MEETING NOTICE AND AGENDA
TECHNICAL ADVISORY COMMITTEE
OF THE
SEASIDE BASIN WATER MASTER

DATE: Wednesday, February 13, 2013
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 (877)810-9415. Use the Access Code of 4560043. 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: Eric Sabolsice, California American Water Company
Vice-Chairperson: Rob Johnson, MCWRA

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**

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8. The next regular meeting will be held on Wednesday March 13, 2013 at 1:30 p.m. at the MRWPCA Board Room	

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2013
AGENDA ITEM:	2.A
AGENDA TITLE:	Approve Minutes from January 9, 2013
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Draft Minutes from this meeting were 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
January 9, 2013

Attendees: TAC Members

City of Seaside – Rick Riedl
California American Water – Eric Sabolsice
City of Monterey – No Representative
Laguna Seca Property Owners – Bob Costa
MPWMD – Joe Oliver
MCWRA – Howard Franklin
City of Del Rey Oaks – Leon Gomez
City of Sand City – Leon Gomez
Coastal Subarea Landowners – No Representative

Watermaster
Technical Program Manager - Robert Jaques

Consultants
HydroMetrics – Derrik Williams and Georgina King (via phone)

Others:
Jon Lear – MPWMD

The meeting was called to order at 1:39 p.m.
Prior to the start of the meeting Mr. Jaques distributed copies of the *2012 Seawater Intrusion Analysis Report* to all attending TAC members.

1. Public Comments

There were no public comments.

2. Administrative Matters:

B. Approve Minutes from November 14, 2012 Meeting

On a motion by Mr. Oliver, seconded by Mr. Costa, the minutes were unanimously approved as presented, with Mr. Gomez abstaining because he had only attended a portion of that meeting.

3. Update on Request from California American Water to Retire and Destroy Certain Wells in the Seaside Basin

Mr. Jaques summarized the agenda packet materials for this item. Mr. Oliver said that he had looked at CAW's well standards for the wells in question and found that to destroy and abandon them would require perforating the casings and filling them with impermeable materials.

Mr. Oliver reported that converting these wells to monitoring wells should be less difficult and less costly than destroying and abandoning them.

Mr. Oliver said CAW would need to submit a proposed procedure to Monterey County Department of Environmental Health and MCWRA to complete two inch diameter schedule 80 PVC wells within the existing wells and completing each monitoring well with a sand pack and a sanitary seal for the upper 50 feet. All of the existing wells appear to already have sanitary seals. Mr. Oliver handed out the attached sketch of the Military Well to illustrate how that well was constructed.

Mr. Sabolsice said that CAW was agreeable with this proposal, if Monterey County approves the proposed approach. Mr. Oliver will communicate the approach to Monterey County.

A motion was made to approve CAW's conversion of three of the wells to monitoring wells, and abandoning one of the wells, all of this subject to approval by Monterey County. The motion was made by Mr. Costa and seconded by Mr. Riedl and approved unanimously.

4. Presentation on Initial Results of Revising the Protective Water Levels for the Basin

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

Mr. Sabolsice pointed out that at their last meeting the Board had approved CAW's replenishment proposal of 700 acre feet per year over a 25 year period.

Using the attached copy of Figure 43 from the November 6, 2009 HydroMetrics report, Mr. Williams explained what protective water levels mean and how they are determined.

Mr. Williams explained that it was initially thought that by using hydrogeologic information from the Basinwide model, it might be possible to refine and lower the protective water levels. He went on to explain that protective water levels could only be lowered by allowing more seawater to flow below and under the interface line. This turned out not to be possible, because the vertical hydraulic conductivity was too low in some areas. A few simulations were run and no lowering of the protective water levels was achieved. Because of this, work was stopped, pending TAC direction.

Mr. Jaques asked if this work indicated that the previously-determined protective water levels may actually be too low. Mr. Williams responded no, that there is a range of protective water levels, and based on about the 70th percentile of vertical hydraulic conductivity values (which is a reasonable management approach in his view) the previously calculated protective water levels were reasonable.

Mr. Oliver asked about protecting less than 100 percent of the Basin depth, perhaps 90 percent. Mr. Williams said that it would be possible to protect only the top 90 percent of the aquifer, but prior TAC discussion on this subject led to the determination that it would be more desirable to protect 100 percent of the aquifer depth.

Mr. Sabolsice said that since the previously developed protective water levels have been found to be as accurate as can be presently determined, the next step should be to go ahead with modeling of CAW's 25 year replenishment proposal, and the iterative replenishment simulations as described in the HydroMetrics RFS.

In response to question from Mr. Jaques, Mr. Williams said that there would probably be a savings of $4,000 to $5,000 by stopping the protective water level work at this point

A motion was made by Mr. Riedl, seconded by Mr. Oliver, to have HydroMetrics stop their work on the protective water levels, and to proceed with the replenishment modeling portion of their RFS. The motion passed unanimously.

Ms. King said that HydroMetric’s Report will document why the work on protective water levels was aborted.

Mr. Riedl asked whether the vertical conductivity values needed to be changed in the mode. Mr. Williams responded that no changes would be needed.

5. Informational Items on the Cal Am Monterey Peninsula Water Supply Project

A. Notice of Preparation of an EIR for the Project

B. Executive Summary from the "Draft Evaluation of Seawater Desalination Projects" Recently Prepared for the Monterey Peninsula Regional Water Authority

Mr. Jaques summarized the agenda packet materials for this item. Mr. Sabolsice pointed out that CAW's "proposed" replenishment proposal had been approved by the Board at their last meeting. There was brief discussion of this topic, but no questions were raised and no TAC direction was provided.

6. Schedule

Mr. Jaques said that the February Board meeting will likely be rescheduled to February 20th, so the TAC can receive and provide input on the HydroMetrics modeling work prior to that, at the TAC's February 13th meeting.

7. Other Business

Mr. Sabolsice reported that Tina Haynes, a 30 year employee of CAW, had recently passed away and that a memorial service will be held for her at the Mission Mortuary in Monterey on January 17. He said that CAW will send out an email with details.

8. Set Next Meeting Date

The next regular meeting was set for Wednesday February 13, 2013 at 1:30 p.m. at the MRWPCA Board Room

The meeting adjourned at 2:23 p.m.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE
** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2013
AGENDA ITEM:	3
AGENDA TITLE:	Presentation on Results of Modeling of CAW's Replenishment Program
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
HydroMetrics is under contract to perform groundwater modeling to assess the impacts of CAW's Basin replenishment program.

At the January TAC meeting a presentation was made by HydroMetrics regarding their work on revising Protective Water Levels as part of the scope of work for the modeling work.

They have now completed the modeling work and will make a presentation on this at today's meeting. A copy of the Final Draft version of their Technical Memorandum on this work is attached.

The following information may be helpful:

1. Although the Adjudication Decision sets the Natural Safe Yield of the Basin at 3,000 AFY, certain Standard and Alternative Producers have been found to be pumping less than their allocated amounts. These lower pumping rates were approved by the TAC for use in the previous modeling of temporarily suspending the Decision-mandated 10% pumping reductions, and have also been used in the current modeling. Consequently, as noted in Conclusion No. 3 in the Technical Memo, eliminating all Standard and Alternative Producer pumping will result in an overall Basin pumping reduction of just over 2,000 acre-feet per year, rather than 3,000 AFY.

2. Rick Riedl provided new data on golf course water usage to HydroMetrics on February 5. However, by that time HydroMetrics had already completed the modeling. The new data he provided amounts to a reduction of water usage of about 90 AFY which is not too large and would have little effect on the results of the modeling if it were to be included.

3. Although the proponent of the development project on the SNG site (Ed Ghandour) forecast water use at that site to begin in 2013, and the project is still in the approval phase as of this date, HydroMetrics used Mr. Ghandour's projected usage data so it would be consistent with the data used in the 10% deferral modeling they did previously. The amount in question is only 25 AFY, which is a small amount that would have little effect on the results of the modeling if it were to be scheduled to occur at a somewhat later date than the forecast date of 2013.

ATTACHMENTS:	Technical Memorandum from HydroMetrics
RECOMMENDED ACTION:	Provide input to HydroMetrics on this work as appropriate

HydroMetrics WRI

519 17th Street, Suite 500
Oakland, CA 94612

TECHNICAL MEMORANDUM

To: Seaside Groundwater Basin Board of Directors

From: Georgina King and Derrik Williams

Date: February 8, 2013

Subject: Groundwater Modeling Results of Replenishment Repayment in the Seaside Basin

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1.0 BACKGROUND AND MODELING OBJECTIVES

Two scenarios were evaluated by the modeling described in this Technical Memorandum: (1) A 25-year groundwater overpumping replenishment program proposed by California American Water (Cal-Am), and (2) A set of pumping reductions to achieve protective water levels over a 25-year period.

Under the first scenario Cal-Am is proposing to repay its post-adjudication overpumping by reducing its pumping in the Seaside Basin for 25 years. During this 25-year period, Cal-Am plans to provide a portion of the water to its customers from a desalination facility in-lieu of pumping. The desalination facility is planned to be commissioned in 2017. Cal-Am's proposal consists of reducing its pumping by 700 acre-feet per year for 25 years, resulting in a total repayment of 17,500 acre-feet of water. Cal-Am and the Seaside Basin Watermaster Board of Directors asked HydroMetrics Water Resources Inc. (WRI) to perform modeling to determine if this repayment schedule would allow groundwater elevations to reach protective levels.

Cal-Am's proposed replenishment program is intended to repay overpumping credits, but may or may not restore coastal groundwater elevations to protective levels. Under the second scenario, the amount of pumping reduction that would be necessary to achieve protective elevations in the six coastal protective elevation monitoring wells (if Cal-Am's proposed repayment of replenishment water over 25 years did not achieve protective elevations) was determined.

As a preliminary step in these modeling activities HydroMetrics WRI was asked to revisit and update the protective groundwater elevations, if necessary, and to extend the 2012 TAC baseline simulation (HydroMetrics WRI, 2012) to 2041.

2.0 Update Protective Elevations

Groundwater elevations that protect the Seaside Basin from seawater intrusion have been established at the coastal monitoring wells SBWM-3, PCA-West deep and shallow, MSC deep and shallow, and CDM MW-4 using cross-sectional models (HydroMetrics LLC 2009). The locations of these wells are shown in Figure 1. These cross-sectional models were developed before the Seaside Groundwater Basin basinwide groundwater model was calibrated and completed. The horizontal (Kh) and vertical (Kv) hydraulic conductivity fields in the original cross-sectional models were based on estimated conductivities from previous studies. The purpose of this analysis was to evaluate whether incorporating the calibrated conductivity fields from the basinwide model into the cross-sectional models would result in lowering the previously-developed protective elevations. Hydraulic conductivity (Kv and Kh) are parameters that control the rate of flow in aquifers. If the basinwide model has higher hydraulic conductivities occurring below the depth that is being protected from seawater intrusion, the protective groundwater elevations can be lowered.

