M E E T I N G N O T I C E AND A G E N D A

TECHNICAL ADVISORY COMMITTEE
OF THE
SEASIDE BASIN WATER MASTER

DATE: Wednesday, June 13, 2018
MEETING TIME: 1:30 p.m.
Monterey Regional Water Pollution Control Agency Offices
5 Harris Court, Building D (Ryan Ranch)
Monterey, CA 93940

If you wish to participate in the meeting from a remote location, please call in on the Watermaster Conference Line by dialing (515) 739-1015. Use the Meeting ID 355890617. Please note that if no telephone attendees have joined the meeting by 10 minutes after its start, the conference call will be ended.

OFFICERS
Chairperson: Nina Miller, California American Water Company
Vice-Chairperson: Jon Lear, MPWMD

MEMBERS
California American Water Company | **City of Del Rey Oaks** | **City of Monterey**
City of Sand City | **City of Seaside** | **Coastal Subarea Landowners**
Laguna Seca Property Owners | **Monterey County Water Resources Agency**
Monterey Peninsula Water Management District

The next regular meeting will be held on Wednesday June 13, 2018 at 1:30 p.m. at the MRWPCA Board Room.

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SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	2.A
AGENDA TITLE:	Approve Minutes from the March 14, 2018 Meeting
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Draft Minutes from this meeting was emailed to all TAC members. Any changes requested by TAC members have been included in the attached version.

ATTACHMENTS:	Minutes from this meeting
RECOMMENDED ACTION:	Approve the minutes

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
March 14, 2018

Attendees: TAC Members

City of Seaside – Scott Ottmar (via telephone) and Rick Riedl
California American Water – Nina Miller
City of Monterey – Laurie Williamson (via telephone)
Laguna Seca Property Owners – No Representative
MPWMD – Jon Lear (via telephone)
MCWRA – Tamara Voss
City of Del Rey Oaks – No Representative
City of Sand City – Leon Gomez (via telephone)
Coastal Subarea Landowners – No Representative

Watermaster
Technical Program Manager - Robert Jaques

Consultants
None

Others
M1W – Bob Holden

The meeting was convened at 1:46 p.m. after a quorum had been established. The meeting was moved from the Board Room to the Conference Room in an effort to improve the performance of the telephone conference call-in line. Persons joining the meeting by telephone reported that there was significant improvement in the sound quality, so future meetings will be held in the Conference Room whenever it is available.

1. Public Comments
There were no public comments.

2. Administrative Matters:

1. **Approve Minutes from the February 14,2018 Meeting**
On a motion by Ms. Voss, seconded by Mr. Gomez, the minutes from this meeting were unanimously approved as presented.

2. **Sustainable Groundwater Management Act (SGMA) Update**
Mr. Jaques summarized the agenda packet materials for this item.
There was no other discussion on this item.

C. Monterey Peninsula, Carmel Bay, and South Monterey Bay Integrated Regional Water Management
Mr. Jaques summarized the agenda packet materials on this item.
There was no other discussion on this item.

D. Monterey Peninsula Stormwater Resource Plan

Mr. Jaques summarized the agenda packet materials for this item.

Mr. Ottmar asked if recharging storm water from the Seaside area would provide any credit to the City of Seaside for creating such a project. Mr. Jaques said he was not aware of any provision in the Adjudication Decision that addresses that, but that this could be explored if desired. Mr. Ottmar also noted that such projects would need to get regulatory approval.

3. Draft Application for Storage of Water from the Pure Water Monterey Project

Mr. Jaques summarized the agenda packet materials for this item.

Mr. Holden commented that the Cal Am-M1W Pure Water Monterey agreement includes an increase of 1,750 acre-feet for Operational Reserve. He believed the 6,000 acre-foot figure in the proposed draft agreement should be increased to at least 6,500 acre-feet per year. Ms. Miller said she would check with Mr. Sabolsice on this and coordinate with Mr. Holden if any revisions to the application should be made. Mr. Jaques said that if any changes were desired, he would incorporate them into the version of the application that would go to the Board for its consideration.

Ms. Voss commented that she felt it was appropriate to include all of the support data (water quality information, permit information, etc.) contained in the version of the draft storage application in the agenda packet in order to make that information part of the record.

On a motion by Ms. Voss, seconded by Mr. Lear, the TAC unanimously approved the storage application as contained in the agenda packet. That approval included the latitude for Mr. Jaques to make any minor revisions, as discussed in the paragraph above, if so requested by Cal Am.

4. New proposal from MCWD to Sell Water to Replenish the Seaside Basin

Mr. Jaques summarized the agenda packet materials for this item.

Mr. Lear noted that with regard to Comment No. 2 in the agenda packet, if there was excess water not needed for golf course irrigation, it might be possible under the Adjudication Decision to have excess water traded between the Standard Producers. The question still remained of how any excess water could actually be utilized by other producers besides the Seaside golf courses.

Ms. Miller asked what the term of the agreement was, and it was reported that a 30-year term was proposed in the agreement.

Mr. Voss questioned why the Watermaster would want to get involved in purchasing the water.

Mr. Riedl commented that the golf courses have two wells that supply irrigation water. Water acquired by the City of Seaside from MCWD temporarily allowed the golf course wells to stop pumping for about 2 ½ years, but those wells are now back in operation

Mr. Riedl noted there he saw a lot of conflicts in the language in the proposed agreement, for example such things as the schedule for delivery of the water and the water being an interruptible supply.

Ms. Voss noted that the MCWD proposal is one potential way of getting water to help avert a pumping ramp-down. She asked whether there would be any excess desalinated water that could also be used for this purpose. She also asked whether the updating of the HydroMetrics groundwater model would provide any information that should be taken into consideration with regard to the MCWD proposal.

Mr. Holden commented that the agreement between MCWD and M1W for the Pure Water Monterey project has some month-by-month caps on the quantities of reclaimed water that MCWD can obtain.

Mr. Riedl asked why the Watermaster should even be involved in the purchase of the water. He said he felt that the City of Seaside would be a more logical buyer of water to be used on its golf courses.

Mr. Riedl also noted that paragraph 8 of the MCWD proposed agreement puts the responsibility for water quality issues on M1W, even though M1W is not a party to the proposed agreement.

Mr. Jaques asked TAC members to send to him via email any additional comments they had within a week, so he could include them in his agenda transmittal on this topic for the Board's next meeting.

5. Schedule

Mr. Jaques reported that the Technical Memorandum from HydroMetrics on updating the groundwater model will be delayed until May, rather than April, due to some staff vacations there.

Mr. Jaques also reported that there may be no need to have an April TAC meeting, unless something comes up at the Board's April meeting that would require the TAC to meet. If no issues arise at that meeting, Mr. Jaques will propose that the April TAC meeting be canceled, and the next TAC meeting be held in May. A notification regarding this will be sent by email to all TAC members

Mr. Lear reported that MPWMD was still waiting for M1W to sign the cost-sharing agreement for the geochemical modeling work. He went on to say that as soon as M1W signs the agreement, MPWMD will give notice-to-proceed to their consultant, Pueblo Water Resources, to begin work on the geochemical modeling.

6. Other Business

Mr. Riedl pointed out that a correction needs to be made on the location of the backwash pond in the map on page 23 of the agenda packet. Mr. Jaques will pursue this with Mr. Holden.

Mr. Lear reported that the new eco-resort project in Sand City has started pumping from their well, so they will need to start reporting pumping quantities to the Watermaster. He also noted that they are grading the site and are lowering the ground levels by as much as 30 feet in some locations. Therefore, the existing monitoring well there may need to be replaced, because it only has about 50 feet of sanitary seal and lowering the grade by 30 feet would reduce this to the point that it would no longer be acceptable to the Monterey County Department of Environmental Health.

Mr. Riedl expressed concerns about chlorine disinfection byproducts in the Pure Water Monterey reclaimed water and would like to have that issue addressed in the geochemical modeling. Mr. Jaques responded that he believed this was an issue that the geochemical modeling would investigate.

The next regular meeting will be held either on Wednesday April 11, 2018 or Wednesday May 9, 2018 at 1:30 p.m. in the MRWPCA Conference Room. An email notification on the date and room location will be sent to all TAC members.

The meeting adjourned at 2:55 p.m.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

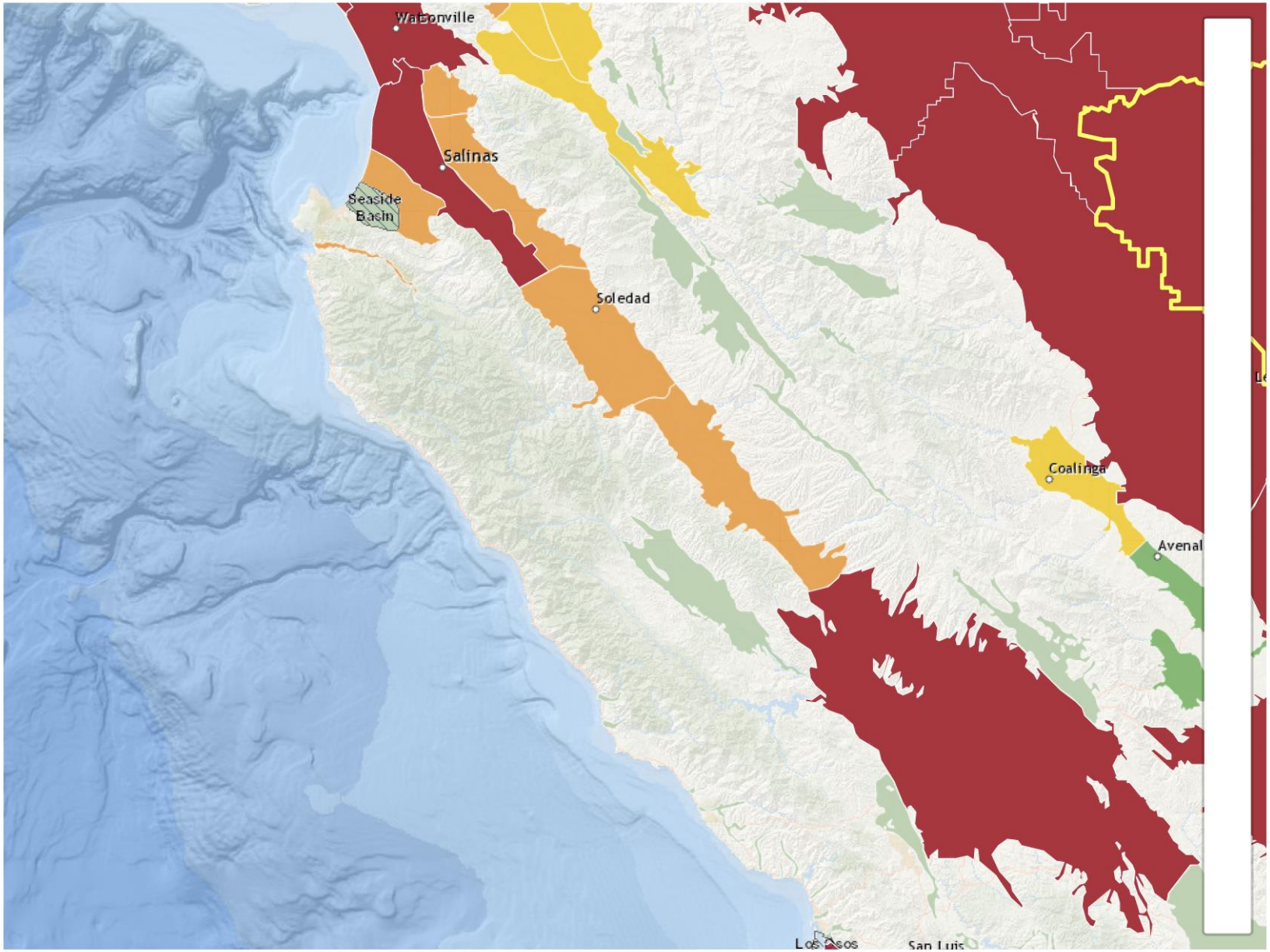
** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	2.B
AGENDA TITLE:	Sustainable Groundwater Management Act (SGMA) Update
PREPARED BY:	Robert Jaques, Technical Program Manager

At the State level:
Since my last update, I have not received any new materials from the State that would impact the Watermaster. However, DWR has released its *2018 SGMA Basin Prioritization Draft,* and a copy of the map covering the Salinas Valley Basin is attached. It shows that all of the Salinas Valley Basin, except for the Seaside subbasin, is a High Priority basin (denoted by the orange color), and the 180'/400' aquifer and the Paso Robles area are Critically Overdrafted (denoted by the red color). The Seaside subbasin is shown as an adjudicated basin and has a very low priority (denoted by the light greet color) for that reason.

At the Monterey County level:
On April 19, May 10, and May 17, 2018 joint meetings of the Salinas Valley Basin Groundwater Sustainability Agency's Board of Directors and its Advisory Committee, were held. Notes I took at those meetings are attached.

ATTACHMENTS:	1. Map of the Salinas Valley Basin from DWR's SGMA Basin Prioritization Dashboard 2. Notes from the April 19 meeting 3. Notes from the May 10 meeting 4. Notes from the May 17 meeting
RECOMMENDED ACTION:	None required – information only


Watsonville
Salinas
Seaside Basin
Soledad
Coalinga
Avenal
Los Banos
San Luis

NOTES FROM THE APRIL 19, 2018
SALINAS VALLEY BASIN GROUNDWATER SUSTAINABILITY AGENCY
JOINT MEETING OF THE BOARD OF DIRECTORS AND THE ADVISORY COMMITTEE

1. Gary Peterson made a presentation on the 90-date Work Group's recommendations that will be made on April 24, 2018 to the Board of Supervisors regarding the recently discovered accelerated rate of advance of seawater intrusion in the Salinas Valley basin. These recommendations include:

- Identify funding to destroy the 8 wells that are most likely causing cross-aquifer contamination from the 180-foot to the 400-foot aquifer. There is concern that the deeper aquifer will get seawater intrusion from the 400-foot aquifer.
- Finalize the extent of the Area of Impact of the seawater intrusion advance.
- Prioritize data collection to more rapidly identify future areas of concern.
- Impose an immediate moratorium on new wells in the 180-foot and 400-foot aquifers within the Area of Impact.
- Minimize the construction of new wells in the deep aquifer until the investigation is complete or the Groundwater Sustainability Plan is complete. Only allow construction of replacement wells, and require destruction of the wells that are being replaced.
- Require well owners to meter water extraction from their wells and monitor for water quality and water level.
- Preform a more in-depth investigation of the problem.
- Optimize and enhance the Castroville Seawater Intrusion Project. Develop an annexation plan to expand the Castroville Seawater Intrusion Project's service area.
- Pursue destruction of the other 134 wells that are no longer in service and are believed to be perforated in multiple aquifers.

Note: The Board of Supervisors did approve the moratorium listed above as the 4th bulleted item when it met on April 24.

2. Derrik Williams made a presentation on the development of the Groundwater Sustainability Plan. HydroMetrics is the lead consultant on this work but has a team of subconsultants to do certain portions of the work.

There will be a series of Informational Meetings to gather input from interested parties. There are 5 Parts (chapters) to be developed for the Groundwater Sustainability Plan. The Informational Meetings are part of Part 1. The Sustainable Groundwater Management Act gives new authorities for Groundwater Sustainability Agencies to use to manage groundwater basins-authorities local entities did not previously have.

The Salinas Valley Basin's Groundwater Sustainability Plan must be developed by 2020, or 2022, depending on which sub-basin it is in. Thus, they will complete the Groundwater Sustainability Plan in about 1 ½ years. The plan must achieve sustainability within 20 years of adoption.

At the 2nd Informational Meeting, the Description of the Basin will be covered and as part of that discussion Sustainable Yield will be discussed. The Sustainable Groundwater Management Act leaves it to the Groundwater Sustainability Agency to decide what the

Sustainable Yield is. This 2nd Informational Meeting is scheduled for May 10 at 3:00 PM at the Salinas City Council Chambers.

In Groundwater Sustainability Plans, the term "sustainability" is not the same as it is in Adjudicated Basins, which are required to not pump beyond the Natural Safe Yield. Groundwater Sustainability Plans must simply achieve their 6 "sustainability goals" (these are goals to avoid undesirable results). In accordance with the Sustainable Groundwater Management Act, if this is done, then sustainability is by definition achieved. These 6 goals are:

1. Not lowering groundwater levels
2. Not reducing stored groundwater
3. Preventing the advance of seawater intrusion
4. Preventing land subsidence
5. Not degrading water quality
6. Not depleting surface water

Minimum Thresholds and Measurable Objectives will be established for every Representative Monitoring Point (these are certain selected wells that are representative of wells in their areas). Existing wells, as well as new monitoring wells, can be used as Representative Monitoring Points. New monitoring wells would be needed if existing wells don't provide an adequate monitoring network. The Minimum Thresholds are determined by defining what is "significant" and what is "unreasonable".

Interim milestones must be set at 5-year intervals in the Groundwater Sustainability Plan.

Under the Sustainable Groundwater Management Act, a certain amount of Minimum Thresholds can fail to be met and still not result in an undesirable result. This "certain amount" must be included in the definitions in the Groundwater Sustainability Plan. In other words, there is some flexibility in demonstrating that sustainability is being achieved.

The Groundwater Sustainability Agency can determine whether there should be separate Groundwater Sustainability Plans for each sub-basin, or whether there should be a single Groundwater Sustainability Plan for the whole basin.

The Marina Coast Water District will develop their own groundwater sustainability plan for their portion of the basin. The Salinas Valley Basin Groundwater Sustainability Agency's Groundwater Sustainability Plan, and the Marina Coast Water District's Groundwater Sustainability Plan, must coordinate with each other.

Under the Sustainable Groundwater Management Act you don't have to mitigate any undesirable results that had already occurred as of January 1, 2015.

The State Water Resources Control Board has up to 2 years to review Groundwater Sustainability Plans before notifying Groundwater Sustainability Agencies if their plans are acceptable.

3. Mr. Peterson reported that the Technical Advisory Committee to work with HydroMetrics on development of the Groundwater Sustainability Plan will begin meeting once HydroMetrics feels it will be beneficial to do so. I spoke with Derrick Williams after the meeting to see if he had any sense of when the Technical Advisory Committee might begin meeting, and he said that was yet to be determined.

NOTES FROM THE MAY 10, 2018
SALINAS VALLEY BASIN GROUNDWATER SUSTAINABILITY AGENCY
JOINT MEETING OF THE BOARD OF DIRECTORS AND THE ADVISORY COMMITTEE

1. Derrik Williams advised me in a separate discussion before the meeting began that until a decision is made regarding whether Marina Coast Water District or the Salinas Valley Basin Groundwater Sustainability Agency will do the Groundwater Sustainability Plan for the Monterey sub-basin area, there will probably little any work done on the Corral de Tierra sub- basin. He said he would check with Stan Chow, who is doing the modeling for him, to find out if the Salinas Valley Basin groundwater model update the County is performing includes that sub-basin. He will have Stan do whatever modeling is found to be necessary for the Groundwater Sustainability Plan. He also said that in updating the Seaside Basin model for the Watermaster, they found a 30 foot to 40 foot difference groundwater elevations at the boundary of the Seaside Basin and the Salinas Valley Basin. This was based on the earlier groundwater model that the County had used for the Salinas Valley Basin. Hydrometrics has now updated the Seaside Basin model based on actual measured groundwater level data, so the recalibrated Seaside Basin model will match the actual measured groundwater levels data along the boundary between these two basins.

2. During the meeting Mr. Peterson and Mr. Williamson that there will be 3 informational meetings-today's is the 2nd of the 3. The purpose of today's meeting is to provide background information on legal and regulatory issues. The 3rd meeting will be next week at which input will be solicited about controlling pumping, management actions, projects, and other issues.

3. Valerie Kincaid, who is an attorney with the Sacramento law firm of Laughlin and Paris and is a member of the Hydrometrics' Groundwater Sustainability Plan development team, gave a presentation on groundwater rights. The following are some notes from her presentation:
   - A groundwater right gives you the right to extract water, but you do not "own" the water until you have extracted it. In California there are no groundwater extraction permit programs.
   - There are 4 types of groundwater rights and all of them are for "reasonable use".
     1. **Pueblo rights**-these are based on historical considerations and are rare in California.
     2. **Overlying rights**-these are water rights belonging to the landowners. Water taken under overlying rights cannot be exported off-site.
     3. **Appropriative rights**-these come from actually extracting water, but not from land ownership. Water extracted under appropriative water rights can be exported off-site.
     4. **Prescriptive rights**-these come from taking water that is not surplus, and which has been continuously taken for 5 or more years, and is taken when a basin is in overdraft. Private pumpers cannot claim prescriptive rights against public entities, but public entities can claim prescriptive rights against private pumpers.

- Extractions are taken in the priority order 1, 2, 3, and 4 listed above. Extractions are all allocated on a “fair-share” basis between overlying rights users.
- The Sustainable Groundwater Management Act requires having local groundwater management. It is not an adjudication. Adjudication comes with “a physical solution” as directed by the court and sets forth specific water rights to each user. The Sustainable Groundwater Management Act does not provide the GSA with authority to establish water rights.
- Under the Sustainable Groundwater Management Act, de minimus pumping is defined as pumping less than 2 acre-feet per year.
- A groundwater sustainability agency can limit groundwater extractions in order to avoid any of the 6 “undesirable results” that were discussed in meeting number 1.
- If the SWRCB finds a GSA is violating the Sustainable Groundwater Management Act, the SWRCB can begin to impose requirements including metering, reporting, and fees on individual well owners. When this happens the SWRCB will discontinue dealing with the GSA. This means the GSA is on “probation” until it gets back into compliance.

NOTES FROM THE MAY 17, 2018
SALINAS VALLEY BASIN GROUNDWATER SUSTAINABILITY AGENCY
JOINT MEETING OF THE BOARD OF DIRECTORS AND THE ADVISORY COMMITTEE

1. This meeting was essentially a consensus-building exercise, which they called "Café on the Water Projects." The objective of the exercise was to break into small groups to discuss a large number of potential projects and management actions that HydroMetrics had developed for consideration by the combined membership of the Board and the Advisory Committee. There were probably around 50 members in attendance.
2. Derrik Williams explained that these projects or management actions could be implemented on a localized basis, if selected, or on a basinwide basis, depending on the applicability of the project or action on each subbasin. Attached is a copy of the HydroMetrics handout that lists these potential projects and actions.
3. Carrie Wagner, Director of Water Resources for the San Luis Obispo consulting firm The Wallace Group, is the HydroMetrics' Team lead person for evaluating the Physical Projects. She briefly reviewed each of these before the exercise commenced.
4. Harry Seely is a Water Economist with the consulting firm Water Wise and is the HydroMetrics' Team lead person for evaluating the Management Actions. He briefly reviewed each of these before the exercise commenced.
5. At the end of the exercise each participant was asked to vote for the top 3 projects or actions he felt would be the most beneficial to the Basin and would also likely be acceptable for implementation.

HydroMetrics WRI

1814 Franklin St., Suite 501
Oakland, CA 94612

SVBGSA Board Members
SVBGSA Advisory Committee Members

May 15, 2018

Subject: Preparatory Material for May 17 Joint Meeting

SVBGSA Board and Advisory Committee members

We have attached information regarding potential projects and actions in preparation for the upcoming May 17 joint meeting. We would like you to review this information prior to the meeting. This will allow you to more fully participate in the discussions on May 17.

The table attached to this letter lists a number of projects and management actions that could be included in our GSP. This list is by no means exhaustive. It is based on known projects and potential projects that could help achieve sustainability. Additionally, not all projects apply to all parts of the Salinas Valley. We realize many projects and management actions preferentially benefit parts of the Valley.

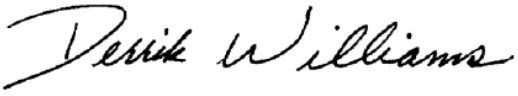
During our May 17 meeting, we will be looking for your feedback on these projects and actions. Note that this is a very high-level discussion. We simply want to know the following:

- Which projects or actions would you support in the GSP? What modifications to the projects or actions would you like to see?
- What projects or actions have we not identified?
- Which projects or actions would you not want considered in the GSP
- What project and action attributes are important to stakeholders

We do not expect people to debate the details or costs of these actions. This is simply an exercise to determine which projects we should evaluate Effectively, it is our attempt to identify which tools are possibly in our toolbox for achieving sustainability.

We look forward to seeing you on May 17 and hearing your opinions on potential projects and actions.

Sincerely,



Derrik Williams, President
HydroMetrics Water Resources Inc.

