

SEASIDE BASIN WATERMASTER

ANNUAL REPORT – 2014

December 3, 2014

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Integral to the Superior Court Decision (Decision) rendered by Judge Roger D. Randall on March 27, 2006 is the requirement to file an Annual Report. This 2014 Annual Report is being filed on or before December 15, 2014, consistent with the provisions of the Decision, as amended by the Annual Report Review and Order dated January 7, 2011. This Annual Report addresses the specific Watermaster functions set forth in Section III. L. 3. x. of the Decision. In addition this Annual Report includes a section pertaining to Water Quality Monitoring and Basin Management.

A. Groundwater Extractions

The schedule summarizing the Water Year 2014 (WY 2014) groundwater production from all the producers allocated a Production Allocation in the Seaside Groundwater Basin is provided in Attachment 1, “Seaside Groundwater Basin Watermaster, Reported Quarterly and Annual Water Production from the Seaside Groundwater Basin for all Producers Included in the Seaside Basin Adjudication During Water Year 2014.” For the purposes of this Annual Report Water Year 2014 is defined as beginning October 1, 2013 and ending on September 30, 2014.

B. Groundwater Storage

Monterey Peninsula Water Management District (MPWMD), in cooperation with California American Water (CAW), operates the Seaside Basin Aquifer Storage and Recovery (ASR) program. Under the ASR program, CAW diverts water from its Carmel River sources during periods of flow in excess of NOAA-Fisheries’ bypass flow requirements, and transports the water through the existing CAW distribution system for injection and storage in the Seaside Basin at the MPWMD’s Santa Margarita ASR site and CAW’s Seaside Middle School ASR site. During WY 2014, no water was diverted and stored in the Seaside Basin under the ASR program. Rainfall in the area was about 50% of normal, but due to the rainfall distribution pattern throughout the season, Carmel River flow was only 10% of normal. WY 2014 was the third consecutive hydrologic “drought” year on the Monterey Peninsula and was classified as “Critically Dry” by MPWMD. Accordingly, there were no periods during WY 2014 when flows exceeded the SWRCB minimum bypass flow requirements for ASR diversions to the Seaside Basin.

Based upon production reported for WY 2014, the following Standard Producers are entitled to Free and Not-Free Carryover Credits to 2015 in accordance with the Decision, Section III. H. 5:

<u>Producer</u>	<u>Free Carryover Credit</u> <u>(Acre-feet)</u>	<u>Not-Free Carryover Credit</u> <u>(Acre-feet)</u>
Granite Rock	121.57	78.85
DBO Development	238.88	152.52

CAW	00.00	00.00
City of Seaside Muni	00.00	00.00

C. Amount of Artificial Replenishment, If Any, Performed by Watermaster

Per the Decision, “Artificial Replenishment” means the act of the Watermaster, directly or indirectly, engaging in contracting for Non-Native Water to be added to the Groundwater supply of the Seaside Basin through Spreading or Direct Injection to offset the cumulative Over-Production from the Seaside Basin in any particular Water Year pursuant to Section III.L.3.j.iii. It also includes programs in which Producers agree to refrain, in whole or in part, from exercising their right to produce their full Production Allocation where the intent is to cause the replenishment of the Seaside Basin through forbearance in lieu of the injection or spreading of Non-Native Water (referred to herein as “In-lieu Replenishment”).

During Water Year 2014 the Watermaster indirectly engaged in In-lieu Replenishment of the Basin. Non-native water was made available to the Basin during Water Year 2014 and is foreseeable for Water Year 2015 under a Memorandum of Understanding and Agreement entered into by Watermaster with the City of Seaside for its golf course irrigation program creating in-lieu replenishment water. In Water Year 2014 a total of 552.38 acre-feet was delivered to the City of Seaside by the Marina Coast Water District for irrigation of its golf courses. Of this amount 540 acre-feet was credited to the City of Seaside by the Watermaster under the terms of the Memorandum of Understanding and Agreement referred to above.

This in-lieu replenishment program was extended by the Board at its April 3, 2013 meeting. Under the original terms of the MOU it would have terminated following the end of WY 2012. Under projected irrigation demands the City of Seaside estimated that its remaining Marina Coast Water District entitlement would provide sufficient irrigation water to satisfy the irrigation demands of the golf courses through WY 2018. Consequently, it was agreed that the in-lieu replenishment program should continue without interruption pursuant to the terms of this MOU. The extended MOU was made retroactively effective to January 1, 2013 and will continue until all of the City’s remaining MCWD entitlement has been used within the Program, and all of the City’s Replenishment Assessment Credit has either been used by the City, or by another party if the City transfers its Replenishment Assessment Credit. A copy of the extended MOU was contained in Attachment 13 of the 2013 Annual Report.

D. Leases or Sales of Production Allocation and Administrative Actions

No sale of Production Allocation and no actions pertaining to real property and/or water rights occurred during WY 2014.

In 2013 the Watermaster approved a request by California American Water (CAW) to convert three of its production wells to monitoring wells and to retire and destroy one of its production wells in the Seaside Basin. These were CAW’s Hilby, Military, Luxton,

and Darwin wells. In 2014 three of these wells (Hilby, Military, and Luxton) were converted from production wells to monitoring wells, and the Darwin well was destroyed.

During WY 2014 the Watermaster Board did not make any revisions to its *Rules and Regulations*.

During WY 2014 the Watermaster Board was comprised of the following Members and Alternates:

<u>MEMBER</u>	<u>ALTERNATE</u>	<u>REPRESENTING</u>
Director Paul Bruno	N/A	Coastal Subarea Landowner
Eric Sabolsice	Roger Hulbert	California American Water
Director Bob Costa	N/A	Laguna Seca Subarea Landowner
Director Bob Brower	Jeanne Byrne	MPWMD
Mayor Dave Pendergrass	Todd Bodem	City of Sand City
Supervisor Dave Potter	Jane Parker	Monterey County (MCWRA)
Mayor Jerry Edelen	Kristin Clark	City of Del Rey Oaks
Mayor Chuck Della Sala	Libby Downey	City of Monterey
Mayor Ralph Rubio	Dennis Alexander	City of Seaside

E. Use of Imported, Reclaimed, or Desalinated Water as a Source of Water for Storage or as a Water Supply for Lands Overlying the Seaside Basin

The CAW/MPWMD ASR Program did not operate in WY 2014 and accordingly, 0 (zero) acre-feet of water was injected into the Basin as Stored Water Credits and 0 (zero) acre-feet was extracted.

Even though no water was imported from the Carmel Basin for the ASR program as described in **Section B** above, during WY 2014 552.38 acre-feet of imported water was used to irrigate golf courses owned by the City of Seaside overlying the Seaside Basin, as discussed above in **Section C**. The terms and conditions under which this in-lieu replenishment water was used to generate a credit to be applied against the City of Seaside’s overproduction replenishment assessments is described in the “Memorandum of Understanding Between the Seaside Basin Watermaster and the City of Seaside” which was contained in Attachment 3 to the Watermaster’s 2010 Annual Report. This is the only imported, reclaimed or desalinated water used either directly or for storage in the groundwater basin that has been reported to the Watermaster during WY 2014.

F. Violations of the Decision and Any Corrective Actions Taken

Section III. D. of the Decision enjoins all Producers from any Over-Production beyond the Operating Yield in any Water Year in which the Watermaster declares that Artificial Replenishment is not available or possible. Section III. L. 3. j. iii. requires that the Watermaster declare the unavailability of Artificial Replenishment in December of each year, so that the Producers are informed of the prohibition against pumping in excess of the Operating Yield.

The Watermaster made a declaration regarding the availability of Artificial Replenishment for WY 2015 at its Board meeting of December 3, 2014. A copy of this declaration is contained in Attachment 2. In WY 2014 the Watermaster continued the previously implemented 10% water production reductions required under Section III.B.2 of the Decision. No additional water production reductions were implemented in WY 2014.

Total pumping for WY 2014 did not exceed the Operating Yield (OY) for the Seaside Basin, but it did exceed the Natural Safe Yield (NSY) of the Basin.

CAW and the City of Seaside reported annual pumping quantities that exceeded their Standard Production NSY allocations by 616.76 and 47.94 acre-feet, respectively, and reported annual pumping quantities that exceeded their Operating Yield allocations by 416.01 and 4.77 acre-feet, respectively. The City of Seaside did not exceed its Alternative Production NSY. The Watermaster will assess CAW and the City of Seaside a Replenishment Assessment for these over productions, as further described in Section H, below.

G. Watermaster Administrative Costs

The total estimated Administrative costs through the end of Fiscal Year 2014 amounted to \$85,000 including a \$19,000 dedicated reserve. Costs include maintaining an office and paying a part time administrator and some part time staff to take and transcribe minutes of the Watermaster Board meetings during 2014. The “Fiscal Year 2014 Administrative Fund Report” is provided as Attachment 3.

H. Replenishment Assessments

As reported in the 2013 Annual Report, a Replenishment Assessment unit cost of \$2,702 per acre-foot was established by the Watermaster for use during WY 2014. At its meeting of October 1, 2014 the Watermaster Board determined that this same Replenishment Assessment unit cost of \$2,702 per acre-foot should be used against WY 2015 pumping. The Agenda transmittal from that meeting discussing this determination is contained in Attachment 4.

Alternative and Standard Producers report their production amounts from the Basin to the Watermaster on a quarterly basis. Based upon the reported production for WY 2014, CAW’s Replenishment Assessment for Overproduction in excess of its share of the

Natural Safe Yield is \$1,666,492.90, and for Overproduction in excess of its share of the Operating Yield is \$1,124,046.05. The City of Seaside's Replenishment Assessment for its Municipal System for Overproduction in excess of its share of the Natural Safe Yield is \$129,523.41, and for overproduction in excess of its share of the Operating Yield is \$12,866.25. The City of Seaside did not exceed its Alternative Production Allocation for its Golf Course System production. A summary of the calculations for Replenishment Assessment for WY 2014 is contained in Attachment 5.

I. All Components of the Watermaster Budget

The Watermaster budget has four separate funds: Administrative Fund; Monitoring & Management–Operations; Monitoring and Management–Capital Fund and; Replenishment Fund. Copies of the Fiscal Year 2014 adopted budgets are contained in Attachment 6. The Chief Executive Officer provides monthly financial status reports to the Watermaster Board on all financial activities for each month with year-to-date totals.

J. Water Quality Monitoring and Basin Management

Water Quality Analytical Results

Groundwater quality data continued to be collected and analyzed on a quarterly basis during WY 2014 from the enhanced network of monitoring wells. The low-flow sampling method implemented in 2009 continued to be used in 2014 and is expected to continue to be used in the future to improve the efficiency of sample collection. As discussed in the 2013 Annual Report, during WY 2014 the Watermaster reduced the frequency of water quality sampling at SBWM-MW5, the most recently installed Watermaster monitoring wells located on the Bureau of Land Management site within the former Fort Ord and far inland from the coastline, to once every 3 years.

No other modifications to the quarterly data collection frequency from the enhanced network of monitoring wells were made during WY 2014 and none are being proposed for WY 2015.

Up until WY 2010 quarterly geophysical (induction) logging was performed at the four coastal Watermaster Sentinel wells that were installed in 2007. The induction logging results showed very little variations and trends were steady since that monitoring began, indicating that the coastal water quality conditions were not changing at this sample frequency. Therefore, beginning in WY 2010 the Court approved reducing the induction logging frequency to semi-annually at these wells. Water samples from these wells continue to be collected on an annual basis.

The expanded water quality analyses begun in WY 2012 were continued in WY 2014, and will be continued in WY 2015, for the four coastal Watermaster Sentinel wells (SBWM-1, SBWM-2, SBWM-3, and SBWM-4), and also for the 3 most coastal MPWMD monitoring wells (MSC, PCA, and FO-09).

Copies of the sampling results are contained in Attachment 7. Analysis of the results indicate no evidence of water quality changes indicative of seawater intrusion at the locations and depths sampled in the coastal areas of the basin.

All of the recommendations contained in the report in Attachment 7 are being actively pursued by the Watermaster. Funds to pursue these recommendations have been included in the adopted FY 2014 budgets contained in Attachment 6.

Management and Monitoring Program Work Plan

The Management and Monitoring Program (M&MP) 2015 Work Plan contained in Attachment 9 includes the types of basin management activities conducted in prior years as well as revisions recommended by the TAC when it reviewed the Draft M&MP 2015 Work Plan at its September 10, 2014 meeting, and revisions that resulted from subsequent discussions with MPWMD and HydroMetrics representatives. The major changes from the 2014 M&MP Work Plan are:

Task I.2.a.2: This task that was first performed in 2009, and the TAC felt it should be again performed in 2015. It consists of verifying the accuracy of production well water meters. The Watermaster's Rules and Regulations state that all parties are required to install water meters and to maintain their meters in good working order. It also states that the Watermaster is to inspect Producers' wells as often as appropriate to ensure they are being properly operated, and to calibrate/test the meters. The TAC felt that, in light of the recent initial modeling work performed on the Laguna Seca Subarea (which is described on page 12 of this report), it would be desirable to perform a re-evaluation of the wells to ensure there are no wells where metering data may be inaccurate. The initial reevaluation would be performed at no out-of-pocket cost to the Watermaster in late 2014 or early 2015. If the reevaluation revealed wells where metering data was suspect, follow-up work such as pump testing and/or meter calibration might be performed. The \$10,000 allocated to this Task is intended to cover the costs of performing that follow-up work if it becomes necessary.

Task I.2.b.2: MPWMD's hourly rates have increased since 2014, resulting in slightly higher costs for this task. Also, two replacement dataloggers @ \$750 each, plus \$100 for installation parts, have been included in this task.

Task I.2.b.3: MPWMD's hourly rates have increased since 2014, resulting in slightly higher costs for this task. Also, the induction logging subcontractor that Martin Feeney has used in the past is no longer able to perform that portion of this work, and the cost for the replacement induction logging subcontractor is higher.

Task I.2.b.6: MPWMD's hourly rates have increased since 2014, resulting in slightly higher costs for this task.

Task I.3.a.1: This Task consists of three subtasks as follows:

Step 1: Update the Watermaster's Seaside Basin groundwater model and check its accuracy

Step 2: Recalibrate the model (if necessary)

Step 3: Prepare report describing the work that was done (if recalibration is necessary)

Step 1 was completed in 2014, however, because there was no immediate need to do any further modeling, other than perhaps in the Laguna Seca Subarea, Steps 2 and 3 were not performed in 2014. These steps may need to be performed in 2015 and that work is therefore included in the scope of work for this Task in 2015.

Tasks I.4.a and I.4.c: Costs for MPWMD's assistance on Task I.4.a have been moved to Task I.4.c where they are more correctly charged. Also, MPWMD's hourly rates have increased since 2014, resulting in slightly higher costs for this task. Since HydroMetrics has not needed to charge to this Task in the past, it has been deleted from their scope of work.

The 2015 M&MP Operations Budget is \$24,734 higher than the 2014 Budget. This increase is largely because (1) the induction logging subcontractor that previously performed work under Task I.2.b.3 is no longer able to perform this work and the new subcontractor's costs are higher by approximately \$8,000, (2) money was allocated to verifying the accuracy of production well meters, and (3) MPWMD's hourly rates have increased since 2014. Partially offsetting these increases was a decrease in laboratory analytical costs for some of the Tasks as a result of MPWMD getting a more favorable rate from the laboratory.

No new monitoring wells are planned for installation in 2015. Consequently no monies are budgeted in the M&MP Capital Budget for 2015.

Basin Management Database

Pertinent groundwater resource data obtained from a number of sources has been consolidated into the Watermaster's database to allow more efficient organization and data retrieval. No modifications or enhancements to the database are planned in FY 2015.

Enhanced Monitoring Well Network

The Seaside Basin M&MP uses an Enhanced Monitoring Well Network to fill in data gaps in the previous monitoring well network used by the Monterey Peninsula Water Management District (MPWMD), and others, in order to improve the Basin management capabilities of the Watermaster. The Enhanced Monitoring Well Network has been described in detail in previous Watermaster Annual Reports. It continues to be used to obtain additional data that is useful to the Watermaster in managing the Basin.

Basin Management Action Plan (BMAP)

HydroMetrics LLC was hired by the Watermaster to prepare the BMAP which contains these Sections:

- Executive Summary

- The Background and Purpose of the Plan
- The State of the Basin
- Supplemental Water Supplies (long-term water supply solutions)
- Groundwater Management Actions (to be taken as interim measures while long-term supplies are being developed)
- Recommended Management Strategies
- References

The Final BMAP was approved by the Watermaster Board at its February 2009 meeting, and the Executive Summary from the BMAP was contained in Attachment 9 of the 2009 Annual Report. The complete document may be viewed and downloaded from the Watermaster’s website at: <http://www.seasidebasinwatermaster.org/>.

Updating of the BMAP may be performed in FY 2015, but only if new data or other information warrants doing so. It is Task I.3.c in the M&MP Work Plan contained in Attachment 9.

Seawater Intrusion Response Plan

HydroMetrics LLC was hired by the Watermaster to prepare a long-term Seawater Intrusion Response Plan (SIRP), as required in the M&MP.

The Final SIRP was approved by the Watermaster Board in 2009 and a summary of the Seawater Intrusion Contingency Actions from the SIRP were contained in Attachment 10 of the 2009 Annual Report. The complete document may be viewed and downloaded from the Watermaster’s website at: <http://www.seasidebasinwatermaster.org/>. No modifications to the SIRP are planned in 2015.

Seawater Intrusion Analysis Report

The Watermaster retained HydroMetrics LLC to prepare the WY 2014 Seawater Intrusion Analysis Report (SIAR) required by the M&MP. The WY 2014 SIAR provides an analysis of data collected during this Water Year.

The SIAR examines the “health” of the Basin with regard to whether or not there are any indications that seawater intrusion is either occurring or is imminent. The WY 2014 SIAR states that depressed groundwater levels, continued pumping in excess of recharge and fresh water inflows, and ongoing seawater intrusion in the nearby Salinas Valley all suggest that seawater intrusion could occur in the Seaside Groundwater Basin. In spite of these factors, the SIAR reports that neither the Piper nor the Stiff Diagrams, chloride levels, or other water quality parameters indicate the presence of seawater intrusion in the existing monitoring wells.

In the 2012 SIAR a trend toward increasing chloride concentration in a few of the near-coast monitoring wells, and decreasing sodium/chloride molar ratios in some of those wells led HydroMetrics to recommend increasing the monitoring frequency in those wells. As a result of preparing the 2013 SIAR HydroMetrics concluded that the cause of these changes in water quality at these wells was the change in the method samples were

collected. A low-flow sampling technique was implemented in 2009, replacing the previously used air-lift sampling technique. The 2013 SIAR discussed this topic and explained the basis for this conclusion.

The SIAR is lengthy, but the full *Executive Summary Section* from it is provided in Attachment 8. A complete copy of the document will be posted for viewing and downloading from the Watermaster's website at: <http://www.seasidebasinwatermaster.org/> as soon as the complete SIAR has been prepared. All recommendations contained in the SIAR are being carried out and are included in the budgeted activities contained in Attachment 6 and described in Attachment 9.

The Watermaster continues to analyze the data that is being gathered at the various monitoring sites in order to keep a close watch on the conditions within the Basin, as discussed under the "Enhanced Monitoring Well Network" heading above.

Aquifer Cross-Contamination Investigation

In 2012 the Watermaster had MPWMD perform an evaluation of coastal wells for cross-aquifer contamination potential. This work concluded that:

- For the 261 wells that were assessed, no problems related to maintenance or abandonment were evident from this work.
- 18 wells in the coastal zone were found to either have been completed in two aquifer zones or to have been drilled through the upper aquifer and completed in the deeper aquifer. These are potential conduits for seawater intrusion, as wells screened in two aquifers potentially provide a direct connection and wells completed in the deeper zone could contribute to cross-aquifer contamination through improperly constructed or failed seals. The 18 identified wells are currently being used as production, backup production, or monitoring wells.
- If seawater intrusion is detected in the locality of one or more of these wells at some future date, it will be necessary to perform focused evaluation to inspect the integrity of well materials and determine the effects of well completions on the movement of seawater between aquifers at specific wells on a case by case basis. Seawater intrusion has not been detected or reported in the locality of any of these wells. Therefore, no further investigative work is warranted at this time.

A complete copy of the MPWMD investigation was contained in Attachment 10 of the Watermaster's WY 2012 Annual Report. No further work regarding aquifer cross-contamination is planned for 2015.

Investigation into Water Quality Anomalies at the City of Sand City Public Works Well

Under Task I. 4. b in the 2013 M&MP, MPWMD was to undertake a "Focused Hydrogeologic Evaluation" of the Sand City Public Works well. This work was envisioned as consisting of compiling historical and current water quality data in the coastal area to provide more in-depth evaluation of conditions in the shallow Dune Sand/Aromas Sand aquifer in the vicinity of the Sand City Public Works well, where unique water quality conditions and variability have recently been observed. However,

after an exhaustive search, including inquiries to California American Water who at one time had wells in this area (these have all since been abandoned), MPWMD was only able to locate a very small amount of historical water quality data that could be used to perform the evaluation. Therefore, it was not possible to definitively determine the cause of the water quality anomalies. The Technical Memorandum summarizing the work that MPWMD performed was contained in Attachment 14 of the 2013 Annual Report. The Watermaster will continue performing sampling of this well at the increased (quarterly) frequency that was initiated in 2012 in order to identify any water quality trends at this well.

Groundwater Modeling

During FY 2009 the previous Groundwater Model of the Basin was updated and a separate Groundwater Model was developed to determine protective water levels within the Basin. The modeling work was performed by HydroMetrics LLC. This Model development work was described in the 2009 Annual Report.

Revising Protective Water Levels

In FY 2009 the Watermaster completed development of preliminary Protective Water Levels (PWLs) for each of the Basin's production aquifers at the locations of several coastal wells. It was believed that additional hydrogeologic data and information obtained since then might lead to a lowering of the 2009 protective water levels. However, further investigation performed in 2013 led to the conclusion that the 2009 protective water levels were reasonable and should not be lowered. This was discussed in Section 2.0 of the modeling report contained in Attachment 10 of the 2013 Annual Report.

Updating and Evaluating the Accuracy of the Groundwater Model

The Watermaster's existing Seaside Basin Groundwater Model (the Model), described in the report titled "Groundwater Flow and Transport Model" dated October 1, 2007, was updated in 2009 in order to develop protective water levels, and to evaluate replenishment scenarios and develop answers to Basin management questions. In 2014 the Model was again updated by incorporating recent pumping data, groundwater level data, rainfall data, and other data into the Model. The Model output was then checked to see if the simulated groundwater levels matched the measured groundwater levels. The plan for performing this work was as follows:

Task 1: Update the Watermaster's Seaside Basin groundwater model and check its accuracy.

Task 2: Recalibrate the model. This Task would only be performed if recalibration was found to be necessary under Task 1.

Task 3: Prepare a report describing the work that was done under Task 2. This Task would only be performed if recalibration is performed under Task 2.

Task 1 was performed in 2014 and this work led to the following four principle conclusions:

1. The performance of the model for LSSA wells indicates that the model continues to provide reliable simulations for the LSSA. As a result, recent

simulations of future groundwater conditions in the LSSA are plausible and can currently be trusted for making management decisions.

2. Although the accuracy of the model for the update period 2009-2014 is not as good as it was when it was previously updated in 2009, the calibration of the model remains within acceptable standards.
3. The northern boundary condition of the model needs to be updated to reflect real groundwater elevation variations for the model period of 2005-2013. An alternative method for defining this boundary condition will have to be developed that does not rely upon simulations from the Salinas Valley Integrated Groundwater Surface Water Model (SVIGSM). SVIGSM results were not available for model years 2005-2013. To approximate the groundwater elevations along the northeastern boundary for this period, the final 12 months of available SVIGSM results (from year 2004) were applied to each of the remaining years 2005-2013. As a result, the northeastern boundary repeats the same seasonal cycle for the final ten years of the simulation. The behavior of the northern boundary will impact flows and the ability to calibrate the model for the area of the model that is adjacent to the northern boundary.
4. The groundwater model should be updated in a maximum of five years and its calibration reevaluated at that time. However, if groundwater related projects are implemented in the Basin before that time, the update and calibration reevaluation may need to be performed sooner.

A copy of the Technical Memorandum describing the work is contained in Attachment 10.

As a result of these findings the Watermaster determined that it was not necessary to recalibrate the Model in 2014. However, funds were included in the 2015 M&MP Budget to perform Tasks 2 and 3 if that work is deemed to be necessary in 2015.

Modeling of the Laguna Seca Subarea

In response to questions and concerns raised about the steady decline in water levels in the Laguna Seca Subarea (LSSA) as reported in the 2009 Basin Management Action Plan and as shown in water level monitoring performed annually by MPWMD, at its September 4, 2013 and April 2, 2014 meetings the Watermaster Board directed that certain modeling of the LSSA be performed relating to the natural safe yield and operating yield of the LSSA.

Although there appears to be no indication of any immediate substantial adverse physical impact to the Basin or the LSSA, the initial results of the modeling work indicate the natural safe yield and operating yield of the LSSA may be significantly less than that set forth in the Decision. A copy of the draft Technical Memorandum describing the modeling work and initial results is contained in Attachment 11. Because of the significance of these initial results, the Watermaster Board at its October 1, 2014 meeting directed staff to identify and recommend an independent hydrogeologist with suitable qualifications and experience to perform a technical peer review of the modeling work and the initial results in order to ensure that the modeling and final results are as accurate as possible. The peer review is

expected to begin in late 2014, and will likely be completed during the first quarter of 2015. After the peer review is completed and reviewed by the Watermaster, and in order to provide the Court with a comprehensive and thorough description of the LSSA modeling and final results, the Watermaster intends to file a noticed motion with the Court which will include a proposed work plan to address the final modeling results. The filing may also include other requests related to direction on interpretation of the Decision.

K. Conclusions and Recommendations

The Seaside Basin Watermaster Board has worked diligently to meet all of the Court’s established deadline dates. All of the Phase 1 Scope of Work activities, which are described in the “Implementation Plan for the Seaside Basin Monitoring and Management Program” dated March 7, 2007, have been completed. At the Watermaster Board meeting held on October 1, 2014 the Board adopted the budgets contained in Attachment 6, which support carrying out all elements of the “Seaside Groundwater Basin Management and Monitoring Program Anticipated 2015 Work Plan.” That Work Plan describes the M&MP activities that will be conducted during Fiscal Year 2015. A copy of this Work Plan is contained in Attachment 9.

As described in Section J above, information from the Enhanced Monitoring Well Network is being utilized to detect any seawater intrusion. The response actions described in the Watermaster’s Seawater Intrusion Response Plan, which was contained in the 2009 Annual Report, will be implemented if seawater intrusion is detected within the Basin.

ATTACHMENT 1

GROUNDWATER EXTRACTIONS

Seaside Groundwater Basin Watermaster

**Reported Quarterly and Annual Water Production From the Seaside Groundwater Basin
For All Producers Included in the Seaside Basin Adjudication -- Water Year 2014
(All Values in Acre-Feet [AF])**

Type	2013-2013			2013-2013			2013-2013			2013-2013			2013-2013			Reported Total	Yield Allocation	2008 WY 2013	2009 WY 2014	2010 WY 2013		
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec							
Coastal Subareas																						
CAW - Coastal Subareas	SPA	281.97	350.39	263.08	895.44	221.36	185.46	127.97	534.79	139.77	299.49	189.03	628.29	233.41	313.27	265.30	811.98	2,870.50	2,668.89	0.00	2,668.89	-349.17
City of Seaside (Municipal)	SPA	21.20	18.82	17.01	57.04	17.07	14.34	16.55	47.96	17.47	20.88	20.57	58.92	21.92	19.71	18.10	59.72	223.64	218.87	0.00	218.87	
Granite Rock Company	SPA	--	--	--	0.00	--	--	--	0.00	--	--	--	0.00	--	--	--	0.00	0.00	20.62	179.79	200.41	
DBO Development No. 27	SPA	--	--	--	0.00	--	--	--	0.00	--	--	--	0.00	--	--	--	0.00	0.00	37.41	353.99	391.40	
City of Seaside (Golf Courses)	APA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.57	0.00	0.00	0.00	0.00	0.57	540.00		540.00	
Sand City	APA	0.06	0.05	0.00	0.10	0.11	0.05	0.05	0.21	0.07	0.08	0.10	0.25	0.05	0.10	0.06	0.21	0.78	9.00		9.00	
SNG (Security National Guaranty)	APA	--	--	--	0.00	--	--	--	0.00	--	--	--	0.00	--	--	--	0.00	0.00	149.00		149.00	
Calabrese (Cypress Pacific Inv.)	APA	0.01	0.00	0.02	0.03	0.00	0.02	0.00	0.02	--	--	0.05	0.05	--	--	0.03	0.03	0.13	14.00		14.00	
Mission Memorial (Alderwoods)	APA	3.46	1.91	1.85	7.21	2.48	0.08	1.18	3.74	1.89	3.53	2.00	7.42	1.44	2.73	2.35	6.51	24.89	31.00		31.00	
Coastal Subareas Totals				959.82					586.72				695.52				878.45	3,120.51	3,688.79	533.78	4,222.57	-349.17
Laguna Seca Subarea																						
CAW - Laguna Seca Subarea	SPA	35.36	28.07	26.56	89.99	28.67	18.71	24.16	71.54	25.65	34.82	35.18	95.65	37.81	34.61	32.00	104.42	361.60	147.20		147.20	
Ryan Ranch Unit		5.58	4.78	4.49	14.85	4.51	3.50	4.01	12.02	4.53	5.49	5.20	15.22	4.80	3.17	4.34	12.31	54.40				
Hidden Hills Unit		13.87	11.30	11.13	36.30	12.33	8.09	9.75	30.17	10.37	14.55	14.03	38.95	15.32	14.78	13.26	43.36	148.78				
Bishop Unit		15.91	11.99	10.94	38.84	11.83	7.12	10.40	29.35	10.75	14.78	15.95	41.48	17.69	16.66	14.40	48.75	158.42				
Nicklaus Club Monterey	APA	14.55	0.00	0.00	14.55	17.69	0.00	3.60	21.29	15.64	29.18	43.24	88.06	37.49	26.44	19.44	83.37	207.27	251.00		251.00	
Laguna Seca Golf Resort (Bishop)	APA	27.64	12.97	8.19	48.80	13.34	0.00	9.16	22.49	15.00	42.06	45.49	102.56	48.95	46.46	30.60	126.01	299.86	320.00		320.00	
York School	APA	2.25	2.23	1.38	5.85	1.54	0.34	0.71	2.59	0.88	2.92	2.90	6.70	2.29	2.28	2.15	6.73	21.87	32.00		32.00	
Laguna Seca County Park	APA	2.14	2.59	1.63	6.36	1.15	1.08	0.99	3.23	2.43	1.48	4.64	8.55	7.17	3.55	0.17	10.89	29.03	41.00		41.00	
Laguna Seca Subarea Totals				165.56					121.14				301.52				331.42	919.64	791.20	0.00	791.20	0.00
Total Production by WM Producers				1,125.38					707.87				997.03				1,209.87	4,040.15	4,479.99	533.78	5,013.77	-349.17
																	584.41					
																	3,455.74					
City of Seaside Golf Courses In-Lieu (MCWD source water)																						
MCWD delivery		44.49	29.64	11.63	85.77	38.22	12.24	31.49	81.94	42.30	66.15	69.83	178.27	71.08	79.37	55.94	206.40	552.38				
CAW / MPWMD ASR (Carmel River Basin source water)																						
(Injection)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Recovery		0.00	0.00	0.00	0.00				0.00				0.00				0.00	0.00				
Net ASR		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Notes:																						
1. The Water Year (WY) begins October 1 and ends September 30 of the following calendar year. For example, WY 2013 begins on October 1, 2013, and ends on September 30, 2014.																						
2. "Type" refers to water right as described in Seaside Basin Adjudication decision as amended, signed February 9, 2007 (Monterey County Superior Court Case No. M66343).																						
3. Values shown in the table are based on reports to the Watermaster as received by MPWMD by October 15, 2014.																						
4. All values are rounded to the nearest hundredth of an acre-foot. Where required, reported data were converted to acre-feet utilizing the relationships: 325,851 gallons = 43,560 cubic feet = 1 acre-foot.																						
5. "Base Operating Yield Allocation" values are based on Seaside Basin Adjudication decision. These values are consistent with the <i>Watermaster Producer Allocations Water Year 2014</i> (see Item IX.C. in 12/4/2013 Board packet).																						
6. Any minor discrepancies in totals are attributable to rounding.																						
7. APA = Alternative Producer Allocation; SPA = Standard Producer Allocation; CAW = California/American Water.																						
8. It should be noted that CAW/MPWMD ASR "Injection" and "Recovery" amounts are not expected to "balance" within each Water Year. This is due to the injection recovery "rules" that are part of SWRCB water rights permits and/or separate agreements with state and federal resources agencies that are associated with the water rights permits.																						
9. CAW now takes physical meter readings as of 1/15/13 per Eric Sabolsice instead of SCADA readings.																						

ATTACHMENT 2

**WATERMASTER DECLARATION
OF
NON-AVAILABILITY
OF
ARTIFICIAL REPLENISHMENT WATER**

NOTICE TO ALL SEASIDE GROUNDWATER PRODUCERS:

Case No. M66343 Amended Decision Section III.B.2.

Commencing with the fourth Water Year, and triennially thereafter, the Operating Yield for both Subareas will be decreased by ten percent (10%) until Operating Yield is the equivalent of the Natural Safe Yield unless:

- a. The Watermaster has secured and is adding an equivalent amount of Non-Native water to the Basin on an annual basis; or*
- b. The Watermaster has secured reclaimed water in an equivalent amount and has contracted with one or more of the Producers to utilize said water in lieu of their Production Allocation, with the Producer agreeing to forego their right to claim a Stored Water Credit for such forbearance; or*
- c. Any combination of a and b above which results in the decrease in Production of Native Water required by this Decision; or*
- d. The Watermaster has determined that Groundwater levels within the Santa Margarita and Paso Robles aquifers are at sufficient levels to ensure a positive offshore gradient to prevent seawater intrusion.*

The Watermaster has determined that the conditions necessary to avoid the ten percent Operating Yield reduction have not been met as follows:

- 1. Watermaster has not secured water for adding an equivalent amount of Non-Native water to the Basin on an annual basis. The Watermaster and the City of Seaside have, however, entered into a Memorandum of Understanding for Seaside’s In-lieu Replenishment Program which may, in future water years, provide sufficient water to avoid an Operating Yield reduction.
- 2. The Watermaster has not secured reclaimed water in an equivalent amount.
- 3. The Watermaster has not secured Non-Native water or reclaimed water which results in the decrease in Production of Native Water required by the Decision.
- 4. The firm contracted by Watermaster for technical analyses continued to report in 2013 that Groundwater levels within the Santa Margarita and Paso Robles aquifers are not at sufficient levels to ensure a positive offshore gradient to prevent seawater intrusion, so the requirement for this item continues to not be met.

Section III.L.3.j.iii: Watermaster declares that for Water Year 2015 Artificial Replenishment Water is not available to offset Operating Yield Over-Production and producers are limited in production to the following quantities of water:

<u>Coastal Subarea Alternative Producers:</u>	
Seaside (Golf)	540.00 acre-feet
SNG	149.00 acre-feet
Cypress (Calabrese)	14.00 acre-feet
Mission Memorial (Alderwood)	31.00 acre-feet
Sand City	9.00 acre-feet

Laguna Seca Subarea Alternative Producers:

Nicklaus Club Monterey	251.00 acre-feet
Bishop	320.00 acre-feet
York School	32.00 acre-feet
Laguna Seca County Park	41.00 acre-feet

Coastal Subarea Standard Producers:

California American Water.....	2,251.14acre-feet*
Seaside (Municipal)	184.61 acre-feet**
Granite Rock	217.81 acre-feet***
D.B.O. Development 30	422.96 acre-feet****

Laguna Seca Subarea Standard Producers:

California American Water.....	48.30 acre-feet
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-
- * Total is the 2015 base allocation of 2,251.14 acre-feet.
California American Water has a negative balance of 349.17 acre-feet of stored water credit in WY 2015 from Basin extractions exceeding injections in 2013 under the CAW/MPWMD ASR Program, formalized through a Storage Agreement in 2012.
 - ** Total is the 2015 base allocation of 184.61 acre-feet.
 - *** Total includes 121.57 acre-feet of “free” carryover and 78.85 acre-feet of “not-free” carryover credit from previous water years, plus the 2015 base allocation of 17.39 acre-feet.
 - **** Total includes 238.88 acre-feet of “free” carryover and 152.52 acre-feet of “not-free” carryover credit from previous water years, plus the 2015 base allocation of 31.56 acre-feet.

ATTACHMENT 3

WATERMASTER ADMINISTRATIVE COSTS

Seaside Groundwater Basin Watermaster
Budget vs. Actual Administrative Fund
 Fiscal Year (January 1 - December 31, 2014)
 Balance through September 30, 2014

	<u>2014 Adopted Budget</u>	<u>Contract Amount</u>	<u>Year to Date Revenue / Expenses</u>
Available Balances & Assessments			
Dedicated Reserve	19,000.00		19,000.00
FY (Rollover)	-		-
Admin Assessments	66,000.00		66,000.00
Available	<u>85,000.00</u>		<u>85,000.00</u>
Expenses			
Contract Staff	60,000.00	60,000.00	42,700.00
Legal Advisor	-	-	-
Total Expenses	<u>60,000.00</u>	<u>60,000.00</u>	<u>42,700.00</u>
Total Available	25,000.00		
Dedicated Reserve	<u>25,000.00</u>		
Net Available	<u><u>-</u></u>		

ATTACHMENT 4

**REPLENISHMENT ASSESSMENT UNIT COST
DETERMINATION FOR WATER YEAR 2015**

SEASIDE GROUNDWATER BASIN
WATERMASTER

TO: Board of Directors
FROM: Budget and Finance Committee and Dewey D Evans, CEO
DATE: October 1, 2014
SUBJECT: Unit Cost for Water Year 2014/15 Over Production Replenishment Assessment Amount

RECOMMENDATION:

Per page 33 of the Decision, *"The per acre-foot amount of the Replenishment Assessments shall be determined and declared by Watermaster in October of each Water Year in order to provide Parties with advance knowledge of the cost of Over-Production in that Water Year."* Thus, the per acre-foot amount determined by the Board in or before October of 2014 will be used to calculate Replenishment Assessments for pumping that occurs during the Water Year which begins on October 1, 2014 and ends on September 30, 2015.

For last Water Year (2013/14) the Budget and Finance Committee updated the basis from which the annual calculation of the Unit Cost of replenishment water is established (Basis attached). Due to the lack of more supportable data the Budget and Finance Committee's recommendation is to continue using \$2,702, the average of the Base Unit Cost (\$/AF) listed in Table 1 for each project $[\$3,507+1,800+2,000+3,500]/4$, as the Replenishment Assessment Unit Cost for the Water Year 2014/2015.

ATTACHMENTS:

Table 1. Replenishment Project Information for Use in Establishing the Replenishment Assessment Unit Costs for Water Year 2014

**Attachment 2: Table 1. Replenishment Project Information for Use in Establishing
the Replenishment Assessment Unit Costs for Water Year 2014 (October 1, 2013-September 30, 2014)**

WATER YEAR 2014 (October 1, 2013-September 30, 2014)

ANTICIPATED UNIT COSTS OF REPLENISHMENT WATER FOR THE SEASIDE BASIN

POTENTIAL SOURCE OF REPLENISHMENT WATER	POTENTIAL DATE REPLENISHMENT WATER COULD BECOME AVAILABLE	POTENTIAL VOLUME OF WATER THAT COULD BE SUPPLIED BY THE PROJECT (AFY) ⁽¹⁾	LEVEL OF PROJECT DEVELOPMENT	CONTINGENCY INCLUDED IN BASE UNIT COST ⁽²⁾ (%)	BASE UNIT COST (\$/AF)	BASE UNIT COST YEAR	ADDITIONAL CONTINGENCY ADDED TO REFLECT LEVEL OF PROJECT DEVELOPMENT ⁽³⁾ (%)	UNIT COST INCLUDING ADDITIONAL CONTINGENCY (\$/AF)	UNIT COST INFLATED @ 3% FROM COST BASIS YEAR TO YEAR REPLENISHMENT WATER COULD BECOME AVAILABLE (\$/AF)	VOLUME-WEIGHTED AVG %
Monterey Peninsula Water Supply Project (Regional Desalination) ⁽⁴⁾	2018	9,752	Project Report	30%	\$3,507	2012	0%	\$3,507	\$4,188	56.53%
Seaside Basin ASR Expansion ⁽⁵⁾	2015	1,000	Conceptual	11%	\$1,800	2012	39%	\$2,502	\$2,734	5.80%
Regional Urban Water Augmentation Project ⁽⁶⁾	2017	3,000	Design	5%	\$2,000	2013	10%	\$2,200	\$2,476	17.39%
Groundwater Replenishment Project (GWRP) ⁽⁷⁾	2017	3,500	Conceptual	50%	\$3,500	2017	0%	\$3,500	\$3,500	20.29%

Total Quantity of Replenishment Water (AFY) the Listed Projects Could Cumulatively Potentially be Able to Produce Within the Next 10 Years ⁽⁸⁾ = 17,252

FOOTNOTES:

(1) For the Monterey Peninsula Water Supply Project this is the total amount of water from this source which could potentially come to the CAW distribution system. Only a portion of this amount might be available as initially unused capacity that could be used to help replenish the Seaside Basin. For the RUWAP this is the total amount of water from this source. Only a portion of this amount might be used for in-lieu replenishment of the Seaside Basin. For the ASR Expansion Project this is the additional amount of water that could potentially be provided by this project (see footnote 5). For the RUWAP this is the total amount of water that this project is expected to produce. Only a portion of this amount might be used as in-lieu replenishment of the Seaside Basin. For the GWRP this is the quantity of water that is being considered at this time by CAW for inclusion in its Monterey Peninsula Water Supply Project.

(2)(3) The following Contingency percentages were considered reasonable for the indicated levels of project development: Conceptual Level - 50%, Project Report Level - 30%, and Design Level - 15%. The sum of the values in the columns titled "Contingency Included in Base Unit Cost" and "Additional Contingency Added to Reflect Level of Project Development" equals the Contingency appropriate for the project's level of development.

(4) Project data based on documents provided by Cal Am and MPWMD.

(5) Project data provided by MPWMD. The 1,000 AFY of potential water that this project could supply would be in addition to the 1,300 AFY included as part of the Monterey Peninsula Water Supply Project, and would be an annual average taking into account river flow and hydrologic conditions that change from year to year.

(6) Project data provided by MCWD.

(7) Project data provided by MRWPCA. MRWPCA reported that the GWRP quantity being used in the current CEQA documentation is 3,500 AFY, but that the project could potentially supply 6,500 AFY or more. The unit cost would be lower if a quantity larger than 3,500 AFY were produced.

(8) This value is the cumulative production capacity of all of the Potential Sources of Replenishment Water that listed in this table, and is used only to determine the "Volume-Weighted Average." It is not the amount of water that is expected to be available to the Seaside Basin.

ATTACHMENT 5

**REPLENISHMENT ASSESSMENT
CALCULATIONS FOR WY 2014**

WATERMASTER PRODUCER ALLOCATIONS WATER YEAR 2014 IN ACRE-FEET (AF)												
INCLUDING A 10% REDUCTION FOR 100% OF THIS WATER YEAR												
Initial Basin-Wide Operating Yield ⁽¹⁾			4480.00		Coastal Operating Yield ⁽¹⁾			3688.80				
Natural Safe Yield (NSY) ⁽²⁾			3000.00		Laguna Seca Operating Yield ⁽¹⁾			791.20				
ALTERNATIVE PRODUCER ALLOCATIONS						ALTERNATIVE PRODUCER AMOUNT PUMPED WY 2014						
Coastal Subarea ⁽³⁾		AF	Laguna Seca Subarea ⁽³⁾		AF	Coastal Subarea ⁽³⁾		AF	Laguna Seca Subarea ⁽³⁾		AF	Total Alternative Producer WY 2014 Production
Seaside (Golf)		540.00	Nicklaus Club Monterey		251.00	Seaside (Golf)		0.57	Nicklaus Club Monterey		207.27	
SNG		149.00	Bishop		320.00	SNG		0.00	Bishop		299.86	
Calabrese		14.00	York School		32.00	Calabrese		0.13	York School		21.87	
Mission Memorial (Alderwood)		31.00	Laguna Seca County Park		41.00	Mission Memorial (Alderwood)		24.89	Laguna Seca County Park		29.03	
Sand City		9.00				Sand City		0.78				
Total ⁽¹⁾		743.00	Total ⁽¹⁾		644.00	Total ⁽¹⁾		26.37	Total ⁽¹⁾		558.04	584.41
STANDARD PRODUCER ALLOCATIONS												
Coastal Operating Yield Available to Standard Producers (AF)			2945.80		Laguna Seca Operating Yield Available to Standard Producers (AF)			147.20				
Coastal Subarea	Standard Producer Allocations		AF Available to This Producer	Laguna Seca Subarea	Standard Producer Allocations		AF Available to This Producer					
	Base Water Right % ⁽⁴⁾	Weighted % ⁽⁵⁾			Base Water Right % ⁽⁴⁾	Weighted % ⁽⁵⁾						
California American Water (CAW)	77.55%	90.60%	2668.89	CAW	45.13%	100.00%	147.20					
Seaside (Municipal)	6.36%	7.43%	218.87									
Granite Rock	0.60%	0.70%	20.62									
D.B.O. Development No. 30	1.09%	1.27%	37.41									
Total	85.60%	100.0%	2945.80	Total	45.13%	100.0%	147.20					
Allocation of Available Operating Yield Among Standard Producers	Base Water Right Available to this Producer (AF)	% NSY to SPA (Base Water Right / Total Water Right)	NSY Available to Producers (AF) Current Water Year	Free Carryover Credits from Prior Water Year	Not-Free Carryover Credits from Prior Water Year	Water Rights Transferred / Sold	Total Producer NSY (AF) (NSY Available + Free Carryover Credits)	Total Authorized Production in Current Water Year (Base Water Right Plus All Carryover) ⁽⁶⁾	Actual AF Pumped by Producer in WY 2014	Free Carryover Credits to WY 2015	Not-Free Carryover Credits to WY 2015	Stored Water Credits to WY 2015
			WY 2014 APA Pumped 584.41 AF									
California American Water	2816.09	91.0%	2199.33	0.00	0.00	0.00	2199.33	2816.09	3232.10	0.00	0.00	349.17
Seaside (Municipal)	218.87	7.1%	170.94	0.00	0.00	0.00	170.94	218.87	223.64	0.00	0.00	0.00
Granite Rock	20.62	0.7%	16.10	105.46	74.33	0.00	121.57	200.42	0.00	121.57	78.85	0.00
D.B.O. Development No. 30	37.41	1.2%	29.22	209.67	144.32	0.00	238.88	391.40	0.00	238.88	152.52	0.00
Total	3093.00	100.00%	2415.59	315.13	218.66	0.00	2730.72	3626.79	3455.74	360.45	231.37	349.17
Footnotes:												
(1) From page 17 of Exhibit A (Amended Decision) of Court Order filed February 9, 2007.												
(2) From page 14 of Exhibit A (Amended Decision) of Court Order filed February 9, 2007.												
(3) From page 21 of Exhibit A (Amended Decision) of Court Order filed February 9, 2007.												
(4) From Table 1 on page 19 of Exhibit A (Amended Decision) of Court Order filed February 9, 2007.												
(5) Calculated from the Base Water Right percentages in the adjacent column.												
(6) Base Water Right plus Free and Not Free Carryover Credit = 2014 Production Allocation (see 2014 Declaration from 12/4/2013 Watermaster board meeting)												

ATTACHMENT 6

WATERMASTER BUDGETS

Seaside Groundwater Basin Watermaster Fiscal Year 2014 Administrative Fund Budget

ITEM NO. IX.A.1.
10/1/2014

Seaside Groundwater Basin Watermaster Administrative Fund Adopted Budget Administrative Year 2015

	<u>2014 Adopted Budget</u>	<u>2014 Estimated Total</u>		<u>2015 Adopted Budget</u>
Assessment Income				
Reserve/Rollover	\$ 19,000	\$ 6,000	*	\$ 12,000
Administrative Assessment	66,000	66,000		70,000
Totals	85,000	72,000		82,000
Expenditures				
Contractual Services - Administrative	60,000	60,000		60,000
Total Expenses	60,000	60,000		60,000
Total Available	25,000	12,000		22,000
Less Reserve	25,000	12,000		22,000
Net Available	\$ -	\$ -		\$ -

** Note: The reserve balance of \$6,000 was determined upon completion by Watermaster staff of a detailed reconciliation from 2006 through July 2014 of the Administrative Fund financial records held at the Watermaster office against the Administrative Fund financial records held by the City of Seaside - the Watermaster fiscal agent.*

**Seaside Groundwater Basin Watermaster
Fiscal Year 2015 Monitoring & Management Plan
Adopted Operations Budget**

Management and Monitoring Plan Operations Budget For Tasks to be Undertaken in 2015							
Task	Subtask	Sub-Subtask	Cost Description	CONSULTANTS & CONTRACTORS ⁽³⁾			Total
				MPWMD	Private Consultants	Contractors	
Labor							
			Technical Project Manager	\$0	\$60,000	\$0	\$60,000
M.1 Program Administration							
	M.1.a		Project Budget and Controls	\$0	\$0	\$0	\$0
	M.1.b		Assist with Board and TAC Agendas	\$0	\$0	\$0	\$0
	M.1.c & M.1.d		Preparation for and Attendance at Meetings ⁽⁸⁾	\$0	\$7,000	\$0	\$7,000
	M.1.e		Peer Review of Documents and Reports ⁽⁸⁾	\$0	\$3,100	\$0	\$3,100
	M.1.f		QA/QC	\$0	\$0	\$0	\$0

Task	Subtask	Sub-Subtask	Cost Description	CONSULTANTS & CONTRACTORS ⁽³⁾			Total
				MPWMD	Private Consultants	Contractors	
I.2 Production, Water Level and Quality Monitoring							
	I. 2. a.		Database Management				
		I. 2. a. 1.	Conduct Ongoing Data Entry/ Database Maintenance/Enhancement	\$11,052	\$2,400	\$0	\$13,452
		I. 2. a. 2.	Verify Accuracy of Production Well Meters	\$0	\$0	\$10,000	\$10,000
	I. 2. b.		Data Collection Program				
		I. 2. b. 1.	Site Representation and Selection ⁽⁷⁾	\$0	\$0	\$0	\$0
		I. 2. b. 2.	Collect Monthly Water Levels ⁽⁶⁾	\$5,872	\$0	\$0	\$5,872
		I. 2. b. 3.	Collect Quarterly Water Quality Samples ⁽¹⁾⁽⁵⁾⁽⁶⁾	\$28,201	\$0	\$23,705	\$51,906
		I. 2. b. 4.	Update Program Schedule and Standard Operating Procedures.	\$0	\$0	\$0	\$0
		I. 2. b. 5.	Monitor Well Construction ⁽⁷⁾	\$0	\$0	\$0	\$0
		I. 2. b. 6.	Reports	\$4,704	\$1,500	\$0	\$6,204

Task	Subtask	Sub-Subtask	Cost Description	CONSULTANTS & CONTRACTORS ⁽³⁾			Total
				MPWMD	Private Consultants	Contractors	
I.3 Basin Management							
	I. 3. a.		Enhanced Seaside Basin Groundwater Model	(Costs Shown in Subtasks Below)			
		I. 3. a. 1	Update the Existing Model	\$0	\$20,000	\$0	\$20,000
		I. 3. a. 2	Develop Protective Water Levels	\$0	\$0	\$0	\$0
		I. 3. a. 3	Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions ⁽¹⁰⁾	\$0	\$40,000	\$0	\$40,000
	I. 3. b.		Complete Preparation of Basin Management Action Plan	\$0	\$0	\$0	\$0
	I. 3. c.		Refine and/or Update the Basin Management Action Plan ⁽¹¹⁾	\$0	\$25,000	\$0	\$25,000
	I. 3. d		Evaluate Coastal Wells for Cross-Aquifer Contamination Potential	\$0	\$0	\$0	\$0

Task	Subtask	Sub-Subtask	Cost Description	CONSULTANTS & CONTRACTORS ⁽³⁾			Total
				MPWMD	Private Consultants	Contractors	
I.4 Seawater Intrusion Contingency Plan							
	I. 4. a.		Oversight of Seawater Intrusion Detection and Tracking	\$0	\$0	\$0	\$0
	I. 4. b.		Provide focused area hydrogeologic investigation for Sand City Public Works	\$0	\$0	\$0	\$0
	I. 4. c.		Annual Report- Seawater Intrusion Analysis	\$2,928	\$25,750	\$0	\$28,678
	I. 4. d.		Complete Preparation of Seawater Intrusion Response Plan ⁽²⁾	\$0	\$0	\$0	\$0
	I. 4. e.		Refine and/or Update the Seawater Intrusion Response Plan ^{(2) (9)}	\$0	\$0	\$0	\$0
	I. 4. f.		If Seawater Intrusion is Determined to be Occurring, Implement Contingency Response Plan ⁽²⁾	(No Costs are Included for This Task, as This Task Will Likely Not be Necessary During 2015. If it Does Become Necessary, Use of Contingency Funds or a Budget Modification Will Likely be Necessary)			
TOTALS CONSULTANTS & CONTRACTORS				\$52,757	\$184,750	\$33,705	
SUBTOTAL not including Technical Program Manager =							\$211,212
Contingency (not including Technical Program Manager) @ 20% ⁽⁴⁾ =							\$42,242
Technical Program Manager =							\$60,000
TOTAL=							\$313,454

Footnotes:

- (1) An outside contractor would be used to perform the induction logging, and potentially to also collect some water quality samples in conjunction with doing the induction logging. MPWMD is expected to perform portions of the work of this Subtask, and will be the party that subcontracts with the Contractor to perform the induction logging and sample collection work on certain of the wells.
- (2) The response plan would only be implemented in the event sea water intrusion is determined to be occurring.
- (3) Within the context of this document the term “Consultant” refers either to a Private Consultant providing professional engineering or other types of technical services, or to the Monterey Peninsula Water Management District (MPWMD). The term “Contractor” refers to a firm providing construction or field services such as well drilling, induction logging, or meter calibration.
- (4) Due to the uncertainties of the exact scopes of some of the Tasks listed above at the time of preparation of this Budget, e.g. Tasks I.3.a.3 and I.3.c, it is recommended that a 20% Contingency be included in the Budget.
- (5) Includes \$1,000 to maintain equipment previously installed for this purpose. Also includes lab costs to analyze for barium and iodide ions in certain of these wells as was done in preceding years beginning in 2012.
- (6) Does not include costs for MPWMD to collect water level data or water quality samples from wells other than those that are part of the basic monitoring well network, i.e. for private well owners who have requested that the Watermaster obtain this data for them. Costs to obtain that data are to be reimbursed to the Watermaster by those well owners, so there should be no net cost to the Watermaster for that portion of the work under these Tasks.
- (7) No additional monitoring well is expected to be constructed in 2015.
- (8) For HydroMetrics to provide hydrogeologic consulting assistance to the Watermaster, beyond that associated with performing other Tasks, when requested to do so by the Technical Program Manager.
- (9) If work under this Task is found to be necessary, it will be funded through the Contingency line item in this Budget.
- (10) If requested by the Board.
- (11) If necessary to reflect knowledge gained from modeling work or other data sources.

**Seaside Groundwater Basin Watermaster
Fiscal Year 2015 Monitoring & Management Plan
Adopted Capital Fund Budget**

**Management and Monitoring Plan Capital Budget
For Tasks to be Undertaken in 2015**

No Capital projects are anticipated to be undertaken in 2015, so this budget is \$0.