HydroMetrics WRI analyzed the calibrated conductivity fields in the basinwide model surrounding and offshore of the coastal monitoring wells. Horizontal and vertical conductivity values were identified for all active cells in each layer. Statistics of the conductivities, weighted by basinwide model cell area, were calculated for layers corresponding to hydrostratigraphic units in the cross-sectional model for each well.

2.1 Update Cross-Sectional Modeling of Well SBWM-3

Table 1 compares the original parameter ranges used in the cross-sectional models with the parameter averages calculated from the basinwide model for Sentinel Well 3 (SBWM-3).

Table 1: Well SBWM-3 Cross-sectional Model and Basinwide Model Hydraulic Conductivities

Hydrostratigraphic Unit	**Basinwide Model Layers**	**Cross-sectional Model Kh Range (feet per day)**	**Average Basinwide Model Kh (feet per day)**	**Cross-sectional Model Kv Range (feet per day)**	**Average Basinwide Model Kv (feet per day)**
Seabed	N/A	N/A	N/A	Conductance = 0.01 – 10 day^{-1}	N/A
Aromas	1	5 - 20	165	0.05 – 1.0	0.5
Upper & Middle Paso Robles	2-3	2 - 8	5	0.01 – 0.1	0.2
Lower Paso Robles	4	2 - 8	7	0.01 – 0.1	0.003
Purisima	5	2 - 8	19	0.02 - 0.4	0.0002

Note: Kh = horizontal conductivity and Kv = vertical conductivity.

For the SBWM-3 well, the protective elevation is established to protect the aquifer at the well site in the middle of the Purisima Formation. From the cross-sectional model sensitivity analysis (HydroMetrics LLC, 2009; Appendix C), the hydraulic conductivity of the aquifer below the protected depth has the greatest effect on the protective elevation. The basinwide model indicates that horizontal conductivity in the Purisima Formation below the protected location (Layer 5) is greater in the basinwide model than in the original cross-sectional model, suggesting that incorporating the basinwide model parameters will reduce the protective elevation. However, the overall hydraulic conductivity in the Purisima Formation below the protected location is smaller in the basinwide model than in the original cross sectional model due to the much lower vertical conductivity in the model. Therefore, using the parameters from the basinwide model will not lower the protective elevation from the already low value of 4 feet MSL

2.2 Update Cross-Sectional Modeling of PCA-West Wells

Table 2 compares the original parameter ranges used in the cross-sectional models with the averages calculated from the basinwide model for the PCA-West wells (shallow and deep).

Table 2: PCA-West Well Cross-sectional Model and Basinwide Model Hydraulic Conductivities

Hydrostratigraphic Unit	Basinwide Model Layers	Cross-sectional Model Kh Range (feet per day)	Average Basinwide Model Kh (feet per day)	Cross-sectional Model Kv Range (feet per day)	Average Basinwide Model Kv (feet per day)
Seabed	N/A	N/A	N/A	Conductance = 0.01 – 10 day^{-1}	N/A
Aromas	1	5 - 20	165	0.05 – 1.0	0.5
Upper & Middle Paso Robles	2-3	2 - 8	11	0.01 – 0.1	0.3
Lower Paso Robles	4	2 - 8	21	0.01 – 0.1	0.01
Purisima/Santa Margarita	5	5 – 20	144	0.05 – 1.0	0.00003
Monterey	N/A	0.5	N/A	0.025	N/A

Note: Kh = horizontal conductivity and Kv = vertical conductivity.

For the PCA-West deep well, a protective elevation is established to protect the aquifer at the well location at the bottom of the Santa Margarita Formation. From the cross-sectional model sensitivity analysis (HydroMetrics LLC, 2009; Appendix C), the hydraulic conductivity of the Monterey Formation which is the unit below the protected depth has the greatest effect on the protective elevation. However, because the basinwide model does include the Monterey Formation, it cannot be used to lower the protective elevation from 17 feet MSL. Therefore, no changes to the protective elevation of the deep PCA-West well can be made based on the basinwide model.

A protective elevation is also established for the shallow PCA-West well that protects the aquifer at the well location below the Paso Robles Formation. The basinwide model indicates that the horizontal conductivity in the Purisima and Santa Margarita Formations below the protected location (Layer 5) are greater in the basinwide model than in the original cross-sectional model, suggesting that incorporating the basinwide model parameters will reduce the protective elevation. However, the overall hydraulic conductivity in the Purisima and Santa Margarita Formations below the protected location is smaller in the basinwide model than in the original cross-sectional model due to the much lower vertical conductivity in the basinwide model. Therefore, using the parameters from the basinwide model will not lower the protective elevation of the shallow PCA-West well from the already low value of 2 feet MSL

2.3 Update Cross-Sectional Modeling of MSC Wells

Table 3 compares the original parameter ranges used in the cross-sectional models with the averages calculated from the basinwide model for the MSC wells (shallow and deep).

Table 3: MSC Well Cross-sectional Model and Basinwide Model Hydraulic Conductivities

Hydrostratigraphic Unit	**Basinwide Model Layers**	**Cross-sectional Model Kh Range (feet per day)**	**Average Basinwide Model Kh (feet per day)**	**Cross-sectional Model Kv Range (feet per day)**	**Average Basinwide Model Kv (feet per day)**
Seabed	N/A	N/A	N/A	Conductance = 0.01 – 10 day^{-1}	N/A
Aromas	1	5 - 20	165	0.05 – 1.0	0.5
Upper & Middle Paso Robles	2-3	2 - 8	5	0.01 – 0.1	0.1
Lower Paso Robles	4	2 - 8	6	0.01 – 0.1	0.03
Santa Margarita	5	5 – 20	18	0.05 – 1.0	0.05
Monterey	N/A	0.5	N/A	0.025	N/A

Note: Kh = horizontal conductivity and Kv = vertical conductivity.

For the deep MSC well, a protective elevation is established to protect the aquifer at the well location at the bottom of the Santa Margarita Formation. From the cross-sectional model sensitivity analysis (HydroMetrics LLC, 2009; Appendix C), the conductivity of the Monterey Formation which is the unit below the protected depth has the greatest effect on the protective elevation. However, because the basinwide model does include the Monterey Formation, it cannot be used to lower the protective elevation from 17 feet MSL. Therefore, no changes to the protective elevation of the deep MSC well can be made based on the basinwide model.

A protective elevation is also established for the shallow MSC well that protects the aquifer at the well below the Paso Robles Formation. The basinwide model indicates that the <u>horizontal</u> conductivity in the Santa Margarita Formation below the protected location (Layer 5) is greater in the basinwide model than in the original cross-sectional model, suggesting that incorporating the basinwide model parameters will reduce the protective elevation. However, the <u>overall</u> hydraulic conductivity in the Santa Margarita Formation below the protected location is smaller in the basinwide model than in the original cross-sectional model due to the lower vertical conductivity in the basinwide model. Therefore, using the parameters from the basinwide model will not lower the protective elevation at the shallow MSC well from 11 feet MSL

2.4 Update Cross-Sectional Modeling of CDM MW-4 Well

Table 4 compares the original parameter ranges used in the cross-sectional models with the averages calculated from the basinwide model for the CDM MW-4 well.

Table 4: CDM MW-4 Well Cross-sectional Model and Basinwide Model Hydraulic Conductivities

Hydrostratigraphic Unit	Basinwide Model Layers	Cross-sectional Model Kh Range (feet per day)	Average Basinwide Model Kh (feet per day)	Cross-sectional Model Kv Range (feet per day)	Average Basinwide Model Kv (feet per day)
Seabed	N/A	N/A	N/A	Conductance = 0.01 – 10 day^{-1}	N/A
Aromas	1	5 - 20	165	0.05 – 1.0	0.5
Paso Robles	2-5	5-20	22	0.05 - 1.0	0.1
Monterey	N/A	0.5	N/A	0.025	N/A

Note: Kh = horizontal conductivity and Kv = vertical conductivity.

For the CDM MW-4 well, a protective elevation is established to protect the aquifer at the well at the bottom of the Paso Robles Formation. From the cross-sectional model sensitivity analysis (HydroMetrics LLC, 2009; Appendix C), the conductivity of the Monterey Formation which is the unit below the protected depth has the greatest effect on the protective elevation. However, because the basinwide model does include the Monterey Formation, it cannot be used to lower the protective elevation from 2 feet MSL. Therefore, no changes to the protective elevation of the CDM MW-4 well can be made based on the basinwide model.

2.5 CONCLUSIONS

The calibrated parameters in the basinwide model do not indicate that protective elevations should be lowered.

3.0 Extend Groundwater Flow Model Through 2041

To accommodate Cal-Am's 25 year repayment schedule , HydroMetrics WRI extended the 2012 TAC baseline model used to previously model temporarily deferring the Adjudication-required ten percent pumping reductions (HydroMetrics WRI, 2012). The baseline model originally simulated the Seaside Basin through 2030. The model was extended from 2030 through 2041 for these simulations. The year 2041 was chosen using the assumption that Cal-Am's repayment would begin in 2017, and the repayment would take 25 years.

All boundary conditions for the added simulation period are held constant at their 2030 levels. These include the general head boundaries along the coast, constant head boundaries adjacent to the Salinas Basin, and all no flow boundaries.

The same hydrology used in previous model runs was applied to the baseline scenario and all pumping scenarios. To extend the hydrology through the predictive period for the baseline and scenarios, the same data were repeated for model years 2009 through 2030, and 2031 through 2041 (Figure 1). Because there are only 22 years of hydrology data that were used for the calibrated portion of the model, these 22 years have been repeated in succession through 2041. By using this hydrology, even during the period January 2009 to present when actual hydrology is known, the model runs can be used to compare relative groundwater levels but not to assess absolute Basin conditions.

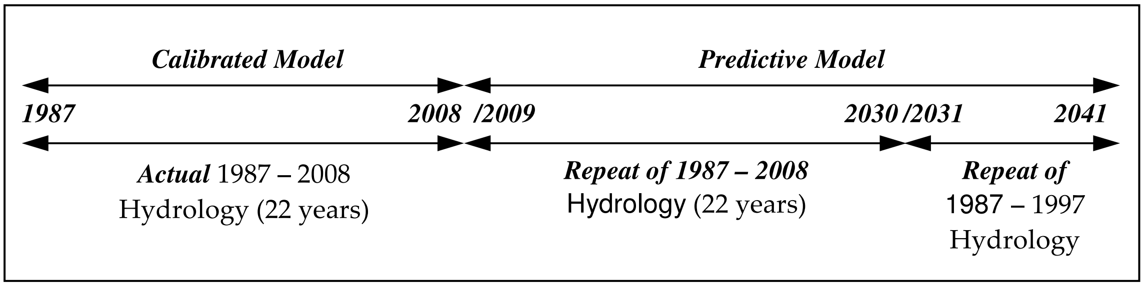


Figure 1: Repetition of Hydrology for Predictive Model

4.0 Develop Model Scenarios

A subgroup of the Water master's Technical Advisory Committee (TAC) met by conference call on December 18, 2012 to develop modeling scenarios and discuss modeling assumptions.

