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, September 11, 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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SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

**** * * AGENDA TRANSMITTAL FORM * * ****

MEETING DATE:	September 11, 2013
AGENDA ITEM:	2.A
AGENDA TITLE:	Approve Minutes from the June 19, 2013 and August 14, 2013 Meetings
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Draft Minutes from these meetings were emailed to all TAC members. Any changes requested by TAC members have been included in the attached versions.

At the August 14, 2013 meeting there was not a quorum present to vote on the June 19 meeting minutes, so it was agreed that those minutes would be carried over to today's meeting for action.

ATTACHMENTS:	Minutes from these meetings
RECOMMENDED ACTION:	Approve the minutes

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
June 19, 2013

Attendees: TAC Members

City of Seaside – Rick Riedl
California American Water – Eric Sabolsice
City of Monterey – Norm Green
Laguna Seca Property Owners – No Representative
MPWMD – Joe Oliver
MCWRA – No Representative
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

Others:
Cal Am – Tim Miller (arrived for Agenda Item No. 3)
MPWMD – Jon Lear
MCWD – Brian True
MRWPCA – Bob Holden and Mike McCullough
DDA – Allison Imamura
University of Calgary – Adam Pidlisecky
ESA – Eric Zigas and Michael Burns
Todd Associates – Phyllis Stanin

The meeting was called to order at 1:37 p.m.

Public Comments
There were no public comments.

1. **Administrative Matters:**
   A. Approve Minutes from May 8, 2012 Meeting
   On a motion by Mr. Oliver, seconded by Mr. Riedl, the Minutes were unanimously approved as presented.

2. **Continued Discussion of Water Supply to the Laguna Seca Subarea**

(Note: This Item was taken up after Item 4 was discussed, so Mr. Miller could be present for this Item) Mr. Jaques summarized the agenda packet materials for this item.

Mr. Sabolsice reported that Cal Am's plans to serve its Laguna Seca customers once the Laguna Seca subarea has no remaining Natural Safe Yield for Cal Am to pump (since 100 percent of the Natural Safe Yield from the Laguna Seca subarea is assigned to Alternate Producers there). The Monterey Peninsula Water Supply Project has the Laguna Seca demands included in it, based on this anticipation. About 300 acre feet per year of Cal Am demand currently exists in the Laguna Seca subarea.

Mr. Miller and Mr. Sabolsice explained Cal Am's long-term plans to serve its Laguna Seca customers. The plan is to discontinue pumping from Laguna Seca to serve these customers and to serve them from other parts of Cal Am's system. They will be connected to Cal Am's main system.

Mr. Miller briefly described the history of development of the Adjudication Decision as it pertains to the Laguna Seca subarea, replenishment assessments, and how Natural Safe Yield is allocated among the producers. He described several sections of the Decision (Sections III.m.3.a through c) which pertain to exporting water from subareas of the Basin and anti-portability issues.

Mr. Miller went on to say that Cal and may wish to seek court approval to use its Laguna Seca systems in an emergency to provide backup to the interconnection to its main system, under certain conditions.

Mr. Sabolsice said it would make sense to look at the Laguna Seca subarea with modeling to see if any conditions are now better understood that could result in a change to the Laguna Seca subarea Natural Safe Yield amount. He went on to say that Cal Am would like to see what groundwater impacts there will be if Cal Am discontinues all of its pumping from its Laguna Seca subarea wells. Mr. Williams recommended looking back at prior monitoring work to see what we now know in conjunction with developing a potential scope of work for this. Mr. Riedl also suggested looking at revising the Natural Safe Yield for the Laguna Seca subarea in conjunction with this other modeling work.

Mr. Jaques concurred and will discuss a potential scope of work with HydroMetrics to perform this work. The matter will be brought back to the TAC for further discussion at a future TAC meeting.

3. Potential Sources of Water That Could be Used to Replenish the Seaside Basin and Help to Achieve Protective Water Levels

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

Mr. Riedl asked if the Groundwater Replenishment Project could provide more water in the future. Mr. Jaques and Mr. Holden responded that MRWPCA was seeking additional flows to help expand the potential production quantities from the Groundwater Replenishment Project.

It was noted that the Regional Urban Water Augmentation Project (RUWAP) has a desalination component. Mr. Jaques responded that the desalination component of that project was intended for delivery to potable demands, not non-potable demands.

Mr. Riedl asked for a change in wording on page 19 of the agenda packet as follows: in the third paragraph under section 5, change the first words of the first sentence from "The current market for recycled water..." to "The potential demand for recycled water..."

Mr. True reported that no areas outside of the former Fort Ord are included for service by the RUWAP.

Mr. Sabolsice asked Mr. Riedl where the well in Project No. 4 on page 14 of the agenda is located. Mr. Riedl said that the well is in the vicinity of Laguna Grande but is apparently not connected to the seaside groundwater basin, although it may affect the Sand City desalination plant's water source. Mr. Oliver noted that the well is on the other side of a fault so it is not hydraulically connected to the Seaside Groundwater Basin.

Mr. Sabolsice felt that the Pacific Grove Local Water Project is gaining traction and that it should continue to be monitored.

Mr. Sabolsice requested that with regard to the language under item No. 8 on page 15 of the agenda packet the term "excess capacity" be revised to read "initially unused capacity".

Mr. Sabolsice briefly discussed water conservation, and questioned whether it would provide replenishment water for the Basin. Mr. Jaques responded that reduced demand on the desalination plant should make available capacity in that plant that could potentially be used to produce water for replenishment. There was consensus to indicate that water conservation has a low potential to produce a meaningful quantity of water for replenishment.

There was consensus to provide a report similar to this to the Board, with the revisions as noted above. Mr. Jaques will email a draft version of the Board agenda transmittal to the TAC for pre-review before sending it to Mr. Evans for inclusion in the August Board agenda packet.

4. HydroMetrics Presentation on Modeling of Coastal Injection Sites

Mr. Jaques introduced this item. Mr. Williams then proceeded, with the use of PowerPoint slides (a copy of which is attached), to describe the scope, findings and conclusions of the modeling work.

Mr. Williams stressed that the modeling work was not simulating any specific project; rather it was providing guidance and general direction. Raising groundwater elevations to protective water levels results in some amount of total-Basin freshwater flowing into the ocean, between 400 and 500 acre feet per year.

In response to a question from Mr. Riedl, Mr. Williams explained that the scenarios looked what a 25-year time period ending in 2041, the same as the Cal Am 700 AFY replenishment plan.

All the injection was done with a single injection well; there is no need to have multiple injection wells.

Coastal injection water levels are about four feet higher than inland injection wells, and coastal injection achieves protective water levels about twelve years earlier. However the twelve years is based on a very small difference between the scenarios, and this could be within the accuracy of the modeling.

Seasonal variation is caused by pumping demands (less production pumping in winter than summer). Either coastal or inland injection achieves a large percentage of what is needed to reach protective water levels, about 90 percent. Continued injection will be required for many years beyond 2041 to maintain protective water levels due to outflows to the ocean and the slowness of water level recovery that occurs through natural replenishment, because natural replenishment water takes a long time to percolate into the aquifer and bring Basin water levels to a stable condition.

Mr. Sabolsice noted that coastal injection has minimal benefit compared to inland injection in terms of the actual increase in groundwater levels, only a couple of feet. Mr. Williams confirmed this, but said it more rapidly raises water levels and requires less water for injection.

When Cal Am's 25 year 700 AFY replenishment program ends, additional injection water would be required to replace this 700 acre feet per year to maintain protective water levels. There are cost trade-offs between the scenarios including infrastructure costs to be able to inject water TAC the coast and the cost of purchasing the necessary quantities of water for injection.

Mr. Sabolsice asked Mr. Williams if injection into the Santa Margarita aquifer would result in less outflow to the ocean then injection into the Paso Robles aquifer. Mr. Williams said that these are essentially the same for the Basin as a whole.

Ms. Stannin asked Mr. Williams if there was a potential for creation of artesian conditions as result of the injection that had been modeled. Mr. Williams responded no.

Mr. Williams said that Natural Safe Yield was calculated on the Basin as a whole without consideration of individual aquifers.

Mr. Riedl asked that language be added to Conclusions six and seven in the Tech Memo stating that 700 acre feet per year of Cal Am replenishment water is included as part of these conclusions.

TAC members suggested several other wording revisions in the Technical Memorandum and the PowerPoint slides.

Mr. Sabolsice asked Mr. Williams what the next step would be. Mr. Williams responded that as projects that could provide injection water are developed, the Watermaster should determine the feasibility of acquiring water for injection from those projects.

There was discussion of various issues pertaining to future decisions and possible actions by the Watermaster.

5. Discussion of Geophysical Imaging of Saltwater Intrusion

Mr. Jaques summarized the agenda packet materials for this item, and introduced Mr. Pidlisecky who made the presentation on this item.

Mr. Pidlisecky works for the Stanford Center for Groundwater Evaluation and Management, which focuses on integrating new technology into groundwater management. Their website lists approximately 12 partnerships with which they have been involved. Using a PowerPoint presentation (copy attached) he described the research he is involved with, which uses electrical resistivity tomography (ERT), a technology that was developed in contamination mitigation and the oil and gas industry.

He reported that borehole based monitoring does not provide early warning against seawater intrusion, because once the intrusion is detected it has already arrived at the monitoring well location.

Pore fluid chemistry is used. Metal probes (electrodes) about one foot long are driven into the ground and current is applied and voltage is measured at numerous locations. This process can cover about three kilometers a day in the field. It uses similar algorithms as medical tomography procedures. Work done locally in 2011and 2012, if done by a commercial company, would cost about $60,000. It

Their current work only images down to about 150 meters in depth. A longer than 1 kilometer array would allow a greater imaging depth.

Seawater intrusion can come not just from the ocean, but also from other aquifers that are seawater intruded.

This technology is done on the ground, but electromagnetic imaging from the air is another technology that is being evaluated.

The technology would not be very useful for detecting the location of the seawater-freshwater interface in Monterey Bay, but there are ways of using the land-based sensors to get some of that information.

Seismic surveying is also helpful in order to accurately learn the subsurface structures.

Mr. Sabolsice felt that this technology might be helpful in siting Cal Am's desalination plant intake wells. In response to a question from Mr. Sabolsice, Mr. Pidlisecky reported that there are a few commercial firms that can do this type of work.

6. Schedule

Mr. Jaques reported that there will be no July TAC meeting, and that the next TAC meeting will be in August.

7. Other Business

There was no other business.

8. Set Next Meeting Date

The next TAC meeting will be on August 14, 2013.

The meeting adjourned at 4:34 p.m.