Seaside Groundwater Basin Watermaster Fiscal Year 2014 Adopted Replenishment Fund Budget

Seaside Groundwater Basin Watermaster													
Replenishment Fund											10/1/2014		
Water Year 2015 (October 1 - September 30) / Fiscal Year (January 1 - December 31, 2015)													
Proposed Budget													
	2006	2007	2008	2009	2010	2011	2012	2013	Estimated 2014	Estimated Totals WY 2006 Through 2014	Proposed Budget WY 2015	Projected Totals Through WY 2014	
Replenishment Fund	WY 05/06	WY 06/07	WY 07/08	WY 08/09	WY 09/10	WY 10/11	WY 11/12	WY 12/13	WY 13/14		WY 14/15		
Assessments:													
Unit Cost:	\$1.132	\$1.132	\$2,485	\$3,040	\$2,780	\$2,780	\$2,780	\$2,780	\$2,702		\$2,702		
Cal-Am Water Balance Forward	\$ -	\$ 1,641,004	\$ 4,206,475	\$ (2,900,435)	\$ (2,868,685)	\$ (3,850,964)	\$ (6,088,909)	\$ (8,919,379)	\$ (6,538,537)		\$ (9,138,537)		
Cal-Am Water Production	3710.0 AF	4059.9 AF	3862.9 AF	2966.0 AF	3713.5 AF	3416.0 AF	3070.9 AF	3076.6 AF					
Exceeding Natural Safe Yield Considering Alternative Producers	2,106,652	2,484,533	5,164,969	3,773,464	4,112,933	3,187,854	1,661,090	1,656,612	1,700,000	\$ 25,848,108	1,700,000	\$ 27,548,108	
Operating Yield Overproduction Replenishment	-	80,938	34,045	-	-	-	619,853	724,229	700,000	2,159,085	700,000	2,859,085	
Total California American	\$ 2,106,652	\$ 2,565,471	\$ 5,199,014	\$ 3,773,464	\$ 4,112,933	\$ 3,187,854	\$ 2,280,943	\$ 2,380,842	\$ 2,400,000	\$ 28,007,174	\$ 2,400,000	\$ 30,407,174	
CAW Credit Against Assessment	(485,848)		(12,305,924)	\$ (3,741,714)	(5,095,213)	(5,425,799)	(5,111,413)	-	(5,000,000)	(37,145,711)	(5,000,000)	(42,145,711)	
CAW Unpaid Balance	\$ 1,641,004	\$ 4,206,475	(2,900,435)	\$ (2,868,685)	\$ (3,850,964)	\$ (6,088,909)	\$ (8,919,379)	\$ (6,538,537)	\$ (9,138,537)	\$ (9,138,537)	\$ (11,738,537)	\$ (11,738,537)	
City of Seaside Balance Forward	\$ -	\$ 230,671	\$ 413,454	\$ 1,106,116	\$ 1,737,569	\$ 988,414	\$ (13,109)	\$ (678,596)	\$ (1,507,666)		\$ (2,357,666)		
City of Seaside Municipal Production	332.0 AF	387.7 AF	294.3 AF	293.4 AF	282.9 AF	240.7 AF	233.7 AF	257.7 AF					
Exceeding Natural Safe Yield Considering Alternative Producers	169,200	173,739	385,642	399,211	231,961	141,335	156,752	128,755	150,000	\$ 1,936,595	150,000	\$ 2,086,595	
Operating Yield Overproduction Replenishment	50,487	340	16,898	66,090	82,761	-	6,757	108,026	-	331,358	-	331,358	
Total Municipal	219,687	174,079	402,540	465,300	314,721	141,335	163,509	236,782	150,000	2,267,954	150,000	2,417,954	
City of Seaside - Golf Courses													
Exceeding Natural Safe Yield - Alternative Producer	-	-	131,705	69,701	-	-	-	-	-	201,406	-	201,406	
Operating Yield Overproduction Replenishment	-	-	131,705	69,701	-	-	-	-	-	201,406	-	201,406	
Total Golf Courses	-	-	263,410	139,402	-	-	-	-	-	402,812	-	402,812	
Total City of Seaside*	\$ 219,687	\$ 174,079	\$ 665,950	\$ 604,702	\$ 314,721	\$ 141,335	\$ 163,509	\$ 236,782	\$ 150,000	\$ 2,670,766	\$ 150,000	\$ 2,820,766	
City of Seaside Late Payment 5%	10,864	8,704	26,712	26,750	15,737					88,887		88,887	
In-lieu Credit Against Assessment	-	-	-	\$ -	(1,079,613)	(1,142,858)	(828,996)	(1,065,852)	(1,000,000)	(5,117,319)	(1,000,000)	(6,117,319)	
City of Seaside Unpaid Balance	\$ 230,671	\$ 413,454	\$ 1,106,116	\$ 1,737,569	\$ 988,414	\$ (13,109)	\$ (678,596)	\$ (1,507,666)	\$ (2,357,666)	\$ (2,357,666)	\$ (3,207,666)	\$ (3,207,666)	
Total Replenishment Fund Balance	\$ 1,871,675	\$ 4,619,929	\$ (1,794,319)	\$ (1,131,116)	\$ (2,862,551)	\$ (6,102,019)	\$ (9,597,976)	\$ (8,046,204)	\$ (11,496,204)	\$ (11,496,204)	\$ (14,946,204)	\$ (14,946,204)	
Replenishment Fund Balance Forward	-	\$ 1,871,675	\$ 4,619,929	\$ (1,794,319)	\$ (1,131,116)	\$ (2,862,551)	\$ (6,102,019)	\$ (9,597,976)	\$ (8,046,204)		\$ (11,496,204)		
Total Replenishment Assessments	2,337,323	2,748,254	5,891,676	4,404,917	4,443,391	3,329,189	2,444,452	2,617,624	2,550,000	30,766,826	2,550,000	33,316,826	
Total Paid and/or Credited	(485,848)	-	(12,305,924)	(3,741,714)	(6,174,826)	(6,568,657)	(5,940,409)	(1,065,852)	(6,000,000)	(42,283,030)	(6,000,000)	(48,263,030)	
Grand Total Fund Balance	\$ 1,871,675	\$ 4,619,929	\$ (1,794,319)	\$ (1,131,116)	\$ (2,862,551)	\$ (6,102,019)	\$ (9,597,976)	\$ (8,046,204)	\$ (11,496,204)	\$ (11,496,204)	\$ (14,946,204)	\$ (14,946,204)	

ATTACHMENT 7

WATER QUALITY ANALYTICAL RESULTS



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SEASIDE BASIN WATERMASTER MEMORANDUM 2014-02

Date: November 7, 2014
To: Seaside Basin Watermaster
From: Jonathan Lear, PG, CHg, Senior Hydrogeologist
Joe Oliver, PG, CHg, Water Resources Division Manager
Tom Lindberg, Associate Hydrologist
Subject: Water Year 2014, Groundwater-Quality and Groundwater-Level Data
Collected for the Seaside Groundwater Basin Watermaster

SUMMARY

This memorandum transmits and summarizes groundwater-quality and groundwater-level data collected for the Seaside Groundwater Basin Watermaster Board (Watermaster) during Water Year (WY)¹ 2014. This report incorporates the data that were collected and reported for each quarter during the period from October 1, 2013 through September 30, 2014. This information is being provided to the Watermaster for information purposes, and is in compliance with the monitoring protocols described in the Watermaster's *Seaside Basin Monitoring and Management Program* (SBMMP, revision date September 5, 2006), which was prepared in response to the court decision filed March 27, 2006 (as amended by February 9, 2007 filing) in the Seaside Basin adjudication case. This document has been prepared by the Monterey Peninsula Water Management District (MPWMD) on behalf of the Watermaster.

This document is organized into the following four categories of data:

- Precipitation,
- Streamflow in Arroyo Del Rey,
- Water-quality data collected from MPWMD and other basin wells, and
- Static water levels collected from MPWMD and other Watermaster basin wells.

¹ The WY begins on October 1, and ends September 30 of the indicated year.

PRECIPITATION

A continuous-recording precipitation gage is located at the south eastern corner of the Southern Coastal Subarea of the Seaside Groundwater Basin (Basin). Data from the precipitation gage are posted to the www.weatherunderground.com website and are available real time as well as archival data sets. **Figure 1** shows the location of the weather station and the average annual rainfall totals for the Basin. **Figure 2** shows daily and cumulative rainfall recorded by the weather station for all four quarters of WY 2014. Average annual rainfall for the location of the weather station is 16 inches. As **Figure 2** illustrates, at the close of WY 2014, the weather station had logged 8.47 inches, which is approximately 53% of normal rainfall.

STREAMFLOW

There is a distinct lack of surface drainages in the Basin due to the high infiltration capacities of the dune sands which overlie the aquifers in much of the Basin. The overlying soils have the capacity to infiltrate large storm events; therefore, water does not typically concentrate into channels. The Arroyo Del Rey drainage is formed over less permeable materials and is the largest drainage in the Basin. The headwaters of the drainage are in the Laguna Seca Subarea, which flow into the Southern Coastal Subarea of the Basin and collect in Roberts Lake.

A continuous streamflow gage was operated by the USGS in Del Rey Oaks Park from 1966 to 1978. MPWMD re-occupied the site in 2002 and data collection is ongoing. The catchment area above the gage is 13.8 square miles. **Figure 3** contains the average daily flow record for the Arroyo Del Rey at Del Rey Oaks gaging station for WY 2014.

WATER-QUALITY DATA: MPWMD AND OTHER BASIN WELLS

MPWMD Coastal Monitor-Well Network

Under the current monitoring program conducted for the Watermaster, the MPWMD collects *quarterly* samples from six monitor wells at three locations that are closest to the coastline, and *annually* from six additional wells at three locations that are farther from the coastline. The well numbers, names and sampling schedule for the MPWMD coastal monitor wells currently being sampled for the Watermaster are listed below.

MPWMD Coastal Monitor Wells

<u>Well Number</u>	<u>Well Name</u>	<u>Sample Interval</u>
15S01E15N3	MSC-Shallow	quarterly
15S01E15N2	MSC-Deep	quarterly
15S01E15F1	PCA-W-Shallow	quarterly
15S01E15F2	PCA-W-Deep	quarterly
15S01E11Pa	FO-09-Shallow	quarterly
15S01E11Pb	FO-09-Deep	quarterly
15S01E15K5	PCA-E-Shallow	annually
15S01E15K4	PCA-E-Deep	annually
15S01E23Ca	Ord Terrace-Shallow	annually
15S01E23Cb	Ord Terrace-Deep	annually
15S01E12Fa	FO-10-Shallow	annually
15S01E12Fc	FO-10-Deep	annually

These sites are shown on **Figure 4** and completion data for these wells are shown in **Table 1**. At each site, a “shallow” and “deep” monitor well have been installed (either in separate boreholes or as multiple completions in a single borehole), generally corresponding to well completions within the two principal aquifer units that have been historically recognized in the Basin, the Paso Robles Formation (QTp or QTc for undifferentiated Continental Deposits) and Santa Margarita Sandstone (Tsm), respectively². More recently, it has been recognized that the Tsm deposits transition to the Purisima Formation (Tp) in the Northern Coastal Subarea of the Basin. The monitor wells are constructed of 2-inch PVC casing, with screens adjacent to the more permeable (i.e., based on lithologic and geophysical logging analyses) sand “packages” within each aquifer unit. The aquifer units are separated from each other in the wells by cement strata-isolation seals.

MPWMD Coastal Monitor Wells Water-Sample Collection

Water-sample collection from the MPWMD coastal monitor wells for WY 2014 was accomplished by the Low-Flow Method. As a means to investigate alternative water-quality sampling technologies, MPWMD staff completed a test of different “low-flow” sampling methodologies in 2009. Motivation behind changing the sampling method included a desire to: (a) switch to a less invasive sampling method to prolong the life of the monitoring wells and (b) implement a less labor-intensive method that will be more cost effective to the Watermaster in the long run. Details of this sampling methodology are described below. This methodology is used for ongoing sampling of all MPWMD monitor wells, unless site specific conditions preclude this.

² An exception is at the Ord Terrace site, where the shallow and deep monitor wells are completed in the upper Tsm and lower Tsm, respectively. Currently, sampling is only conducted at the shallow well; there are no distinct differences in water quality in the upper and lower Tsm at this location.

- **Low-Flow Sampling Method**

The low-flow/low-volume purging method is performed using a pumping mechanism that produces low-flow rates [less than 1 liter per minute (L/min) or less than 0.26 gallon per minute (gpm)] that cause minimal drawdown of the static water table and usually employs a flow cell in which geochemical parameters are continuously monitored. These parameters may include dissolved oxygen content, oxidation-reduction potential (redox), conductivity, turbidity, and/or pH. The intent of this sampling protocol is to collect a representative sample from the monitored groundwater zone. A representative sample may be obtained when all the monitored chemical parameters have stabilized, thus quantitatively demonstrating that the sample being collected is in equilibrium with the groundwater system. The low-flow/low volume purging method (purging to parameter stability) tends to isolate the interval being sampled, which provides more accurate water-quality measurements and reduces the volume of purge water generated. This method has an advantage in that it can limit vertical mixing and volatilization of any volatile organic compounds (VOCs) in solution within the well casing or borehole, as compared to high-flow purging and sampling (e.g., air-lift sampling method).

Figure 5 illustrates the QED Environmental Systems, Inc. low-flow sampling equipment. The bladder pump is placed in the monitor well and powered by a fuel source of compressed gas. The peristaltic action of the pump lifts water from the well and initiates flow through the well screen at the location where the drop tube and intake assembly have been placed. An electric wire sounder is used to measure drawdown to insure minimal drawdown is caused by pumping the well. Water-quality parameters are monitored at the flow cell as the well is purged.

The low-flow/low-volume purging method of sample collection has been described in groundwater monitoring literature since the mid-1980s with a defined methodology being accepted by the U.S. EPA in 1995. These protocols are summarized below as adopted by MPWMD staff:

1. **Flow rate**

The flow rate used during purging must be low enough to avoid increasing the water turbidity. The following measures should be taken to determine the appropriate flow rate: (a) the flow rate shall be determined for each well, based on the hydraulic performance of the well; (b) the flow must be adjusted to obtain stabilization of the water level in the well as quickly as possible; (c) the maximum flow rate used should not exceed 1 liter per minute (0.26 gpm); (d) once established, this rate should be reproduced with each subsequent sampling event; and (e) if a significant change in initial water level occurs between events, it may be necessary to re-establish the optimum flow rate at each sampling event.

2. **Measurement of water level and drawdown**

Measurement of the water level in the well during purging is important when establishing the optimum flow rate for purging. The goal is to achieve a stabilized

pumping water level as quickly as possible with minimal drawdown, to avoid stressing the formation and mobilizing solids, and to obtain stabilized indicator parameters in the shortest time possible.

3. Measurement of indicator parameters

Continuous monitoring of water-quality indicator parameters is used to determine when purging is completed and sampling should begin. Measurement of indicator parameters (e.g., dissolved oxygen content, redox potential, specific conductance, temperature and pH) is required. This is most easily performed using an in-line flow cell (closed) system attached directly to the pump discharge tubing. For turbidity measurement, a separate field nephelometer should be used.

If portable systems are used, they must be placed carefully into the well and lowered into the screen zone as slowly as possible. Placement of the portable pump can disturb the groundwater flow conditions resulting in non-equilibrium conditions. As a result, longer purge times and greater purge volumes may be necessary to achieve indicator parameter stabilization. In general, this may require that after installation, the portable pump should remain in place for a minimum of 1-2 hours to allow settling of solids and re-establishment of horizontal flow through the screen zone. If initial turbidity readings are excessive (>50 NTU), pumping should cease and the well should rest for another 1-2 hours before initiating pumping again. In wells set in very fine-grained formations, longer waiting periods may be required. Continuous water-level measurement devices are preferred, such as down-hole pressure transducers, but electronic water-level tapes can be used. The devices used should be capable of measuring to 0.01-foot precision.

4. Sample Collection

Water samples for laboratory analyses must be collected before water has passed through the flow-through cell (use a by-pass assembly or disconnect cell to obtain sample). VOC samples (if collected) should be collected first and directly into pre-preserved sample containers. All sample containers are filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. During purging and sampling, the tubing should remain filled with water so as to minimize possible changes in water chemistry upon contact with the atmosphere.

MPWMD Coastal Monitor Wells Water-Quality Results

Water chemistry analytical results for the samples collected during WY 2014 are provided in the table in **Appendix 1**. This table and other water-level data tables were prepared utilizing the “report” feature of the Watermaster Database.

In general, the WY 2014 chemical data from these monitor wells do not show significant changes relative to the results provided in WY 2013, and are not currently indicative of seawater intrusion into the basin at the locations and depths of the monitor well completions. Water sampled via the

low-flow method is extracted near the bottom of the screen, where the pump intake is located. The low-flow pump intakes are located near the screen bottom to facilitate early detection of a seawater intrusion wedge that would be presumed to first approach the lowest portion of the screens in the coastal monitor wells. Additional discussion and conclusions regarding these sample testing results is contained in the Water Year 2014 Seawater Intrusion Analysis Report (SIAR WY2014) prepared by Hydrometrics, LLC.

Other Basin Monitor and Producer Wells Water-Quality Results

Water chemistry analytical results for the samples collected from other Basin monitor wells and producer wells during WY 2014 are also provided in the table in **Appendix 1**. These include: (a) annual sample results from coastal and inland monitor wells that were added as part of the monitoring well network enhancement study that was conducted by MPWMD for the Watermaster in 2007; (b) annual sample results for the active Watermaster producer wells in the coastal subareas of the Basin that are required to collect these samples under the Watermaster's MMP; (c) annual sample results for the four dedicated coastal Watermaster Sentinel wells that were installed in 2007; and (d) periodic sample results from the inland Watermaster monitor wells that were installed in 2009.

WATER-LEVEL DATA: BASIN MONITOR AND PRODUCER WELLS

Basin monitor wells and basin producer active and inactive wells with water-level data collected during WY 2014 are provided in **Appendix 2**. The general locations of these wells are shown on **Figure 6**. The Watermaster has requested that producers collect and report "static", i.e., non-pumping, water-level measurements. The purpose for this is so these measurements will more closely approximate ambient groundwater-level conditions, and facilitate the plotting and trend analysis of well water-level hydrographs. Occasionally, water-level measurements have been collected and reported while the well was in operation. In some cases, this may be due to the fact that the well can not be taken offline to collect a static water-level measurement because of pumping demand requirements. These occurrences have been recorded in the comments section of **Appendix 2**. These water-level data were collected primarily with manual water-level sounding devices by producers or by the MPWMD on behalf of the Watermaster.

These water-level data have been entered into the Watermaster database. The table in **Appendix 2** was generated by querying the Watermaster database and using the report feature in MS Access. The table format for the WY 2014 report includes additional information relative to each well and its monitoring schedule. This format will be used as a template to improve the web-based reporting feature of the database.

It should be noted that the table in **Appendix 2** includes the "reference-point elevations" that were surveyed in 2008 or 2011 for each well, as part of work conducted for the Watermaster. The reference point elevations were established at the water-level data collection point at each wellhead. The reference point elevations are tied to the North American Vertical Datum of 1988 (NAVD88). The measurements in NAVD88 datum have been adjusted for the Watermaster's use

by subtracting 2.97 feet to conform to local Mean Sea Level (MSL) reference, based on data provided by the surveyor. The “depth to water” measurement at each well is subtracted from the “ref point” elevation to obtain the “water elevation” relative to MSL.

Water-level hydrographs for the MPWMD monitor wells located in the Northern Coastal Subarea and the Watermaster Sentinel wells are included in **Appendix 3**. The long-term hydrograph figures for the MPWMD monitor wells were generated to provide historical static water-level data for the wells with longer data records in the Seaside Groundwater Basin. The Sentinel well hydrographs are included to comply with monthly water-level reporting requirements.

It should be noted that in WY 2014, three formerly-used Cal-Am production wells in the Northern Coastal Subarea of the basin (i.e., Hilby MGT, Luxton, Military) were formally converted to monitor wells, and water-level monitoring data logger equipment has been acquired to obtain ongoing water-level data at these sites. In addition, water-level data logger equipment has been acquired to allow for collection of continuous water-level data from selected monitor wells in the Laguna Seca Subarea (per recommendation in the MMP).

CONCLUSIONS

- In WY 2014, chemical data for the MPWMD dedicated coastal monitor wells do not show significant changes in chemistry relative to previous samplings, and are not currently indicative of seawater intrusion into the basin at the locations and depths of these monitor wells. This conclusion continues to be supported by work completed this year for the Watermaster as documented in the WY 2014 Seawater Intrusion Analysis Report prepared by HydroMetrics, LLC.
- Based on the long-term water-level hydrographs for coastal monitor wells presented in **Appendix 3**, the trend of declining groundwater levels is continuing in the deeper Santa Margarita aquifer monitor wells, whereas groundwater levels have generally stabilized, and in a few cases displayed an overall increase in the shallower Paso Robles aquifer. The seasonal high water level peaks in the Santa Margarita monitoring wells for WY 2014 seen in these figures are lower than water levels from WY 2013. This difference is likely due to a dry winter and no water was injected into the Santa Margarita aquifer by the MPWMD and Cal-Am at the Aquifer Storage and Recovery sites in Seaside, compared to earlier wetter years.

RECOMMENDATIONS

- Given that there is now a five-year history of water-quality sampling results from the Watermaster monitor wells that were installed in 2009 at the inland Camp Huffman site on former Fort Ord (SBWM #5), it is recommended that the sampling frequency be continued on a triennial basis (i.e., once every three years). This is more frequent than the five-year

sampling recurrence interval recommended in the completion report for these wells³, and will allow for periodic checking of any long-term trend changes in water quality at this remote inland location in the Basin.

- As a future monitoring enhancement, it is recommended that the feasibility of deploying an automatic-recording water-quality monitoring data logger in a coastal monitoring well should continue to be pursued in the event that a suitably rugged device can be acquired as a trial method using this technology.
- Reporting of water levels and quality should continue to be conducted semi-annually. Quarterly water-quality reporting is problematic due to the time required to process and analyze water-quality samples.
- Consideration should be given to locating available existing wells that may be added to the basin monitoring network to enhance the spatial coverage (e.g., two formerly-used Fort Ord monitor wells have recently been destroyed and are no longer available).
- Follow-up communications should be made to producers that have not consistently provided required water-level or water-quality monitoring data to the Watermaster (e.g., monthly water level data have not consistently been reported for several producer wells in the basin).
- Deployment of water-level monitoring data logger equipment at recently converted Cal-Am Northern Coastal Subarea production wells and at selected Laguna Seca Subarea dedicated monitor wells should continue in WY 2015.

³ Feeney, M.B., 2010. *Seaside Groundwater Basin Watermaster Inland Monitoring Well Project, Construction of SBWM Monitoring Well #5*. Report prepared for SBWM, Jan 2010 (see pg. 15).

Table 1. Summary of Well Completions, MPWMD Coastal Seaside Basin Watermaster Wells.

SUMMARY OF MPWMD COASTAL SEASIDE BASIN GROUNDWATER QUALITY MONITOR WELLS													
Site	Well Name	Location Description	Well Number	Date Drilled	DWR Drillers Log	Hole Depth (feet)	Well Depth (feet)	Screened Interval (feet)	Strata Seal (feet)	Casing Type	Geologic Unit	E-Log	Elevation (feet AMSL)
MSC		former MSC mine north of Playa Ave. and west of Hwy. 1											
	MSC-Shallow	approx. 10' S of north property line	15S/1E-15N3	5/25/1990	338413	720	695	490 - - 680	95 - 275	2" pvc	QTp	---	80.1
	MSC-Deep	approx. 7' E of MSC-Shallow	15S/1E-15N2	5/25/1990	338425	920	865	810 - 850	725 - 775	2" pvc	Tsm	yes	80.29
PCA WEST		former PCA mine W of Hwy. 1											
	PCA-W Shallow	approx. 200' SE of ocean bluff	15S/1E-15F1	3/28/1990	338400	600	585	525 - 575	120 - 150	2" pvc	QTp	---	64.22
	PCA-W Deep	approx. 50' E of PCA-W Shallow	15S/1E-15F2	3/90	338401	900	885	825 - 875	760 - 790	2" pvc	Tsm	yes	65.18
PCA EAST		vacant lot NE of Seaside High baseball field											
	PCA-E Shallow	approx. 300' E Monterey Rd, 50" N fence	15S/1E-15K5	4/16/1990	338402	863	410	350 - 400	110 - 150	2" pvc	QTp	---	68.51
	PCA-E Deep	(same borehole as shallow well)	15S/1E-15K4	4/16/1990	338402	863	710	650 - 700	580 - 620	2" pvc	Tsm	yes	68.54
ORD TERRACE		Ord Terrace School property south of Ord Grove Ave.											
	OT-Shallow	1700 block Ord Grove Ave.	15S/1E-23Ca	8/5/1999	---	530	340	280 - 330	0 - 260	2" pvc	upper Tsm	---	228.65
	OT-Deep	(same borehole as shallow well)	15S/1E-23Cb	8/5/1999	---	530	450	390 - 440	350 - 377	2" pvc	lower Tsm	yes	228.63
MPWMD # FO-09		E of Hwy.1, SE of Okinawa Rd.											
	# 9-Shallow	50' east of utility service rd.	15S/1E-11Pa	8/16/1994	---	1,110	660	610 - 650	500 - 540	2" pvc	QTp (?)	---	118.89
	# 9-Deep	(same borehole as shallow well)	15S/1E-11Pb	8/16/1994	---	1,110	840	790 - 830	700 - 765	2" pvc	Tsm (?)	yes	118.85
MPWMD # FO-10		south of Light Fighter Drive, behind Barker Theater Building											
	# 10-Shallow	20' north of access road curb	15S/1E-12Fa	9/3/1996	---	1,500	650	620 - 640	480 - 500	2" pvc	QTp	---	200.85
	# 10-Deep	(same borehole as shallow well)	15S/1E-12Fc	9/3/1996	---	1,500	1,420	1380 - 1410	1280 - 1300	2" pvc	Tsm (?)	yes	201.03
<p>NOTES:</p> <ol style="list-style-type: none"> 1. Official State well numbers end with a numeral; unofficial MPWMD well numbers end with a small case letter. 2. Geologic Unit refers to the unit adjacent to the screened interval: QTp = Paso Robles Formation; Tsm = Santa Margarita Sandstone. 3. Elevation refers to the water level reference point elevation surveyed by Central Coast Surveyors. For additional information, see "Documentation of 2008 Well Elevation Surveys", MPWMD Seaside Basin Watermaster Memorandum 2008-05. 4. Well completion data at site MSC are documented in "Installation of Monitoring Well Cluster, Monterey Sand Company", Staal, Gardner & Dunne, Inc. (SGD), July 1990. 5. Well completion data at sites PCA West and PCA East are documented in "Hydrogeologic Investigation, PCA Well Aquifer Test", SGD, July 1990. 6. Well completion data at site MPWMD FO-09 are documented in "Summary of 1994 Fort Ord Monitor Well Installations", MPWMD Technical Memorandum 94-07. 7. Well completion data at site MPWMD FO-10 are documented in "Summary of 1996 Seaside Basin Monitor Well Installations", MPWMD Technical Memorandum 97-04. 8. Two dashes (i.e., "-") indicate multiple screened intervals. 9. Three dashes (i.e., "---") indicate not applicable or not available. 													

Legend

**Annual Rainfall
 (inches)**

- 15
- 17
- 19

Seaside Groundwater Basin

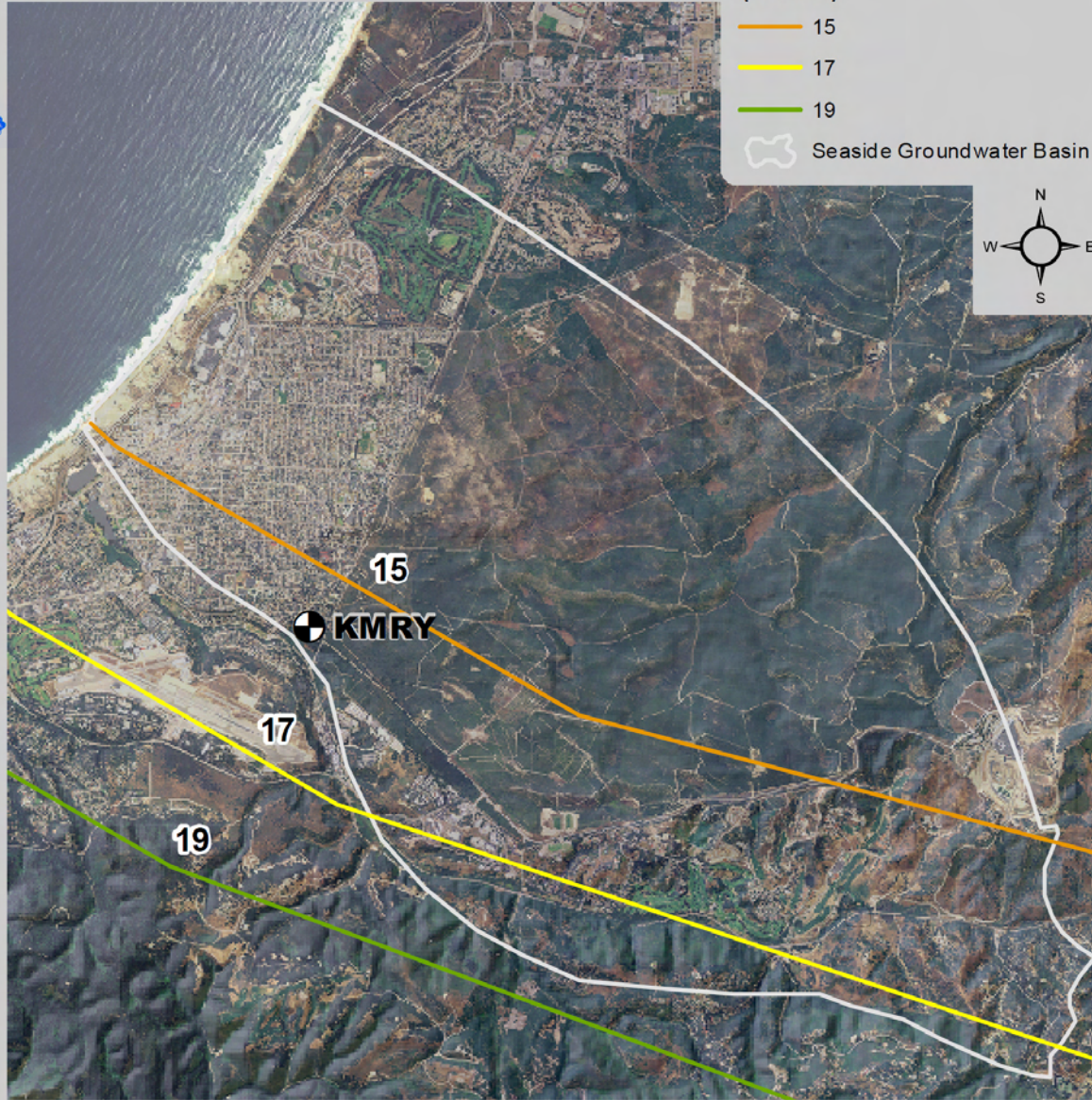
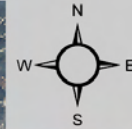
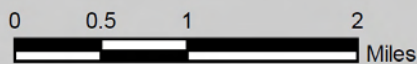


Figure 1. Location of Weather Station KMRY and Average Annual Rainfall for the Seaside Groundwater Basin, Seaside, CA



Datasources: Rainfall Totals - Monterey County
 Photobase - AMBAG 2005

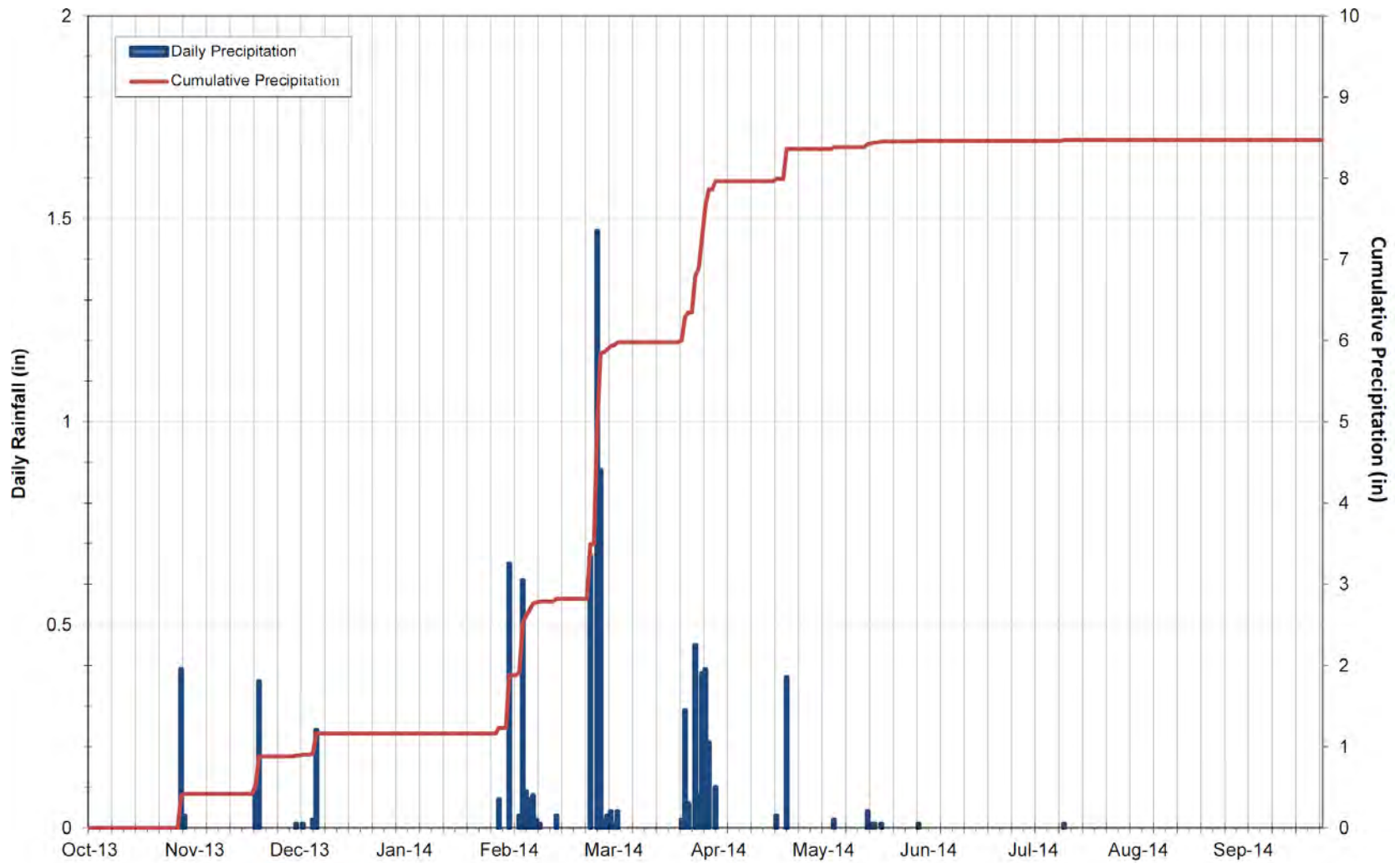


Figure 2. Daily and Cumulative Rainfall for Water Year 2014 recorded at Weather Underground Weather Station KMRY, Seaside, California

Data from www.weatherunderground.com
 Station Coordinates 36.59, -121.84

U:\jlear\Watermaster\Weather Station2.xls

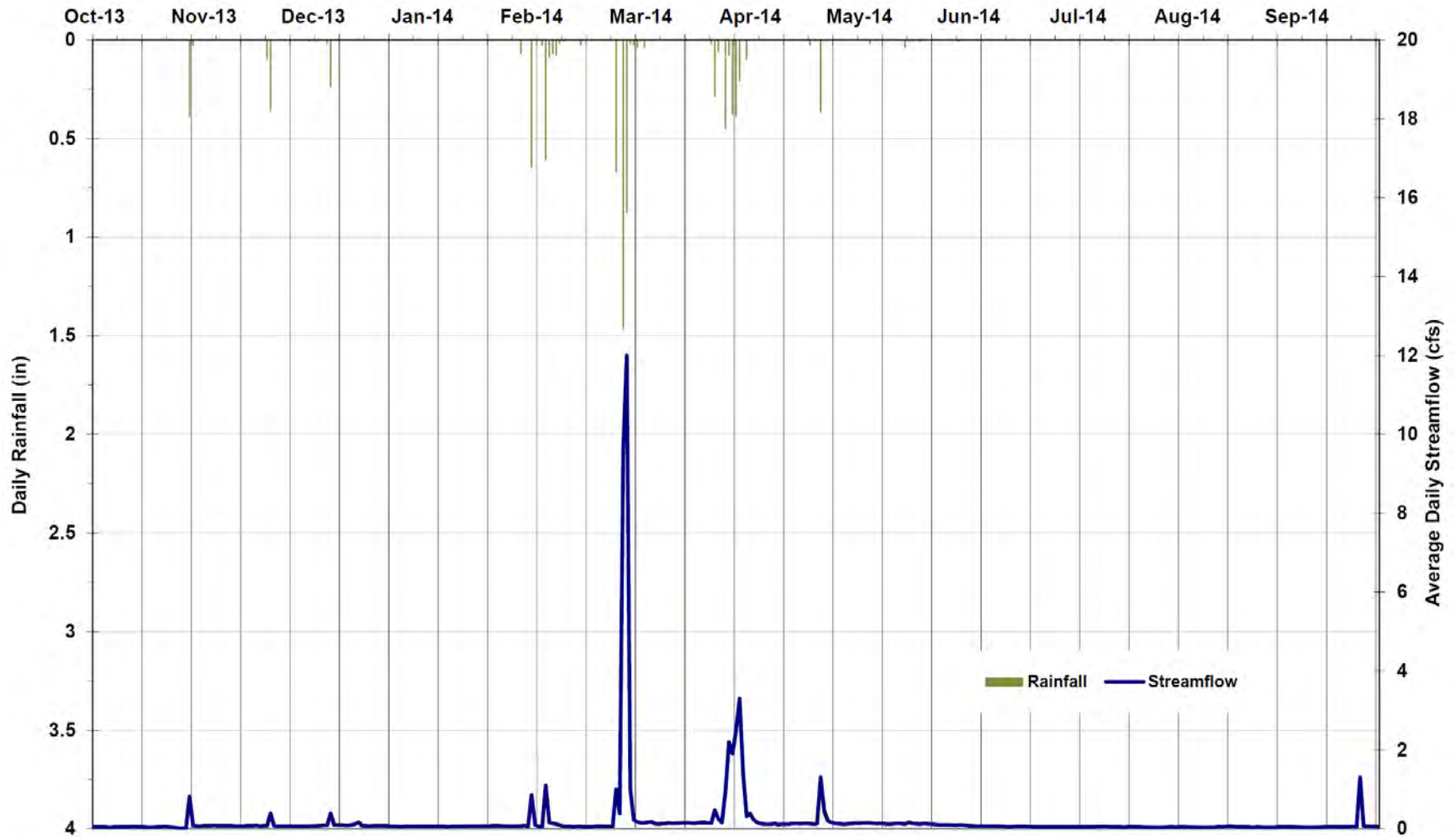


Figure 3. Daily Rainfall at Weather Station KMRY and Average Daily Flow at Arroyo Del Rey at Del Rey Oaks Stream Gage for Water Year 2014 , Seaside, California

U:\jlear\Watermaster\Weather Station2.xls

Monterey Peninsula Water Management District



Legend

Monitor Well

Data Type and Frequency

- Water Level - Monthly
- Water Level - Monthly, Water Quality - Annual
- Water Level - Monthly, Water Quality - Quarterly
- Water Level - Quarterly
- Seaside Groundwater Basin

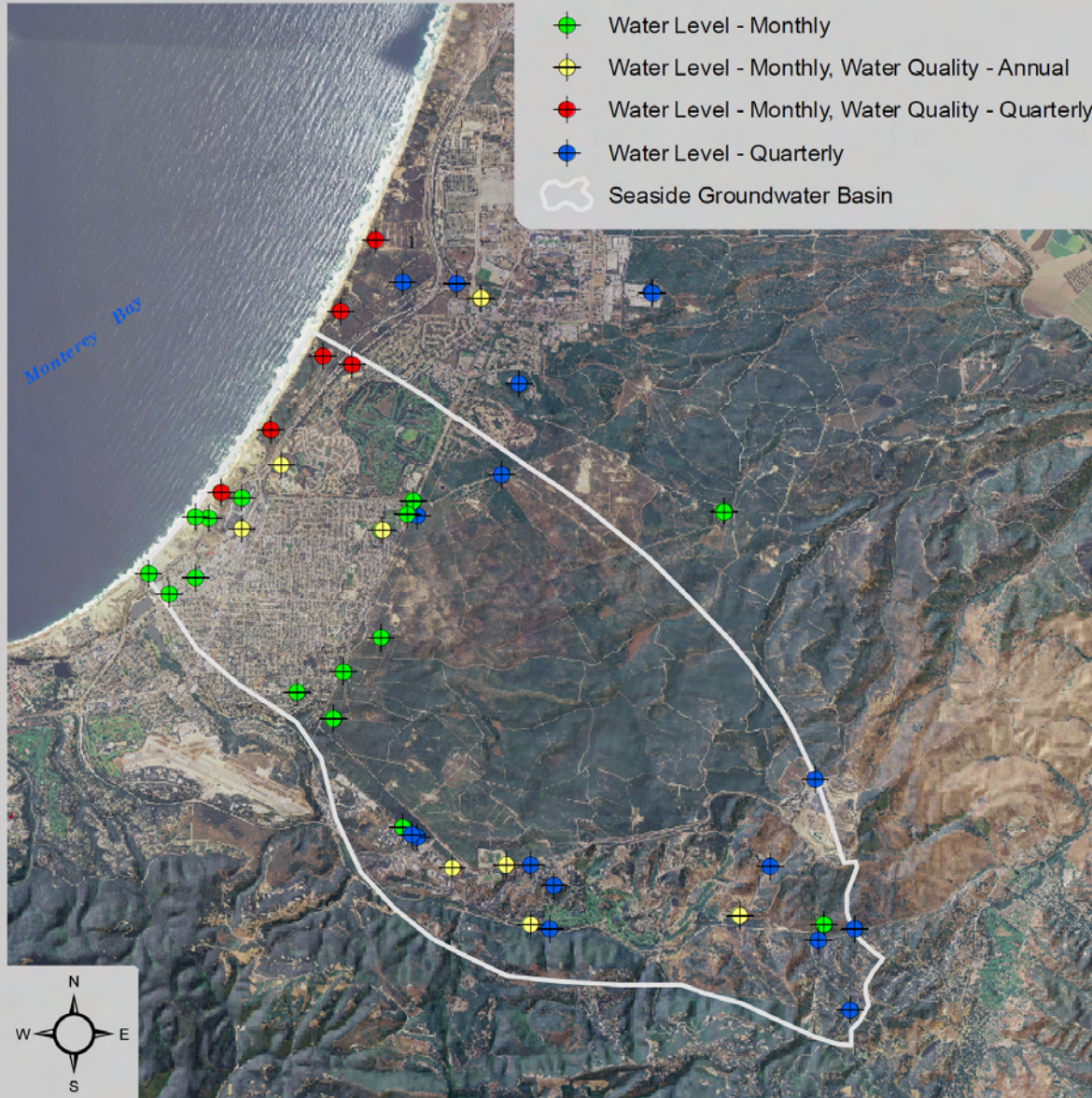


Figure 4. Seaside Groundwater Basin Watermaster Monitoring Well Network, Seaside, CA

0 0.5 1 2 Miles

Datasources: Rainfall Totals - Monterey County
Photobase - AMBAG 2005

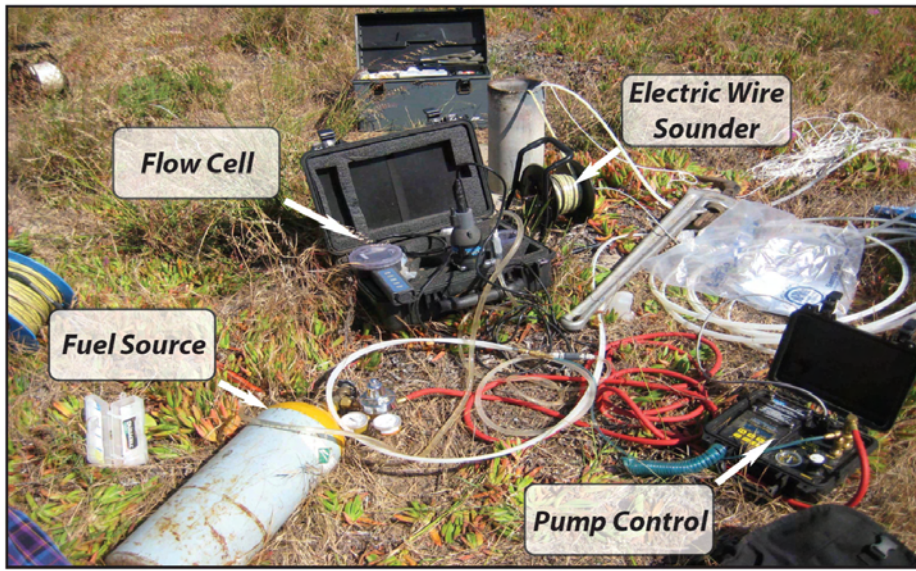
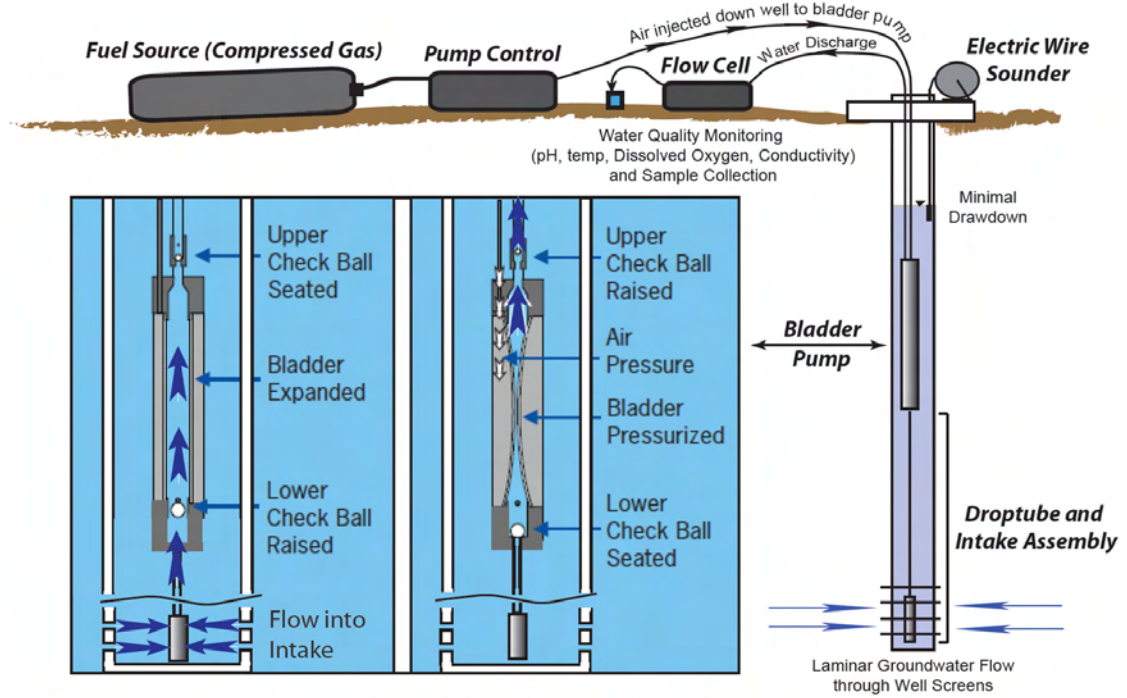





Figure 5. Low Flow Groundwater Sampling System Presented in Cartoon and Photograph

Legend

Watermaster Well

Category

-  Monitor
-  Producer
-  Seaside Groundwater Basin

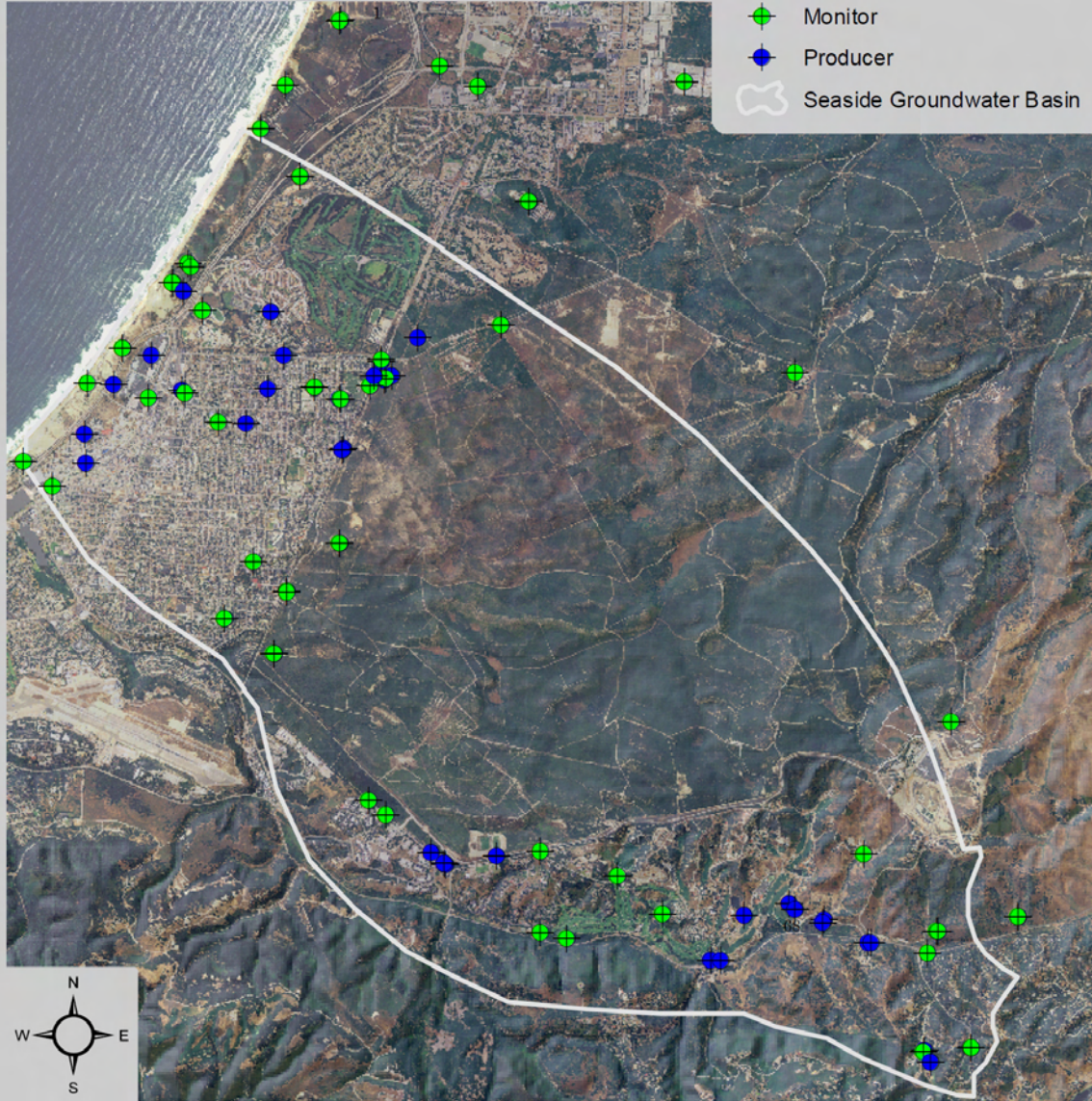
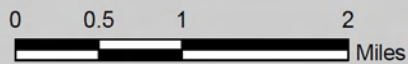


Figure 6. Seaside Groundwater Basin Watermaster Wells by Category, Seaside, CA



Appendix 1

Seaside Basin Groundwater Quakity Monitoring Results

for Water Year 2014

Seaside Basin Monitoring and Management Plan Water Quality Data for WY 2014

<0.1 = Not detected above detection limit of 0.1 mg/L all values in mg/L unless otherwise noted

Camp Huffman (D)

WM No. 250

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18363	7/22/14	76	94	24	4.9	323	51	0.3	124	<1	0.017	0.066	<0.1	0.07	0.3	8	591	983

Camp Huffman (S)

WM No. 249

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18362	7/22/14	58	84	19	3.9	148	13	<0.1	190	3	0.403	<0.010	<0.1	0.08	0.6	8.1	540	896

Cypress Pacific Prod

WM No. 150

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB17762	7/10/14	53	63	17	3.9	237	57	<0.1	94	<1	0.519	0.049	<0.1	0.09	0.2	7.6	468	797
AB11889	2/19/14	93	102	29	5.1	283	80	0.1	172	<1	1.308	0.099	<0.1	0.14	0.3	7.2	708	1152

Del Monte Test

WM No. 231

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
CA2710004	7/15/14	21	47.5	8	<5	110	14.7	0.15	57.9	<0.2	4.650	0.115	<0.25	<0.1	0.20		238	407

FO-09-Deep

WM No. 112

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB20599	9/11/14	23	53	4	3.6	120	<1	0.5	77	<1	0.506	<0.010	<0.1	<0.05	0.2	6.6	268	411

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

AB17176	6/26/14	24	48	3	3.3	115	3	<0.1	64	<1	0.348	<0.010	<0.1	0.06	0.2	6.9	251	425
AB13392	3/25/14	25	52	4	3.5	106	12	0.1	62	<1	0.116	<0.01	<0.1	0.07	0.1	6.8	254	419

FO-09-Shallow

WM No. 111

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB20598	9/11/14	27	34	5	3.6	100	5	<0.1	60	<1	4.358	0.029	<0.1	<0.05	<0.1	7	206	338
AB17175	6/26/14	26	32	4	3.4	104	3	<0.1	50	<1	2.792	0.020	<0.1	<0.05	0.1	6.6	232	355
AB13391	3/25/14	26	32	4	3.4	88	11	<0.1	48	1	0.109	<0.01	<0.1	<0.05	<0.1	6.6	240	349

FO-10-Deep

WM No. 114

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18745	7/31/14	20	38	3	3.3	73	15	<0.1	47	<1	0.830	0.014	<0.1	0.06	0.1	8.2	180	316

FO-10-Shallow

WM No. 113

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18744	7/31/14	9	36	2	2.4	55	6	<0.1	41	<1	0.636	0.090	<0.1	<0.05	0.1	7.3	137	245

LS Driving Range

WM No. 141

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18447	7/23/14	40	140	26	5.2	148	48	0.1	257	1	1.035	<0.010	0.1	0.09	0.8	6.5	663	1184

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

LS Golf New #12

WM No. 203

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB17801	7/14/14	155	150	35	6	300	194	0.5	243	<1	0.303	0.046	<0.1	0.14	0.6	7.1	943	1566

LSRA #1

WM No. 197

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB71545	9/5/14	16	108	10	2.2	113	17	0.22	134	4	<0.1	0.051	1.1	0.11	0.3	6.4	395	626
AB17799	7/14/14	18	103	12	2.7	120	18	0.2	128	4	<0.010	0.011	0.8	0.1	0.4	6.6	386	670

LSRA #2

WM No. 196

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB71546	9/5/14	11	91	6.4	1.8	133	13	0.21	86	<1	5.3	0.061	1.1	<0.1	0.22	6.5	315	482

Luzern #2

WM No. 159

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
CA2710004	7/29/14	83	119.3	22	6	230	91.8	0.25	155.8	9.33	<0.1	0.023	<0.25	0.169	0.54		648	1069

Mission Memorial

WM No. 156

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB17764	7/10/14	34	59	10	2.9	132	36	0.1	84	9	0.102	<0.010	<0.1	<0.05	0.2	7.2	360	601

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

MSC-Deep

WM No. 102

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB20601	9/11/14	80	114	17	4.8	325	40	0.2	172	<1	0.082	0.125	<0.1	0.11	0.1	7.2	580	1013
AB17174	6/26/14	77	104	16	4.6	331	34	0.2	140	<1	0.135	0.125	<0.1	0.1	0.3	7.2	580	1032
AB13394	3/25/14	79	110	16	4.6	345	20	0.2	136	<1	0.160	0.154	<0.1	0.1	0.3	7.2	608	1020
AB05838	9/19/13	84	105	15	4.6	331	37	0.2	145	<1	0.245	0.195	<0.1	0.1	0.4	7.1	609	1035

MSC-Shallow

WM No. 101

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB20600	9/11/14	19	34	5	2.8	83	14	<0.1	48	<1	<0.010	<0.010	<0.1	<0.05	<0.1	6.8	206	308
AB17173	6/26/14	19	34	5	2.8	82	13	<0.1	42	<1	0.010	<0.010	<0.1	<0.05	<0.1	6.9	180	314
AB13393	3/25/14	18	32	5	2.7	79	12	0.1	40	<1	<0.01	<0.01	<0.1	<0.05	<0.1	6.9	217	311
AB05839	9/19/13	19	33	5	2.8	79	13	0.1	43	<1	<0.01	<0.01	<0.01	<0.05	0.1	6.4	211	309

Ord Grove #2

WM No. 153

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
CA2710004	7/31/14	60	92.6	18	<5	210	63.4	0.17	127.9	8.43	<0.1	<0.02	<0.25	0.128	0.43		536	910

Ord Terrace-Shallow

WM No. 109

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18746	7/31/14	62	79	15	4.1	243	35	<0.1	103	6	0.087	0.114	<0.1	0.07	0.3	7.4	440	778

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

Paralta

WM No. 169

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
CA2710004	7/28/14	27	55.9	9	<5	92	31.4	<0.1	75.8	3.44	<0.1	<0.02	<0.25	<0.1	0.24		318	483

Pasadera Golf - Paddock

WM No. 204

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB17788	7/11/14	136	132	33	5.2	289	175	0.5	186	3	<0.010	0.026	<0.1	0.11	0.4	7	848	1386

PCA-E Deep

WM No. 106

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18448	7/23/14	35	65	7	3.2	196	24	0.3	80	<1	<0.001	0.011	<0.1	0.07	0.2	7.6	372	622

PCA-E Shallow

WM No. 105

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB18743	7/31/14	16	39	4	2.1	77	7	<0.1	47	2	<0.010	<0.010	<0.1	<0.05	0.1	7.8	186	298

PCA-W Deep

WM No. 104

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB20596	9/11/14	90	118	21	5.3	326	45	0.2	215	<1	0.057	0.180	<0.1	0.13	<0.1	6.2	694	1145
AB17172	6/26/14	90	118	21	5.4	317	40	0.3	176	<1	0.033	0.189	<0.1	0.13	0.4	6.4	654	1150
AB13396	3/25/14	86	113	20	5.1	309	37	0.3	172	<1	<0.01	0.093	<0.1	0.12	0.4	7.2	668	1140
AB05840	9/19/13	84	113	19	5.2	305	42	0.2	175	<1	<0.01	0.071	<0.1	0.13	0.5	7.4	649	1092

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

PCA-W Shallow

WM No. 103

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB20597	9/11/14	20	34	5	2.2	93	10	<0.1	49	1	0.184	0.130	<0.1	<0.05	<0.1	6.7	214	319
AB17171	6/26/14	19	34	5	2.3	93	9	0.1	42	<1	0.161	0.011	<0.1	<0.05	<0.1	6.7	183	328
AB13395	3/25/14	19	33	5	2.2	93	9	0.1	41	1	0.164	0.012	<0.1	<0.05	<0.1	6.8	211	329
AB05841	9/19/13	20	33	5	2.2	94	10	0.1	44	1	0.474	<0.01	<0.1	<0.05	0.1	6.8	211	324

Plava #3

WM No. 162

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
CA2710004	7/15/14	52	95.7	18	<5	140	93.1	0.12	123.3	27.81	<0.1	<0.02	<0.25	0.128	0.47		516	861

Plumas #4

WM No. 177

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
CA2710004	7/15/14	47	135.3	25	<5	150	83.3	0.17	201.6	11.58	<0.1	<0.02	<0.25	0.11	0.70		598	1075

Ryan Ranch #7

WM No. 213

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
CA2701466	7/9/14	103	154.5	31	6	250	162.1	0.65	198.3	<0.2	0.34	0.165	0.70	0.147	0.74		810	1336

Ryan Ranch #8

WM No. 216

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

CA2701466 7/9/14 61 169.3 33 <5 160 107.3 0.59 291.2 2.44 0.46 0.035 0.60 0.11 1.02 780 1383

Sand City Corp Yard

WM No. 165

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB17763	7/10/14	34	230	7	5	160	142	3.4	262	27	<0.010	0.028	<0.1	0.99	0.6	7.4	857	1519
AB11890	2/19/14	34	267	7	5.3	156	138	3.4	268	30	<0.01	0.019	<0.1	1.07	0.4	7.5	868	1515

Seaside Golf - Reservoir

WM No. 187

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
2710018	6/23/14	23	52	7.5	1.9	82	16	<0.1	78	6		<0.001	<0.03	<0.1	0.17	7	264	432

Seaside Muni #4

WM No. 173

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
2710018-004	6/23/14	13	52	4.6	1.8	60	7	<0.1	66	3	0.190	<0.001	<0.03	<0.1	0.14	7.4	200	330

Sentinel MW#1 (1,140 feet)