PROJECT TYPE/NAME	DESCRIPTION/BENEFIT
Potential Projects: Seawater Intrusion Control	
Reduce Pumping & Abandoned Wells Termination	
Expansion of Castroville Seawater Intrusion Project (CSIP)	Use of recycled wastewater for irrigation, offsetting the need for groundwater and slowing seawater intrusion into the aquifer. Source waters include agricultural wash water from Salinas' industrial ponds, Salinas' stormwater, Reclamation Ditch, Tembladero Slough, Blanco Drain and Monterey stormwater.
Termination of 8 Wells: Sub Basin 180/400	Slow or eliminate seawater migration and intrusion into 400-foot aquifer and deep aquifer.
Pursue Termination of 134 wells	Slow or eliminate seawater migration and intrusion into 400-foot aquifer and deep aquifer.
Seawater Desalination	
Monterey Peninsula Water Supply Project	Benefit to basin: Creates a barrier for seawater intrusion. The MPWSP slant wells pull seawater intrusion towards coast.
Deepwater Desal	Slow seawater intrusion by replacing pumped water with desalinated water. Potential to produce up to 25,000 acre-feet per year. Requires a pipeline from Moss Landing.
Seawater Intrusion Barrier	
Seawater Intrusion Barrier - Injection Wells	Push seawater intrusion back towards the coast by injecting water into 180 and 400 foot aquifers. A number of injection wells would be required and sufficient water (recycled) to supply the injection wells.
Seawater Intrusion Barrier - Extraction Wells	Pull seawater back towards the coast by extracting saline groundwater from the 180 and 400 foot aquifers. Extracted water would either be disposed of in the ocean or desalinated for potable/agricultural use.
Potential Projects: Groundwater Replenishment	
Stormwater Capture/Recharge	
Stormwater Capture and Treatment (Municipal)	Municipal agencies incorporate decentralized stormwater recharge projects to increase groundwater basin recharge in lieu of stormwater flowing to the Salinas River.
Stormwater Capture and Treatment (Agricultural and Industrial)	Agricultural and Industrial users incorporate decentralized stormwater recharge projects to increase groundwater basin recharge in lieu of stormwater flowing to the Salinas River.

Conjunctive Use	
Water Right Permit 11043 - Source Water	Provides a surface water source during high winter flow conditions for additional stream recharge or flood plain recharge that allows for reduced pumping, increasing groundwater levels. Manage nitrate in the unconfined aquifers in the Forebay and Upper Valley.
Water Right Permit 11043 - Direct Injection, Managed Aquifer Recharge	Provides a surface water source during high winter flow conditions for Managed Aquifer Recharge (MAR) including direct injection wells or spreading basins. A conveyance and temporary water storage system may be needed with capital costs to use the Permit 11043.
Water Right Permit 11043 - Conveyance Option: Distribution Pipeline	Provides a surface water source during high winter flow conditions with a pipeline from San Antonio Reservoir to North County.
Conjunctive Use Transfer	Groundwater pumping and conveyance facilities in mid-valley for delivery to Eastside and 180/400 aquifer sub basin areas to reduce pumping stresses and allow re-establishment of higher groundwater levels in these areas, thereby reducing or eliminating existing seawater intrusion risk. Project promotes conjunctive use of surface water and groundwater storage for more effective distribution and management of in-basin water resources.
Other Conjunctive Use - Small-scale near-source diversions and blending of surface water.	Diversion at much smaller scale than the SVWP II at appropriate locations. These are low-cost options compared to MAR by injection wells. One in-lieu recharge approach relies on reduced pumping in the 180/400-Foot Aquifer sub basin in exchange for increased use of Salinas River water, allowing for natural recovery of water levels in the aquifer.
Surface Water Storage	
Interlake Connection and Regional Water Conservation Project - Interlake Water Tunnel & San Antonio Spillway Modification	Tunnel to divert water from Nacimiento Lake to San Antonio Lake, capturing high Nacimiento flows. Forecasted to increase overall storage capacity in San Antonio by 59,000 ac-ft (18%). New water available is about 21,000 ac-ft/yr. Benefit to the Salinas Valley includes additional river water for local diversion and groundwater replenishment; and seawater intrusion mitigative measures.
Jerrett Dam	The Jerrett dam site is on the Nacimiento River, upstream of Nacimiento Reservoir, on Fort Hunter Liggett Military Reservation property. The dam could be constructed to impound 145,000 acre-feet of water . Benefit to the Salinas Valley is additional reservoir / release management scenarios, leading to 1) additional river water for local diversion and groundwater replenishment; and 2) seawater intrusion mitigative measures.
Recycled Water	
Source Water Development with Recycled Water	Source waters include agricultural wash water, industrial processing facilities, etc. Recycled water to be used for irrigation, offsetting the need for groundwater.
Municipal Groundwater Recharge	Municipal WWTP effluent recycle w/ groundwater injection or recharge.

Environmental	
Arundo Eradication Phase III	Eradicating Arundo lessens evapotranspiration, leaving more water in the aquifers. Phase III, funded by an additional grant from the Wildlife Conservation Board, will treat an additional 350 acres downstream of Phase II (King City to Soledad). The goal of the program is to eradicate Arundo within 20 years (~1500 acres over 90 miles of river).
Arundo Eradication Additional Phases	Eradicating Arundo lessens evapotranspiration, leaving more water in the aquifers. Eradicate Arundo within 20 years (~1500 acres over 90 miles of river). ~1550 acres remaining after Phase III (Soledad to Coast)
Management Actions: Distribution Optimization	
Land Purchase/Retirement	Reduce agricultural groundwater pumping to improve groundwater levels and prevent seawater intrusion by compensating landowners to permanently retire irrigated land.
Voluntary Fallowing	Reduce agricultural groundwater pumping to improve groundwater levels and limit seawater intrusion by leaving historically-irrigated land fallow for a full year.
Partial Season Irrigation	Reduce agricultural groundwater pumping to improve groundwater levels and limit seawater intrusion by shortening the length of the irrigation season. In practice, this may mean growing fewer crops within a given season.
Deficit Irrigation	Apply less water than is required for optimal yield to reduce agricultural groundwater pumping, improve groundwater levels, and limit seawater intrusion.
Crop Conversion	Transition to less water-intensive crops to reduce agricultural groundwater pumping, improve groundwater levels, and limit seawater intrusion.
Individual Transferable Quotas	Reduces groundwater pumping by establishing total allowable pumping allocations among individual pumpers, and authorize quota trading to minimize the economic effects of lower pumping volumes.
Conservation Credits	Incentivize water conservation by awarding groundwater pumping credits based on reduction in use. Can be carried over for use in future years.
Quota/Credit Buyback	Reduce annual groundwater pumping by purchasing/leasing quotas and/or conservation credits.
Incentives for Replenishment	Offer payments and/or conservation quotas for recharge of available surface water. All or a portion of the recharge will be maintained in the aquifer to benefit groundwater levels or limit seawater intrusion.
Land Use Restrictions/Easements	Limit future Ag or Urban groundwater pumping by restricting land use or purchasing conservation easements in targeted areas to maintain aquifer levels and limit seawater intrusion.
Mandatory Restrictions	Mandate reduced groundwater pumping to improve aquifer levels and limit seawater intrusion.

Water Export Limitations	Limit water export from an overdrafted sub basin to prevent further groundwater level decline or seawater intrusion.
Metering/Monitoring	Measure groundwater withdrawals at individual wells to support quantification of individual transferable quotas, conservation credits, and implement withdrawal fees/tiered pricing.
Nacimiento Water Release Management	Modify reservoir operations to increase groundwater recharge in the basin
SW Education/Outreach & Municipal Enforcement	Additional Education and Outreach efforts for Commercial and Industrial Facilities w/ Enforcement by Municipalities for violators or IGP non-filers.
Withdrawal Fees/Tiered Pricing	Charge fees per acre-foot pumped (flat, increasing block, and/or by water use type) to incentivize reductions in groundwater pumping.
Management Actions: Efficiency	
Irrigation Efficiency	Implement on-farm technology to improve irrigation efficiency and reduce groundwater pumping.
Municipal Water System Leak Detection & Repair	Address municipal water system losses to reduce groundwater pumping or support additional recharge. For systems w/ over 12% water loss annually. (16% is average w/ 75% generally assumed to be recoverable)
Urban Conservation (indoor/outdoor)	Mandate or incentivize urban conservation
Municipal Water Conservation Efforts	Widespread adoption of water-saving appliances and fixtures, along with replacement of lawns with water-efficient landscapes, may reduce total residential water use by 30-40 percent in areas not currently implementing these strategies.
Recycled Water Incentives - Industrial Facilities	Wineries, Produce Production, Breweries, & Other water intensive industrial facility types. Recycle process wastewater and site storm water for onsite reuse.

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	2.C
AGENDA TITLE:	Progress Report on Geochemical Modeling Work
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Following TAC and Board approval earlier this year, work was started by MPWMD's consultant Pueblo Water Resources to perform geochemical modeling in the Seaside Groundwater Basin to assess the geochemical interaction effects of introducing non-native water from the storage and recovery projects proposed by MPWMD (expanded ASR project), M1W (Pure Water Monterey Project), and CAW (desalination project) into the native water in the Basin.

Mr. Jon Lear of MPWMD was not able to attend today's meeting, but has provided this progress report on this work:

MPWMD is in contact with Trussell Technologies who are the consultants for both Pure Water Monterey (PWM) and CalAm's Desalination project. They are water quality and treatment system design engineers. We have collected all of the preliminary water quality data for both projects that include modeled finished water quality data and pilot plant water quality in the case of PWM. Trussell is currently undergoing an effort to characterize the effects of introducing desalinated water into the CalAm distribution system. We have compiled these data into a database and the geochemical modeler is currently reviewing it for completeness that will allow for modeling water interaction with the aquifer minerology.

Additionally, MPWMD is set to collect a core sample from the Santa Margarita in the next month. This work will be completed while the wells are being drilled for the current construction phase of PWM. We will use the core to complete laboratory analyses (bench tests) to fill in any gaps in the geochemical database identified by the geochemist. After receiving the results from laboratory analyses, we will begin modeling the different mixed ratios of water and their interaction with the aquifer. Modeling work should commence in mid to late July which is driven by core collection and laboratory analysis.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	3
AGENDA TITLE:	Results from Martin Feeney's March 2018 Induction Logging of the Sentinel Wells
PREPARED BY:	Robert Jaques, Technical Program Manager

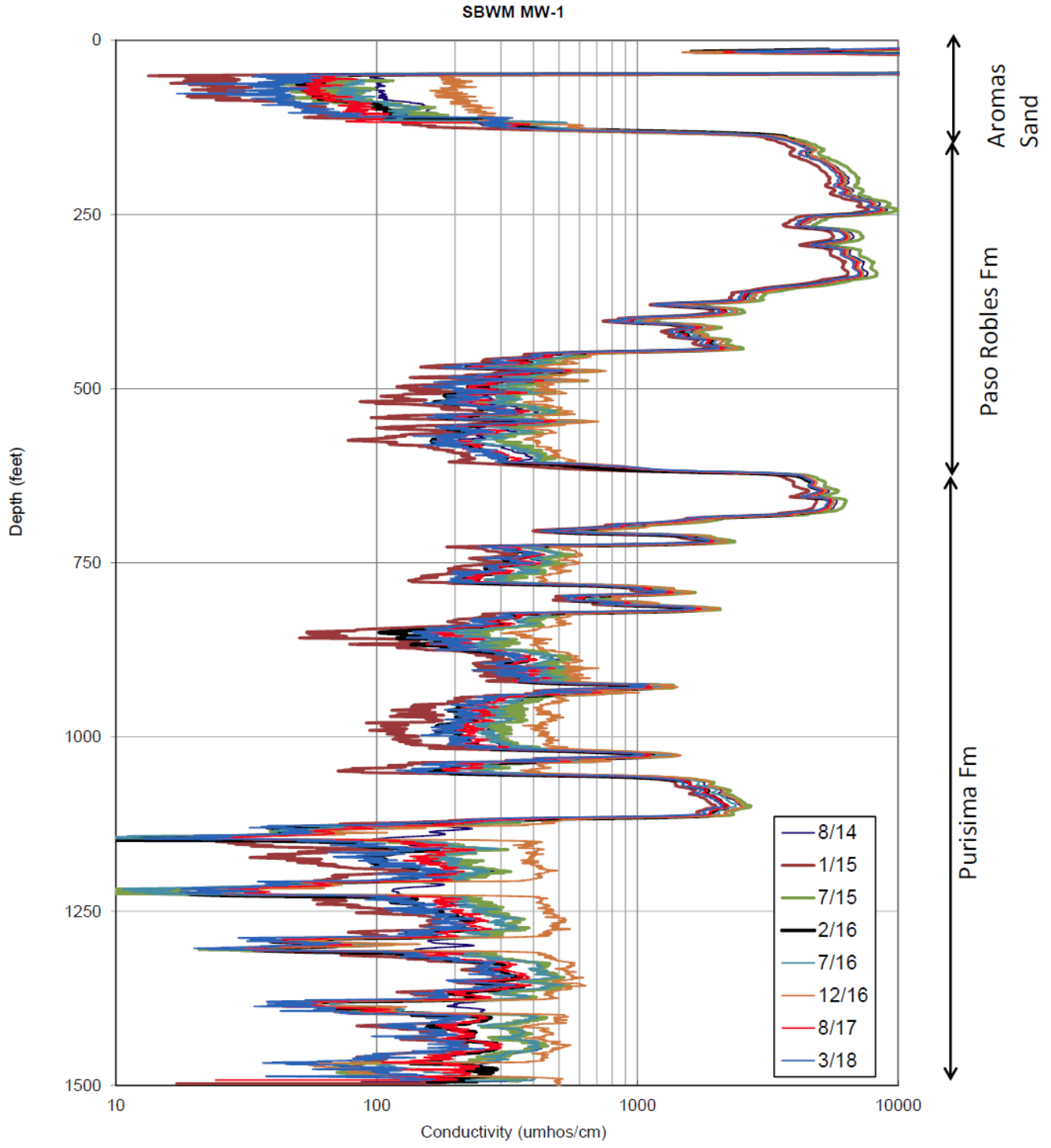
Attached are plots of the induction logging data from the March 2018 Sentinel Well logging event. This year in these plots Mr. Feeney changed the x-axis scale to a log-scale. The purpose of this change was to make it easier to see variations in conductivity at those depths where the conductivity is lower than it is in the shallower seawater intruded Aromas Sands. Mr. Feeney also added notes identifying the formations through which the wells pass.

His analysis of this data is that the induction logging has not shown any significant change in conductivity, and thus has not shown any indication of the start of seawater intrusion in any of the formations within which production wells are located (primarily the Paso Robles and Santa Margarita formations).

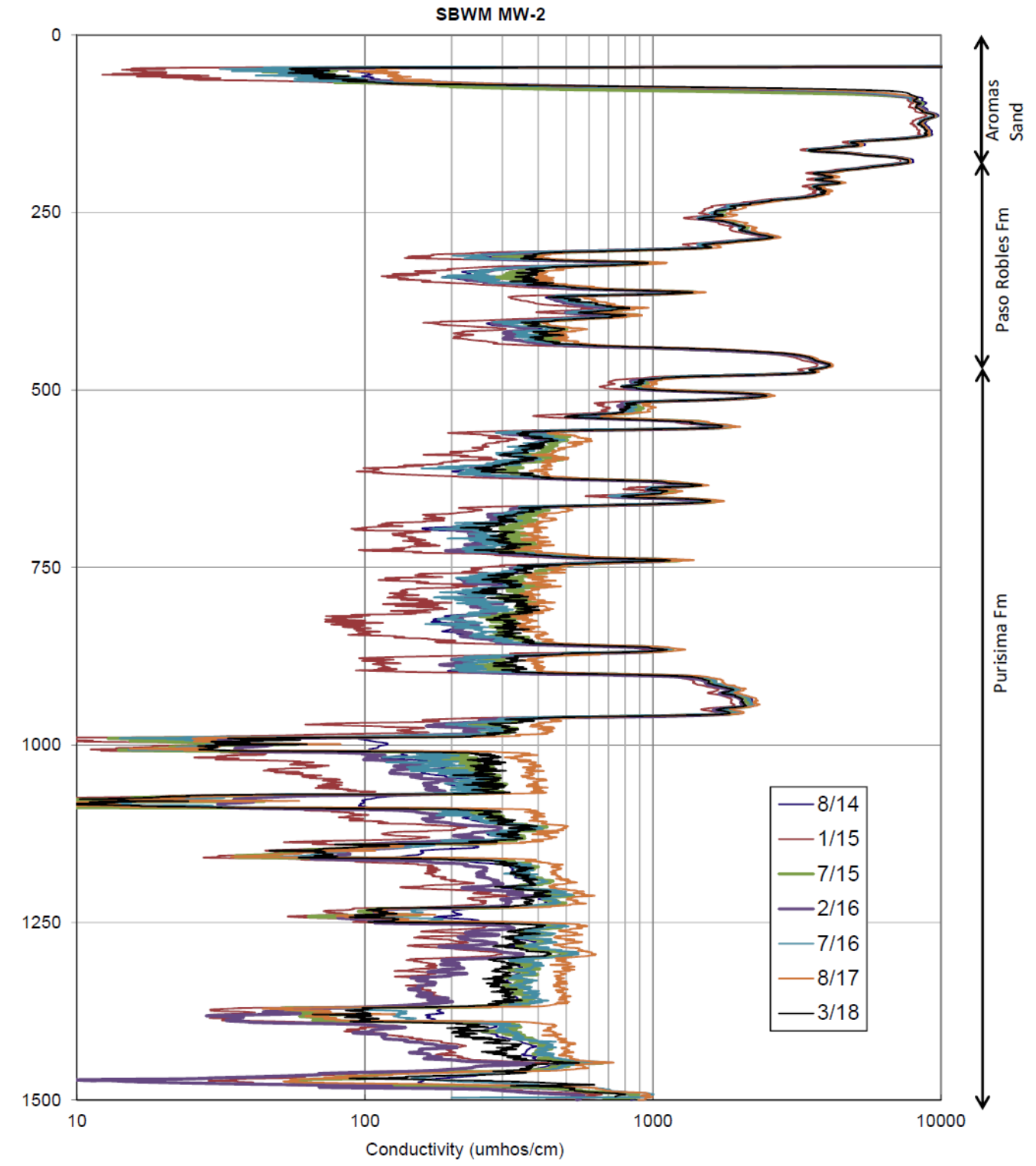
Mr. Feeney will participate in the TAC meeting via telephone to provide a brief overview of the data and respond to questions from the TAC.

ATTACHMENTS:	Induction Logging Results
RECOMMENDED ACTION:	None required – information only

SENTINEL WELLS CONDUCTIVITY



SENTINEL WELLS CONDUCTIVITY



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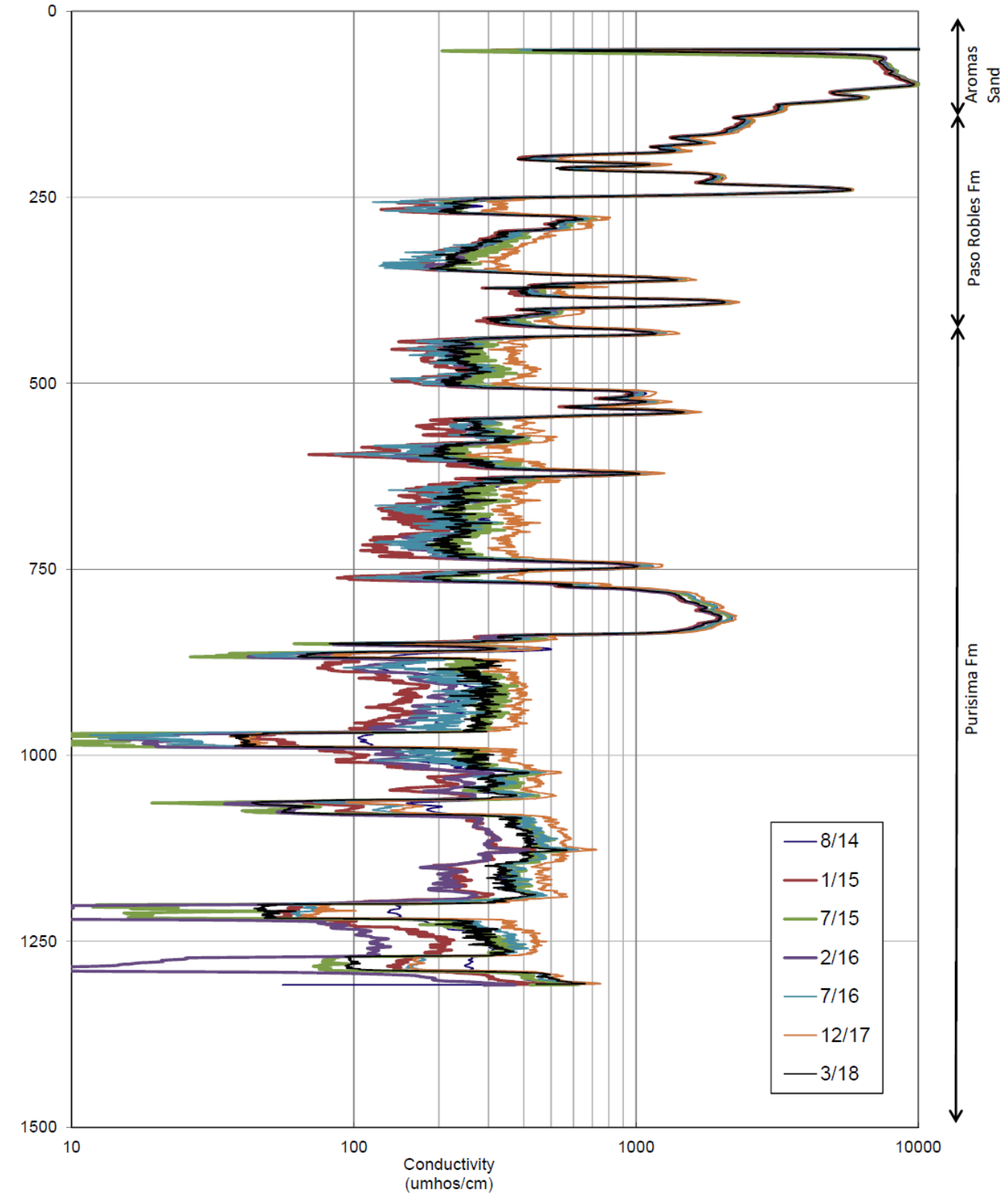
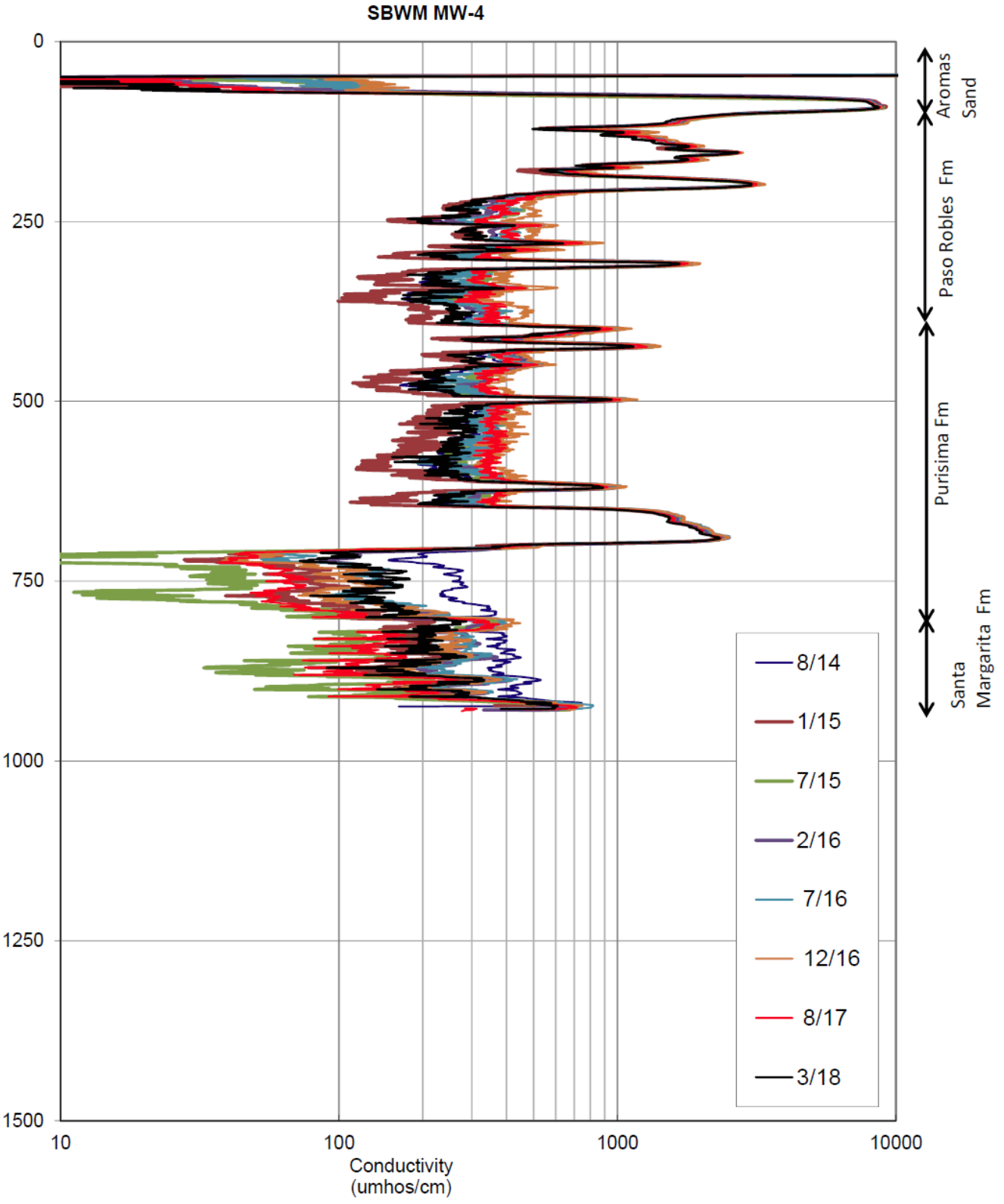


SENTINEL WELLS CONDUCTIVITY



SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	4
AGENDA TITLE:	Discuss Technical Memorandum from HydroMetrics on Updating and Recalibrating the Seaside Basin Groundwater Model
PREPARED BY:	Robert Jaques, Technical Program Manager

HydroMetrics has completed work on recalibrating and updating the Seaside Basin Groundwater Model under its RFS No. 2018-03.