Seaside Groundwater Basin TAC Meeting
June 19, 2013

Results of Coastal Injection Modeling

HydroMetrics

Project Purposes

A. Compare benefits of injecting water near the coast to injecting water at existing ASR wells

B. Criteria:
  A. Time to reach protective elevations
  B. Injection rates
  C. Total quantity of injected water
  D. Outflow to ocean

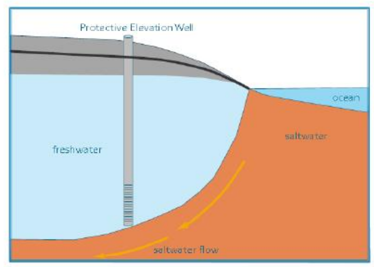
Project Purposes

These results provide only guidance and general direction

Results do not simulate any project

Protective Groundwater Elevations

Achieving protective elevations eliminates the threat of seawater intrusion



Previous Modeling

- Inject at existing ASR sites
- Inject approximately 1,000 AFY
- Leave water in the basin
- Protective elevations are achieved by 2041

Inland and Coastal Injection Sites

Assumptions

- Implement Cal-Am's 25-year replenishment repayment schedule
- All other producers subject to triennial pumping reductions
- Repeat historical rainfall

Modeling Scenarios Encompass Reasonable Operations

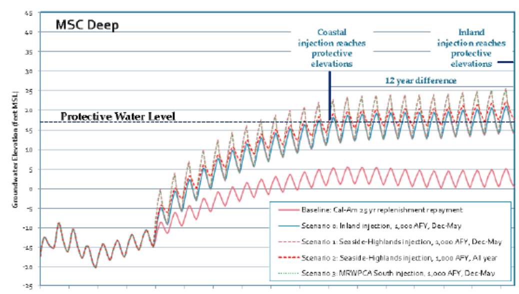
Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
0	1,000 AFY	Existing Inland ASR	No	Dec – May
1	1,000 AFY	Seaside - Highlands	No	Dec – May
2	1,000 AFY	Seaside - Highlands	No	All Year
3	1,000 AFY	MRWPCA South	No	Dec – May
4	Reach protective elevations in 2041	Seaside – Highlands	No	Dec – May
5	Reach protective elevations is 5 years	Seaside - Highlands	No	Dec – May
6	1,000 AFY	Seaside - Highlands	Yes	Dec – May
7	Reach protective elevations is 5 years	Seaside - Highlands	Yes	Dec – May

Modeling Results

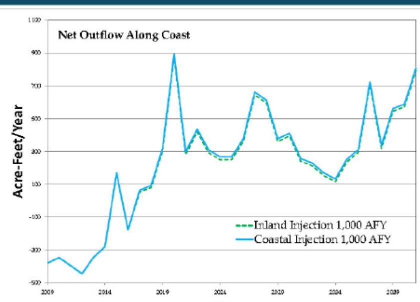
Inland vs. Coastal Injection

Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
0	1,000 AFY	Existing Inland ASR	No	Dec – May
1	1,000 AFY	Seaside - Highlands	No	Dec – May
2	1,000 AFY	Seaside - Highlands	No	All Year
3	1,000 AFY	MRWPCA South	No	Dec – May

Inland vs. Coastal Injection

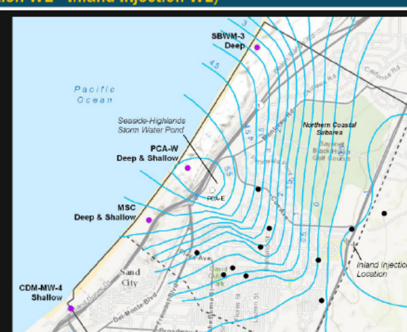


Inland vs. Coastal Injection



Inland vs. Coastal Injection

Groundwater Level Difference in Santa Margarita Aquifer (Coastal Injection WL– Inland Injection WL)

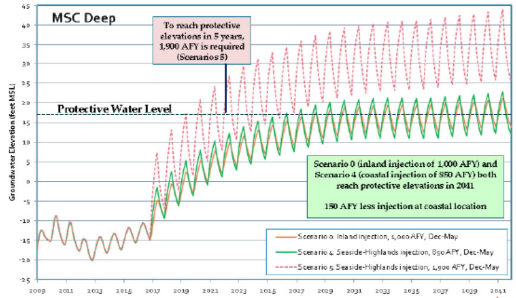


Modeling Results

How much injection in needed to reach protective elevations in 25 years and 5 years?

Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
4	Reach protective elevations in 2041	Seaside – Highlands	No	Dec – May
5	Reach protective elevations is 5 years	Seaside - Highlands	No	Dec – May

Protective Elevations in 25 years or 5 years

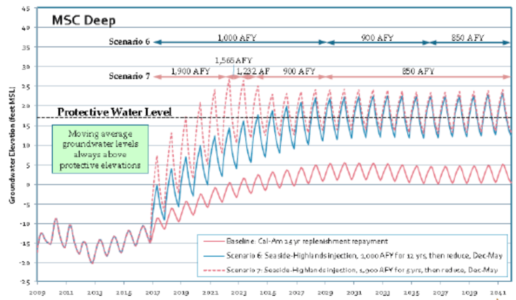


Maintaining Protective Groundwater Elevations

How much to reduce injection once protective elevations have been reached?

Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
6	1,000 AFY	Seaside - Highlands	Yes	Dec – May
7	Reach protective elevations is 5 years	Seaside - Highlands	Yes	Dec – May

Maintaining Protective Groundwater Elevations



Scenario Comparison

Scenario	Years to Reach Protective Elevations	Injected Volume through 2041 (acre-feet)	Outflow to Ocean (acre-feet)
0: Inland, 1,000AFY, Dec-May	25	25,000	9,310
1 : S-H, 1,000 AFY, Dec-May	12	25,000	9,720
2: S-H, 1,000 AFY, all year	12	25,000	9,730
3: MRWPCA, 1,000 AFY, Dec-May	12	25,000	9,780
4: S-H, 850 AFY, Dec-May	25	21,250	9,140
5: S-H, 1,900 AFY, Dec-May	5	47,500	13,830
6: S-H, 1,000 to 900 AFY, Dec-May	12	23,600	9,550
7: S-H, 1,900 to 850 AFY, Dec-May	5	28,850	10,990

Conclusions

1. Seaside-Highland or MRWPCA South site equally suitable as coastal injection location.
2. Average groundwater elevations similar if injected seasonally or year round.
3. Coastal injection reaches protective elevations 12 years faster than inland injection at existing ASR wells.
4. Offshore flow ranges from 100 to 900 AFY.

Conclusions continued

5. 150 AFY less water is needed for coastal injection to achieve protective elevations by the end of 2041 compared to injecting in existing ASR wells.
6. Protective elevations can be reached in 5 years if 1,900 AFY are injected at the coast.
7. 850 AFY is required to maintain groundwater levels above protective elevations once they have been reached by:
   - Injecting 1,000 AFY for 12 years, and ramping down
   - Injecting 1,900 AFY for 5 years, and ramping down

HydroMetrics WRI

Questions?

HydroMetrics WRI

Looking Beneath a Saltwater Intrusion:
Geophysics for Improved Groundwater Management

Adam Pidlisecky
University of Calgary
Tara Moran
Stanford University
Rosemary Knight
Stanford University

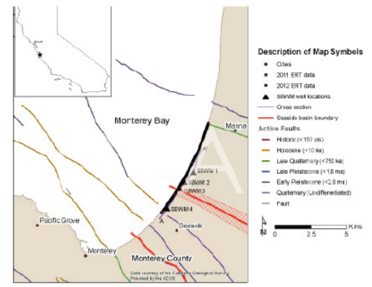
The Center for Groundwater Evaluation and Management
Stanford University

The Center for Groundwater Evaluation and Management
Stanford University

Goal: To foster integration of new and emerging technologies into local, regional and statewide groundwater management practice.

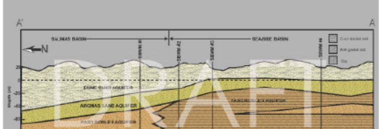
Approach: Partnering with with groundwater management districts throughout the western US to demonstrate the value of these technologies.

gemcenter.stanford.edu



Borehole based monitoring for Saltwater intrusion

- Sentinel Wells 2007
- 4 monitoring wells drilled to facilitate time-lapse logging of the aquifer to identify saltwater intrusion zones
- Wells drilled to ~ 300-400m
- Logged seasonally using resistivity logging –WHY?
- Not really early warning! Once we see it in the well it is there.



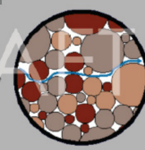
modified after Feeney 2009

Why resistivity?

- Electrical Resistivity Tomography (ERT)
- Well documented for small-scale water resource applications
- Currently used in petroleum applications – this has lead to advancement in field systems and processing approaches
- Non-invasive, fast deployment, continuous data
- 2D, 3D, and 4D imaging is possible

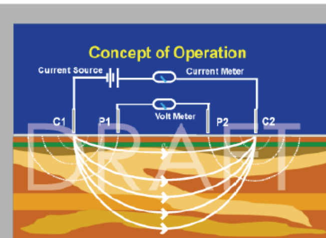
What You're Measuring: Resistivity (Ohm-m)

- Resistivity is a function of the bulk electrical properties and is sensitive to:
  - porosity
  - connectivity of pore fluid
  - pore fluid chemistry
  - lithology

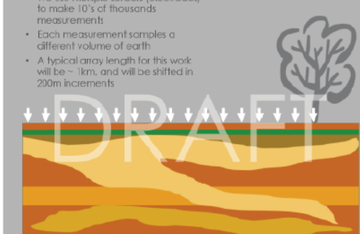


Pore fluid chemistry: Salinity

	Concentration (g/L)	Conductivity (S/m)	Resistivity (Ohm-m)
Freshwater	0.03	0.006	156
	0.1	0.02	48
	0.3	0.06	16
	1	0.2	5
	3	0.6	2
Saltwater	10	1.8	1

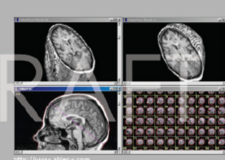


- We use multiple sensors (electrodes) to make 10's of thousands measurements
- Each measurement samples a different volume of earth
- A typical array length for this work will be ~ 1km, and will be shifted in 200m increments



Geophysical Tomography

Like medical tomography, but with much poorer resolution



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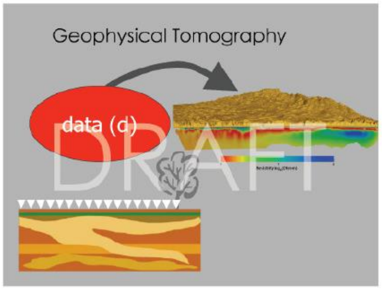
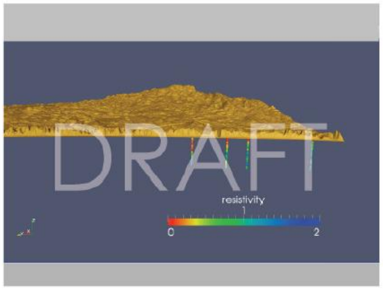

Geophysical Tomography
data (d)


Data acquisition/ Processing
Two field campaigns:
July 2011
October 2012
Total survey length: 6.8km
Acquisition Cost: $60,000


N
~8.5km


~9km

3



Conclusions

- Effective non-invasive subsurface imaging
- Improved large-scale understanding of aquifers
- Improved operational modeling
- Optimized remediation or interventions
- Lower cost and environmental impact
- Potential for long-term, spatially exhaustive monitoring

Acknowledgments

S. D. BECHTEL, JR. FOUNDATION
STEPHEN BECHTEL FUND

NSERC CRSNG

- Brad Hansen, Curtis Ferguson, Andrew Parsekian, Jan Walbrecker, Nick Odlum, Jackie Randell
- Stephen Bachman at California State Parks- Monterey Division
- Tim Jensen at Monterey Peninsula Regional Parks
- Ben Mirus and Kim Perkins, USGS

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
August 14, 2013

Attendees: TAC Members

City of Seaside – No Representative
California American Water – Eric Sabolsice (via telephone)
City of Monterey – Norm Green
Laguna Seca Property Owners – No Representative
MPWMD – No Representative
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 – Georgina King (via telephone)

Others:
None

Since he was attending by telephone rather than in person, Mr. Sabolsice requested that Mr. Franklin serve as Chair for this meeting. The meeting was called to order at 1:40 p.m.

1. **Public Comments**

There were no public comments.

2. **Administrative Matters:**

A. Approve Minutes from June 19, 2013 Meeting

Mr. Franklin said he would need to abstain from voting on the minutes from the June 19th meeting since he had not been in attendance at that meeting. As a consequence, a quorum was not present to vote on this item, so it will be continued on to the September TAC meeting for action.

B. Sentinel Well Induction Logging Results for July 2013

Mr. Jaques summarized the agenda packet materials for this item. There was no further discussion.

3. **Proposed Replenishment Assessment Unit Costs for Water Year 2014 (October 1, 2013-September 30, 2014)**

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

Mr. Sabolsice questioned whether volume-weighting was the best way to present the data. He suggested considering using a "level of opportunity" of getting water from a project as a possible approach to establishing a unit cost. For example, if a high percentage of water from a specific project was already committed to other uses, it would have a lower "level of opportunity" than a project that had a lower percentage of its water already committed to other uses.

Mr. Franklin said he felt the volume-weighted approach described in the agenda packet was best, due to the uncertainty of which projects might or might not come to fruition, and also because it imposes a higher penalty for overpumping.

Mr. Sabolsice said the replenishment assessment unit cost is supposed to be an estimate of what the Watermaster would have to pay to get replenishment water. He said that rather than using the volume-weighted approach, he would recommend using a straight average approach.

Mr. Green commented that it would be difficult to determine what cost should be used.