WM No. 245.1

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19235	8/8/14	24	105	2	4.8	95	26	0.2	115	<1	3.249	0.044	<0.1	0.11	0.3	8.7	332	597

Sentinel MW#1 (1,390 feet)

WM No. 245.2

SPL Id.	Date	Major Cations				Major Anions					Minor Ions					Physical		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19236	8/8/14	24	87	3	4.2	102	25	0.2	97	<1	8.149	0.088	<0.1	0.1	0.3	8.6	310	513

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

Sentinel MW#2 (1,000 feet)

WM No. 246.1

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19237	8/8/14	16	75	1	4.1	100	18	0.1	78	<1	0.661	<0.010	<0.1	0.08	0.2	8.4	258	464

Sentinel MW#2 (1,470 feet)

WM No. 246.2

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19238	8/8/14	16	66	8	5.1	127	18	0.1	66	<1	34.169	0.303	<0.1	0.09	0.2	8.5	268	434

Sentinel MW#3 (1,275 feet)

WM No. 247.2

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19240	8/8/14	18	63	2	4	101	16	<0.1	64	<1	2.055	0.028	<0.1	0.08	0.2	8	252	410

Sentinel MW#3 (870 feet)

WM No. 247.1

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19239	8/8/14	18	62	3	4.2	100	16	<0.1	64	<1	3.967	0.04	<0.1	0.11	0.2	8	252	415

Sentinel MW#4 (715 feet)

WM No. 248.1

SPL Id.	Date	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19241	8/8/14	60	97	10	6.1	235	37	0.2	126	<1	1.653	0.039	<0.1	0.12	0.3	7.5	495	844
AB11145	1/29/14	49	88	9	7.5	212	35	0.3	128	<1	2.421	0.03	<0.1	0.1	0.2	7.5	494	843

<0.1 = Not detected above detection limit of 0.1 mg/L

all values in mg/L unless otherwise noted

Sentinel MW#4 (900 feet)

WM No. 248.2

<u>SPL Id.</u>	<u>Date</u>	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB19242	8/8/14	86	197	21	9.4	354	40	0.2	262	<1	7.439	0.185	<0.1	0.35	0.9	7.4	800	1439
AB11146	1/29/14	71	162	18	7.3	338	39	0.3	254	<1	3.662	0.111	<0.1	0.28	0.7	7.4	806	1449

York School 2001

WM No. 212

<u>SPL Id.</u>	<u>Date</u>	<u>Major Cations</u>				<u>Major Anions</u>					<u>Minor Ions</u>					<u>Physical</u>		
		Ca ⁺	Na ⁺	Mg ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ⁻	F ⁻	Cl ⁻	NO ₃ ⁻	Fe ²⁺	Mn ²⁺	HPO ₄ ⁻	B	Br ⁻	pH	TDS	EC (us/cm)
AB17800	7/14/14	36	166	29	4.4	74	32	0.2	318	5	0.410	<0.010	0.2	0.09	0.9	6.4	726	1244

Appendix 2

Seaside Basin Groundwater Level Monitoring Results for Water Year 2014

Seaside Basin Monitoring and Management Plan Water Level Data for WY 2014

Bay Ridge (Watermaster No. 226)

Southern Inland

Owner: California American Water

Aquifer Unit: QTc/Tsm

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	381	545.92	164.92	
10/31/2013	377	545.92	168.92	
11/27/2013	440	545.92	105.92	Well Running
12/26/2013	443	545.92	102.92	Well Running
01/30/2014	377	545.92	168.92	
02/27/2014	385	545.92	160.92	
03/27/2014	439	545.92	106.92	Well Running
04/24/2014	372	545.92	173.92	
05/29/2014	442	545.92	103.92	Well Running
06/26/2014	378	545.92	167.92	
07/31/2014	381	545.92	164.92	
08/28/2014	444	545.92	101.92	Well Running
09/26/2014	443	545.92	102.92	

Bishop #1 (west) (Watermaster No. 209)

Southern Inland

Owner: California American Water

Aquifer Unit: QTc/Tsm

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	264.7	398.81	134.11	
10/31/2013	269	398.81	129.81	
11/27/2013	260	398.81	138.81	
12/26/2013	258	398.81	140.81	

01/30/2014	258	398.81	140.81	
02/27/2014	253	398.81	145.81	
03/27/2014	258	398.81	140.81	
04/24/2014	257	398.81	141.81	
05/29/2014	258	398.81	140.81	
06/26/2014	314	398.81	84.81	Well Running
07/31/2014	341	398.81	57.81	Well Running
08/28/2014	266	398.81	132.81	
09/25/2014	342	398.81	56.81	Well Running

Bishop #3 (Watermaster No. 262)

Southern Inland

Owner: CAW

Aquifer Unit:

Well Type: Producer

All Values in Feet

Responsible Party: (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	384	420.58	36.58	Well Running
10/31/2013	375	420.58	45.58	Well Running
11/27/2013	279	420.58	141.58	
12/26/2013	283	420.58	137.58	
01/30/2014	283	420.58	137.58	
02/27/2014	266	420.58	154.58	
03/27/2014	269	420.58	151.58	
04/24/2014	265	420.58	155.58	
05/29/2014	285	420.58	135.58	
06/26/2014	273.2	420.58	147.38	
07/31/2014	273	420.58	147.58	
08/28/2014	363	420.58	57.58	Well Running
09/25/2014	272	420.58	148.58	

Blue Larkspur-East End (Watermaster No. 143)**Southern Inland**

Owner: Laguna Seca Resorts

Aquifer Unit:

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
12/20/2013	110.35	253.29	142.94	
03/19/2014	110.70	253.29	142.59	
08/06/2014	111.83	253.29	141.46	

CalAm Granite Construction (Watermaster No. 242)**Southern Inland**

Owner: California American Water

Aquifer Unit: Tsm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/20/2013	134.69	223.43	88.74	
12/20/2013	134.62	223.43	88.81	
03/19/2014	134.80	223.43	88.63	
08/06/2014	134.98	223.43	88.45	

CDM MW-1 (Watermaster No. 251)**Northern Coastal**

Owner: MPWMD

Aquifer Unit: Qod/Qar

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
12/06/2013	90.04	93.35	3.31	
01/07/2014	89.83	93.35	3.52	
01/29/2014	90.1	93.35	3.25	
03/06/2014	89.49	93.35	3.86	
04/02/2014	89.38	93.35	3.97	
04/29/2014	89.52	93.35	3.83	
05/28/2014	90.24	93.35	3.11	

07/01/2014	90.31	93.35	3.04
07/29/2014	90.60	93.35	2.75
09/02/2014	90.53	93.35	2.82
09/29/2014	90.03	93.35	3.32

CDM MW-2 (Watermaster No. 252)

Northern Coastal

Owner: MPWMD

Aquifer Unit: Qod/Qar

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
12/05/2013	60.35	68.83	8.48	
01/07/2014	60.46	68.83	8.37	
03/06/2014	59.98	68.83	8.85	
03/29/2014	61.80	68.83	7.03	
04/02/2014	59.72	68.83	9.11	
04/29/2014	59.05	68.83	9.78	
05/28/2014	60.62	68.83	8.21	
07/01/2014	60.82	68.83	8.01	
07/29/2014	61.18	68.83	7.65	
09/02/2014	60.82	68.83	8.01	
09/29/2014	61.80	68.83	7.03	

CDM MW-3 (Watermaster No. 239)

Southern Coastal

Owner: MPWMD

Aquifer Unit: Qod

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/07/2013	30.99	33.81	2.82	
12/04/2013	31.18	33.81	2.63	
01/06/2014	31.61	33.81	2.20	
01/30/2014	30.80	33.81	3.01	

03/05/2014	32.19	33.81	1.62
04/08/2014	32.62	33.81	1.19
04/28/2014	32.58	33.81	1.23
05/28/2014	32.88	33.81	0.93
06/26/2014	32.86	33.81	0.95
07/28/2014	33.18	33.81	0.63
08/28/2014	32.42	33.81	1.39
10/01/2014	31.90	33.81	1.91

CDM MW-4 (Watermaster No. 238)

Southern Coastal

Owner: MPWMD

Aquifer Unit: Qod

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/07/2013	14.87	18.69	3.82	
12/04/2013	15.05	18.69	3.64	
01/06/2014	15.46	18.69	3.23	
01/30/2014	14.52	18.69	4.17	
03/05/2014	14.55	18.69	4.14	
04/08/2014	14.50	18.69	4.19	
04/28/2014	14.74	18.69	3.95	
05/28/2014	15.19	18.69	3.50	
06/26/2014	15.42	18.69	3.27	
07/28/2014	15.38	18.69	3.31	
08/28/2014	15.32	18.69	3.37	
10/01/2014	14.96	18.69	3.73	

Cypress Pacific Prod (Watermaster No. 150)**Southern Coastal**

Owner: King Venture

Aquifer Unit: QTc

Well Type: Producer

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	47.50	50.23	2.73	
11/07/2013	46.90	50.23	3.33	
12/04/2013	46.89	50.23	3.34	
01/06/2014	46.96	50.23	3.27	
01/31/2014	46.78	50.23	3.45	
03/05/2014	46.82	50.23	3.41	
04/08/2014	47	50.23	3.23	
04/28/2014	49.23	50.23	1.00	
05/28/2014	47.18	50.23	3.05	
06/25/2014	47.19	50.23	3.04	
07/28/2014	47.37	50.23	2.86	
08/28/2014	47.29	50.23	2.94	
10/01/2014	47.28	50.23	2.95	

Darwin (Watermaster No. 186)**Northern Coastal**

Owner: California American Water

Aquifer Unit: QTc

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	114.3	134.05	19.75	
10/31/2013	114.2	134.05	19.85	
11/27/2013	114.3	134.05	19.75	
12/26/2013	114.0	134.05	20.05	
01/30/2014	114.0	134.05	20.05	
02/27/2014	113.5	134.05	20.55	

03/27/2014	114.0	134.05	20.05	
04/24/2014	114.1	134.05	19.95	
05/29/2014	114.3	134.05	19.75	
06/16/2014	114.0	134.05	20.05	Darwin Was Destroyed 7/14

Del Monte Test (Watermaster No. 231)

Owner: California American Water
 Well Type: Monitor
 Responsible Party: CAW (Monthly)

Northern Coastal
 Aquifer Unit: QTc
 All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	30	32.62	2.62	
10/31/2013	30	32.62	2.62	
11/27/2013	30.1	32.62	2.52	
12/26/2013	30.5	32.62	2.12	
01/30/2014	30.3	32.62	2.32	
02/27/2014	29.8	32.62	2.82	
03/27/2014	30.0	32.62	2.62	
04/24/2014	29.9	32.62	2.72	
05/29/2014	29.9	32.62	2.72	
06/26/2014	30.0	32.62	2.62	
07/31/2014	30.0	32.62	2.62	
08/28/2014	30.0	32.62	2.62	
09/25/2014	30.1	32.62	2.52	

Design Ctr. (Watermaster No. 167)

Owner: City of Sand City
 Well Type: Producer
 Responsible Party: MPWMD (Monthly)

Southern Coastal
 Aquifer Unit: Qod/Qar/QTc
 All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	13.85	21.31	7.46	
11/07/2013	14.10	21.31	7.21	

12/04/2013	13.99	21.31	7.32
01/06/2014	14.04	21.31	7.27
01/30/2014	13.75	21.31	7.56
03/05/2014	13.88	21.31	7.43
04/08/2014	13.81	21.31	7.50
04/28/2014	14.20	21.31	7.11
05/28/2014	14.35	21.31	6.96
07/01/2014	14.30	21.31	7.01
07/28/2014	14.04	21.31	7.27
08/28/2014	14.08	21.31	7.23
10/01/2014	14.04	21.31	7.27

FO-01-Deep (Watermaster No. 116)

Northern Inland

Owner: MPWMD

Aquifer Unit: Tm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	340.51	362.57	22.06	
12/23/2013	341.01	362.57	21.56	
03/21/2014	340.75	362.57	21.82	
08/06/2014	341.00	362.57	21.57	

FO-01-Shallow (Watermaster No. 115)

Northern Inland

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	202.56	362.61	160.05	
12/23/2013	202.74	362.61	159.87	
03/21/2014	202.72	362.61	159.89	
08/06/2014	202.73	362.61	159.88	

FO-03-Deep (Watermaster No. 127)**Southern Inland**

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	637.34	774.74	137.40	
12/23/2013	637.99	774.74	136.75	
03/20/2014	637.41	774.74	137.33	
08/13/2014	637.42	774.74	137.32	

FO-04-Deep (W) (Watermaster No. 130)**Southern Inland**

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/07/2013	113.42	167.44	54.02	
12/04/2013	113.56	167.44	53.88	
01/07/2014	113.90	167.44	53.54	
01/30/2014	113.92	167.44	53.52	
03/06/2014	113.26	167.44	54.18	
04/08/2014	112.67	167.44	54.77	
04/28/2014	112.40	167.44	55.04	
05/27/2014	113.87	167.44	53.57	
07/29/2014	113.89	167.44	53.55	
09/02/2014	113.66	167.44	53.78	
10/01/2014	113.89	167.44	53.55	

FO-04-Shallow (E) (Watermaster No. 129)**Southern Inland**

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/07/2013	113.95	168.23	54.28	
12/04/2013	113.96	168.23	54.27	
01/07/2014	114.18	168.23	54.05	
01/30/2014	114.33	168.23	53.90	
03/06/2014	114.13	168.23	54.10	
04/08/2014	113.7	168.23	54.53	
04/28/2014	113.59	168.23	54.64	
05/27/2014	113.23	168.23	55.00	
07/29/2014	113.42	168.23	54.81	
09/02/2014	112.57	168.23	55.66	
10/01/2014	113.38	168.23	54.85	

FO-05-Deep (Watermaster No. 132)**Southern Inland**

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	319.99	479.29	159.30	
12/23/2013	317.95	479.29	161.34	
03/19/2014	314.50	479.29	164.79	
08/06/2014	319.05	479.29	160.24	

FO-05-Shallow (Watermaster No. 131)**Southern Inland**

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	248.99	478.97	229.98	
12/23/2013	250.40	478.97	228.57	
03/19/2014	246.01	478.97	232.96	
08/06/2014	249.82	478.97	229.15	

FO-06-Deep (Watermaster No. 134)**Southern Inland**

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	235.73	470.63	234.90	
12/23/2013	236.85	470.63	233.78	
03/18/2014	232.25	470.63	238.38	
08/13/2014	237.13	470.63	233.50	

FO-06-Shallow (Watermaster No. 133)**Southern Inland**

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	235.98	470.13	234.15	
12/23/2013	237.41	470.13	232.72	
03/18/2014	234.46	470.13	235.67	
08/13/2014	236.13	470.13	234.00	

FO-07-Deep (Watermaster No. 119)

Northern Inland

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/17/2013	494.31	470.15	-24.16	
11/05/2013	494.38	470.15	-24.23	
12/03/2013	494.5	470.15	-24.35	
01/03/2014	491.97	470.15	-21.82	
01/29/2014	491.69	470.15	-21.54	
03/05/2014	491.30	470.15	-21.15	
04/02/2014	490.97	470.15	-20.82	
04/28/2014	490.88	470.15	-20.73	
05/27/2014	490.97	470.15	-20.82	
07/01/2014	490.82	470.15	-20.67	
07/28/2014	491.38	470.15	-21.23	
08/25/2014	492.40	470.15	-22.25	
09/26/2014	492.98	470.15	-22.83	

FO-07-Shallow (Watermaster No. 118)

Northern Inland

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/17/2013	453.5	470.19	16.69	
11/05/2013	450.59	470.19	19.60	
12/03/2013	453.51	470.19	16.68	
01/03/2014	453.5	470.19	16.69	
01/29/2014	453.68	470.19	16.51	
03/05/2014	453.12	470.19	17.07	

04/02/2014	453.11	470.19	17.08
04/28/2014	453.20	470.19	16.99
05/17/2014	453.17	470.19	17.02
07/01/2014	453.13	470.19	17.06
07/28/2014	453.22	470.19	16.97
08/25/2014	454.07	470.19	16.12
09/26/2014	453.31	470.19	16.88

FO-08-Deep (Watermaster No. 121)

Northern Inland

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/08/2013	401.16	378.1	-23.06	
12/04/2013	401.32	378.1	-23.22	
01/06/2014	399.1	378.1	-21.00	
01/30/2014	398.72	378.1	-20.62	
03/05/2014	398.38	378.1	-20.28	
03/25/2014	398.11	378.1	-20.01	
04/29/2014	397.97	378.1	-19.87	
05/27/2014	398.20	378.1	-20.10	
07/01/2014	397.98	378.1	-19.88	
07/29/2014	398.32	378.1	-20.22	
08/25/2014	399.52	378.1	-21.42	
09/26/2014	399.37	378.1	-21.27	

FO-08-Shallow (Watermaster No. 120)

Northern Inland

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
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11/08/2013	373.37	378.04	4.67
12/04/2013	373.33	378.04	4.71
01/06/2014	373.33	378.04	4.71
01/30/2014	373.49	378.04	4.55
03/05/2014	372.91	378.04	5.13
03/25/2014	373.17	378.04	4.87
04/29/2014	373.38	378.04	4.66
05/27/2014	373.62	378.04	4.42
07/01/2014	373.73	378.04	4.31
07/29/2014	373.90	378.04	4.14
08/25/2014	374.10	378.04	3.94
09/26/2014	374.2	378.04	3.84

FO-09-Deep (Watermaster No. 112)

Owner: MPWMD

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

Northern Coastal

Aquifer Unit: Tsm

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/19/2013	143.42	118.85	-24.57	
11/05/2013	141.52	118.85	-22.67	
12/03/2013	141.93	118.85	-23.08	
01/06/2014	139.8	118.85	-20.95	
01/30/2014	139.80	118.85	-20.95	
03/05/2014	139.02	118.85	-20.17	
03/25/2014	138.59	118.85	-19.74	
04/28/2014	138.5	118.85	-19.65	
05/27/2014	138.92	118.85	-20.07	
06/25/2014	138.5	118.85	-19.65	
07/28/2014	139.1	118.85	-20.25	
09/02/2014		118.85		No Access

09/29/2014

118.85

No Access

FO-09-Shallow (Watermaster No. 111)

Northern Coastal

Owner: MPWMD

Aquifer Unit: QTc/Tp

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/19/2013	111.06	118.89	7.83	
11/05/2013	111.09	118.89	7.80	
12/03/2013	111.04	118.89	7.85	
01/06/2014	111.29	118.89	7.60	
01/30/2014	111	118.89	7.89	
03/05/2014	111.27	118.89	7.62	
03/25/2014	111.02	118.89	7.87	
04/28/2014	111.13	118.89	7.76	
05/27/2014	111.28	118.89	7.61	
06/25/2014	111.40	118.89	7.49	
07/28/2014	111.60	118.89	7.29	
09/02/2014	111.58	118.89	7.31	
09/29/2014	111.87	118.89	7.02	

FO-10-Deep (Watermaster No. 114)

Northern Coastal

Owner: MPWMD

Aquifer Unit: Tp

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/08/2013	206.1	201.03	-5.07	
12/03/2013	206.28	201.03	-5.25	
01/07/2014	206.50	201.03	-5.47	
01/31/2014	206.80	201.03	-5.77	
03/06/2014	206.15	201.03	-5.12	

04/08/2014	206.32	201.03	-5.29
04/29/2014	206.25	201.03	-5.22
05/28/2014	206.5	201.03	-5.47
07/02/2014	206.42	201.03	-5.39
07/29/2014	208.66	201.03	-7.63
09/02/2014	208.68	201.03	-7.65
10/01/2014	208.59	201.03	-7.56

FO-10-Shallow (Watermaster No. 113)

Northern Coastal

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/08/2013	206.32	200.85	-5.47	
12/03/2013	206.53	200.85	-5.68	
01/07/2014	206.92	200.85	-6.07	
01/31/2014	207.40	200.85	-6.55	
03/06/2014	206.68	200.85	-5.83	
04/08/2014	207.02	200.85	-6.17	
04/29/2014	207.13	200.85	-6.28	
05/28/2014	207.25	200.85	-6.40	
07/01/2014	207.17	200.85	-6.32	
07/29/2014	209.42	200.85	-8.57	
09/02/2014	209.60	200.85	-8.75	
10/01/2014	209.61	200.85	-8.76	

FO-11-Deep (Watermaster No. 123)

Northern Inland

Owner: MPWMD

Aquifer Unit: Tp

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
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11/08/2013	330.30	332.96	2.66
12/04/2013	330.41	332.96	2.55
01/07/2014	330.65	332.96	2.31
01/31/2014	330.82	332.96	2.14
03/06/2014	330.44	332.96	2.52
04/08/2014	330.65	332.96	2.31
04/29/2014	330.03	332.96	2.93
05/28/2014	330.29	332.96	2.67
07/01/2014	330.19	332.96	2.77
07/29/2014	332.04	332.96	0.92
09/02/2014	332.06	332.96	0.90
10/01/2014	331.96	332.96	1.00

FO-11-Shallow (Watermaster No. 122)

Owner: MPWMD

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

Northern Inland

Aquifer Unit: QTc

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/08/2013	349.22	332.93	-16.29	
12/04/2013	349.17	332.93	-16.24	
01/07/2014	349.55	332.93	-16.62	
01/31/2014	349.94	332.93	-17.01	
03/06/2014	350.07	332.93	-17.14	
04/08/2014	351.33	332.93	-18.40	
04/29/2014	351.48	332.93	-18.55	
05/28/2014	351.6	332.93	-18.67	
07/01/2014	351.55	332.93	-18.62	
07/29/2014	355.98	332.93	-23.05	
09/02/2014	356.33	332.93	-23.40	
10/01/2014	356.28	332.93	-23.35	

Hilby MGT (Watermaster No. 244)**Southern Coastal**

Owner: California American Water

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: CAW (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	247.4	248.04	0.64	
10/31/2013	247.5	248.04	0.54	
11/27/2013	247.4	248.04	0.64	
12/26/2013	242.7	248.04	5.34	
01/31/2014	246.8	248.04	1.24	
02/27/2014	246.9	248.04	1.14	
03/27/2014	246.0	248.04	2.04	
04/24/2014		248.04		No Access
05/29/2014		248.04		No Access
06/26/2014		248.04		No Access
07/31/2014	241.4	248.04	6.64	Converted to Monitor Well
08/28/2014	241.3	248.04	6.74	
09/25/2014	241.5	248.04	6.54	

Justin Court (Watermaster No. 135)**Southern Inland**

Owner: California American Water

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/20/2013	142.84	240.28	97.44	
12/20/2013	142.80	240.28	97.48	
03/19/2014	142.89	240.28	97.39	
08/06/2014	143.08	240.28	97.20	

K-Mart (Watermaster No. 125)**Southern Coastal**

Owner: MPWMD

Aquifer Unit: Qod/Qar

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	23.92	30.65	6.73	
11/07/2013	23.88	30.65	6.77	
12/04/2013	23.95	30.65	6.70	
01/06/2014	23.83	30.65	6.82	
03/05/2014	23.52	30.65	7.13	
04/08/2014	23.46	30.65	7.19	
04/28/2014		30.65		trailer parked on well
06/25/2014	23.90	30.65	6.75	
07/28/2014	23.98	30.65	6.67	
08/28/2014	23.99	30.65	6.66	
10/01/2014	23.99	30.65	6.66	

LS Driving Range (Watermaster No. 141)**Southern Inland**

Owner: County of Monterey

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	340.69	488.34	147.65	
12/20/2013	342.63	488.34	145.71	
03/18/2014	342.04	488.34	146.30	
07/23/2014	344.02	488.31	144.29	

LS Golf Old #12 (Watermaster No. 144)**Southern Inland**

Owner: Laguna Seca Resorts

Aquifer Unit: QTc/Tsm

Well Type: Producer

Responsible Party: LSGR (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	233.9	368.02	134.12	
11/01/2013	228.6	368.02	139.42	
12/01/2013	226.5	368.02	141.52	
01/01/2014	226.6	368.02	141.42	
02/01/2014	223	368.02	145.02	
03/01/2014	222.7	368.02	145.32	
04/01/2014		368.02		not reported
05/01/2014		368.02		not reported
06/01/2014		368.02		not reported
07/01/2014	236	368.02	132.02	
08/01/2014	236	368.02	132.02	
09/01/2014	236	368.02	132.02	

LS No. 1 Subdivision (Watermaster No. 142)**Southern Inland**

Owner: Laguna Seca Resorts

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/20/2013	132.68	277.13	144.45	
12/20/2013	133.66	277.13	143.47	
03/19/2014	133.93	277.13	143.20	
08/06/2014	134.98	277.13	142.15	

LS Pistol Range (Watermaster No. 136)**Southern Inland**

Owner: County of Monterey

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	285.63	514.39	228.76	
03/18/2014	286.03	514.39	228.36	
08/05/2014	286.90	514.39	227.49	

LSRA #2 (Watermaster No. 196)**Southern Inland**

Owner: Monterey County Parks Department

Aquifer Unit: QTc

Well Type: Producer

Responsible Party: MCPD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013		390.9		Not Visited
11/01/2013		390.9		Not Visited
12/01/2013		390.9		Not Visited
01/01/2014	178	390.9	212.90	
02/01/2014		390.9		Not Visited
03/01/2014		390.9		Not Visited
04/01/2014	178	390.9	212.90	
05/01/2014		390.9		Not Visited
06/01/2014		390.9		Not Visited
07/01/2014	203	390.9	187.90	
08/01/2014		390.9		Not Visited
09/01/2014	213	390.9	177.90	

Luxton (Watermaster No. 243)

Northern Coastal

Owner: California American Water

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: CAW (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	99.5	89.12	-10.38	
10/31/2013	99.5	89.12	-10.38	
11/27/2013	99.6	89.12	-10.48	
12/26/2013	99.8	89.12	-10.68	
01/30/2014	99.7	89.12	-10.58	
02/27/2014	99.0	89.12	-9.88	
03/27/2014	99.0	89.12	-9.88	
04/24/2014		89.12		No Access
05/29/2014		89.12		No Access
06/26/2014		89.12		No Access
07/31/2014	103.0	89.12	-13.88	Converted to Monitor Well
08/28/2014	103.3	89.12	-14.18	
09/25/2014	103.2	89.12	-14.08	

Luzern #2 (Watermaster No. 159)

Northern Coastal

Owner: California American Water

Aquifer Unit: QTc/Tsm

Well Type: Producer

All Values in Feet

Responsible Party: CAW (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	188	159.99	-28.01	
10/31/2013	187.1	159.99	-27.11	
11/27/2013	187.0	159.99	-27.01	
12/26/2013	182.0	159.99	-22.01	
01/30/2014	187.0	159.99	-27.01	
02/27/2014	185.7	159.99	-25.71	

03/27/2014	186.0	159.99	-26.01	
04/24/2014	185.2	159.99	-25.21	
05/29/2014	218.0	159.99	-58.01	Well Running
06/26/2014	187	159.99	-27.01	
07/31/2014	187.6	159.99	-27.61	
08/28/2014	186.5	159.99	-26.51	
09/25/2014	208.6	159.99	-48.61	Well Running

Military (Watermaster No. 151)

Northern Coastal

Owner: California American Water

Aquifer Unit: QTc

Well Type: Producer

All Values in Feet

Responsible Party: CAW (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	165.3	135.8	-29.50	
10/31/2013	163.6	135.8	-27.80	
11/27/2013	163.0	135.8	-27.20	
12/16/2013	162.1	135.8	-26.30	
01/31/2014	162.9	135.8	-27.10	
02/27/2014	161.2	135.8	-25.40	
03/27/2014	161.0	135.8	-25.20	
04/24/2014		135.8		No Access
05/29/2014		135.8		No Access
06/26/2014		135.8		No Access
07/31/2014	161.5	135.8	-25.70	Converted to Monitor Well
08/28/2014	162.9	135.8	-27.10	
09/25/2014	162.6	135.8	-26.80	

MMP monitor (Watermaster No. 154)

Northern Coastal

Owner: Mission Memorial Park

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	360.40	315.42	-44.98	production well on
11/07/2013	360.59	315.42	-45.17	prod on
12/04/2013	360.54	315.42	-45.12	prod on
01/06/2014	359.60	315.42	-44.18	prod on
01/30/2014	359.10	315.42	-43.68	
03/05/2014	359.3	315.42	-43.88	
04/08/2014	359.1	315.42	-43.68	
04/28/2014	347.92	315.42	-32.50	
05/28/2014	351.89	315.42	-36.47	prod on
06/26/2014	351.71	315.42	-36.29	
07/28/2014	352.23	315.42	-36.81	prod on
08/28/2014	353.02	315.42	-37.60	prod on
09/29/2014	343.09	315.42	-27.67	prod on

MSC-Deep (Watermaster No. 102)

Northern Coastal

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/19/2013	99.93	80.29	-19.64	
11/07/2013	98.09	80.29	-17.80	
12/04/2013	97.95	80.29	-17.66	
01/06/2014	97.67	80.29	-17.38	
01/31/2014	97.14	80.29	-16.85	
03/05/2014	96.99	80.29	-16.70	

03/25/2014	89.40	80.29	-9.11
04/28/2014	95.45	80.29	-15.16
05/28/2014	96.62	80.29	-16.33
06/25/2014	97.11	80.29	-16.82
07/28/2014	97.64	80.29	-17.35
08/28/2014	98.81	80.29	-18.52
10/01/2014	98.38	80.29	-18.09

MSC-Shallow (Watermaster No. 101)

Northern Coastal

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/19/2013	75.85	80.1	4.25	
11/07/2013	74.69	80.1	5.41	
12/04/2013	74.45	80.1	5.65	
01/06/2014	75.17	80.1	4.93	
01/31/2014	75.13	80.1	4.97	
03/05/2014	75.12	80.1	4.98	
03/25/2014	76.38	80.1	3.72	
04/28/2014	74.82	80.1	5.28	
05/28/2014	75.09	80.1	5.01	
06/25/2014	75.32	80.1	4.78	
07/28/2014	75.62	80.1	4.48	
08/28/2014	75.39	80.1	4.71	
10/01/2014	75.67	80.1	4.43	

MW-B-22-180 (Watermaster No. 254)**Northern Coastal**

Owner: U.S.A. Fort Ord

Aquifer Unit: Qod/Qar

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
12/06/2013	157.46	168.1	10.64	
01/07/2014	157.66	168.1	10.44	
03/06/2014	158.17	168.1	9.93	
04/08/2014	158.25	168.1	9.85	
04/29/2014	158.21	168.1	9.89	
05/18/2014	158.31	168.1	9.79	Well Destroyed 6/2014

MW-B-23-180 (Watermaster No. 258)**Northern Coastal**

Owner: U.S.A. Fort Ord

Aquifer Unit: Qod/Qar

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
12/06/2013	110.3	113.52	3.22	
01/07/2014	110.16	113.52	3.36	
01/29/2014	109.5	113.52	4.02	
03/06/2014	109.98	113.52	3.54	
04/29/2014	109.59	113.52	3.93	
05/18/2014	109.81	113.52	3.71	Well Destroyed 6/2014

MW-BW-08-A (Watermaster No. 240)**Southern Coastal**

Owner: U.S.A. Fort Ord

Aquifer Unit: Qod/Qar

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
07/08/2014	59.90	205.18	145.28	

MW-BW-09-180 (Watermaster No. 241)**Southern Coastal**

Owner: U.S.A. Fort Ord

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
07/08/2014	209.18	206.22	-2.96	

Ord Grove #2 (Watermaster No. 153)**Northern Coastal**

Owner: California American Water

Aquifer Unit: QTc/Tsm

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	392.6	292.39	-100.21	
10/31/2013	391.8	292.39	-99.41	
11/27/2013	391.8	292.39	-99.41	
12/26/2013	386.7	292.39	-94.31	
01/30/2014	392.3	292.39	-99.91	
02/27/2014	391.3	292.39	-98.91	
03/27/2014	390.0	292.39	-97.61	
04/24/2014	388.5	292.39	-96.11	Production Well On
05/29/2014	390.9	292.39	-98.51	Production Well On
06/26/2014	391.0	292.39	-98.61	Production Well On
07/31/2014	389.3	292.39	-96.91	Production Well On
08/28/2014	393.5	292.39	-101.11	Production Well On
09/25/2014	393.2	292.39	-100.81	Production Well On

Ord Grove Test (Watermaster No. 107)**Northern Coastal**

Owner: California American Water

Aquifer Unit: QTc/Tsm

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
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11/07/2013	350.85	294.00	-56.85	prod on
12/04/2013	350.78	294.00	-56.78	prod on
01/06/2014	350.10	294.00	-56.10	prod on
01/30/2014	349.52	294.00	-55.52	prod on
03/05/2014	349.48	294.00	-55.48	prod on
04/28/2014	348.2	294.00	-54.20	prod on
05/28/2014	349.2	294.00	-55.20	prod on
06/26/2014	349.17	294.00	-55.17	
07/28/2014	349.22	294.00	-55.22	prod on
08/28/2014	350.10	294.00	-56.10	prod on
09/29/2014	349.98	294.00	-55.98	prod on

Ord Terrace-Shallow (Watermaster No. 109)

Northern Coastal

Owner: MPWMD

Aquifer Unit: Tsm (upper)

Well Type: Monitor

Responsible Party: MPWMD (Annually)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/17/2013	269.69	228.65	-41.04	
11/07/2013	269.78	228.65	-41.13	
12/04/2013	269.93	228.65	-41.28	
01/06/2014	268.95	228.65	-40.30	
01/30/2014	268.40	228.65	-39.75	
03/05/2014	268.21	228.65	-39.56	
03/28/2014	266.02	228.65	-37.37	
05/28/2014	267.82	228.65	-39.17	
06/26/2014	267.72	228.65	-39.07	
07/28/2014	267.78	228.65	-39.13	
08/28/2014	269.10	228.65	-40.45	
09/29/2014	268.99	228.65	-40.34	

Paralta (Watermaster No. 169)**Northern Coastal**

Owner: California American Water

Aquifer Unit: QTc/Tsm

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	373.7	324.49	-49.21	
10/31/2013	350.5	324.49	-26.01	
11/27/2013	353.0	324.49	-28.51	
12/26/2013	344.6	324.49	-20.11	
01/30/2014	356.0	324.49	-31.51	
02/27/2014	347.8	324.49	-23.31	
03/27/2014	347.0	324.49	-22.51	
04/24/2014	347.0	324.49	-22.51	
05/29/2014	348.7	324.49	-24.21	
06/26/2014		324.49		No Access
07/31/2014		324.49		No Access
08/28/2014	369.5	324.49	-45.01	Well On
09/25/2014	349.5	324.49	-25.01	

Paralta Test (Watermaster No. 108)**Northern Coastal**

Owner: MPWMD

Aquifer Unit: QTc/Tsm

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/08/2013	337.52	330.72	-6.80	
12/03/2013	337.30	330.72	-6.58	
01/06/2014	334.38	330.72	-3.66	
01/07/2014	333.00	330.72	-2.28	
01/30/2014	333.51	330.72	-2.79	
03/05/2014	333.42	330.72	-2.70	

04/02/2014	333.05	330.72	-2.33	
04/28/2014	333.02	330.72	-2.30	
05/27/2014	333.65	330.72	-2.93	
07/28/2014	333.57	330.72	-2.85	
08/28/2014	343.20	330.72	-12.48	prod on
10/01/2014	334.50	330.72	-3.78	

Pasadera Golf - Main Gate (Watermaster No. 208)

Southern Inland

Owner: Pasadera Country Club, LLC

Aquifer Unit: Tsm

Well Type: Producer

All Values in Feet

Responsible Party: Pasadera (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	225.8	345.42	119.62	
11/01/2013	214.33	345.42	131.09	
12/01/2013	210.08	345.42	135.34	
01/01/2014	211.83	345.42	133.59	
02/01/2014	208	345.42	137.42	
03/01/2014	207.08	345.42	138.34	
04/01/2014	208.17	345.42	137.25	
05/01/2014	219.42	345.42	126.00	
06/01/2014	225.5	345.42	119.92	
07/01/2014	227.25	345.42	118.17	
08/01/2014	226.08	345.42	119.34	
09/01/2014	220.17	345.42	125.25	

Pasadera Golf - Paddock (Watermaster No. 204)

Southern Inland

Owner: Pasadera Country Club, LLC

Aquifer Unit: QTc/Tsm

Well Type: Producer

All Values in Feet

Responsible Party: Pasadera (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	216.3	359.69	143.39	

11/01/2013	217.42	359.69	142.27
12/01/2013	215.5	359.69	144.19
01/01/2014	217	359.69	142.69
02/01/2014	213.42	359.69	146.27
03/01/2014	211.58	359.69	148.11
04/01/2014	212.42	359.69	147.27
05/01/2014	216.33	359.69	143.36
06/01/2014	216.33	359.69	143.36
07/01/2014	216.33	359.69	143.36
08/01/2014	216.33	359.69	143.36
09/01/2014	224.92	359.69	134.77

PCA Production (Watermaster No. 171)

Northern Coastal

Owner: Security National Guaranty Inc

Aquifer Unit: QTc

Well Type: Producer

All Values in Feet

Responsible Party: Craig Evans (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/25/2013	67.20	72.63	5.43	
10/25/2013	68.02	72.63	4.61	
11/23/2013	67.8	72.63	4.83	
12/25/2013	67.8	72.63	4.83	
01/26/2014	67.8	72.63	4.83	
02/22/2014	68.3	72.63	4.33	
03/25/2014	68.4	72.63	4.23	
04/25/2014	68.4	72.63	4.23	
05/25/2014	68.1	72.63	4.53	
06/24/2014	68.5	72.63	4.13	
07/25/2014	68.15	72.63	4.48	
08/23/2014	68.6	72.63	4.03	
09/22/2014	67.88	72.63	4.75	

PCA-E Shallow (Watermaster No. 105)**Northern Coastal**

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/17/2013	62.67	68.51	5.84	
11/07/2013	62.75	68.51	5.76	
12/04/2013	59.72	68.51	8.79	
01/06/2014	62.80	68.51	5.71	
01/30/2014	62.62	68.51	5.89	
03/05/2014	62.41	68.51	6.10	
04/02/2014	62.22	68.51	6.29	
04/28/2014	62.21	68.51	6.30	
05/28/2014	62.42	68.51	6.09	
06/26/2014	62.45	68.51	6.06	
07/28/2014	62.72	68.51	5.79	
08/28/2014	62.72	68.51	5.79	
09/28/2014	62.91	68.51	5.60	

PCA-W Deep (Watermaster No. 104)**Northern Coastal**

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/19/2013	87.11	68.18	-18.93	
03/25/2014	85.49	68.18	-17.31	
06/25/2014	84.89	68.18	-16.71	
09/11/2014	85.62	68.18	-17.44	

PCA-W Shallow (Watermaster No. 103)**Northern Coastal**

Owner: MPWMD

Aquifer Unit: QTc

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/16/2013	58.83	64.22	5.39	
03/25/2014	59.31	64.22	4.91	
06/25/2014	59.13	64.22	5.09	
09/11/2014	59.02	64.22	5.20	

Playa #3 (Watermaster No. 162)**Northern Coastal**

Owner: California American Water

Aquifer Unit: QTc

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	153	56.02	-96.98	well running
10/31/2013	153.6	56.02	-97.58	well running
11/27/2013	154.2	56.02	-98.18	well running
12/26/2013	153.2	56.02	-97.18	well running
01/30/2014	154.1	56.02	-98.08	well running
02/27/2014	54.0	56.02	2.02	
03/27/2014	54.0	56.02	2.02	
04/24/2014	52.3	56.02	3.72	
05/29/2014	160.9	56.02	-104.88	Well On
06/26/2014	54	56.02	2.02	
07/31/2014	167.7	56.02	-111.68	Well On
08/28/2014	54.7	56.02	1.32	
09/25/2014	158.1	56.02	-102.08	Well On

Playa #4 (Watermaster No. 163)**Northern Coastal**

Owner: California American Water

Aquifer Unit: QTc/Tsm

Well Type: Monitor

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	64	52.53	-11.47	
10/31/2013	no access	52.53		
11/27/2013	66.2	52.53	-13.67	
12/26/2013	66.3	52.53	-13.77	
01/30/2014	65.5	52.53	-12.97	
02/27/2014	64.8	52.53	-12.27	
03/27/2014	65.0	52.53	-12.47	
04/24/2014	64.4	52.53	-11.87	
05/19/2014	65.8	52.53	-13.27	
06/26/2014	64.0	52.53	-11.47	
07/31/2014		52.53		Well Destroyed 7/2014

Plumas #4 (Watermaster No. 177)**Southern Coastal**

Owner: California American Water

Aquifer Unit: Tsm

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	225.4	161.48	-63.92	Well Running
10/31/2013	229.5	161.48	-68.02	Well Running
11/27/2013	233.3	161.48	-71.82	Well Running
12/26/2013	227.4	161.48	-65.92	Well Running
01/30/2014	232.0	161.48	-70.52	Well Running
02/27/2014	120.2	161.48	41.28	
03/27/2014	115.0	161.48	46.48	
04/24/2014	113.7	161.48	47.78	

05/29/2014	200.5	161.48	-39.02	Well Running
06/26/2014	113.0	161.48	48.48	
07/31/2014	231.1	161.48	-69.62	Well Running
08/28/2014	113.7	161.48	47.78	
09/25/2014	179.1	161.48	-17.62	Well Running

Plumas Test 1990 (Watermaster No. 124)

Southern Coastal

Owner: MPWMD

Aquifer Unit: Tsm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
11/07/2013	108.08	157.82	49.74	prod on
12/04/2013	108.30	157.82	49.52	prod on
01/06/2014	108.41	157.82	49.41	prod on
01/30/2014	108.98	157.82	48.84	prod on
03/05/2014	108.62	157.82	49.20	
04/08/2014	108.02	157.82	49.80	
04/28/2014	107.72	157.82	50.10	
05/28/2014	108.22	157.82	49.60	prod on
07/01/2014	107.54	157.82	50.28	
07/28/2014	108.3	157.82	49.52	prod on
09/02/2014	107.81	157.82	50.01	
10/01/2014	108.33	157.82	49.49	

Robley Deep (South) (Watermaster No. 140)

Southern Inland

Owner: County of Monterey

Aquifer Unit: Tsm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	392.86	566.44	173.58	
12/23/2013	393.99	566.44	172.45	

03/19/2014	389.73	566.44	176.71
08/13/2014	395.25	566.44	171.19

Robley Shallow (North) (Watermaster No. 139)

Southern Inland

Owner: County of Monterey

Aquifer Unit: QTc

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	318.32	599.54	281.22	
12/23/2013	318.70	599.54	280.84	
03/19/2014	320.13	599.54	279.41	
08/13/2014	320.95	599.54	278.59	

Ryan Ranch #11 (Watermaster No. 215)

Southern Inland

Owner: California American Water

Aquifer Unit: Tsm

Well Type: Producer

All Values in Feet

Responsible Party: CAW (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	201	307.59	106.59	
10/31/2013	224	307.59	83.59	
11/27/2013	211	307.59	96.59	
12/26/2013	201	307.59	106.59	
01/30/2014	203	307.59	104.59	
02/27/2014	195	307.59	112.59	
03/27/2014	197	307.59	110.59	
04/24/2014	198	307.59	109.59	
05/29/2014	197	307.59	110.59	
06/26/2014	197	307.59	110.59	
07/31/2014	192	307.59	115.59	
08/28/2014	173	307.59	134.59	
09/25/2014	176	307.59	131.59	

Ryan Ranch #7 (Watermaster No. 213)**Southern Inland**

Owner: California American Water

Aquifer Unit: Tsm

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	244	294	50.00	
10/31/2013	399	294	-105.00	Well Running
11/27/2013	396	294	-102.00	Well Running
12/26/2013	240	294	54.00	
01/30/2014	384	294	-90.00	Well Running
02/27/2014	392	294	-98.00	Well Running
03/27/2014	320	294	-26.00	Well Running
04/24/2014	240	294	54.00	
05/19/2014	242	294	52.00	
06/26/2014	402	294	-108.00	Well Running
07/31/2014	405	294	-111.00	Well Running
08/26/2014	371	294	-77.00	Well Running
09/25/2014	346	294	-52.00	Well Running

Ryan Ranch #8 (Watermaster No. 216)**Southern Inland**

Owner: California American Water

Aquifer Unit: Tsm

Well Type: Producer

Responsible Party: CAW (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/26/2013	203	306.86	103.86	
10/31/2013	204	306.86	102.86	
11/27/2013	213	306.86	93.86	
12/26/2013	203	306.86	103.86	
01/30/2014	208	306.86	98.86	
02/27/2014	197	306.86	109.86	

03/27/2014	200	306.86	106.86
04/24/2014	199	306.86	107.86
05/29/2014	200	306.86	106.86
06/26/2014	198	306.86	108.86
07/31/2014	197	306.86	109.86
08/28/2014	188	306.86	118.86
09/25/2014	196	306.86	110.86

Sand City Corp Yard (Watermaster No. 165)

Southern Coastal

Owner: City of Sand City

Aquifer Unit: Qod/Qar/QTc

Well Type: Producer

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	42.68	47.25	4.57	1540 us/cm
11/08/2013	42.71	47.25	4.54	1640 us/cm
12/04/2013	42.35	47.25	4.90	1560 us/cm
01/06/2014	42.20	47.25	5.05	1760 us/cm
01/30/2014	41.95	47.25	5.30	1720 us/cm
03/05/2014	42.23	47.25	5.02	1570 us/cm
04/08/2014	42.42	47.25	4.83	1580 us/cm
04/28/2014	42.40	47.25	4.85	1620 us/cm
05/28/2014	42.49	47.25	4.76	1440 us/cm
07/01/2014	42.39	47.25	4.86	
07/28/2014	42.50	47.25	4.75	1630 us/cm
08/28/2014	42.38	47.25	4.87	1500 us/cm
10/01/2014	42.41	47.25	4.84	1640 us/cm

Seaside Golf - Coe (Watermaster No. 189)

Northern Coastal

Owner: City of Seaside

Aquifer Unit: QTc

Well Type: Producer

Responsible Party: City of Seaside (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/02/2013	101.07	115.15	14.08	
11/01/2013	101.15	115.15	14.00	
12/01/2013	100.96	115.15	14.19	
01/01/2014	101.12	115.15	14.03	
02/01/2014	101.21	115.15	13.94	
03/01/2014	100.98	115.15	14.17	
04/01/2014	100.97	115.15	14.18	
05/01/2014	100.92	115.15	14.23	
06/01/2014	100.93	115.15	14.22	
07/01/2014	101.04	115.15	14.11	
08/01/2014	101.18	115.15	13.97	
09/01/2014	101.26	115.15	13.89	
10/01/2014	101.37	115.15	13.78	

Seaside Golf - Reservoir (Watermaster No. 187)

Northern Coastal

Owner: City of Seaside

Aquifer Unit: Qc, Tsm

Well Type: Producer

Responsible Party: City of Seaside (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/02/2013	392.48	417.44	24.96	
11/01/2013	392.40	417.44	25.04	
12/01/2013	392.48	417.44	24.96	
01/01/2014	392.23	417.44	25.21	
02/01/2014	392.06	417.44	25.38	
03/01/2014	391.68	417.44	25.76	

04/01/2014	391.81	417.44	25.63
05/01/2014	391.71	417.44	25.73
06/01/2014	391.64	417.44	25.80
07/01/2014	392.25	417.44	25.19
08/01/2014	392.02	417.44	25.42
09/01/2014	391.98	417.44	25.46

Seaside Muni #3 (Watermaster No. 174)

Northern Coastal

Owner: City of Seaside

Aquifer Unit: QTc, Tsm

Well Type: Producer

All Values in Feet

Responsible Party: City of Seaside (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/02/2013	271.43	307.19	35.76	
11/01/2013	271.45	307.19	35.74	
12/01/2013	271.21	307.19	35.98	
01/01/2014	271.05	307.19	36.14	
02/01/2014	270.78	307.19	36.41	
03/01/2014	271.02	307.19	36.17	
04/01/2014	270.80	307.19	36.39	
05/01/2014	270.75	307.19	36.44	
06/01/2014	271.13	307.19	36.06	
07/01/2014	270.78	307.19	36.41	
08/01/2014	270.81	307.19	36.38	
09/01/2014	271.14	307.19	36.05	
10/01/2014	270.87	307.19	36.32	

Seaside Muni #4 (Watermaster No. 173)

Northern Coastal

Owner: City of Seaside

Aquifer Unit: QTc, Tsm

Well Type: Producer

All Values in Feet

Responsible Party: City of Seaside (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
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10/01/2013	347.1	312.12	-34.98
11/01/2013	347.05	312.12	-34.93
12/01/2013	347.20	312.12	-35.08
01/01/2014	347.00	312.12	-34.88
02/01/2014	346.80	312.12	-34.68
03/01/2014	346.71	312.12	-34.59
04/01/2014	346.0	312.12	-33.88
05/01/2014	344.7	312.12	-32.58
06/01/2014	344.5	312.12	-32.38
07/01/2014	343.00	312.12	-30.88
08/01/2014	342.1	312.12	-29.98
09/01/2014	342.02	312.12	-29.90

Seca Place (Watermaster No. 138)

Southern Inland

Owner: County of Monterey

Aquifer Unit: Tsm

Well Type: Monitor

All Values in Feet

Responsible Party: MPWMD (Quarterly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	267.26	427.58	160.32	
12/23/2013	269.31	427.58	158.27	
03/19/2014	262.23	427.58	165.35	
08/13/2014	269.08	427.58	158.50	

Target Well (Watermaster No. 152)

Northern Coastal

Owner: DBO Development

Aquifer Unit: QTc/Tsm

Well Type: Producer

All Values in Feet

Responsible Party: MPWMD (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	60.22	44.42	-15.80	
11/07/2013	60.14	44.42	-15.72	
12/04/2013	60.21	44.42	-15.79	

01/07/2014	60.69	44.42	-16.27
01/30/2014	60.35	44.42	-15.93
03/06/2014	60.29	44.42	-15.87
04/08/2014	60.24	44.42	-15.82
04/28/2014	59.72	44.42	-15.30
05/28/2014	59.98	44.42	-15.56
07/01/2014	60.03	44.42	-15.61
07/28/2014	60.19	44.42	-15.77
08/28/2014	60.08	44.42	-15.66
10/01/2014	60.18	44.42	-15.76

Toro #3 (Watermaster No. 303)

Southern Inland

Owner: Cal-Am

Aquifer Unit: QTc

Well Type: Producer

All Values in Feet

Responsible Party: Cal-Am (Monthly)

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/31/2013	205	449	244.00	
11/27/2013	205	449	244.00	
12/26/2013	206	449	243.00	
01/30/2014	206	449	243.00	
02/27/2014	204	449	245.00	
03/27/2014	205	449	244.00	
04/24/2014	205	449	244.00	
05/29/2014	205	449	244.00	
06/26/2014	208	449	241.00	
07/31/2014	202	449	247.00	
08/28/2014	208	449	241.00	
09/25/2014	209	449	240.00	

York Rd-West (Watermaster No. 137)**Southern Inland**

Owner: County of Monterey

Aquifer Unit: Tsm

Well Type: Monitor

Responsible Party: MPWMD (Quarterly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
09/18/2013	317.54	490.28	172.74	
12/20/2013	317.47	490.28	172.81	
03/18/2014	318.60	490.28	171.68	
08/05/2014	320.66	490.28	169.62	

York School 2001 (Watermaster No. 212)**Southern Inland**

Owner: York School

Aquifer Unit: QTc/Tsm

Well Type: Producer

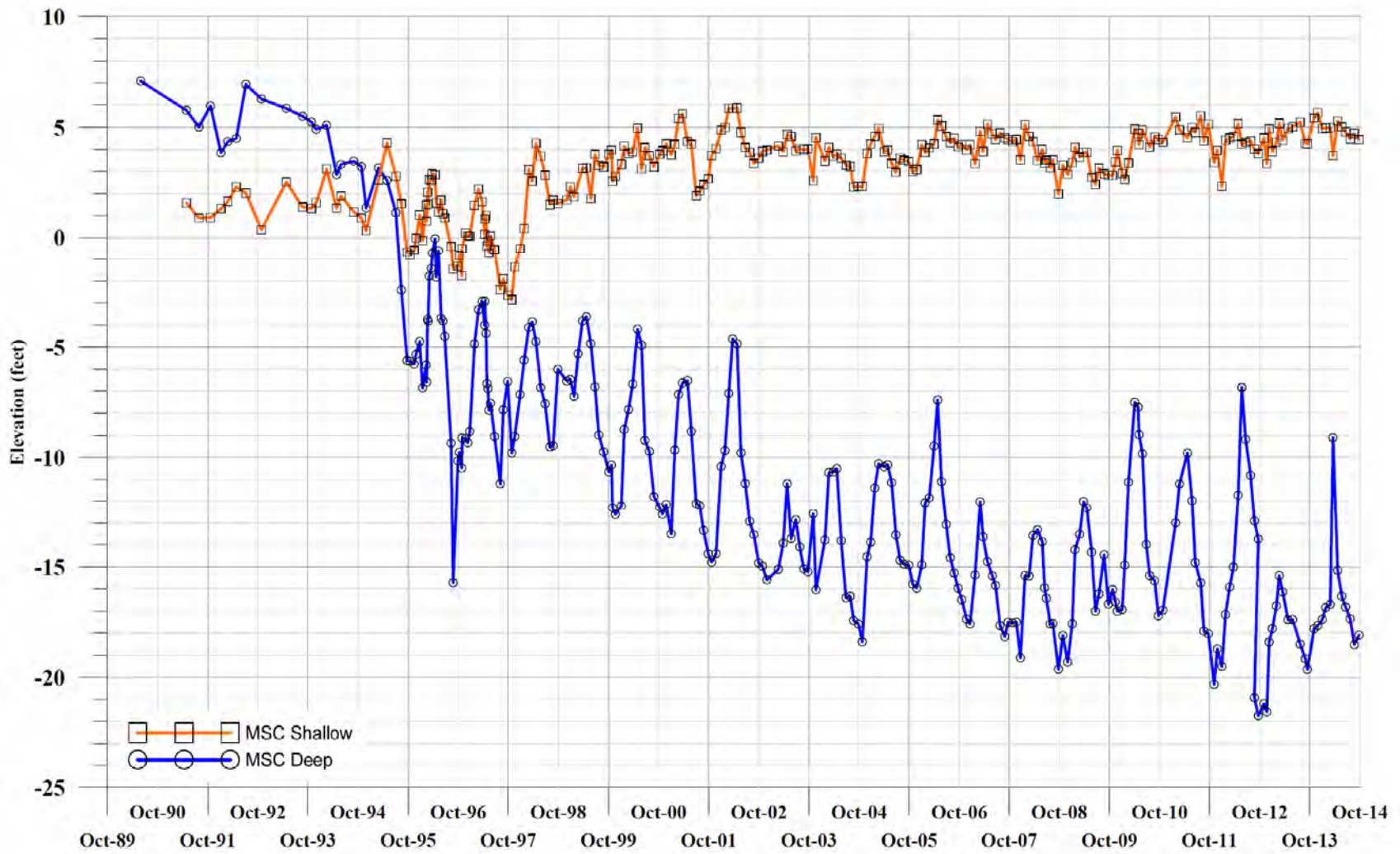
Responsible Party: MPWMD (Monthly)

All Values in Feet

Date Measured	Depth To Water	Ref Point	Water Elevation	Comments
10/01/2013	224.44	384.3	159.86	
11/07/2013	221.35	384.3	162.95	
12/04/2013	222.22	384.3	162.08	
01/30/2014	221.71	384.3	162.59	
03/05/2014	220.8	384.3	163.50	
04/09/2014	223.08	384.3	161.22	
04/30/2014	224.44	384.3	159.86	
05/28/2014	238.20	384.3	146.10	
07/01/2014	224.21	384.3	160.09	
07/19/2014	229.22	384.3	155.08	
09/02/2014	274.00	384.3	110.30	production well on
09/29/2014	242.16	384.3	142.14	

Appendix 3

Selected Hydrographs

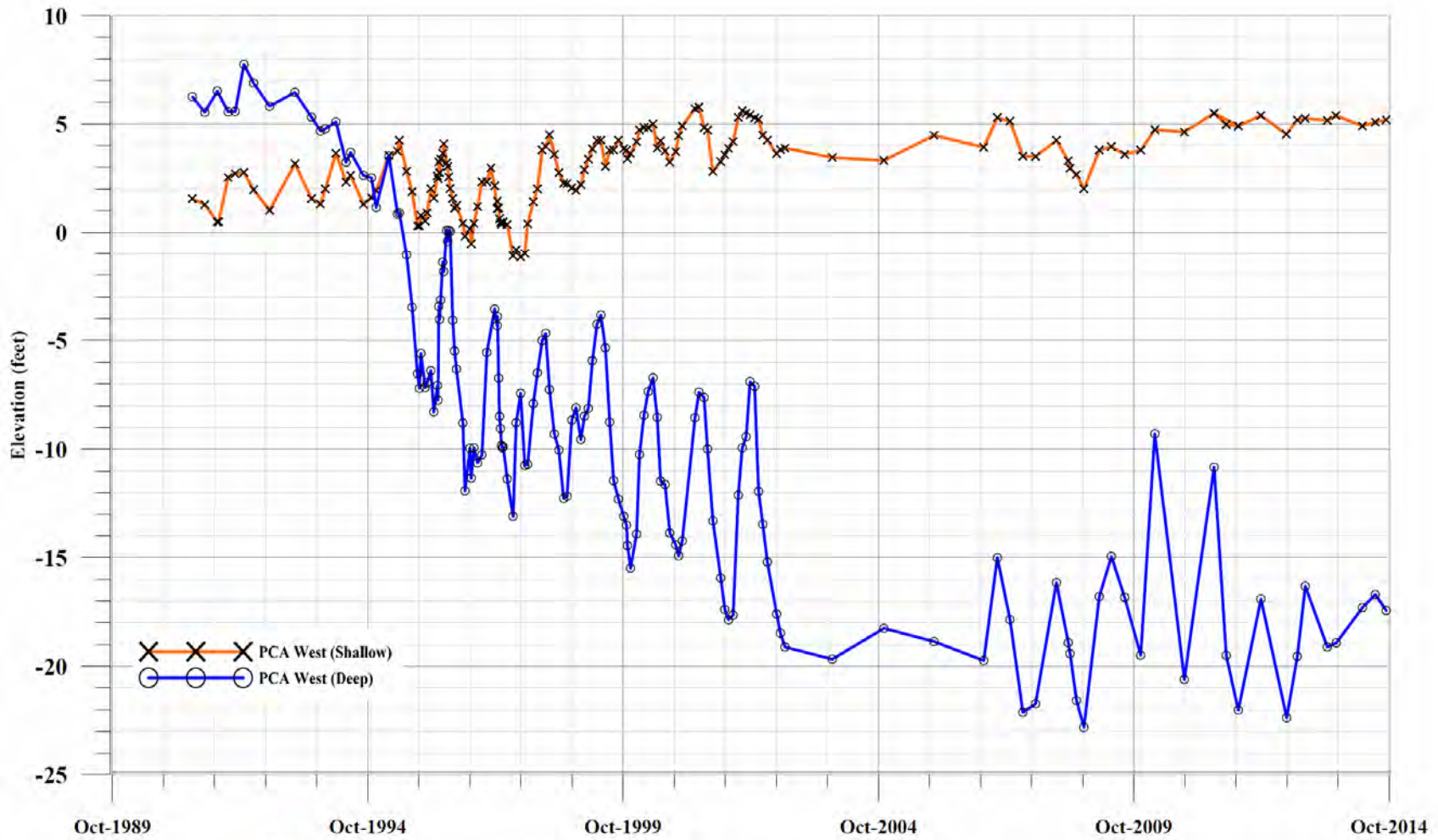


MSC-Shallow (15S/1E-15N1)