Attendees on the conference call were:

Bob Jaques	Seaside Basin Watermaster
Joe Oliver	Monterey Peninsula Water Management District
John Kilpatrick	California American Water
Robert Johnson	Monterey County Water Resources Agency

The assumptions agreed upon during the call are summarized in the following sections.

4.1 Baseline Simulation Assumptions

Water Year 2009 through Water Year 2012 Pumping

Actual pumping and injection data for all wells from January 2009 through December 2012 are included in the baseline.

Standard Producer Pumping from Water Year 2013 Onwards

Standard Producer pumping follows the Decision-prescribed triennial reductions. All water injected by ASR wells is pumped from select Cal-Am wells.

Golf Course Pumping

Golf course wells pump at rates based on the hydrologic year. For example, pumping in January 2015 equals the amount pumped in January 1993, because the simulated 2015 hydrology is based on 1993 hydrology. This ensures that the demand corresponds to the hydrology. If the amount pumped by a Producer pre-adjudication exceeded the Producer's adjudicated right, pumping was capped at the Producer's adjudicated amount.

Additional golf course pumping adjustments accounted for in the baseline simulation are:

- The Bayonet and Blackhorse golf courses pump no water until September, 2016. This is based on an in-lieu replenishment program the City of Seaside has with its golf course pumping. Under this program, Marina Coast Water District provides water in-lieu of the City pumping from the Seaside Basin. The City expects to start pumping its golf course wells again starting September 2016.

- In 2007, Bayonet and Black Horse golf courses had irrigation upgrades that have reduced irrigation demand by approximately 10% from historical amounts.

- The City of Seaside expects to begin pumping an average of 360 AFY from its wells for golf course supply starting in September 2016. These projected quantities were used rather than basing demand on the hydrology year.

Alternative Producer and Private Pumping

Alternative Producers, excluding golf courses, pump at their Water Year (WY) 2011 volumes from WY 2013 onwards. All other pumpers that are not covered by the Decision, including Cal Water Service and private wells, also pump at WY 2011 volumes from WY 2013 onwards.

Pumping exceptions taken into account in the baseline are:

- Water for SNG, which is an Alternative Producer, is supplied from Cal-Am wells under an agreement with Cal-Am. When the SNG site is developed they will be supplied with water by Cal-Am, who will use SNG's water right of 149.7 acre-feet/year. Currently there is no production from the SNG well. Based on input from the property owner, Ed Ghandour, project construction is planned to start in 2013 with 25 AFY water usage. Water usage thereafter is estimated to be:

    - 2014 - 30 AFY
    - 2015 – 50 AFY
    - 2016 onwards – 70 AFY

Injection and Extraction of Injected Water

From WY 2013 onwards, a combined volume of 1,445 acre-feet per year was injected into four aquifer storage and recovery (ASR) wells in accordance with their permitted amounts. The same amount of 1,445 acre-feet per year is extracted back out annually by Cal-Am production wells in the Northern Coastal subarea.

4.2 Cal-Am's Twenty-Five Year Replenishment Repayment Simulation Assumptions

The 25 year replenishment scenario includes the same pumping rates as the baseline with the exception of Cal-Am wells. From January 2017, Cal-Am pumps only 774 AFY of its allotted natural safe yield of 1,474 AFY. The 700 AF not being pumped over a 25 year period is Cal-Am's replenishment repayment. The reduced pumping is distributed among Cal-Am wells relative to the amount each well pumps as a percentage of monthly pumping. Table 5 summarizes the production information for each scenario.

All other model assumptions are identical to those of the baseline scenario as summarized in Table 5.

4.3 Twenty-Five Years to Achieve Protective Elevations Simulation Assumptions

Pumping is iteratively reduced throughout the basin to estimate the level of pumping reduction needed to reach protective elevations in the four coastal monitoring well locations after 25 years. Pumping is first reduced for all Standard Producers, in proportion to their pumping amounts. If Standard Producers production reaches zero without protective elevations being met, Alternative Producer pumping is reduced in proportion to their pumping amounts. The pumping reductions do not affect the annual recovery of injected water: Cal-Am continues to recover 1,445 acre-feet per year of water injected by the ASR wells.

Table 5: Model Simulation Summary

	Baseline	**Cal-Am's 25 Year Replenishment Scenario**	**25 Years to Achieve Protective Elevations Scenario**
Standard Producers	Pump full adjudicated right with triennial reductions	Only difference with Baseline is that Cal-Am only pumps 774 AFY for 25 years, starting in January 2017	Iteratively reduce to zero production. Cal-Am continues to recover 1,445 AFY of injected water
Alternative Producers	Pump at WY 2011 rates	Pump at WY 2011 rates	Iteratively reduce to zero production
SNG	Cal-Am pumps SNG required water	Cal-Am pumps SNG required water	Iteratively reduce to zero production

5.0 MODEL RESULTS

The model assumptions discussed above were integrated into the Seaside Basin groundwater flow model, and the model was run separately for each simulation. Results of the model runs are presented in the sections below.

5.1 Protective Level Monitoring Wells

The simulated groundwater elevations for each scenario were evaluated in six monitoring wells used for establishing protective elevations against seawater intrusion (HydroMetrics LLC, 2009). These monitoring wells are: MSC Deep, MSC Shallow, PCA-West Deep, PCA-West Shallow, Sentinel Well 3, and CDM MW-4 (Figure 2).

The protective elevations at each well were used as a benchmark for comparing the relative success of each scenario at achieving protective elevations. Simulated hydrographs for the baseline, and two model scenarios are provided in Figure 3 through Figure 5. In these figures, the hydrographs for well CDM MW-4 appear significantly different from the other well plots because CDM MW-4 is very shallow and is located in a different model layer and hydrostratigraphic layer than the other wells. Additionally, the groundwater elevation scale is different than the scales on the other plots.

Cal-Am's 25 Year Replenishment Scenario

Under Cal-Am's 25 year replenishment scenario, the model predicts some additional recovery above the baseline, but not enough to bring any levels up to protective elevations (Table 6). Groundwater levels recover 1 to 1.5 feet in the shallow wells and approximately 3 feet in the deep wells by the end of this scenario (Table 7). As expected, there is almost no recovery in CDM-MW-4 because it is very shallow and Cal-Am's pumps from deeper aquifers.

Achieving Protective Levels Scenario

Significant pumping reductions were required for the model to achieve protective elevations in all six monitoring wells. This could only be attained by ceasing all pumping from both Standard and Alternative Producers, with the exception of 1,445 AFY recovered by Cal-Am from injection. Under this scenario, MSC Deep, PCA-W Deep, and CDM-MW-4 all just reach protective levels in the final year (2041) of the simulation. The MSC Shallow well and Sentinel Well 3 reach protective elevations sooner than the end of the simulation period. Table 6 summarizes the approximate dates protective elevations are met in each monitoring well. The average groundwater level differences between the scenarios and baseline at the end of the simulations are shown in Table 7.

Table 6: Summary of Protective Elevation Achievement

Scenario	MSC Deep	MSC Shallow	PCA-West Deep	PCA-West Shallow	Sentinel-3	CDM MW-4
Baseline	Not achieved	Not achieved	Not achieved	Already achieved	Not achieved	Not achieved
25 Year Cal-Am Replenishment Scenario	Not achieved	Not achieved	Not achieved	Already achieved	Not achieved	Not achieved
25 Years to Achieve Protective Elevations Scenario	Achieved in 2041	Achieved in 2032	Achieved in 2041	Already achieved	Achieved in 2022	Achieved in 2041

Table 7: Average Groundwater Elevation Difference at the End of Simulation (Scenario- Baseline)

Scenario	MSC Deep	MSC Shallow	PCA-West Deep	PCA-West Shallow	Sentinel-3	CDM MW-4
25 Year Cal-Am Replenishment Scenario	2.9	1.6	3.0	1.2	3.0	0.05
25 Years to Achieve Protective Elevations Scenario	17.1	5.0	19.3	3.7	18.7	0.3

Ceasing pumping in all Standard and Alternative Producer wells has the greatest affect on the deep monitoring wells' groundwater levels, allowing them to recover substantially. This is because the production wells with the greatest production are completed in the deeper aquifers.