Mr. Franklin said he did not feel a straight average approach should be used, because this could underestimate what the actual cost will be.

Mr. Green recommended being conservative by using the highest of the unit costs.

Mr. Jaques said that a variety of approaches could be presented to the Budget and Finance Committee for its consideration.

Mr. Franklin said he would be willing to support either the volume-weighted approach which resulted in a $3,666/AF unit cost or using the highest unit cost of $4,188/AF, from the table on page 25 of the agenda packet.

Mr. Sabolsice said he would be hesitant to establish a "level of opportunity" for a project, as this could be politically sensitive. He recommended deleting the right-hand column from the table on page 25 of the agenda packet when the material is presented to the Budget and Finance Committee and also deleting the line showing the volume-weighted replenishment water cost per acre foot of $3,666. He recommended adding some language to mention that volume-weighting could be used, but that the decision should be left up to the Budget and Finance Committee. There was TAC consensus for Mr. Jaques to do this when he prepares the agenda transmittal on this item for the Budget and Finance Committee meeting.

4. HydroMetrics Scope and Cost Proposal to Perform Modeling of the Laguna Seca Subarea and MPWMD Cost Proposal to Provide Assistance to HydroMetrics on This

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

Ms. King estimated that this modeling work would take about six weeks to perform. She noted that there were probably less than 20 total wells in the Laguna Seca Subarea including Cal Am wells as well as between 8 and 10 private wells. Mr. Sabolsice estimated that Cal Am had between 6 and 8 wells in the Laguna Seca Subarea.

Mr. Franklin said he felt uncomfortable making decisions on this without direct input from MPWMD, and no one was present from MPWMD at today's meeting. He said he would prefer to delay action to a TAC meeting when MPWMD representatives are present.

Mr. Sabolsice said he felt getting the information as soon as possible would be helpful, and that this would allow the apparent errors in the Decision regarding the amount of water available for Producers to start being corrected. If MPWMD were to encounter an over-run in its cost for performing its portion of the work, the Watermaster could provide additional cost authorization at that time. He said he would like to have this item approved at today's meeting if possible.

Mr. Green said he was comfortable with approving the item at today's meeting even though MPWMD representatives were not present, because they had already provided their proposed scope of work and cost to Mr. Jaques, and it was included in the agenda packet.

Mr. Franklin said he was not at the June 19th TAC meeting when this was discussed, but based on the discussion at today's meeting he was now comfortable approving the item.

On a motion by Mr. Franklin, seconded by Mr. Green, the TAC unanimously approved the scopes of work and costs included in the agenda packet and recommended that these be presented to the Board for approval.

5. Preliminary Discussion of Potential Scope of Work for 2014 M&MP

At this point in the meeting Mr. Sabolsice said he would need to depart for another meeting and gave Mr. Franklin his proxy to vote on the remaining agenda items.

Mr. Jaques reviewed the agenda packet materials for this item and there were the following comments:

Ms. King said she agreed that no new monitoring wells would be needed, and that no further work on protective water levels needed to be done this time.

There was, however, a brief discussion on addressing sea level rise in the protective water level calculations. It was agreed that this should be discussed as a separate item at a future TAC meeting. Mr. Franklin requested that climate change in the Central Coast also be discussed under this same agenda item. Mr. Jaques asked Mr. Franklin if he could provide agenda packet material for this item, and he agreed to do so.

Mr. Jaques said he would contact HydroMetrics and MPWMD prior to the next TAC meeting to obtain their input and would present a proposed final M&MP Work Plan and Budgets at the September TAC meeting.

6. Schedule

Mr. Jaques summarized the agenda packet materials for this item. There was no further discussion. He noted that no October TAC meeting would need to be held.

7. Other Business

There was no other business.

8. Set Next Meeting Date

The next TAC meeting will be on September 11, 2013.

The meeting adjourned at 3:01 p.m.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

**** * * AGENDA TRANSMITTAL FORM * * ****

MEETING DATE:	September 11, 2013
AGENDA ITEM:	2.B
AGENDA TITLE:	MPRWA TAC Agenda Item re: Storm Water
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
The attached item was on the agenda of a recent Monterey Peninsula Regional Water Authority TAC meeting. It indicates that some discussion is in progress regarding collecting storm water and piping it to the Seaside Basin for aquifer recharge. In order to stay abreast of this matter, I will be meeting with MPWRA Executive Director Cullem in the near future to ensure that the Watermaster is included in those discussions as part of our role in managing the Basin.

ATTACHMENTS:	MPRWA TAC agenda item
RECOMMENDED ACTION:	None required – information only

Monterey Peninsula Regional Water Authority Agenda Report

Date: August 19, 2013

Item No: 4.

FROM: Executive Director Cullem

SUBJECT: Receive Update on Local Efforts for Storm Water Mitigation (Information Only)

DISCUSSION:

As requested by the TAC, this report provides an update on staff level meetings to investigate storm water runoff as a future potable water source.

On June 11, 2013, the City of Monterey sent a letter to MRWPCA with respect to the NOP for the GWR expressing concern about the ability of the sewage treatment plant to accommodate storm water flows from Peninsula jurisdictions as well as those from Salinas.

In response to the City's concerns, I have met twice with City staff to discuss ideas for diverting and recycling storm water that currently flows into areas of special biological significance (ASBS) offshore of the Monterey Peninsula.

There appears to be little question that the Peninsula communities will shortly have to collect and transfer dry weather flows, and possibly first flush runoff, to the sewage treatment plant due to their relatively high levels of contamination. However, a portion of normal winter runoff might be recycled as purple water, or better, as a source of potable water. Given current plant capacity, it is likely that it would be overwhelmed with significantly higher and cyclic storm water flows.

Unfortunately, due to the lack of rain from June to October and high demand for potable water in summer months, we have a problem of where and how to store storm water given the only sizeable storage capacity we have is the Seaside Aquifer.

Accordingly, the City staff is considering a grant request to study the feasibility of collecting and transferring cleaner portions of winter flows to the aquifer via dedicated pipelines. It is necessary to establish, as soon as possible, where they would be placed to avoid conflict with CalAm's pipeline, currently under design. Treatment required to meet State standards for injection into the aquifer would be performed at appropriate locations along the pipeline.

I have made it clear that storm water is not currently a factor in the MPWSP, and we would not want to complicate that project any further than it is already. However, storm water recycling through the Seaside Aquifer could expedite the process of refilling the aquifer, possibly allowing the community to draw more water sooner from that source. Furthermore, it might prove a viable alternative as we move past the current water supply crisis and address future growth and general plan build out.

Although I will continue to participate in future meetings on this subject at staff level, the cities will have to continue to take the lead for the foreseeable future.

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

MEETING DATE:	September 11, 2013
AGENDA ITEM:	3
AGENDA TITLE:	Discuss Issues Pertaining to HydroMetrics Work Using the Groundwater Model
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At the Board's August 7 meeting a couple of comments or requests were made by Board members, and I initially recommended that they be addressed in the 2014 M&MP as follows:

1. Once per year perform a comparison of measured monitoring well water levels with Model-predicted water levels for these same wells. From this comparison determine if the Model needs any recalibration in order to accurately predict water levels. I propose that this be added to the scope of work for the annual Seawater Intrusion Analysis Report under Task I.4.c.
2. Include the effects of predicted sea level rise in future modeling work and future reports. I propose that this be incorporated into future contract work with HydroMetrics, as appropriate.

<u>Update/Recalibrate the Model:</u> Derrik Williams of HydroMetrics has raised the points described below which warrant TAC discussion and direction, so they can be properly addressed as HydroMetrics performs its work.

Mr. Williams recommends first having a more complete discussion on what is to be checked. He points out that the model predictions are based on an assumed pumping schedule and assumed future rainfall/recharge. These may or may not be the correct pumping or rainfall for any particular year, but they are assumed to be representative of average conditions in the future. Therefore, any single predicted year will not necessarily be accurate. However, over time, accounting for variations in rainfall, these are the average responses that we would expect to occur.

Updating the Model: Model simulations run this year have Incorporated the measured pumping between 2009 and 2011. Therefore, simulated water levels between 2009 and 2011 may be closer to accurate, but the model still does not incorporate the actual rainfall and recharge measured during those years. Therefore, we should not expect the model to be necessarily accurate for those three years; and even less accurate for any subsequent year where we have not incorporated the actual rainfall or the measured pumping.

Updating the model input data will involve collecting pumping data, groundwater level data, and rainfall data. The rainfall data is used in a soil moisture budget program to estimate the amount of deep groundwater recharge applied to the model. This process is outlined in Appendix A of the 2009 Model Report. Once those data have been incorporated, the model's accuracy can be checked by comparing measured and predicted hydrographs over the period for which data are available. If the predicted groundwater elevations match, no recalibration is necessary.

Model Re-Calibration: If the comparison of measured and predicted groundwater levels shows that there is a unsatisfactory difference, the model will require recalibration.

Most models that are used for active management purposes are updated and re-calibrated every 3 – 5 years. It has been almost six years since the model was first calibrated, and even though an update of

AGENDA ITEM:	3 (Continued)

pumping and injection data was done in 2012, the rainfall data which influences recharge has not been updated. The predictive model runs thus far have been run with the acknowledgement that the results do not simulate actual basin conditions because the hydrology has not been updated, but rather simulations are relatively compared against one another.

The first model update could take place in 2014 if we want to include it in the M&MP Scope of Work and Budget. I have included it as Task I.3.a.1 of the Work Plan under item 4 on today's Agenda.

<u>Include the effects of predicted sea level rise in future modeling work and future reports</u>. Mr. Williams feels this is a bit more straightforward, but it brings up some interesting questions. At the basic level, sea level rise can be incorporated into future simulations as necessary. We can either do this when we are next asked to provide some simulations, or when/if we update the model. A secondary question is whether we should acknowledge sea level rise in our target protective groundwater elevations. If we assume that the ocean is going to rise (as an example) 8 inches in the next 25 years, should we raise all the target protective groundwater elevations by 1 foot? Optionally, we could have different protective levels for different years based on expected sea level rise. We should probably be consistent: if we include ocean level rise in our modeling, we should raise our target water levels by the appropriate amount.

At the August 14th meeting Mr. Franklin requested that climate change also be discussed under this agenda item, and he provided the attached material on this topic. The *Climate Change Handbook for Regional Water Planning* in the attached material is quite lengthy. However, I excerpted Appendix C of the document titled "Quantifying Uncertainty in Climate Change Analysis" for today's discussion.

TAC direction is requested on both of these issues, so they can be properly incorporated into the 2014 M&MP in the scope of HydroMetrics' future work.

ATTACHMENTS:	Information pertaining to climate change
RECOMMENDED ACTION:	Provide direction to the Technical Program Manager on both of these issues, so he can properly incorporate them into the M&MP Scope of Work and Budget, and any subsequent RFSs to be Issued to HydroMetrics to perform this work

U.S. Fish & Wildlife Service

National Conservation Training Center

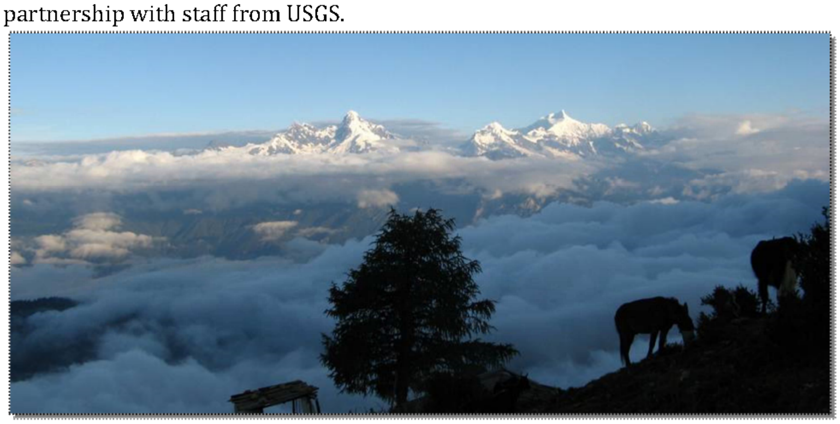
Training Announcement

Decision Analysis for Climate Change

ALC3196

Course Description

Natural resource managers are increasingly tasked with understanding climate change impacts and using this knowledge in making decisions. Yet the uncertainty inherent in evaluating climate impacts often impedes action. This 8-week online course provides participants with skills to address climate change impacts in making decisions about natural resource management. It highlights principles from *Informing Decisions in a Changing Climate* (2009) National Research Council report. Videos show techniques in structured decision making and adaptive management, and discuss how climate change affects each step in the processes. Participants work in teams on actual decision problems. As the teams use similar techniques on their different decision problems, participants observe multiple examples of on the ground application. Instructors work with teams to build expertise in climate change impacts and decision analysis. Teams develop a final report and presentation on their decision problem. The course and the entire Structured Decision Making curriculum at NCTC are developed in partnership with staff from USGS.