Screened from 490-680 in the Paso Robles Formation (QTp)
Wellhead Elevation 80.1 MSL
DWR Driller Log No. 338413

MSC-Deep (15S/1E-15N2)

Screened from 810-850 in the Santa Margarita Formation (Tsm)
Wellhead Elevation 80.29 MSL
DWR Driller Log No. 338425
Datasource: MPWMD

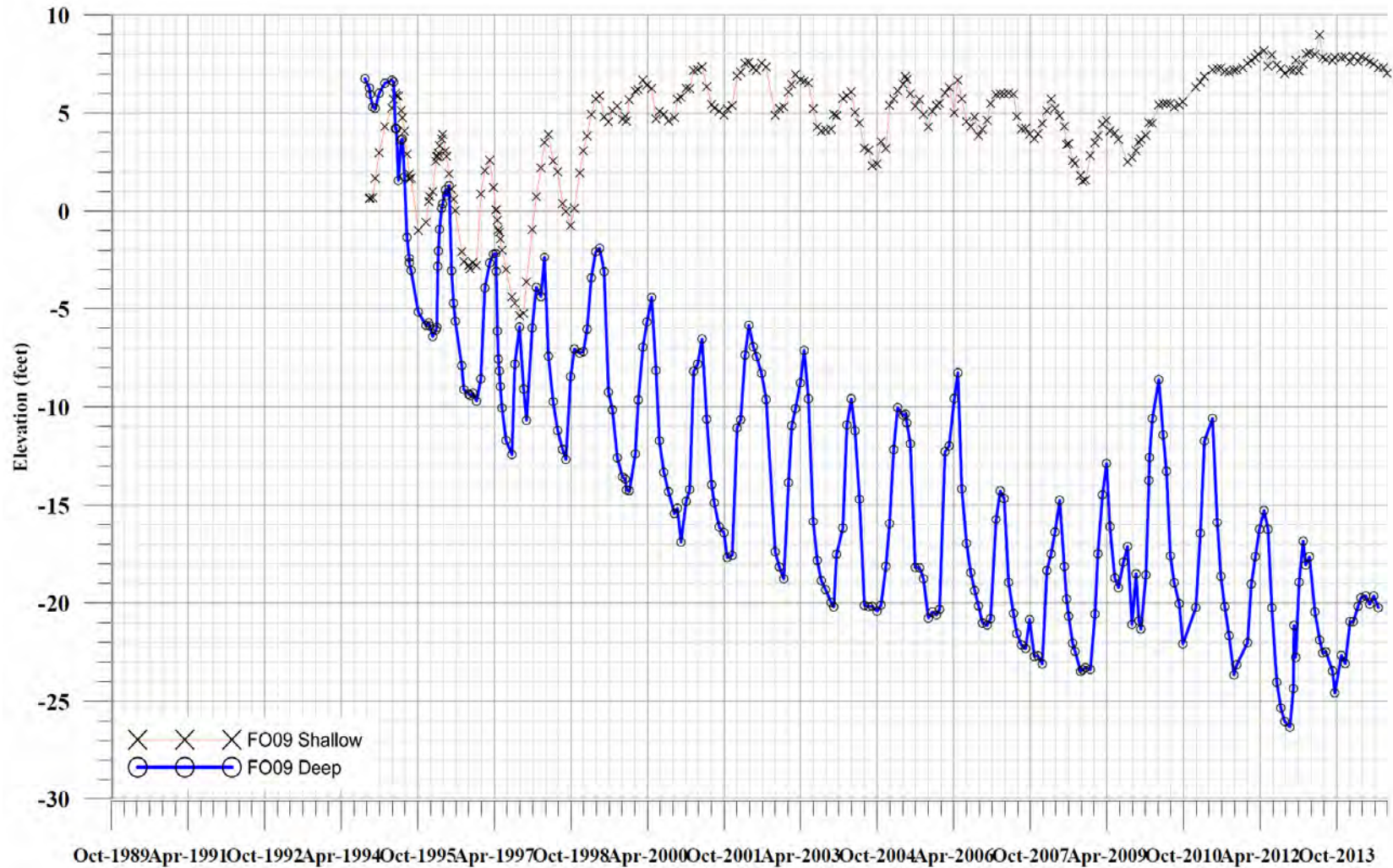


PCA West (Deep) (15S/1E-15F2)

Screened from 825-875 in the Santa Margarita Sandstone (Tsm)
Wellhead Elevation 65.18 MSL
DWR Driller Log No. 338401
Datasource: MPWMD

PCA West (Shallow) (15S/1E-15F1)

Screened from 525-575 in the Paso Robles Formation (QTp)
Wellhead Elevation 64.22 MSL
DWR Driller Log No. 338400
Datasource: MPWMD

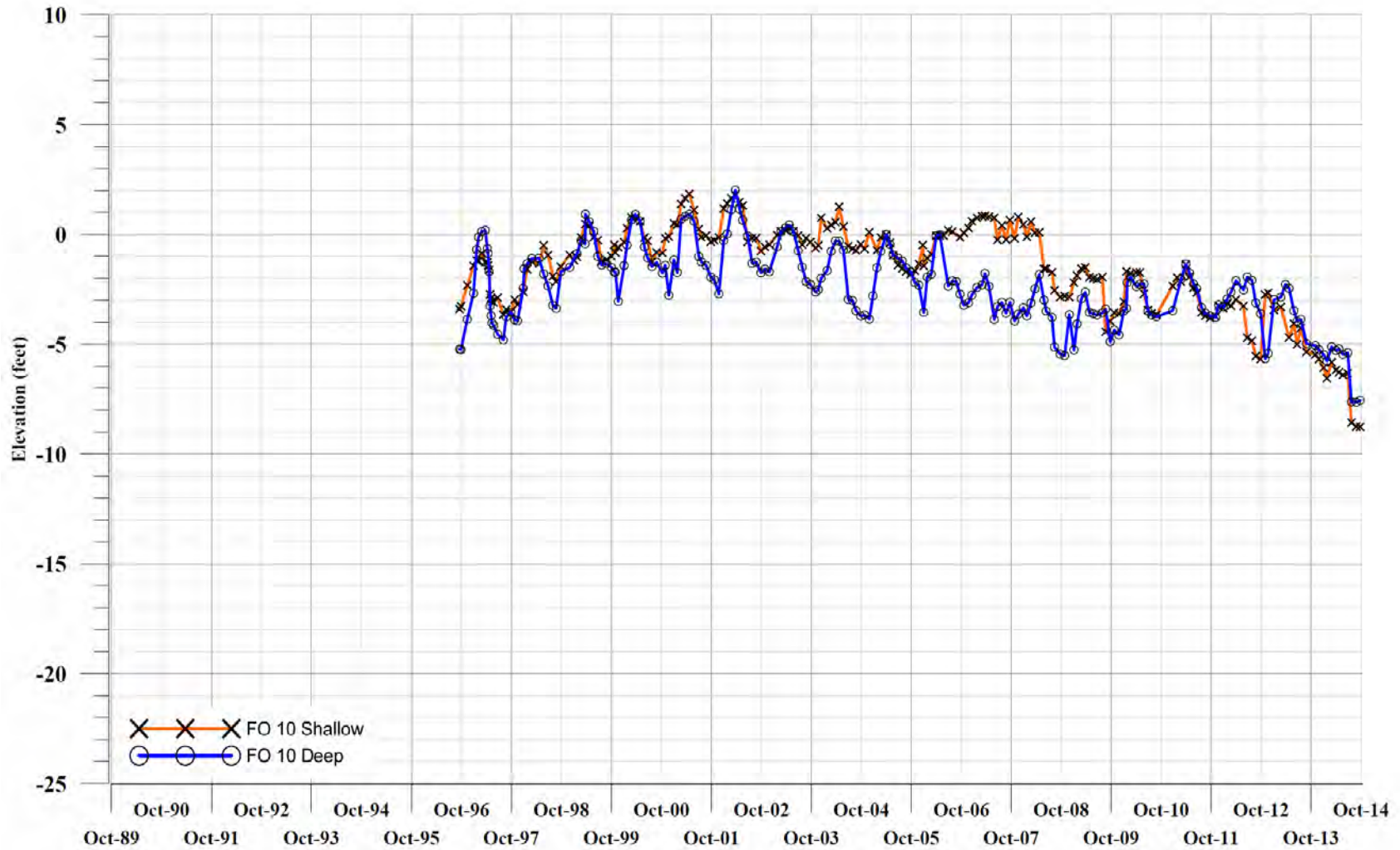


FO-09 (shallow) (15S/1E-11Pa)

Screened from 610-650 in the Paso Robles (QTp)
Wellhead Elevation 118.89 MSL
DWR Driller Log No. N/A
Datasource: MPWMD

FO-09 (Deep) (15S/1E-15Pb)

Screened from 790-830 in the Santa Margarita Formation (Tsm)
Wellhead Elevation 188.85 MSL
DWR Driller Log No. N/A
Datasource: MPWMD

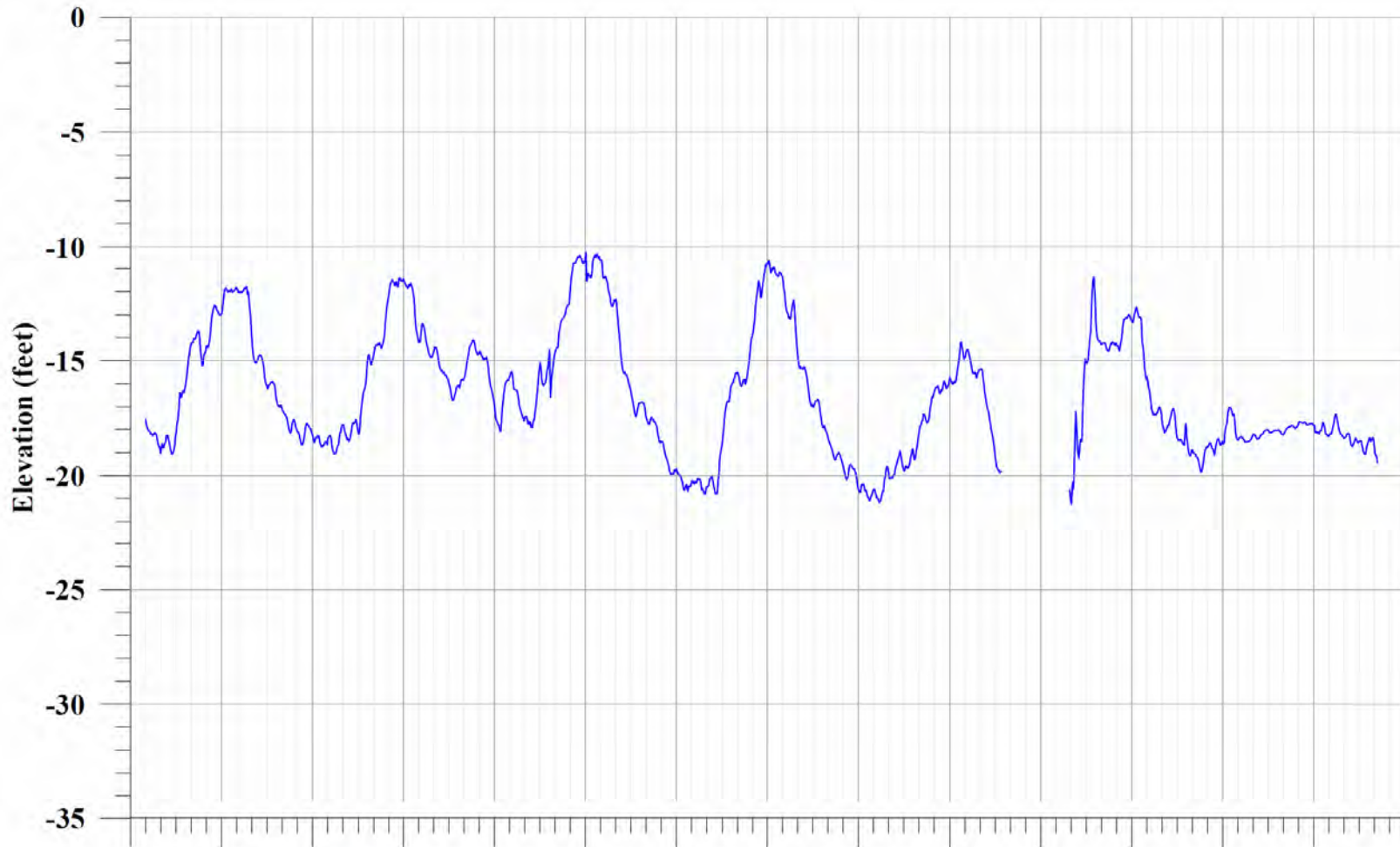


FO-10 (Shallow) (15S/1E-11Fa)

Screened from 480-500 in the Paso Robles (QTp)
Wellhead Elevation 200.85 MSL
DWR Driller Log No. N/A
Datascource: MPWMD

FO-10 (Deep) (15S/1E-15Fc)

Screened from 790-830 in the Santa Margarita Formation (Tsm)
Wellhead Elevation 201.03 MSL
DWR Driller Log No. N/A
Datascource: MPWMD



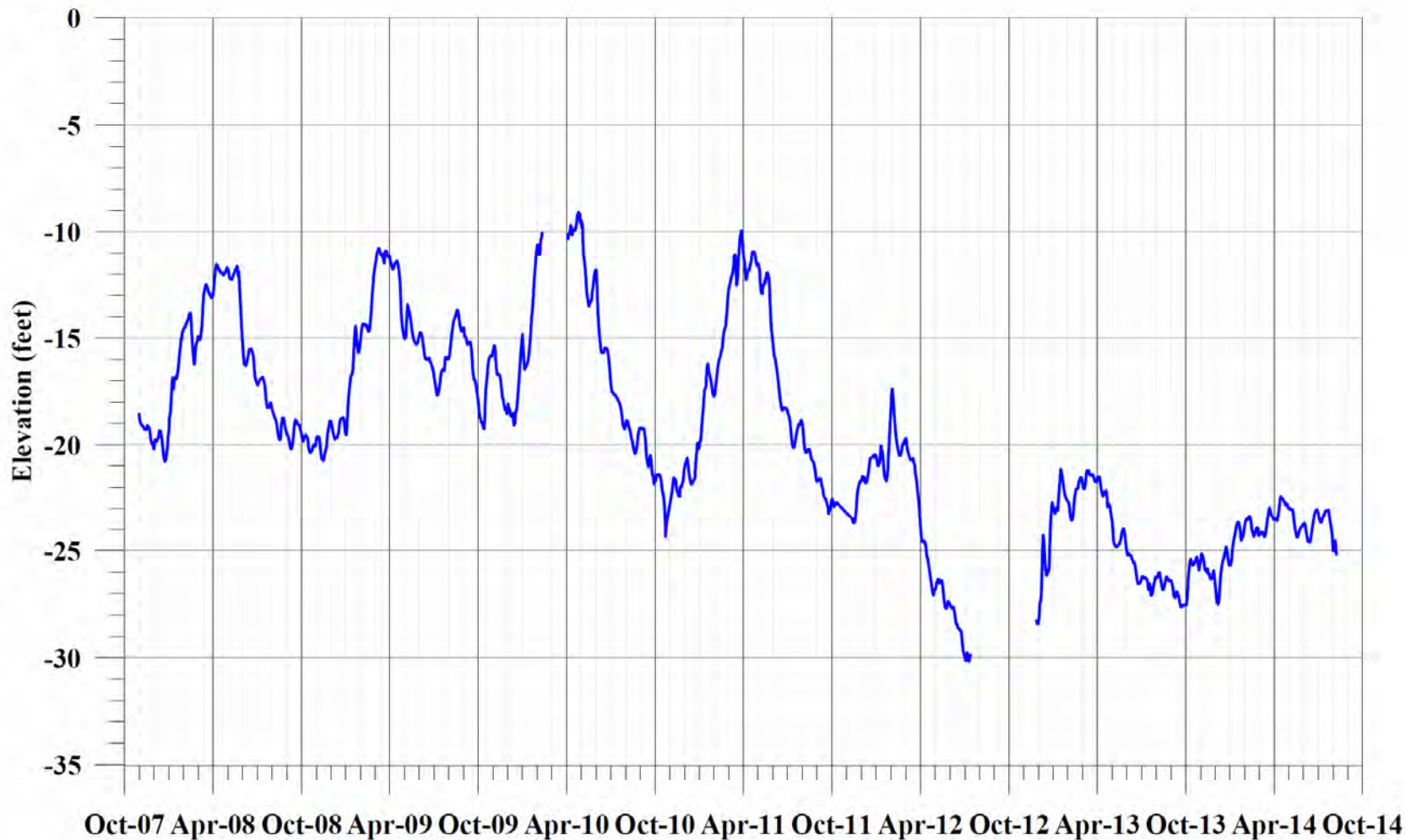
Oct-07 Apr-08 Oct-08 Apr-09 Oct-09 Apr-10 Oct-10 Apr-11 Oct-11 Apr-12 Oct-12 Apr-13 Oct-13 Apr-14 Oct-14

Sentinel Well No. 1 Hydrograph

Continuous water level reported by tidal days



Screen intervals (feet below ground) : 1130-1150,
 1210-1230, 1290-1310, 1380-1400, 1470-1490
 Total Depth: 1500 feet



Sentinel Well No. 2 Hydrograph

Continuous water level reported by tidal days

Screen intervals (feet below ground) : 990-1010, 1070-1090,
 1140-1160, 1230-1250, 1370-1390, 1460-1480

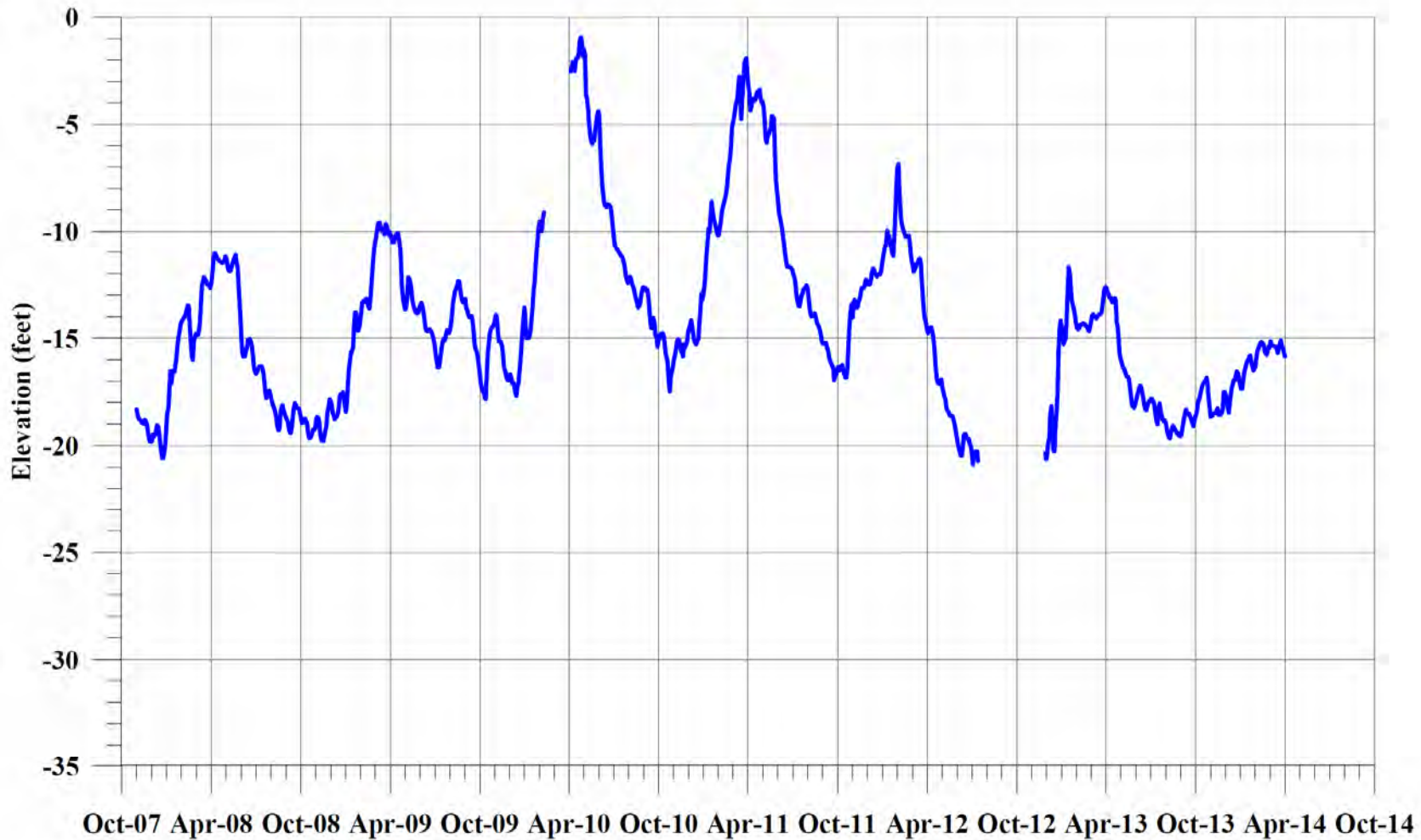


Oct-07 Apr-08 Oct-08 Apr-09 Oct-09 Apr-10 Oct-10 Apr-11 Oct-11 Apr-12 Oct-12 Apr-13 Oct-13 Apr-14 Oct-14



Sentinel Well No. 3 Hydrograph

Continuous water level reported by tidal days
 Screen intervals (feet below ground) : 860-880, 970-990,
 1060-1080, 1200-1220, 1270-1290
 Total Depth: 1310 feet

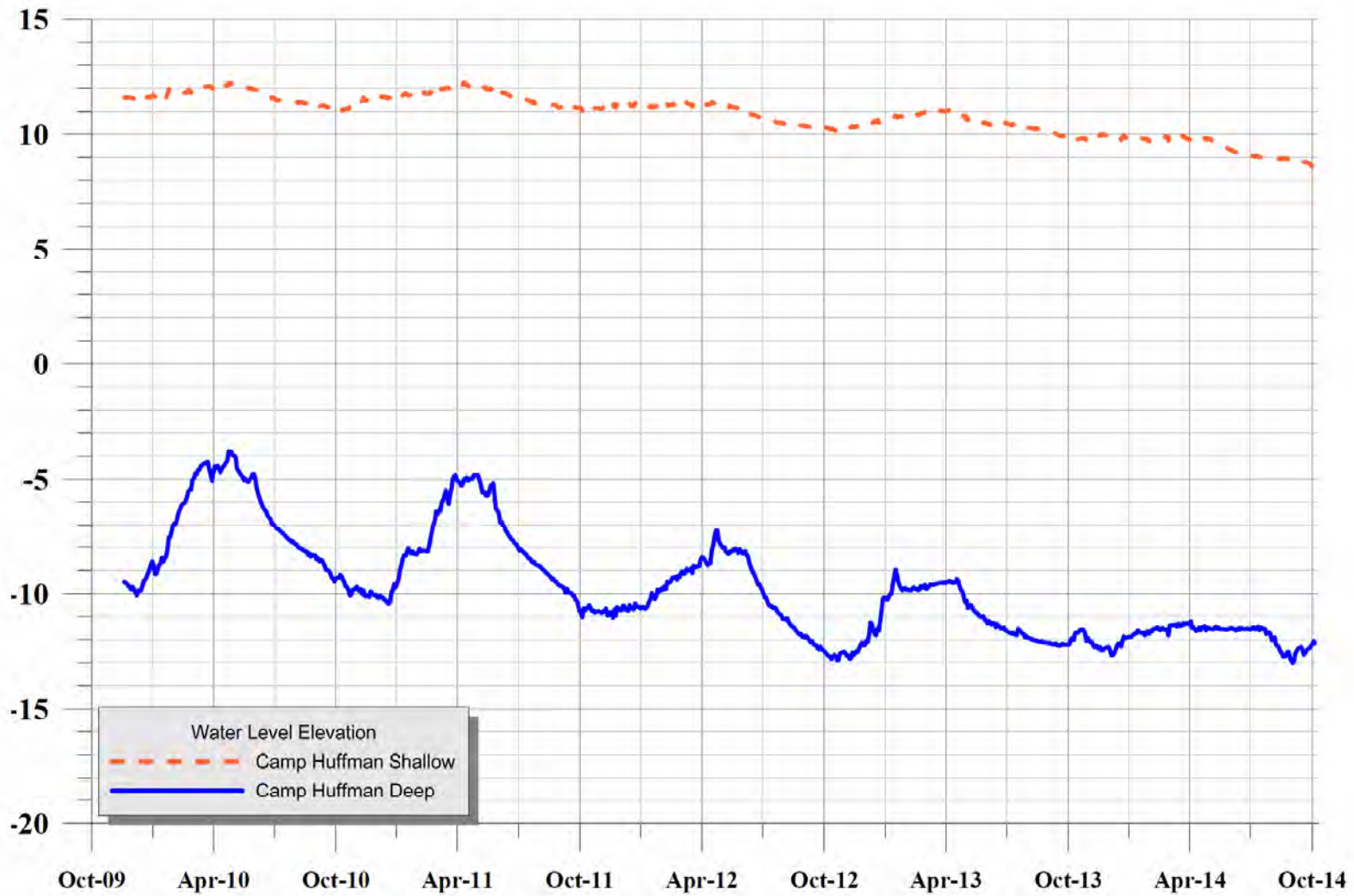


Sentinel Well No. 4 Hydrograph

Continuous water level reported by tidal days

Screen intervals (feet below ground) : 705-800, 820-920

Total Depth: 930 feet



Camp Huffman Monitor Well Hydrographs

Shallow Perforations - 600 to 680 feet bgs
 Deep Perforations - 950 to 1,320 feet bgs

ATTACHMENT 8

**EXECUTIVE SUMMARY
FROM THE
WY 2014 SEAWATER INTRUSION ANALYSIS REPORT**

EXECUTIVE SUMMARY

No seawater intrusion has historically been or is currently observed in existing monitoring and production wells in the Seaside Groundwater Basin, as demonstrated by the different tools and analyses that are used to investigate for evidence of seawater intrusion.

This annual report addresses the potential for, and extent of, seawater intrusion in the Seaside Groundwater Basin. Continued pumping in excess of recharge and fresh water inflows, pumping depressions near the coast, and ongoing seawater intrusion in the nearby Salinas Valley all suggest that seawater intrusion could occur in the Seaside Groundwater Basin.

- Piper diagrams for groundwater samples collected from depth-discreet monitoring wells during Water Year 2014 show no changes in water chemistry towards seawater.
- No groundwater samples collected in Water Year 2014 and plotted on Stiff diagrams, show chemistry indicative of incipient seawater intrusion.
- Overall, chloride concentration trends have been stable for most monitoring wells, with only two wells showing increasing trends over the past few years. These are sentinel well SBWM-1 and SBWM-2.
- Maps of chloride concentrations for the shallow aquifer do not show chlorides increasing towards the coast. The deep aquifer maps show that the highest chloride concentrations are limited to coastal monitoring wells PCA-West Deep and sentinel well SBWM-4. The chloride concentrations in these wells appears to be stable.
- Although production wells have a different water quality than the monitoring wells, this is probably as a result of them being screened across both shallow and deep zones. The production well water qualities are not indicative of seawater intrusion.
- Induction logging data at the coastal sentinel wells do not indicate changes indicative of seawater intrusion.

- Groundwater levels continue to be below protective elevations in the deep coastal target monitoring wells for which protective elevations were developed (MSC deep, PCA-West, and sentinel well SBWM-3). Two of the three shallow wells' groundwater levels are above protective elevations: PCA-W shallow and CDM-MW4. MSC shallow remains below protective elevations.

Based on the findings of this report, the following recommendations should be implemented to continue to monitor and track potential seawater intrusion.

- 1. Verification Water Quality Sampling and Analysis for Sentinel Well SBWM-1**
Because of the 47 mg/L increase in chloride and 31 mg/L increase in sodium at sentinel well SBWM-1 since last year, it is recommended that this well be resampled in the next quarter to verify these increases at both sample depths.
- 2. Continue to Analyze and Report on Water Quality Annually**
Seawater intrusion is a threat, and data must be analyzed regularly to identify incipient intrusion. Maps, graphs, and analyses similar to what are found in this report should continue to be developed every year.

ATTACHMENT 9

**SEASIDE GROUNDWATER BASIN
MANAGEMENT AND MONITORING PROGRAM
ANTICIPATED 2015 WORK PLAN**

Seaside Groundwater Basin Management and Monitoring Program Proposed FY 2015 Work Plan

The tasks outlined below are those that are anticipated to be performed during 2015. Some Tasks listed below are specific to 2015, while others Tasks recur throughout the program, such as data collection and database entry, and Program Administration Tasks.

Within the context of this document the term "Consultant" refers either to a firm providing professional engineering or other types of technical services, or to the Monterey Peninsula Water Management District (MPWMD). The term "Contractor" refers to a firm providing construction or field services such as well drilling, induction logging, or meter calibration.

M.1 Program Administration

M. 1. a Project Budget and Controls (\$0)	Consultants will provide monthly or bimonthly invoices to the Watermaster for work performed under their contracts with the Watermaster. Consultants will perform maintenance of their internal budgets and schedules, and management of their subconsultants. The Watermaster will perform management of its Consultants.
M. 1. b Assist with Board and TAC Agendas (\$0)	Watermaster staff will prepare Board and TAC meeting agenda materials. No assistance from Consultants is expected to be necessary to accomplish this Task.
M. 1. c. & M. 1. d Preparation for and Attendance at Meetings (\$7,000)	<p>The Consultants' work will require internal meetings and possibly meetings with outside governmental agencies and the public. For meetings with outside agencies, other Consultants, or any other parties which are necessary for the conduct of the work of their contracts, the Consultants will set up the meetings and prepare agendas and meeting minutes to facilitate the meetings. These may include planning and review meetings with Watermaster staff. The costs for these meetings will be included in their contracts, under the specific Tasks and/or subtasks to which the meetings relate. The only meeting costs that will be incurred under Tasks M.1.c and M.1.d will be:</p> <p>Those associated with attendance at TAC meetings (either in person or by teleconference connection), including providing written monthly progress reports to the Watermaster for inclusion in the agenda packets for the TAC meetings, when requested by the Watermaster to do so. These progress reports will typically include project progress that has been made, problem identification and resolution, and planned upcoming work. and</p> <p>From time-to-time when Watermaster staff asks Consultants to make special presentations to the Watermaster Board and/or the TAC, and which are not included in the Consultant's contracts for other tasks.</p> <p>Appropriate Consultant representatives will attend TAC meetings when requested to do so by Watermaster Staff (either in person or by teleconference connection), but will not be asked to prepare agendas or meeting minutes. As necessary, Consultants may provide oral updates to their progress reports (prepared under Task M.1.d) at the TAC meetings.</p>
M. 1. e Peer Review of Documents and Reports (\$3,100)	When requested by the Watermaster staff, Consultants may be asked to assist the TAC and the Watermaster staff with peer reviews of documents and reports prepared by various other Watermaster Consultants and/or entities.
M. 1. f QA/QC (\$0)	A Consultant (MPWMD) will provide general QA/QC support over the Seaside Basin Monitoring and Management Program. These costs are included in the other tasks.

I. 2 Comprehensive Basin Production, Water Level and Water Quality Monitoring Program

I. 2. a. Database Management

I. 2. a. 1 Conduct Ongoing Data Entry and Database Maintenance/ Enhancement (\$13,452)	<p>The database will be maintained by a Consultant (MPWMD) performing this work for the Watermaster. MPWMD will enter new data into the consolidated database, including water production volumes, water quality and water level data, and such other data as may be appropriate. Another Consultant will periodically post database information to the Watermaster's website, so it will be accessible to the public and other interested parties. No enhancements to the database are anticipated during 2015.</p>
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I. 2. a. 2 Verify Accuracy of Production Well Meters (\$10,000)	<p>To ensure that water production data is accurate, the well meters of the major producers were verified for accuracy during 2009. A reevaluation of the larger producers will be performed in late 2014 to determine if any pump testing or meter calibration work needs to be performed. If that follow-up work is found to be needed, it will be performed under this Task. The amount budgeted for the Task will be used, if necessary, to hire a contractor to perform pump testing or meter calibration.</p>
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I. 2. b. Data Collection Program

I. 2. b. 1 Site Representation and Selection. (\$0)	<p>The monitoring well network review that was started in 2008 has been completed, and sites have been identified where future monitoring well(s) could be installed, if it is deemed necessary to do so in order to fill in data gaps. No further work of this type is anticipated in 2015.</p>
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I. 2. b. 2 Collect Monthly Manual Water Levels. (\$5,872)	<p>Each of the monitoring wells will be visited on a monthly basis. Water levels will be determined by either taking manual water levels using an electric sounder, or by dataloggers. All wells where the use of dataloggers is feasible or appropriate have been equipped with dataloggers. Dataloggers wear out over time and need to be periodically replaced. This Task budget amount includes the possible replacement of up to 2 dataloggers at a unit price of \$750, plus \$100 for installation parts.</p>
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I. 2. b. 3 Collect Quarterly Water Quality Samples. (\$51,906) update if higher price for induction logging	<p>Water quality data will be collected quarterly from certain of the monitoring wells. In 2012 water quality analyses were expanded to include barium and iodide ions, to determine the potential benefit of performing these additional analyses. These two parameters have been useful in analyzing seawater intrusion potential in other vulnerable coastal groundwater basins, and are briefly mentioned in the Watermaster's annual Seawater Intrusion Analysis Reports. These parameters were added to the annual water quality sampling list for the four Watermaster Sentinel wells (SBWM-1, SBWM-2, SBWM-3, and SBWM-4), and also for the 3 most coastal MPWMD monitoring wells (MSC, PCA, and FO-09). Barium and iodide analyses will continue being performed in 2015.</p>
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Water quality data may come from water quality samples that are taken from these wells and submitted to a State Certified analytic laboratory for general mineral and physical suite of analyses, or the data may come from induction logging of these wells and/or other data gathering techniques. The Consultant selected to perform this work will make this judgment based on consideration of costs and other factors.

Under this Task in 2013 retrofitting to use the low-flow purge approach for getting

<p>I. 2. b. 4 Update Program Schedule and Standard Operating Procedures. (\$0)</p>	<p>water quality samples was completed on all of the wells that are sampled. This sampling equipment sits in the water column and may periodically need to be replaced or repaired. Therefore, this Task budget includes \$1,000 for performing maintenance and/or replacement of the sample collection equipment.</p>
<p>I. 2. b. 5. Monitor Well Construction (\$0)</p>	<p>An additional monitoring well was installed in 2009. No further work of this type is anticipated in 2015.</p>
<p>I. 2. b. 6 Reports (\$6,204)</p>	<p>The groundwater level and quality monitoring will be conducted on a monthly, quarterly, and annual basis, as described in the Consultant's Scope of Work. Reports summarizing data collected and analyzed will be submitted to the Watermaster on a schedule to be established during the year, and will consist of:</p> <ul style="list-style-type: none"> • One combined report summarizing the water production data and summarizing and analyzing the water quality and water level data from the 1st & 2nd Quarters of the Water Year. • One annual report summarizing the water production data and summarizing and analyzing the water quality and water level data from the 3rd & 4th Quarters of the Water Year, and containing tables consolidating the data for the complete Water Year and a narrative summarization of the findings, conclusions, and recommendations for the complete Water Year. This annual report may include, as attachments, additional documentation as needed to support the findings, conclusions and recommendations.
<p><i>I. 3 Basin Management</i></p>	
<p>I. 3. a. Enhanced Seaside Basin Groundwater Model (Costs listed in subtasks below)</p>	<p>The Watermaster and its consultants use a Groundwater Model for basin management purposes.</p>

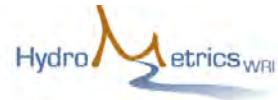
<p>I.3.a.1 Update the Existing Model (\$20,000)</p>	<p>The existing Model, described in the report titled “Groundwater Flow and Transport Model” dated October 1, 2007, was updated in 2009 in order to develop protective water levels, and to evaluate replenishment scenarios and develop answers to Basin management questions (Tasks I.3.a.2 and I.3.a.3). The scope and budget in 2014 for again updating the Model included the following:</p> <p>Step 1: Update the model and check its accuracy - \$10,000 Step 2: Recalibrate the model - \$15,000 Step 3: Prepare report describing the work that was done - \$5,000</p> <p>Step 1 was completed in 2014 by incorporating recent pumping data, groundwater level data, and rainfall data, and then checking to see if the recently simulated groundwater levels match the recently measured groundwater levels. These are the principle findings and conclusions of this Step 1 work:</p> <ul style="list-style-type: none"> • The model still provides reliable results in the Laguna Seca Subarea. • Although the performance of the model during the updated period is worsening, the calibration of the model remains within acceptable standards. • The northern boundary condition needs to be updated to reflect real groundwater elevation variations for the model period of 2005-2013. The behavior of the northern boundary will impact flows and the ability to calibrate the model for the area of the model that is adjacent to the northern boundary. An alternative method for defining this boundary condition will have to be developed that does not rely upon simulations from the Salinas Valley Integrated Groundwater Surface Water Model (SVIGSM). • The groundwater model should be updated in a maximum of five years and its calibration reevaluated at that time. However, if groundwater related projects are implemented in the Basin before that time, the update and calibration reevaluation may need to be performed sooner.
<p>I. 3. a. 2 Develop Protective Water Levels (\$0)</p>	<p>Because in 2014 there was no immediate need to do any further modeling, other than perhaps in the Laguna Seca Subarea, Steps 2 and 3 were not performed in 2014. However, these steps may need to be performed in 2015 and that work is therefore included in the scope of work for this Task in 2015.</p>
<p>I. 3. a. 3 Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions (\$40,000)</p>	<p>A series of cross-sectional models was created in 2009 in order to develop protective water levels for selected production wells, as well as for the Basin as a whole. This work is discussed in Hydrometrics’ “Seaside Groundwater Basin Protective Water Elevations Technical Memorandum.” In 2013 further work was started to refine these protective water levels, but it was found that the previously developed protective water levels were reasonable. Therefore, no further work of this type is anticipated.</p> <p>In 2009 the updated Model was used to evaluate different scenarios to determine such things as the most effective methods of using supplemental water sources to replenish the Basin and/or to assess the impacts of pumping redistribution. This work is described in HydroMetrics’ “Seaside Groundwater Basin Groundwater Model Report.” In 2010, and again in 2013, HydroMetrics used the updated Model to develop answers to some questions associated with Basin management. Some of this modeling led to the conclusion that groundwater levels in parts of the Laguna Seca Subarea will continue to fall even if all pumping within that subarea is discontinued, because of the influence of pumping from areas near to, but outside of, the Basin boundary. Additional modeling work and/or consulting assistance may be required in 2015 to further examine the situation.</p>

<p>I. 3. b. Complete Preparation of Basin Management Action Plan (\$0)</p>	<p>The Watermaster's Consultant completed preparation of the Basin Management Action Plan (BMAP) in February 2009. The BMAP serves as the Watermaster's long-term seawater intrusion prevention plan. The Sections that are included in the BMAP are: Executive Summary Section 1 – Background and Purpose Section 2 – State of the Seaside Groundwater Basin Section 3 – Supplemental Water Supplies Section 4 –Groundwater Management Actions Section 5 – Recommended Management Strategies Section 6 – References The only work which may be performed on the BMAP in 2015 is discussed under Task I. 3. c.</p>
<p>I. 3. c. Refine and/or Update the Basin Management Action Plan (\$25,000)</p>	<p>During 2015 it may be beneficial to update the BMAP based on new data, and/or knowledge that is gained from the work described under Tasks I. 3. a. 2 and/or I. 3. a. 3. Such work might involve issues pertaining to Basin storage capacity, water storage rights, or pumping redistribution strategies. This work has been scheduled and budgeted in several of the preceding years, but not all of the information needed to update the BMAP was available at those times. Therefore, the updating has been rescheduled to potentially occur in 2015. This task is included primarily for budgeting purposes in the event such work is deemed necessary.</p>
<p>I. 3. d. Evaluate Coastal Wells for Cross-Aquifer Contamination Potential (\$0)</p>	<p>If seawater intrusion were to reach any of the coastal wells in any aquifer, and if a well was constructed without proper seals to prevent cross-aquifer communication, or if deterioration of the well had compromised these seals, it would be possible for the intrusion to flow from one aquifer to another. An evaluation of this was completed in 2012 and is described in MPWMD's Memorandum titled "Summary of Seaside Groundwater Basin Cross-Aquifer Contamination Wells Investigation Process and Conclusions" dated August 8, 2012. This Memorandum did not recommend performing any further work on this matter at this time, other than to incorporate into the Watermaster's Database data from wells that were newly identified by the work performed in 2012. That data has now been incorporated into the Database, and no further work on this Task is anticipated.</p>
<p><i>I. 4 Seawater Intrusion Response Plan (formerly referred to as the Seawater Intrusion Contingency Plan)</i></p>	
<p>I. 4. a. Oversight of Seawater Intrusion Detection and Tracking (\$0)</p>	<p>Consultants will provide general oversight over the Seawater Intrusion detection program. The cost for this work is included under Task I.4.c.</p>

<p>I. 4. b. Focused Hydrogeologic Evaluation (\$0)</p>	<p>MPWMD attempted to compile historical and current water quality data in the coastal area to provide more in-depth evaluation of conditions in the shallow Dune Sand/Aromas Sand aquifer in the vicinity of the Sand City Public Works well, where unique water quality conditions and variability have recently been observed as discussed at TAC meetings. However, it was found that no historical water quality data from Cal Am's now-abandoned wells existed, and consequently it was not possible to answer the question of why water quality in the Sand City Public Works well differs from water quality in other wells in the Basin. The Sand City desalination plant could be affecting water quality in this area, but without the prior water quality data from now-abandoned wells, this could not be determined. The results of this work were summarized in 2013 in a brief Technical Memorandum prepared by MPWMD with conclusions and recommendations, and no further work on this matter is planned.</p>
<p>I. 4. c. Annual Report- Seawater Intrusion Analysis (\$28,678)</p>	<p>At the end of each water year, a Consultant will reanalyze all water quality data. Semi-annual chloride concentration maps will be produced for each aquifer in the basin. Time series graphs, trilinear graphs, and stiff diagram comparisons will be updated with new data. The annual EM logs will be analyzed to identify changes in seawater wedge locations. All analyses will be incorporated into an annual report that follows the format of the initial, historical data report. Potential seawater intrusion will be highlighted in the report, and if necessary, recommendations will be included. The annual report will be submitted for review by the TAC and the Board. Modifications to the report will be incorporated based on input from these bodies, as well as Watermaster staff. The impacts of sea level change will be taken into account in performing this work, as it will change the protective water levels that are used in the Seawater Intrusion Analysis Report. Climate change would affect how much recharge results from precipitation and would have an impact on predicted groundwater levels in the future. This would not have an impact on anything in the SIAR but could be a change in the predictive groundwater model.</p>
<p>I. 4. d Complete Preparation of Seawater Intrusion Response Plan (\$0)</p>	<p>The Watermaster's Consultant (HydroMetrics) completed preparation of the long-term Seawater Intrusion Response Plans (SIRP) in February 2009. The Sections that are included in the SIRP are: Section 1 – Background and Purpose Section 2 – Consistency with Other Documents Section 3 – Seawater Intrusion Indicators and Triggers Section 4 –Seawater Intrusion Contingency Actions Section 5 - References No further work on the SIRP is anticipated in 2015.</p>
<p>I. 4. e. Refine and/or Update the Seawater Intrusion Response Plan (\$0)</p>	<p>At the beginning of 2009 it was thought that it might be beneficial or necessary to perform work to refine the SIRP and/or to update it based on new data or knowledge that was gained subsequent to the preparation of the SIRP. However, this did not prove to be necessary, and no further work of this type is anticipated in 2015.</p>
<p>I. 4. f. If Seawater Intrusion is Determined to be Occurring, Implement Contingency Response Plan (\$0)</p>	<p>The SIRP will be implemented if seawater intrusion, as defined in the Plan, is determined by the Watermaster to be occurring.</p>

ATTACHMENT 10

2014 SEASIDE GROUNDWATER MODEL UPDATE



1814 Franklin St, Suite 501
Oakland, CA 94612

TECHNICAL MEMORANDUM

To: Seaside Groundwater Basin Watermaster
Technical Advisory Committee

From: Stephen Hundt, Derrik Williams, and Georgina King

Date: July 31, 2014

Subject: 2014 Seaside Groundwater Model Update

Background and Scope

This technical memorandum documents a recent update to the Seaside Basin groundwater model that extends the model simulation period to 2013. In extending the model timeframe, new pumping and recharge input data for the extended period, and new groundwater level data used to measure model calibration were required. A second part of the model update is to assess the performance of the model for the updated period and determine whether or not a recalibration of the model is needed.

The model was extended from its previous time frame of 1987 through 2008 to simulate conditions between 1987 and 2013. Model simulations were compared to the updated groundwater levels to determine the performance of the model for the entire model period, the original model period, and the updated model period. The model remains in good calibration for the entire model period, but the model appears to have declining accuracy for the updated period. Additional changes are recommended, including a recalibration, to ensure the accuracy of the Seaside Basin groundwater model for future uses.

Data Collection and Input to Model

PUMPING

Updated monthly records of groundwater pumping from wells in the model area were provided by Monterey Peninsula Water Management District (MPWMD), Cal Water Service, and Marina Coast Water District (MCWD) for the period between 2009 and 2013.

Figure 1 shows the monthly pumping for the entire model period of 1987-2013. It can be seen that the pumping pattern of the updated period is consistent with the preceding years. No new wells were added to the model for the updated period, but the position of the ASR wells 3&4 were moved to correct their former misplacement in the model.

DEEP GROUNDWATER RECHARGE

The amount of deep groundwater recharge that is received by the model each month is estimated by a soil moisture balance model. The documentation of this model can be found in the Seaside Basin Modeling and Protective Groundwater Elevations Report (HydroMetrics, 2009). The inputs to the soil moisture balance model include:

- Water system deliveries
- Precipitation
- Evapotranspiration
- Land use
- Soil types
- Recharge pond and septic information

The soil moisture balance model was updated by supplying updated input data that extend into the model to 2013. System loss data was obtained from MPWMD for Cal-Am water delivered to customers. Precipitation data was downloaded from the Utah Climate Center to extend the Monterey (Coop No. 45795) and Salinas (Coop No. 47668) station data. Similarly, evapotranspiration data was downloaded from CIMIS for the Castroville station. The number of septic tanks in use was assumed to be the same as in 2008. The amount of runoff percolation occurring in the recharge ponds is estimated in the soil moisture balance model as a proportion of precipitation.

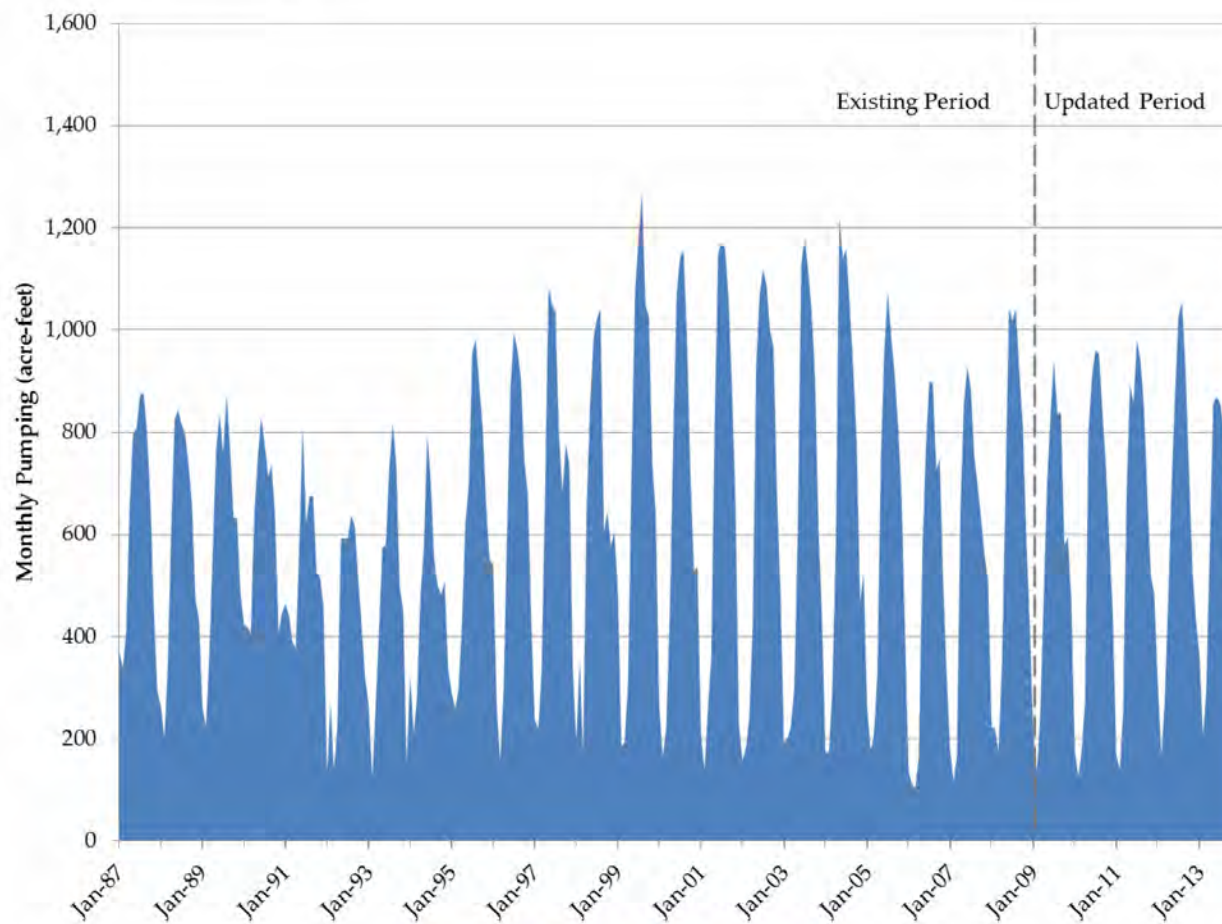


Figure 1: Total Monthly Pumping Rates

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Figure 2 shows the total monthly deep groundwater recharge that is received by the model for every month between 1987 and 2013. The greatest recharge takes place during winter months when deep percolation of rainfall occurs. Less recharge takes place during the dry portion of the year when recharge is dependent upon system losses and irrigation return flow. This seasonal pattern is consistent throughout the entire simulation period, including the updated model period.

GROUNDWATER LEVEL OBSERVATIONS

An updated set of groundwater level observations from wells in the Seaside Groundwater Basin were provided by MPWMD. This dataset covered the updated model period of 2009-2013. Observations collected from wells under operation at the time of measurement and other questionable values were removed from the dataset by MPWMD staff.

The updated groundwater level data were used to judge the performance of the updated groundwater model. Performance of the model was evaluated by comparing the model's simulated groundwater elevations to the observed groundwater elevations provided by MPWMD. This process is described in greater detail in the section below.

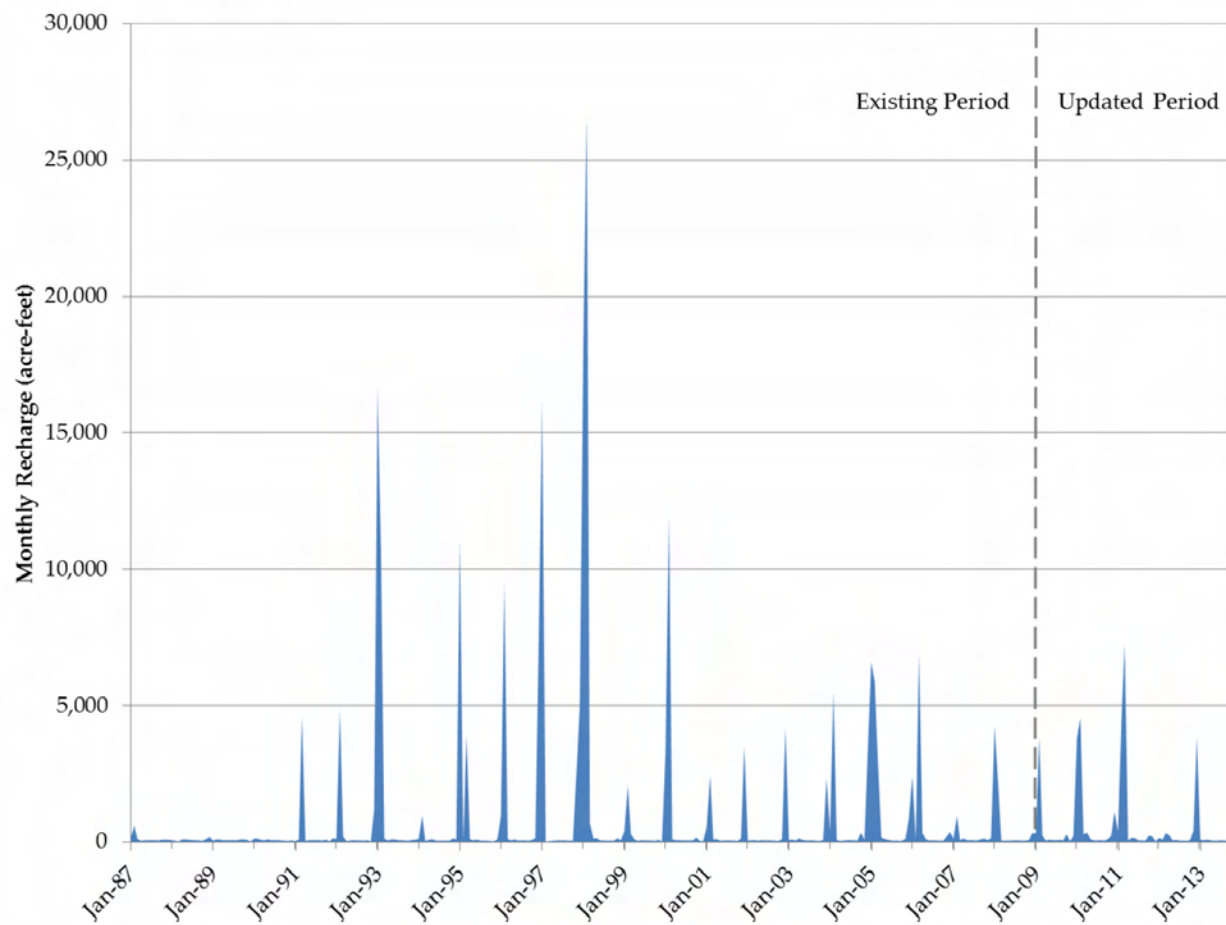


Figure 2: Monthly Recharge

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MODEL BOUNDARY WITH SALINAS VALLEY

Groundwater flows freely into and out of the Salinas Valley along the model's northeastern boundary. The boundary with Salinas Valley was simulated with the MODFLOW Constant Head (CHD) option. This option assigns a known groundwater elevation to each model cell along the northwestern boundary. If simulated groundwater elevations in the model are higher than the assigned boundary elevations, water will flow out of the model towards Salinas Valley. If simulated groundwater elevations in the model are lower than the assigned boundary elevations, water will flow from Salinas Valley into the model.

For model years 1987-2004, the groundwater elevations assigned to model nodes along the northeastern boundary were derived from the Salinas Valley Integrated Groundwater Surface Water Model (SVIGSM). Wprime Inc. provided estimated groundwater elevations from a number of the SVIGSM nodes that are near the regional model boundary and these were interpolated onto the regional model boundary nodes.

SVIGSM model results were not available for model years 2005-2013. To approximate the groundwater elevations along the northeastern boundary for this period, the final 12 months of available SVIGSM results (from year 2004) were applied to each of the remaining years 2005-2013. As a result, the northeastern boundary repeats the same seasonal cycle for the final ten years of the simulation. Figure 3 shows the groundwater elevations at an example cell along the northeastern model boundary. Because no sensitivity analysis has been performed for this boundary of the model, we cannot say definitively what the impact is on the model. However, the boundary is over four miles away from the nearest Seaside Basin production wells which are located in the central portion of the Northern Coastal subarea. Groundwater flow gradients generated by these production wells have a greater influence on groundwater flow in the Seaside Groundwater Basin than the northern boundary.