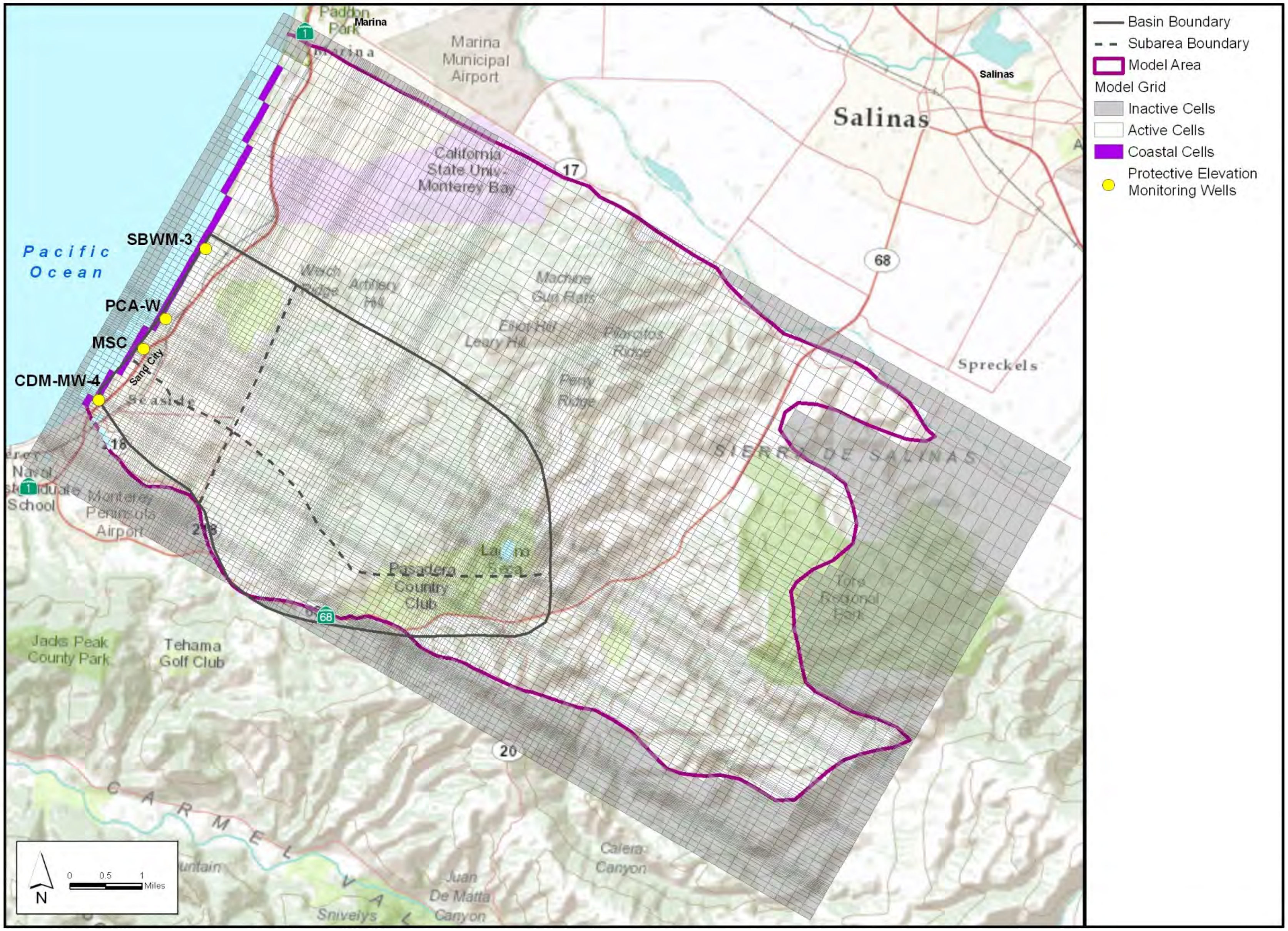


Figure 2: Location of Coastal Cells and Protective Elevation Monitoring Wells

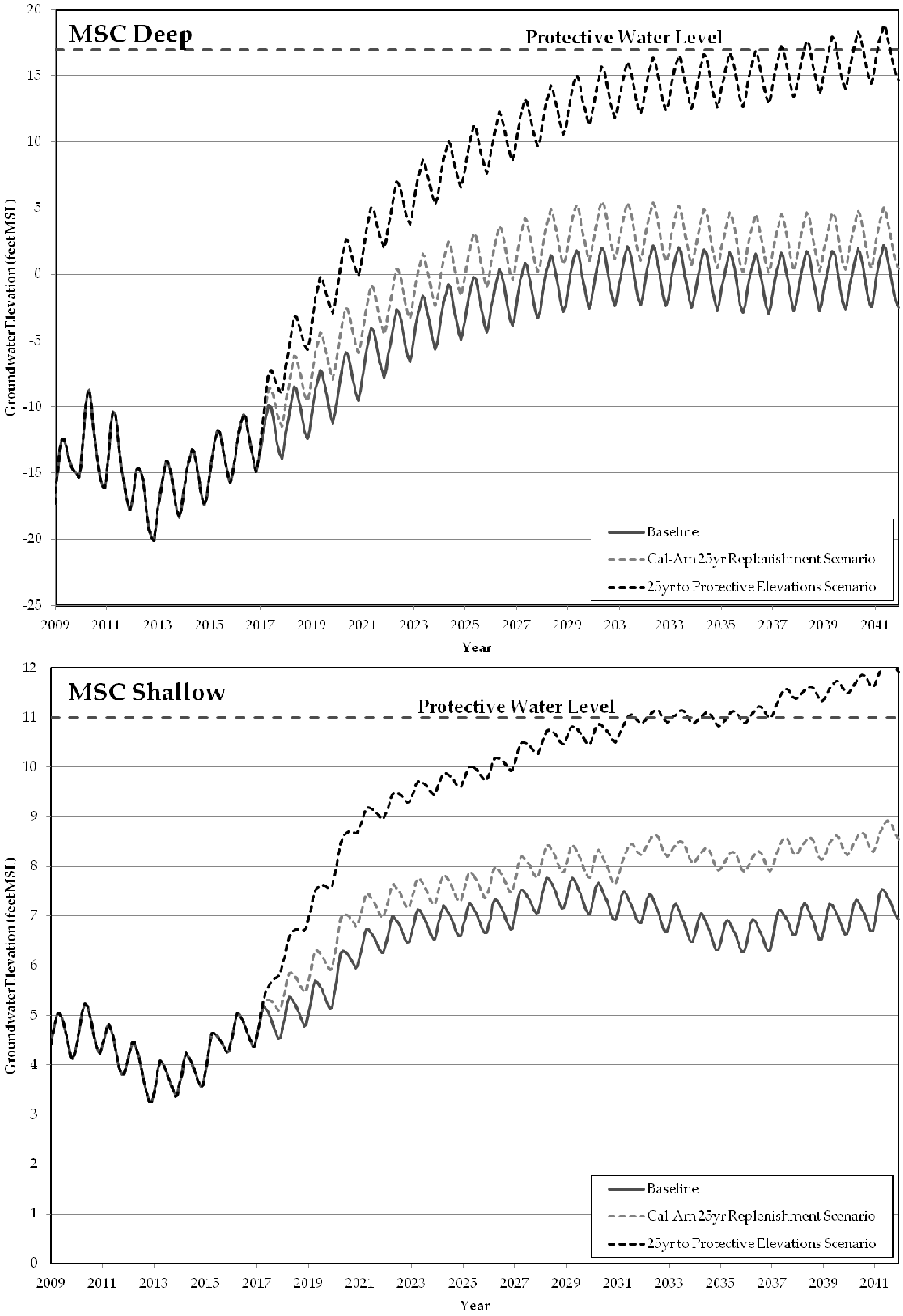
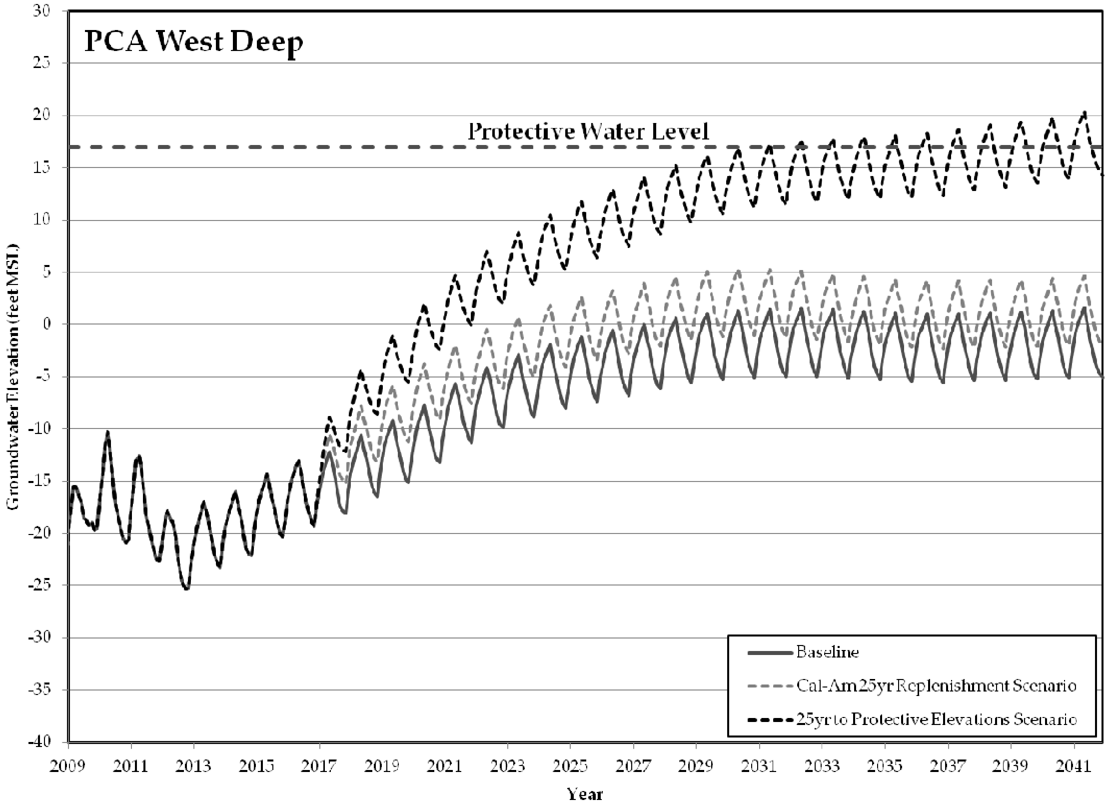


Figure 3: Predicted Groundwater Elevations and Protective Elevations for the MSC Wells



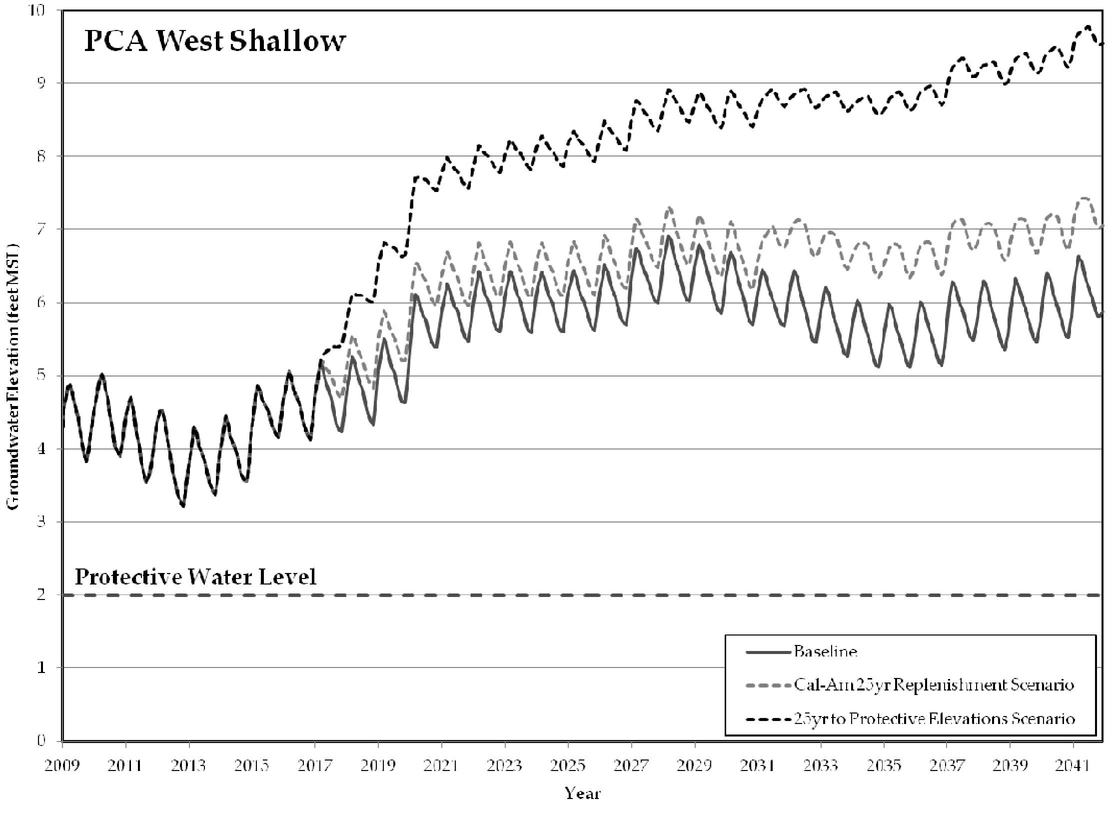


Figure 4: Predicted Groundwater Elevations and Protective Elevations for the PCA West Wells