Objectives

At the conclusion of this course, participants should be able to:

- Understand how to frame choices to effectively integrate climate change concerns
- Engage with a team on a real-life decision addressing climate impacts
- Articulate the concept of stationarity, understand its role in traditional analysis, and appreciate the significance of its absence in climate change problems
- Learn how to classify and incorporate different types of uncertainty about system change
- Compare modes of learning about system change and understand when and how to use different approaches
- Structure a climate change adaptation decision using adaptive management

Date
January 20 - March 14, 2014

Location
Online

Who Should Attend
Natural resource managers and conservation professionals

Length
8 weeks

Tuition
There is no tuition for FWS, NPS, BLM and USGS employees. For participants from other agencies and organizations, there is a tuition charge of $200.

To Register
Register online at http://training.fws.gov using DOI Learn, the Department of the Interior's Learning Management System.

Availability
Course may be offered annually

Course Development
In partnership with staff from FWS and USGS.

Contact for Registration Questions
Jill DelVecchio at 304/876- 7424 or jill_delvecchio@fws.gov

Contact for Content Questions
Christy Coghlan at 304/876-7438 or christy_coghlan@fws.gov

Create targeted alternatives to address climate change impacts and reduce uncertainties in managing natural resources.

Climate Change Handbook for Regional Water Planning

Developed cooperatively by DWR, The U.S. Environmental Protection Agency, Resources Legacy Fund, and The U.S. Army Corps of Engineers, the Climate Change Handbook for Regional Water Planning provides a framework for considering climate change in water management planning. Key decision considerations, resources, tools, and decision options are presented that will guide resource managers and planners as they develop means of adapting their programs to a changing climate.

The handbook uses DWR's Integrated Regional Water Management (IRWM) planning framework as a model into which analysis of climate change impacts and planning for adaptation and mitigation can be integrated.

The Handbook includes:

- The science of climate change, tools and links;
- Evaluating the energy-water connection and greenhouse gas emissions;
- Assessing regional vulnerability to climate change;
- Measuring regional impacts;
- Evaluating projects, resource management strategies, and Integrated Regional Water Management Plans with respect to climate change;
- Implementing and quantifying uncertainty; and
- Case studies illustrating a range of climate change adaptation and mitigation issues within and outside of California.

Download the Handbook	**Size**
Complete Handbook	15.15 MB
Individual Report Sections	
Front Matter	1.6 MB
Section 1: Overview of IRWM Planning and Climate Change	1.7 MB
Section 2: The Science of Climate Change	1.3 MB
Section 3: Evaluating the Energy-Water Connection and Greenhouse Gas Emissions	1.5 MB
Section 4: Assessing Regional Vulnerability to Climate Change	1.3 MB
Section 5: Measuring Regional Impacts	3.8 MB
Section 6: Evaluating Projects, Resource Management Strategies, and IRWM Plan Benefits with Climate Change	1.6 MB
Section 7: Implementing Under Uncertainty	1.5 MB
Section 8: References	450 KB
Appendix A: Climate Change Literature Review (searchable Excel database)	266 KB
Appendix A: Climate Change Literature Review (PDF)	601 KB

Click here to download the "Vulnerability Assessment Checklist", quickly and easily identify how climate change could impact aspects of water resources in your region.

A very limited number of printed handbooks are available for those who are unable to download and print the handbook. Please contact: IMR Publications or call DWR Publications Office at (916) 653-1097.

Appendix B: Vulnerability Assessment Checklist	425 KB
Appendix C: Quantifying Uncertainty in Climate Change Analysis	738 KB
Appendix D: Climate Change Analysis Tools	485 KB

Current Perspectives

Principal Consultant to the California Assembly Select Committee on Regional Approaches to Addressing the State's Water Crisis, **Alf Brandt**, talks about how the ***Climate Change Handbook for Regional Water Planning*** will help push California toward more action on climate change adaptation. Read his blog post on DWR's *Current* **Perspectives** Blog.

For additional information about the handbook please contact: Andrew Schwarz (DWR) or Suzanne Marr (USEPA)

Appendix C
Quantifying Uncertainty in Climate Change Analyses

This appendix discusses the sources of uncertainty in climate change analyses and methods for addressing and quantifying uncertainty in planning studies. Probabilistic methods and scenario planning are two common methods for incorporating uncertainty into planning analyses.

Uncertainty is a feature of any planning study, whether climate change is explicitly included or not. Accounting for and disclosing uncertainty is an established component of good planning practices. In water resources planning this has traditionally included uncertainties associated with natural climate and hydrologic variability, future population and economic conditions, and future technological advances and social trends. Climate change involves added uncertainties associated with future GHG emissions conditions and the hydroclimatic response to current and future emissions as projected by numerical models. This appendix describes the sources of climate change-related uncertainty and methods for quantifying uncertainty in planning.

Types of Uncertainty in Planning

Traditional Water Resources Planning Uncertainties

Uncertainty can be a significant part of any planning study that attempts to project future conditions that are subject to random processes using tools and understanding that are imperfect. In water resources planning, traditional sources of uncertainty have included natural hydroclimate variability, imprecision in measured model input parameters, model numerical error and inaccuracies, demographic projections, technological advances and performance, and human operational decision making.

Natural hydroclimate variability is defined here as the seasonal and yearly variations in climate (precipitation and temperature) and streamflow that has been observed in historical records. This variability includes the occurrence of droughts and floods. In water resources planning, the anticipated availability of water supply, for example, is often quantified using historical records or subsets of the available record. The assumption that a limited snapshot of the past is adequate for projecting the full range of potential future conditions is clearly imperfect and therefore introduces uncertainty in the projections.

Uncertainty is also introduced to planning studies through the use of data that are inherently imperfect due to inaccuracies and/or imprecision in measurement. For example, water quality modeling studies can be particularly sensitive to error in laboratory or field measurements upon which model parameterization and calibration are based. These sensitivities lead to uncertainty in projections. Similarly, uncertainties may be introduced in hydrologic studies through the use of imperfect stage-volume or stage-flow relationships. These forms of uncertainty are generally unavoidable and may or may not warrant explicit consideration in a planning study.

Process-based numerical models are typically based on simplified mathematical representations of complex natural or anthropogenic processes. As such, they are never completely accurate and their projections of the future are not certain. For example, a watershed hydrologic model might be constructed as a series of lumped-parameter "buckets" to represent the complex surface and sub-surface physical systems. This is a simplification of the real system and many potentially important processes are neglected. Consequently, simulations of runoff response to rainfall will be uncertain, particularly for conditions that fall outside the range of typical values seen in the past. This type of uncertainty can be reduced, but not eliminated, through calibration and/or verification exercises. Additionally, an element of uncertainty can be introduced in modeling studies due to numerical error: the error associated with the numerical approximations of underlying fundamental mathematical equations. This error, and consequently the resulting uncertainty, can often be reduced through model input parameter manipulations given appropriate user expertise.

Water resources planning studies often require projections of social parameters and demographics. For example, water demand projections typically rely on population projections. Demand modeling may also include projections of economic parameters, consumptive patterns, and land use change. Clearly uncertainty exists in all of these projections of the future and must be acknowledged in a planning study.

Technology changes with time. Uncertainty over how technology will advance in the future or how existing technology will perform in the future can play a significant role in water resources planning studies. For example, water quality planning studies often assume a certain level of treatment for wastewater treatment plant effluent entering a water body. If treatment technologies improve over time, water quality could be significantly impacted.

Finally, uncertainty associated with human operational decision making on a day-to-day basis can be significant in some planning studies. For example, reservoir releases may be managed based on a variety of objective and subjective criteria. This makes it challenging to model such dynamics and adds uncertainty to estimates of future reservoir conditions.

Climate Change Uncertainties

In the science of climate change, there are uncertainties associated with the climate models themselves (sometimes called epistemic uncertainty), and uncertainties associated with how the planet will respond to future conditions (sometimes called aleatory uncertainty or variability). Both kinds of uncertainty are relevant for regional water plan decision making.

With respect to the former, upwards of 20 different general circulation models (GCMs), each from different modeling centers located around the world, are widely accepted and used in climate change studies. Each of these has multiple versions based on varying input assumptions. Differences in regional downscaling techniques applied to each of these models also add to the volume of climate model projection information available for any given location. The fact that such volume exists, representing a range of projection values, for the same projected parameter (e.g., temperature or precipitation at a given location and time horizon) is indicative of the large epistemic uncertainty in GCM projections. This uncertainty arises due to differences in both model structure (i.e., underlying mathematical equations) and input assumptions (e.g., greenhouse gas emissions or cloud cover dynamics). There is simply not enough knowledge to arrive at a consensus. We can surmise that this type of uncertainty will be reduced over time as the climate change science advances.

Aleatory uncertainty in climate change studies is attributable to the randomness of many of the critical components of the system under study and is thus not reducible. In climate change studies, the "system" starts with the global climate system. There is large uncertainty in how the global climate will respond to the accumulation of greenhouse gases in the atmosphere. There is particular uncertainty with respect to precipitation impacts and annual and seasonal variability that is effectively random. In other words, for the purposes of this document, this type of uncertainty is attributable to the unpredictability of the planet's natural system response to greenhouse gas accumulation.

Techniques for Addressing Uncertainty in Water Resources Planning Studies (With or Without Climate Change)

Addressing uncertainty, either quantitively or qualitatively, in water resources planning studies aids in the decision making process. For example, a planner may make decisions based on a worst case scenario quantified as part of uncertainty analyses. Similarly, a "margin of safety" might be implemented based on knowledge of the uncertainty in model projections. Given the significant additional uncertainty associated with climate change, addressing uncertainty in water resources planning studies is even more important now than it was in the past.

There are several techniques for incorporating uncertainty into the regional water planning process, with two categories of techniques that appear particularly well-suited for quantifying climate change uncertainty:

- **Probabilistic Methods**. These methods involve defining specific input variables in terms of probability functions. Traditionally, in water resources planning studies, probability distributions might be used to represent parameters that vary randomly in nature (or are effectively random due to the complexity of the process), such as wildlife bacterial loadings to a stream or climate fluctuations on a short time scale (e.g., daily). Additionally, probability distributions might be used to quantify a model input parameter whose value is unknown but for which a realistic range of potential values can be constructed by expert opinion. In climate change studies, this approach can be extended to address the uncertainties associated with climate change projections and capture the variability of available projections. This method can be applied at different stages of the plan development. It can be applied at the earliest stages to define temperature, precipitation and sea level rise data (described in Sections 2 and 5), and can also be applied to assess climate change impacts (described in Sections 5 and 6). The performance of a climate change strategy or group of strategies is measured in terms of joint probability functions based on the input distributions. The result of this analysis can be viewed as an overall assessment of risk and is useful for decision making.

- **Scenario Planning**. This method is widely used and simple to understand. First, several plausible scenarios of potential future conditions are defined. Then projects within a regional water plan are evaluated under these different scenarios to determine the most robust strategies.

A general description of each of these two categories of techniques is presented in the sections below. Information is provided on the data requirements and the steps necessary to complete each method. The relative strengths and limitations of incorporating each method into a regional water planning process are presented. Relevant example applications from the literature are provided. A general reference on planning methods that can be used in climate change analysis can be found in the Water Utility Climate Alliance's white paper "Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning" (WUCA 2010).

Probabilistic Methods

Probabilistic models provide a range of output, characterized by probabilities of occurrence, rather than the single projections provided by deterministic models. They require key inputs to be provided either as a range of possible discrete values or as continuous probability distribution functions, rather than as single values. Generally, output probabilities can be thought of as the "risk" of achieving a certain threshold. For example, probabilistic models could be used to quantify the risk of a water supply shortfall in a given planning horizon given past observed hydrologic conditions. This type of information can be very valuable to any decision making process.