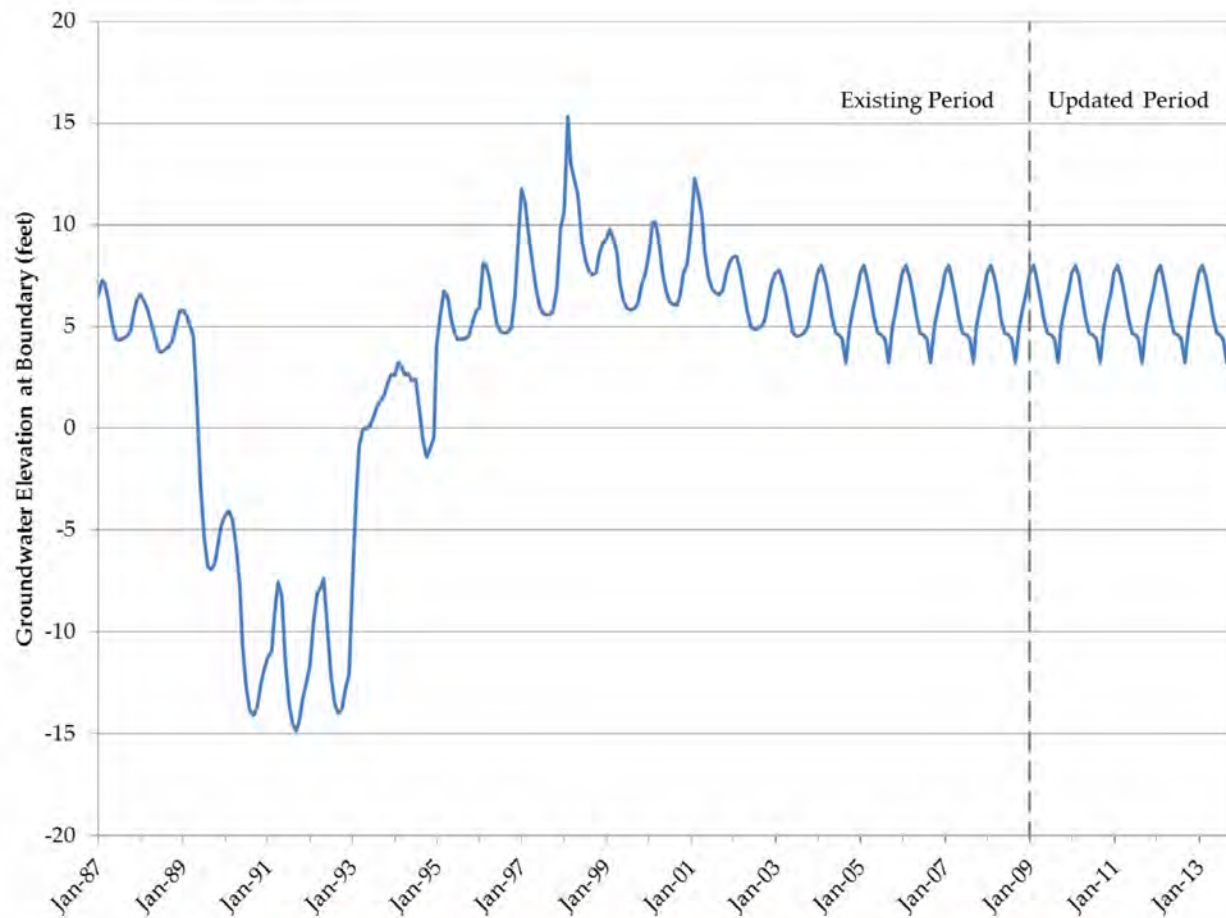


Figure 3: Groundwater Elevations at an Example Northeastern Boundary Cell

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Results of Updated Model

The simulated groundwater levels of the updated groundwater model were compared to observed groundwater levels to assess whether a recalibration of the model is required.

The original calibration of the model of the model included data through December 2008. Calibrating the regional groundwater flow model involved successive attempts to match model output to measured data from this calibration period. The model was considered calibrated when simulated results matched the measured data within an acceptable measure of accuracy, and when successive calibration attempts did not notably improve the calibration statistics. However, in the time following the calibration period the groundwater system may experience stresses and observations (such as different pumping rates, new wells, or changing groundwater level trends) that were not included in the original calibration and that the model may not be able to faithfully reproduce. As a result, it is good practice to periodically revisit a groundwater model and adjust the calibration if it is deemed necessary.

The analysis focused on three time periods:

1. The entire period of the updated model; from January 1987 through December 2013
2. The period included before the model update; from January 1987 through December 2008
3. The updated period; January 2009 through December 2013

In the figures and results presented below a comparison was made between these three periods. These periods were singled out to reveal whether the updated period is simulated as well as the original calibrated period, and to determine the overall performance of the updated model.

GROUNDWATER ELEVATION CALIBRATION

Flow model calibration is commonly evaluated by comparing simulated groundwater elevations with observed groundwater elevations from monitoring and production wells. Hydrographs of simulated groundwater elevations should generally match the trends and fluctuations observed in measured hydrographs. Furthermore, the average errors between observed and simulated groundwater elevations should be relatively small and unbiased.

A complete set of hydrographs showing both observed and simulated groundwater elevations are included in Appendix A. These hydrographs include wells in the Northern Coastal Subarea, the Southern Coastal Subarea, the Laguna Seca Subarea, and outside of the Seaside Groundwater Basin. The green line shows the groundwater elevations that were simulated by the model, the blue dots show observed groundwater elevations, and the vertical dashed gray line indicates when the newly updated period begins in January 2009.

The following four sets of hydrographs, Figure 4 through Figure 7, demonstrate the accuracy of the model in various parts of the Seaside Basin. These wells generally show the model accurately reproducing the magnitudes of fluctuations and the trends of observed groundwater elevations. However, in several of the wells (MSC-Deep, Playa 4, K-Mart, MPWMD FO-8 Deep) the trends simulated by the model appear to diverge from the observed data during later time periods. This behavior suggests that a recalibration may be required to bring the model back into agreement.

Various graphical and statistical methods can be used to demonstrate the magnitude and potential bias of the calibration errors. Figure 8 through Figure 10 show simulated groundwater elevations plotted against observed groundwater elevations for the entire model period, the original period, and the updated period. Results from an unbiased model will scatter around a 45° line on this graph. If the model has a bias such as exaggerating or underestimating groundwater levels, the results will diverge from this 45° line.

For Figure 8 through Figure 10, the results tend to lie close to the 45° line, with a greater tendency to lie above the line than below. This suggests that model has a minor bias towards overestimating average groundwater levels. A comparison between the original period (Figure 9) and the new period (Figure 10) shows that the model overestimates groundwater elevations more during the updated period than during the original period.

Figure 8 through Figure 10 also include various statistical measures of calibration accuracy. The four statistical measures used to evaluate calibration are the mean error (ME), the mean absolute error (MAE), the standard deviation of the errors (STD), and the root mean squared error (RMSE).

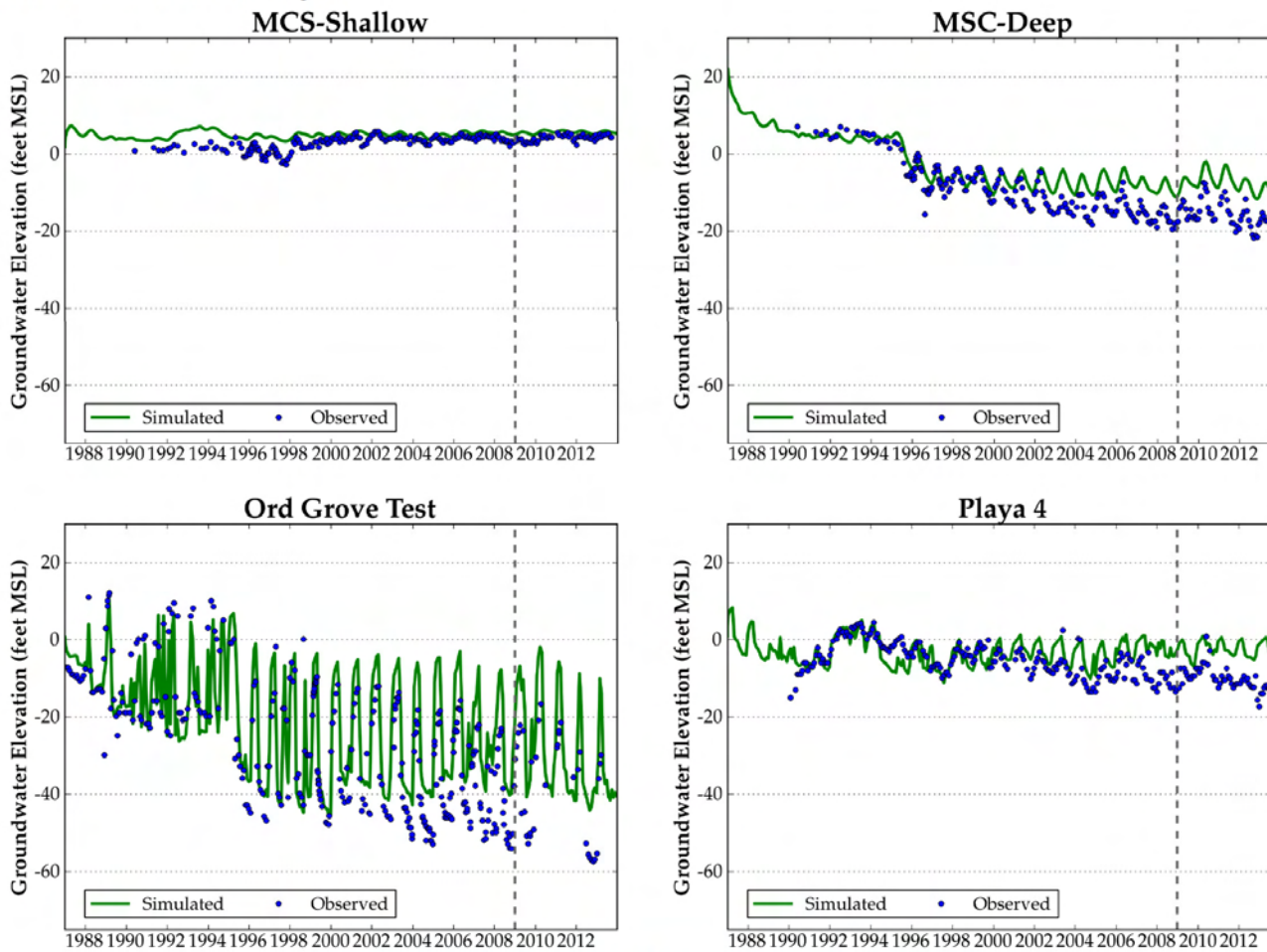


Figure 4: Hydrographs – Northern Coastal Subarea

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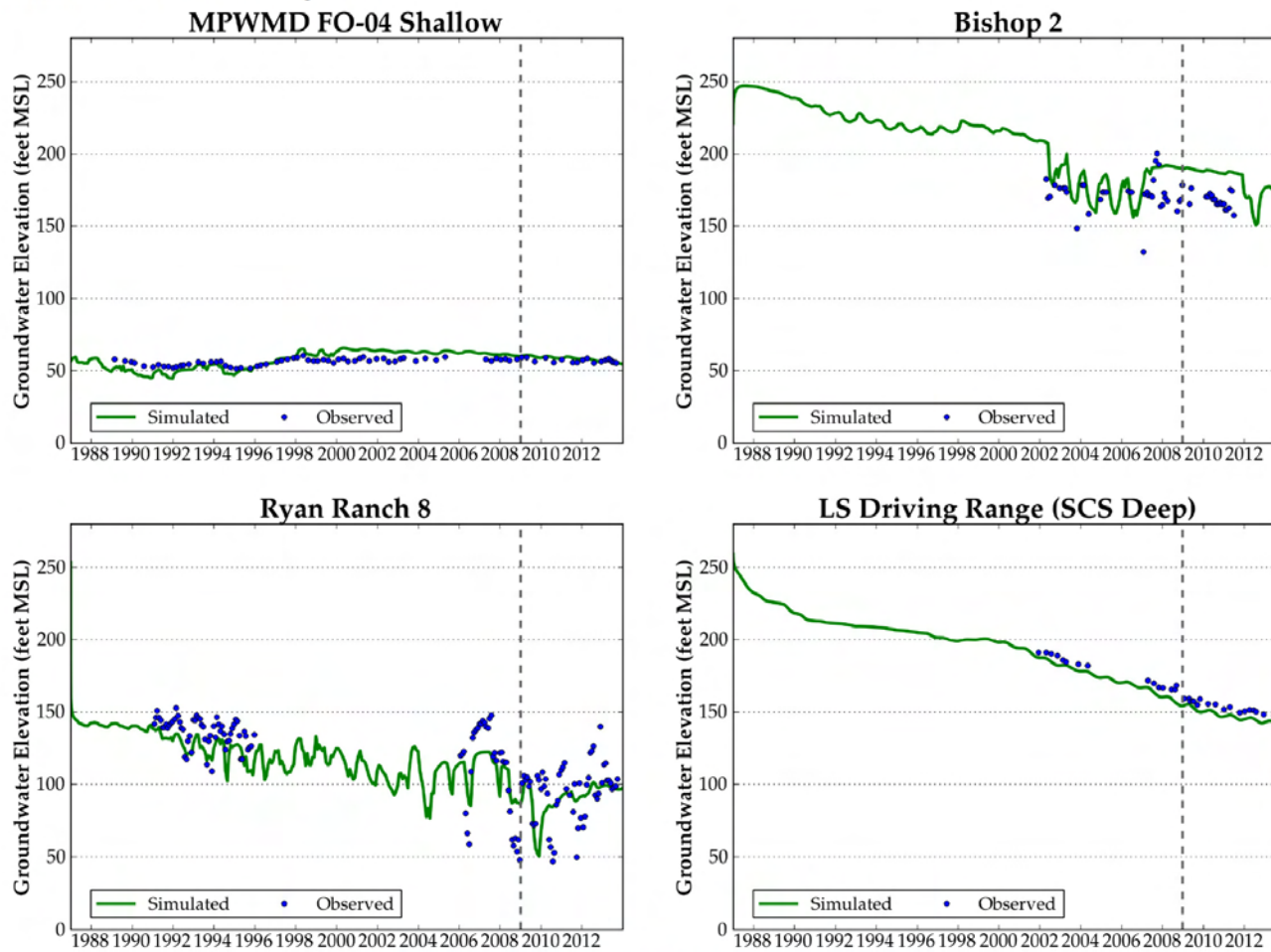


Figure 5: Hydrographs – Laguna Seca Subarea

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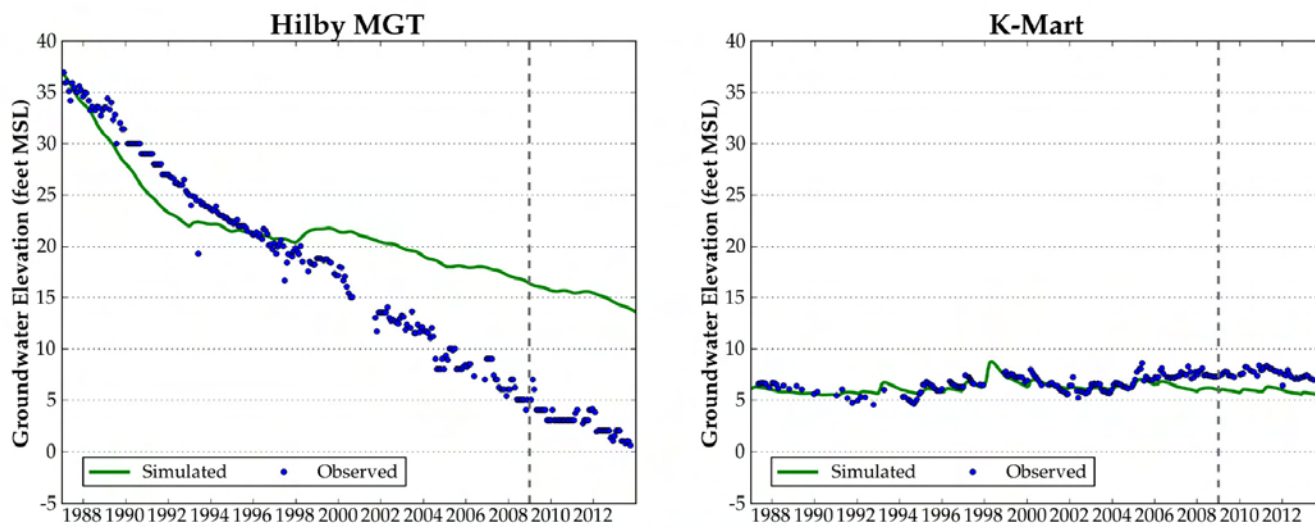


Figure 6: Hydrographs – Southern Coastal Subarea

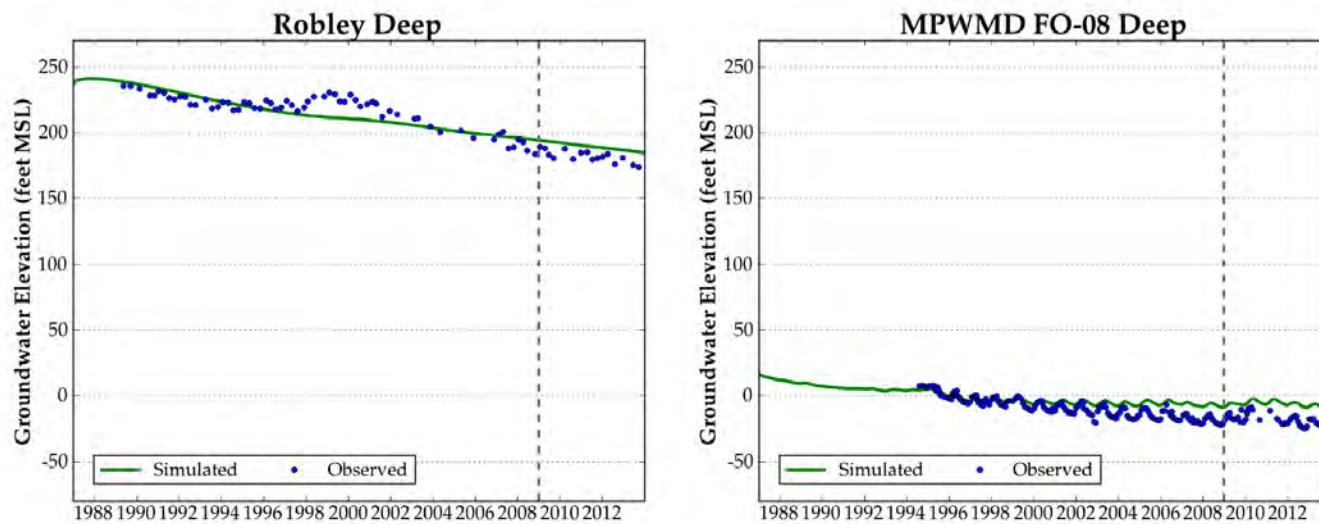


Figure 7: Hydrographs – Outside Seaside Groundwater Basin

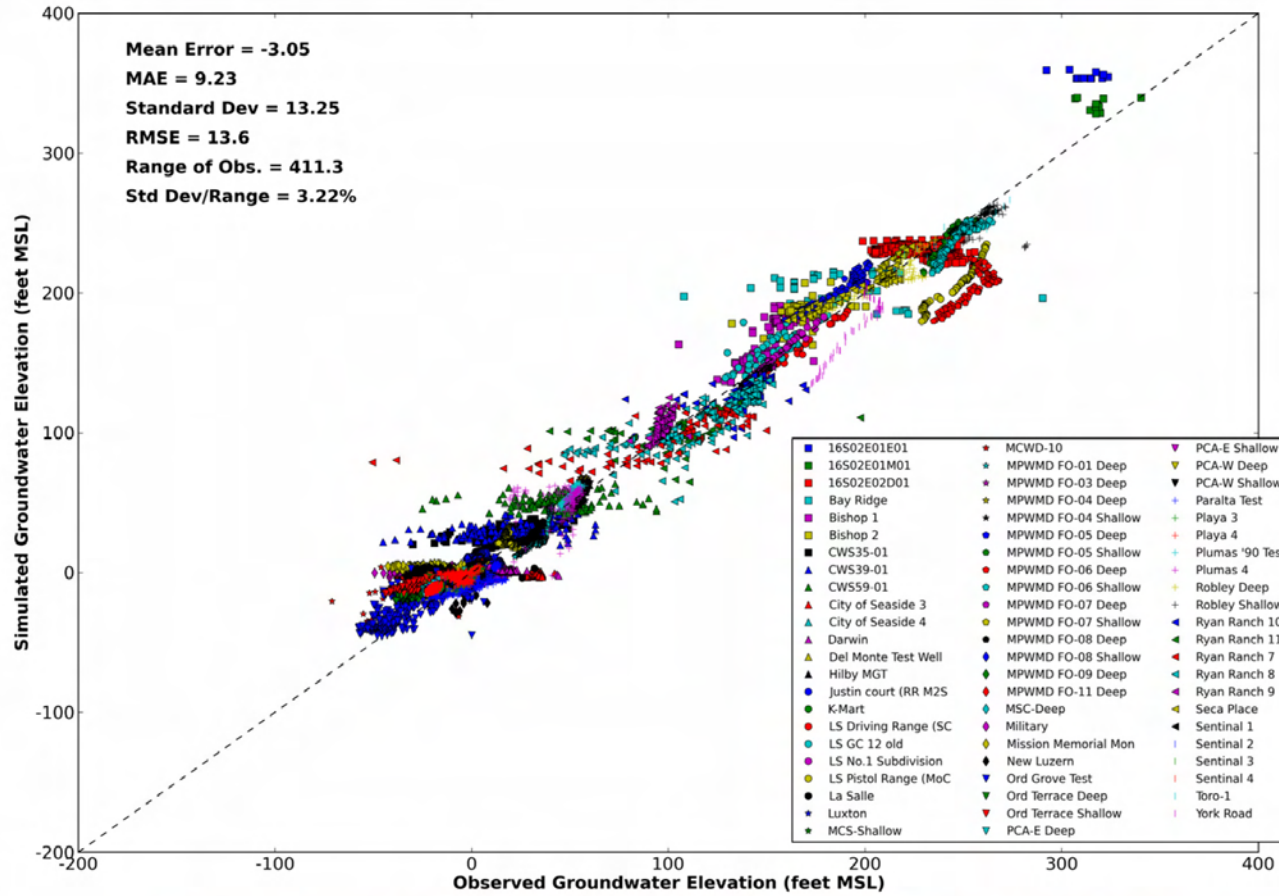


Figure 8: Simulated Versus Observed Groundwater Elevations - All Data (1987-2013)

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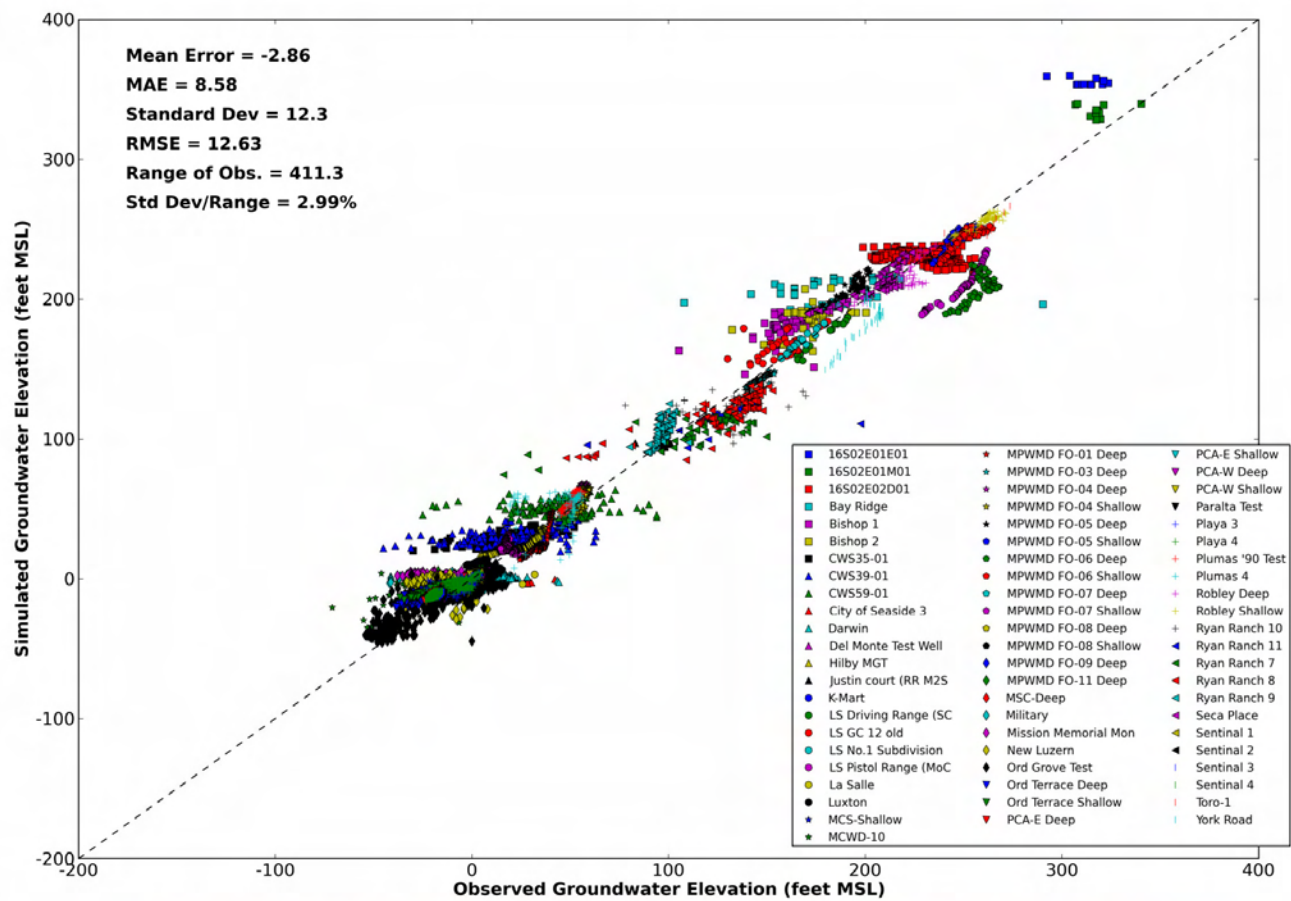


Figure 9: Simulated Versus Observed Groundwater Elevations - Existing Data (1987–2008)

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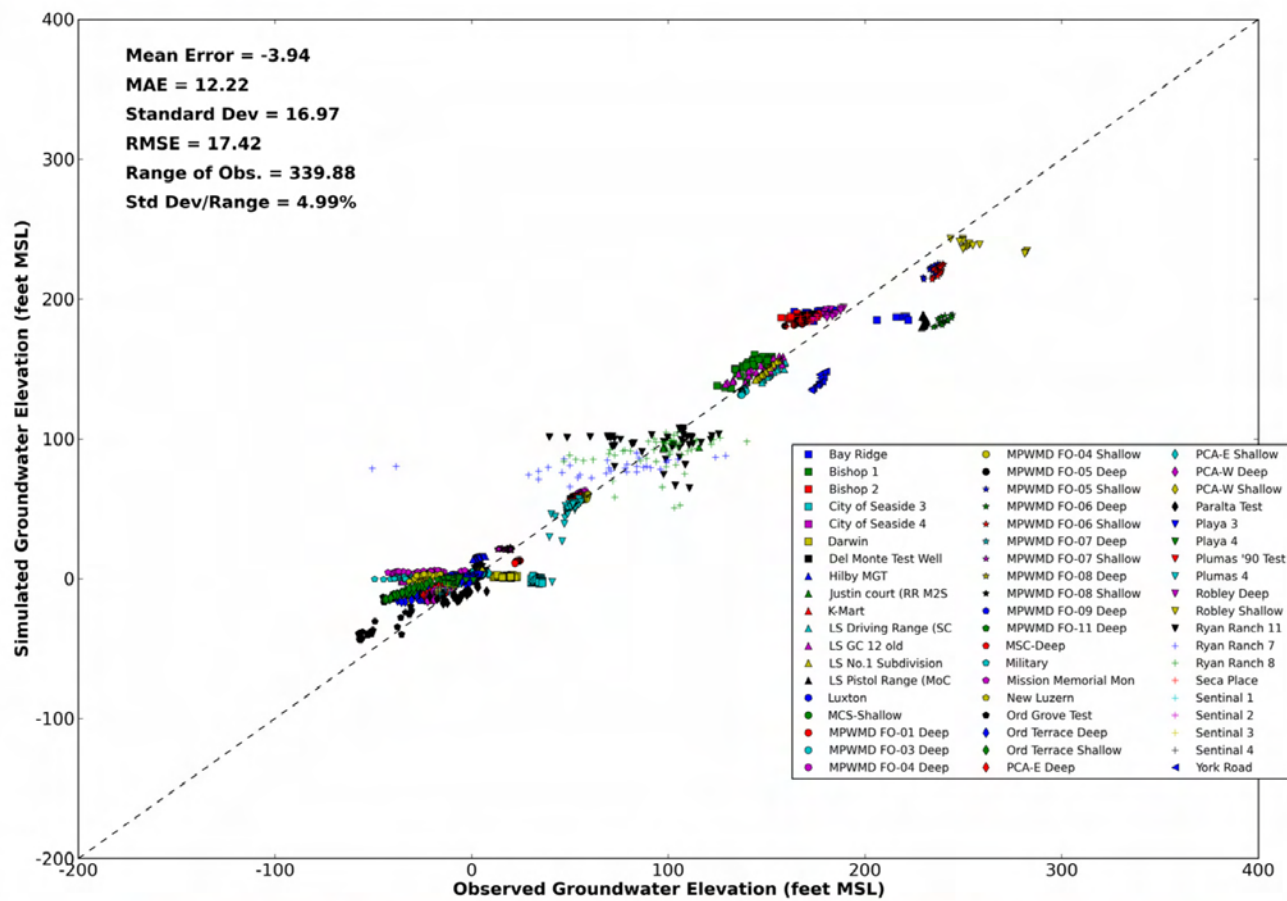


Figure 10: Simulated Versus Observed Groundwater Elevations - Updated Data (2009–2013)

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The mean error is the average error between measured and simulated groundwater elevations for data on Figure 8 through Figure 10.

$$ME = \sum_{i=1}^n (h_m - h_s)_i$$

Where h_m is the measured groundwater elevation, h_s is the simulated groundwater elevation, and n is the number of observations.

The mean absolute error is the average of the absolute differences between measured and simulated groundwater elevations.

$$MAE = \sum_{i=1}^n |h_m - h_s|_i$$

The standard deviation of the errors is one measure of the spread of the errors around the 45° line on Figure 8 through Figure 10. The population standard deviation is used for these calculations.

$$STD = \sqrt{\sum_{i=1}^n (h_m - h_s)_i^2 - \left(\sum_{i=1}^n (h_m - h_s)_i \right)^2}$$

The RMSE is similar to the standard deviation of the error. It also measures the spread of the errors around the 45° line on Figure 8 through Figure 10, and is calculated as the square root of the average squared errors.

$$RMSE = \sqrt{\sum_{i=1}^n (h_m - h_s)_i^2}$$

As a measure of successful model calibration, Anderson and Woessner (1992) state that the ratio of the spread of the errors to the total head range in the system should be small to ensure that the errors are only a small part of the overall model response. As a general rule, the RMSE should be less than 10% of the total head range in the model.

The RMSE for the entire simulation period is 13.25 feet. This is approximately 3.2% of the total range of observed groundwater elevations of 411.3 feet. For the original period the RMSE of 12.6 feet is 3.0% of the range of 411.3 feet. For the updated period the RMSE of 17.4 feet is 5.0% of the range of 339.9 feet.

A second general rule that is occasionally used is that the absolute value of the mean error should be less than 5% of the total head range in the model. The mean error for the entire simulation period is -3.05 feet. This is approximately 0.7% of the range of observed groundwater elevations. For the original period the mean error of -2.86 feet is 0.7% of the range. For the updated period the mean error of -3.94 feet is 1.2% of the range.

On average, the model errors are within an acceptable range for all three periods analyzed. These results suggest that the model remains in good calibration after the updated period has been added, but that agreement between simulated and observed values begins to weaken for the updated period.

A second graph used to evaluate bias in model results is shown on Figure 11, Figure 12, and Figure 13. These figures graph the observed groundwater elevations versus model residual (observed elevation minus simulated elevation) for the entire model period, the original period, and the updated period. Results from a non-biased simulation will appear as a cloud of data points clustered around the zero model residual line. Results that do not cluster around the zero residual line show potential model bias. Results that display a trend instead of a random cloud of points may suggest additional model bias.

The results plotted on all three figures (Figure 11 through Figure 13) show that the calibrated model results have a minor bias towards overestimating high observed groundwater elevations. The greatest overestimations (points that fall below the horizontal zero line) appear for the updated period when observed groundwater elevations are low. In addition, all three periods appear to show trends for individual wells, indicating additional model bias.

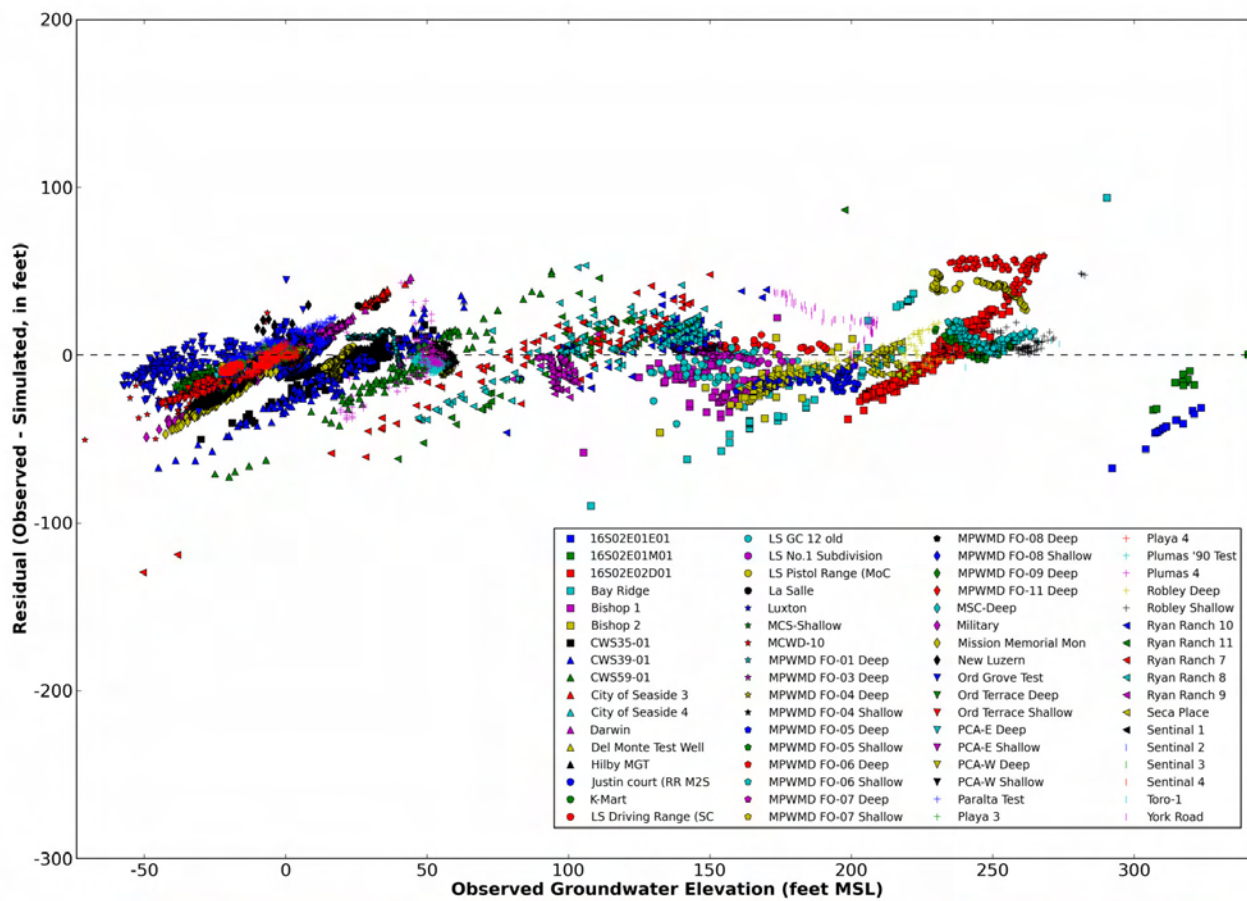


Figure 11: Observed Groundwater Elevations Versus Model Residual - All Data (1987–2013)

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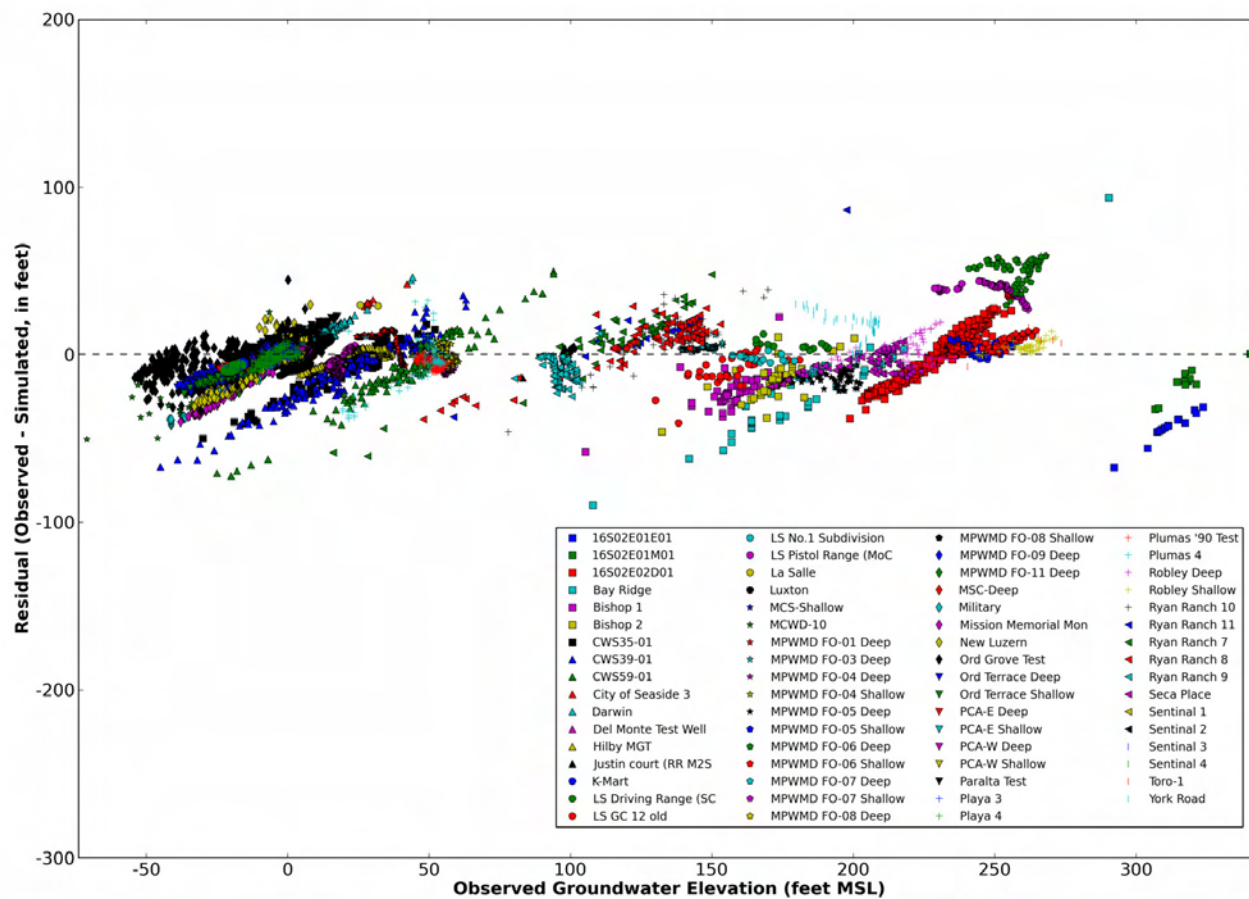


Figure 12 Observed Groundwater Elevations Versus Model Residual - Existing Data (1987-2008)

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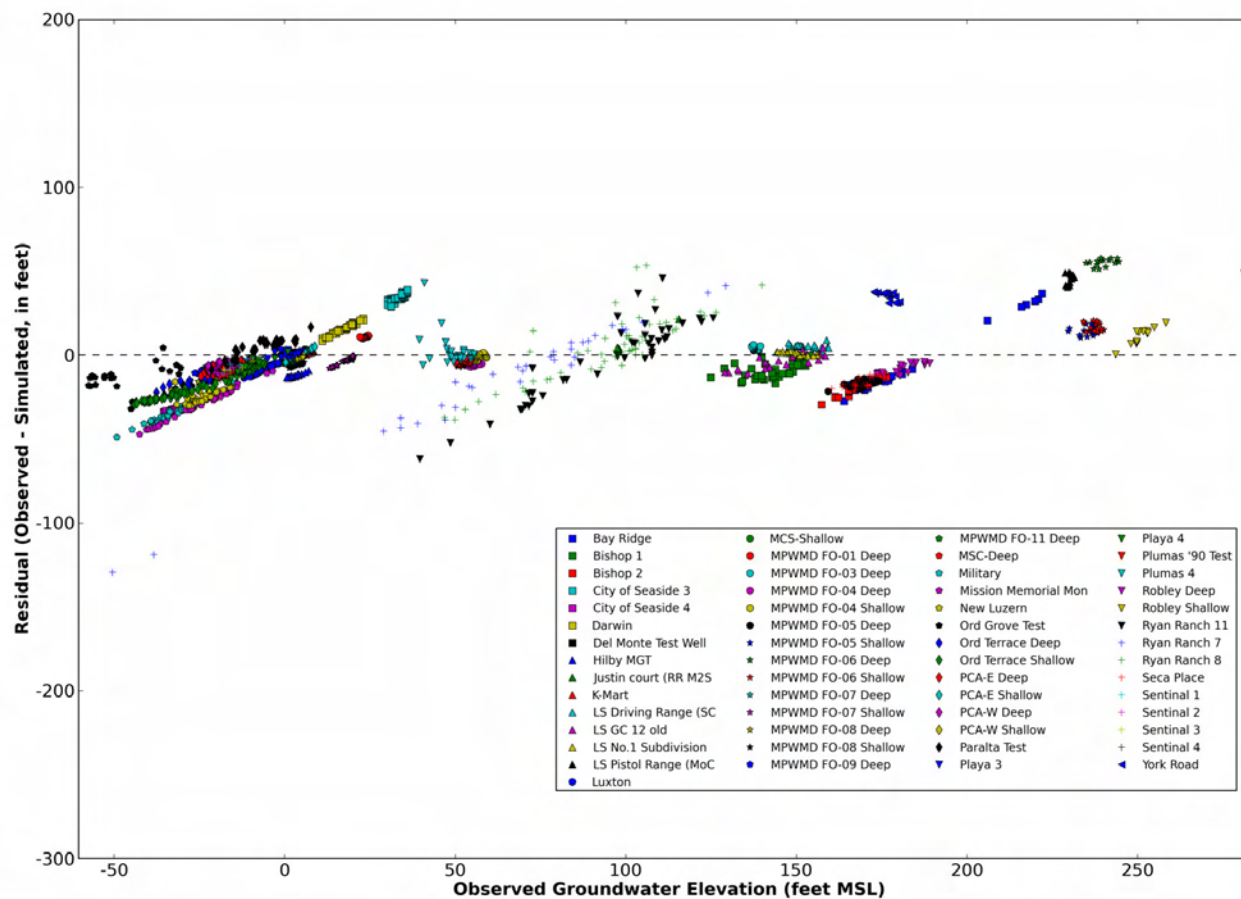


Figure 13: Observed Groundwater Elevations Versus Model Residual - Updated Data (2009-2013)

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Conclusions

Four conclusions result from the model update:

1. The performance of the model for Laguna Seca subarea wells indicates that the model continues to provide reliable simulations for the Laguna Seca subarea (Appendix Figures A8 – A12). As a result, recent simulations of future groundwater conditions in the Laguna Seca subarea are plausible and can currently be trusted for making management decisions.
2. Although the performance of the model during the updated period is worsening, the calibration of the model remains within acceptable standards.
3. The northern boundary condition needs to be updated to reflect real groundwater elevation variations for the model period of 2005-2013. The behavior of the northern boundary will impact flows and the ability to calibrate the model for the area of the model that is adjacent to the northern boundary. An alternative method for defining this boundary condition will have to be developed that does not rely upon simulations from the Salinas Valley IGSM.
4. The groundwater model should be updated in a maximum of five years and its calibration reevaluated at that time. However, if groundwater related projects are implemented in the basin before that time, the update and calibration reevaluation may need to be performed sooner.

References

- Anderson, M.P., and W.W. Woessner. 1992. *Applied groundwater modeling, simulation of flow and advective transport*, Academic Press, Inc., San Diego, California, 381 p.
- HydroMetrics WRI. 2009. *Seaside Groundwater Basin Modeling and Protective Groundwater Elevations*, prepared for Seaside Groundwater Basin Watermaster. November.

APPENDIX A: HYDROGRAPHS

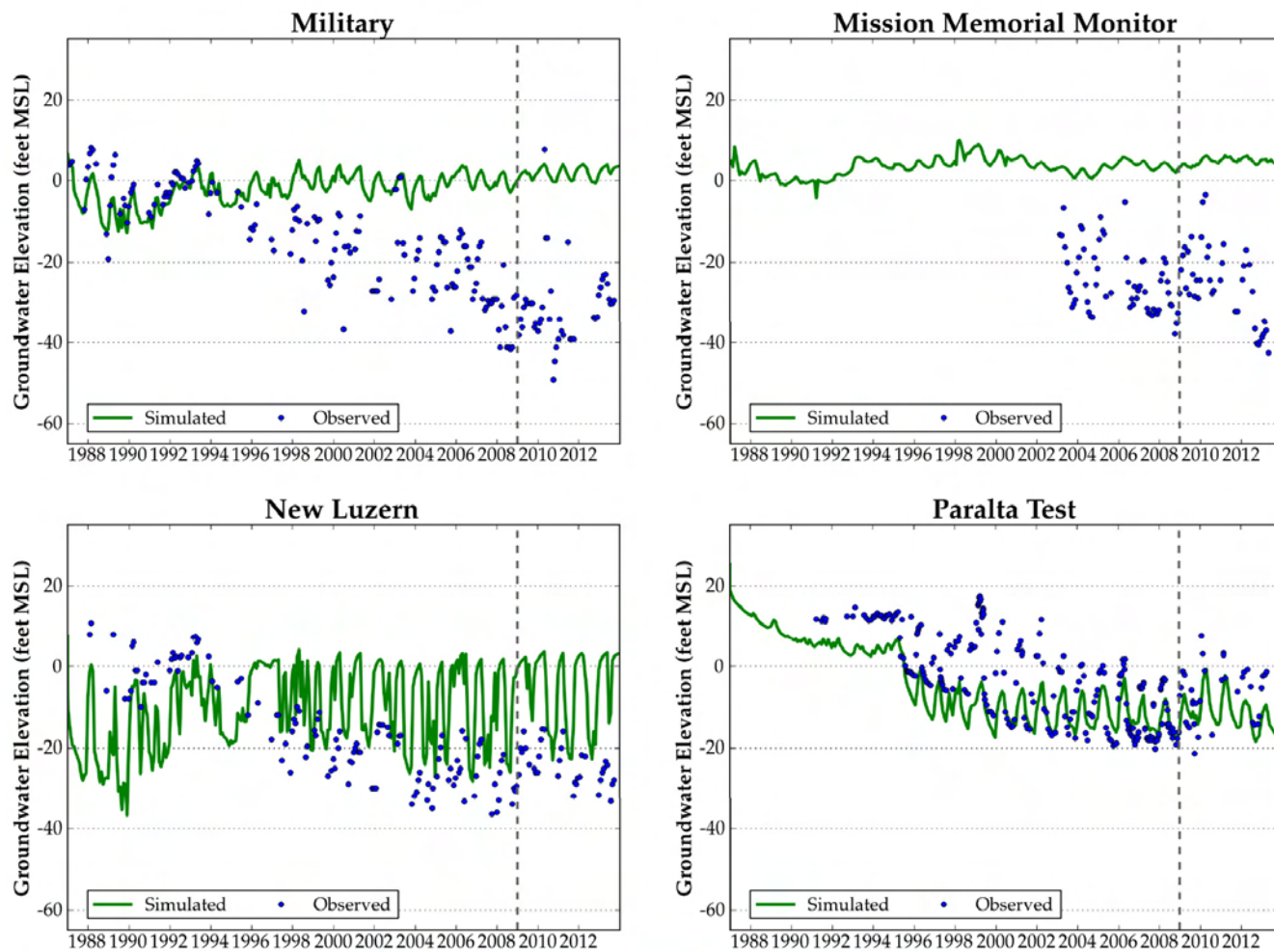


Figure A1: Northern Coastal Subarea Hydrographs

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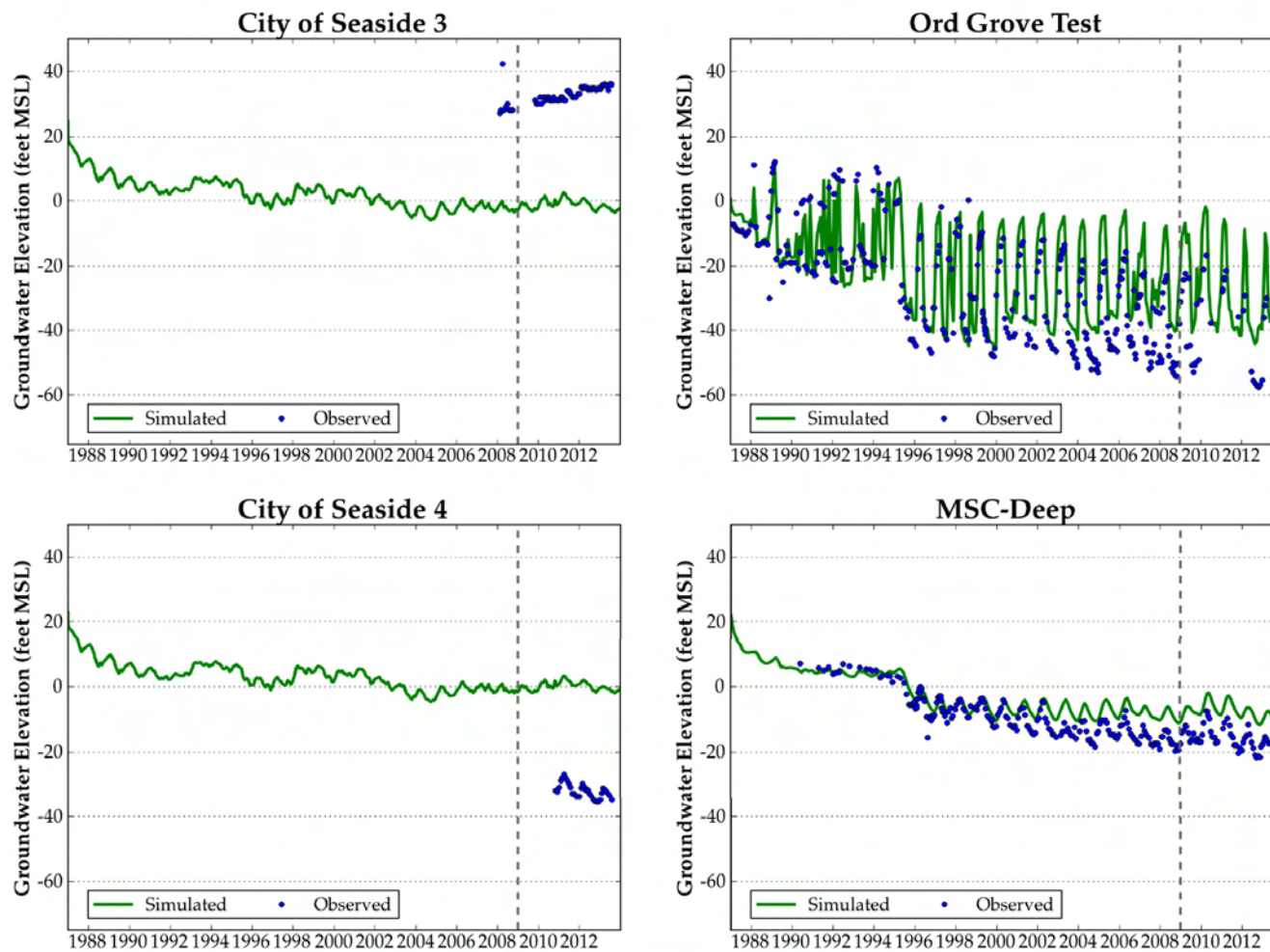


Figure A2: Northern Coastal Subarea Hydrographs

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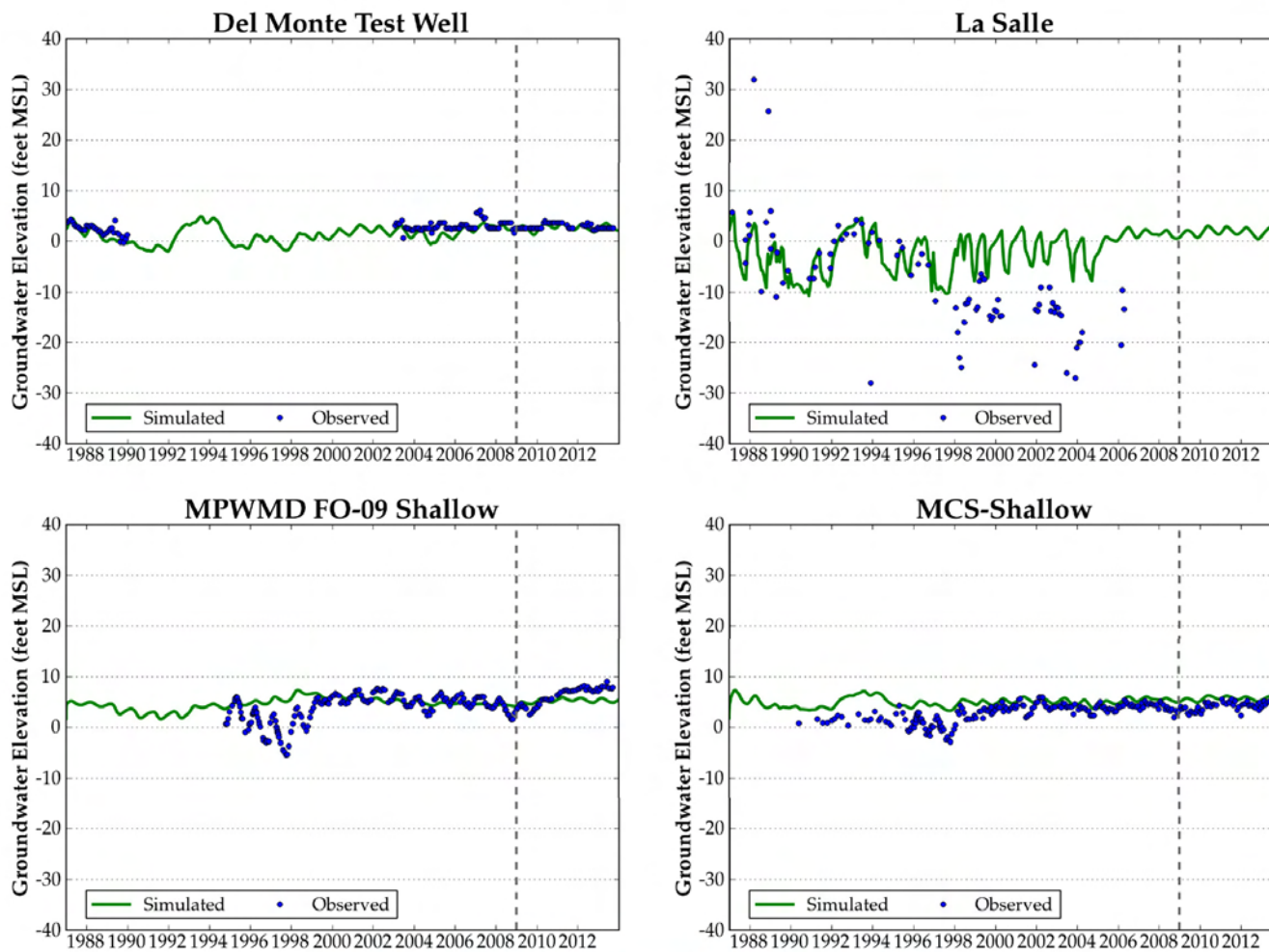


Figure A3: Northern Coastal Subarea Hydrographs

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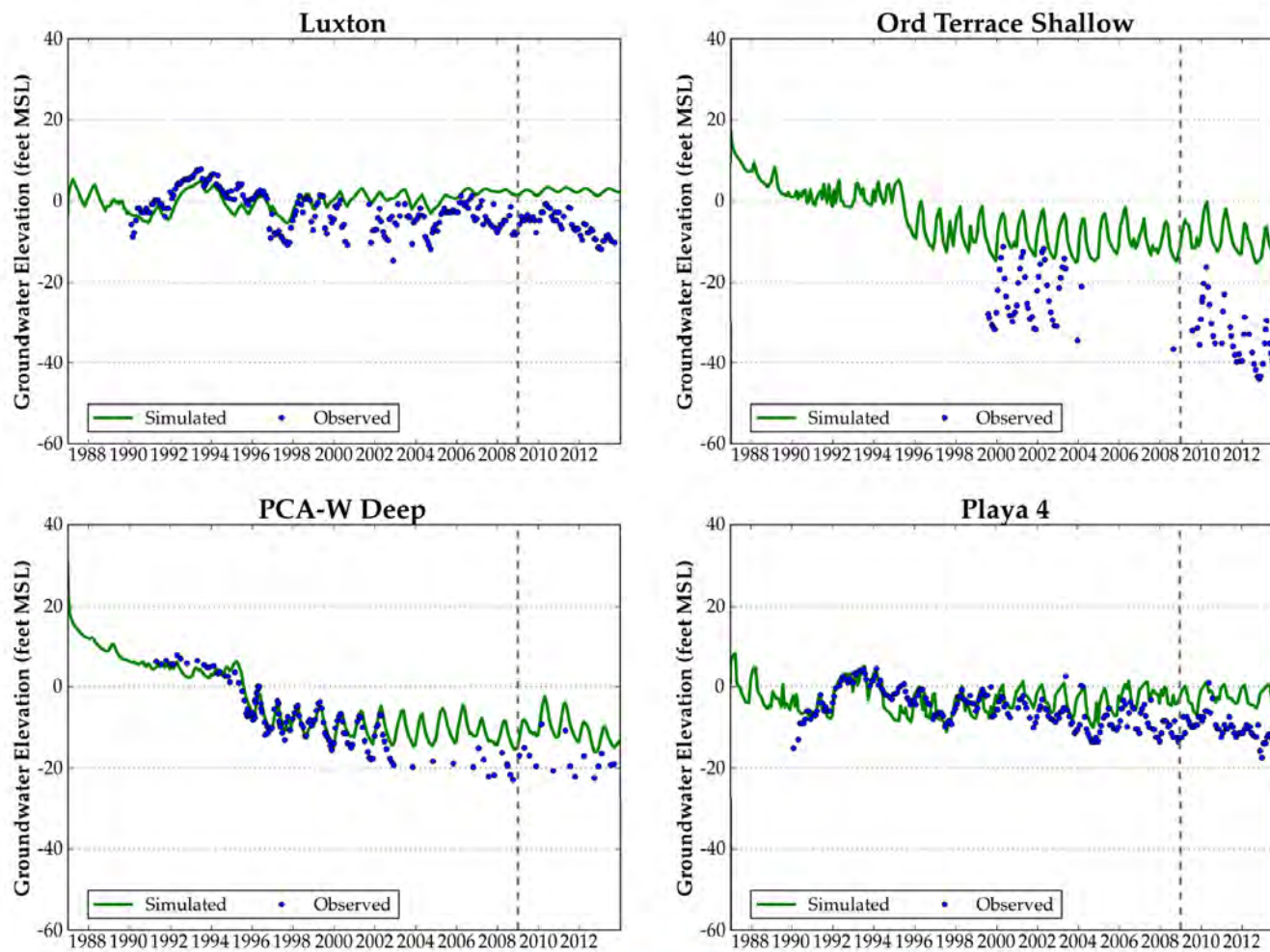