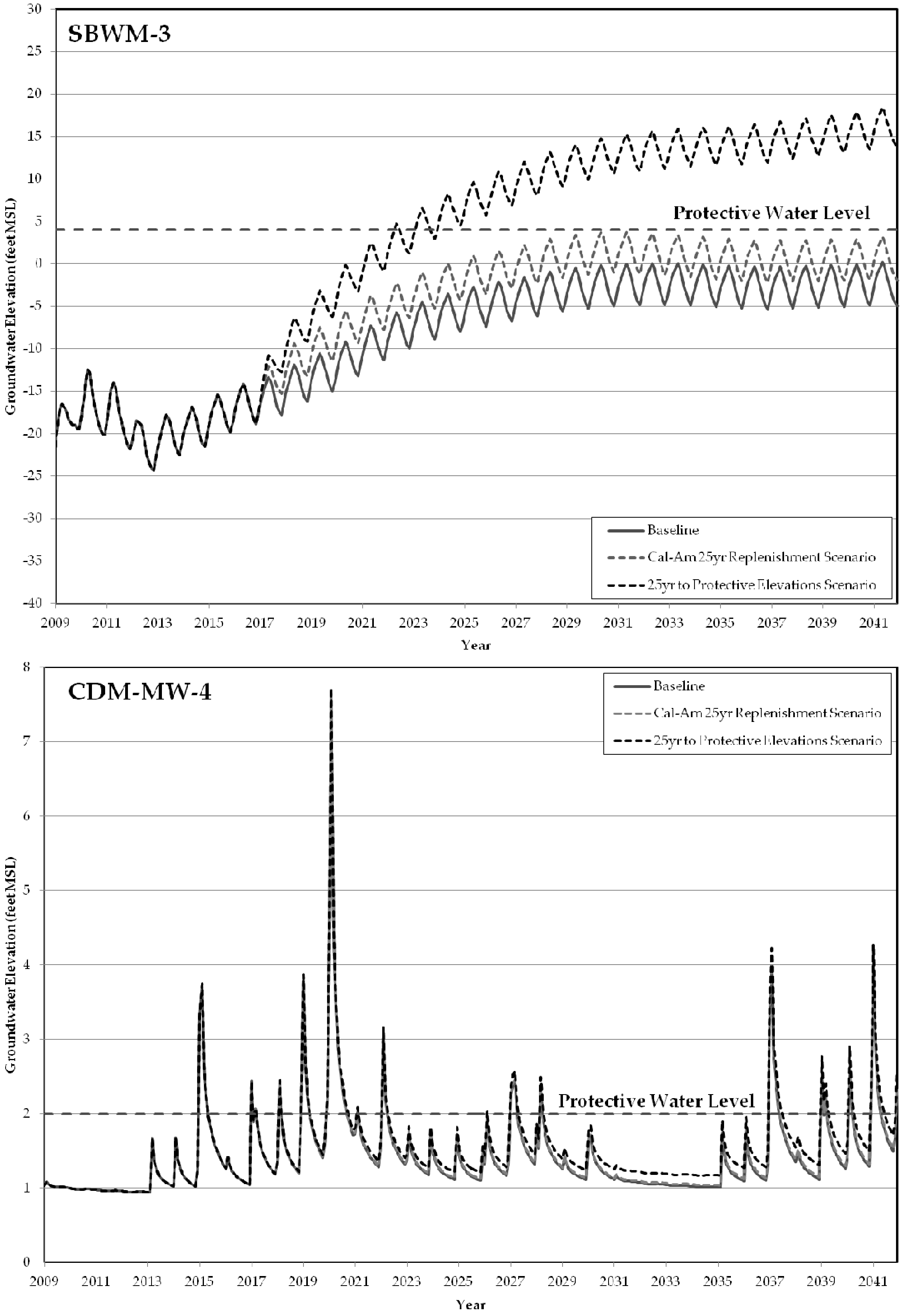


Figure 5: Predicted Groundwater Elevations and Protective Elevations for Sentinel Well 3 (SBWM-3) and CDM MW-4 Wells

The total production by Water Year for the baseline and the two scenarios is shown on Figure 6. The data show that a just over 2,000 acre-feet per year reduction in baseline pumping is required over a 25 year period to achieve protective groundwater elevations in all wells. The baseline and Cal-Am's 25 year replenishment scenario vary year to year because of golf course pumping which varies due to hydrologic demand (see Section 0). A constant pumping rate occurs for the 25 year to achieve protective elevations scenario because the only pumping taking place is to extract 1,445 acre-feet per year of injected ASR water.

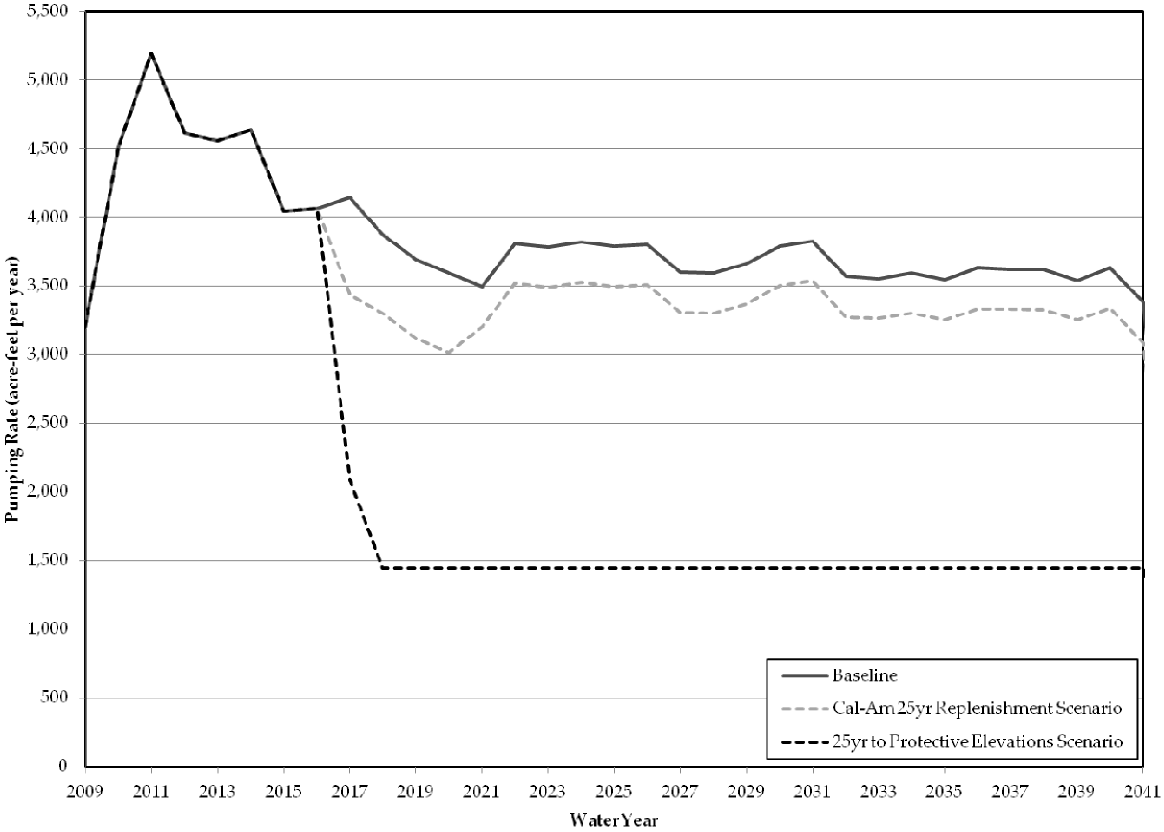


Figure 6: Modeled Production for Baseline and Scenarios

The baseline scenario and the pumping reduction scenarios included injecting and recovering 1,445 acre-feet of ASR water annually. It was found that injecting and recovering the full ASR amount does not benefit basin groundwater levels. However, during some initial exploratory model runs, it was found that injecting 1,445 acre-feet per year and leaving the injected water in the aquifer had a significant impact on groundwater levels. Figure 7 shows that when the injected water is allowed to remain in the aquifer and there is no Standard or Alternative

Producer pumping, protective groundwater elevations achieve protective groundwater elevations within seven years.

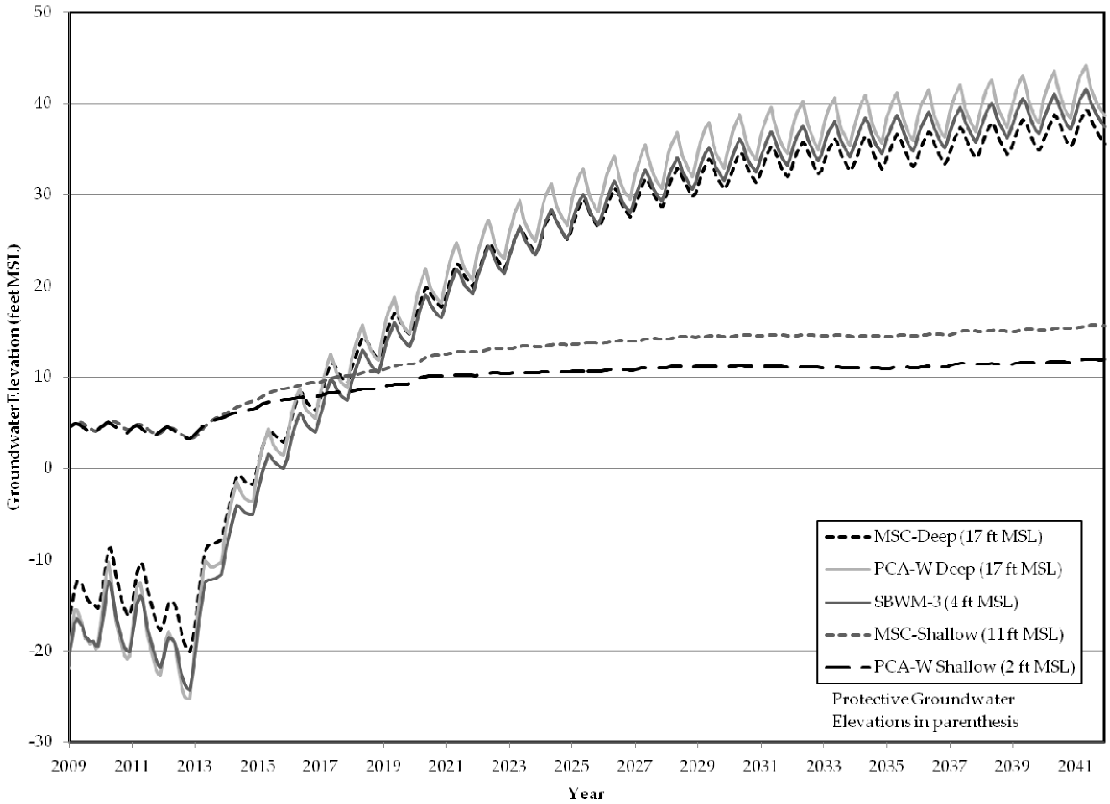


Figure 7: Example Model Run of Not Extracting Injected Water with Zero Standard and Alternative Producer Pumping

This model run shows that injecting water in the deep aquifer has a significant impact on achieving and maintaining protective elevations. Injection closer to the coast may have a more direct impact on achieving protective elevations than injecting at the locations of the existing ASR wells.