As described in Section 5.1, combining GCM model results available in the CMIP3 dataset within a probabilistic framework, in which the projection of each GCM is given equal probability, is one method for addressing climate model uncertainty (Brown 2011). However, it is important to realize that probability distributions fit to these datasets do not strictly represent probabilities of occurrence. The data are model projections, not real observations, and (as discussed above) are subject to their own large uncertainties. Rather, the probabilities, and consequently the final planning model outcomes, represent *levels of consensus* in projective modeling (Mote et al 2011). We propose that this framework may be as useful as true risk assessment to planning decision making in the face of climate change.

The probabilistic method is prescriptive rather than adaptive—meaning once a decision is made about a strategy or group of strategies, they are fully implemented under the assumption that the strategy is the best (e.g., measured risk under a predefined threshold of acceptable risk to the decision maker) under varying future conditions. This probabilistic approach to decision making requires an explicit definition of risk tolerance. Decisions will be made based on the level of risk that different strategies represent; as such, decision makers need to be able to discriminate between different levels of risk.

***Climate-Related Risk**: The possibility of interaction of physically defined hazards with the exposed systems. Risk is commonly considered to be the combination of the likelihood of an event and its consequences – i.e., risk equals the probability of climate hazard occurring multiplied by the consequences a given system may experience. (Sometimes risk is defined as hazard exposure times 'vulnerability', where vulnerability is merely the sensitivity and adaptive capacity of the exposed system.)*

--- United Nations Development Programme 2005

Conducting the Probabilistic Analysis

Numerical probabilistic models often incorporate random, or "stochastic", sampling in the analysis. This approach can be either "parametric" or "non-parametric" in nature. For the former, continuous probability distribution functions (PDFs) are fit to input data, such as the GCM climate data (ensemble or individual model projections). The PDFs would then be sampled over multiple iterations within the analysis process. For the latter, the actual data would be sampled, without assuming an underlying distribution. This type of iterative "bootstrap" sampling with replacement is a common modeling approach for capturing variability and uncertainty in projections.

In any stochastic sampling scheme, the number of sampling iterations must be set to ensure that the output properly reflects the full range of input statistical characteristics. Additionally, it may be necessary to incorporate input data couplings or correlations in the sampling. For example, there may be an identified correlation between monthly mean temperature and monthly precipitation. In such a case, these two parameters cannot be sampled independently of each other but rather must be sampled in a way that retains the quantified correlations. Multiple software tools exist for both PDF curve fitting and stochastic sampling, including @RISK (Palisade Inc., www.palisade.com/risk/), Crystal Ball (Oracle, www.oracle.com), and Excel (Microsoft Inc.). All of these tools also allow for the presentation of results probabilistically, often as cumulative distribution functions (CDFs).

The probabilistic approach described above for sampling climate data must ultimately be linked with the final regional water plan analyses. In some cases, it may be possible to incorporate regional water plan calculations and/or models directly into a probabilistic analysis. For example, a simple regression model describing changes in demand as a function of climate parameters could be built directly into spreadsheet calculations that include probabilistic sampling of climate data. In other cases, particularly for more complicated regions, the final analysis must be performed as a separate step or series of separate steps. In this case, intermediate output may need to be generated that are then able to serve as input to the regional water plan analyses. These intermediate outputs would need to reflect the collective results of the stochastic sampling. For example, an extended (e.g., 1,000 years) stochastic time series dataset might be developed using the techniques described above, in order to serve as input to a time series planning model.

In line with the goal of probabilistic modeling, final output and/or performance metrics should be presented as a range of numbers with quantified probabilities of occurrence (or levels of model consensus, as described above). These final outputs should then support decision making in the regional planning process.

An example of a parametric probabilistic approach to quantifying climate change uncertainty can be found in the Seattle Puget Sound demand study described in Section 5 (Box 5-1). In this study, probability distribution functions were fitted to historical demand data and modified to reflect climate change based on quantified regression "elasticities" that isolate the relationship between demand and climate variables. Future climate conditions were quantified using an ensemble of multiple GCM projections. Monte Carlo sampling of the input distributions were used to generate output cumulative probability distribution functions (CDFs).

An example of a non-parametric probabilistic analysis to address climate change uncertainty can be found in Cox et al. 2011. In this water supply study for the City of Santa Fe (NM), output from six different GCM models were pooled for two different emission scenarios. All of the GCM data corresponded to a single future planning horizon (2050 – 2070). The combined climate data were sampled randomly as two sets of pooled discrete data, rather than fitting a continuous PDF to the data. Significant month to month correlations in temperature were identified and incorporated into the random sampling. The results of the sampling were two sets (for each of the two emission scenarios) of 1000 year synthetic timeseries of monthly precipitation and temperature data that captured a large range of GCM projection variability. These data were used to seed hydrologic models that ultimately provided performance metrics (e.g., annual surface water supply delivery) in the form of probabilistic percentile curves.

Strengths and Weaknesses of Probability Analysis

The strengths of probabilistic modeling relate to the direct handling of model uncertainties and in the presentation of risk-based results. The structure of probabilistic models allows the user to input a range of values for a given parameter, with associated confidence levels, to reflect the uncertainty surrounding the parameter. These uncertainties are then compounded in the analysis with final output reflecting the combined impact of the individual parameter uncertainties. The compounded uncertainties are presented as risk levels associated with a specific performance metric, an appealing framework for both planners and regulators.

The primary weakness of the approach is that it often requires a significantly higher level of expertise compared to deterministic modeling and may require additional analytical tools and software. Additionally, data requirements are generally greater than deterministic methods, in order to support the parameterization of probabilistic inputs.

Finally, the fact that the output of the analysis is probabilistic requires the ability to interpret probabilistic information not only by the analyst but also by decision makers. In order to facilitate the interpretation of probabilistic results by decision makers, some output simplification may be required and the use of some interpretive charts and tables will be necessary. The technical analysts need to pay particular attention in these simplification steps to still preserve the relevant uncertainty in the output and the key characteristics of it. Usually, relevant information for decision makers is presented in the shape of a distribution, or its tail ends (extreme conditions).

The use of only an average to characterize the probabilistic value of an output of interest (e.g., water supply deficit) runs the risk oversimplifying the problem and making it look deterministic, with important implications for decision making.

Scenario Planning

Scenario planning is widely used and simple to understand, and it is similar to Robust Decision Making, described in Section 7. This method fully defines several potential “futures” (i.e., scenarios). Strategies are then evaluated under these different scenarios to determine the most robust strategy. For instance, one scenario might consist of future conditions that are warmer and wetter than current conditions, while another might consist of future conditions that are much warmer and drier than current conditions. The strategies’ performance is compared under all scenarios. Then each strategy can be evaluated for its performance under different climate conditions. A strategy that performs well under all scenarios would likely be preferred. Scenario analysis also provides good information for choosing “no regrets” strategies, meaning strategies that provide benefits across all scenarios of future conditions.

With this method, there typically is no quantitative assessment of probability for the selected scenarios, but in many cases a weight can be assigned to different scenarios representing the collective professional judgment about the credibility of the scenarios.

Section 5.2.2 describes how climate change scenarios can be developed using discrete climate model projections or an ensemble of climate projections.

Conducting the Scenario Planning Analysis

Scenario planning requires the planner to conduct a series of workshops with stakeholders and decision makers in addition to technical analysts. Developing the planning scenarios is typically a group exercise that takes place over a number of working sessions. Generally, the scenario definition process involves the following steps:

1. Understanding the system (e.g., watershed or region) and driving forces behind the variables of interests;
2. Identifying the key uncertain variables (e.g., future atmospheric temperature and precipitation) that define the range of unexpected future conditions that stakeholders wish to explore and ranking these variables in order to define a manageable number of scenarios;
3. Identifying the range of expected future conditions that stakeholders wish to explore;
4. Combining uncertainties to create a scenario table, and then describing these scenarios; and
5. Defining a pathway to each scenario.

The key elements of each step are described below:

1. Understanding the system and driving forces. Planners need to define those variables, independent of climate change, that drive the behavior of the region. For example, water demands for a region may be driven mostly by population growth and agricultural use. These driving forces are related to climate change but the climate change variables are not the emphasis of this scenario planning step. In this step of the process, brainstorming (often in interviews or stakeholder workshops) is commonly used to capture the full spectrum of driving forces before they are assessed.
2. Identifying key uncertainty variables. During this step of scenario planning, the key variables driving climate change uncertainty (e.g., sea level rise, temperature, or precipitation) are identified by the analysis team (experts) and presented to stakeholders. These key variables should be ranked and will be directly associated with the development of scenarios.
3. Identifying the range of expected future conditions that stakeholders wish to explore. Individual stakeholders may be acutely concerned about specific future conditions that could be detrimental to their interests. For instance, a salmon fisherman may be specifically concerned about extremely hot and dry future conditions that would stress salmon populations by decreasing streamflow and increasing the temperature of rivers. Alternatively, a floodplain manager maybe more concerned about future conditions that are cool and wet. Thus, the scenarios must incorporate a range of potential future conditions that meet the needs of stakeholders.
4. Combining uncertainty to create scenarios. Some of the literature recommends reducing the number of key variables to two, so that a 2 by 2 matrix of scenarios can be developed (WUCA 2009), which in traditional planning (including water resources planning) has proven to be adequate. This 2 by 2 matrix might consist of two scenarios for population growth (high and low) and two scenarios for land use trends (expansive development and compact development).

When climate change uncertainties are added to the analysis, another dimension is added to the matrix, significantly expanding the required analysis. In addition, it is difficult to adequately cover the range of uncertainty in climate change projections without analyzing multiple scenarios. Climate change projections typically output two important variables for water resource planning: temperature and precipitation. These two outputs vary independently, thus at least four scenarios are necessary to describe potential extreme results of climate change. A further scenario is necessary to describe a mean or median climate change scenario.

Combining variables of uncertainty in this case may be better represented by a tree than a two-dimensional matrix. Figure C-1 illustrates the difference between the 4-scenario matrix and the multiple scenario tree.

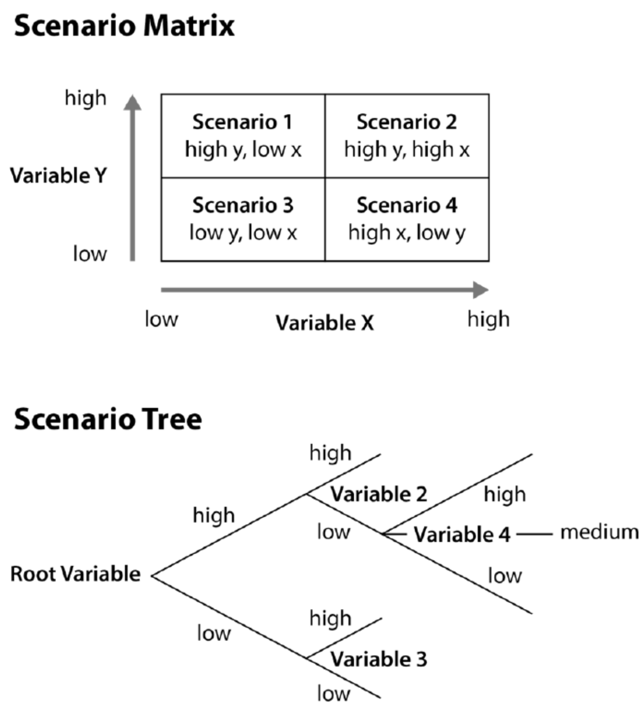


Figure C-1. Scenario Matrix vs Scenario Tree. Source: WUCA 2010.

Each branch of the tree needs to be thoroughly described by the planning group. A short document consisting of one or several paragraphs is typically written to describe each scenario, so that every decision maker is clear about them. A simple figure or table is usually insufficient to clearly describe a scenario and can result in different interpretations by different stakeholders.