Figure A4: Northern Coastal Subarea Hydrographs

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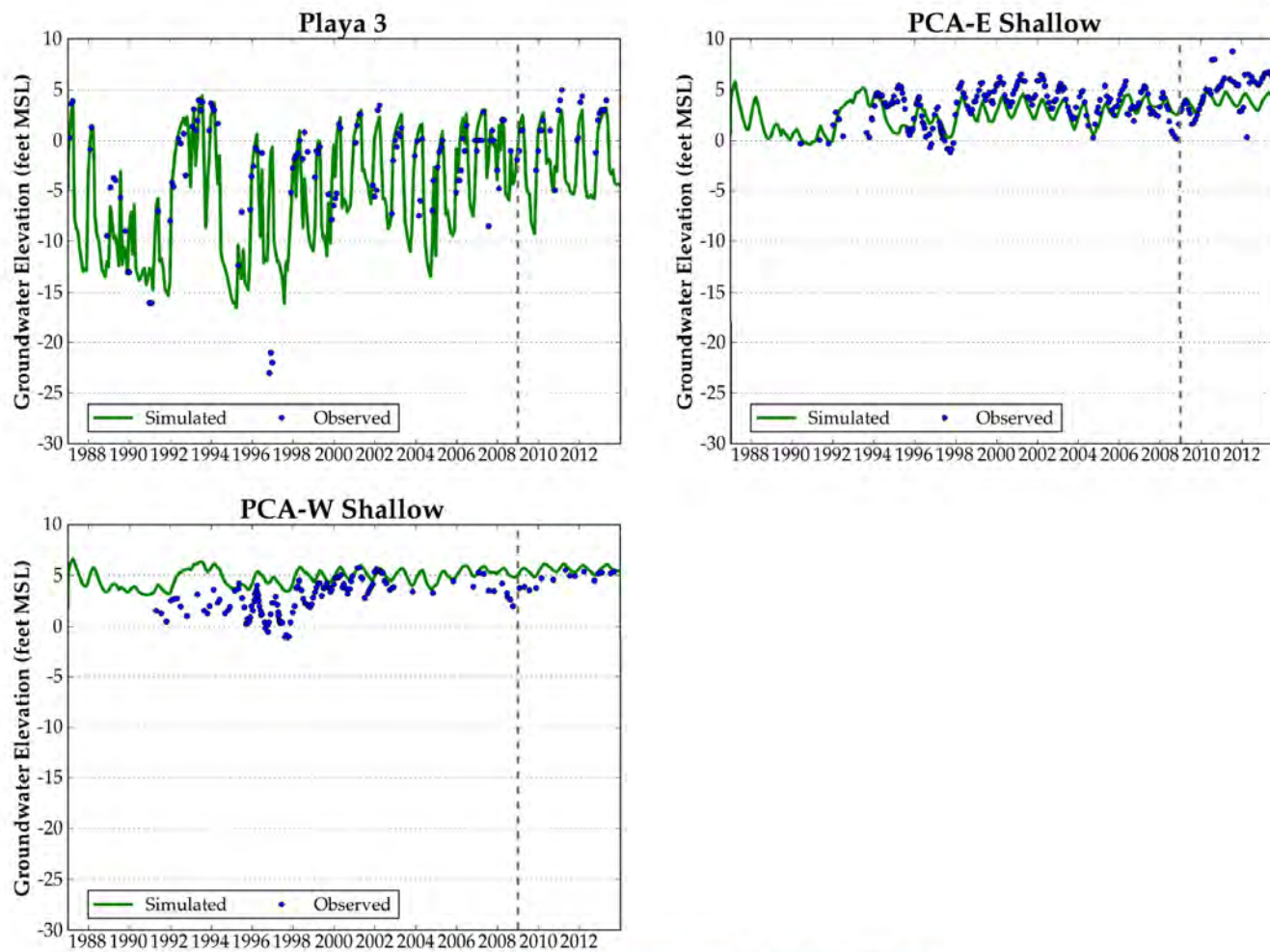


Figure A5: Northern Coastal Subarea Hydrographs

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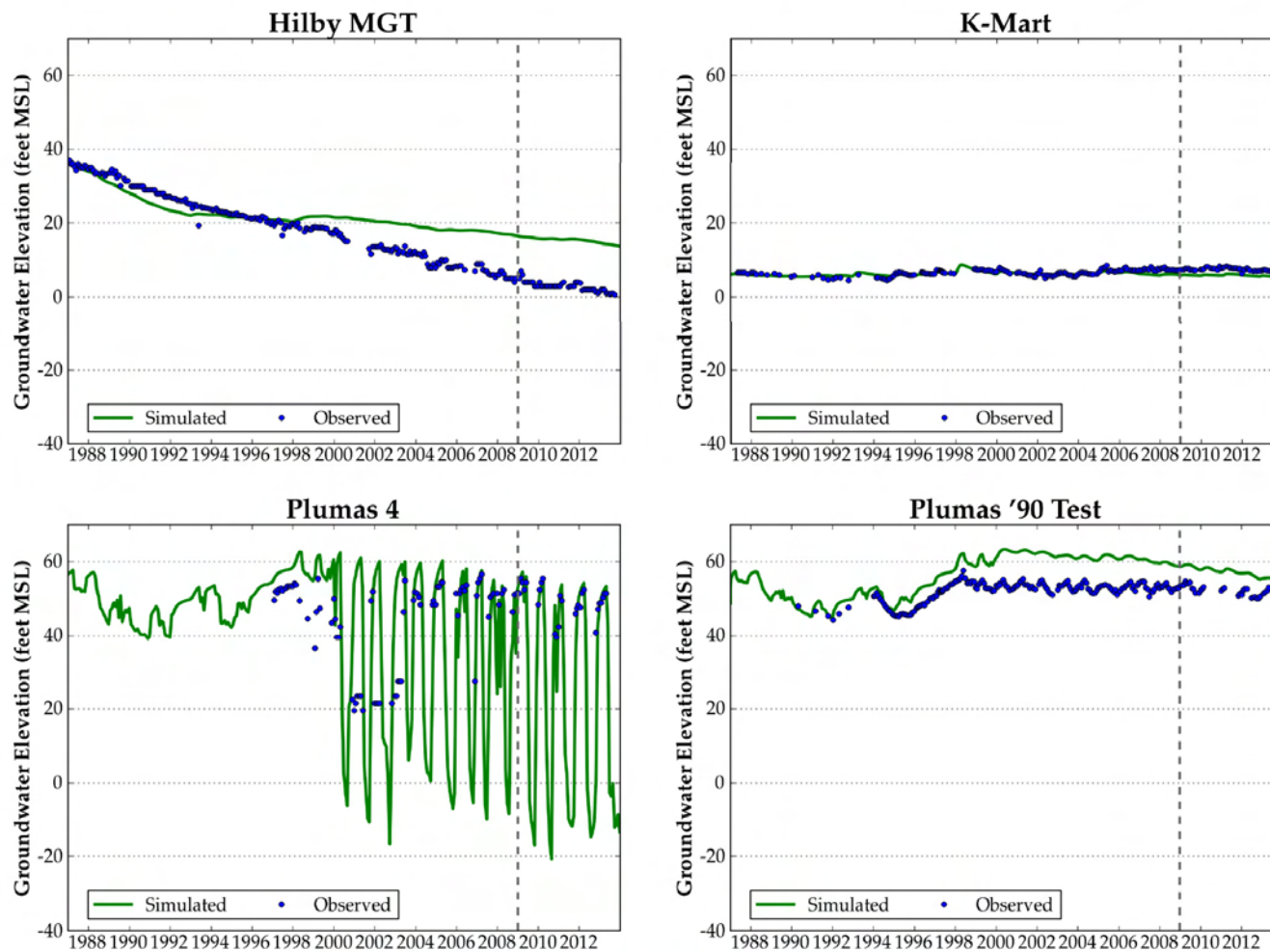


Figure A6: Southern Coastal Subarea Hydrographs

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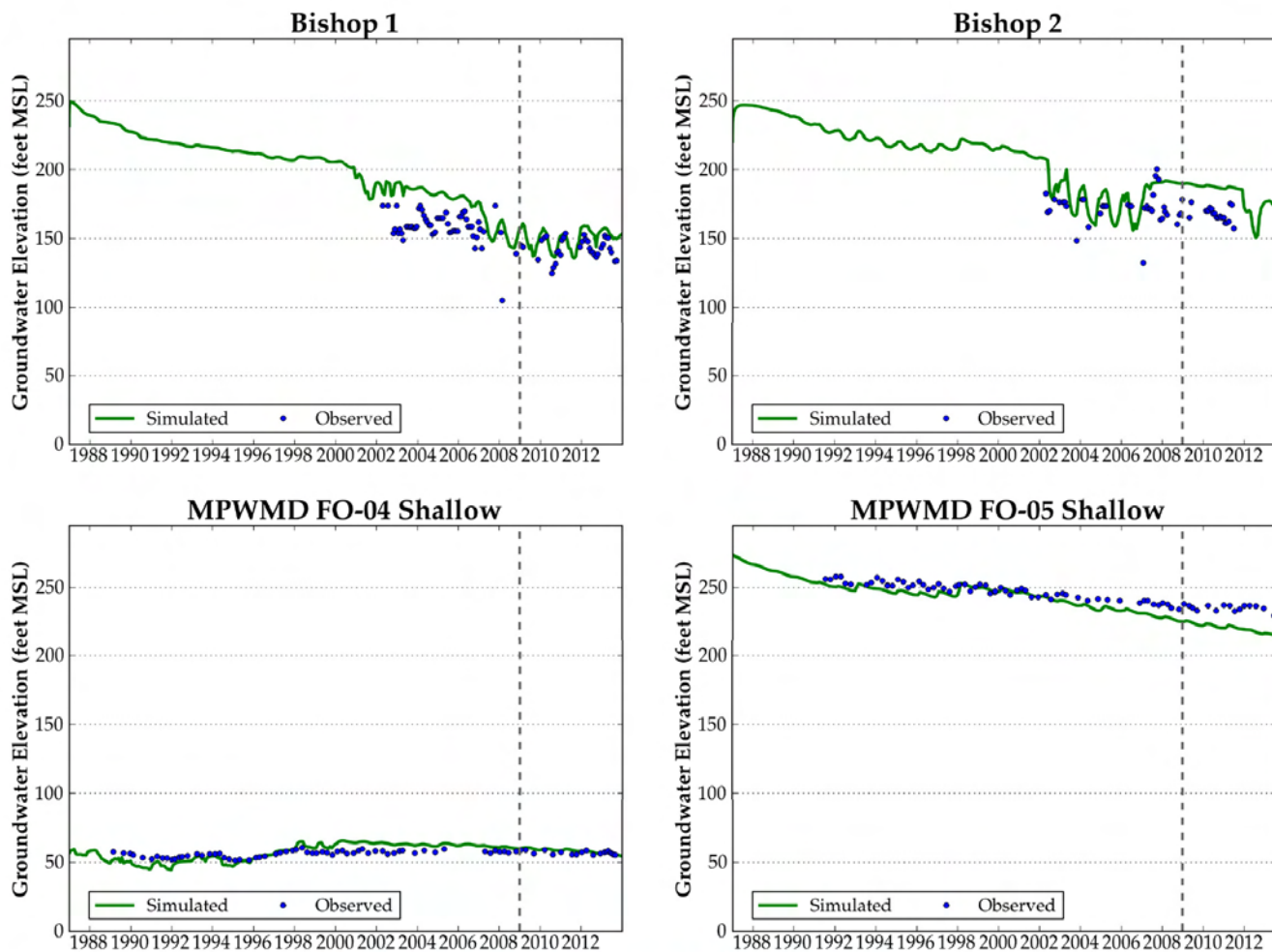


Figure A7: Southern Coastal Subarea Hydrographs

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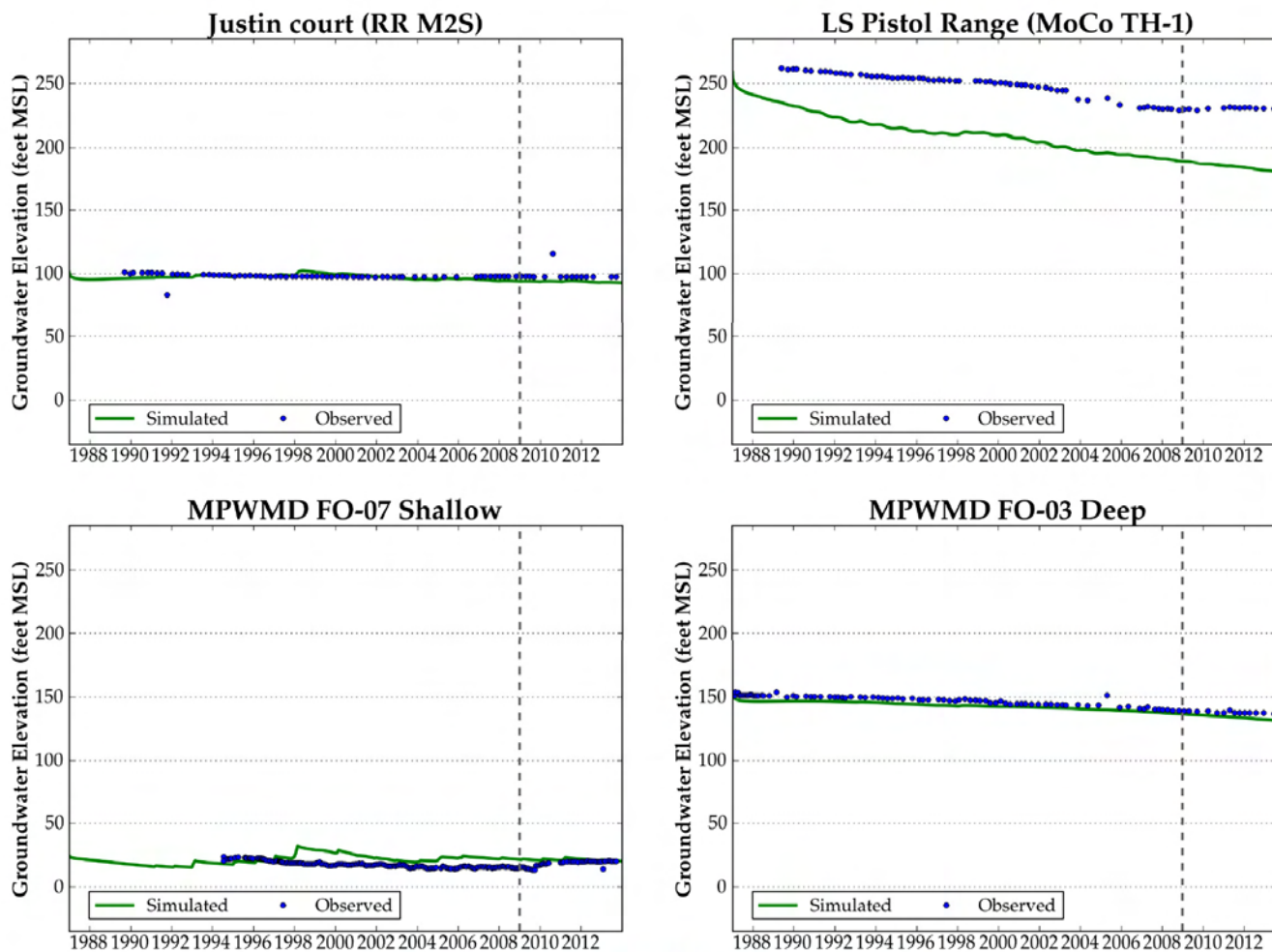


Figure A8: Laguna Seca Subarea Hydrographs

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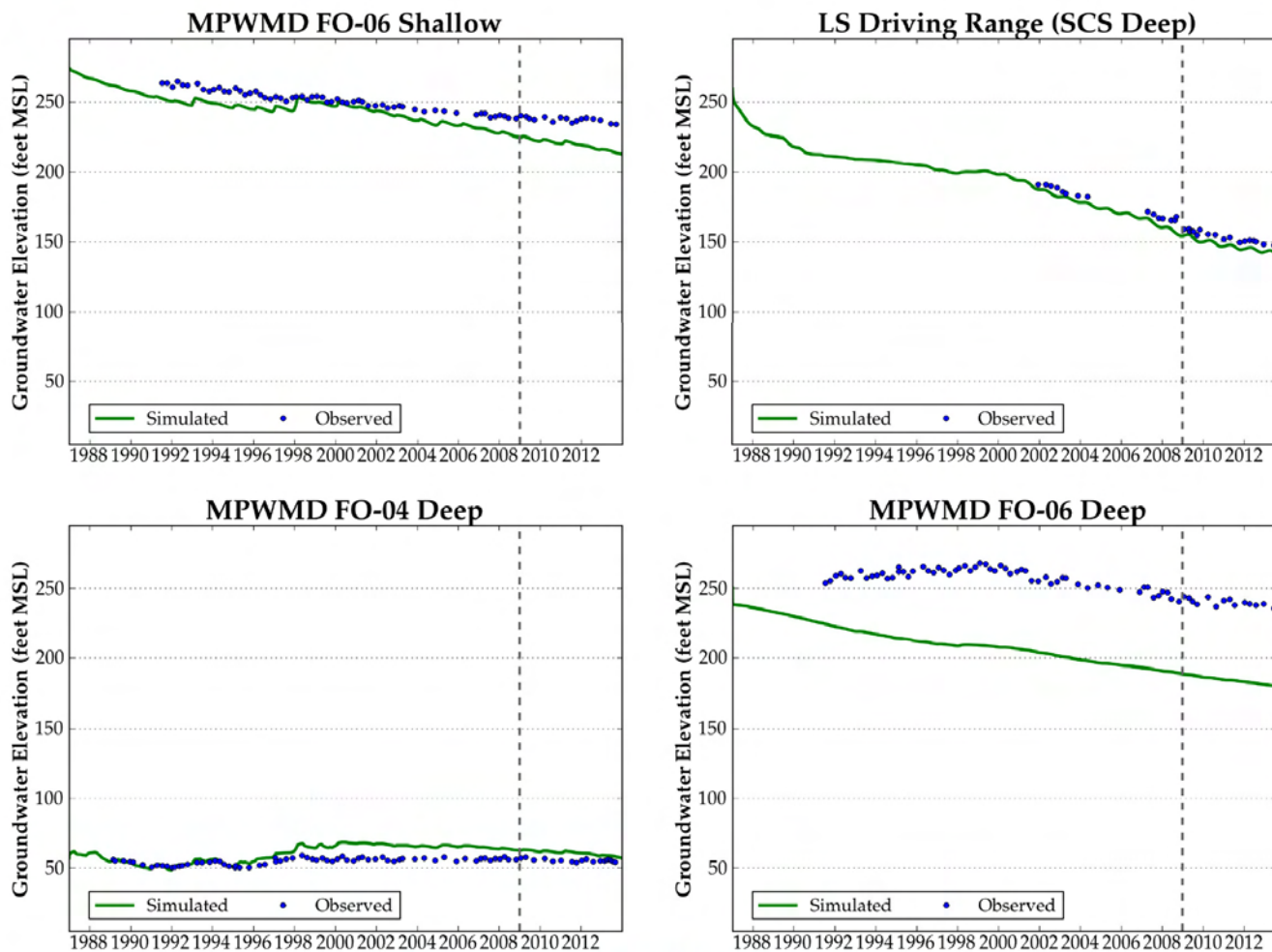


Figure A9: Laguna Seca Subarea Hydrographs

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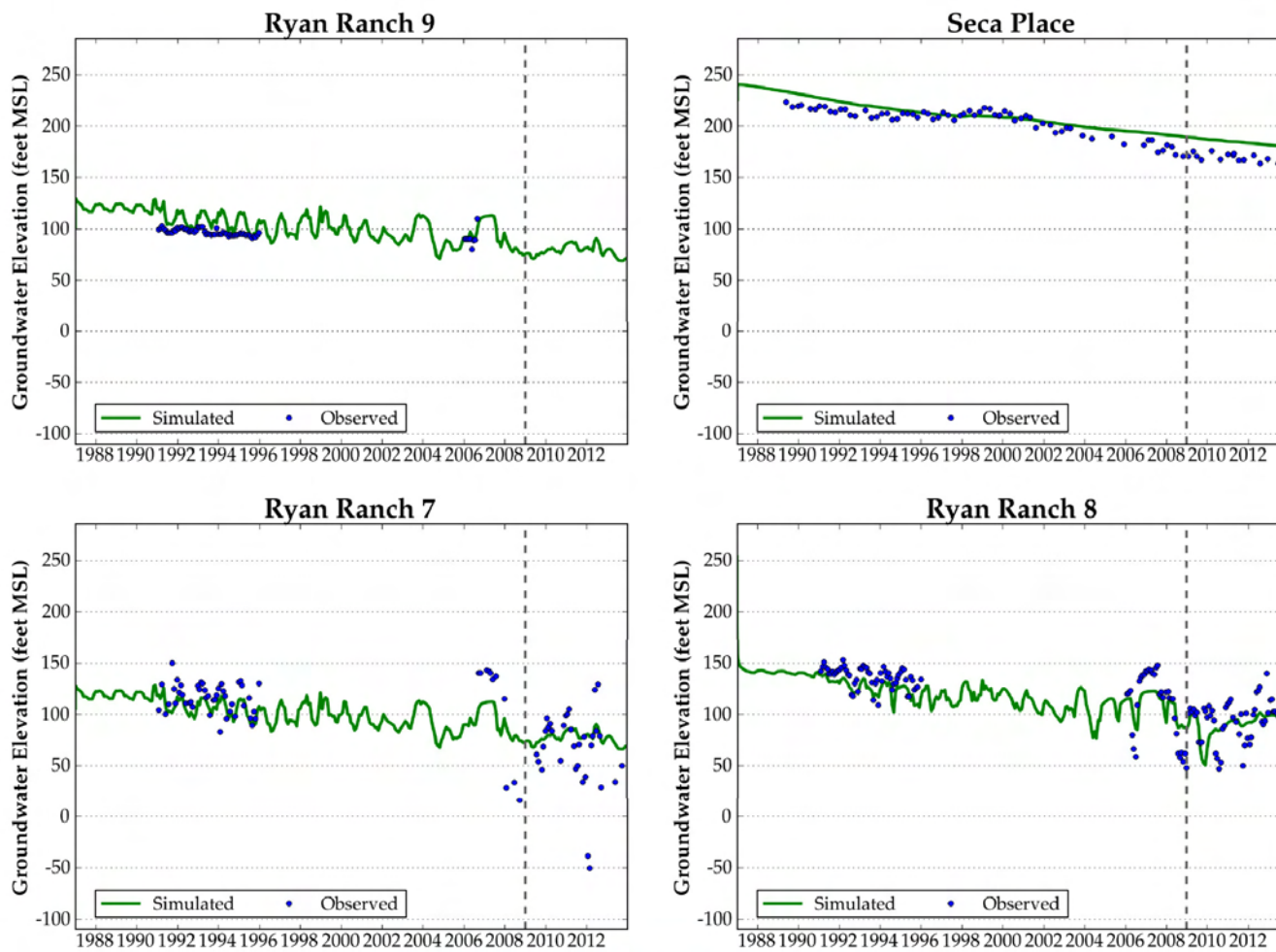


Figure A10: Laguna Seca Subarea Hydrographs

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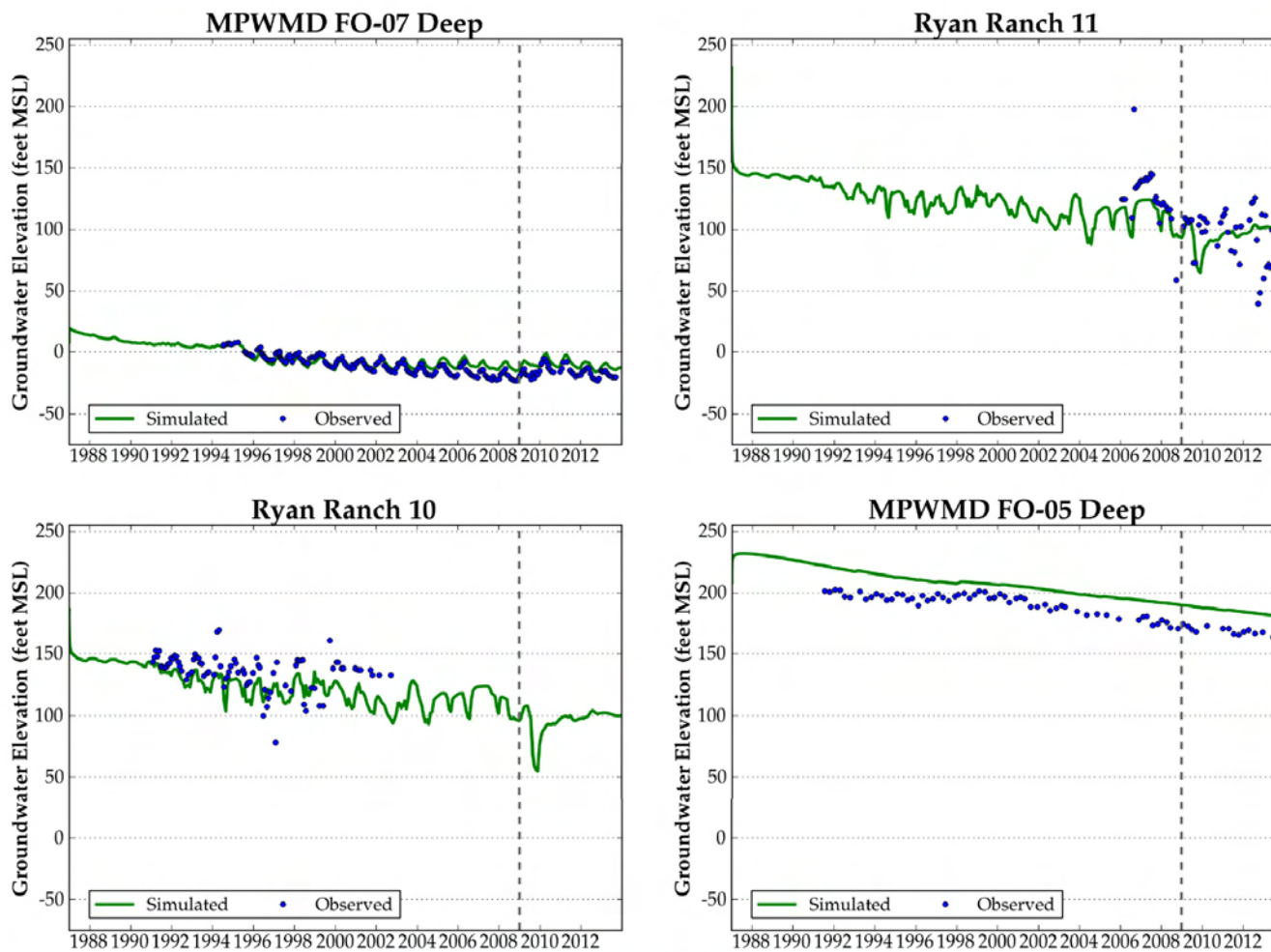


Figure A11: Laguna Seca Subarea Hydrographs

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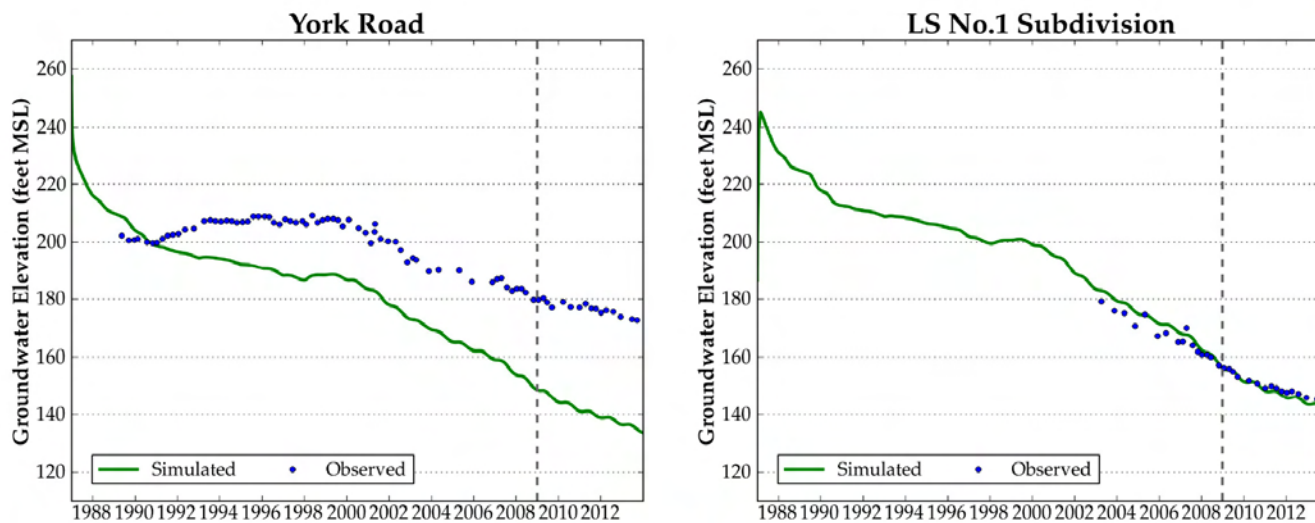


Figure A12: Laguna Seca Subarea Hydrographs

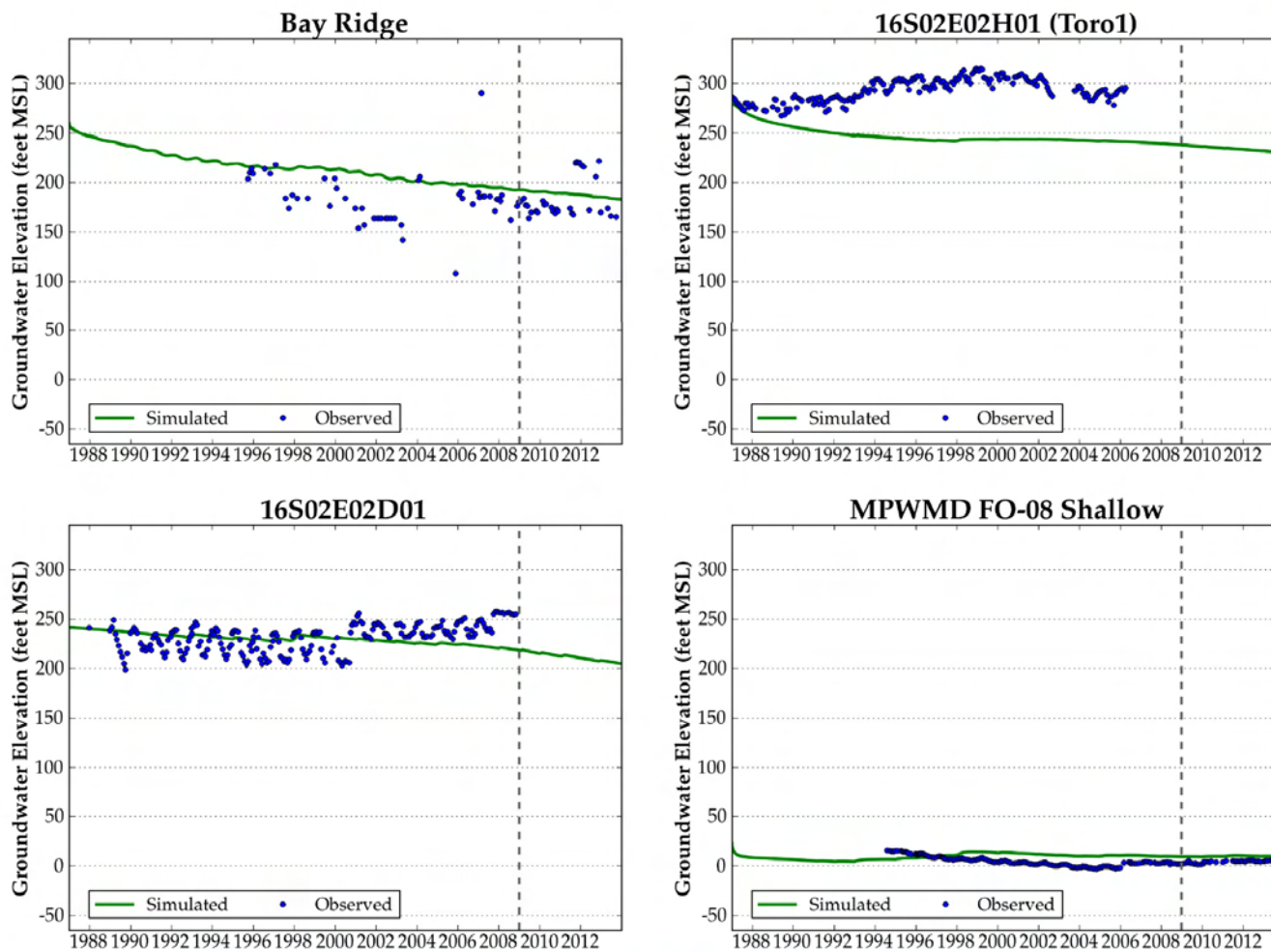


Figure A13: Hydrographs from Wells Outside of the Seaside Groundwater Basin

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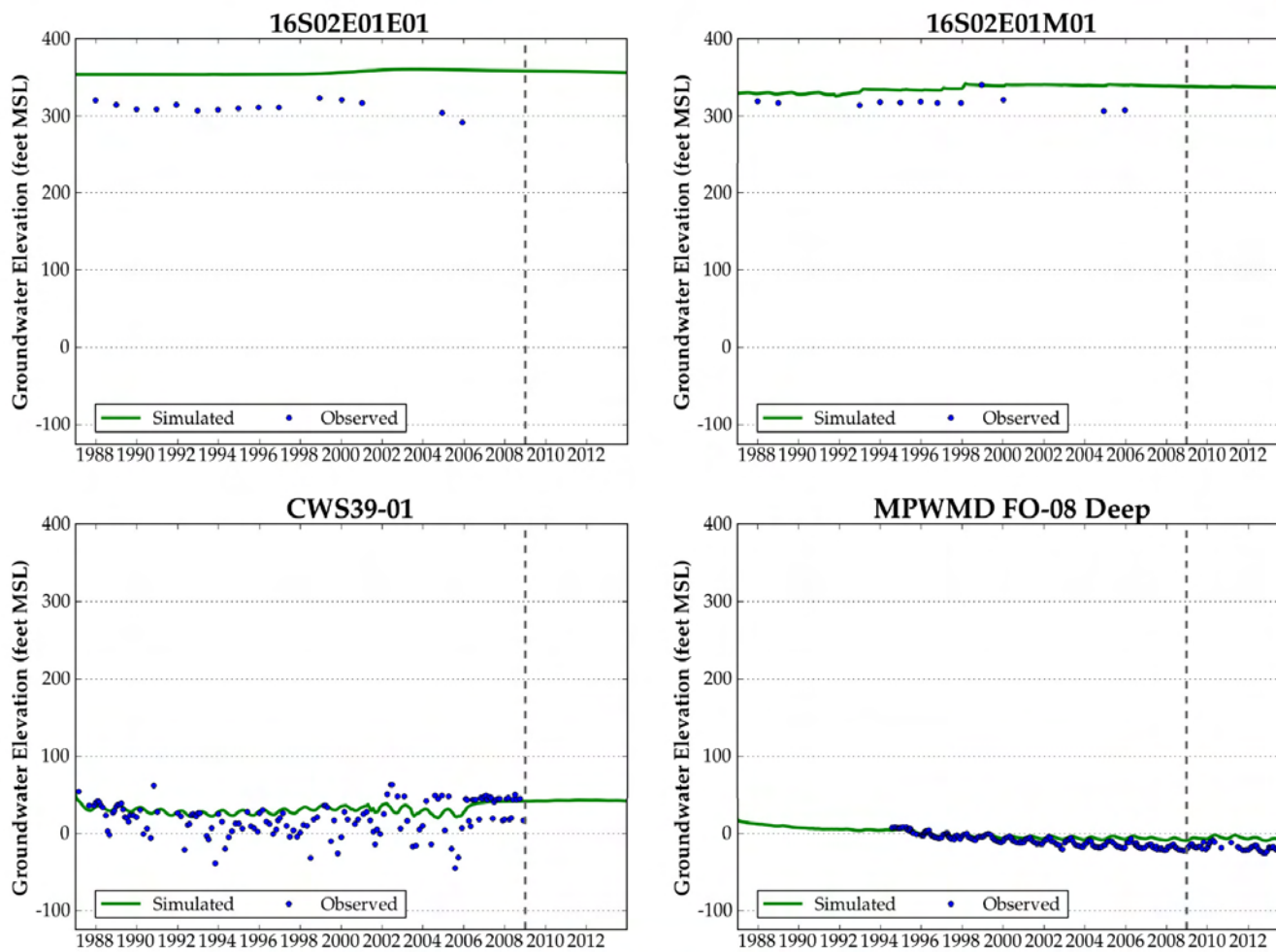


Figure A14: Hydrographs from Wells Outside of the Seaside Groundwater Basin

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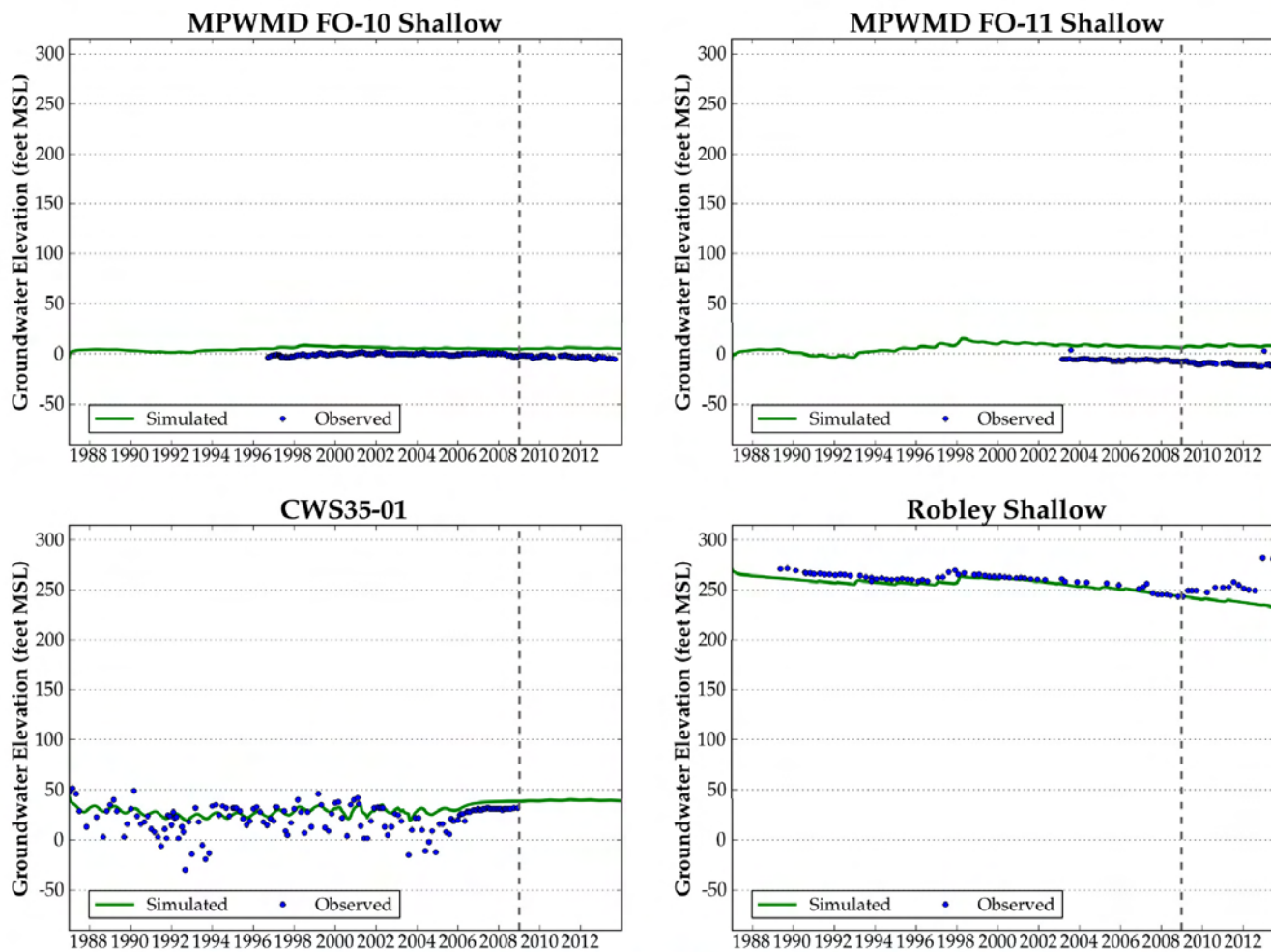


Figure A15: Hydrographs from Wells Outside of the Seaside Groundwater Basin

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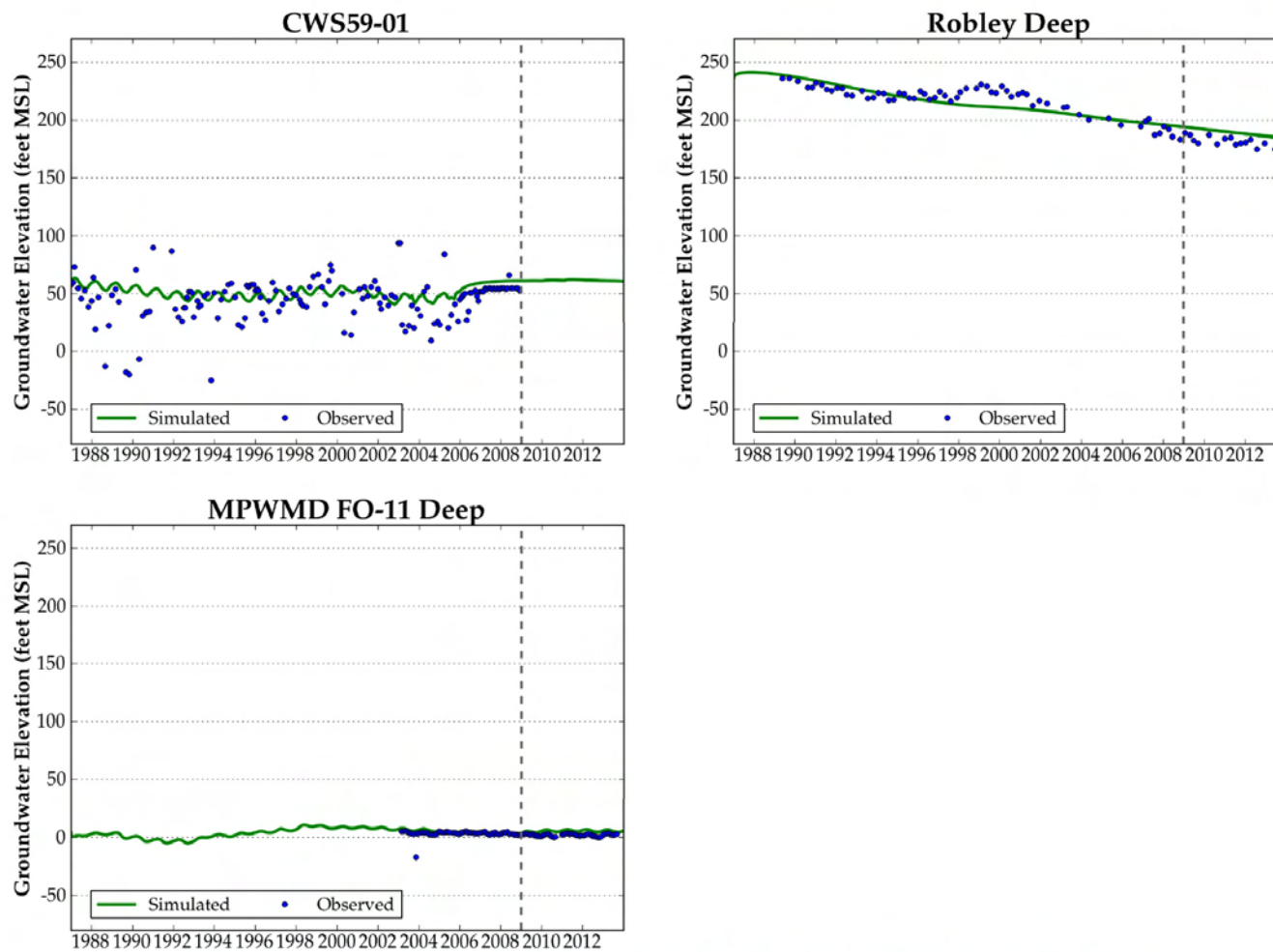


Figure A16: Hydrographs from Wells Outside of the Seaside Groundwater Basin

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ATTACHMENT 11

LAGUNA SECA SUBAREA MODELING



1814 Franklin Street, Suite 501
Oakland, CA 94612

TECHNICAL MEMORANDUM

To: Mr. Bob Jaques
From: Stephen Hundt, Derrick Williams
Date: August 6, 2014
Subject: Results of Laguna Seca Safe Yield Analysis (Revised)

Hydrometrics Water Resources Inc. (WRI) was tasked with determining impacts to the Laguna Seca subarea (LSSA) from potential pumping changes, and estimating the Natural Safe Yield and Operational Safe Yield of the subarea. After the first three subtasks, listed below, were completed, an additional two subtasks were added by the Watermaster Board. This memorandum describes the results of each of the subtasks. The subtasks were:

- Subtask 1.1 – Estimate impacts if Cal-Am discontinues Laguna Seca pumping.
- Subtask 1.2 – Estimate Laguna Seca subarea Natural Safe Yield
- Subtask 1.3 – Estimate Laguna Seca subarea Operational Safe Yield
- Subtask 1.4 – Groundwater level impacts from a reduction or elimination of Alternative producer pumping.
- Subtask 1.5 – Groundwater level impacts in Laguna Seca Subarea from wells outside the subarea.

SUBTASK 1.1 - ESTIMATE IMPACTS IF CAL-AM DISCONTINUES LAGUNA SECA PUMPING

Subtask 1.1 involved selecting and running a baseline scenario that includes Cal-Am's discontinuing Laguna Seca pumping. The baseline scenario chosen for this analysis is the 25 Year Replenishment Scenario run as part of the Replenishment Repayment Modeling project, completed by Hydrometrics WRI in 2013.

Results of the baseline scenario were analyzed against two criteria:

1. Does ceasing Cal-Am pumping in the LSSA allow groundwater elevations to stabilize?
2. Will groundwater elevations drop below either the pump intake or the top of the screen in existing wells?

Hydrographs of predicted groundwater elevations from the baseline scenario are presented in **Error! Not a valid bookmark self-reference.** through **Error! Not a valid bookmark self-reference.**. These figures also include well construction information, including the top of the screen and the pump intake elevation where available.

Pumping groundwater level data were provided by Monterey Peninsula Water Management District (MPWMD) for many wells. The difference between measured static water groundwater levels and measured pumping groundwater levels was used to estimate pumping drawdown in each well. For wells where pumping drawdown estimates are available, the predicted pumping groundwater level is included as a dashed blue line on **Error! Not a valid bookmark self-reference.** through **Error! Not a valid bookmark self-reference.**.

The table of available well data is included as Table A3 in Appendix A. This information was combined with the model results to track how the simulated static and pumping water levels change over time, and to check whether these are predicted to drop into the screened interval or below the pump intake. A short explanation of missing data is noted on each of the hydrograph figures.

Table 1 summarizes the results of the baseline simulation for each well; noting whether or not the static or pumping water levels are predicted to fall below the screen top or the pump intake. Several wells do not have all of the information necessary to make these predictions. Of those that have the necessary information, groundwater levels in two wells – Bishop 3, and Ryan Ranch #7 - are predicted to drop below the top of the screen. Only the Laguna Seca Resort Raceway well is predicted to see static water levels drop below the top of the screen. No wells with known pump intake elevations are predicted to have static or pumping water levels drop below the pump intake.

Table 1: Summarized Results for Select Wells

Well	Static Water Level		Pumping Water Level	
	Drops Below Screen Top	Drops Below Pump Intake	Drops Below Screen Top	Drops Below Pump Intake
Bay Ridge	N	N	N	N
Bishop #1	N	N	N	N
Bishop #3	N	n/a	Y	n/a
Pasadera – Paddock	N	N	N	N
Pasadera – Main Gate	N	n/a	N	n/a
Ryan Ranch #7	N	N	Y	N
Ryan Ranch #8	N	N	n/a	n/a
Ryan Ranch #11	N	N	N	N
Laguna Seca Golf Resort New #12	N	N	N	N
Laguna Seca Golf Resort Racetrack	Y	n/a	n/a	n/a
Toro #3	n/a	n/a	n/a	n/a
Laguna Seca Recreation Area #1	n/a	n/a	n/a	n/a
Laguna Seca Recreation Area #2	N	n/a	n/a	n/a

Y = yes, N = no, n/a = not available

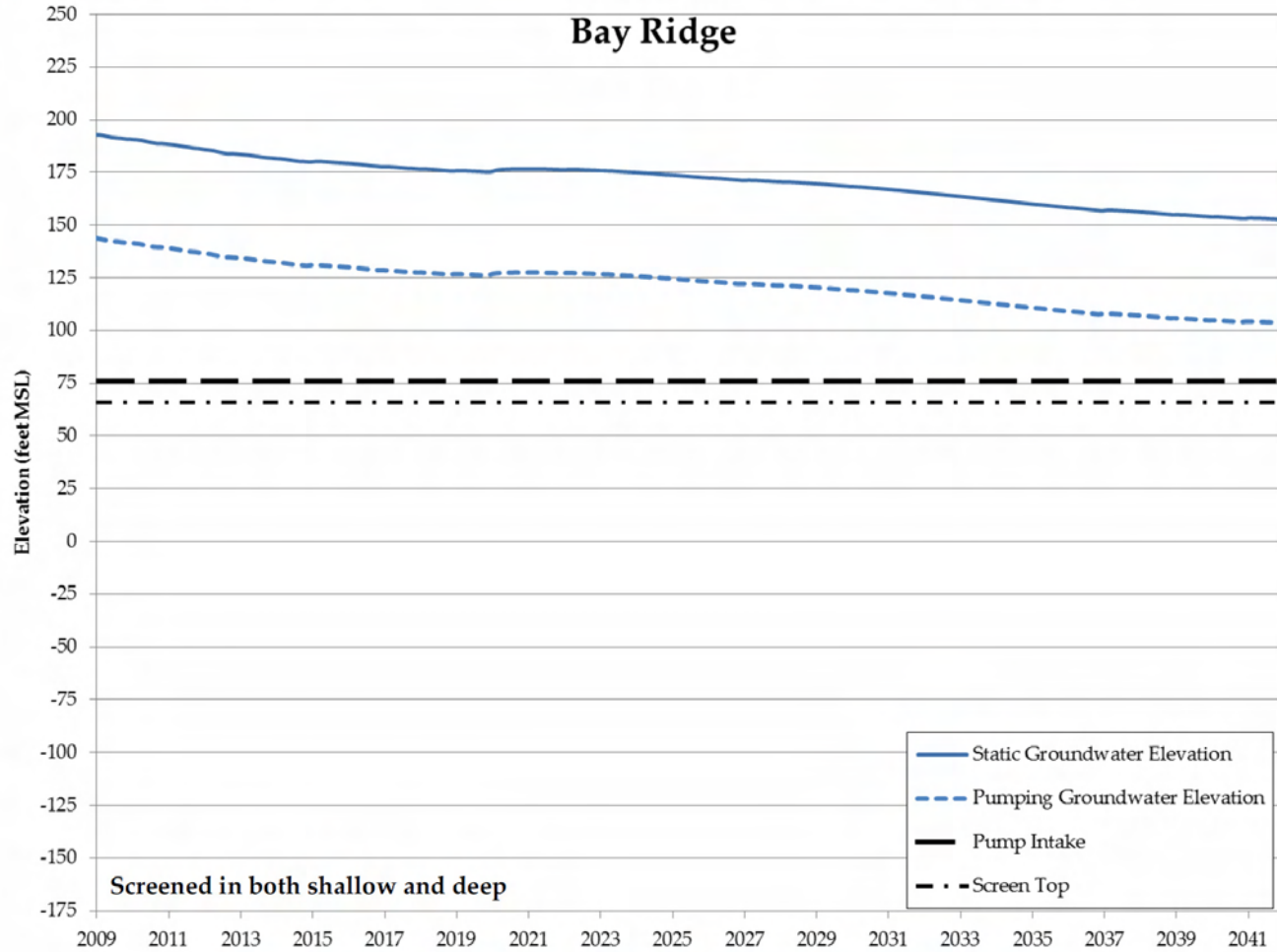


Figure 1: Bay Ridge Baseline Scenario Static and Pumping Hydrograph

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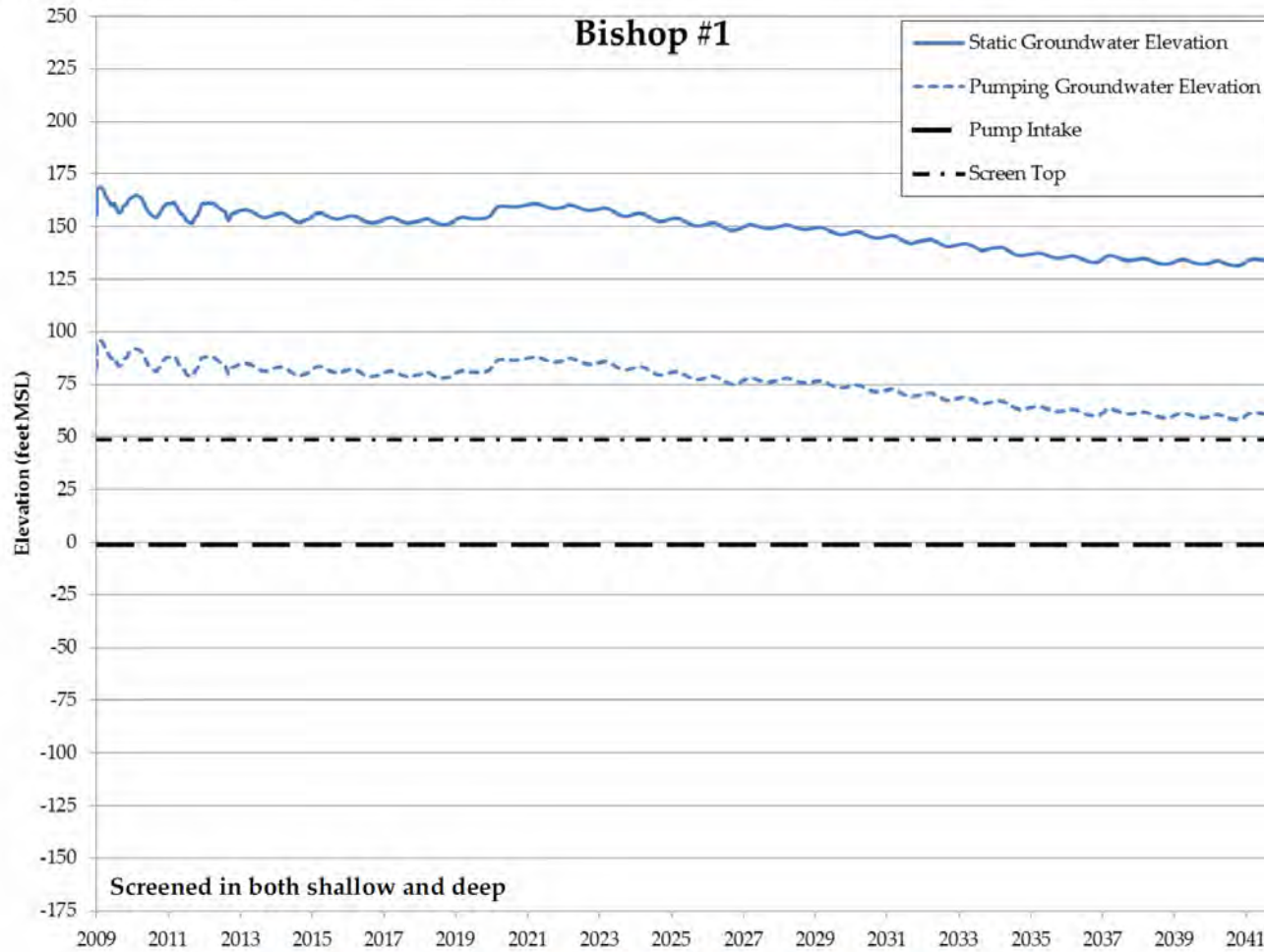