Note that this model run was an exploratory run which eliminates Standard and Alternative Producer pumping starting January 2013. The official scenarios of Cal-Am's 25 year replenishment repayment and the 25 year to achieve protective elevations eliminate Standard and Alternative Producer pumping starting January 2017. The difference in start dates for eliminating pumping means that the hydrographs on Figure 7 cannot be compared directly with Figure 3 through Figure 5. Regardless of the start date of eliminating pumping together with leaving injected water in the aquifer, under these conditions it will always take proximately seven years to reach protective elevations.

5.2 Potential Seawater Intrusion Rate

Although no seawater intrusion has occurred in the basin, potential seawater intrusion rates were determined based on groundwater velocities along the coastline. The following calculations were used to estimate average groundwater velocities:

- Model cells that represent the coastline were identified. These cells are shown on Figure 2.
- To establish the change in coastal groundwater velocities between the first year of pumping reductions (2017) and the end of the simulation period (2041), the onshore and offshore velocities for the 12 months comprising each of the years (2017 and 2041) were averaged. This approach rather than averaging the entire simulation was taken so as to highlight the actual change in velocities. An average for the 25 year period would be too generalized and not provide an understanding of the velocities achieved by the end of the simulations. This is particularity important for the 25 year to achieve protective elevations scenario.
- The average groundwater flows were combined with an assumed effective porosity of 0.20 to obtain average groundwater velocities.
- The difference in potential seawater intrusion rates from 2017 to 2041 are shown in Table 8 (Cal-Am's 25 year replenishment scenario) and Table 9 (25 years to achieve protective elevation scenario). These tables summarize the velocities for each model layer and for all layers combined.

For Cal-Am's 25 year replenishment scenario, the average flow direction in each model layer changes from onshore to offshore flows, except in Layer 4 (Table 8). For the 25 years to achieve protective elevations scenario, the average flow direction in each model layer changes from onshore to offshore flow. The offshore flows in this simulation are greater than the offshore flows in Cal-Am's 25-year-replenishment scenario (Table 9).

Although as summarized in Table 9, the average flows for Layer 4 are offshore in this scenario, there is still some onshore flow occurring along the coast. This is illustrated in Figure 8 where Layer 4's (Paso Robles Formation) coastal flows in 2017 are shown on the left panel and 2041's on the right panel. At the end of the simulation when protective elevations are achieved, onshore flow is not completely eliminated. The reason for the perceived discrepancy between the maps and the average is due to the averaging process which averages onshore and offshore velocities. Even if the number of cells with onshore flow outnumber onshore flow, the average flows can still be calculated as offshore if the offshore velocities are greater than the offshore velocities.

Table 8: Average Groundwater Flow Rate Differences for Cal-Am's 25 Year Replenishment Scenario

		Baseline* (feet/year)		**Scenario* (feet/year)**		**Difference** (feet/year)**	
		2017	**2041**	**2017**	**2041**	**2017**	**2041**
1	**Aromas and Older Dune Deposits**	-147.78	-208.90	-148.87	-228.55	-1.09	-19.65
2	**Paso Robles**	0.52	-1.09	0.48	-1.81	-0.04	-0.72
3	**Paso Robles**	4.04	0.87	3.85	-0.91	-0.19	-1.06
4	**Paso Robles**	30.63	20.21	28.91	12.80	-1.72	-7.41
5	**Santa Margarita/Purisima**	0.57	-0.48	-0.77	-0.82	-1.34	-0.34
	All Layers	**-6.22**	**-15.27**	**-7.40**	**-19.18**	**-1.18**	**-3.91**

* Negative Baseline or Scenario is offshore flow, positive Baseline or Scenario is onshore flow

** Negative difference indicates velocity of the scenario is less than the baseline

Table 9: Average Groundwater Flow Rate Differences for 25 Years to Achieve Protective Elevations

		Baseline* (feet/year)		**Scenario* (feet/year)**		**Difference** (feet/year)**	
		2017	**2041**	**2017**	**2041**	**2017**	**2041**
1	**Aromas and Older Dune Deposits**	-147.78	-208.90	-156.71	-325.50	-8.93	-116.60
2	**Paso Robles**	0.52	-1.09	0.33	-4.68	-0.19	-3.59
3	**Paso Robles**	4.04	0.87	3.03	-8.69	-1.01	-9.56
4	**Paso Robles**	30.63	20.21	26.52	-3.99	-4.11	-24.20
5	**Santa Margarita/Purisima**	0.57	-0.48	-2.14	-3.20	-2.71	-2.72
	All Layers	**-6.22**	**-15.27**	**-9.44**	**-32.40**	**-3.22**	**-17.13**

* Negative Baseline or Scenario is offshore flow, positive Baseline or Scenario is onshore flow

** Negative difference indicates velocity of the scenario is less than baseline

Figure 8: Layer 4 Average Flow in 2017 and 2041 for Scenario to Achieve Protective Elevations within 25 Years

6.0 CONCLUSIONS

1. The calibrated parameters in the basinwide model do not indicate that protective elevations should be lowered. The protective elevations developed in 2009 remain reasonable targets for groundwater management.
2. Cal-Am's proposed 25 year replenishment repayment scenario increases groundwater elevations by 1 – 1.5 feet in the shallow aquifer coastal wells and 3 feet in the deep aquifer coastal wells. These increases do not achieve protective elevations.
3. Eliminating all Standard and Alternative Producer pumping for 25 years starting in January 2017 will allow protective elevations to be met at the end of the 25 year period. This will require an overall pumping reduction of just over 2,000 acre-feet per year.
4. The baseline scenario and both pumping reduction scenarios included injecting and recovering 1,445 acre-feet of ASR water annually. Protective elevations could be reached after seven years of ceasing all Standard and Alternative Producer pumping, if the injected water was left in the aquifer.
5. Potential intrusion rates for both model scenarios are slower than baseline intrusion rates. The scenario which achieves protective elevations within 25 years has onshore flow of almost half the rate of Cal-Am's 25 year replenishment scenario rate.
6. For Cal-Am's 25 year replenishment repayment scenario, all model layer average flows changed from onshore to offshore, except Layer 4. For the 25 years to achieve protective elevations scenario, average flows are offshore for all model layers.

REFERENCES

HydroMetrics LLC. 2009. Groundwater modeling and protective groundwater elevations. Prepared for Seaside Basin Watermaster. November 2009.

HydroMetrics WRI. 2012. Groundwater modeling results of temporary suspension of triennial pumping reductions. Technical memorandum to the Seaside Groundwater Basin Board of Directors. September 28.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

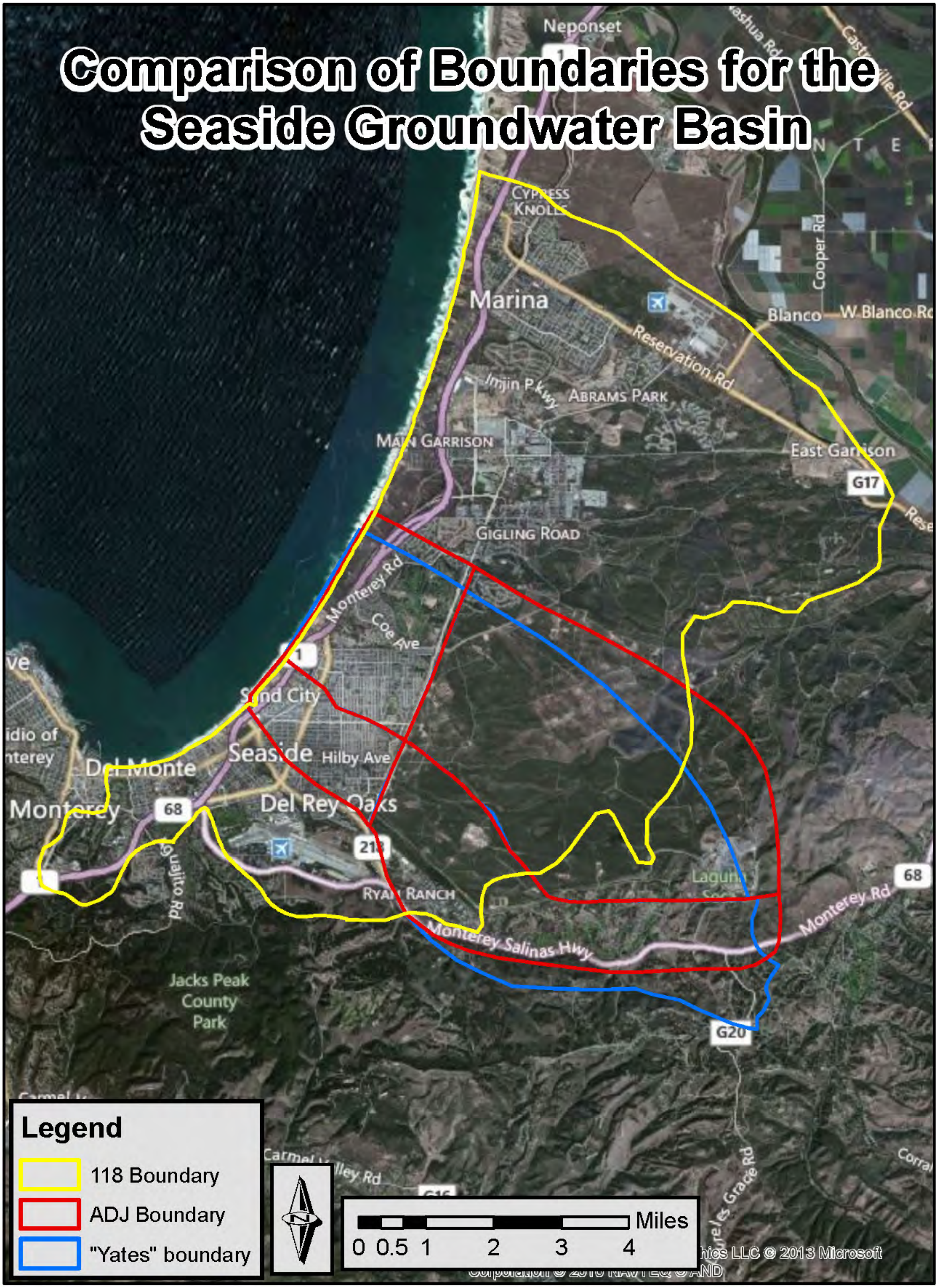
MEETING DATE:	February 13, 2013
AGENDA ITEM:	4
AGENDA TITLE:	Update on Seaside Basin Salt and Nutrient Management Plan
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Mr. Oliver, Mr. Lear, and Ms. King requested that this item be added to the TAC agenda, as they would like to discuss the Basin boundary to be used in the Seaside Basin Salt and Nutrient Management Plan which is being prepared by MPWMD.