Attached is a draft copy of their Technical Memorandum describing this work. The attached copy reflects questions and comments I made to them in a preliminary draft version that I received on June 5.

Ms. Georgina King of HydroMetrics will provide a presentation on this work at today's meeting and will respond to questions from the TAC. A copy of her PowerPoint presentation slides (which were still being prepared at the time this agenda packet was sent out) will be sent to all TAC members via separate email a few days prior to the TAC meeting, so TAC members can follow along with her presentation.

One question for the TAC to consider and provide direction to the Technical Program Manager on is whether it would be worthwhile to have Gus Yates of Todd Groundwater review the Technical Memorandum to see if he has any comments or concerns that he feels should be addressed before the updated model is used. We have an open contract with Todd Groundwater to perform on-call services such as this. I'd expect it would take him several hours to review the document and to provide us with a short memo describing any of his comments or concerns.

ATTACHMENTS:	Draft Technical Memorandum from HydroMetrics on Updating and Recalibrating the Seaside Basin Groundwater Model
RECOMMENDED ACTION:	Provide direction to the Technical Program Manager on what comments to provide to HydroMetrics on the Draft Technical Memorandum

HydroMetrics WRI
1814 Franklin St, Suite 501
Oakland, CA 94612

TECHNICAL MEMORANDUM

To: Seaside Groundwater Basin Watermaster
Technical Advisory Committee

From: Pascual Benito, Georgina King, and Derrik Williams

Date: June 8, 2018

Subject: 2018 Seaside Groundwater Model Update

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Background and Scope

The Watermaster's first Basin Management Action Plan (BMAP) was completed in February 2009 (HydroMetrics LLC, 2009a). The BMAP constitutes the basic plan for managing the Seaside Groundwater Basin. The BMAP identifies both short-term actions and long-term strategies intended to protect the groundwater resource while maximizing the beneficial use of groundwater in the basin. It provides the Seaside Basin Watermaster (Watermaster) a logical set of actions that can be undertaken to manage the basin to its Safe Yield. Over the nine years since the BMAP was completed, the Watermaster has collected much groundwater level and quality data, and conducted various studies to improve the understanding of the basin.

At the time the 2009 BMAP was prepared, a groundwater model had not yet been developed for the basin, and the analysis contained in the BMAP was completed using analytical methods. Following the BMAP recommendation that a groundwater model be constructed to assist with groundwater management decisions, a calibrated model was completed in November 2009 (HydroMetrics LLC, 2009b). The model simulated groundwater conditions in the basin between January 1987 and December 2008. In 2014, the model was updated with data through September 2013 (HydroMetrics WRI, 2014) but not recalibrated because its accuracy was still acceptable. The 2014 update found that the uncalibrated portion of the model (January 2009 – September 2013) tended to simulate higher groundwater levels than measured levels. Periodic recalibration of the model is

necessary to ensure the model simulates groundwater levels within an acceptable industry standard accuracy. When simulated groundwater levels are not accurate this reduces the accuracy of all output from the model such as groundwater storage and water budget.

This technical memorandum documents (1) the update of the Seaside Basin groundwater model that extends the model simulation period through 2017, and (2) recalibration of the model using all the groundwater level data that has been added to the model since 2008. 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 added to the model.

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 2014 and 2017.

Figure 1 shows the total monthly pumping for the entire model period of 1987-2017. The pumping pattern of the updated period between 2014 and 2017 is similar to the lower pumping that was observed in the 1992/93 drought. No new wells were added to the model for the updated period as no new municipal production wells were drilled and put into production between 2014 and 2017.

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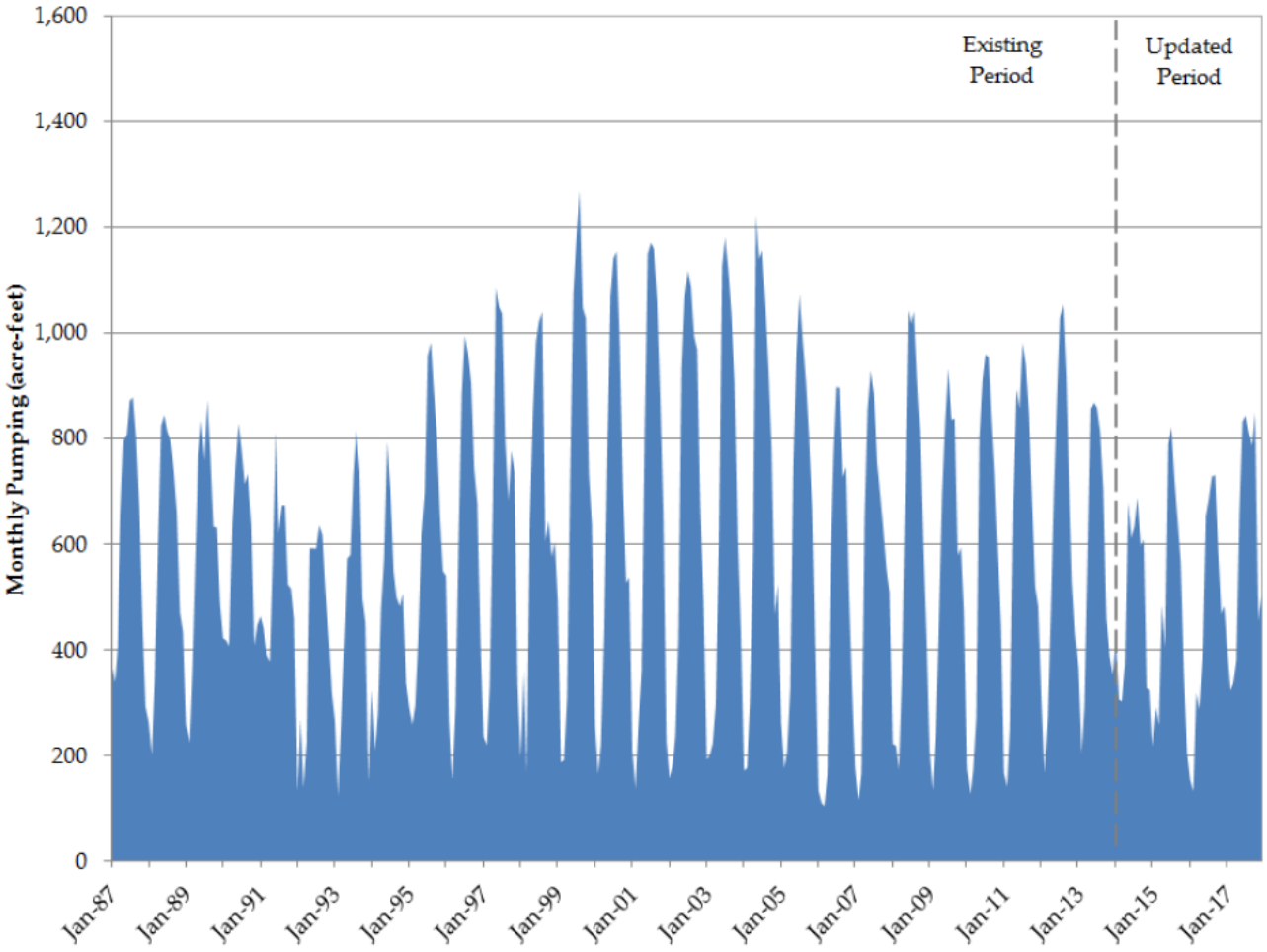

Figure 1: Total Monthly Pumping

DEEP GROUNDWATER RECHARGE

The amount of deep groundwater recharge added to 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, 2009a). 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 to extend the model period through the end of 2017. System loss data were obtained from MPWMD for Cal-Am water delivered to customers. Precipitation data were downloaded from the Utah Climate Center to extend the Monterey (Coop No. 45795) and Salinas (Coop No. 47668) station data. Monthly evapotranspiration data were downloaded for the Castroville CIMIS station.

As the soil moisture balance model uses average monthly evapotranspiration rates, 2009-2017 evapotranspiration data for the Castroville CIMIS station was evaluated to determine if it varied from average monthly rates used previously in the model. It was found that average monthly evapotranspiration for the updated period was similar to previous years and thus, average monthly evapotranspiration rates for the updated model were assumed to be the same as for the 1987-2008 original model calibration period.

The number of septic tanks in use and the land use throughout the model domain were assumed to be the same because land use has not changed substantially from the General Plan land use used in the original model. The amount of runoff percolation occurring in the recharge ponds is estimated in the soil moisture balance model as a proportion of precipitation.

Figure 2 shows the estimated total monthly deep groundwater recharge that is input into the model for every month between 1987 and 2017. 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

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is dependent upon system losses and irrigation return flow. This seasonal pattern is consistent throughout the entire simulation period, including the updated model period.

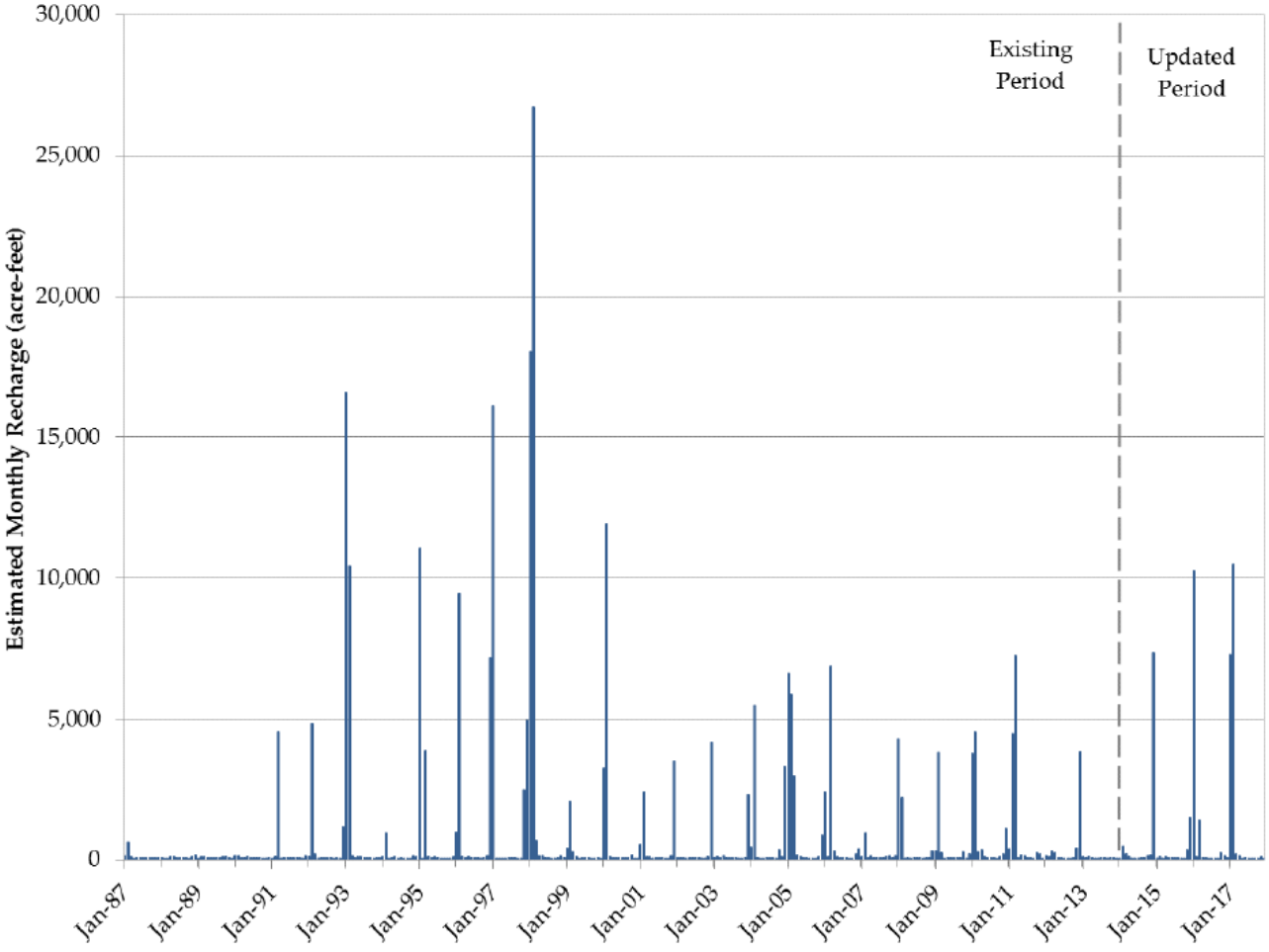

Figure 2: Estimated Monthly Recharge

GROUNDWATER LEVEL OBSERVATIONS

An updated set of groundwater level observations from wells in the Seaside Basin were provided by MPWMD, MCWD, and the Monterey County Water Resources Agency (MCWRA). The dataset covers the updated model period of 2014-2017. Observations collected from wells that were pumping at the time of measurement (pumping temporarily lowers the groundwater level at the well location) and other questionable values were removed from the dataset.

The updated groundwater level data were used to assess 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 that were provided. This process is described in greater detail in the Model Recalibration section below.

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 as a specified head boundary condition with the MODFLOW Constant Head (CHD) package. This option assigns a set of specified (or known) groundwater elevation heads to each model cell along the northwestern boundary. The specified groundwater elevations vary spatially along the boundary and can also be made to vary with time according to changing conditions. If simulated groundwater elevations in the model are higher than the assigned boundary elevations, water will flow out of the model towards the Salinas Valley. If simulated groundwater elevations in the model are lower than the assigned boundary elevations, water will flow from the Salinas Valley into the model.

For the original model calibration in 2009 (HydroMetrics LLC, 2009b), the groundwater elevations assigned to the model cells along the northeastern boundary were derived from results of the Salinas Valley Integrated Groundwater Surface Water Model (SVIGSM) (Montgomery Watson, 1997). WRIME Inc., the consultant updating the SVIGSM for Monterey County Water Resources Agency, provided estimated groundwater elevations from a number of the SVIGSM nodes that were near the regional model boundary and these were interpolated onto the regional model boundary cells ("the 1997 SVIGSM results"). In 2009, the SVIGSM calibrated results were available only through model year 1994, so the SVIGSM groundwater heads from the last month of 1994 were repeated through the end of the calibration model period, 2008, for each boundary cell.

In 2010, WRIME, Inc. provided updated SVIGSM results ("2010 SVIGSM Results") that covered a longer time period extending to 2004, and these new results were used to update the specified heads along the northeastern boundary as part of a modeling study looking at the impacts from the Regional Project as described in the Final Environmental Impact Report (EIR) for the Coastal Water Project (HydroMetrics Water Resources Inc., 2010).

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In the Seaside Basin model's 2014 update, the Seaside Basin model was updated to extend through years 2005-2013. SVIGSM model results were not available for these years, so to approximate the groundwater elevations along the northeastern boundary for this period, the final 12 months of available 2010 SVIGSM results (from year 2004) were applied to each of the remaining years from January 2005 through December 2013. This is illustrated in graph form on Figure 3 as the higher elevation blue line.

At the time of the 2014 Seaside Basin model update, no sensitivity analysis had yet been performed for the northeastern boundary condition to evaluate if and how changes to the specified heads along this boundary might impact model results. Given that the boundary is over four miles away from the nearest Seaside Basin production wells located in the central portion of the Northern Coastal subarea, it was thought that impacts from the boundary would be greatest in areas adjacent to the boundary, and would have less impact on areas further away.

In preparation for the model recalibration described in this Technical Memorandum, a limited sensitivity analysis of the northeastern boundary condition was carried out by applying consecutive changes in specified groundwater heads along the boundary for different durations of time, and assessing how this impacted groundwater levels in different areas of the model. It was found that changes in specified boundary heads of more than 10-20 feet over multi-year periods resulted in changes to groundwater levels and regional gradients in large areas of the model including areas not directly adjacent to the boundary, such as the Northern Coastal subarea. Because of the length and large cross-sectional area of the northeastern boundary, large changes in the specified heads over sustained periods of time can change the regional groundwater levels and gradients, the location of the groundwater divide, and also the spatial and temporal distribution of wet and dry cells in the model.

With this understanding, the original 1997 SVIGSM model and the newer 2010 SVIGSM model head values along the northeastern boundary were compared against one another, as shown for an example model boundary cell in Figure 3. For the same time periods, the newer updated 2010 SVIGSM head values that were used to update the model in 2014 were significantly higher than the earlier 1997 SVGISM model head values, by as much as 35 feet during some periods.

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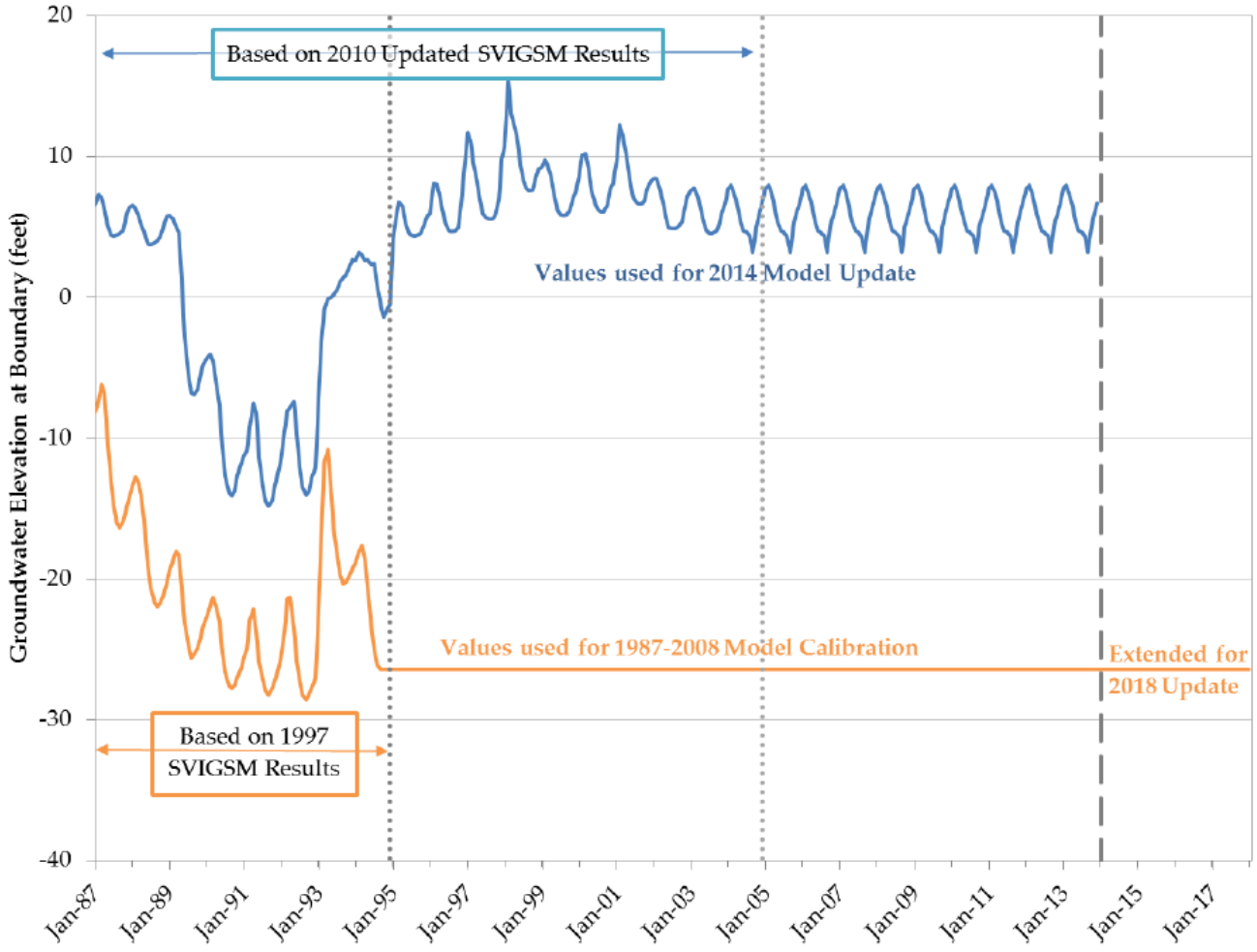

Figure 3: Groundwater Elevations at an Example Northeastern Boundary Cell

The two SVIGSM model results (1997 and 2010) were compared against measured groundwater levels in wells located along and adjacent to the northeastern boundary. Historical and current groundwater level data for these wells were compiled from a number of sources, including the Fort Ord environmental remediation monitoring wells, the California Department of Water Resources CASGEM program, and Marina Coast Water District's production wells.

The comparison of the two SVIGSM model results along the boundary showed that the heads from the earlier 1997 SVIGSM model results used for the original 2009 Seaside Basin model calibration much more closely match observed groundwater levels along the boundary over the extended model period through

2017. Using the 2010 SVIGSM heads did not allow for improvement in model calibration and for this reason, the much higher 2010 SVIGSM heads, used in the groundwater model since 2010, were replaced with the original 1997 SVIGSM heads. The head value for the last month of 1994 in the 1997 SVIGSM model were applied to all subsequent months through December 2017, as shown in Figure 3. Even without the annual seasonal variation in the extended period from 1994 through 2017, it was found matching the overall average head elevations along the boundary was critical to recalibrating the model.

Model Recalibration

CALIBRATION APPROACH

Calibrating the groundwater flow model involved successive attempts to match model output to measured data from the calibration period. Relatively uncertain and sensitive parameters such as horizontal and vertical hydraulic conductivities, were varied over a reasonable range of values. Simulated hydraulic heads were compared against available observed groundwater elevations. The model was considered calibrated when simulated groundwater levels matched the measured groundwater levels within an industry standard acceptable measure of accuracy, and when successive calibration attempts did not notably improve the calibration statistics. Acceptable measures of model accuracy are described on pages 15 and 16.

Prior to varying the 2009 calibrated model parameters such as hydraulic conductivity and storage coefficients, a limited sensitivity analysis was carried out on two model inputs that had not previously undergone calibration, 1) the specified head boundary with the Salinas Valley (as described in the previous section), and 2) the deep groundwater recharge estimated using a soil moisture balance model.

The sensitivity of the groundwater model to changes in applied recharge was evaluated by making incremental changes to the soil properties in the soil moisture balance model. Both the rooting depth and the soil runoff curve numbers (CN) are soil parameters that influence the percentage of rainfall that runs off or infiltrates to become recharge. Rooting depth is the typical depth of the root zone and the soil runoff curve number is a coefficient that reduces precipitation to runoff. The soil balance model was run with a range of soil rooting depth (between 12-80 inches) and a range of CN parameter values to create different groundwater recharge input data sets for the groundwater model, and the sensitivity of the

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changes on simulated groundwater levels was evaluated. It was found that in general the model was much more sensitive to long-term average groundwater elevations along the Salinas Valley boundary than to changes in the soil runoff properties, and as such, recalibration efforts were focused first on recalibrating the Salinas Valley boundary as described in the previous section.

CALIBRATION RESULTS

After updating the Salinas Valley boundary conditions as described above, the updated groundwater model was re-run and the calibration results improved to the same level of calibration as the original 1987-2008 calibration period. This indicates that the revision of the northern boundary condition provides for better simulation of groundwater levels than the model was able to achieve with the higher 2010 SVIGSM heads. Many of the simulated groundwater levels that had been diverging from the observed values in the 2014 model update better matched observed values. At this stage, a calibration tool called Parameter Estimation (PEST) (Watermark Numerical Computing, 2004) was used to determine if further significant improvements could be made by adjusting model parameters.