Figure 2: Bishop #1 Baseline Scenario Static and Pumping Hydrograph

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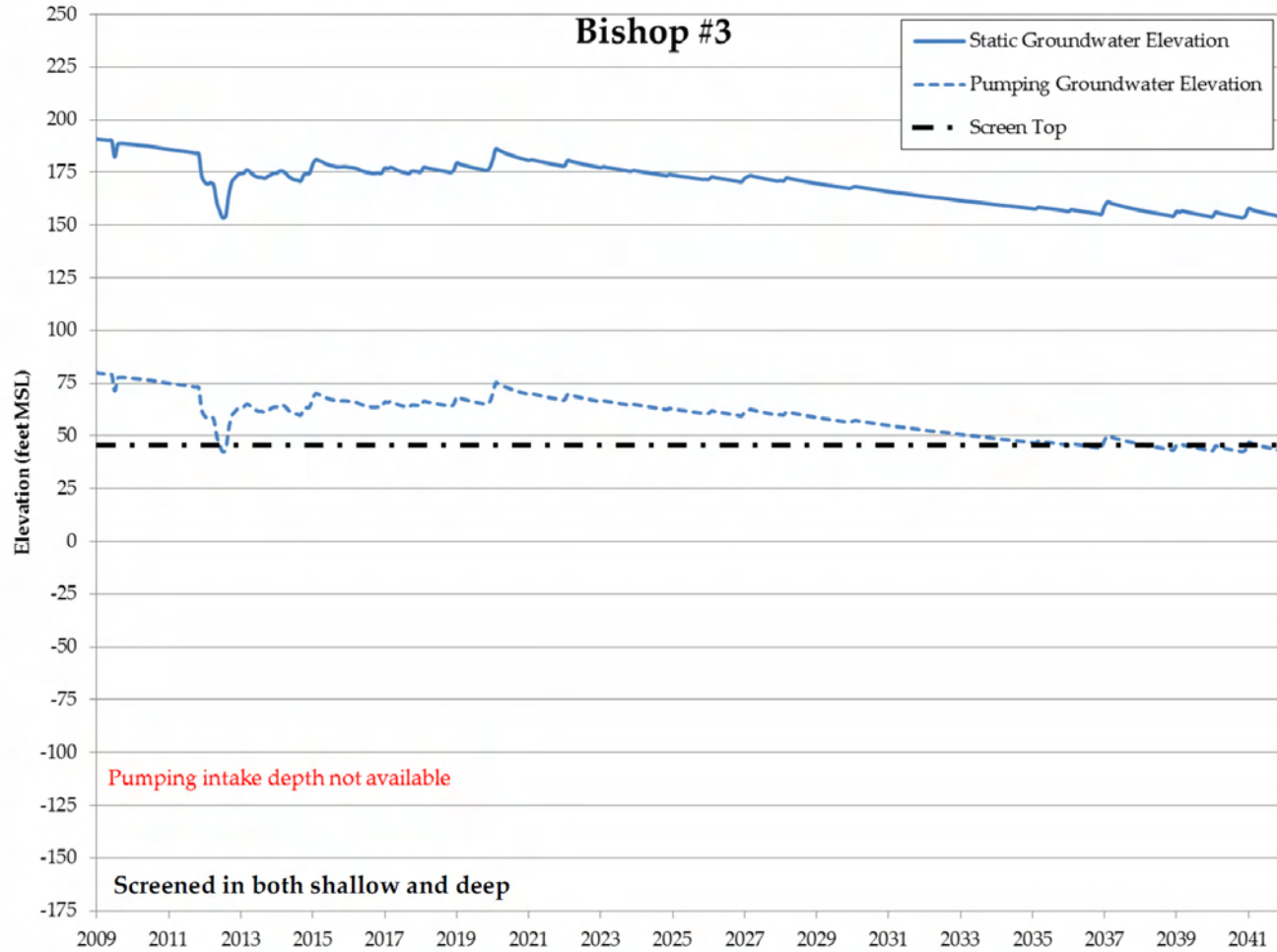


Figure 3: Bishop #3 Baseline Scenario Static and Pumping Hydrograph

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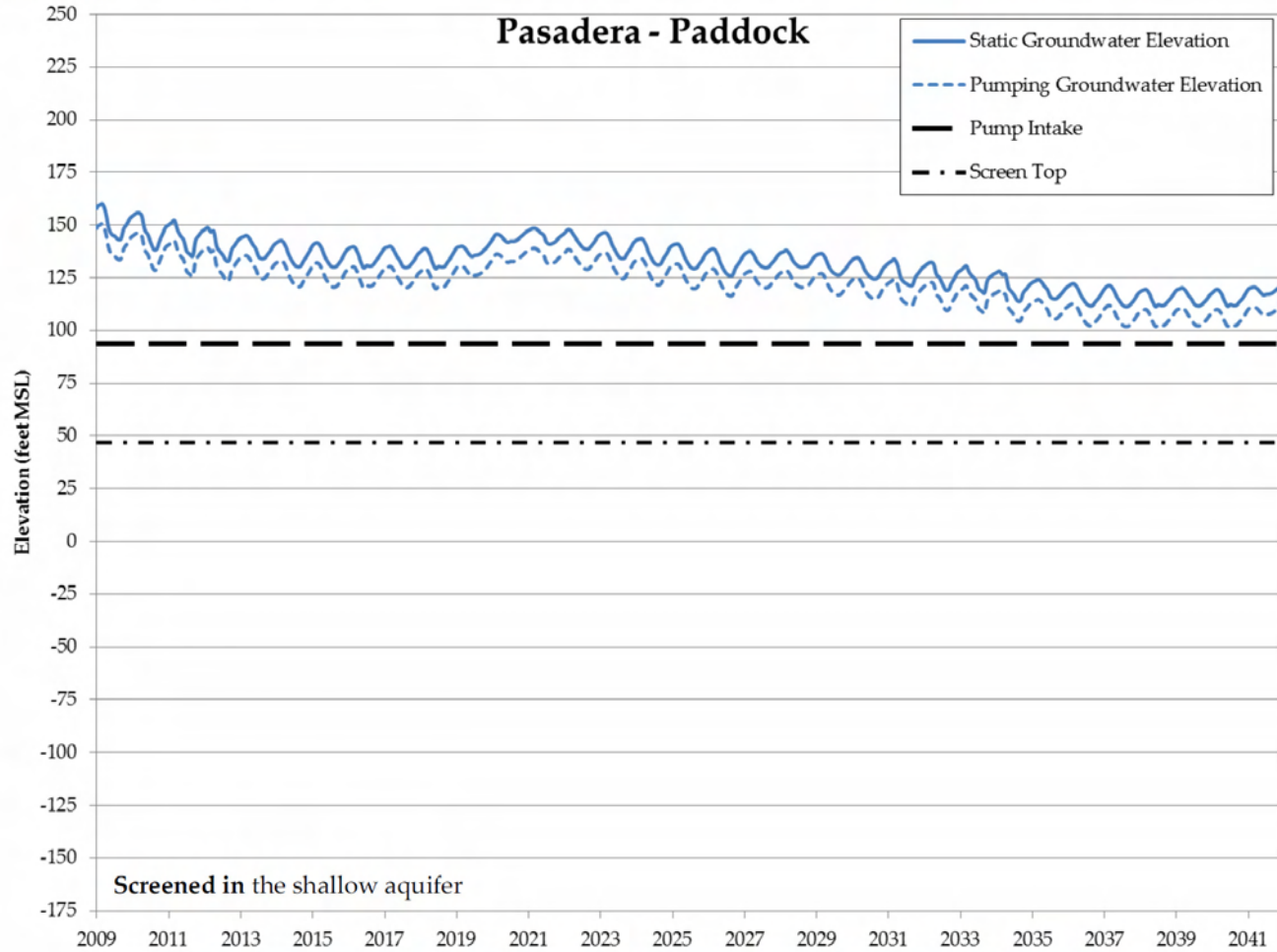


Figure 4: Pasadera Paddock Baseline Scenario Static and Pumping Hydrograph

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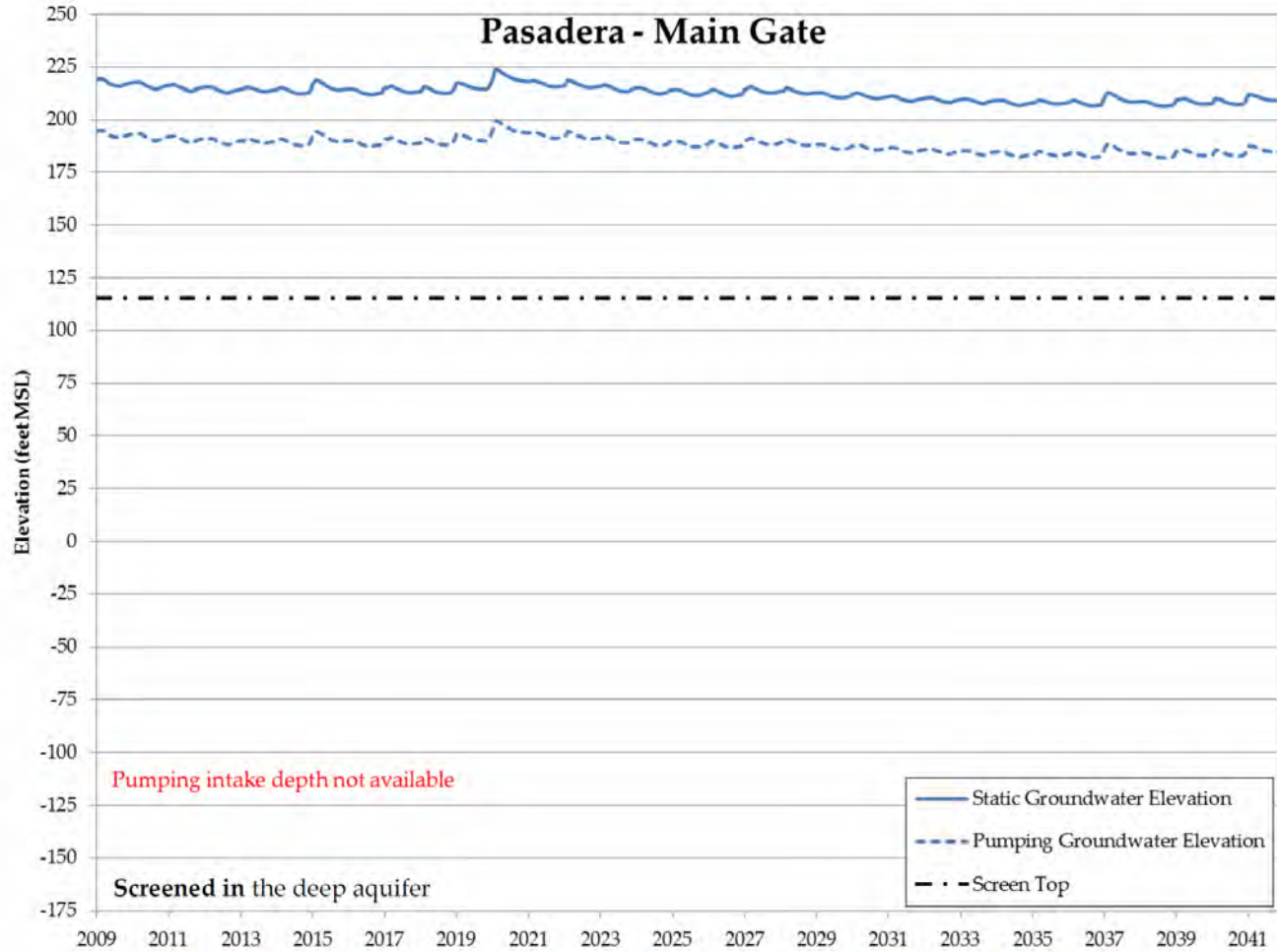


Figure 5: Pasadera Main Gate Baseline Scenario Static and Pumping Hydrograph

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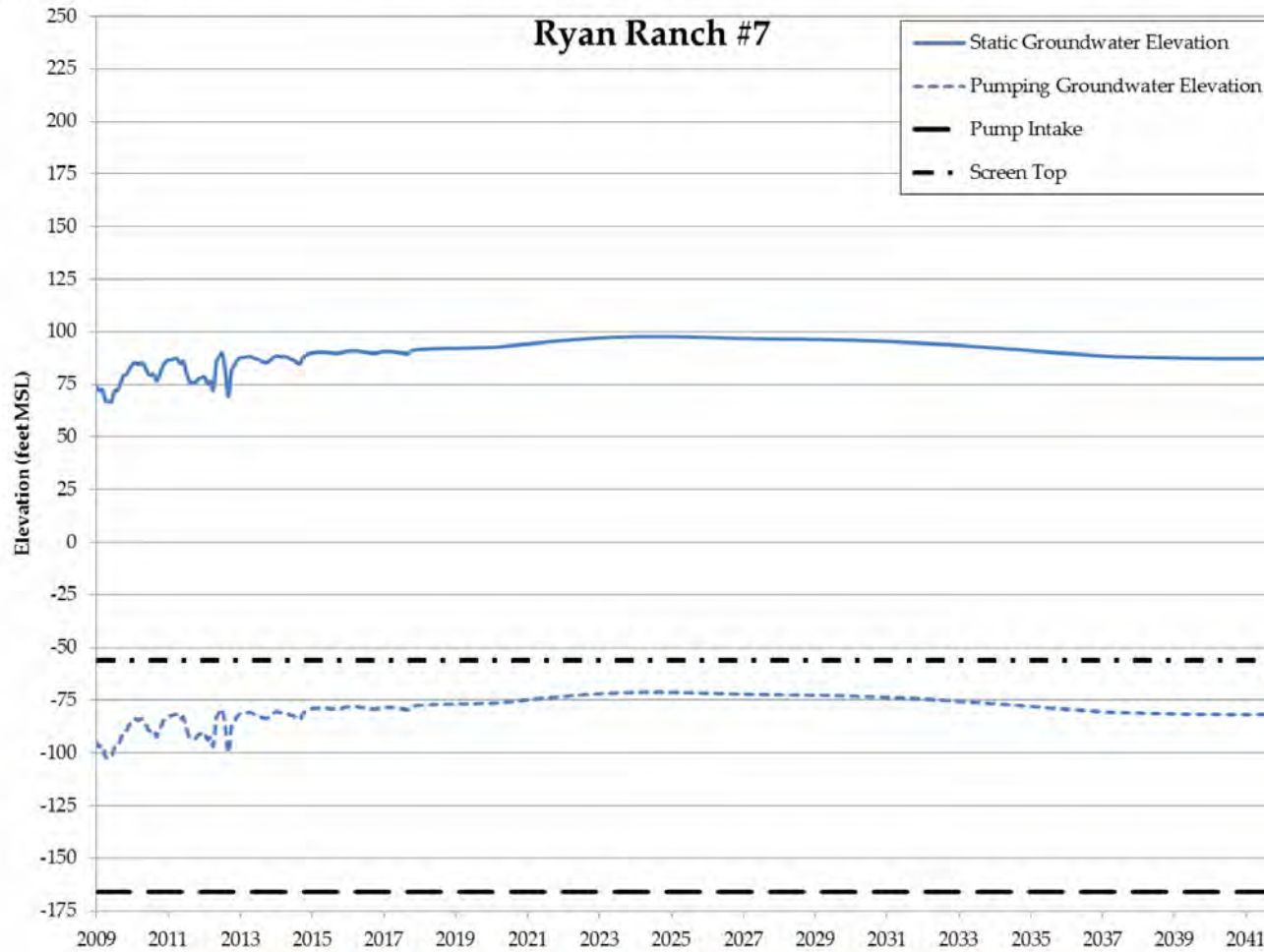


Figure 6: Ryan Ranch #7 Baseline Scenario Static and Pumping Hydrograph

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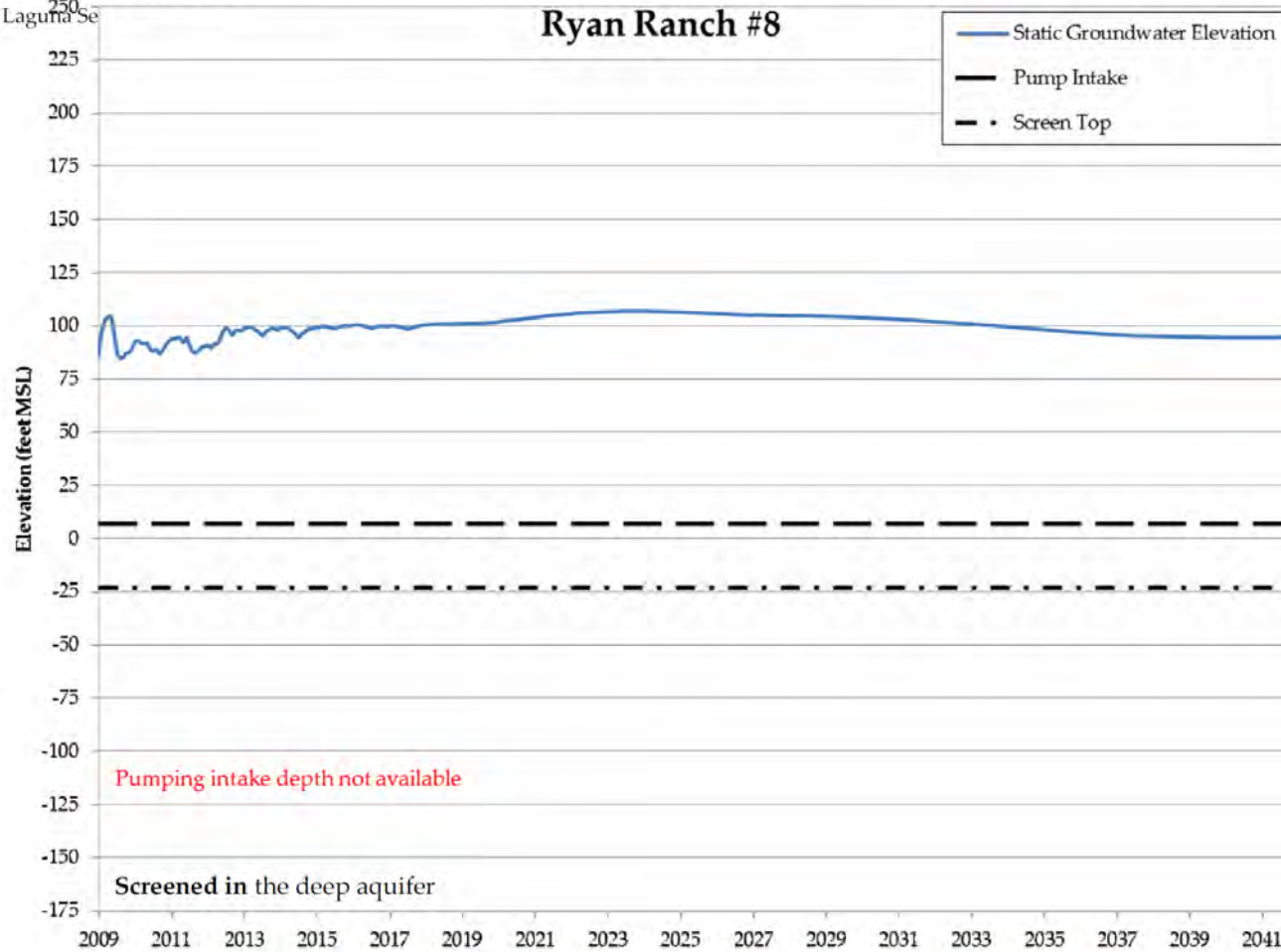


Figure 7: Ryan Ranch #8 Baseline Scenario Static and Pumping Hydrograph

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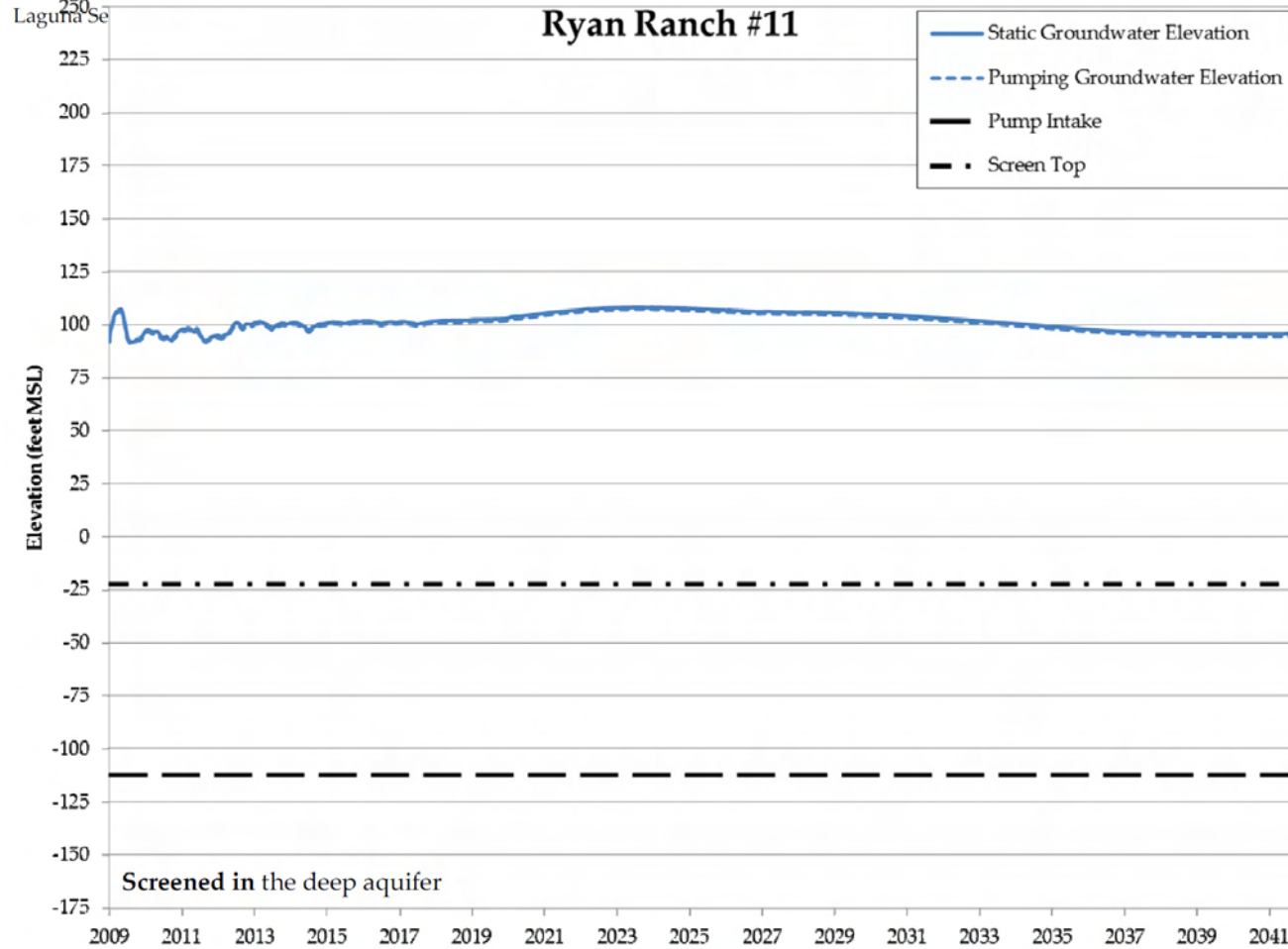


Figure 8: Ryan Ranch #8 Baseline Scenario Static and Pumping Hydrograph

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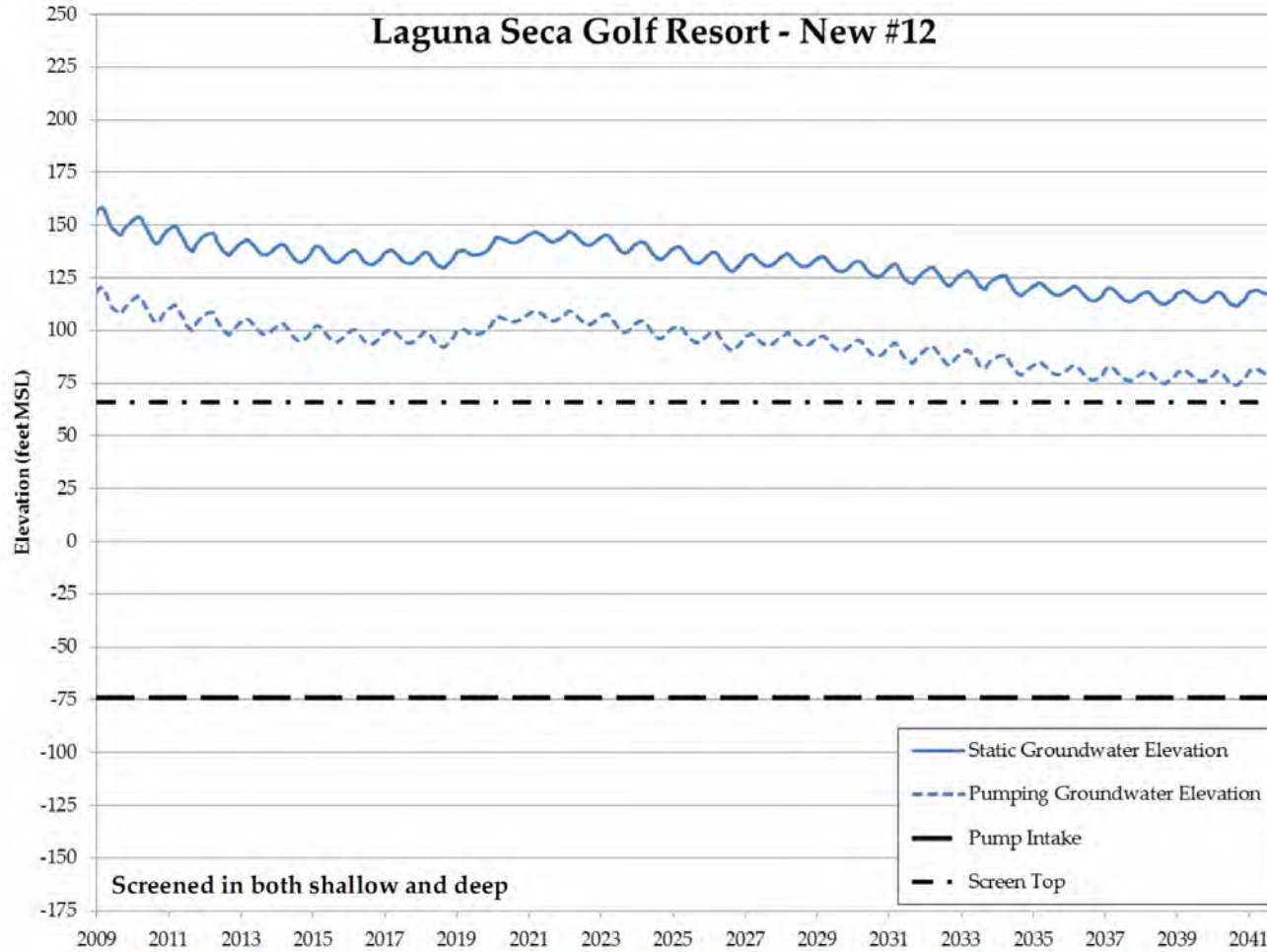


Figure 9: Laguna Seca Resort New 12 Baseline Scenario Static and Pumping Hydrograph

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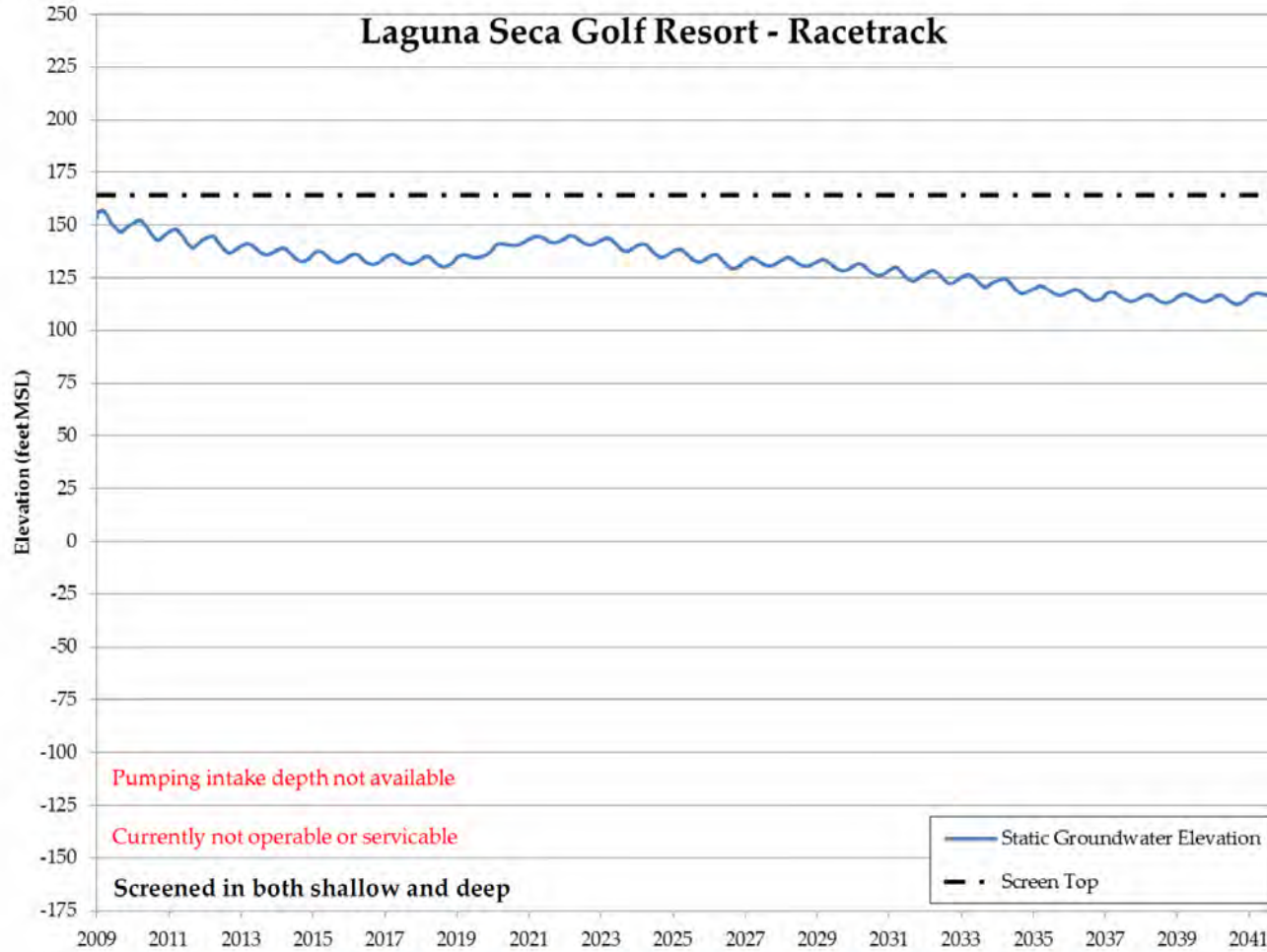


Figure 10: Laguna Seca Resort Racetrack Baseline Scenario Static and Pumping Hydrograph

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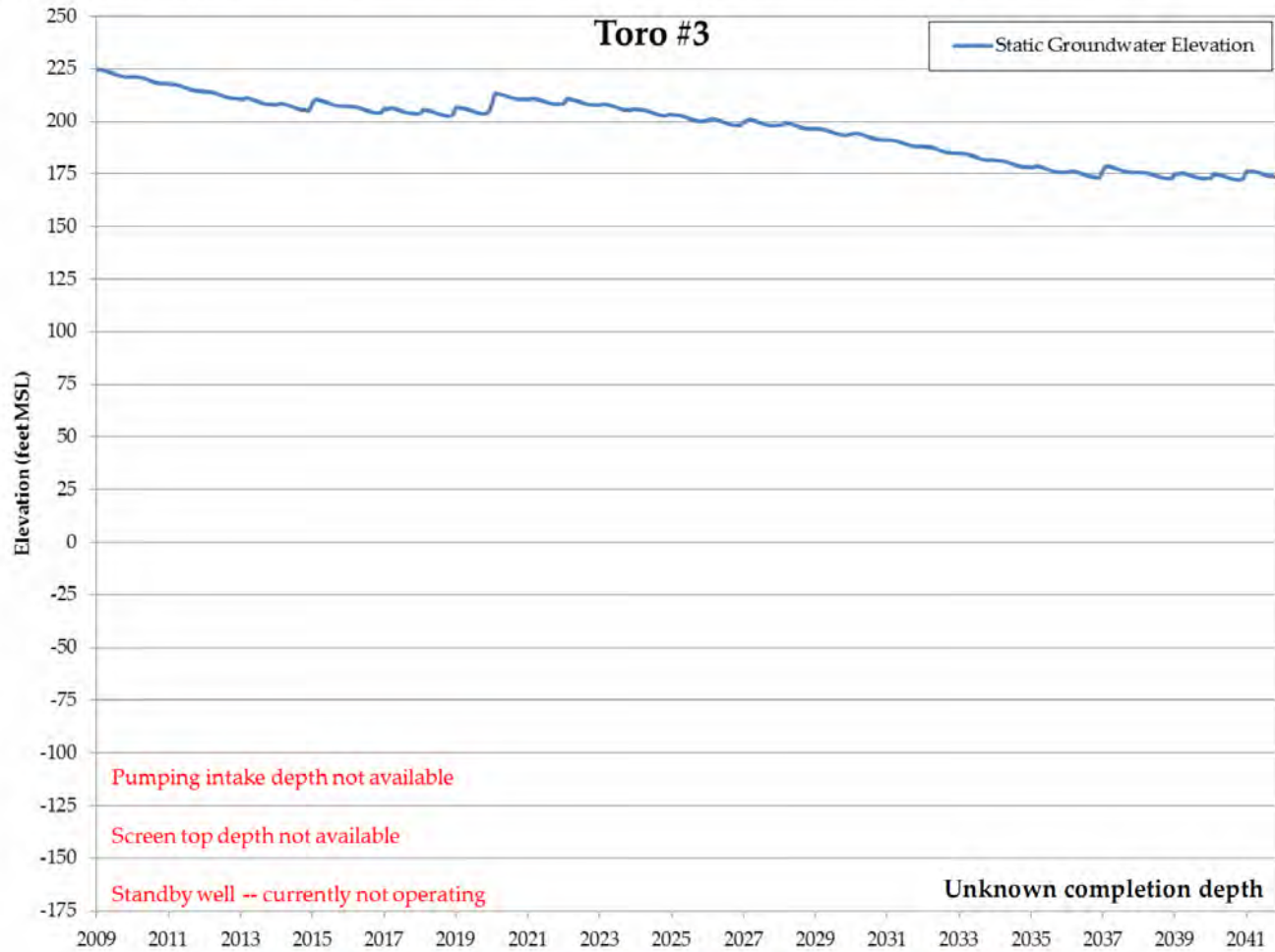


Figure 11: Toro #3 Baseline Scenario Static and Pumping Hydrograph

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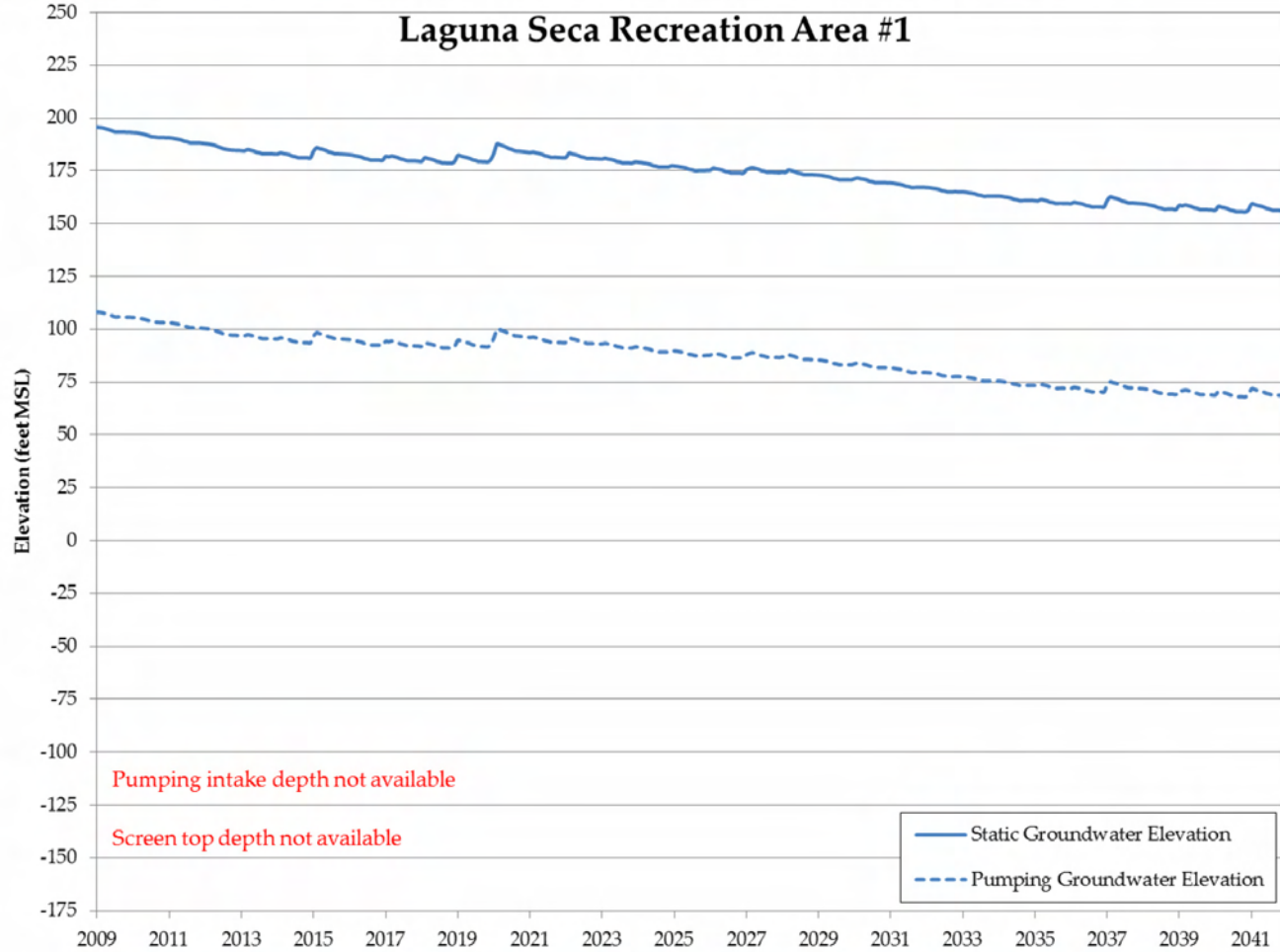


Figure 12: Laguna Seca Recreation Area #1 Baseline Scenario Static and Pumping Hydrograph

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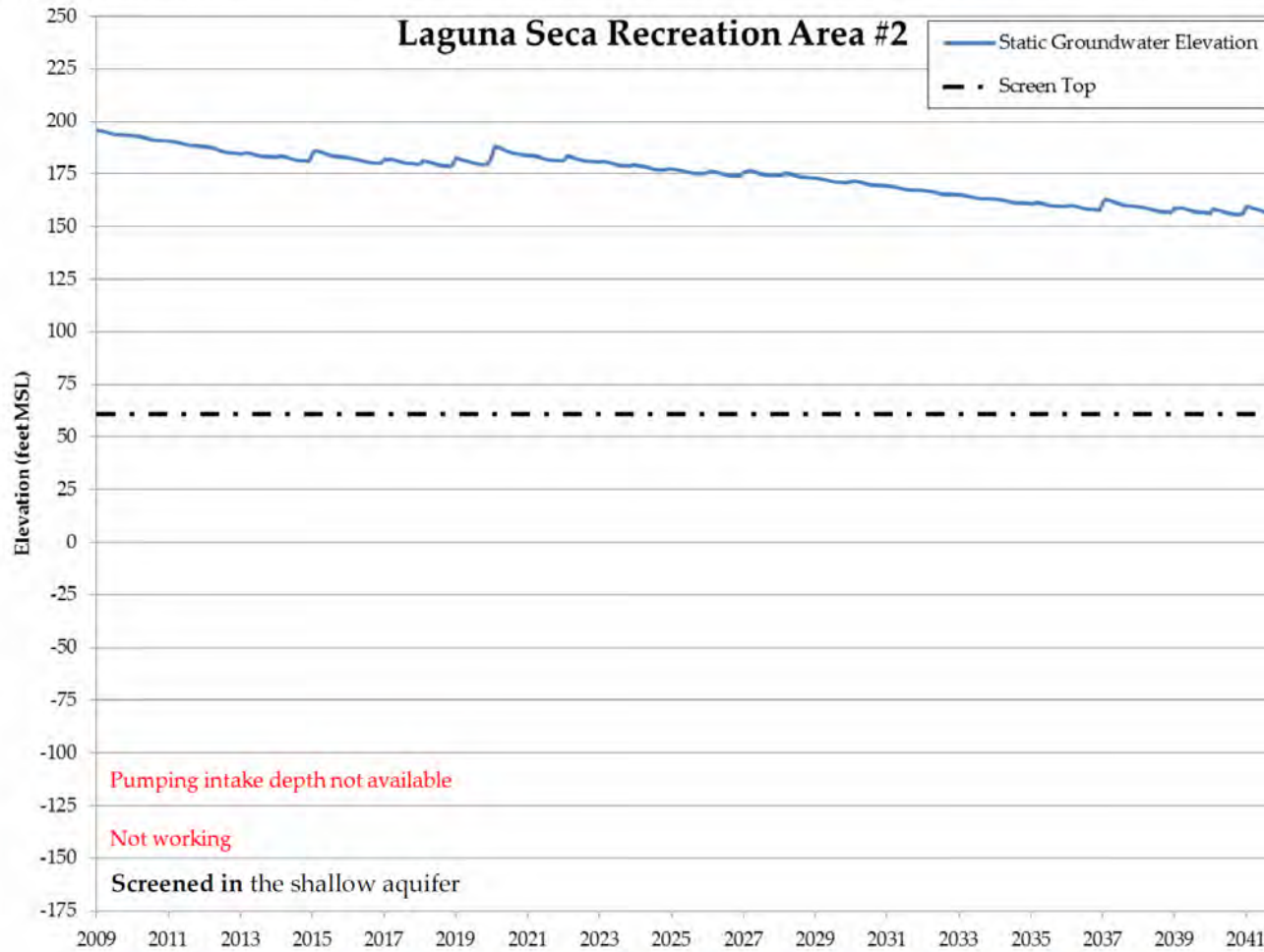


Figure 13: Laguna Seca Recreation Area #2 Baseline Scenario Static and Pumping Hydrograph

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SUBTASK 1.2 - ESTIMATE LAGUNA SUBAREA SECA NATURAL SAFE YIELD

The results obtained from the baseline scenario flow model simulation were used to calculate the natural safe yield. The natural safe yield is the amount of groundwater recharge and subsurface inflow that could be pumped while maintaining necessary streamflows and subsurface outflows to neighboring basins.

The only stream leaving the LSSA is the Arroyo del Rey. Groundwater elevations are currently below the bottom of the Arroyo del Rey, and therefore lowering groundwater elevations do not result in any additional loss of streamflow (MPWMD, personal communication). Therefore, changes to required streamflows were ignored when calculating the natural safe yield. The natural safe yield was calculated with the formula:

$$\begin{aligned} \text{Natural Safe Yield} &= \text{Aerial Recharge} + \text{Subsurface Inflow} \\ &\quad - \text{Subsurface Outflow} \end{aligned}$$

The values used for aerial recharge and subsurface inflow were the average annual values simulated in the baseline scenario. Similarly, the required subsurface outflow is the average annual subsurface outflow simulated in the baseline scenario.

The simulated average annual aerial recharge in the LSSA simulated is 866 acre-feet per year. The simulated average annual subsurface inflow into the LSSA is 930 acre-feet per year. The simulated average annual subsurface outflow from the LSSA is 1,556 acre-feet per year. Applying these values to the formula above, the average annual natural safe yield is 240 acre-feet per year.

The results of the natural safe yield calculation for every water year and for an average year are shown on Figure 14. The chart shows the annual rates in acre-feet per water year for each of the components of the natural safe yield. Aerial recharge is shown in blue, the subsurface inflow in green, the subsurface outflow in red, and the resulting annual natural safe yield is shown in gray. In addition, the average annual natural safe yield of 240 acre-feet per year is shown as the dashed black line. The annual values for each component of the natural safe yield are tabulated in Table A1 in Appendix A. Additionally, the annual pumping and

changes in storage, which complete the water budget for the LSSA are tabulated with the natural safe yield in

Table A2.

The LSSA is currently subject to the adjudication Decision natural safe yield value of 608 acre feet per year. There have been several studies that arrive at safe yield values for the Seaside Basin and LSSA (Yates 2002, CH2M Hill 2004), yet the methodology and data used to arrive at the adjudicated 608 acre feet per year is not stated in any of these reports. This value is two and a half times larger than the 240 acre feet per year natural safe yield that this study estimates. However, since the methodology used to develop the 608 acre feet per year figure is unknown, it was not possible to make a side-by-side comparison to determine the causes of the difference.

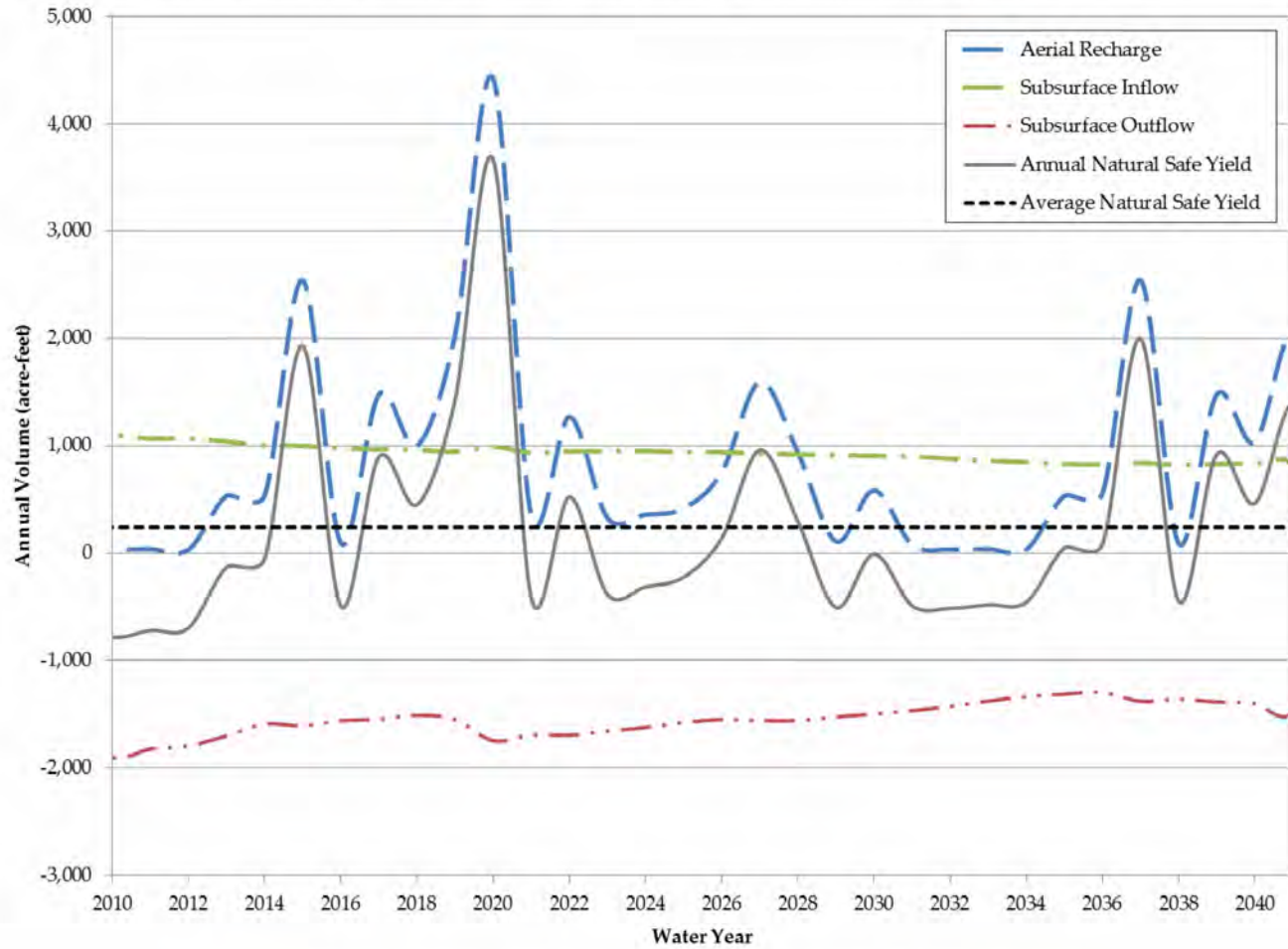


Figure 14: Annual Natural Safe Yield Components for the Baseline Scenario

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SUBTASK 1.3 - ESTIMATE LAGUNA SECA SUBAREA OPERATIONAL SAFE YIELD

The approach adopted in the natural safe calculation treats the entire basin as an isolated reservoir in which all inputs and outputs are distributed uniformly over its geographic area and throughout time. Ideally, pumping at the natural safe yield results in a stable water balance for the subarea. However, there is both spatial and temporal variability in the inputs and outputs of water to the subarea, and this prevents the natural safe yield from providing a stable water balance.

Initially, for this task, the operational safe yield for the LSSA was to be estimated based on a pumping rate that can be sustained by Standard and Alternative producers, and meets the criteria below. However, as the first and second criterion could not be met, the third criterion was not considered further.

- 1) Groundwater levels in existing wells stabilize, and do not persistently and continuously decline,
- 2) Pumping groundwater levels remain above the well pump intake and top of screen for each well, and
- 3) Existing subsurface outflows determined from the natural safe yield calculations are maintained.

The operational safe yield acknowledges constraints imposed by the locations of existing wells, as well as the spatial and temporal variability in recharge and discharge. The operational safe yield is therefore the amount of groundwater that can be pumped from existing wells without unwanted detrimental effects. The operational safe yield was estimated through iterative model runs.

The first criterion of maintaining stable groundwater levels in existing wells was evaluated by graphing simulated hydrographs from a number of wells throughout the basin. Hydrographs were produced for three simulations: 1) the baseline simulation, 2) a scenario in which pumping is reduced to the previously calculated natural safe yield of 240 acre-feet per year, and 3) for the most severe pumping reduction possible – dropping all Standard and Alternative producer pumping to zero. The hydrographs are shown on Figure 15 through Figure 17. As noted on the hydrographs, these wells are screened in both the Paso Robles (shallow) and Santa Margarita (deep) aquifers. The pumping rates for each of these scenarios are summarized in Table 2.

Table 2: Laguna Seca Subarea Average Annual Pumping Rates by Producer

	Average Annual Pumping (AF/year)		
	Baseline Scenario	Natural Safe Yield Scenario	No Standard or Alternative Pumping Scenario
Standard Producers	36	0	0
Alternative Producers	480	240*	0
Private Producers**	8	8	8
Standard + Alternative	516	240	0
All Producers	524	248	8

* Lowering the total annual production from Alternative Producers to this level would require reducing Alternative Producers to reduce their current levels of pumping by 240 acre-feet per year.

** Private producers are: Shoreline Community Church - Merrill Trust, SPCA, Stolich, and Wayland (formerly Fowler).

Figure 15 through Figure 17 show that groundwater levels do not stabilize at several wells, even under the most extreme pumping reductions. Figure 18 shows the locations of the wells, in addition to the locations of pumping wells in and near the LSSA that are active in the baseline scenario.

Hydrographs from the baseline scenario, in which Cal-Am pumping in the LSSA ceases in 2018, are plotted on Figure 15. Groundwater levels in wells FO-4 and Ryan Ranch #7 (RR-7) stabilize in this scenario. Groundwater levels in wells FO-6 Shallow, FO-6 Deep, Bishop1, and LS Driving Range (SCS-Deep) continue to decline in this scenario. The two wells with stable hydrographs are the two westernmost wells included on Figure 15.

Hydrographs from the second scenario, in which LSSA pumping is set to the estimated natural safe yield of 240 acre-feet per year, are plotted on Figure 16. Groundwater levels in the westernmost wells, FO-4 and RR-7, stabilize in this scenario. Groundwater levels in wells from the middle of the LSSA, Bishop1 and LS Driving Range (SCS-Deep), continue to decline, although at a slower rate than observed in the baseline scenario. Groundwater levels in the easternmost wells, FO-6 Shallow and FO-6 Deep continue to decline in this scenario at rates similar to, although slightly slower than, rates observed in the baseline scenario.

Hydrographs from the third scenario, in which all Standard producer and Alternative producer pumping from the LSSA is halted, are plotted on Figure 17. Groundwater levels in wells in the western and middle portions of the LSSA either stabilize or rise in this scenario. This includes groundwater levels in wells FO-4, RR-7, Bishop1 and LS Driving Range (SCS-Deep). Groundwater levels in the easternmost wells, FO-6 Shallow and FO-6 Deep continue to decline in this scenario, although the decline is slower than rates observed in the baseline scenario.

Hydrographs shown on Figure 15 through Figure 17 suggest that reducing pumping helps a number of wells to stabilize or recover; but a few wells on the eastern side of the basin continue to decline. The inability of some wells to achieve stable groundwater levels is apparently due to the amount of pumping from wells located outside of the LSSA, but near its eastern boundary. Figure 18 includes the locations of pumping wells located outside the eastern boundary of the LSSA. The Toro-1, Toro-2, and Toro-3 wells shown on Figure 18 are close to, but officially outside of the LSSA boundary. This finding suggests that either the original boundary in this portion of the Seaside Basin was incorrectly drawn, or the boundary has shifted to the east due to changes in pumping practices.

Figure 19 displays wells inside, and just outside the eastern boundary of, the LSSA under the baseline scenario. The wells just outside and east of the LSSA, which are listed in Table 3, pump roughly twice as much as all of the wells within the LSSA. A breakdown of the average annual pumping rates by well is shown in this table. Some of these production wells, such as Toro 1, 2 and 3 wells, lie extremely close to the subarea boundary and close to the easternmost monitoring well (FO-6). Well FO-6 is the well that shows the largest and most persistent groundwater level declines under all scenarios.

The pumping variability observed on Figure 19 results from the scenario's pumping assumptions. The baseline pumping scenario begins by replicating 3½ years of recorded rates. After this initial period, the pumping switches to estimated future pumping rates. Included in the estimated future pumping rates are wells with constant annual pumping rates and wells (primarily golf course irrigation wells) that have variable pumping rates that are tied to the hydrology that is applied to the simulation period of the model. The golf course irrigation wells in this part of the basin drive the annual variability seen in Figure 19.