Attached is a PDF map showing the different boundaries that have been shown in various reports. This map will be used to discuss the issues at hand and to invite input from TAC members regarding selection of the boundary to be used in the Management Plan.

ATTACHMENTS:	Map showing the different boundaries that have been shown in various reports
RECOMMENDED ACTION:	Provide input on what boundary should be used in the Management Plan



Comparison of Boundaries for the Seaside Groundwater Basin

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2013
AGENDA ITEM:	5
AGENDA TITLE:	Schedule
PREPARED BY:	Robert Jaques, Technical Program Manager

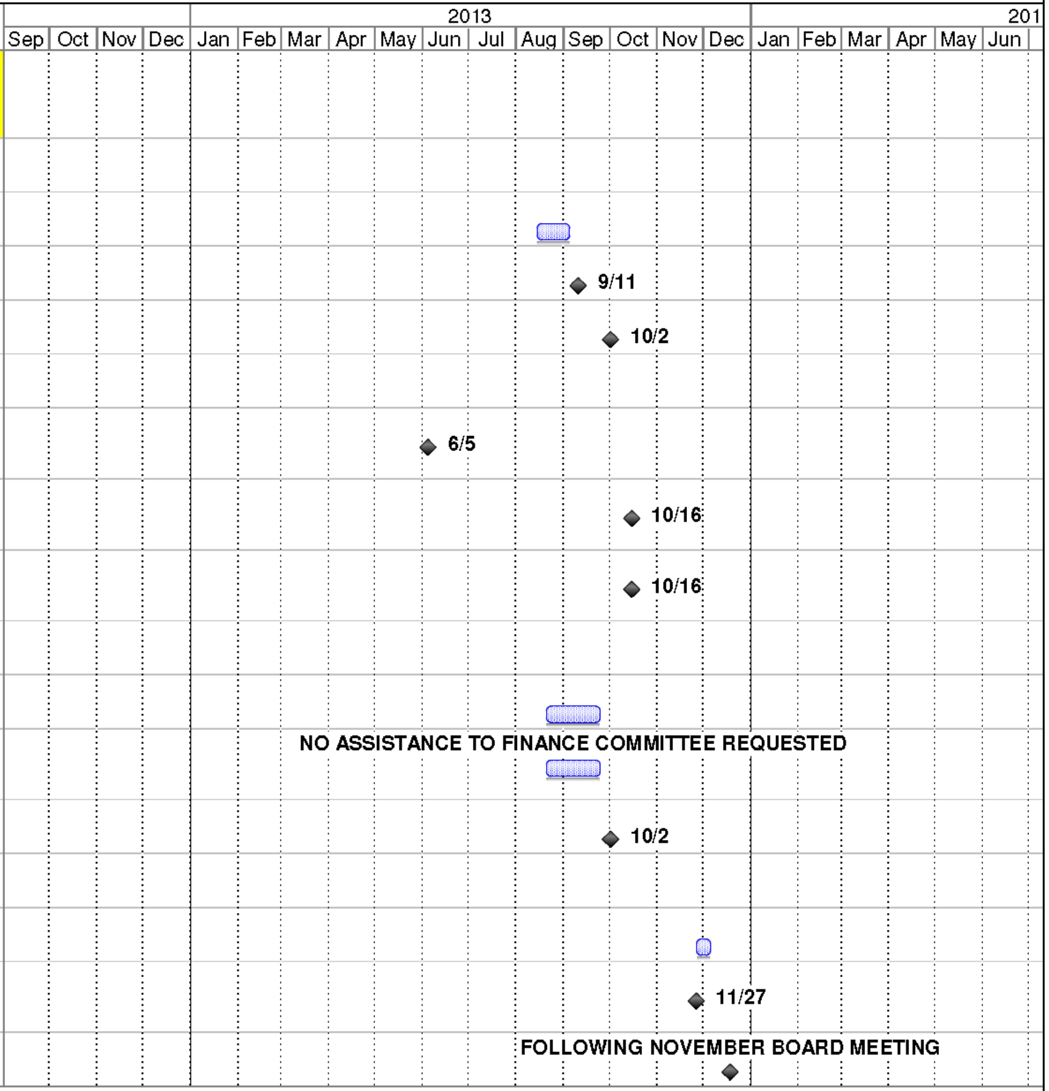
SUMMARY:
As a regular part of each monthly TAC meeting, I will provide the TAC with an updated Schedule of the activities being performed by the Watermaster, its consultants, and the public entity, MPWMD, which is performing certain portions of the work.

Attached is the most recent update of the Work Schedule for FY 2013.

ATTACHMENTS:	Schedule of Work Activities for FY 2013
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedule

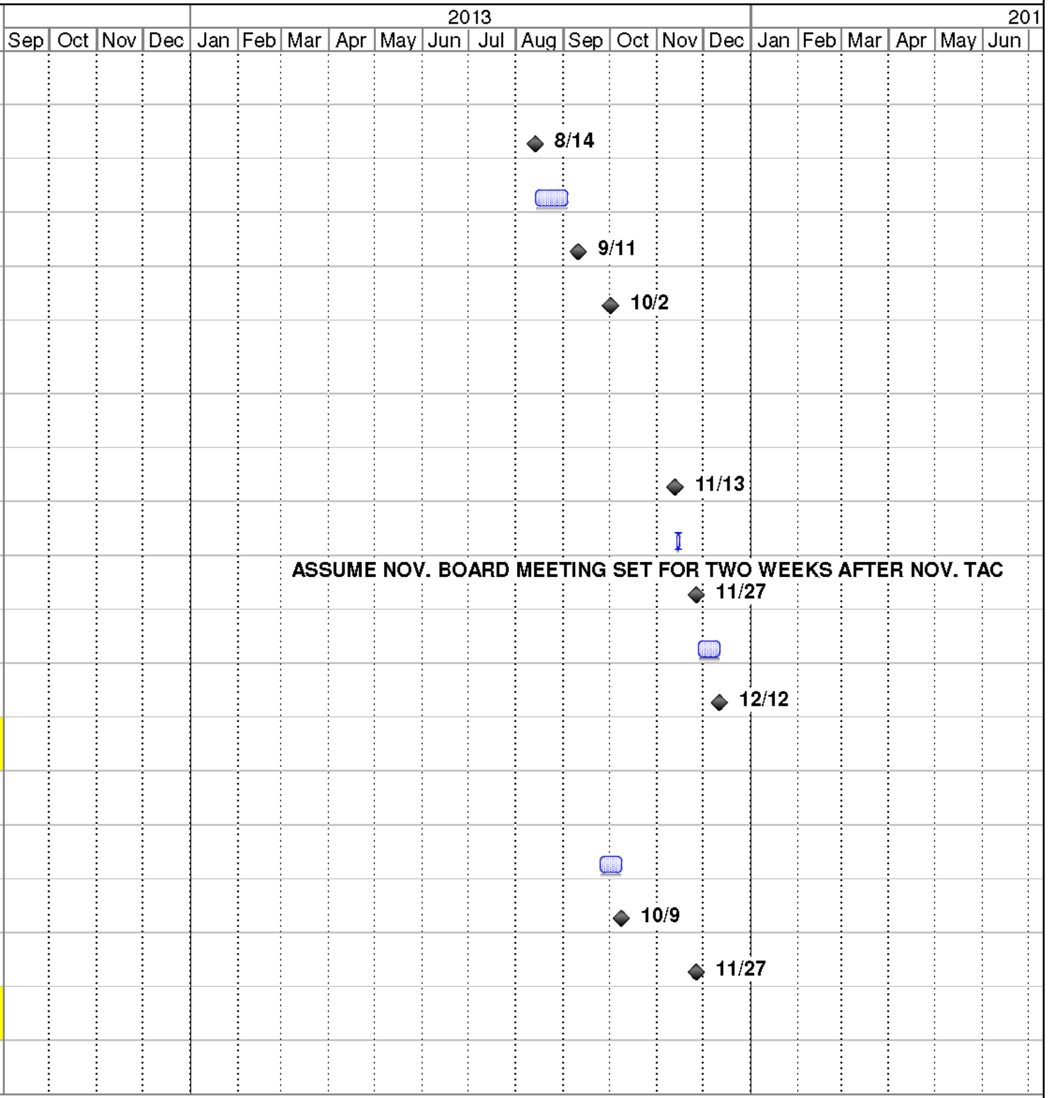
Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name
1	***CRITICAL PROJECT MILESTONES ASSOCIATED WITH TAC, BOARD, AND/OR CONSULTANT WORK***
2	**2014 Administration, Operations and Replenishment Budgets**
3	Prepare M&MP Draft Budgets (Same as Task 19)
4	TAC Approves M&MP Budgets (Same as Task 20)
5	Board Approves M&MP Budgets (Same as Task 21)
6	**Watermaster Prepares Quarterly Water Production, Water Level, and Water Quality Reports**
7	Watermaster Prepares Combined Quarterly Water Production, Water Level, and Water Quality Reports for 1st & 2nd Quarters (Same as Task 41)
8	Watermaster Prepares Quarterly Water Production, Water Level, and Water Quality Reports for 3rd and 4th Quarters (Same as Task 42)
9	Watermaster Prepares Annual Water Production, Water Level, and Water Quality Report for 2013 (Same as Task 43)
10	**Replenishment Assessment Unit Costs for Water Year 2014**
11	B&F Committee Develops Replenishment Assessment Unit Cost for 2014 Water Year
12	If Requested, TAC Provides Assistance to B&F Committee in Development of 2014 Water Year Replenishment Assessment Unit Cost
13	Board Adopts and Declares 2014 Water Year Replenishment Assessment Unit Cost
14	**Replenishment Assessments for Water Year 2013**
15	Watermaster Prepares Replenishment Assessments for Water Year 2013
16	Watermaster Board Approves Replenishment Assessments for Water Year 2013 (At November Meeting)
17	Watermaster Levies Replenishment Assessment for 2013