MODEL PARAMETER MODIFICATIONS

Model hydraulic parameters are adjusted during model calibration to improve the model's ability to simulate known conditions. Calibration runs of the model with PEST consisted of modifying the distribution and magnitude of horizontal hydraulic conductivity, vertical hydraulic conductivity, and specific storage values. This process was conducted in the 2009 model calibration.

For this 2018 recalibration of the model, hydraulic parameter modifications resulted in measureable, but not significant, improvements in the calibration statistics. In some cases, small improvements were gained in matching groundwater levels of some wells, while other wells showed decreases in accuracy. It was determined that the existing calibrated parameters should be kept and that the recalibration of groundwater elevations at the Salinas Valley boundary was sufficient to return the model to its original performance and accuracy, without the need to modify hydraulic parameters.

GROUNDWATER ELEVATION CALIBRATION

Groundwater flow model calibration is 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. Unbiased means that simulated groundwater levels should not be either all higher or all lower than the observed values. For wells screened over multiple model layers, simulated groundwater levels in each of the layers were weighted by layer transmissivity and averaged before comparing with measured data.

Example hydrographs showing both observed and simulated groundwater elevations are shown in Figure 4 through Figure 7. These example hydrographs were selected to demonstrate the model's accuracy in various parts of the Seaside Groundwater Basin. The hydrographs show that the updated model accurately simulates both the magnitude of groundwater fluctuations and trends observed in monitoring well data throughout the basin. A complete set of hydrographs showing both observed and simulated groundwater elevations are included in Appendix A.

Various graphical and statistical methods can be used to demonstrate the magnitude and potential bias of the calibration errors. Figure 8 shows all simulated groundwater elevations plotted against observed groundwater elevations for each month in the updated calibration period. Results from an unbiased model will scatter around a dashed line with a slope of 45° on Figure 8. If the model has a bias such as consistently exaggerating or underestimating groundwater level differences, the results will diverge from this line. The dashed line drawn on Figure 8 demonstrates that the results suggest that in general the model results are not biased towards overestimating or underestimating average groundwater level differences.

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). These statistical measures are included on Figure 8. These statistical measures take into consideration all wells in the model with groundwater level data.

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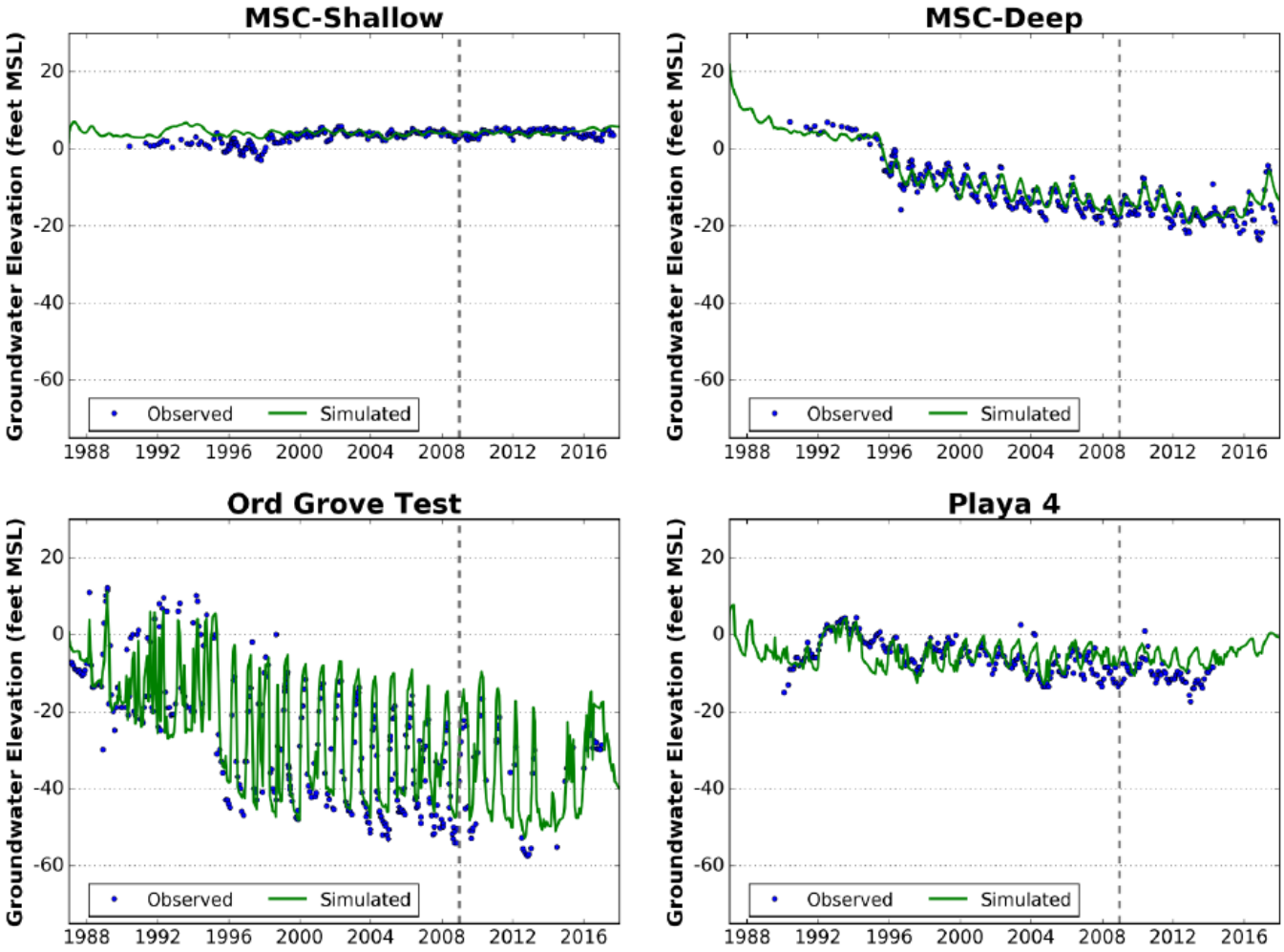

Figure 4: Hydrographs – Northern Coastal Subarea

Right of the dashed line represents the model period added as part of this model update

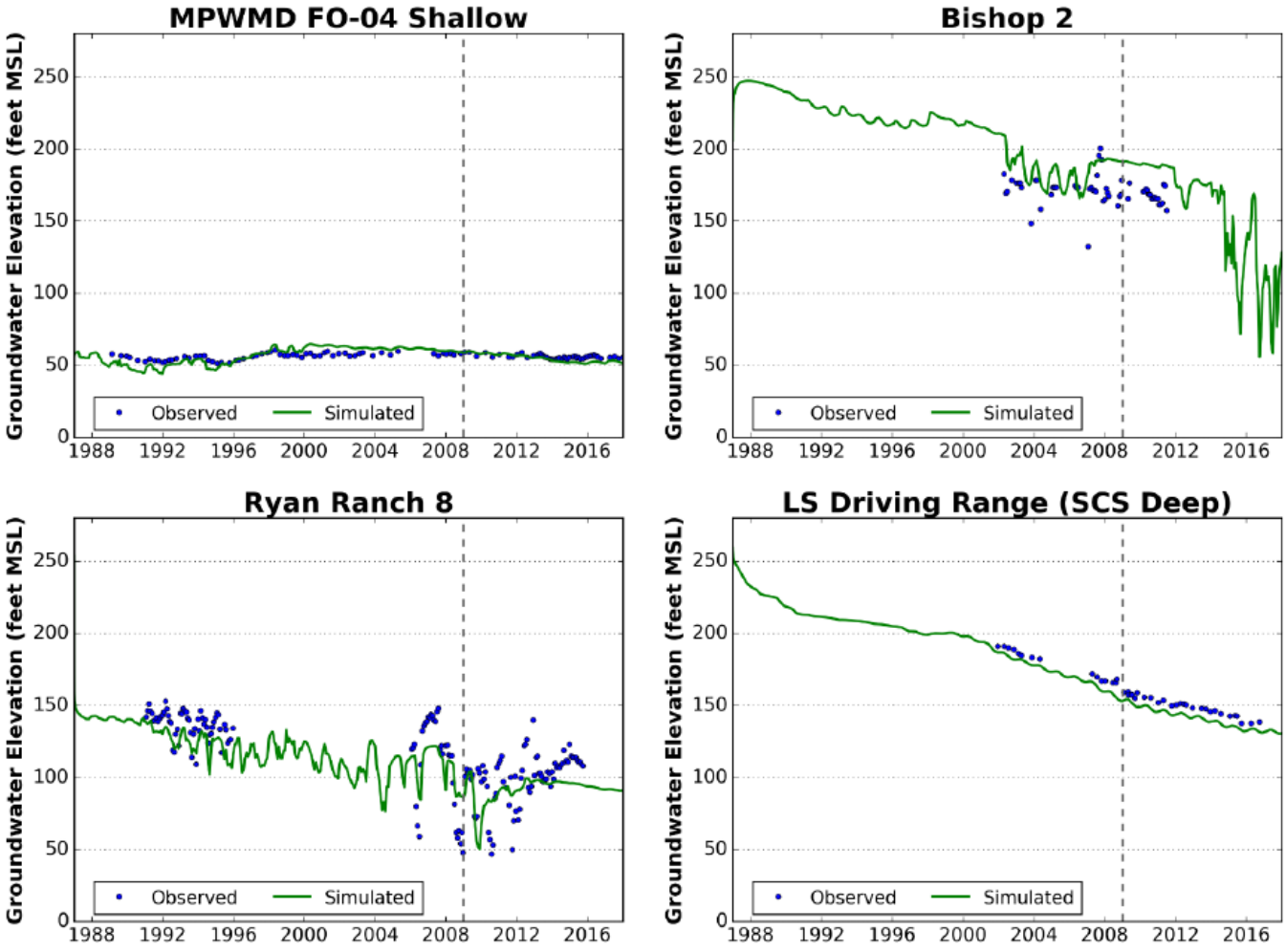

Figure 5: Hydrographs – Laguna Seca Subarea

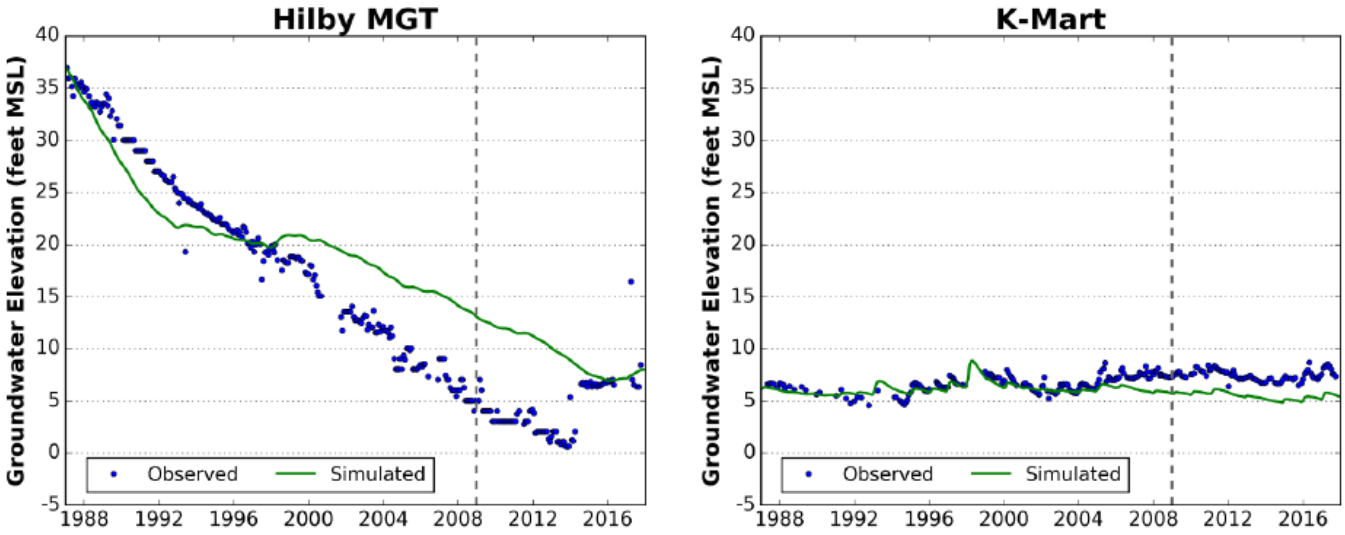

Figure 6: Hydrographs – Southern Coastal Subarea

Right of the dashed line represents the model period added as part of this model update

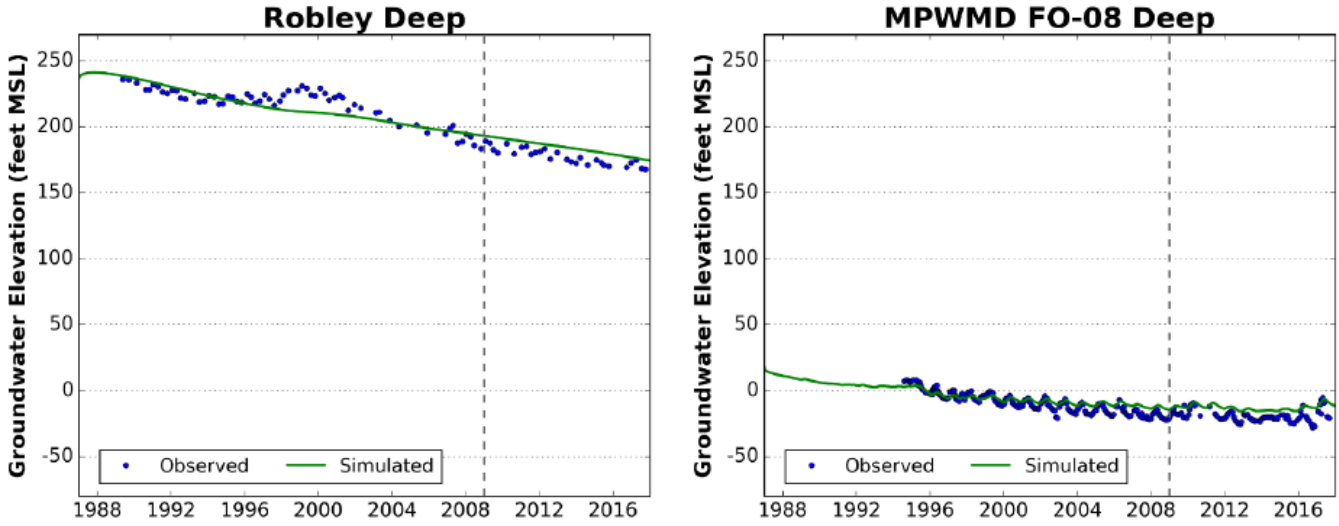

Figure 7: Hydrographs – Outside Seaside Groundwater Basin

Right of the dashed line represents the model period added as part of this model update

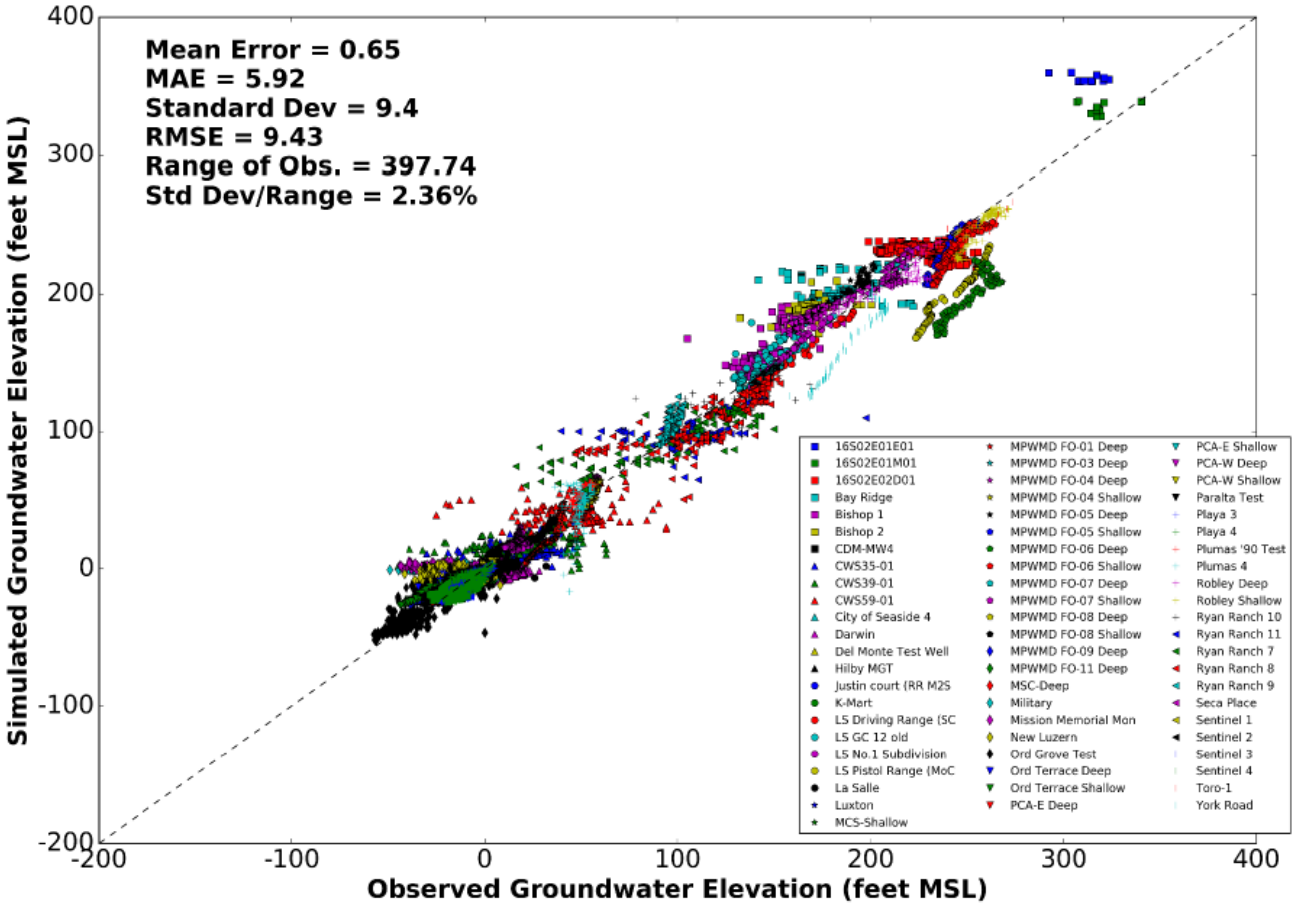

Figure 8: Simulated Versus Observed Groundwater Elevations - All Data (1987–2017)

The mean error is the average error between measured and simulated groundwater elevations for data on Figure 8 through **Error! Reference source not found.**.

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

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.

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

The standard deviation of the errors is one measure of the spread of the errors around the 45º line on Figure 8 through **Error! Reference source not found.**. The population standard deviation is used for these calculations.

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

The RMSE is similar to the standard deviation of the error. It also measures the spread of the errors around the 45º line on Figure 8 through **Error! Reference source not found.**, and is calculated as the square root of the average squared errors.

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

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.

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The RMSE for the entire simulation period is 9.4 feet. This is approximately 2.4% of the total range of observed groundwater elevations of 397.7 feet. Table 1 provides a comparison of calibration statistics for both the original 2009 model and the 2018 recalibrated model. The table shows that overall, the 2018 updated and recalibrated model simulates groundwater levels better than the 2009 model.

Table 1: Comparison of 2009 Model Calibration and 2018 Recalibration Statistics

Statistical Measure	**2009 Calibration**	**2018 Recalibration**
Mean Error	2.18	0.65
Mean Absolute Error (MAE)	7.4	5.9
Standard Deviation	12.9	9.4
Root Mean Squared Error (RMSE)	12.9	9.4
Standard Deviation/Range	2.9%	2.4%

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 0.65 feet. This is approximately 0.2% of the range of observed groundwater elevations. These results indicate that the model is in good calibration after the model update and recalibration of the Salinas Valley boundary condition.

A second graph type used to evaluate bias in model results is shown on Figure 9. This figure shows observed groundwater elevations versus model residual (observed elevation minus simulated elevation) for the entire model period. A residual value of zero would indicate the model exactly simulating the observed groundwater elevation. Residual values greater than zero indicate that the model has underestimated observed groundwater levels, and residuals less than zero indicate the model has overestimated the observed groundwater level. Results from a non-biased simulation will appear as a cloud of residual points evenly distributed both above and below 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.

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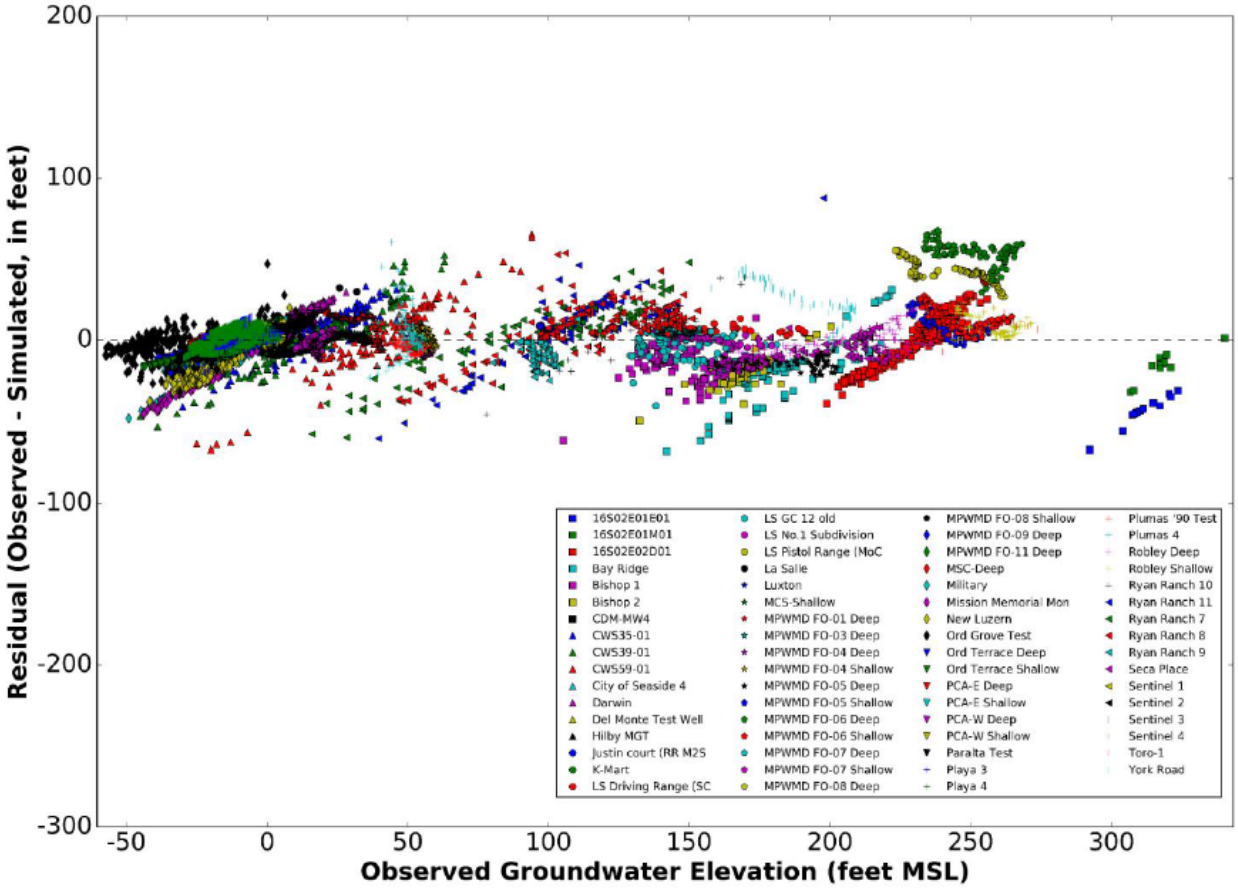

Figure 9: Observed Groundwater Elevations Versus Model Residual - All Data (1987–2013)

The residuals plotted on Figure 9 show that overall the calibrated model is not strongly biased to either overestimating or underestimating observed groundwater levels. There are however, some individual wells that show bias towards overestimation or underestimation, as well as some wells that show trends that may indicate other types of model bias. There are a number of individual well hydrographs in Appendix A with simulated groundwater levels that do not correspond well with observed levels. Generally, these are production wells that are screened in multiple aquifers/model layers, e.g., Northern Coastal Subarea wells: Military, Mission Memorial Monitor (former production well), and City of Seaside 3. Without field spinner (flow) testing to determine how much groundwater each aquifer is contributing to the well, only an estimate of each aquifer's contribution can be simulated by the model. The difference in modeled levels and observed levels can be attributed to this estimate not being correct and/or the model layers in this area requiring refinement. For example, , some production wells, such as City of Seaside 3 and City of Seaside 4, are located in the same model cell, and as such because of the model grid resolution, the model cannot accurately resolve the different groundwater level behavior at both wells.