5. <u>Defining Pathways</u>. The description of scenarios is followed by the definition of the pathway to each scenario (how the system transitions from today to the state described by the scenario, in the time frame included in the planning horizon). Defining pathways may be conducted in a workshop setting where the stakeholder group plots

independent pathways, each representing a sequence of strategies and projects, that would be necessary to realize each unique scenario based upon its specific characteristics and issues. Despite differences among the developed pathways, similarities and overlaps will occur; this commonality indicates which projects and programs would be most viable over time. This step is critical in decision making since it will provide the information necessary to define projects and strategies that can help change the outcome of the system performance under each scenario path.

6. Evaluating Alternative Plans. Once all scenarios are clearly defined, the different strategies and projects included in a regional water plan can be evaluated under each scenario. This evaluation is not a probabilistic evaluation; rather, it is a deterministic evaluation given that the uncertainty variables have been defined by a deterministic value for each scenario. That simplifies the analysis under each scenario, as compared to a probabilistic analysis. Depending on the number of scenarios, however, the overall effort of scenario planning compared to the effort in a probabilistic analysis may be similar or greater.

   The performance of alternative plans and strategies can be evaluated in two different ways under scenario planning: given a scenario, the performance metrics of the plan are better or worse compared to other plans and strategies. Alternatively, the path to arrive at a given scenario is modified after applying a set of plans and strategies, and the resulting potential future is transformed positively. In other words, the scenario itself is impacted by a strategy and the future that it describes is better than in the original scenario. These two different methods to evaluate performance are valid and will be dictated by the variables used to define the scenarios, and whether or not the analysis allows for feedback between variables and the strategies being tested.

   In most cases for regional water plans, the analysis will be more practical if strategies are analyzed in terms of the set of performance metrics under each scenario, without consideration to how a scenario could change based on the implementation of strategies. Various methodologies for performing this analysis are described in Section 5.

7. Decision Making. In the decision making step, consideration can be given to the different likelihood of the scenarios being used. In the scenario tree in Figure 7-2 (or the cells in the matrix in that figure), a weight for each tree branch can be assigned. The weight should not be confused with probability since probability implies a mathematical dimension that is not there in the simplified weight value. The weight of the scenarios can be valued to represent the professional judgment of the group in terms of the likelihood of the different scenarios. This weighted information can be then used in ranking the performance of the strategies and plans. Additional methodologies for performing this step are described in section 6.

   In the decision making step, projects and strategies are selected that work well under a range of scenarios. These projects and strategies are sometimes referred to as "no-regret solutions" or "co-benefit" solutions.

Strengths and Weaknesses of Scenario Planning

Some of the strengths of scenario planning are related to the amount of data required for the analysis, compared to the data required in the probability analysis. Given that no specific probabilities are necessary for the scenarios and that the variables of interest don't require a probabilistic output, the analysis can be conducted with less sophisticated tools.

Another significant strength of scenario planning is that the process to develop scenarios is very valuable as a learning process for stakeholders and decision makers. Stakeholders involved in the development of scenarios will learn about the key uncertain variables and better understand how uncertainties can play a role in shaping potential futures. When done correctly, scenario development is usually accompanied by some significant discussion about the system and the system's behavior to different triggers, so the learning for stakeholders and decision makers goes beyond the climate change impacts. They usually gain a greater understanding of the system structure and responses independent of climate change.

Scenario planning is useful when the management strategies and projects do not have great flexibility. For example, if the main options on the table to achieve regional objectives are related to large scale infrastructure, the phasing of that infrastructure may not be very flexible. When the actions that can be taken, or projects that can be implemented, are smaller or more flexible in nature (e.g., different levels of reservoir releases, or small scale best management practices for water quality management) adaptive management may be a stronger option.

One of the weaknesses of scenario planning is the heavy emphasis on the development of scenarios compared to the effort involved in evaluating the performance of the actual decisions under each scenario. In other words, scenario planning in some cases may fall short in the analytical elements necessary to make decisions in light of the scenarios developed. Another weakness of scenario planning, when resources are limited for it, is that the number of scenarios are reduced to just a handful. In these cases, the number of scenarios may be insufficient to adequately frame the universe of potential futures.

Combining Emissions Scenarios

A particular aspect of planning projects with climate change analysis where probabilistic methods can be combined with scenario planning is the handling of carbon emission scenarios in the technical analysis.

Several studies using GCM projections have developed ensemble GCM projections by combining projections that use different emissions scenarios (Chung et al 2009). However, some studies maintain the emission scenarios separate and avoid the ensemble averaging of them (Cox et al 2010). Combining scenarios inherently assumes that each scenario is equally likely. This can be appropriate as long as the assumption is understood by all decision makers. For planning horizons beyond 2050, planners may consider maintaining separation in the emission scenarios.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

**** * * AGENDA TRANSMITTAL FORM * * ****

MEETING DATE:	September 11, 2013
AGENDA ITEM:	4
AGENDA TITLE:	Approve Work Plan for FY 2014 Management and Monitoring Program (M&MP) and FY 2014 and 2015 M&MP Operations and Capital Budgets
PREPARED BY:	Robert Jaques

The Schedule calls for the TAC to approve the proposed Management and Monitoring Program (M&MP) Work Plan and Budgets at its September 2013 meeting. Attached are the proposed M&MP 2014 Work Plan, and the proposed M&MP Operations and Capital Budgets for 2014 and 2015. The Board has asked that two-year budgets be developed to alert the Board to any appreciable changes in scope and/or cost that the TAC anticipates in near future years.

The M&MP 2014 Work Plan which is attached reflects revisions resulting from the TAC's discussion when it reviewed the Draft M&MP 2013 Work Plan at its August 14, 2013 meeting, as well as subsequent input from HydroMetrics and MPWMD.

Changes in costs from the draft version contained in the August 14 agenda packet are:

<u>Task M.1.c & M.1.d:</u> This was increased to $7,000 because more agenda items require HydroMetrics participation in TAC and Board meetings.

<u>Task I.2.b.2:</u> This was decreased to $5,176 because all the dataloggers have now been installed. An additional replacement datalogger was included this year since there are now more dataloggers in our system.

<u>Task I.2.b.3:</u> This was decreased by $1,000 because retrofitting to use the low-flow purge sampling approach has been completed. The amount included to repair or replace the sampling equipment was increased to $1,000 since there are now more wells equipped with this equipment.

<u>Task I.3.a.1</u>: This is a new task, based on a recommendation made by a Board member.

As shown in the attachments, the proposed 2014 M&MP Operations Budget is $10,344 lower than the 2013 Budget. This is largely because several tasks were completed in 2013 and therefore did not need to be included in the 2014 Budget.

I am not recommending that any new monitoring wells be installed in either 2014 or 2015. Consequently, it is proposed that no monies be budgeted in the M&MP Capital Budgets for either 2014 or 2015.

Following TAC approval of the Work Plan and Budgets, they will be forwarded to the Board for their approval at the Board's October 2013 meeting.

ATTACHMENTS:	• Proposed 2014 M&MP Work Plan • Proposed 2014 and 2015 M&MP Operations Budgets • Proposed 2014 and 2015 M&MP Capital Budgets
RECOMMENDED ACTION:	Approve, or make changes to, the attached Work Plan and Budgets, and recommend that the Board approve the 2014 Work Plan and 2014 Operations and Capital Budgets

Seaside Groundwater Basin Management and Monitoring Program
FY 2014 Work Plan

The tasks outlined below are those that are anticipated to be performed during 2014. Some Tasks listed below are specific to 2014, while others Tasks recur throughout the program, such as data collection and database entry, and Program Administration Tasks.

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

M.1 Program Administration

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

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

I. 2. a. Database Management	
I. 2. a. 1 **Conduct Ongoing Data Entry and Database Maintenance/ Enhancement** **($11,724)**	The database will be maintained by a Consultant (MPWMD) performing this work for the Watermaster. MPWMD will enter new data into the consolidated database, including water production volumes, water quality and water level data, and such other data as may be appropriate. Another Consultant will periodically post database information to the Watermaster's website, so it will be accessible to the public and other interested parties. No enhancements to the database are anticipated during 2014.
I. 2. a. 2 **Verify Accuracy of Production Well Meters** **($0)**	To ensure that water production data is accurate, the well meters of the major producers were verified for accuracy during 2009. No additional work of this type is anticipated during 2014.
I. 2. b. Data Collection Program	
I. 2. b. 1 **Site Representation and Selection. ($0)**	The monitoring well network review that was started in 2008 has been completed, and sites have been identified where future monitoring well(s) could be installed, if it is deemed necessary to do so in order to fill in data gaps. No further work of this type is anticipated in 2014.
I. 2. b. 2 **Collect Monthly Manual Water Levels. ($5.176)**	Each of the monitoring wells will be visited on a monthly basis. Water levels will be determined by either taking manual water levels using an electric sounder, or by dataloggers. Pursuant to the Management and Monitoring Program approved by the Court in 2006, in 2013 wells at 2 additional sites in the Laguna Seca Subarea were equipped with dataloggers taking measurements in two aquifers at each site. Included in the cost for this Task is the purchase of two replacement dataloggers @ $500.
I. 2. b. 3 **Collect Quarterly Water Quality Samples.** **($47,738)**	Water quality data will be collected quarterly from certain of the monitoring wells. In 2012 water quality analyses were expanded to include barium and iodide ions, to determine the potential benefit of performing these additional analyses. These two parameters have been useful in analyzing seawater intrusion potential in other vulnerable coastal groundwater basins, and are briefly mentioned in the Watermaster's annual Seawater Intrusion Analysis Reports. These parameters were added to the annual water quality sampling list for the four Watermaster Sentinel wells (SBWM-1, SBWM-2, SBWM-3, and SBWM-4), and also for the 3 most coastal MPWMD monitoring wells (MSC, PCA, and FO-09). Barium and iodide analyses will continue being performed in 2014. Water quality data may come from water quality samples that are taken from these wells and submitted to a State Certified analytic laboratory for general mineral and physical suite of analyses, or the data may come from induction logging of these wells and/or other data gathering techniques. The Consultant selected to perform this work will make this judgment based on consideration of costs and other factors. Under this Task in 2013 retrofitting to use the low-flow purge approach for getting water quality samples was completed on the wells that are sampled. This sampling equipment sits in the water column and may periodically need to be replaced or repaired. $1,000 is included in the cost of this Task for performing ongoing maintenance and/or replacement of the sample collection equipment.
I. 2. b. 4 **Update Program Schedule and Standard Operating Procedures.** **($0)**	All recommendations from prior reviews of the data collection program have been implemented. No additional work of this type is anticipated in 2014.
I. 2. b. 5.	An additional monitoring well was installed in 2009. No further work of this type is

Monitor Well Construction ($0)	anticipated in 2014.
I. 2. b.6 Reports ($5,448)	The groundwater level and quality monitoring will be conducted on a monthly, quarterly, and annual basis, as described in the Consultant's Scope of Work. Reports summarizing data collected and analyzed will be submitted to the Watermaster on a schedule to be established during the year, and will consist of: One combined report summarizing the water production data and summarizing and analyzing the water quality and water level data from the 1st & 2nd Quarters of the Water Year. One annual report summarizing the water production data and summarizing and analyzing the water quality and water level data from the 3rd & 4th Quarters of the Water Year, and containing tables consolidating the data from the quarterly reports and a narrative summarization of the findings, conclusions, and recommendations from the quarterly reports. This annual report may include, as attachments, each of the quarterly reports.