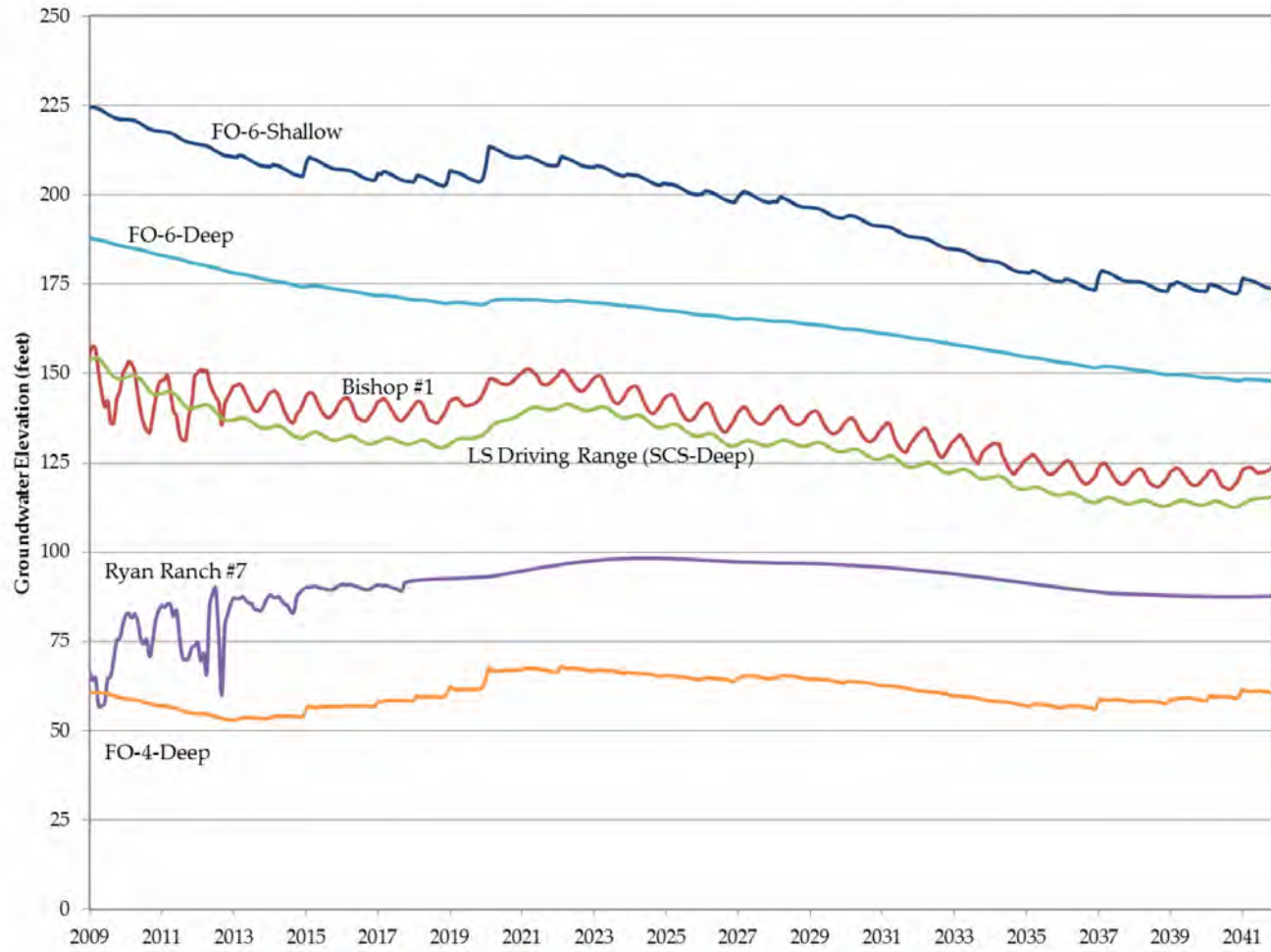


Figure 15: Hydrographs of Selected Wells Under the Baseline Scenario

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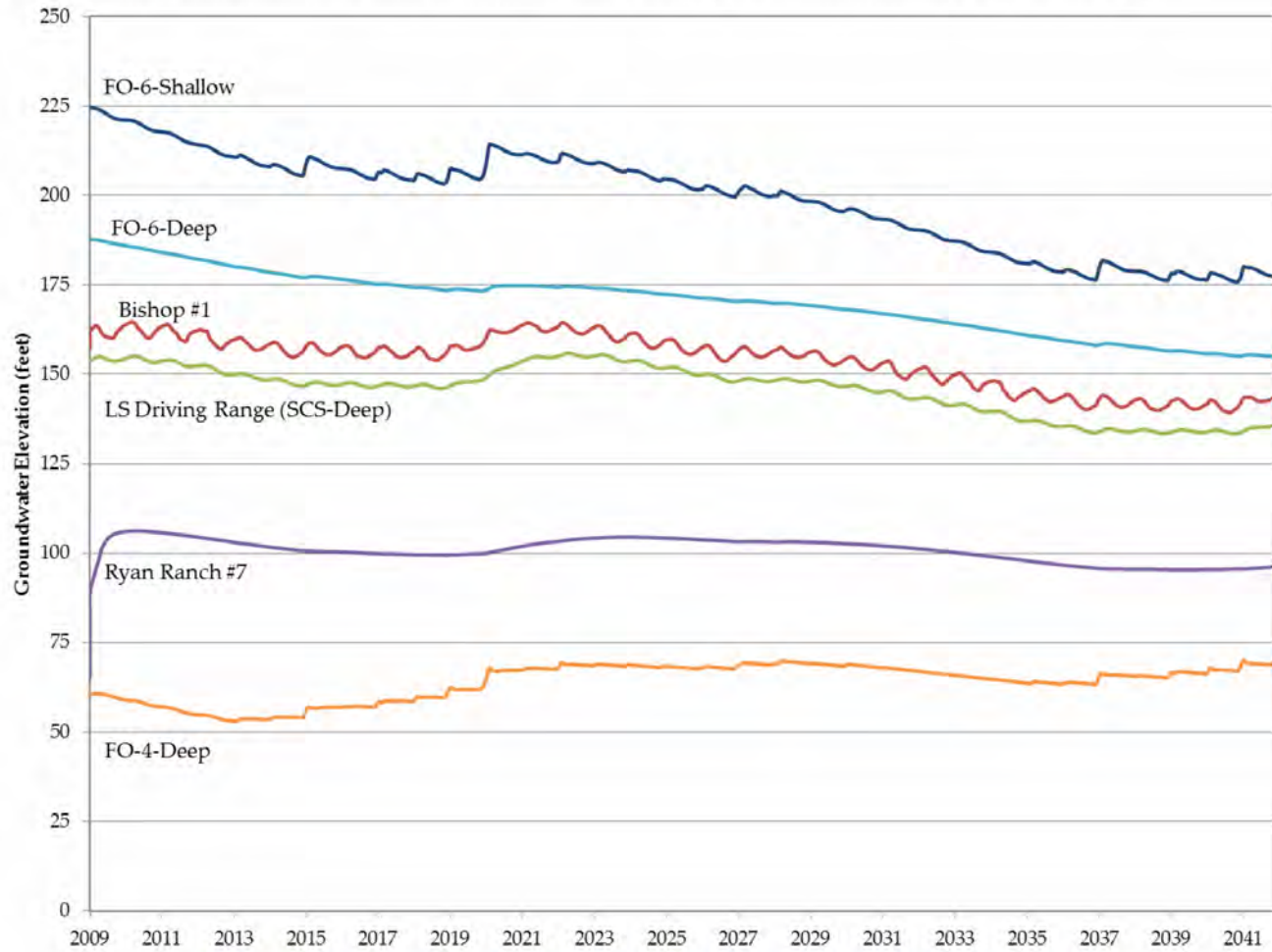


Figure 16: Hydrographs of Selected Wells Under the Natural Safe Yield Scenario

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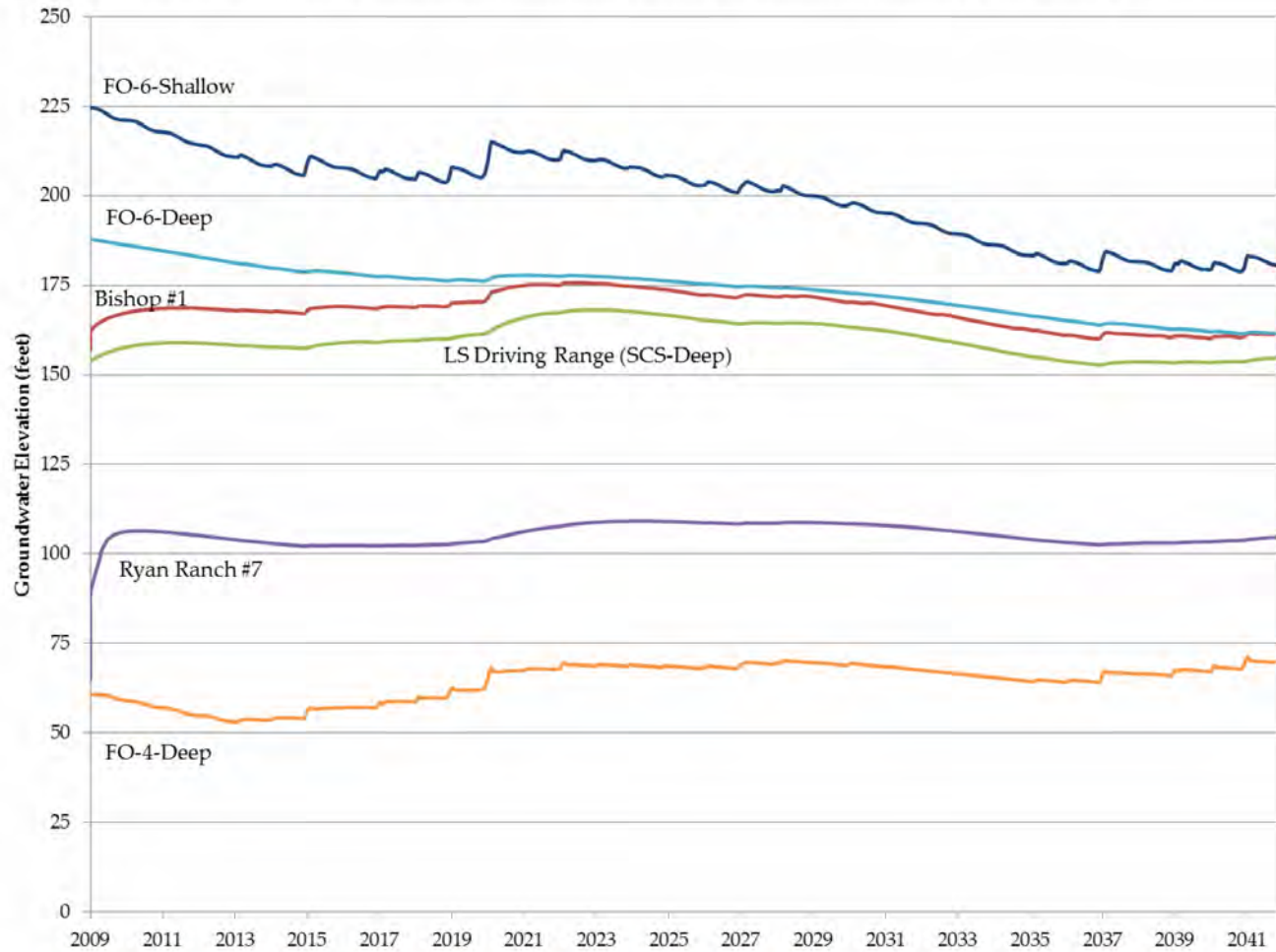


Figure 17: Hydrographs of Selected Wells under the No Standard or Alternative Producer Pumping Scenario

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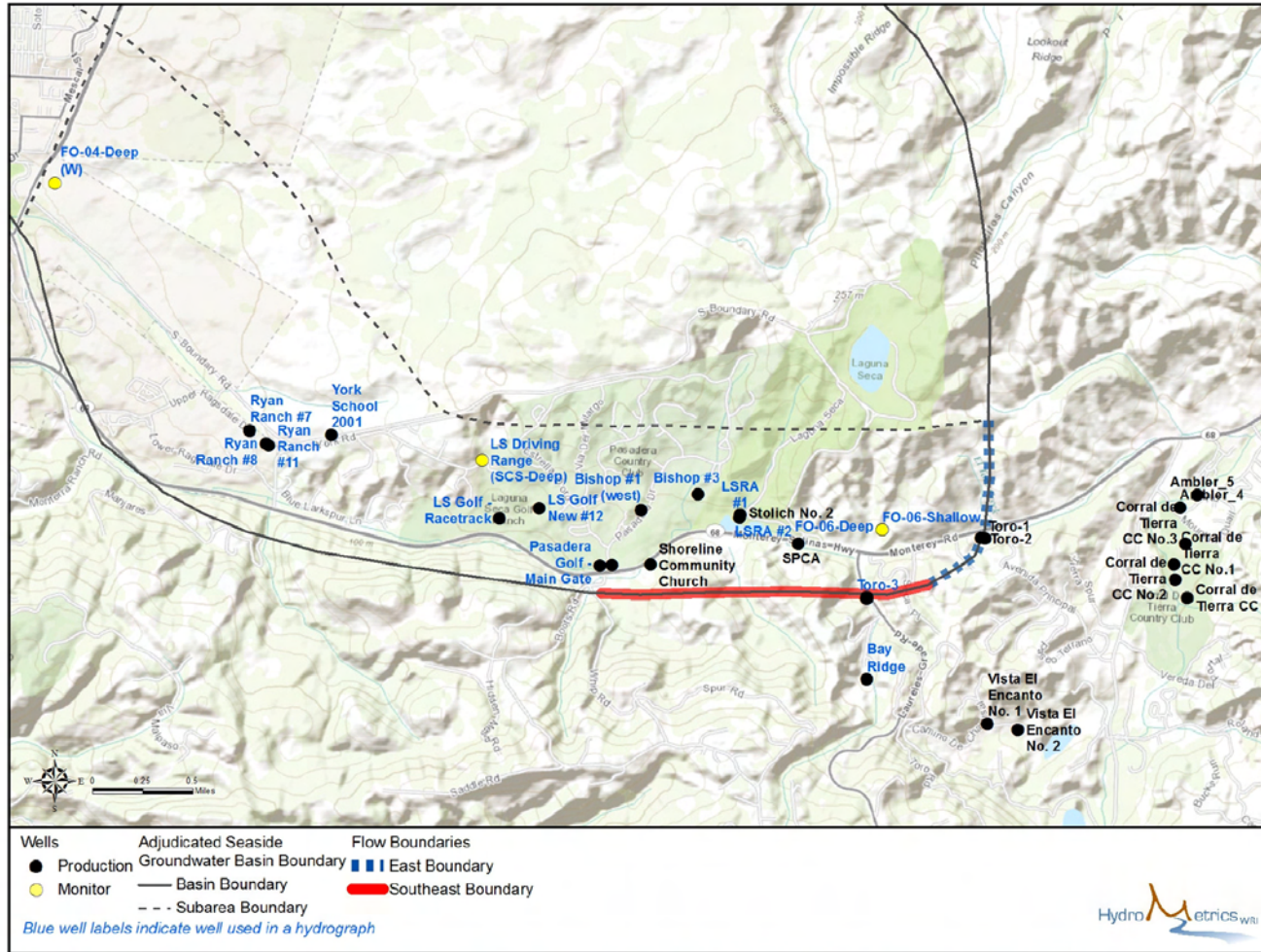


Figure 18: Locations of Laguna Seca Flow Boundaries, Wells with Plotted Hydrographs, and Active Pumping Wells

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Table 3: Baseline Scenario Pumping Rates Outside of the Laguna Seca Subarea, but Near its Eastern Boundary

Well	Average Annual Pumping (AF)
Ambler_4	2
Ambler_5	185
Bay_Ridge	24
Corral_de_Tierra_CC_No_1	64
Corral_de_Tierra_CC_No_2	64
Corral_de_Tierra_CC_No_3	64
Corral_de_Tierra_CC	64
Tierra_Meadows_No_1	105
Tierra_Meadows_No_2	105
Toro-1	128
Toro-2&3	101
Vista_El_Encanto_No_1	105
Vista_El_Encanto_No_2	105
All Eastern Boundary Wells	1,117
All Laguna Seca Wells	526

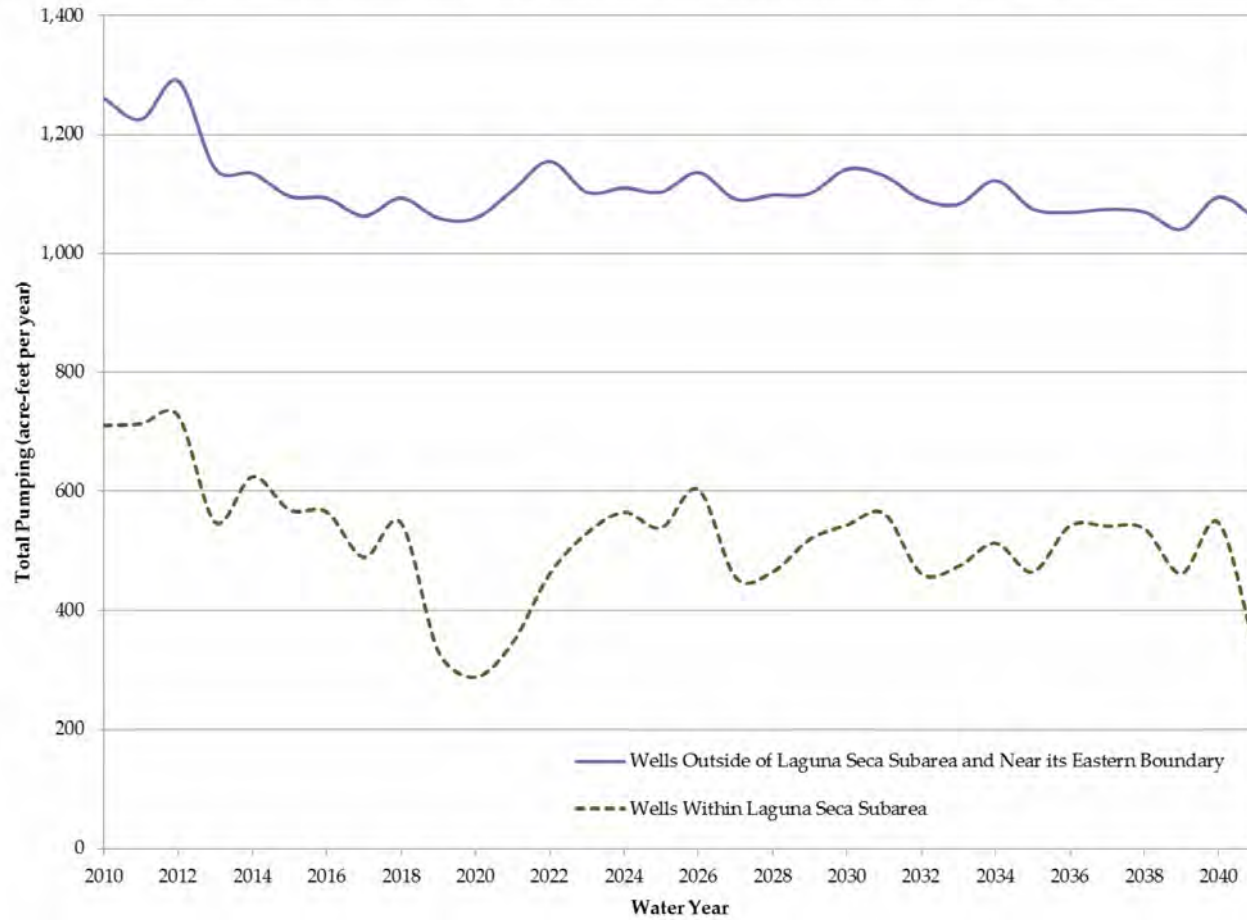


Figure 19: Baseline Scenario Pumping Rates within the Laguna Seca Subarea and Near its Eastern Boundary

The amounts of groundwater flowing in and out of the LSSA are additional pieces of evidence that shed light on the dynamics of the aquifer system. Specifically, the relationship between boundary flows and pumping helps explain why the LSSA appears to be unable to achieve stable groundwater elevations.

To examine the flows that take place near the eastern boundary, the eastern boundary was divided into an eastern segment and a southeastern segment. The locations of these segments are shown on Figure 18. The total amount of groundwater that flows across each boundary segment during every year of the simulation period was then extracted from the model results.

The annual flows across the eastern and southeastern boundary are shown on Figure 20. On this figure the solid lines are boundary flows under the baseline scenario, and the dashed lines are boundary flows under the no Laguna Seca pumping scenario. Positive values indicate that flow is entering the LSSA from the adjacent basin and negative values indicate that flow is exiting the LSSA. Figure 20 shows that groundwater flows into the subarea across the southeastern boundary and that groundwater flows out of the subarea across the eastern boundary.

When both Standard and Alternative producer pumping is reduced to zero, groundwater levels in the LSSA are higher, so less groundwater flows into the subarea from the southeast, and more groundwater flows out of the subarea to the east. Figure 21 shows the annual differences in flows between the two scenarios for each boundary segment.

The changes observed on this figure are consistent with the observation that groundwater elevations in the LSSA, while not recovering entirely, are higher in the scenario with no Standard or Alternative producers pumping than in the baseline scenario. The flow out of the subarea along the eastern boundary, for example, is driven by the groundwater levels in the LSSA being higher than water levels to the east. As groundwater levels in the LSSA rise, the gradient from the LSSA to the east increases and drives more water out of the subarea.

Overall, this analysis highlights the difficulty that can arise when trying to manage only a subset of an aquifer system when that subset is fully integrated with the system surrounding it. In the case of the LSSA, the surrounding system

contains several wells that appear to have a direct influence on the conditions that exist within the subarea. This influence is beyond the control of the Watermaster and draws into question the ability of establishing an operational safe yield for the LSSA as defined in the memorandum.

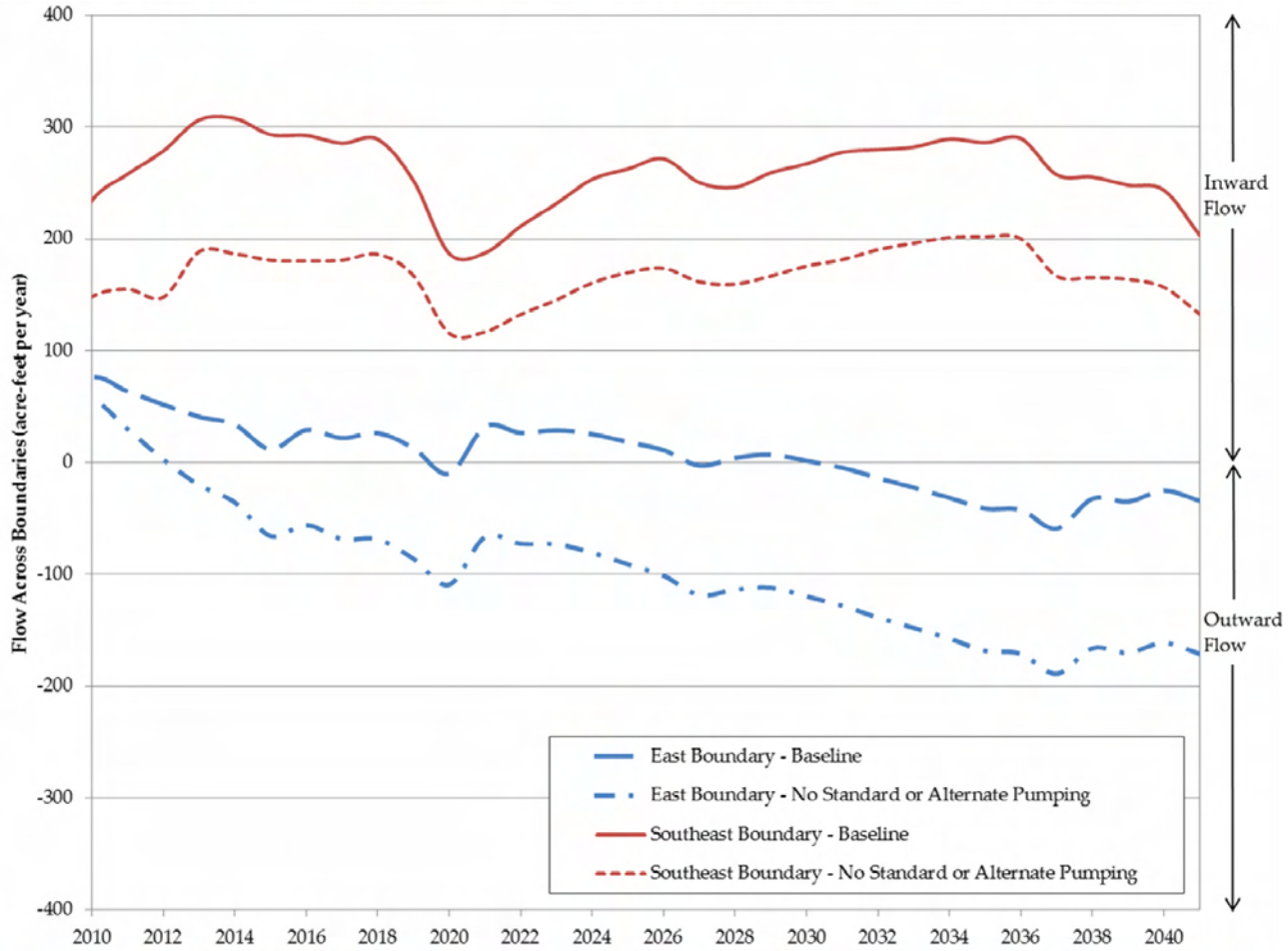


Figure 20: Flows Across the Laguna Seca East and Southeast Boundaries under the Baseline and No Standard or Alternative Producer Pumping Scenarios

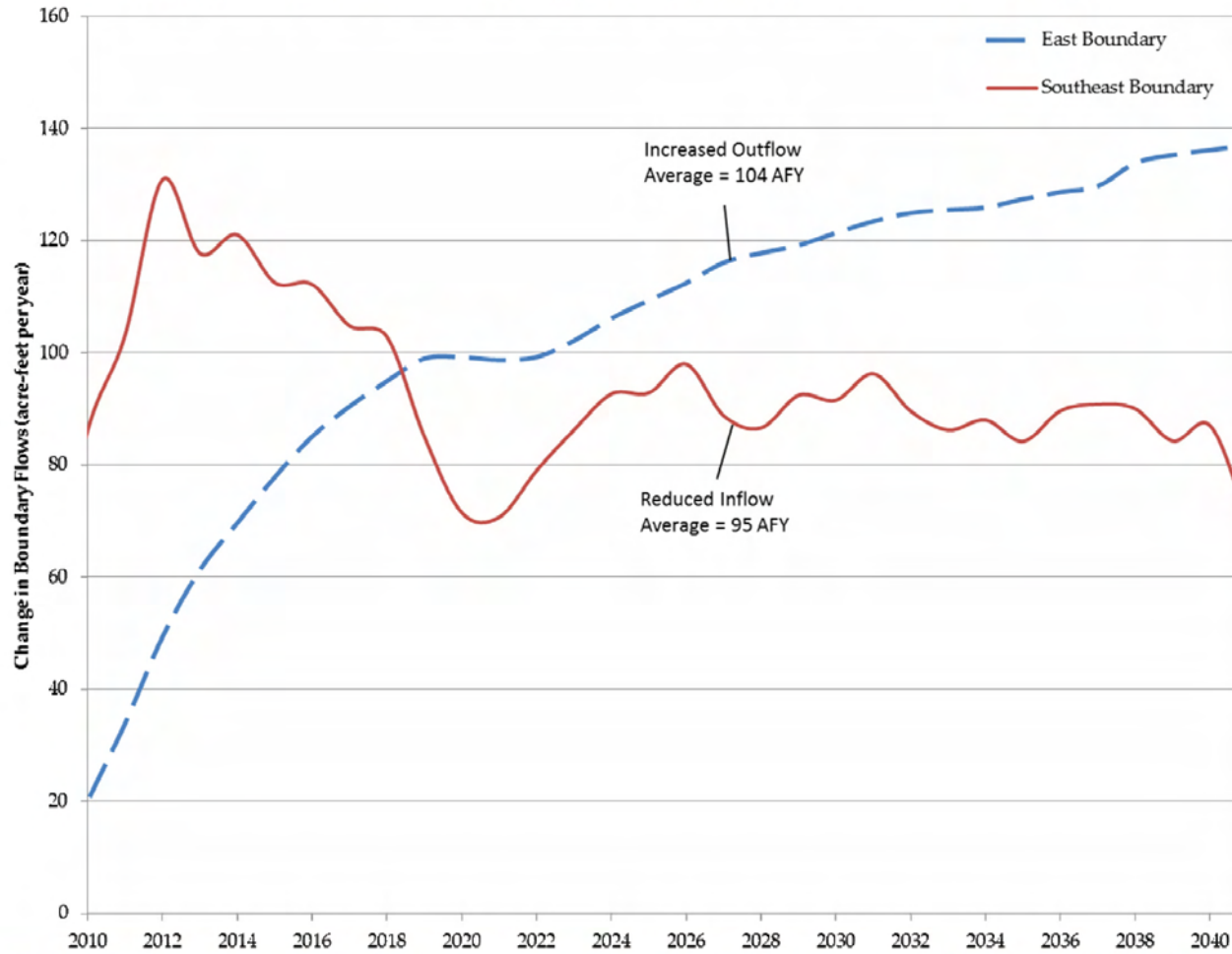


Figure 21: Changes in Flows Across the Laguna Seca’s East and Southeast Boundaries that Result When Pumping is educed from the Baseline to No Standard or Alternative Producer Pumping Scenario

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SUBTASK 1.4 – GROUNDWATER LEVEL IMPACTS FROM A REDUCTION OR ELIMINATION OF ALTERNATIVE PRODUCER PUMPING

This additional task was added after the Watermaster Board had been presented with the results of the first three subtasks in April 2014. The Board asked whether reducing or eliminating pumping by Alternative producers in the LSSA would appreciably reduce the rate at which groundwater levels are falling in the LSSA. To answer this question, groundwater levels from three scenarios run as part of Subtask 1.3 and summarized in Table 2, were compared against each other. The three simulations represent maintaining current pumping by Alternative producers, cutting pumping by Alternative producers in half, and eliminating all pumping by Alternative producers.

Three representative monitoring wells were selected to evaluate the impacts to groundwater levels in different portions of the LSSA. The three wells are shown on Figure 18, and include:

- Monitoring well FO-04 Deep: western LSSA;
- Laguna Seca Driving Range well: central LSSA; and,
- Monitoring well FO-06 Shallow: eastern LSSA

The hydrographs for each of the three wells are shown on Figure 22 through Figure 24. The three different lines on each figure represent the predicted groundwater levels for each of the three scenarios.

Figure 22 shows that reducing Alternative producer pumping has only a minor impact on groundwater levels in the western LSSA. Groundwater elevations in monitoring well FO-04 remain relatively constant, even under existing conditions. Reducing pumping allows these groundwater levels to rise a bit, however the benefit is limited. This is likely due to the fact that as groundwater levels rise in this area, additional groundwater flows out into the Southern Coastal subarea. These additional groundwater flows limit the amount of groundwater levels can rise in the western LSSA.

Figure 23 shows that the most significant benefits from reducing Alternative producer pumping are realized in the central LSSA. Most the subarea's groundwater is extracted from wells located in the central part of the subarea, and therefore this is where we would expect to see the greatest benefit.

Figure 24 shows that reducing Alternative producer pumping has only a minor impact on groundwater levels in the eastern LSSA. Groundwater levels in monitoring well FO-06 Shallow continue to drop steeply whether alternative producers pump at existing rates or not at all. This suggests that groundwater elevations in the eastern LSSA are largely controlled by pumping outside of the LSSA. Reducing pumping in the LSSA cannot raise groundwater elevations along the LSSA's eastern boundary.

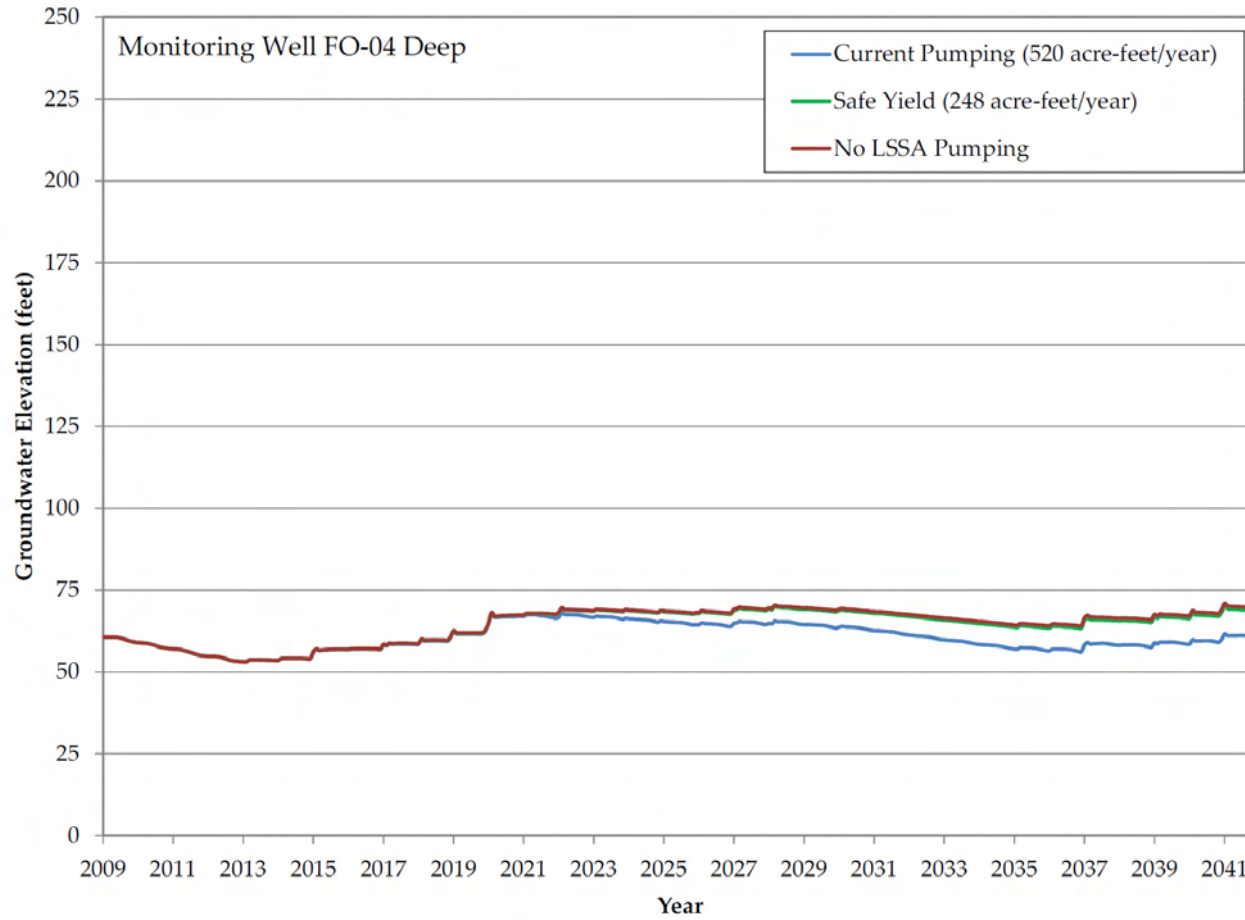


Figure 22: Western LSSA Impacts from Changes in Pumping – FO-04 Deep

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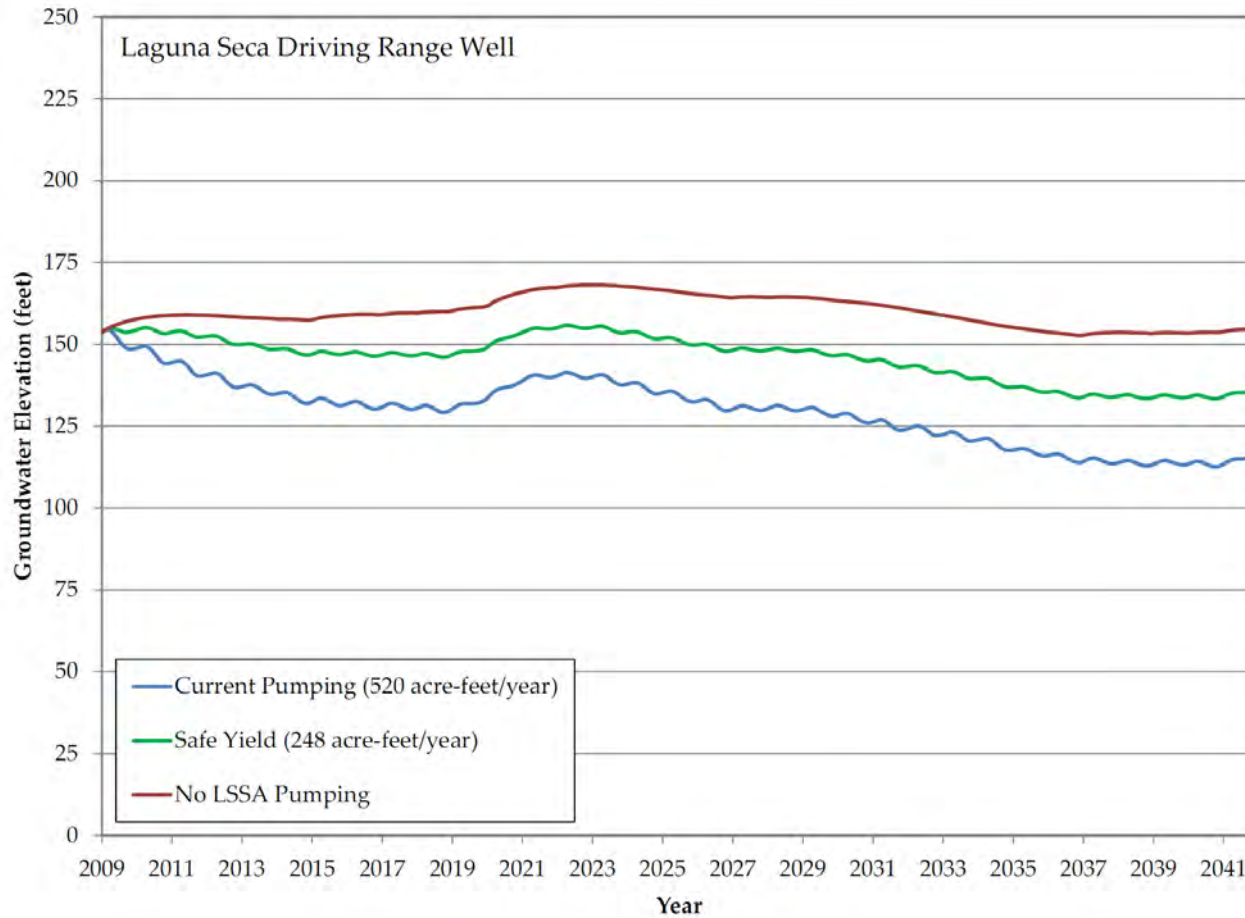


Figure 23: Central LSSA Impacts from Changes in Pumping – Laguna Seca Driving Range

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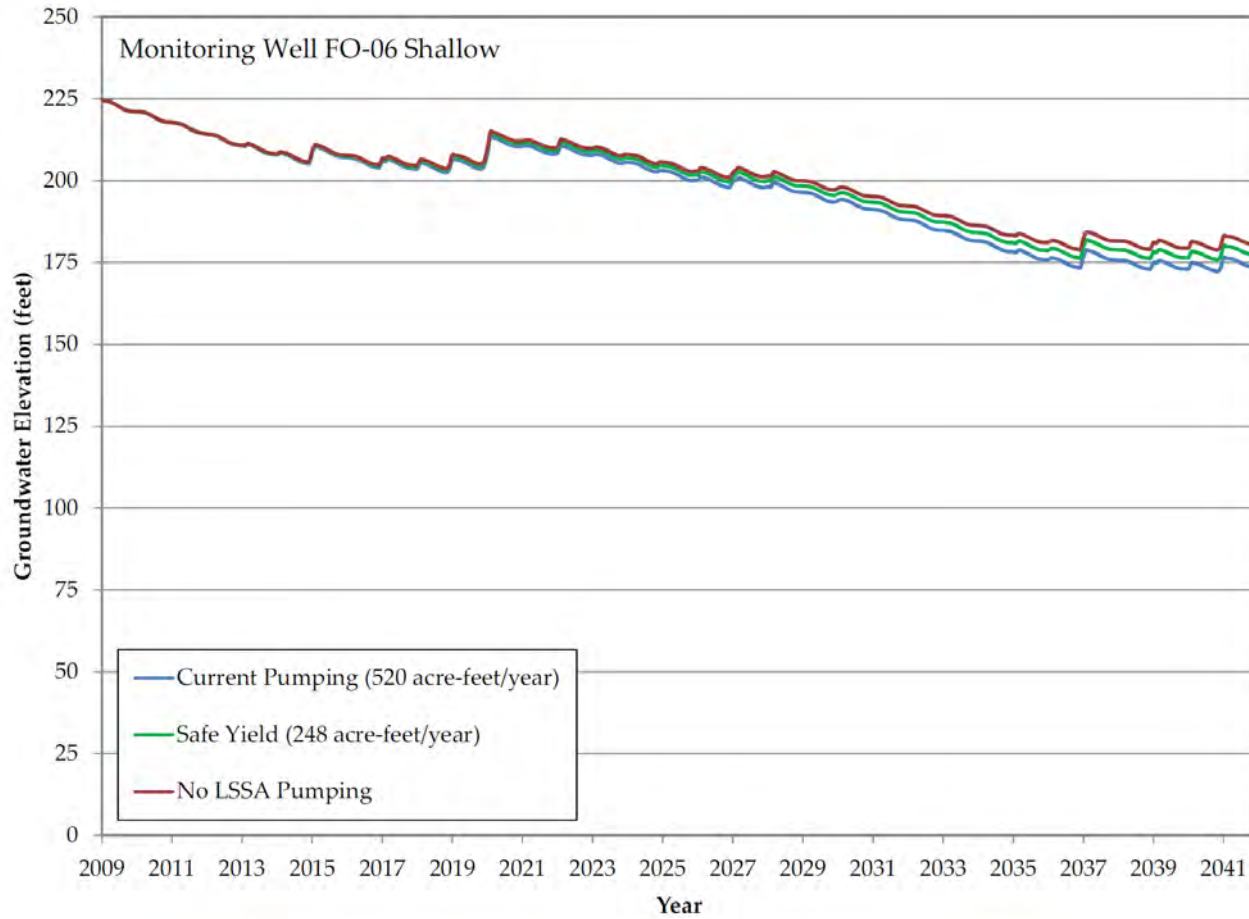


Figure 24: Eastern LSSA Impacts from Changes in Pumping – FO-06 Shallow

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SUBTASK 1.5 – GROUNDWATER LEVEL IMPACTS IN LAGUNA SECA SUBAREA FROM WELLS OUTSIDE THE SUBAREA

This additional task was added after the Watermaster Board had been presented with the results of the first three subtasks in April 2014. The Board asked what the impact on groundwater levels in the LSSA is from pumping outside the eastern and southeastern boundaries of the subarea.

To evaluate impacts from outside wells, four scenarios were developed and run, and results compared against each other. The scenarios all included pumping in LSSA at current rates. Each of the scenarios included a different assumption about well pumping outside the LSSA. Figure 18 shows the location of the wells outside the LSSA that were varied in each scenario. The scenario differences in the outside pumping were:

1. Maintain existing pumping rates for wells south and east of the LSSA.
2. Eliminate all pumping from the three Toro wells.
3. Reduce by half the existing pumping for wells south and east of the LSSA.
4. Eliminate all pumping from wells south and east of the LSSA.

Hydrographs for the same wells used in Subtask 1.4 were used to show the relative impacts of the four scenarios on different portions of the LSSA. Figure 25 through Figure 27 show the hydrographs for each well with separate lines for each of the four predicted groundwater levels.

Figure 25 shows that reducing pumping south and east of the LSSA has only a minor impact on monitoring well FO-04 Deep. This monitoring well is the farthest from the outside pumping wells, and is expected to have the least impact from the simulated pumping changes. Similar to the results in Subtask 1.4, groundwater elevations in monitoring well FO-04 Deep do not appear to exceed a certain elevation, regardless of the pumping scenario.

Figure 26 shows that reducing pumping south and east of the LSSA has a small but discernible impact on the Laguna Seca Driving Range well in the central LSSA. None of the four scenarios run for this subtask had enough effect on the Laguna Seca Driving Range well to completely eliminate long-term water level declines. The impact in this area from reducing pumping south and east of the LSSA was notably less than the impact from reducing Alternative producer pumping.

As expected, reducing well pumping south and east of the LSSA has a significant impact on groundwater levels in the eastern portion of the LSSA. This is shown in the hydrograph of monitoring well FO-06 Shallow on Figure 27. In this portion of the subarea, reducing outside pumping or eliminating Toro well pumping has a similar impact. However, to completely eliminate declining water levels in this area, all pumping from wells south and east of the LSSA must be eliminated.

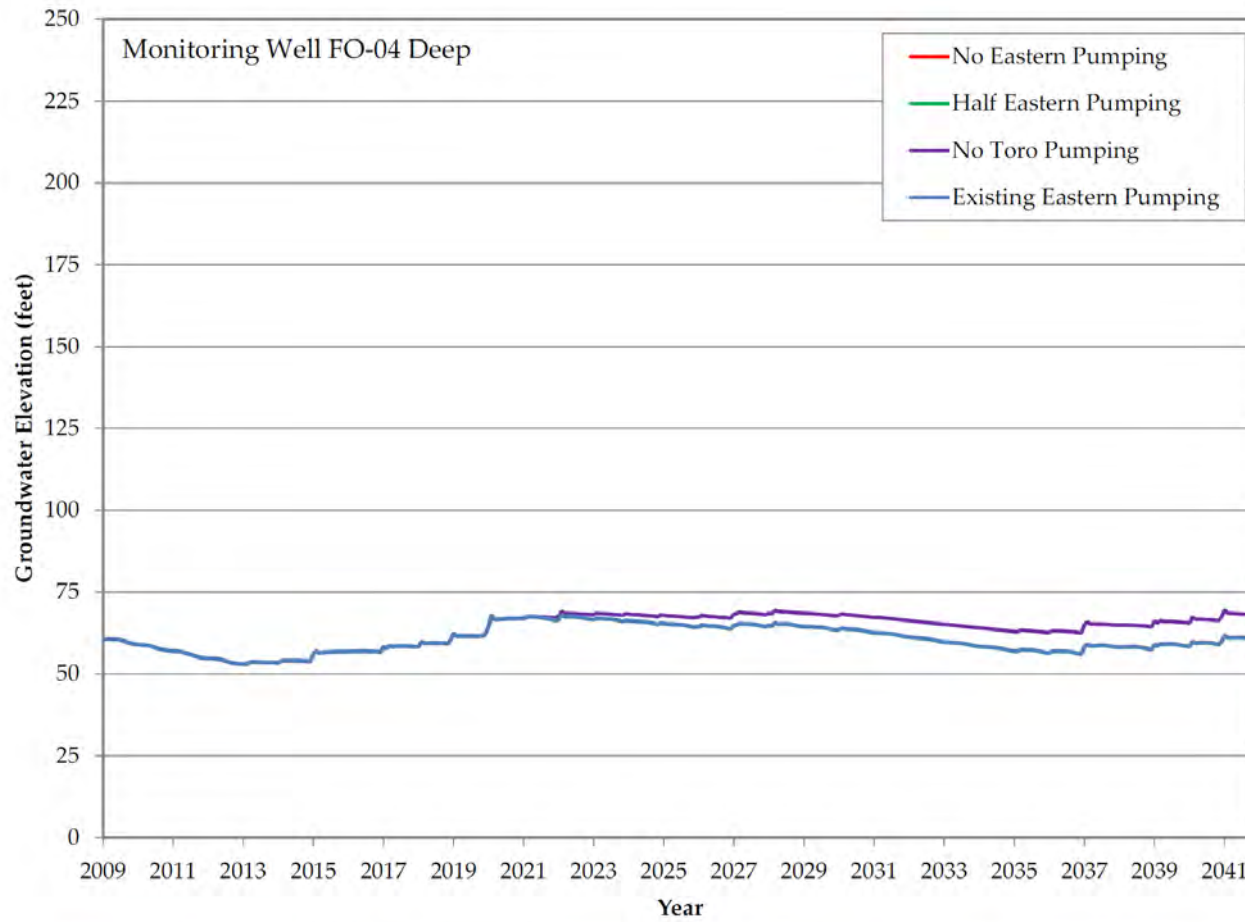


Figure 25: Western LSSA Impacts from Changes in Outside Pumping – Monitoring Well FO-04 Deep

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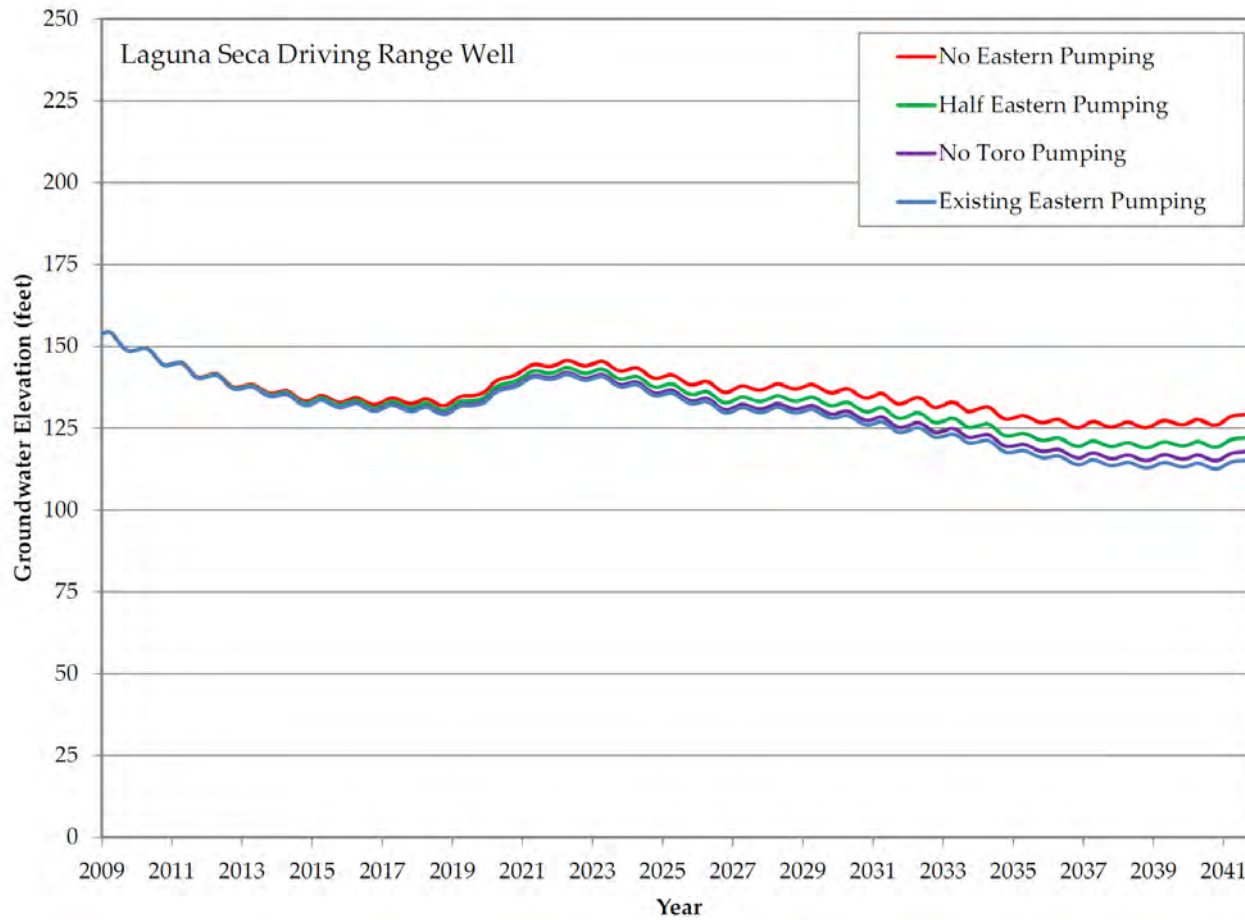


Figure 26: Central LSSA Impacts from Changes in Outside Pumping – Laguna Seca Driving Range Well

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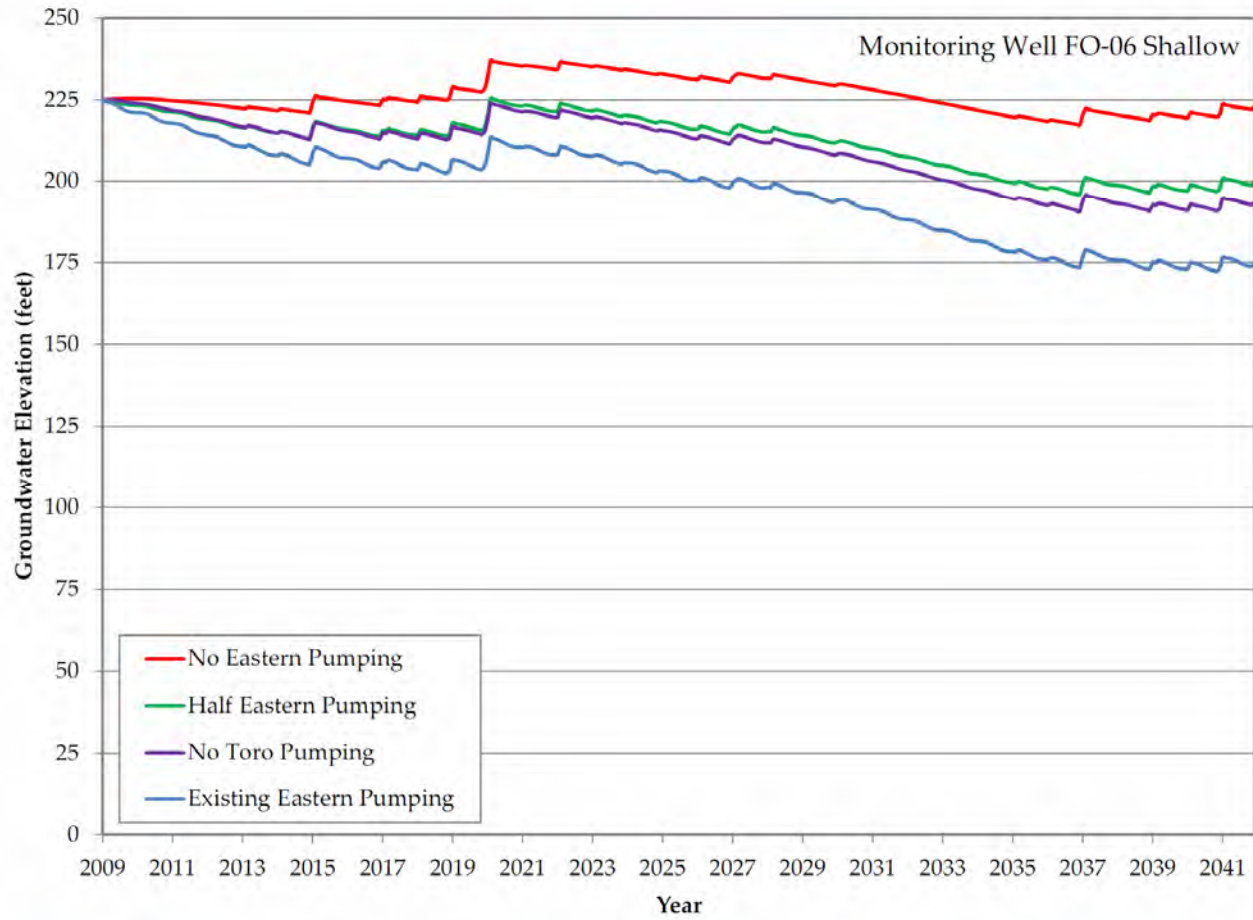


Figure 27: Eastern LSSA Impacts from Changes in Outside Pumping – Monitoring Well FO-06 Shallow

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Conclusions

The Seaside Basin groundwater flow model predicts that if Cal-Am discontinues pumping from the LSSA, groundwater elevations in the subarea will continue to decline during the simulation period of 2009-2041. The eastern side of the subarea suffers the greatest and most persistent declines. Pumping groundwater elevations are predicted to fall below the top of the well screen prior to 2041 in wells Bishop #3, Ryan Ranch #7, and Laguna Seca Golf Resort – Racetrack.

Using simple mass balance calculations, we estimated an average annual natural safe yield of 240 acre feet per year for the LSSA. This is considerably lower than the adjudication Decision perennial safe yield of 608 acre feet per year. This safe yield is dependent on maintaining current flows into and out of the LSSA. A scenario with the pumping in Laguna Seca reduced to the natural safe yield of 240 acre feet per year failed to achieve stable groundwater levels because of changing flows into and out of the LSSA.

Modeling shows that eliminating all pumping from the subarea does not completely halt the predicted decline in groundwater elevations in the easternmost well: FO-6-Shallow. This suggests that pumping from wells outside of the LSSA prevents the subarea from achieving stable groundwater elevations. This influence was evaluated by running multiple scenarios with varying pumping from wells outside LSSA. As expected, well pumping outside of the LSSA has a significant impact on groundwater levels in the eastern portion of the LSSA (Figure 27).

Modeling runs reducing and eliminating production from wells within the LSSA shows that reducing pumping in the eastern LSSA has limited impact on reducing drawdown, while reducing pumping in the central portion of the LSSA has the largest impact on reducing rates of drawdown. This is because the majority of the subarea's production is concentrated in the central LSSA.

Given these results, there will need to be significant pumping reductions both inside and outside of the subarea to halt groundwater level declines throughout the LSSA.

References

- CH2M Hill, 2004. *Hydrogeologic Assessment of the Seaside Groundwater Basin*. Prepared for Somach, Simmons, & Dunn and California-American Water Co. January, 2004.
- Yates, E.B., Feeney, M.B., Rosenberg, L.I., 2002. *Laguna Seca Subarea Phase III Hydrogeologic Update*. Prepared for Monterey Peninsula Water Management District. November, 2002.

APPENDIX A

Table A1: Baseline Scenario Annual Natural Safe Yield Components

Simulated Water Year	Aerial Recharge	Subsurface Inflow	Subsurface Outflow	Natural Safe Yield
	Acre-Feet per Year			
2009 (Jan-Sep)	70	841	-1,510	-598
2010	35	1,080	-1,896	-782
2011	37	1,064	-1,821	-720
2012	33	1,066	-1,795	-696
2013	532	1,038	-1,701	-131
2014	538	1,003	-1,592	-51
2015	2,540	997	-1,606	1,931
2016	92	974	-1,560	-494
2017	1,476	964	-1,546	894
2018	998	962	-1,509	450
2019	2,034	942	-1,549	1,427
2020	4,423	987	-1,747	3,663
2021	349	931	-1,693	-414
2022	1,269	947	-1,694	522
2023	325	946	-1,656	-385
2024	356	951	-1,623	-316
2025	415	937	-1,577	-225
2026	750	938	-1,549	138
2027	1,592	925	-1,559	958
2028	937	918	-1,558	296
2029	107	911	-1,524	-507
2030	583	906	-1,498	-9
2031	79	897	-1,466	-491
2032	34	878	-1,427	-515
2033	37	858	-1,377	-481
2034	33	845	-1,335	-457
2035	532	829	-1,312	48
2036	556	825	-1,296	85
2037	2,540	837	-1,379	1,997
2038	89	822	-1,358	-447
2039	1,476	828	-1,386	918
2040	1,030	832	-1,400	462
2041	2,034	824	-1,470	1,388
2042 (Oct-Dec)	642	197	-373	467
Average Year	866	930	-1,556	240

Table A2: Baseline Scenario Annual Pumping, Change in Storage, and Natural Safe Yield

Simulated Water Year	Well Pumping	Change in Storage	Natural Safe Yield
	Acre-Feet per Year		
2009 (Jan-Sep)	706	-1303	-598
2010	711	-1493	-782
2011	713	-1434	-720
2012	727	-1422	-696
2013	548	-679	-131
2014	624	-675	-51
2015	569	1362	1931
2016	565	-1059	-494
2017	489	405	894
2018	532	-81	450
2019	315	1113	1427
2020	272	3391	3663
2021	329	-743	-414
2022	445	77	522
2023	513	-898	-385
2024	548	-864	-316
2025	522	-748	-225
2026	587	-449	138
2027	440	518	958
2028	448	-152	296
2029	503	-1010	-507
2030	527	-537	-9
2031	546	-1037	-491
2032	446	-962	-515
2033	458	-940	-481
2034	497	-955	-457
2035	448	-401	48
2036	526	-442	85
2037	525	1473	1997
2038	521	-968	-447
2039	446	472	918
2040	531	-69	462
2041	315	1074	1388
2042 (Oct-Dec)	51	416	467
Average Year	513	-273	240

Table A3: Well Construction Information Provided by MPWMD

Producer Name	Well Name	WM No.	Township Range Section	DWR Log #	MCHD Permit #	WL Ref Elevation (ft MSL)	Well Depth (feet)	Depth of Screen Top (feet)	Depth of Screen Bottom (feet)	Pump Intake Depth (feet)	Static Water Level (SWL) (feet)	Date SWL (feet)	Pumping Water Level (PWL) (feet)	Date PWL	Pumping Rate (gpm)	Pumping Drawdown (PWL - SWL) (feet)
California American Water	Bishop #1	209	16S02E05Ea	NA	NA	398.81	500	350	490	400	265.00	8/29/13	338.00	8/27/13	282	73.00
California American Water	Bishop #3	262	16S02E05Fd	NA	10-11766	420.58	697	375	685	NA	268.00	8/27/13	379.00	8/27/13	254	111.00
California American Water	Bay Ridge	226	16S02E09Cd	NA	94-0240	545.92	800	480	780	470	382.90	8/27/13	432.00	8/27/13	348	49.10
California American Water	Toro #3		16S02E04P01	NA	NA	NA	758	NA	NA	NA	204.00	9/26/13	<i>Standby well -- currently not operated</i>			NA
California American Water	Ryan Ranch #7	213	15S01E36Nb	082916	W-2089	294	480	350	470	460	244.00	9/20/13	413.00	9/20/13	65	169.00
California American Water	Ryan Ranch #8	216	16S01E01T54	082948	W-2117	306.86	450	330	440	300	203.00	9/26/13	<i>Standby well -- currently not operated</i>			NA
California American Water	Ryan Ranch #11	215	16S01E01Cd	804084	03-01475	307.59	455	330	450	420	228.00	9/20/13	229.00	9/20/13	7	1.00
Pasadera Country Club	Main Gate	208	16S02E05Mg	e067374	07-11128	345.42	380	230	380	NA	201.33	3/1/13	225.75	10/1/13	NA	24.42
Pasadera Country Club	Paddock	204	16S02E05Mf	075035	NA	352.69	498	306	498	259	206.83	3/1/13	216.33	10/1/13	NA	9.50
Laguna Seca Golf Resort	New #12	203	16S02E06H_	796328	03-01188	365.96	490	300	480	440	244.90	10/15/13	282.5	10/17/13	380	37.60
Laguna Seca Golf Resort	Racetrack	202	16S02E06G50	115052	W3885	NA	320	200	300	NA	<i>Currently not operable or serviceable (T. Bevan, 10/17/13)</i>					NA
York School	York #1	212	15S01E36Qa	768995	01-349	384.30	500	160	480	NA	224.44	10/1/13	286.3	7/2/13	NA	61.86
Laguna Seca Recreation Area	LSRA #1	197	16S02E05Ge	NA	NA	392.72	690	NA	NA	NA	200.82	10/15/13	288.4	10/16/13	190	87.58
Laguna Seca Recreation Area	LSRA #2	196	16S02E05Gf	788672	02-051	390.90	650	330	630	NA	180.30	10/15/13	<i>Not working (M. Pierce, 10/16/13)</i>			NA