As there is a mix of well simulated and less well simulated wells in the same area, there is confidence that the model is simulating groundwater levels acceptably in those areas, and that there no locational bias. Monitoring wells such as MSC-Shallow, MSC-Deep, Ord Grove Test, Del Monte Test, show much better correlation between simulated and observed groundwater levels. These wells are screened in a single aquifer/model layer which provides much more certainty in assigning it to a model layer.

Many modelers show just the best simulated vs. observed well hydrographs to show the accuracy of their model. Our philosophy is to show all hydrographs so that it is clear that some wells are less well calibrated than others. It is impossible to simulate every well accurately, and thus the statistical measures described above have ranges of statistics that are considered acceptable. Statistical ranges such as the RMSE should be less than 10% of the total head range in the model, and the absolute value of the mean error should be less than 5% of the total head range in the model acknowledge that some wells will be less well calibrated than others.

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Conclusions

1. Simulated groundwater levels are sensitive to the specified heads along the northeastern boundary with the Salinas Valley. The behavior of the boundary was found to impact the calibration of areas of the model at some distance from the boundary. It was found that in the absence of the most recent Salinas Valley Integrated Hydraulic Model (SVIHM), currently being developed by the USGS, assigning boundary head elevations that match the general observed average groundwater levels along the boundary is more important than capturing smaller scale seasonal fluctuations along the boundary. It is recommended that when the SVIHM has been completed, an assessment of how well it simulates historical groundwater conditions in the Seaside Basin be conducted. If it is concluded that the new data improves simulation of groundwater level in the Seaside Basin, the boundary condition can be revised using parts of the SVIHM that improve model calibration of the Seaside Basin model.

2. The model recalibration improved calibration statistics over the original 2009 model calibration. As a result, simulated groundwater levels throughout the model, as a whole, better match observed groundwater levels.

3. 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.

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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 LLC. 2009a. *Basin Management Action Plan. Seaside Groundwater Basin, Monterey County, California*, prepared for Seaside Groundwater Basin Watermaster. February.

HydroMetrics LLC. 2009b. *Seaside Groundwater Basin Modeling and Protective Groundwater Elevations*, prepared for Seaside Groundwater Basin Watermaster. November.

HydroMetrics WRI. 2010. *Technical Memorandum – Model Scenario 2 – Final EIR Regional Project,* for Seaside Groundwater Basin Technical Advisory Committee. March 23.

HydroMetrics WRI. 2014. *Technical Memorandum – 2014 Seaside Groundwater Model Update*, prepared for Seaside Groundwater Basin Watermaster. July 31.

Montgomery Watson, 1997. *Salinas Valley Integrated Ground Water and Surface Model Update - Final Report*, prepared for Monterey County Water Resources Agency. May 1997.

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APPENDIX A: HYDROGRAPHS

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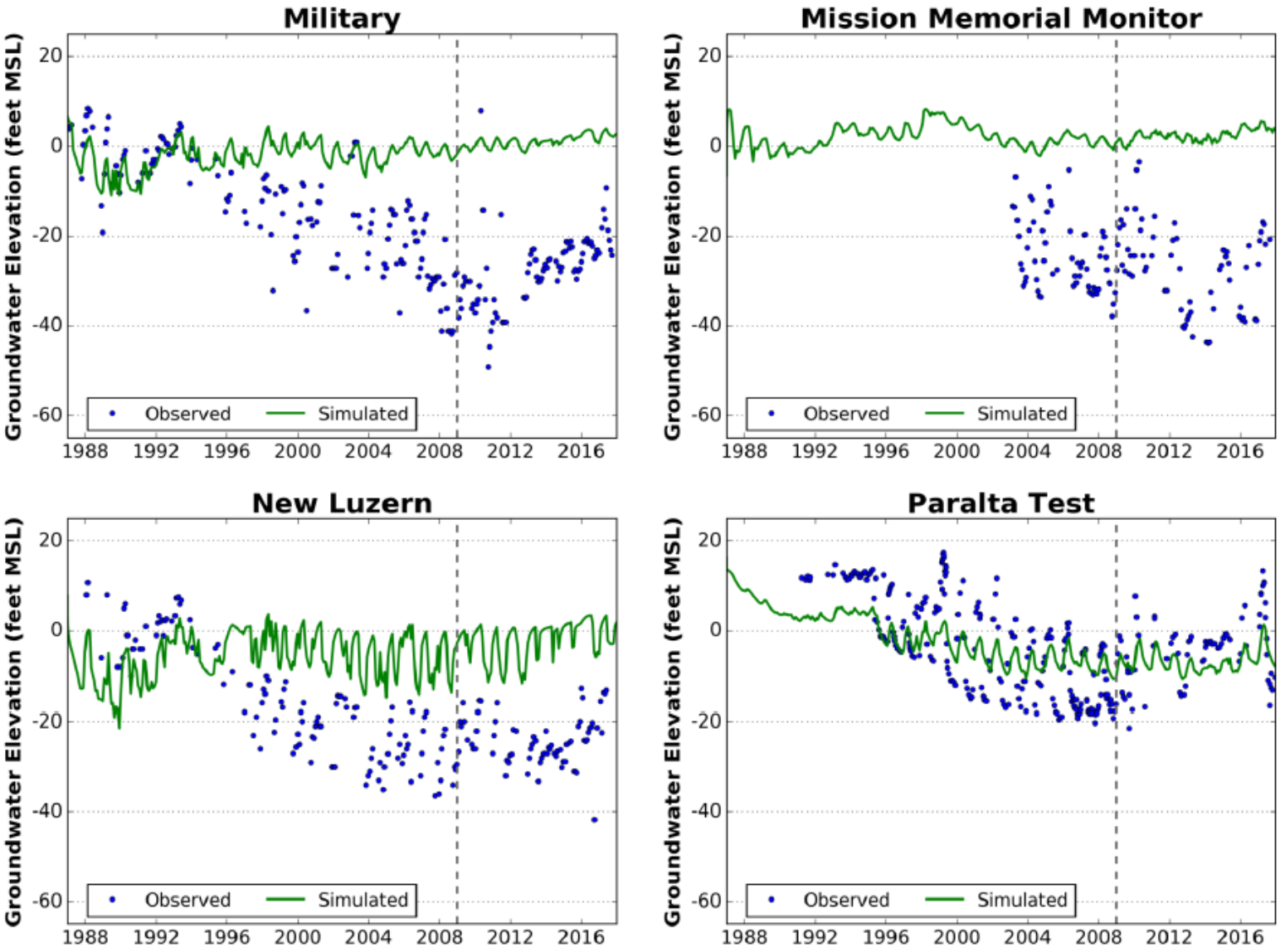


Figure A1: Northern Coastal Subarea Hydrographs

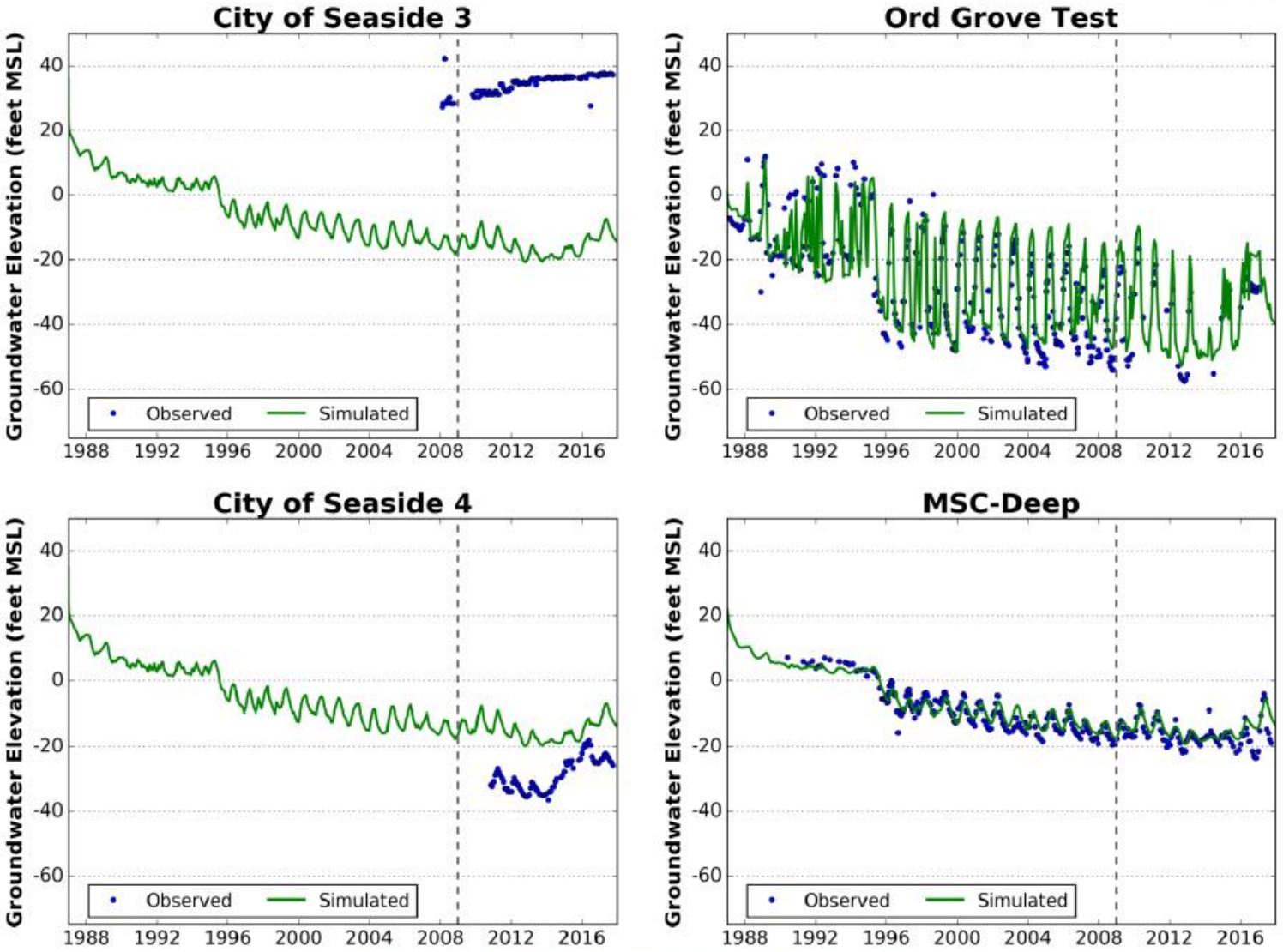


Figure A2: Northern Coastal Subarea Hydrographs

HydroMetrics Water Resources Inc. • 1814 Franklin Street, Suite 501 • Oakland, CA 94612
(510) 903-0458 • (510) 903-0468 (fax)

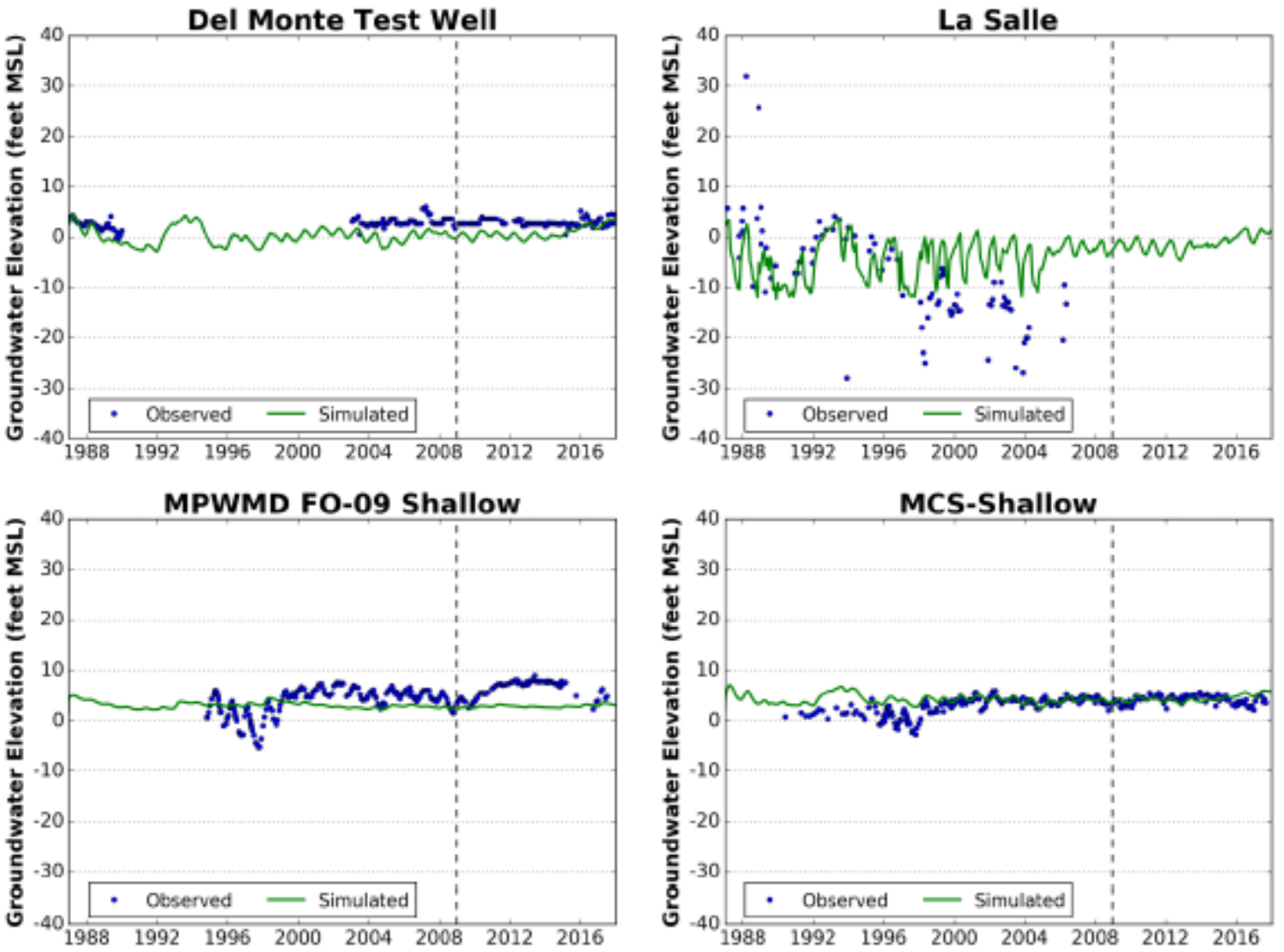


Figure A3: Northern Coastal Subarea Hydrographs

HydroMetrics Water Resources Inc. • 1814 Franklin Street, Suite 501 • Oakland, CA 94612
(510) 903-0458 • (510) 903-0468 (fax)

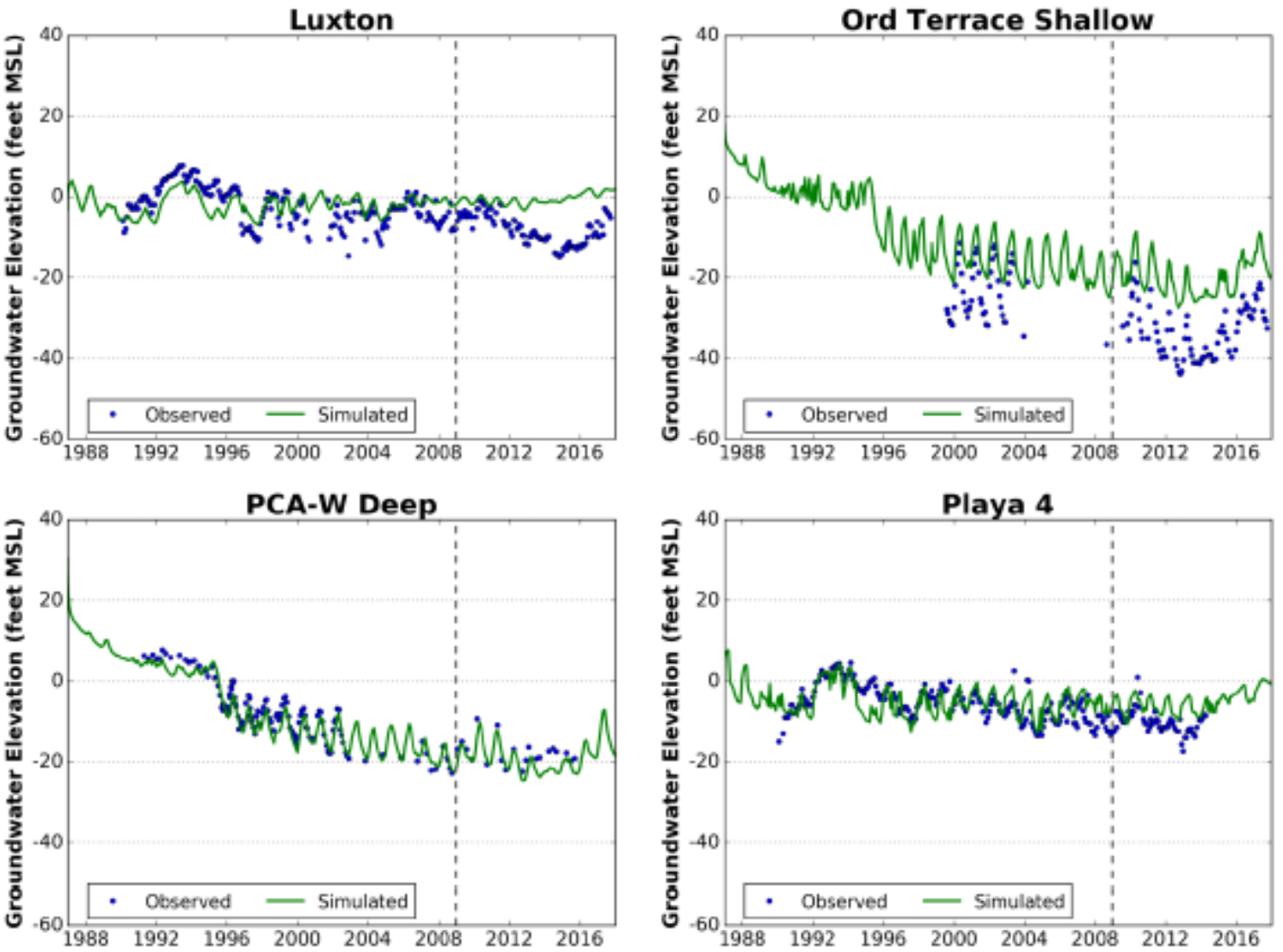
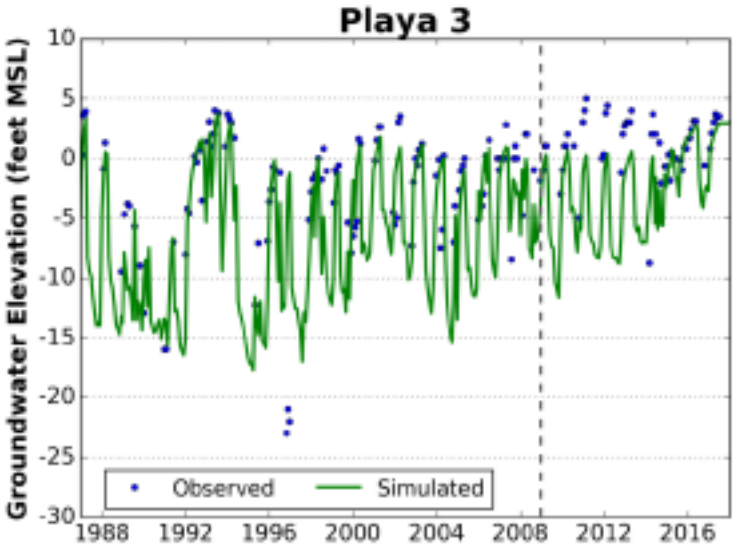
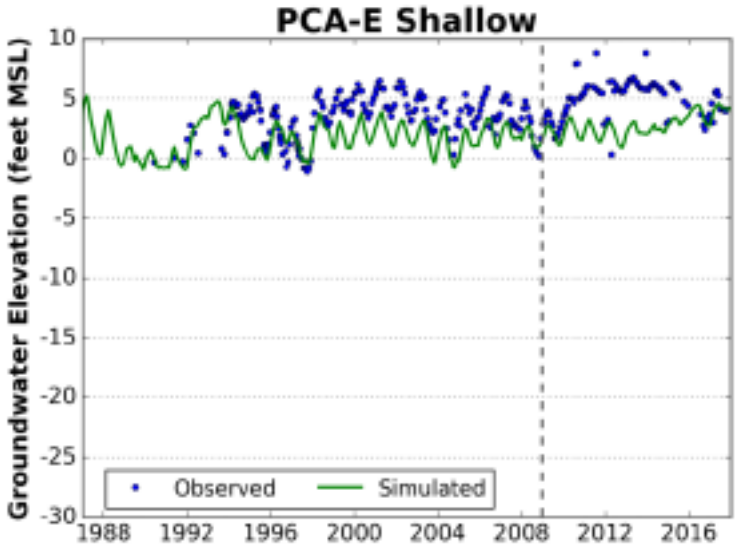