I. 3 Basin Management

I. 3. a. Enhanced Seaside Basin Groundwater Model (Costs listed in subtasks below)	The Watermaster and its consultants use a Groundwater Model for basin management purposes.
I.3.a.1 Update the Existing Model ($30,000)	The existing Model, described in the report titled "Groundwater Flow and Transport Model" dated October 1, 2007, was updated in 2009 in order to develop protective water levels, and to evaluate replenishment scenarios and develop answers to Basin management questions (Tasks I.3.a.2 and I.3.a.3). During 2014 the accuracy of the model will be updated by incorporating recent pumping data, groundwater level data, and rainfall data into the model. The model output will then be checked to see if the recently simulated groundwater levels match the recently measured groundwater levels. If they match well, no further work will be needed. If the simulated and measured groundwater levels start to diverge, some model recalibration will be needed. The amount budgeted for this task is a maximum anticipated cost, and includes the following costs for each of these steps: Step1: Update the model and check its accuracy - $10,000 Step 2: Recalibrate the model - $15,000 Step 3: Prepare report describing the work that was done - $5,000 If Step 1 finds that the model is accurate as-is, Steps 2 and 3 will not be performed and the cost for this task will be considerably less than $30,000.
I. 3. a. 2 Develop Protective Water Levels ($0)	A series of cross-sectional models was created in 2009 in order to develop protective water levels for selected production wells, as well as for the Basin as a whole. This work is discussed in Hydrometrics' "Seaside Groundwater Basin Protective Water Elevations Technical Memorandum." In 2013 further work was started to refine these protective water levels, but it was found that the previously developed protective water levels were reasonable. No further work of this type is anticipated in 2014.
I. 3. a. 3 Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions ($25,000)	In 2009 the updated Model was used to evaluate different scenarios to determine such things as the most effective methods of using supplemental water sources to replenish the Basin and/or to assess the impacts of pumping redistribution. This work is described in HydroMetrics' "Seaside Groundwater Basin Groundwater Model Report." In 2010, and again in 2013, HydroMetrics used the updated Model to develop answers to some questions associated with Basin management. If requested by the Watermaster additional work may be performed in 2014 to answer additional questions.

I. 3. b. **Complete Preparation of Basin Management Action Plan ($0)**	The Watermaster's Consultant completed preparation of the Basin Management Action Plan (BMAP) in February 2009. The BMAP serves as the Watermaster's long-term seawater intrusion prevention plan. The Sections that are included in the BMAP are: Executive Summary Section 1 – Background and Purpose Section 2 – State of the Seaside Groundwater Basin Section 3 – Supplemental Water Supplies Section 4 –Groundwater Management Actions Section 5 – Recommended Management Strategies Section 6 – References The only work which may be performed on the BMAP in 2014 is discussed under Task I. 3. c.
I. 3. c. **Refine and/or Update the Basin Management Action Plan ($25,000)**	During 2014 it may be beneficial to update the BMAP based on new data, and/or knowledge that is gained from the work described under Tasks I. 3. a. 2 and/or I. 3. a. 3. Such work might involve issues pertaining to Basin storage capacity, water storage rights, or pumping redistribution strategies. This work has been scheduled and budgeted in several of the preceding years, but not all of the information needed to update the BMAP was available at those times. Therefore, the updating has been rescheduled to potentially occur in 2014. This task is included primarily for budgeting purposes in the event such work is deemed necessary.
I. 3. d. **Evaluate Coastal Wells for Cross-Aquifer Contamination Potential ($0)**	If seawater intrusion were to reach any of the coastal wells in any aquifer, and if a well was constructed without proper seals to prevent cross-aquifer communication, or if deterioration of the well had compromised these seals, it would be possible for the intrusion to flow from one aquifer to another. An evaluation of this was completed in 2012 and is described in MPWMD's Memorandum titled "Summary of Seaside Groundwater Basin Cross-Aquifer Contamination Wells Investigation Process and Conclusions" dated August 8, 2012. This Memorandum did not recommend performing any further work on this matter at this time, other than to incorporate into the Watermaster's Database data from wells that were newly identified by the work performed in 2012. That data has now been incorporated into the Database, and no further work of this type is anticipated in 2014.

I. 4 Seawater Intrusion Response Plan (formerly referred to as the Seawater Intrusion Contingency Plan)

I. 4. a. **Oversight of Seawater Intrusion Detection and Tracking ($4,664)**	Consultants will provide general oversight over the Seawater Intrusion detection program.
I. 4. b. **Focused Hydrogeologic Evaluation ($0)**	A Consultant will compile historical and current water quality data in the coastal area to provide more in-depth evaluation of conditions in the shallow Dune Sand/Aromas Sand aquifer in the vicinity of the Sand City Public Works well, where unique water quality conditions and variability have recently been observed as discussed at TAC meetings. It was found that no historical water quality data from Cal Am's now-abandoned wells existed, and consequently it was not possible to answer the question of why water quality in the Sand City Public Works well differs from water quality in other wells in the Basin. The Sand City desalination plant could be affecting water quality in this area, but without the prior water quality data from now-abandoned wells, this could not be determined. The results of this work were summarized in 2013 in a brief Technical Memorandum with conclusions and recommendations, and no further work of this type is planned.

I. 4. c. **Annual Report- Seawater Intrusion Analysis ($25,750)**	At the end of each water year, a Consultant will reanalyze all water quality data. Semi-annual chloride concentration maps will be produced for each aquifer in the basin. Time series graphs, trilinear graphs, and stiff diagram comparisons will be updated with new data. The annual EM logs will be analyzed to identify changes in seawater wedge locations. All analyses will be incorporated into an annual report that follows the format of the initial, historical data report. Potential seawater intrusion will be highlighted in the report, and if necessary, recommendations will be included. The annual report will be submitted for review by the TAC and the Board. Modifications to the report will be incorporated based on input from these bodies, as well as Watermaster staff.
I. 4. d **Complete Preparation of Seawater Intrusion Response Plan ($0)**	The Watermaster's Consultant (HydroMetrics) completed preparation of the long-tem Seawater Intrusion Response Plans (SIRP) in February 2009. The Sections that are included in the SIRP are: Section 1 – Background and Purpose Section 2 – Consistency with Other Documents Section 3 – Seawater Intrusion Indicators and Triggers Section 4 –Seawater Intrusion Contingency Actions Section 5 - References No further work on the SIRP is anticipated in 2014.
I. 4. e. **Refine and/or Update the Seawater Intrusion Response Plan ($0)**	At the beginning of 2009 it was thought that it might be beneficial or necessary to perform work to refine the SIRP and/or to update it based on new data or knowledge that was gained subsequent to the preparation of the SIRP. However, this did not prove to be necessary, and no further work of this type is anticipated in 2014.
I. 4. f. **If Seawater Intrusion is Determined to be Occurring, Implement Contingency Response Plan ($0)**	The SIRP will be implemented if seawater intrusion, as defined in the Plan, is determined by the Watermaster to be occurring.

Management and Monitoring Plan Operations Budget
For Tasks to be Undertaken in 2014

Task	Subtask	Sub-Subtask	Cost Description	CONSULTANTS & CONTRACTORS[3] MPWMD	Private Consultants	Contractors	Total	Comparative Costs from 2013 Budget
Labor								
			Technical Project Manager	$0	$60,000	$0	$60,000	$60,000
M.1 Program Administration								
	M.1.a		Project Budget and Controls	$0	$0	$0	$0	$0
	M.1.b		Assist with Board and TAC Agendas	$0	$0	$0	$0	$0
	M.1.c & M.1.d		Preparation for and Attendance at Meetings[8]	$0	$7,000	$0	$7,000	$5,500
	M.1.e		Peer Review of Documents and Reports[8]	$0	$3,100	$0	$3,100	$3,100
	M.1.f		QA/QC	$0	$0	$0	$0	$0
I.1 Initial Phase 1 Monitoring Well Construction (Task Completed in Phase 1)								
I.2 Production, Water Level and Quality Monitoring								
	I. 2. a.		Database Management					
		I. 2. a. 1.	Conduct Ongoing Data Entry/ Database Maintenance/Enhancement	$9,324	$2,400	$0	$11,724	$11,724
		I. 2. a. 2.	Verify Accuracy of Production Well Meters	$0	$0	$0	$0	$0
	I. 2. b.		Data Collection Program					
		I. 2. b. 1.	Site Representation and Selection[7]	$0	$0	$0	$0	$0
		I. 2. b. 2.	Collect Monthly Water Levels[6]	$5,176	$0	$0	$5,176	$7,076
		I. 2. b. 3.	Collect Quarterly Water Quality Samples[1][5][6]	$32,238	$0	$15,500	$47,738	$48,738
		I. 2. b. 4.	Update Program Schedule and Standard Operating Procedures.	$0	$0	$0	$0	$0
		I. 2. b. 5.	Monitor Well Construction[7]	$0	$0	$0	$0	$0
		I. 2. b. 6.	Reports	$3,948	$1,500	$0	$5,448	$5,448
I.3 Basin Management								
	I. 3. a.		Enhanced Seaside Basin Groundwater Model	(Costs Shown in Subtasks Below)				
		I. 3. a. 1	Update the Existing Model	$0	$30,000	$0	$30,000	$0
		I. 3. a. 2	Develop Protective Water Levels	$0	$0	$0	$0	$25,000
		I. 3. a. 3	Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions[11]	$0	$25,000	$0	$25,000	$25,000
	I. 3. b.		Complete Preparation of Basin Management Action Plan	$0	$0	$0	$0	$0
	I. 3. c.		Refine and/or Update the Basin Management Action Plan [11]	$0	$25,000	$0	$25,000	$25,000
	I. 3. d		Evaluate Coastal Wells for Cross-Aquifer Contamination Potential	$0	$0	$0	$0	$4,700
I.4 Seawater Intrusion Contingency Plan								
	I. 4. a.		Oversight of Seawater Intrusion Detection and Tracking	$2,664	$2,000	$0	$4,664	$4,664
	I. 4. b.		Provide focused area hydrogeologic investigation for Sand City Public Works	$0	$0	$0	$0	$7,520
	I. 4. c.		Annual Report- Seawater Intrusion Analysis	$0	$25,750	$0	$25,750	$25,750
	I. 4. d.		Complete Preparation of Seawater Intrusion Response Plan[2]	$0	$0	$0	$0	$0
	I. 4. e.		Refine and/or Update the Seawater Intrusion Response Plan[2] [9]	$0	$0	$0	$0	$0
	I. 4. f.		If Seawater Intrusion is Determined to be Occurring, Implement Contingency Response Plan[2]	(No Costs are Included for This Task, as This Task Will Likely Not be Necessary During 2014. If it Does Become Necessary, Use of Contingency Funds or a Budget Modification Will Likely be Necessary)				
			TOTALS CONSULTANTS & CONTRACTORS	**$53,350**	**$181,750**	**$15,500**		
			SUBTOTAL not including Technical Program Manager =				$190,600	$199,220
			Contingency (not including Technical Program Manager) @ 20%[4]=				$38,120	$39,844
			Technical Program Manager =				$60,000	$60,000
			TOTAL=				**$288,720**	$299,064

Footnotes:

(1) An outside contractor would be used to perform the induction logging, and potentially to also collect some water quality samples in conjunction with doing the induction logging. MPWMD is expected to perform portions of the work of this Subtask, and will be the party that subcontracts with the Contractor to perform the induction logging and sample collection work on certain of the wells.

(2) The response plan would only be implemented in the event sea water intrusion is determined to be occurring.

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

(4) Due to the uncertainties of the exact scopes of some of the Tasks listed above at the time of preparation of this Budget, e.g. Tasks I.3.a and I.3.c, it is recommended that a 20% Contingency be included in the Budget.

(5) Includes $1,000 to maintain equipment previously installed for this purpose. Also includes lab costs to analyze for barium and iodide ions in certain of these wells as was done in preceding years beginning in 2012.

(6) Does not include costs for MPWMD to collect water level data or water quality samples from wells other than those that are part of the basic monitoring well network, i.e. for private well owners who have requested that the Watermaster obtain this data for them. Costs to obtain that data are to be reimbursed to the Watermaster by those well owners, so there should be no net cost to the Watermaster for that portion of the work under these Tasks.

(7) No additional monitoring well is expected to be constructed in 2014.

(8) For HydroMetrics to provide hydrogeologic consulting assistance to the Watermaster, beyond that associated with performing other Tasks, when requested to do so by the Technical Program Manager.

(9) If work under this Task is found to be necessary, it will be funded through the Contingency line item in this Budget.

(10) Does not include funds for Database enhancement, as it is assumed that all desired enhancements have already been made.

(11) If necessary to reflect knowledge gained from modeling work or other data sources. Provides funds for work originally budgeted in prior years, but which has been rescheduled to 2014.

