Update of the 2009 BMAP

Contents include:
- Description of State of the Basin
- Groundwater Storage
- Groundwater Budget
- Review of Natural Safe Yield
- Supplemental Supplies
- Management Actions
- Recommendations
Groundwater levels continue to decline, except in Southern Coastal Subarea and in shallow coastal wells.

All of the Northern Coastal Subarea levels are below sea level.

Protective elevation are not met in any of the 3 monitoring wells with deep aquifer protective elevations.

Protective elevation are not met in 2 of the 3 monitoring wells with shallow aquifer protective elevations.
GROUNDWATER STORAGE

Reflects limitations imposed by protective elevations

Usable Stored Groundwater

Predevelopment Water Level

Current Water Level

Protective Water Level

Unsaturated & can be used for storage

Total Usable Storage Space

Deficit

Total Stored Groundwater

Unusable Stored Groundwater
CURRENT GROUNDWATER ELEVATIONS

4th Quarter – Shallow 2017

4th Quarter – Deep 2017
PROTECTIVE GROUNDWATER ELEVATIONS

Simulated assuming Pure Water Monterey and reducing Northern Coastal pumping by 1,800 AFY
The percentage of usable stored groundwater in the Basin that can be recovered at a later date

Inefficiency happens when stored groundwater flows out of the Basin to adjacent basins, the ocean, or when groundwater is consumed by vegetation

Depends on location and method of storage

- ASR may cause groundwater to mound and flow north out of the Basin
- Surface percolation may take a many years to reach the water table and may leave the Basin as outflow

Recommended that the Watermaster evaluate the project specific storage efficiencies and include these in the producer’s Storage and Recovery Agreement.

## Recharge Sources

<table>
<thead>
<tr>
<th>Recharge Source</th>
<th>Northern Coastal Subarea</th>
<th>Northern Inland Subarea</th>
<th>Southern Coastal Subarea</th>
<th>Laguna Seca Subarea</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basin Inflows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percolation from streams</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Deep Percolation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Rainfall</td>
<td>510</td>
<td>1,670</td>
<td>130</td>
<td>900</td>
<td>3,210</td>
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<tr>
<td>Irrigation &amp; System Losses</td>
<td>150</td>
<td>20</td>
<td>100</td>
<td>10</td>
<td>280</td>
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<tr>
<td>Injection wells</td>
<td>260</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>260</td>
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<tr>
<td>Groundwater inflow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From adjacent subareas</td>
<td>2,900</td>
<td>1,520</td>
<td>520</td>
<td>360</td>
<td>5,300</td>
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<tr>
<td>From adjacent basins</td>
<td>130</td>
<td>400</td>
<td>50</td>
<td>770</td>
<td>1,350</td>
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<tr>
<td>From offshore area</td>
<td>490</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Total inflows</td>
<td>4,440</td>
<td>3,610</td>
<td>810</td>
<td>2,040</td>
<td>10,900</td>
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## Basin Outflows

<table>
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<tr>
<th>Wells</th>
<th>3,660</th>
<th>70</th>
<th>170</th>
<th>680</th>
<th>4,580</th>
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<tbody>
<tr>
<td>Groundwater outflow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To adjacent subareas of the Basin</td>
<td>290</td>
<td>2,710</td>
<td>550</td>
<td>1,750</td>
<td>5,300</td>
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<tr>
<td>To adjacent basins</td>
<td>280</td>
<td>1,310</td>
<td>70</td>
<td>490</td>
<td>2,150</td>
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<tr>
<td>To offshore area</td>
<td>260</td>
<td>0</td>
<td>60</td>
<td>0</td>
<td>320</td>
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<tr>
<td>Total outflows</td>
<td>4,490</td>
<td>4,090</td>
<td>850</td>
<td>2,920</td>
<td>12,350</td>
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</tbody>
</table>

## Storage Change

| Based on Inflows-Outflows | -50 | -480 | -40 | -880 | -1,450 |
SUBSURFACE FLOWS BETWEEN SUBAREAS, OCEAN & OTHER BASINS
CHANGE IN GROUNDWATER IN STORAGE (1988 – 2017)

Basin Inflows 5,600 AFY

- Basin Outflows 7,050 AFY

= Change in Storage
Loss of 1,450 AFY

43,500 AF loss of groundwater in storage over 30 years
Decision established initial Natural Safe Yield = 3,000 AFY

Using 1988 – 2017 model output, Natural Safe Yield estimated as
- Coastal and Northern Inland Subareas = 2,500 AFY
- Laguna Seca Subarea = -190 AFY
- Basin total = 2,310 AFY

Laguna Seca Subarea Natural Safe Yield has been studied in the past
- Even if all wells stop pumping in the subarea, groundwater levels the very eastern portion of the subarea do not stabilize
- Pumping in Corral de Tierra subbasin of the Monterey subbasin of the Salinas Valley Basin having an effect in the Seaside Basin
Monterey Peninsula Water Supply Project (MPWSP)
- 6.4 MGD Desalination Plant
- Pure Water Monterey Project (3,500 AFY high quality purified water for recharge)

Regional Urban Water Augmentation Project (RUWAP) - recycled water distribution from the M1W Advanced Wastewater Purification Facility

DeepWater Desal

Various projects in the planning stage to increase source water to the M1W Advanced Wastewater Purification Facility
SUPPLEMENTAL SUPPLIES

Implemented since 2009 BMAP:
- Sand City Water Supply Project – desalination plant with beach wells
- Pacific Grove Wastewater Reuse Project – recycled water irrigation at golf course and cemetery
- Carmel River Water Aquifer Storage and Recovery Project – Phases 1 and 2

Various alternatives no longer being considered
Purpose of management actions

- Raise groundwater levels before supplemental supplies become available
- Optimize existing natural recharge and basin storage capacity
- Manage and reduce the near-term threat of seawater intrusion

1. Increase groundwater recharge
   - Enhanced Storm Water Recharge within the City of Seaside
   - Modeling shows injection as a recharge mechanism is more effective than in-lieu recharge for raising groundwater levels
2. Decrease groundwater demand
   - Water conservation
   - Recycled water for Laguna Seca golf courses

3. Operational management
   - Redistribute pumping amongst existing wells
   - Install new Southern Coastal Subarea production wells to shift pumping from Northern Coastal Subarea – use model to optimize locations
   - Install new Northern Inland Subarea production wells to shift pumping from Northern Coastal Subarea – modeled to have limited benefit
   - Coordinate with neighboring Sustainability Management Planning agencies
RECOMMENDATIONS

1. Encourage implementation of selected management actions
   - Install new Southern Coastal Subarea production wells
   - Recycled water for Laguna Seca golf courses
   - Water conservation
   - Coordination with the Salinas Valley Basin Groundwater Sustainability Agency (Laguna Seca Subarea management)
   - Enhanced storm water recharge within the City of Seaside

2. Groundwater modeling to determine a combination of management actions and supplemental supply projects that achieve protective groundwater elevations at the coast
QUESTIONS?