Figure A4: Northern Coastal Subarea Hydrographs





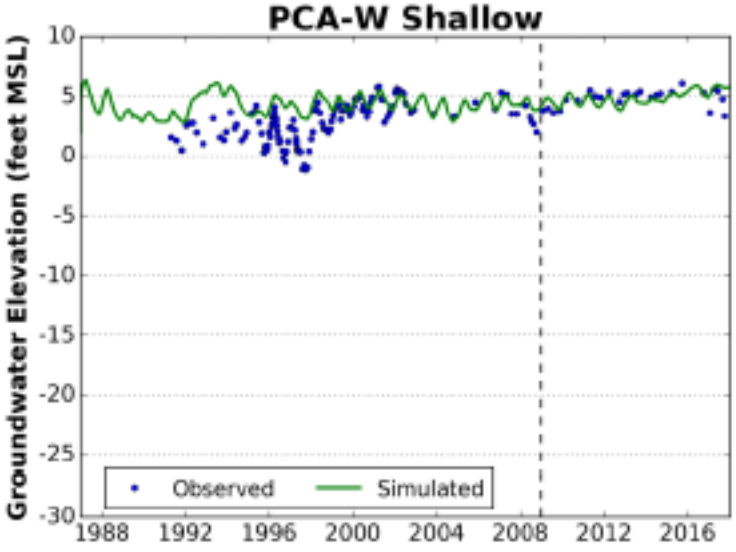


Figure A5: Northern Coastal Subarea Hydrographs

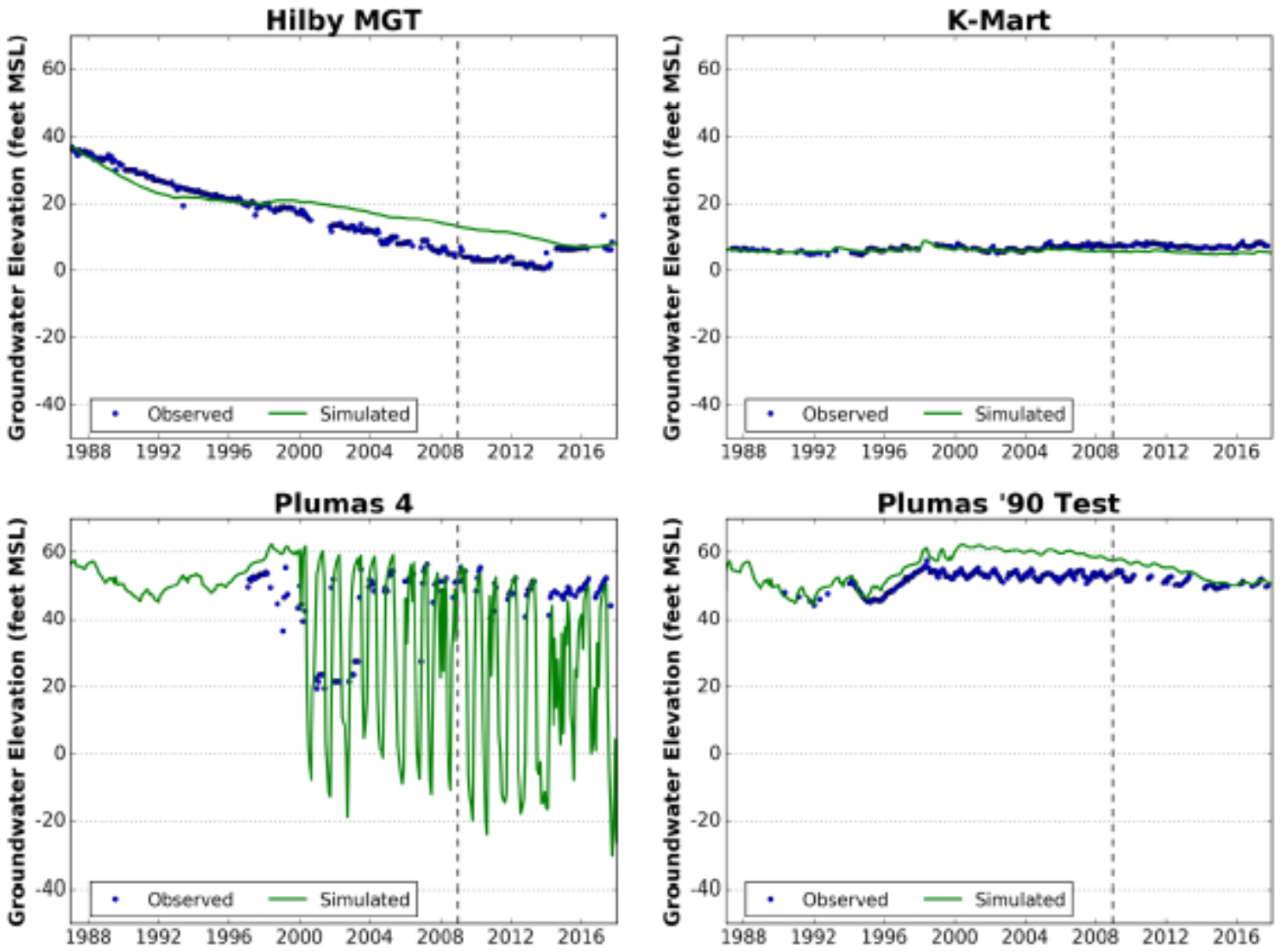


Figure A6: Southern Coastal Subarea Hydrographs

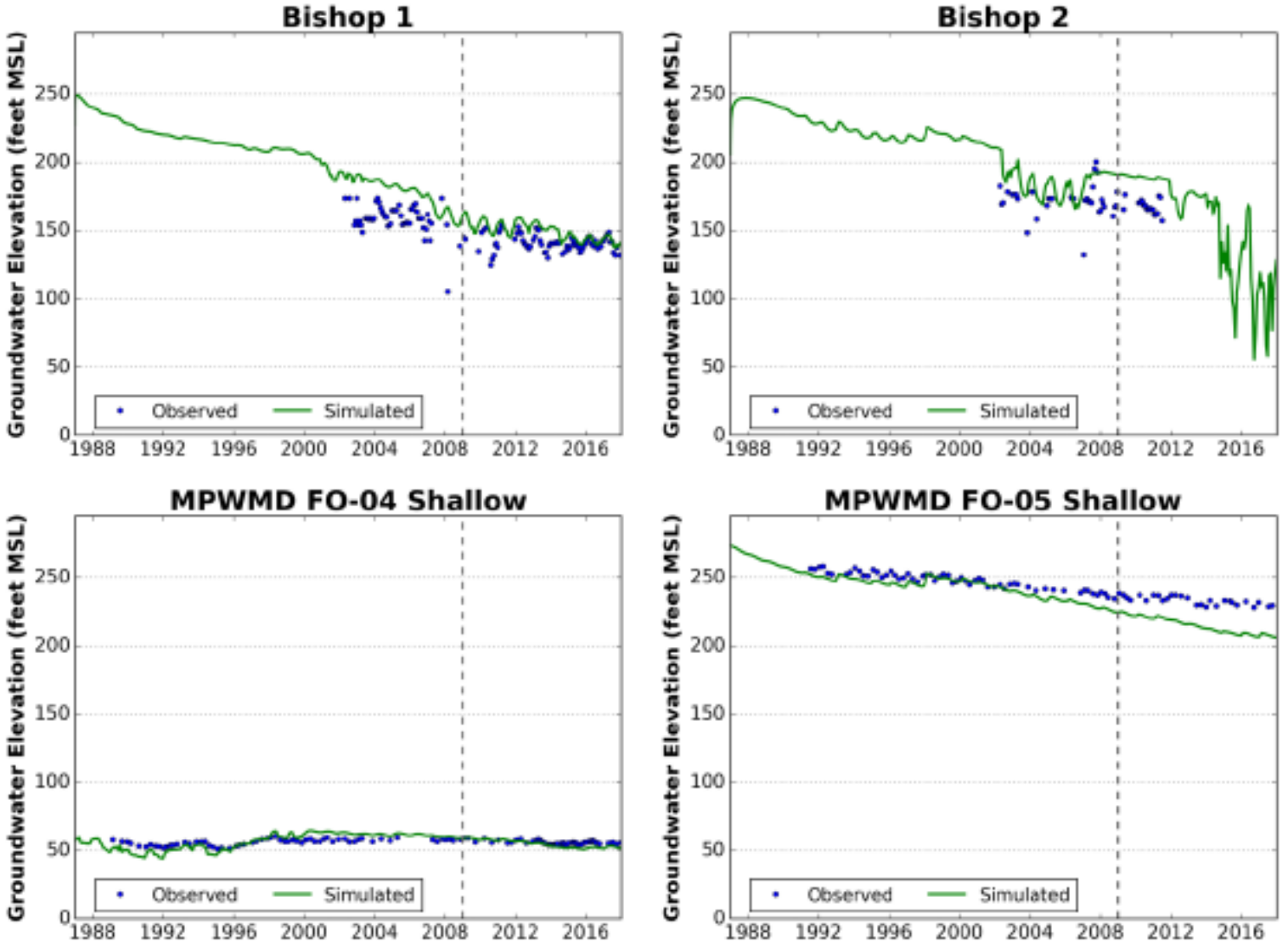


Figure A7: Southern Coastal Subarea Hydrographs

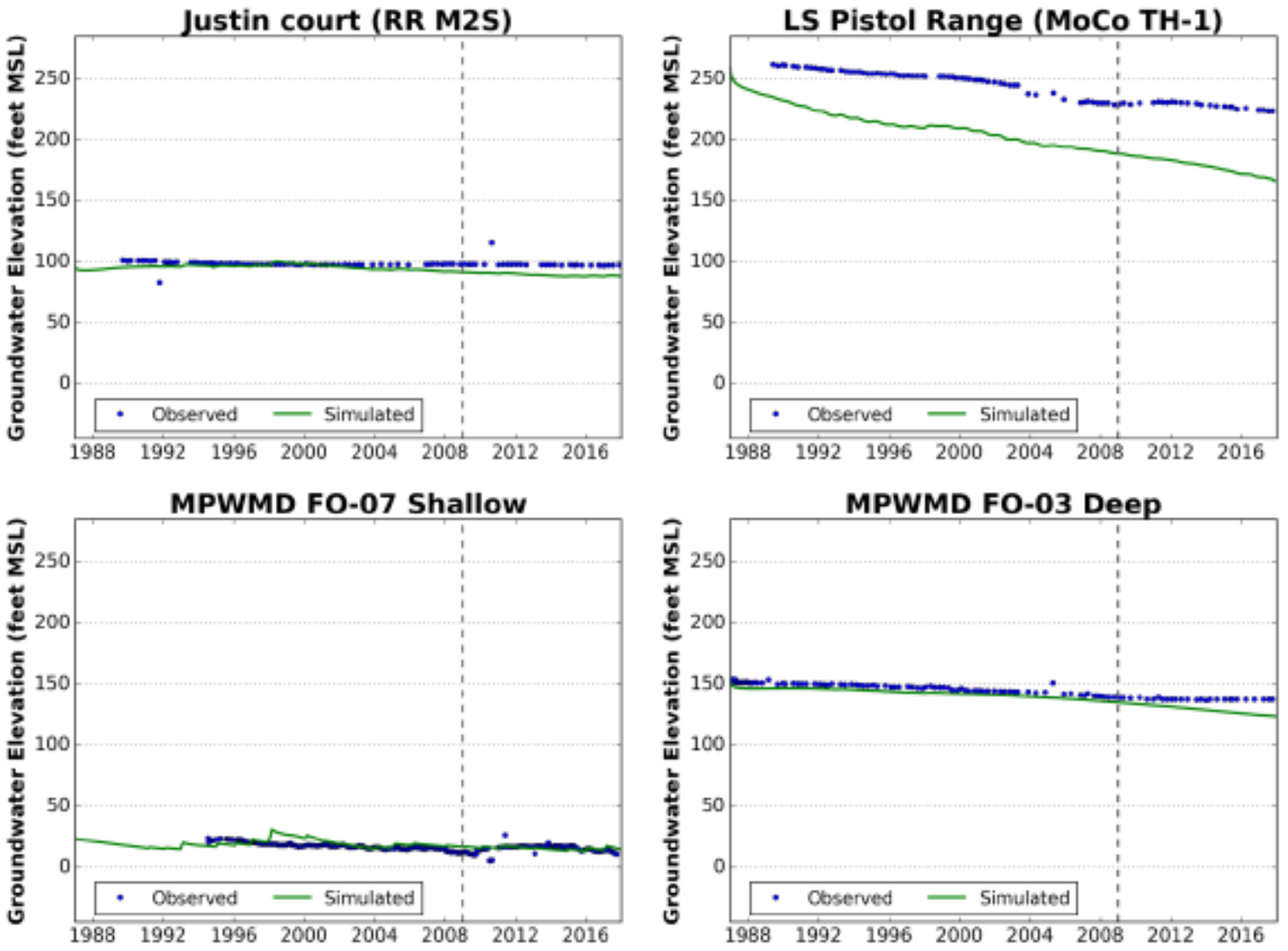


Figure A8: Laguna Seca Subarea Hydrographs

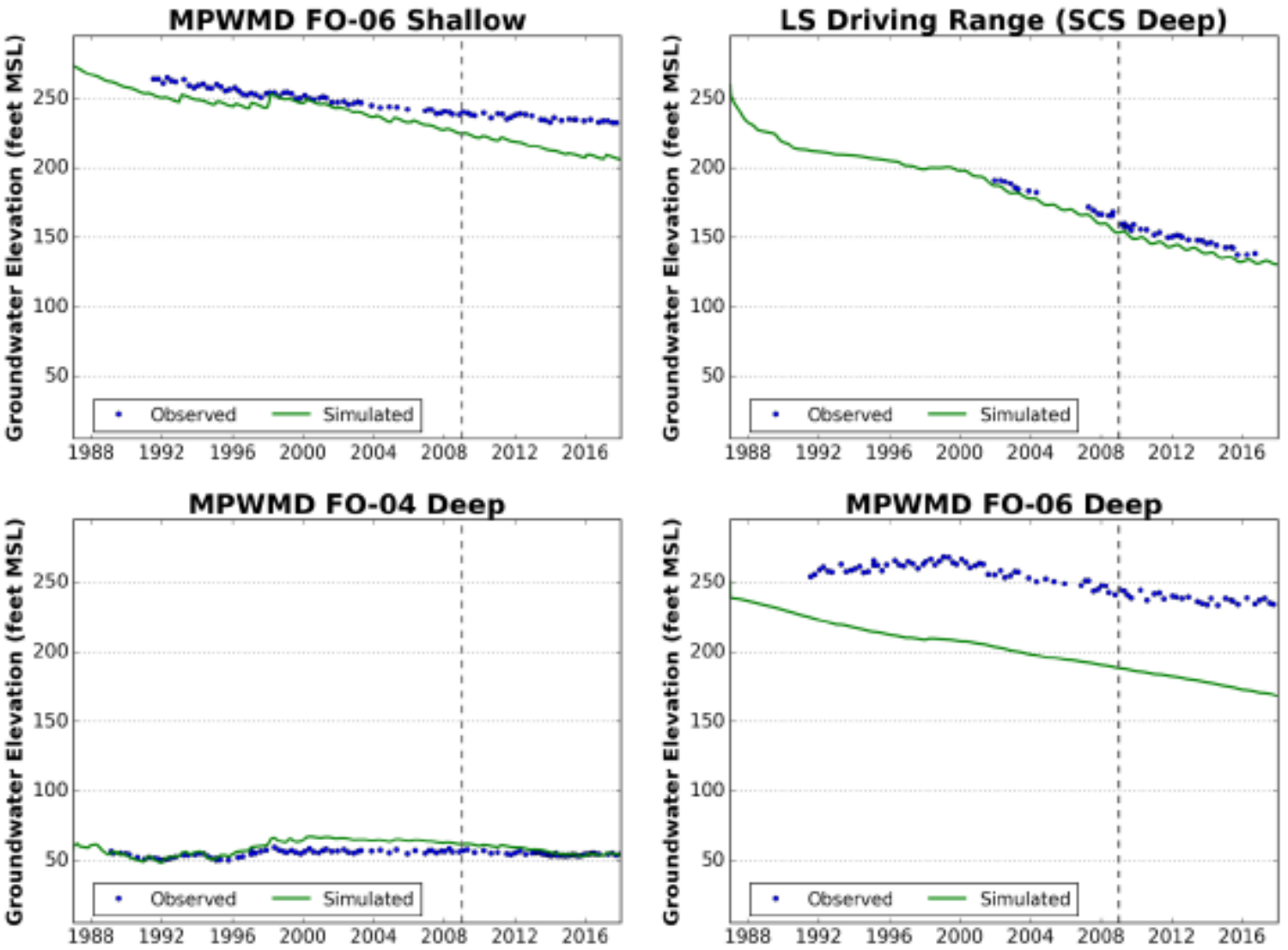


Figure A9: Laguna Seca Subarea Hydrographs

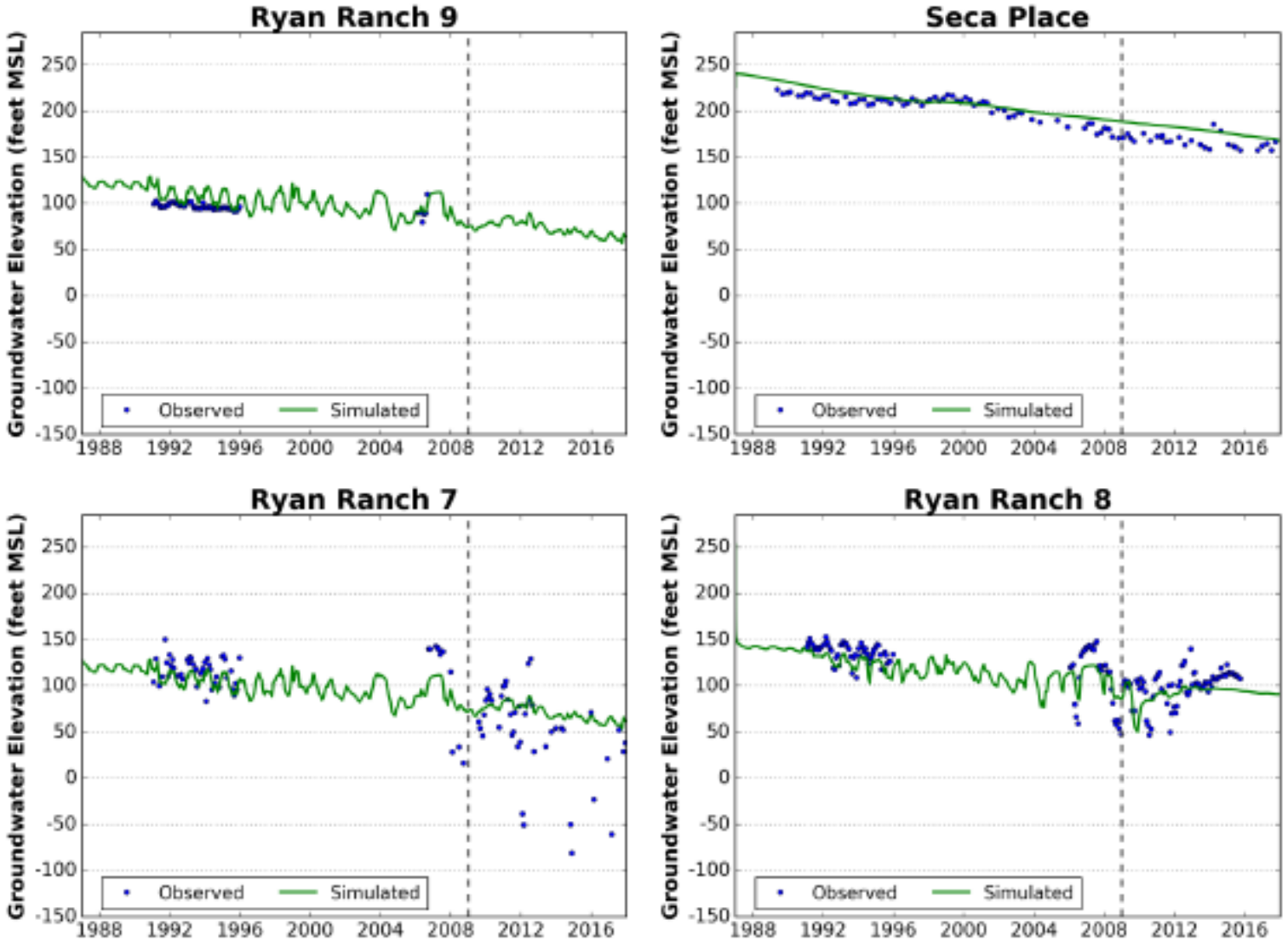


Figure A10: Laguna Seca Subarea Hydrographs

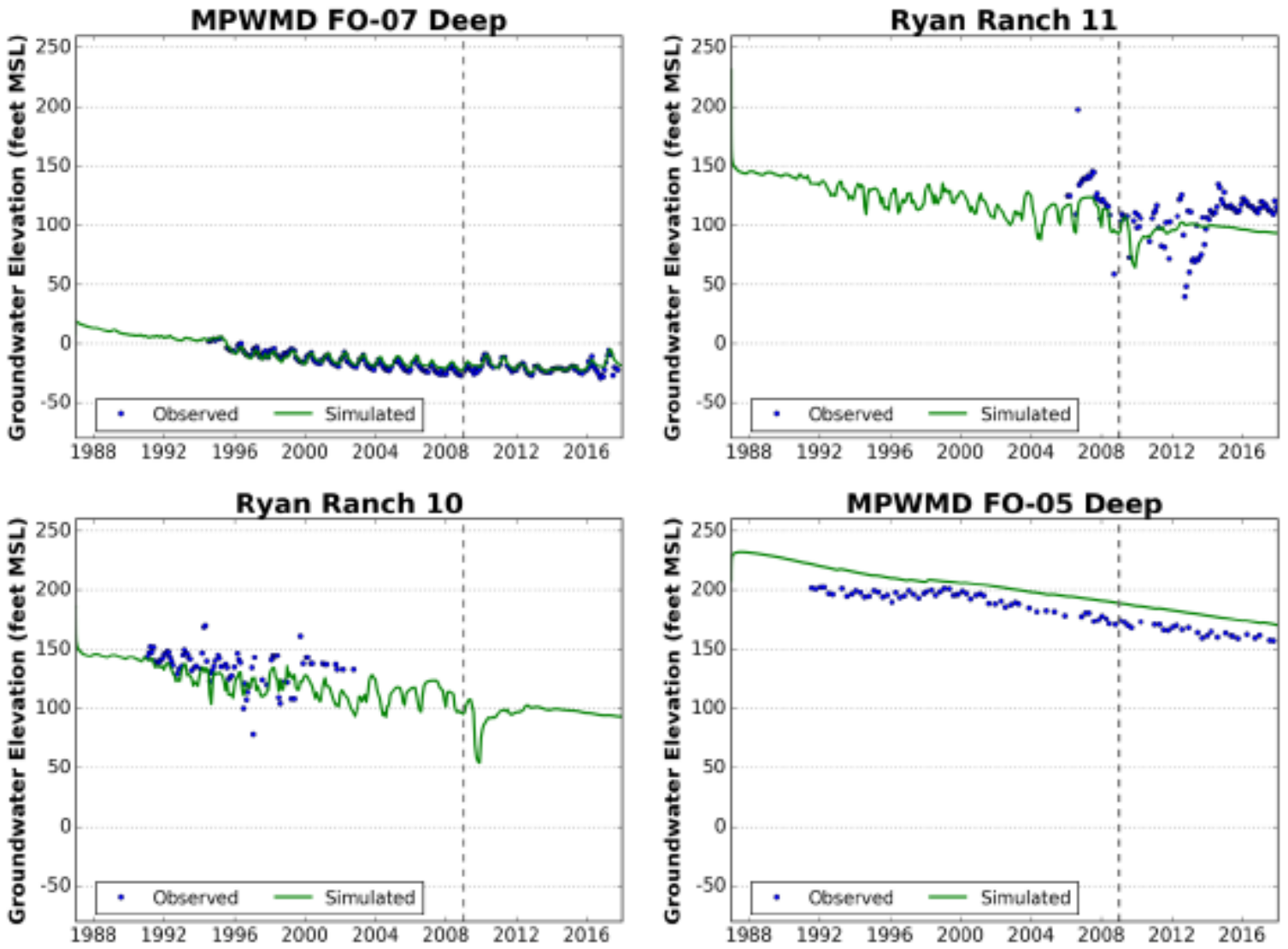


Figure A11: Laguna Seca Subarea Hydrographs

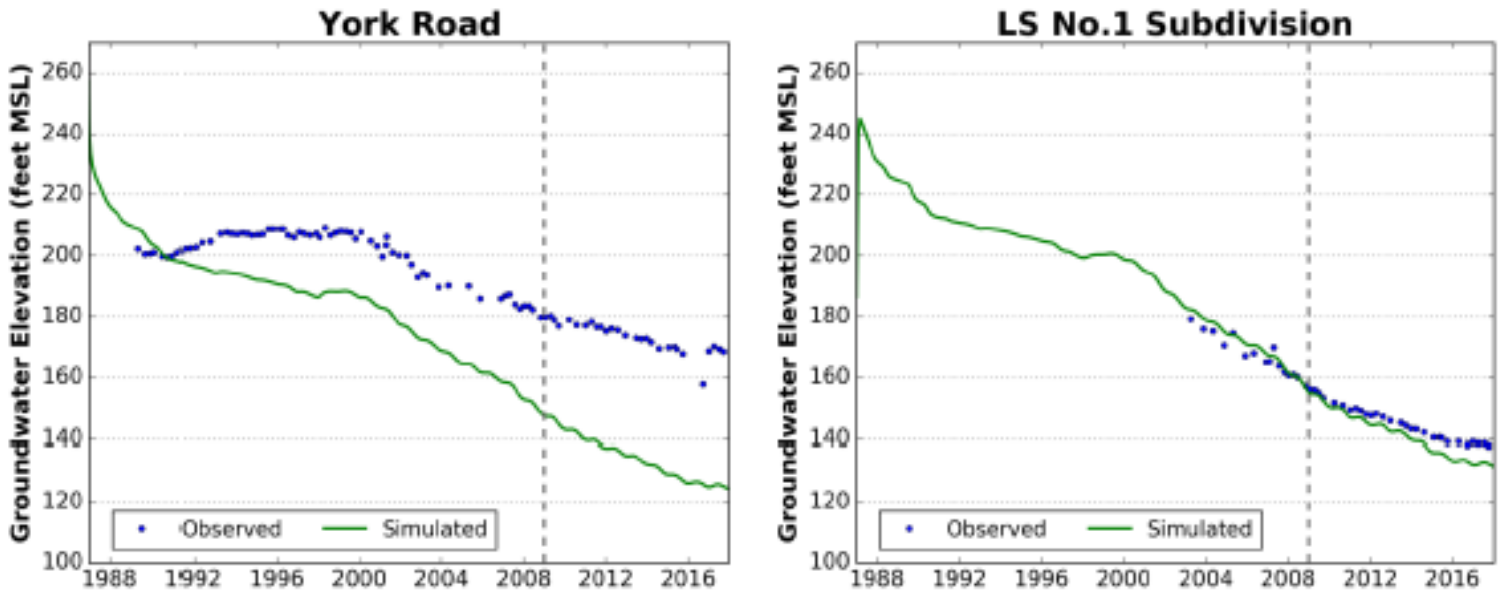


Figure A12: Laguna Seca Subarea Hydrographs

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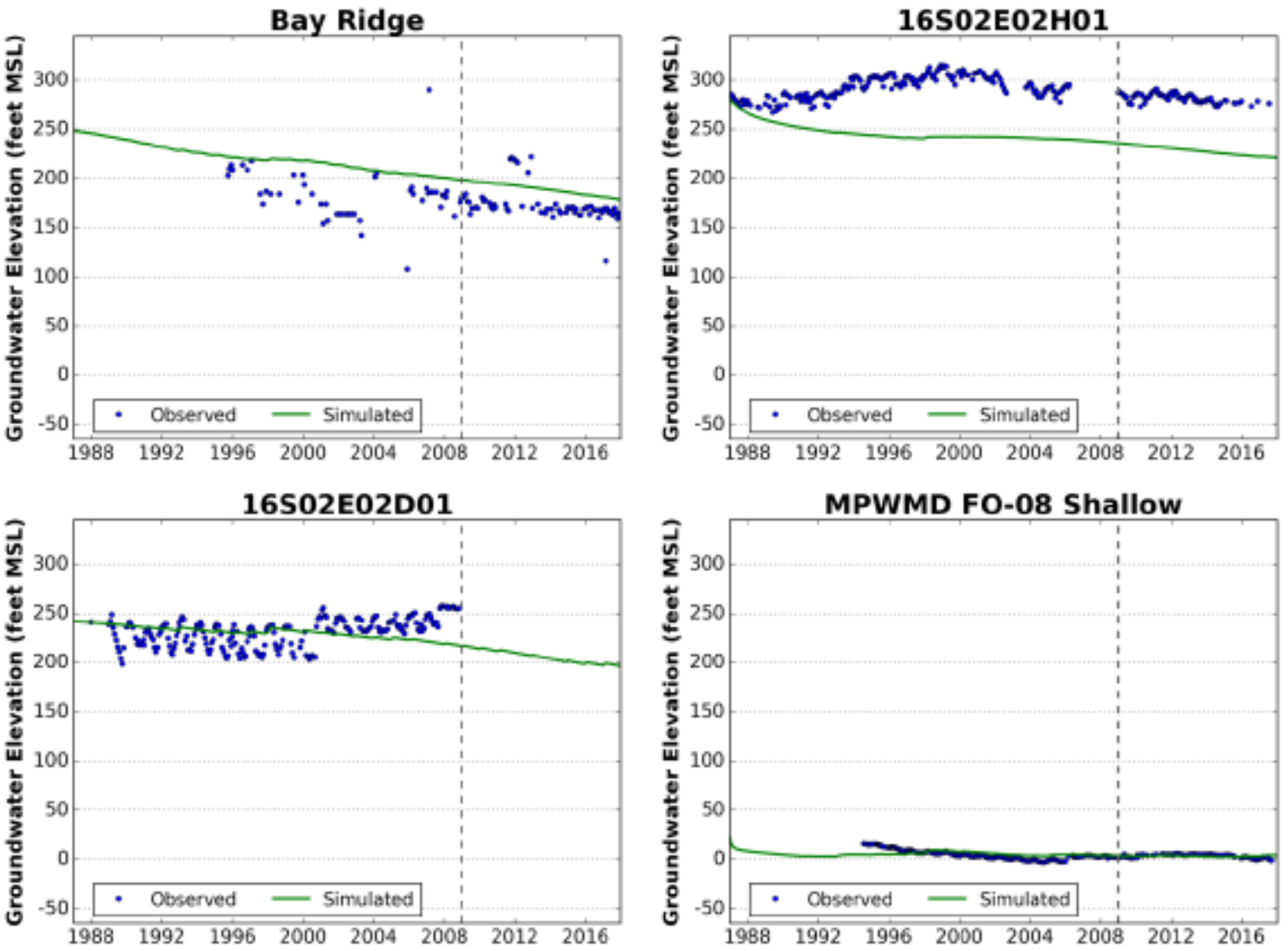