Management and Monitoring Plan Operations Budget
For Tasks to be Undertaken in 2015[12]

Task	Subtask	Sub-Subtask	Cost Description	CONSULTANTS & CONTRACTORS[3]			Total
				MPWMD	Private Consultants	Contractors	
Labor							
			Technical Project Manager	$0	$60,000	$0	$60,000
M.1 Program Administration							
	M.1.a		Project Budget and Controls	$0	$0	$0	$0
	M.1.b		Assist with Board and TAC Agendas	$0	$0	$0	$0
	M.1.c & M.1.d		Preparation for and Attendance of at Meetings[8]	$0	$7,210	$0	$7,210
	M.1.e		Peer Review of Documents and Reports[8]	$0	$3,193	$0	$3,193
	M.1.f		QA/QC	$0	$0	$0	$0
I.1 Initial Phase 1 Monitoring Well Construction (Task Completed in Phase 1)							
I.2 Production, Water Level and Quality Monitoring							
	I. 2. a.		Database Management				
		I. 2. a. 1.	Conduct Ongoing Data Entry/ Database Maintenance/Enhancement	$9,604	$2,472	$0	$12,076
		I. 2. a. 2.	Verify Accuracy of Production Well Meters	$0	$0	$0	$0
	I. 2. b.		Data Collection Program				
		I. 2. b. 1.	Site Representation and Selection[7]	$0	$0	$0	$0
		I. 2. b. 2.	Collect Monthly Water Levels[6]	$5,331	$0	$0	$5,331
		I. 2. b. 3.	Collect Quarterly Water Quality Samples[1][5][6]	$33,205	$0	$15,965	$49,170
		I. 2. b. 4.	Update Program Schedule and Standard Operating Procedures.	$0	$0	$0	$0
		I. 2. b. 5.	Monitor Well Construction[7]	$0	$0	$0	$0
		I. 2. b. 6.	Reports	$4,066	$1,545	$0	$5,611
I.3 Basin Management							
	I. 3. a.		Enhanced Seaside Basin Groundwater Model	(Costs Shown in Subtasks Below)			
		I. 3. a. 1	Update the Existing Model	$0	$0	$0	$0
		I. 3. a. 2	Develop Protective Water Levels[13]	$0	$0	$0	$0
		I. 3. a. 3	Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions[13]	$0	$25,000	$0	$25,000
	I. 3. b.		Complete Preparation of Basin Management Action Plan	$0	$0	$0	$0
	I. 3. c.		Refine and/or Update the Basin Management Action Plan [11][13]	$0	$25,000	$0	$25,000
	I. 3. d		Evaluate Coastal Wells for Cross-Aquifer Contamination Potential[14]	$0	$0	$0	$0
I.4 Seawater Intrusion Contingency Plan							
	I. 4. a.		Oversight of Seawater Intrusion Detection and Tracking	$2,744	$2,060	$0	$4,804
	I. 4. b.		Analyze and Map Water Quality from Coastal Monitoring Wells	(Costs Included Under I.4.a)			
	I. 4. c.		Annual Report- Seawater Intrusion Analysis	$0	$26,523	$0	$26,523
	I. 4. d.		Complete Preparation of Seawater Intrusion Response Plan[2]	$0	$0	$0	$0
	I. 4. e.		Refine and/or Update the Seawater Intrusion Response Plan[2][9]	$0	$0	$0	$0
	I. 4. f.		If Seawater Intrusion is Determined to be Occurring, Implement Contingency Response Plan[2]	(No Costs are Included for This Task, as This Task Will Likely Not be Necessary During 2014. If it Does Become Necessary, Use of Contingency Funds or a Budget Modification Will Likely be Necessary)			
			TOTALS CONSULTANTS & CONTRACTORS	**$54,951**	**$153,003**	**$15,965**	
SUBTOTAL not including Technical Program Manager =							$163,918
Contingency (not including Technical Program Manager) @ 20%[4]=							$32,784
Technical Program Manager							$60,000
TOTAL=							**$256,702**

Footnotes:

(1) An outside contractor would be used to perform the induction logging, and potentially to also collect some water quality samples in conjunction with doing the induction logging. MPWMD is expected to perform portions of the work of this Subtask, and will be the party that subcontracts with the Contractor to perform the induction logging and sample collection work on certain of the wells.

(2) The response plan would only be implemented in the event sea water intrusion is determined to be occurring.

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

(4) Due to the uncertainties of the exact scopes of some of the Tasks listed above at the time of preparation of this Budget, e.g. Tasks I.3.a and I.3.c, it is recommended that a 20% Contingency be included in the Budget.

(5) A portion of this cost is for maintaining sampling equipment that was installed in prior years.

(6) Does not include costs for MPWMD to collect water level data or water quality samples from wells other than those that are part of the basic monitoring well network, i.e. for private well owners who have requested that the Watermaster obtain this data for them. Costs to obtain that data are to be reimbursed to the Watermaster by those well owners, so there should be no net cost to the Watermaster for that portion of the work under these Tasks.

(7) No additional monitoring well is expected to be constructed in 2015.

(8) For HydroMetrics to provide hydrogeologic consulting assistance to the Watermaster, beyond that associated with performing other specified Tasks, when requested to do so by the Technical Program Manager.

(9) If work under this Task is found to be necessary, it will be funded through the Contingency line item in this Budget.

(10) Does not include funds for Database enhancement, as it is assumed that all desired enhancements have already been made.

(11) If necessary to reflect knowledge gained from modeling work or other data sources.

(12) Includes a 3% inflation factor on most annually recurring costs in the 2014 Budget, except the Technical Program Manager cost which has no inflation factor applied to it.

(13) Costs included for these Tasks would only be incurred if the Board determined to defer this work from 2014 to 2015, or determined to perform additional work beyond that performed in 2014.

(14) No further work on this Task is anticipated in 2015.

Management and Monitoring Plan Capital Budget For Tasks to be Undertaken in 2014

No Capital projects are anticipated to be undertaken in 2014, so this budget is $0.

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

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

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

**** * * AGENDA TRANSMITTAL FORM * * ****

MEETING DATE:	September 11, 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.

As reported at the August 14 TAC meeting, I do not envision having a TAC meeting in the month of October. All TAC work that can be performed prior to October will be completed by the September TAC meeting. October will be needed for our consultants (HydroMetrics and MPWMD) to work on the Seawater Intrusion Analysis Report (SIAR) and the year-end Water Quality and Water Level reports, respectively, and for staff to work on the Annual Report and consultant contracts for 2014. All of these documents will be presented to the TAC at its November 13, 2013 meeting.

ATTACHMENTS:	Schedule of Work Activities for FY 2013
RECOMMENDED ACTION:	1. Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedule 2. Confirm holding no TAC meeting in October and having the next TAC meeting on November 13, 2013

Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name	Milestone
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)	9/11
5	Board Approves M&MP Budgets (Same as Task 21)	10/2
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)	Completed
8	Watermaster Prepares Quarterly Water Production, Water Level, and Water Quality Reports for 3rd and 4th Quarters (Same as Task 42)	10/30
9	Watermaster Prepares Annual Water Production, Water Level, and Water Quality Report for 2013 (Same as Task 43)	10/30
10	**Replenishment Assessment Unit Costs for Water Year 2014**	
11	TAC Provides Assistance to B&F Committee in Development of 2014 Water Year Replenishment Assessment Unit Cost	
12	B&F Committee Develops Replenishment Assessment Unit Cost for 2014 Water Year	
13	Board Adopts and Declares 2014 Water Year Replenishment Assessment Unit Cost	10/2
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)	11/27
17	Watermaster Levies Replenishment Assessment for 2013	FOLLOWING NOVEMBER BOARD MEETING

2013 Consultants Work Schedule for FY 2013 9-11-13

Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name	Schedule (Sep 2012 – Jun 2014)
18	**Monitoring & Management Program (M&MP) Budgets for 2012 and 2013**	
19	Preliminary Discussion of Potential Scope of Work for 2014 M&MP	Completed
20	Prepare Draft 2014 and 2015 M&MP O&M and Capital Budgets	Completed
21	TAC approves Draft 2014 and 2015 M&MP O&M and Capital Budgets	9/11
22	Board approves 2014 and 2015 M&MP O&M and Capital Budgets	10/2
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	11/13
26	Prepare Revised Draft 2013 Annual Report (Incorporating TAC Input)	
27	Board Provides Input on Revised Draft 2013 Annual Report (At November Board Meeting)	ASSUME NOV. BOARD MEETING SET FOR TWO WEEKS AFTER NOV. TAC 11/27
28	Prepare Final 2013 Annual Report (Incorporating Board Input)	
29	Watermaster Submits Final 2013 Annual Report to Judge	12/12
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	11/13
34	Board Approval of Initial Consultant Contracts for 2014 (At November Board Meeting)	11/27
35	***IMPLEMENTATION***	
36	**I.2.a DATABASE MANAGEMENT**	

Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name	Schedule (Sep 2012 – Jun 2014)
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	Completed
43	Watermaster Prepares Annual Water Production, Water Level, and Water Quality Report for 2013	10/30
44	**I.3.a ENHANCED SEASIDE BASIN GROUNDWATER MODEL**	
45	**I.3.a.2 Develop Protective Water Levels**	
46	Board Approves RFS to HydroMetrics	Completed
47	HydroMetrics Revises Protective Water Levels	Completed
48	HydroMetrics Progress Report to TAC	Completed
49	HydroMetrics Presents Draft Revised Protective Water Levels Report to TAC	Completed
50	HydroMetrics Presents Report to Board	Completed
51	**I.3.a.3 Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions**	
52	Board Approves RFS to HydroMetrics	Completed
53	HydroMetrics Models Replenishment Scenarios	Completed
54	HydroMetrics Presents Draft Replenishment Modeling Report to TAC	Completed

Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name	Schedule (Sep 2012 – Jun 2014)
55	HydroMetrics Presents Replenishment Modeling Report to Board	Completed
56	TAC Approves Additional RFS to HydroMetrics for Additional Modeling	Completed
57	Board Approves Additional RFS to HydroMetrics for Additional Modeling	Completed
58	HydroMetrics Models Additional Replenishment Scenarios	Completed
59	Evaluate Potential Sources of Water to Replenish the Basin by Injection	Completed
60	HydroMetrics Presents Draft Additional Replenishment Modeling Report to TAC	Completed
61	Presentation to TAC of Evaluation of Potential Sources of Water to Replenish the Basin by Injection	Completed
62	HydroMetrics Presents Additional Replenishment Modeling Report to Board	Completed
63	Presentation to Board of Evaluation of Potential Sources of Water to Replenish the Basin by Injection	Completed
64	**I.3.c Refine and/or Update the BMAP**	**NO WORK SCHEDULED UNTIL TAC DIRECTION PROVIDED TO RESUME DISCUSSION**
65	**I.3.d Evaluate Coastal Wells for Cross-Aquifer Contamination Potential**	
66	MPWMD Migrates Well Data from Newly Identified Wells into Watermaster's Database	Completed
67	**I.4.a HydroMetrics & MPWMD Provide Oversight of Seawater Intrusion Detection and Tracking**	
68	**I.4.b MPWMD Performs Focused Hydrogeologic Investigation in Vicinity of Sand City Public Works Well**	Completed
69	**I.4.c Annual Seawater Intrusion Analysis Report (SIAR)**	
70	HydroMetrics Provides Draft SIAR to Watermaster	11/8
71	TAC Approves Annual Seawater Intrusion Analysis Report (SIAR)	11/13
72	Board Approves Annual Seawater Intrusion Analysis Report (SIAR)	11/27
73	**I.4.d Complete Preparation of Seawater Intrusion Response Plan (SIRP)**	**WORK COMPLETED - NO FURTHER WORK PLANNED IN 2013**

Seaside Basin Watermaster
Monitoring and Management Program
2013 Work Schedule

ID	Task Name	Sep	Oct	Nov	Dec	2013 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	201 Jan	Feb	Mar	Apr	May	Jun
74	**I.4.e Refine and/or Update the SIRP**						NOT NECESSARY																

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

**** * * AGENDA TRANSMITTAL FORM * * ****

MEETING DATE:	September 11, 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

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	September 11, 2013
AGENDA ITEM:	7
AGENDA TITLE:	Set Next Meeting Date
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

There is no TAC meeting business that needs to be conducted in October, so there will be no need for an October TAC meeting.

I recommend that the next TAC meeting be held on the regular 2nd Wednesday in November, November 13, 2013.

ATTACHMENTS:	None
RECOMMENDED ACTION:	Approve skipping having a TAC meeting in October and holding the next TAC meeting on November 13, 2013