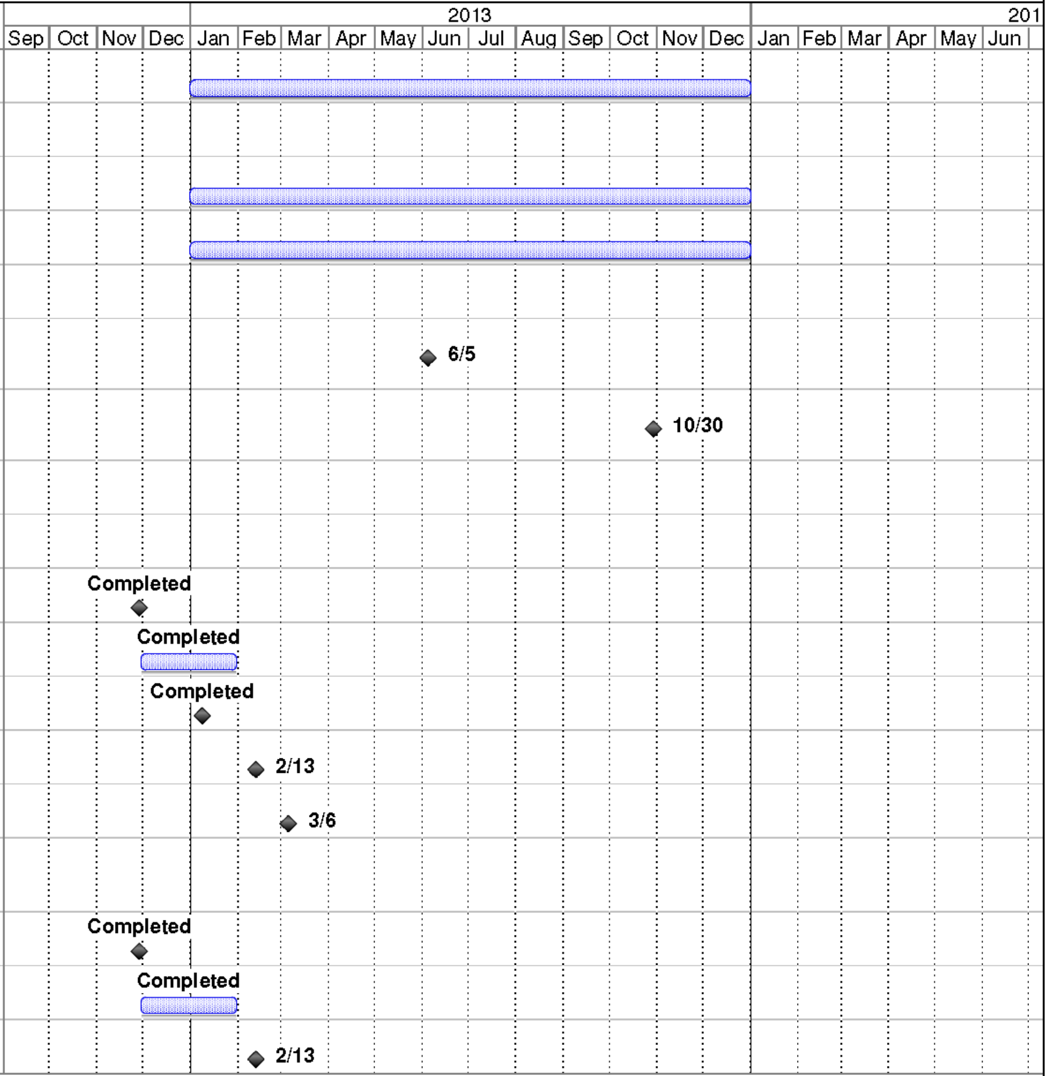
Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name
18	**Monitoring & Management Program (M&MP) Budgets for 2012 and 2013**
19	Preliminary Discussion of Potential Scope of Work for 2014 M&MP
20	Prepare Draft 2014 and 2015 M&MP O&M and Capital Budgets
21	TAC approves Draft 2014 and 2015 M&MP O&M and Capital Budgets
22	Board approves 2014 and 2015 M&MP O&M and Capital Budgets
23	**2013 Annual Report (Note: Schedule Reflects Court Approval of Later Submittal Date for Annual Report)**
24	Prepare Preliminary Draft 2013 Annual Report
25	TAC Provides Input on Draft 2013 Annual Report
26	Prepare Revised Draft 2013 Annual Report (Incorporating TAC Input)
27	Board Provides Input on Revised Draft 2013 Annual Report (At November Board Meeting)
28	Prepare Final 2013 Annual Report (Incorporating Board Input)
29	Watermaster Submits Final 2013 Annual Report to Judge
30	***MANAGEMENT***
31	**M.1 PROGRAM ADMINISTRATION (All Work Performed by Watermaster Staff)**
32	Prepare Initial Consultant Contracts for 2014
33	TAC Approval of Initial Consultant Contracts for 2014
34	Board Approval of Initial Consultant Contracts for 2014 (At November Board Meeting)
35	***IMPLEMENTATION***
36	**I.2.a DATABASE MANAGEMENT**



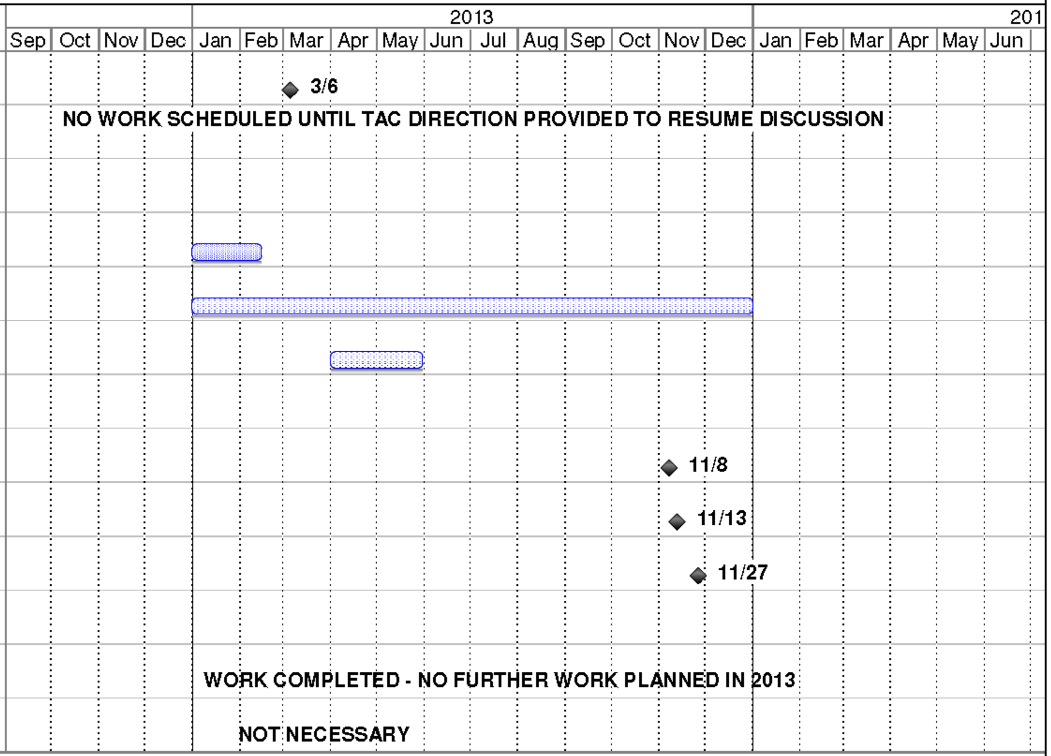
Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name
37	**I.2.a.1 Conduct Ongoing Data Entry/Database Maintenance**
38	**I.2.b DATA COLLECTION PROGRAM**
39	**I.2.b.2 Collect Monthly Water Levels (MPWMD)**
40	**I.2.b.3 Collect Quarterly Water Quality Samples (MPWMD)**
41	**I.2.b.6 Reports (from MPWMD)**
42	Watermaster Prepares Combined Quarterly Water Production, Water Level, and Water Quality Reports for 1st & 2nd Quarters
43	Watermaster Prepares Annual Water Production, Water Level, and Water Quality Report for 2013
44	**I.3.a ENHANCED SEASIDE BASIN GROUNDWATER MODEL**
45	**I.3.a.2 Develop Protective Water Levels**
46	Board Approves RFS to HydroMetrics
47	HydroMetrics Revises Protective Water Levels
48	HydroMetrics Progress Report to TAC
49	HydroMetrics Presents Draft Revised Protective Water Levels Report to TAC
50	HydroMetrics Presents Report to Board
51	**I.3.a.3 Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions**
52	Board Approves RFS to HydroMetrics
53	HydroMetrics Models Replenishment Scenarios
54	HydroMetrics Presents Draft Replenishment Modeling Report to TAC



Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name
55	HydroMetrics Presents Draft Replenishment Modeling Report to Board
56	**I.3.c Refine and/or Update the BMAP**
57	**I.3.d Evaluate Coastal Wells for Cross-Aquifer Contamination Potential**
58	MPWMD Migrates Well Data from Newly Identified Wells into Watermaster's Database
59	**I.4.a HydroMetrics & MPWMD Provide Oversight of Seawater Intrusion Detection and Tracking**
60	**I.4.b MPWMD Performs Focused Hydrogeologic Investigation in Vicinity of Sand City Public Works Well**
61	**I.4.c Annual Seawater Intrusion Analysis Report (SIAR)**
62	HydroMetrics Provides Draft SIAR to Watermaster
63	TAC Approves Annual Seawater Intrusion Analysis Report (SIAR)
64	Board Approves Annual Seawater Intrusion Analysis Report (SIAR)
65	I.4.c Annual Seawater Intrusion Analysis Report (SIAR)
66	**I.4.d Complete Preparation of Seawater Intrusion Response Plan (SIRP)**
67	**I.4.e Refine and/or Update the SIRP**



NO WORK SCHEDULED UNTIL TAC DIRECTION PROVIDED TO RESUME DISCUSSION

WORK COMPLETED - NO FURTHER WORK PLANNED IN 2013

NOT NECESSARY

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2013
AGENDA ITEM:	6
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