Figure A13: Hydrographs from Wells Outside of the Seaside Groundwater Basin

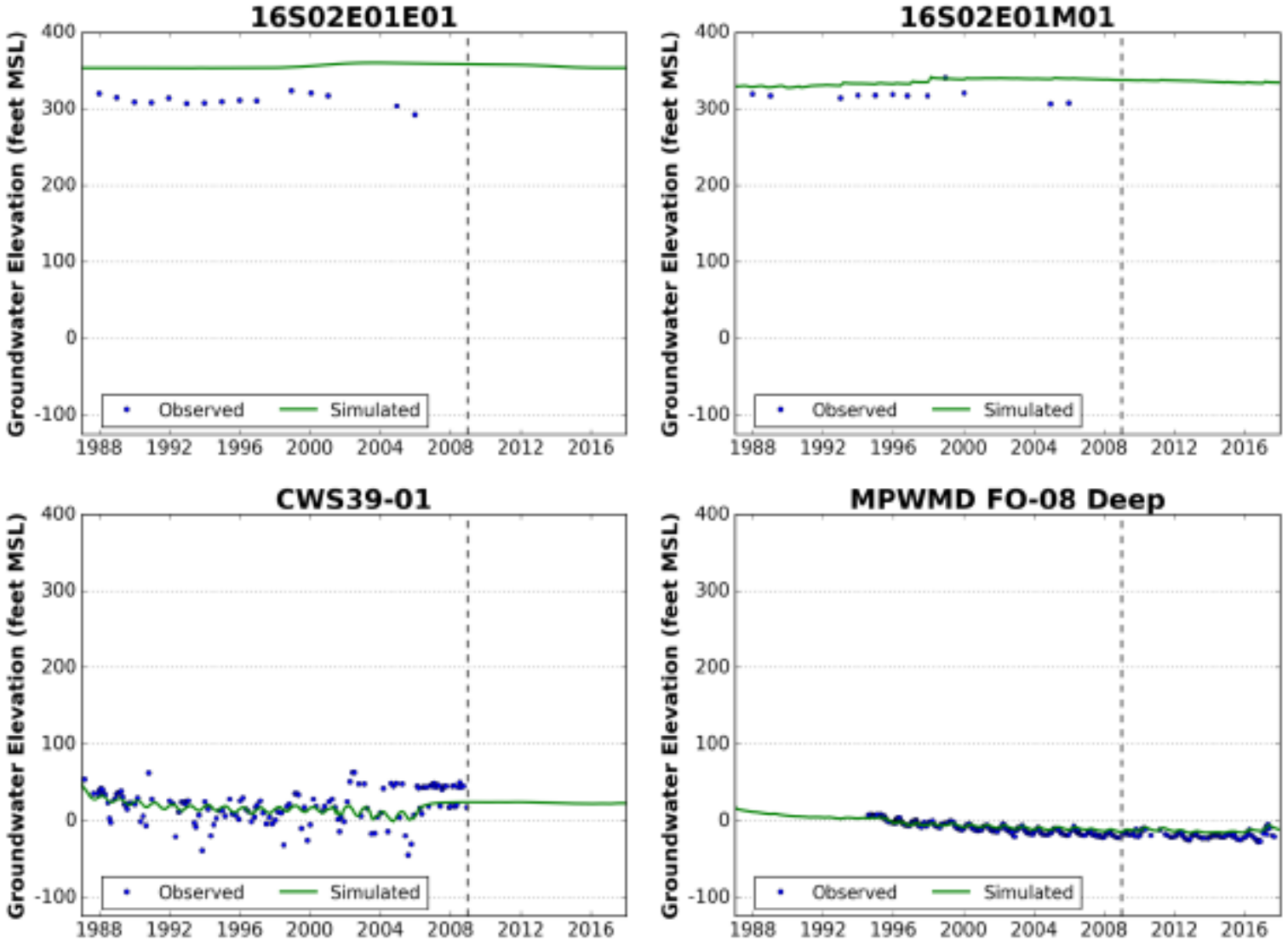


Figure A14: Hydrographs from Wells Outside of the Seaside Groundwater Basin

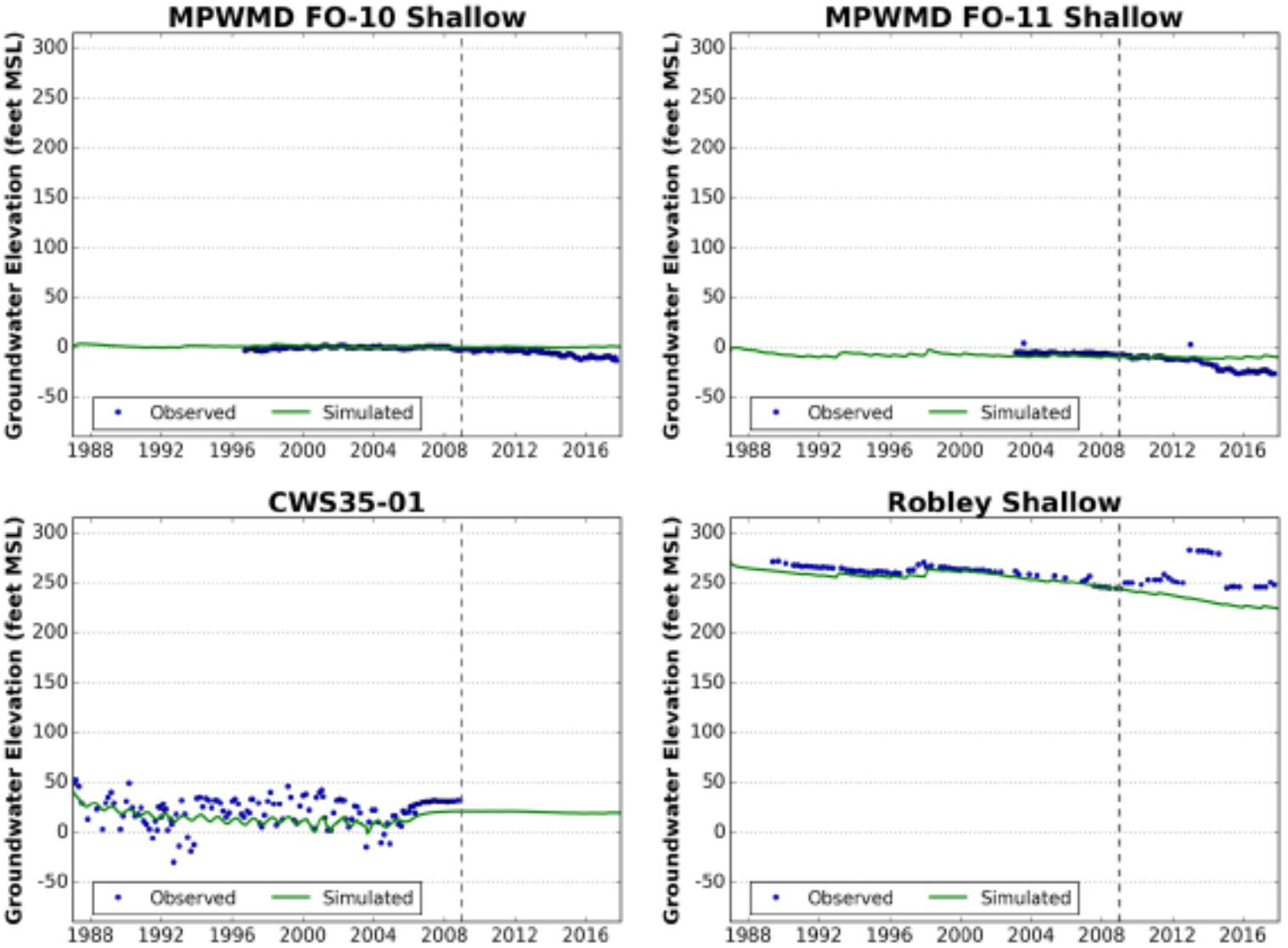
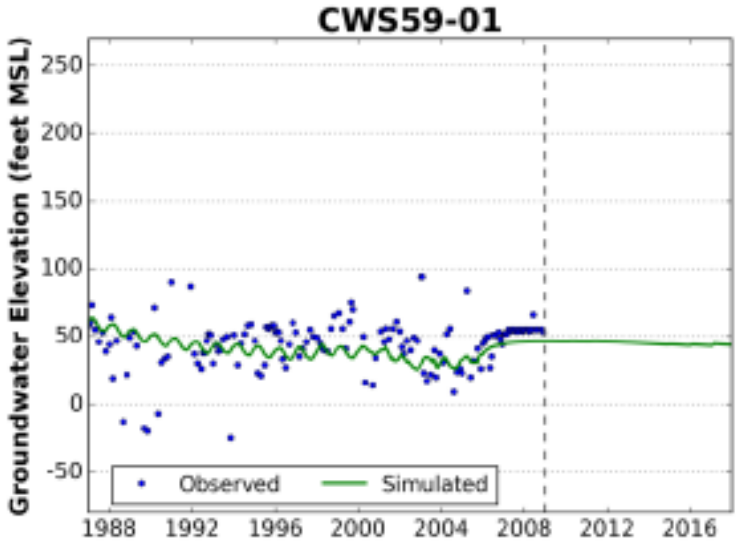
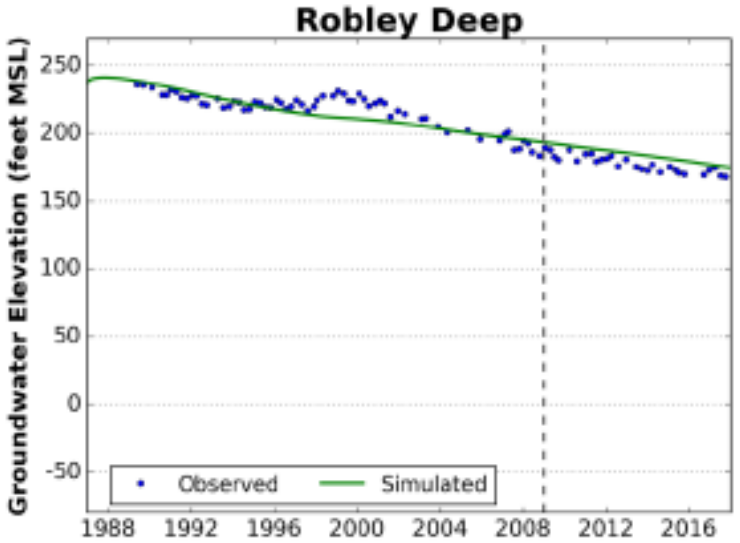


Figure A15: Hydrographs from Wells Outside of the Seaside Groundwater Basin





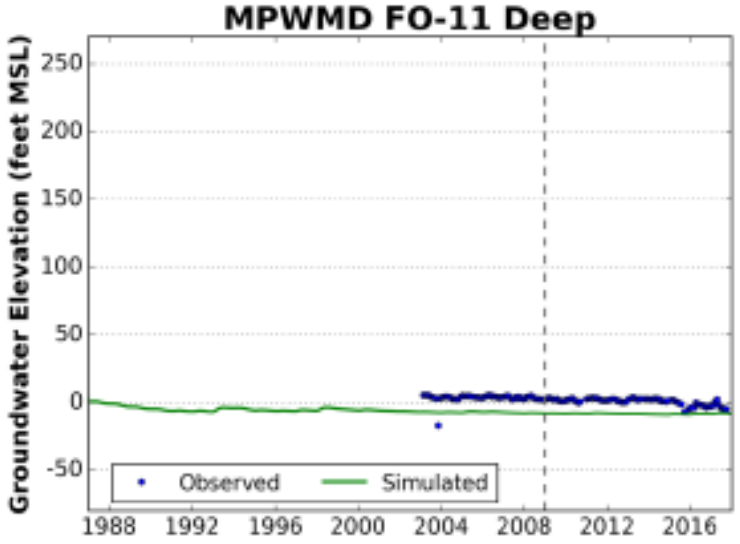


Figure A16: Hydrographs from Wells Outside of the Seaside Groundwater Basin

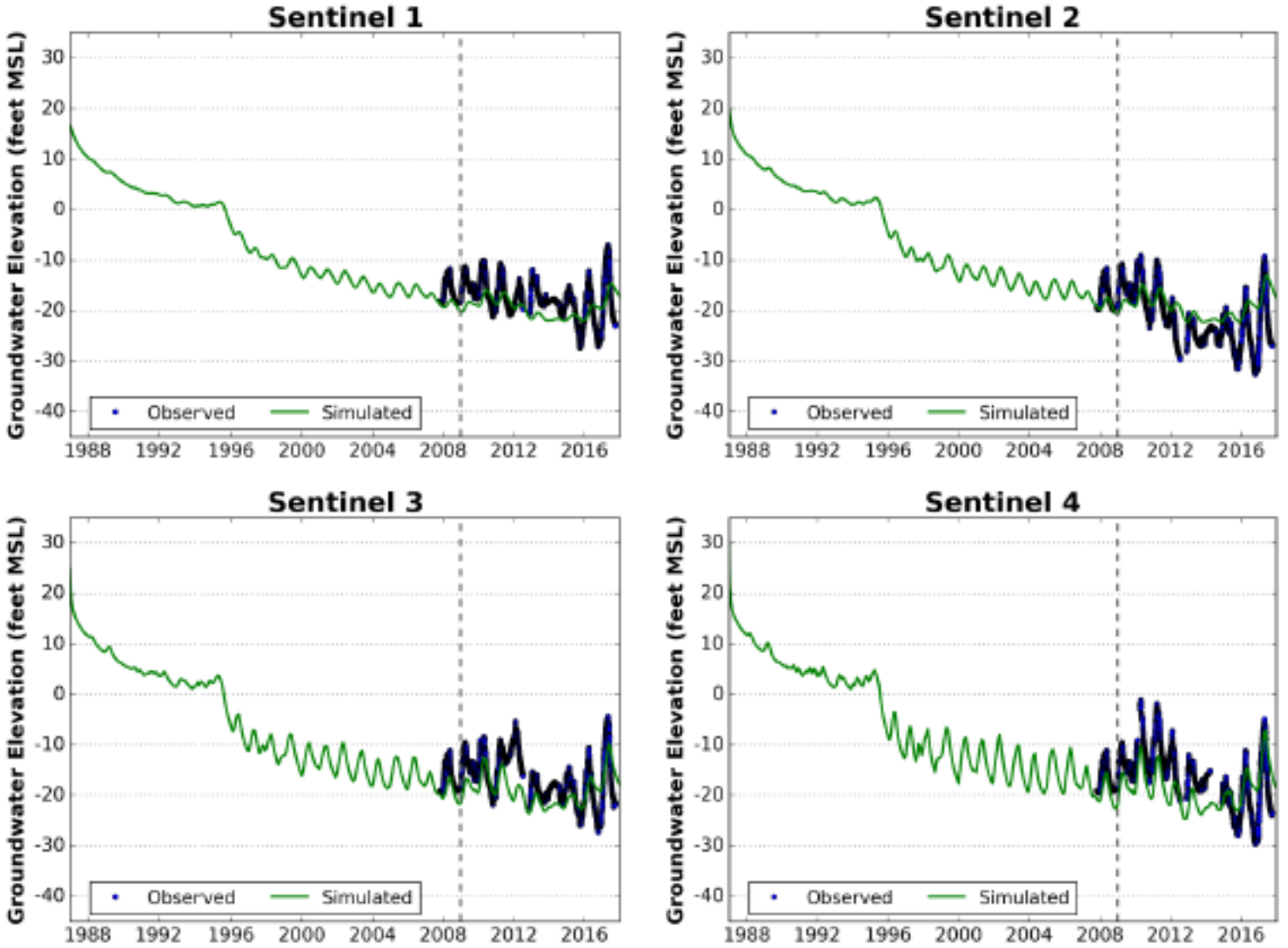


Figure A17: Hydrographs for Sentinel Wells

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	5
AGENDA TITLE:	RFS to HydroMetrics WRI to Update the Seaside Groundwater Basin Basin Management Action Plan
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

In the approved Monitoring and Management Program (M&MP) for 2018, and in its associated approved budget, there is a task to update the Basin Management Action Plan (BMAP).

Attached is RFS No. 2018-04 to HydroMetrics to perform that work. The Scope of Work and cost in the RFS were taken directly from the scope and cost proposal the TAC reviewed at its August 9, 2017 meeting. At that same meeting the TAC recommended going ahead with updating the BMAP.

ATTACHMENTS:	HydroMetrics RFS No. 2018-04 to update the Basin Management Action Plan
RECOMMENDED ACTION:	Approve or edit the RFS

SEASIDE BASIN WATERMASTER
REQUEST FOR SERVICE

DATE: _____ **RFS NO.** 2018-04
(To be filled in by WATERMASTER)

TO: Derrik Williams
HydroMetrics WRI
PROFESSIONAL

FROM: Robert Jaques
WATERMASTER

Services Needed and Purpose: Update the Seaside Groundwater Basin Basin Management Action Plan. This work will be comprised of Task 2 (including all Subtasks under Task 2) as described in the Scope of Work in Attachment 1.

Completion Date: All work of this RFS shall be completed not later than November 30, 2018, and shall be performed in accordance with the Schedule described in Attachment 1.

Method of Compensation: Time and Materials (As defined in Section V of Agreement.)

Total Price Authorized by this RFS: $ 45,260.00 (Cost is authorized only when evidenced by signature below.) (See Table 1 in Attachment 1 for Detailed Breakdown of Estimated Costs for Task 2).

Total Price may not be exceeded without prior written authorization by WATERMASTER in accordance with Section V. COMPENSATION.

Requested by: _____ Date: _____.
WATERMASTER Technical Program Manager

Agreed to by: _____ Date: _____.
PROFESSIONAL

ATTACHMENT 1

1814 Franklin St., Suite 501
Oakland, CA 94612

Mr. Robert S. Jaques
Seaside Groundwater Basin Watermaster
83 Via Encanto
Monterey, CA 93940

August 4, 2017

Subject: Revised Scope and Cost to Update the Seaside Basin Management Action Plan

Mr. Jaques:

Thank you for the opportunity to provide you with this scope and cost to update the Seaside Groundwater Basin's Basin Management Action Plan (BMAP). The scope we have put together addresses the BMAP items that were presented at the February 2017 Technical Advisory Committee meeting, and includes some of the recommendations made by Gus Yates of Todd Groundwater.

The Watermaster's first BMAP was completed in February 2009 (HydroMetrics LLC, 2009a). The BMAP constitutes the basic plan for managing the Seaside Groundwater Basin. The BMAP identifies both short-term actions and long-term strategies intended to protect the groundwater resource while maximizing the beneficial use of groundwater in the basin. It provides the Watermaster a logical set of actions that can be undertaken to manage the basin to its Safe Yield. Over the eight years since the BMAP was completed, the Watermaster has collected much groundwater level and quality data, and conducted various studies to improve the understanding of the basin. This improved understanding should be incorporated into an updated BMAP to facilitate ongoing responsible management of the groundwater resource.

At the time the 2009 BMAP was prepared, a groundwater model had not yet been developed for the basin, and the analysis contained in the BMAP was completed using analytical methods. Following the BMAP recommendation that a groundwater model be

constructed to assist with groundwater management decisions, a calibrated model was completed in November 2009 (HydroMetrics LLC, 2009b). The model simulated groundwater conditions in the basin between January 1987 and December 2008. In 2014, the model was updated with data through September 2013 (HydroMetrics WRI, 2014) but not recalibrated because its accuracy was still acceptable. The 2014 update found that the uncalibrated portion of the model (January 2009 – September 2013) tended to simulate higher groundwater levels than measured levels. Periodic recalibration of the model is necessary to ensure the model simulates groundwater levels within an acceptable industry standard accuracy. If simulated groundwater levels are not accurate this reduces the accuracy of all output from the model such as groundwater storage and water budget.

The scope of work provided below assumes the model will be used to develop estimates of groundwater storage, water budget, and safe yield; and to test impacts of potential management actions. The groundwater model was developed to assist in making basin management decisions, and for providing the simulated results that are required for analysis in the BMAP. As the model currently only includes input data through September 2013, groundwater storage, water budget, and safe yield estimates can only reliably be obtained from the model up through Water Year 2013. The model needs to be updated through Water Year 2016 to be used for current estimates. It is likely recalibration of the model will be required so that it more accurately simulates the historic low groundwater levels currently occurring in the basin.

The scope outlined below starts with an update and recalibration of the groundwater model, and then generally updates each of the main sections of the BMAP.

Task 1: Update Seaside Basin Groundwater Flow Model.

Subtask 1.1. Update Model Input Data.

Groundwater production, groundwater levels, injected water, and precipitation data will be sourced and compiled for input into the groundwater model. In addition to precipitation, estimates of storm water percolation, septic tank leakage, and system losses are also needed as they all contribute to the recharge of the basin. Most data are already available from MPWMD or Watermaster, but some other pumpers such as Cal Water Service and Marina Coast Water District, which do not fall under the Watermaster will be contacted for their data.

The updated model input data will be incorporated into the groundwater model. Once the model has been updated and is successfully running, hydrographs comparing measured and simulated groundwater levels will be prepared. The hydrographs produced will be the same ones used in the 2009 model report.

Subtask 1.2. Model Recalibration.

Model calibration is a process that involves varying relatively uncertain and sensitive parameters such as horizontal and vertical hydraulic conductivities, over a reasonable range of values. Per Mr. Yates's recommendation, we will jointly calibrate recharge and aquifer parameters. This is a change from our previous calibration approach of only calibrating aquifer parameters. Calibration will be completed when simulated results match the measured data within an acceptable measure of accuracy, and when successive calibration attempts do not notably improve the calibration statistics. Parameter Estimation (PEST) software will be used as a tool to improve calibration.

Estimating the effort involved in model calibration is difficult because there is no defined set of steps that can be followed. The costs provided with this scope reflect our best estimate, but additional costs may be necessary to complete calibration successfully.

Subtask 1.3. Model Update Technical Memorandum.

A Draft Technical Memorandum will be prepared documenting the model update and calibration results. After presenting the Tech Memo to the TAC and receiving comments, a Final Tech Memo will be prepared for submission to the Board. For purposes of the cost estimate, we have assumed HydroMetrics WRI will present the findings to the TAC and to the Board. One presentation will be in-person and one will be by telephone.

Task 2: Update BMAP Section 2 - State of the Seaside Groundwater Basin.

Subtask 2.1. Update Basin Conceptual Model. Since the 2009 BMAP was completed, a significant amount of modeling has been undertaken that has assisted in improving our hydrogeologic understanding of the basin. Additionally, a few new wells have been drilled that may improve our understanding of basin geometry. Below is a list of recent developments that will be used to update our conceptual understanding of the basin:

- Modeling work we completed related to the locations of flow divides in the eastern part of the Laguna Seca subarea and how pumping outside of the basin affects groundwater within the basin.
- The concept of the Laguna Seca Anticline as only a partial barrier to groundwater flow is relatively recent. We will present data and implications related to that reconceptualization.
- New wells, such as the Pure Water Monterey ASR wells and the MPWMD ASR wells, may provide new data related to aquifer depths and bottom of the basin that could improve the conceptual understanding of the basin.
- Groundwater levels collected over the past eight years may provide an undated definition of the basin's northeastern flow-divide boundary.

Subtask 2.2. Analyze Groundwater Levels Trends. Since 2009, eight years of groundwater level data have been collected, some of it using data loggers that record groundwater levels multiple times a day. This has allowed us to vastly improve our understanding of both seasonal and long-term trends. The basin has also experienced a recent drought and Court-mandated pumping reductions. How groundwater levels have responded to these changes has also improved our understanding of the basin. Furthermore, protective groundwater elevations developed after the 2009 BMAP should be included and discussed in an updated BMAP.

Subtask 2.3. Update Estimates of Groundwater Storage. The updated BMAP will include updates of estimated total stored groundwater, usable storage space, and total useable storage space. The Watermaster is required under the Decision to recalculate Total Usable Storage Space and adjust the allocation as needed.

The groundwater model and protective groundwater elevations should be used to quantify these storage estimates for the Seaside Basin. The 2009 BMAP did not have the benefit of site specific protective elevations and thus used Ghyben-Herzberg generated elevations. This updated BMAP will instead use protective elevations developed using groundwater models that estimate onshore groundwater elevations that keeps the productive onshore aquifers fresh (HydroMetrics LLC, 2009b).

Subtask 2.4. Update Groundwater Budget. A long-term and current groundwater budget will be developed to enhance our understanding of the groundwater system, and how the basin has responded during the recent drought. Similar to Subtask 2.3, the groundwater budget can be readily generated from groundwater model output. However, the groundwater model needs to be updated through September 2016 and recalibrated for it be used reliably to evaluate the current and historical water budget.

Subtask 2.5. Review Natural Safe Yield Estimates. The State of California has experienced a recent drought which has impacted natural aquifer recharge more than was anticipated in the 2009 BMAP. Also, even though pumping in recent years has been below the amounts required under the Decision, groundwater levels have continued to fall. This suggests that the Natural Safe Yield of 3,000 AFY in the Decision may be too high.

The reevaluated Safe Yield will be compared against other Safe Yield estimates that were included in the 2009 BMAP. If appropriate, a revised Safe Yield to replace the Decision-established Natural Safe Yield of 3,000 AFY will be provided for basin management purposes.

Task 3: Update Section 3 – Supplemental Water Supplies.
This section will be primarily completed by Watermaster staff, and will be edited and integrated into the BMAP update by HydroMetrics WRI. Watermaster staff will update the old BMAP Section 3 with current information on projects being considered to meet the long-term water needs in the Seaside Basin. Included will be MRWPCA's Pure Water Monterey groundwater replenishment project and Cal Am's Monterey Peninsula Water Supply Project (MPWSP). Recent Environmental Impact Reports will be used to update the information. If any other projects are in early planning stage, they will also be included in the update.

In the revised cost estimate (Table 1), the number of hours has been reduced from our previous cost estimate in March to reflect that Watermaster staff will be responsible for the majority of this task.

Task 4: Update Section 4 – Groundwater Management Actions.
This section will be updated to reflect actions and interim water supplies that have already been implemented, eliminate actions that are no longer viable, and add potential future actions and interim water supplies that could be implemented to address basin imbalances in the short-term before the long-term supply projects in Section 3 of the BMAP can be permitted, built and operated.

An example of a local management action would be to identify optimal extraction well locations such that those wells can make more efficient use of useable stored groundwater. The groundwater model is the most appropriate tool for this as it is able to simulate cumulative impacts by taking into account long-term projects and any other short-term projects while optimizing well locations.

It is beyond the scope of the BMAP update to prepare preliminary costs for potential future actions and interim water supplies. However, as cost is an important factor in deciding which actions to pursue, the Watermaster may need to engage a financial expert to provide preliminary cost estimates for those actions that do not already have cost estimates associated with them.

Task 5: Update Section 5 – Recommended Management Strategies.
After developing the groundwater management actions, we will present the results to the TAC with the purpose of soliciting input that will allow each action to be ranked in order of preference. The top actions will become recommended management strategies that the Watermaster should consider going forward.

Task 6: Prepare Draft, Final Draft and Final Updated BMAP.

A Draft Updated BMAP will be prepared that follows the format of the 2009 BMAP. After the TAC has reviewed the Draft Updated BMAP, comments received will be incorporated into a Final Draft Updated BMAP that will be presented to the Board. If comments are received from the Board, these will be included in a Final Updated BMAP. Up to 15 bound hardcopies will be provided to the Watermaster. We assume that HydroMetrics WRI will attend one TAC and one Board meeting in person to present the Updated BMAP.

Estimated Budget

The total cost to update and recalibrate the groundwater model through September 2016, and to update the BMAP is provided in Table 1.

Schedule

We expect it will take two months to update and recalibrate the groundwater model. An updated BMAP draft can be completed in approximately six weeks after the model update.

References

HydroMetrics LLC. 2009a. Basin Management Action Plan. Seaside Groundwater Basin, Monterey County, California, prepared for Seaside Groundwater Basin Watermaster. February.

HydroMetrics LLC. 2009b. Seaside Groundwater Basin Modeling and Protective Groundwater Elevations, prepared for Seaside Groundwater Basin Watermaster. November.

HydroMetrics WRI. 2014. Technical Memorandum – 2014 Seaside Groundwater Model Update, prepared for Seaside Groundwater Basin Watermaster. July 31.

Please call if you have any questions.

Sincerely,

Georgina King
Principal Hydrogeologist
HydroMetrics Water Resources Inc.

Table 1: Cost Estimate for Basin Management Action Plan Update

Tasks	HydroMetrics WRI Labor			Labor Total		Other Direct Costs	TOTALS
	Derrik Williams	Georgina King	Hanieh Haeri				
	President	Principal Hydrogeologist	Hydrologist				
Rates	$220	$195	$130	Hours	($)	($)	($)
Task 1: Update Groundwater Model & Recalibrate							
Subtask 1.1. Update Model Input Data	8	24	40	72	$ 11,640	$ -	$ 11,640
Subtask 1.2. Model Recalibration	46	10	140	196	$ 30,270	$ -	$ 30,270
Subtask 1.3. Model Update and Recalibration Technical Memorandum	12	28	32	72	$ 12,260	$ 200	$ 12,460
Subtotal Task 1	***66***	***62***	***212***	***340***	***$ 54,170***	***$ 200***	***$ 54,370***
Task 2: Update BMAP Section 2 - State of the Seaside Groundwater Basin							
Subtask 2.1. Update Basin Conceptual Model	2	16	4	22	$ 4,080	$ -	$ 4,080
Subtask 2.2. Analyze Groundwater Levels Trends	1	16	4	21	$ 3,860	$ -	$ 3,860
Subtask 2.3. Update Estimates of Groundwater Storage	5	10	16	31	$ 5,130	$ -	$ 5,130
Subtask 2.4. Update Groundwater Budget	4	8	20	32	$ 5,040	$ -	$ 5,040
Subtask 2.5. Review of Natural Safe Yield Estimates	3	8	12	23	$ 3,780	$ -	$ 3,780
Subtotal Task 2	***15***	***58***	***56***	***129***	***$ 21,890***	***$ -***	***$ 21,890***
Task 3: Update BMAP Section 3 – Supplemental Water Supplies	***1***	***4***	***0***	***5***	***$ 1,000***	***$ -***	***$ 1,000***
Task 4: Update BMAP Section 4 – Groundwater Management Actions	***8***	***20***	***12***	***40***	***$ 7,220***	***$ -***	***$ 7,220***
Task 5: Update BMAP Section 5 – Recommended Management Strategies	***4***	***10***	***0***	***14***	***$ 2,830***	***$ -***	***$ 2,830***
Task 6: Prepare Draft, Final Draft and Final BMAP	***6***	***40***	***20***	***66***	***$ 11,720***	***$ 600***	***$ 12,320***
TOTAL for GROUNDWATER MODEL UPDATE	66	62	212	340	$ 54,170	$ 200	$ 54,370
TOTAL for BMAP UPDATE	34	132	88	254	$ 44,660	$ 600	$ 45,260
TOTAL	***100***	***194***	***300***	***594***	***$ 98,830***	***$ 800***	***$ 99,630***

Notes

Other direct costs include travel expenses, office supplies, photocopies, postage, and equipment rental

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	6
AGENDA TITLE:	Schedule
PREPARED BY:	Robert Jaques, Technical Program Manager

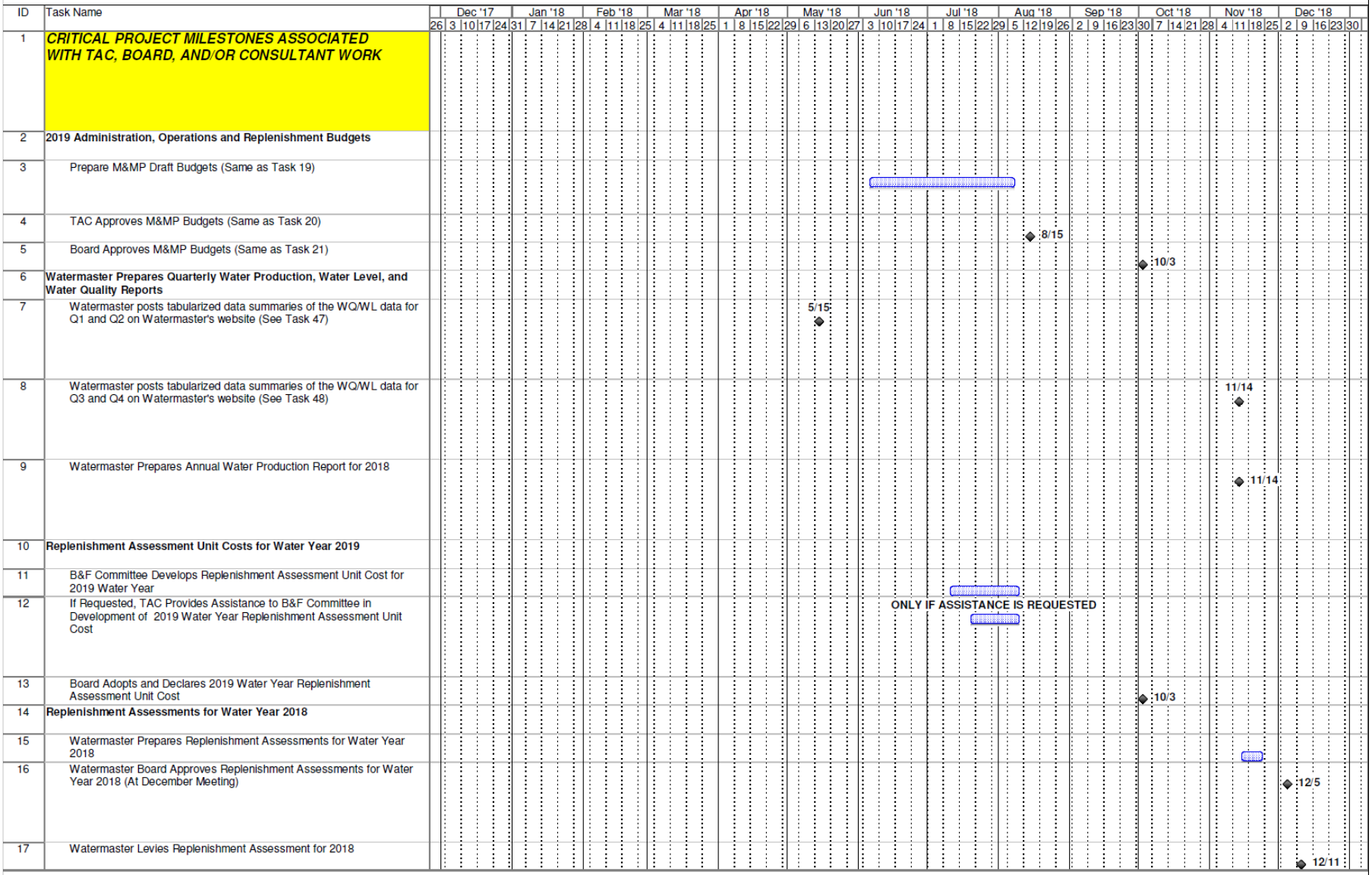
SUMMARY:

As a regular part of each monthly TAC meeting, I will provide the TAC with an updated Schedule of the activities being performed by the Watermaster, its consultants, and the public entity, MPWMD, which is performing certain portions of the work.

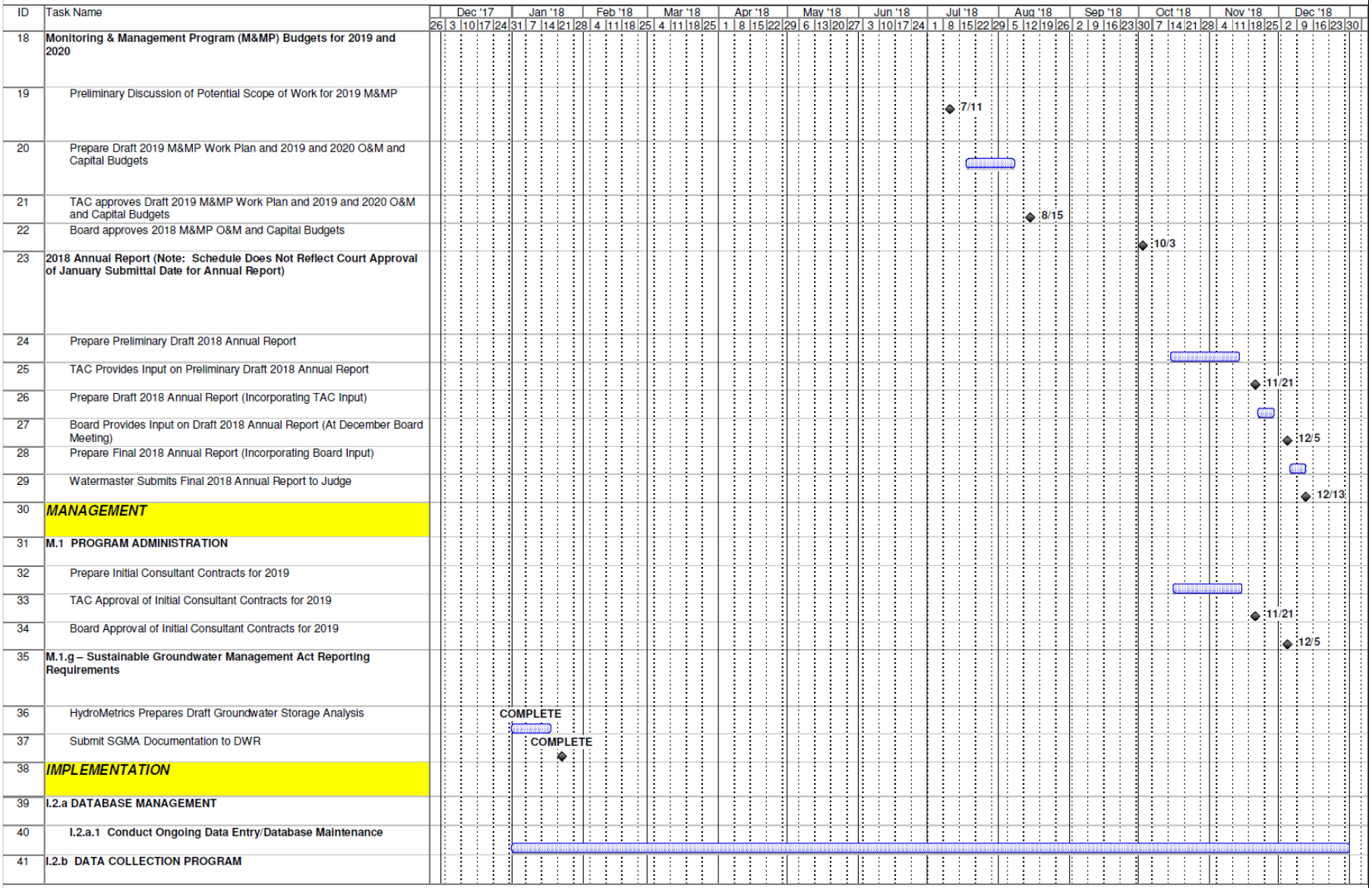
Attached is the Work Schedule for FY 2018.

ATTACHMENTS:	Schedule of Work Activities for FY 2018
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedule

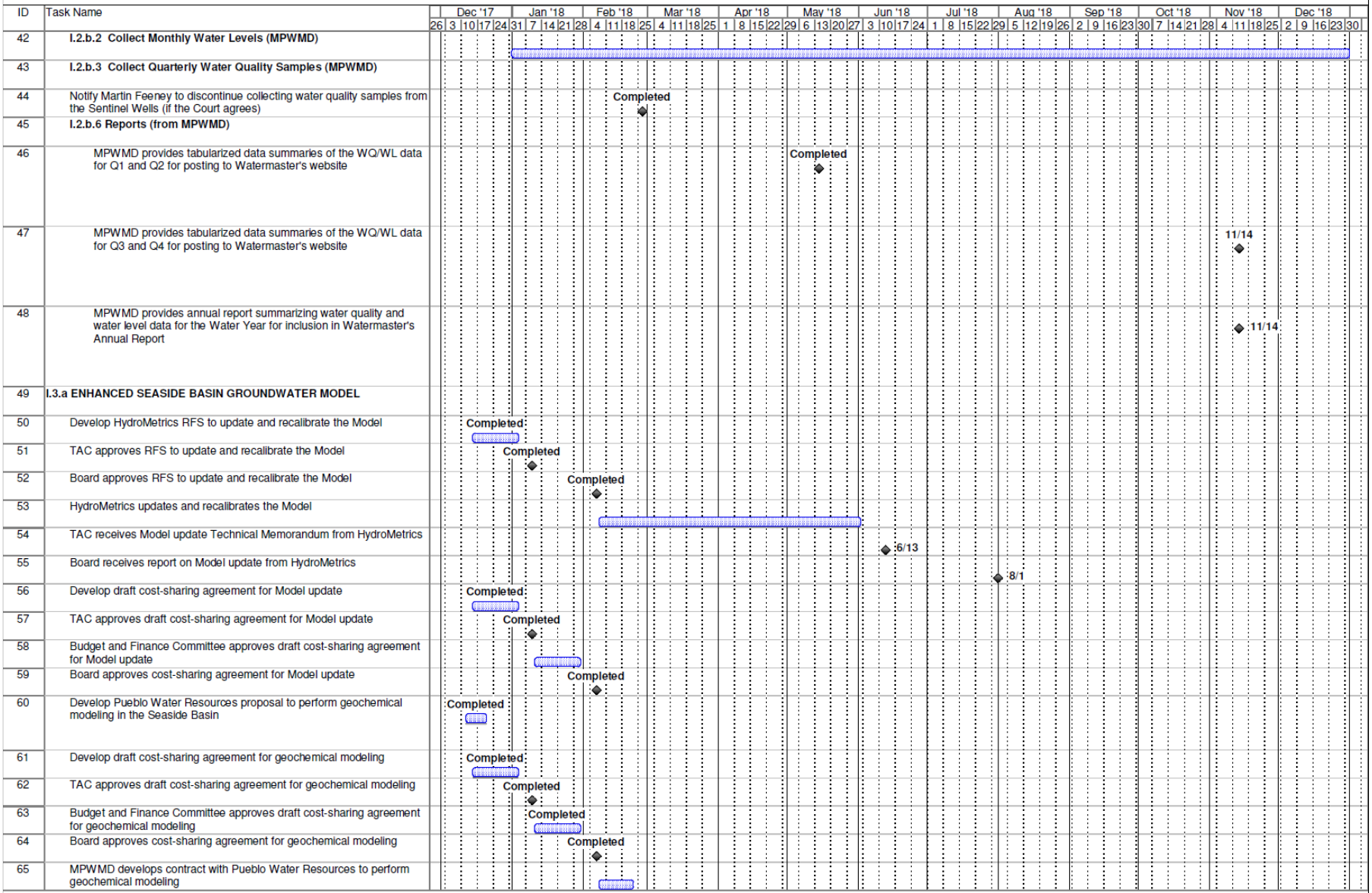
Seaside Basin Watermaster
Monitoring and Management Program
2018 Work Schedule



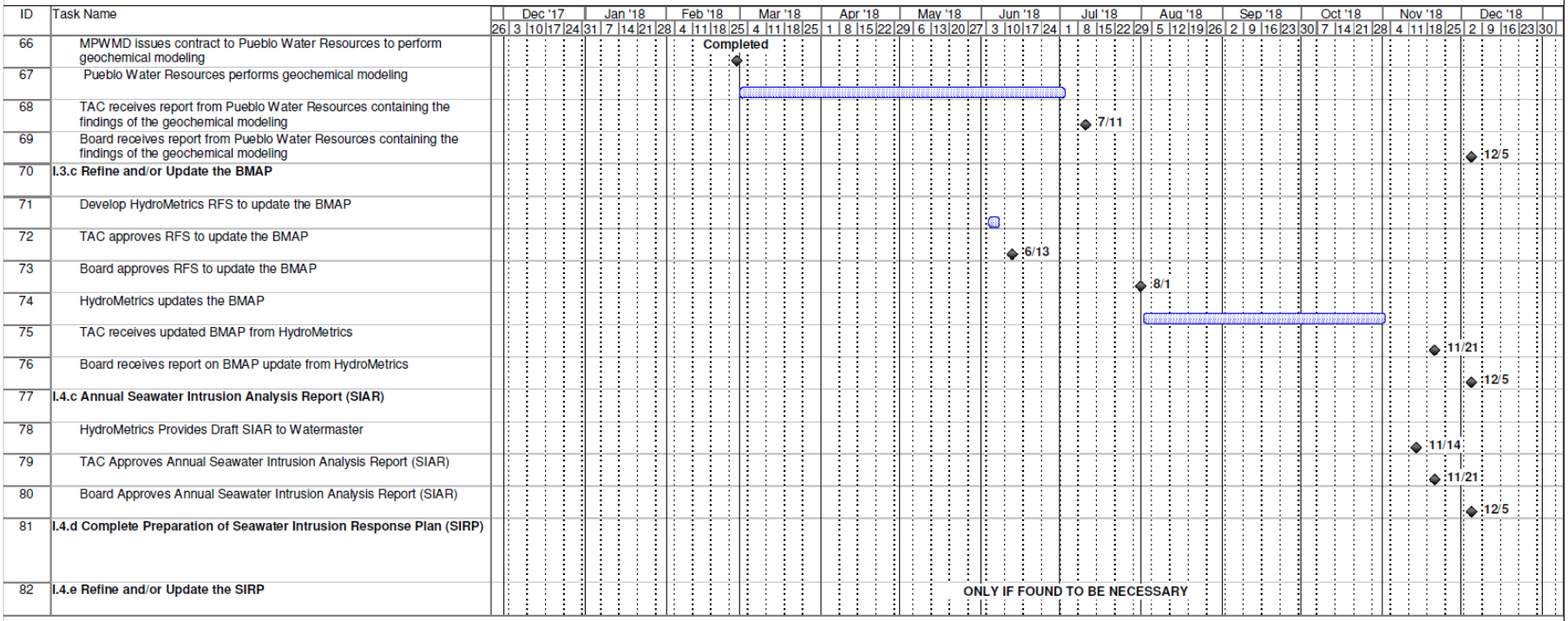
Seaside Basin Watermaster
Monitoring and Management Program
2018 Work Schedule



Seaside Basin Watermaster
Monitoring and Management Program
2018 Work Schedule



Seaside Basin Watermaster
Monitoring and Management Program
2018 Work Schedule



SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 13, 2018
AGENDA ITEM:	7
AGENDA TITLE:	Other Business
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
The "Other Business" agenda item is intended to provide an opportunity for TAC members or others present at the meeting to discuss items not on the agenda that may be of interest to the TAC.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only