Planning for Water Shortages

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And Maddaus Water Management
Planning for Water Shortages - Overview

- Goal – Water Shortage Contingency Plan that clearly identifies implementation criteria, reduction measures, and expectations
- Identify key networking group – representatives
- Identify, obtain current and relevant water use information that will be used to back up the plan
- Develop a flexible, practical plan, use scenarios
Planning for Water Shortages - Plan Elements

- Get Intelligence - History of water supply and demand – use annual, seasonal, monthly, trend meter data
- Identify “intelligence loop” - factual information from customer groups, use trends – define group profiles, multi-year trends
- Survey customers - early in the season, request current information from each customer group
- Establish communication process and access: web site, newsletters, emails, billing inserts, information available for mobile devices
- Identify measures, priorities, implementation phases
- Obtain commitments, set performance goals, track and communicate
Stanford University Domestic Water Use 2001-2012

Gallons Per Day (000's)

- Water Purchases
- GSF

Gross Square Footage

Stanford University Domestic Water Consumption
FY2012 (2.13 million gals/day)

- Metered Irrigation 9%
- Faculty Staff Housing (includes irrigation) 20%
- Academic & Administrative 19%
- Student Housing & Dining 20%
- CEF COGEN 25%

Stanford University Lake Water Consumption
FY2012 (1.03 million gals/day)

- Athletics - Golf Course 23%
- Athletics - Varsity Golf Practice Field 6%
- Athletics - Not Including Golfcourse & Golf Practice Field 15%
- Academic & Administrative 32%
- Other Support Facilities 11%
- Faculty Staff Housing 1%
- Flushing/Construction 1%
Domestic Water Consumption
BAWSCA FY2002 - FY2014 YTD

FY02-14 YTD Bill Period Avg/Day
12 per. Mov. Avg. (FY02-14 YTD Bill Period Avg/Day)

BAWSCA FY2014
(July 2013 - December 2013 Bill Periods)
2,514,000 Avg Gals/Day
LAKE WATER SYSTEM
FY2002-FY2014 YTD
Bill Period Average per Day

BAWSCA FY2014 YTD
(July 2013 - Dec 2013
Bill Periods)
1,453,000 Avg Gals/Day
Planning for

Water Shortages - Set Realistic Expectations

- Identify key communication needs
- Survey customers early in the season - request information about their water efficiency work
- Prepare communication materials – establish Fact Sheet format for consistency
- Model scenarios
Web-based interface, with dashboard

Model criteria:
- Easy to use, clear
- Flexible
- Captures all background data used in the model
- Relevant references
- Sources of information and data
- Historical metered data
- Supply and demand projections
- Wholesaler requirements
WATER SHORTAGE MANAGEMENT MODEL

Includes:

✓ All water sources, independently and combined
✓ Cutbacks/limitations for each source
✓ Pre-programmed and new scenarios
✓ Identified categories of use
✓ Monthly use for each category
✓ Seasonal supply and demand
✓ Growth: population, business, sqft
Projected Demand for Each Category by Month

- Non-Billable NP
- Staff Housing NP
- Academic NP
- Comm Spaces NP
- Construction Projects NP
- Medical School NP
- CEF/Cogen NP
- Athletics NP
- Student Housing NP
- Golf Course NP
- Lake Lagunita Diversions
- Flushing/System Losses
- CEF
- Staff Housing
- Academic
- Comm Spaces
- Construction Projects
- Medical School
- Athletics
- Student Housing
### SFPUC & Surface Supply Limit

<table>
<thead>
<tr>
<th>Year</th>
<th>SFPUC Supply Limit (mgd)</th>
<th>Surface Water Supply Limit (mgd)</th>
<th>Comments</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1.99</td>
<td>0.75</td>
<td></td>
<td>SFPUC max supply: 3.03 mgd</td>
</tr>
<tr>
<td>2015</td>
<td>1.99</td>
<td>0.75</td>
<td></td>
<td>SFPUC Estimated Demand for 2012 (up 3%): 2.1</td>
</tr>
<tr>
<td>2016</td>
<td>1.99</td>
<td>0.75</td>
<td></td>
<td>SFPUC DRIP supply limit: 1.81 mgd</td>
</tr>
<tr>
<td>2017</td>
<td>2.05</td>
<td>0.75</td>
<td></td>
<td>Lake Water Production Min: 0.2 mgd in 2007 Max</td>
</tr>
<tr>
<td>2018</td>
<td>2.12</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>2.18</td>
<td>0.75</td>
<td></td>
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### Well Supply Limit

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Use Percent</th>
<th>Max Capacity (mgd)</th>
<th>Usable Capacity (mgd)</th>
<th>Use Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well #1</td>
<td>65%</td>
<td>0.72</td>
<td>0.47</td>
<td>Domestic/Non-Potable</td>
<td>Tom is working to get the sustainable</td>
</tr>
<tr>
<td>Well #2</td>
<td>65%</td>
<td>0.72</td>
<td>0.47</td>
<td>Domestic/Non-Potable</td>
<td>All wells can be valved for Dom/NP</td>
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<tr>
<td>Well #3</td>
<td>65%</td>
<td>1.73</td>
<td>1.12</td>
<td>Domestic/Non-Potable</td>
<td>Wells Max Use in July 2007 was 2.43</td>
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<tr>
<td>Well #4</td>
<td>65%</td>
<td>0.58</td>
<td>0.37</td>
<td>Non-Potable</td>
<td>Not permitted Use in July 2007 was 2.43</td>
</tr>
<tr>
<td>Well #5</td>
<td>65%</td>
<td>0.03</td>
<td>0.02</td>
<td>Domestic/Non-Potable</td>
<td>Restricted to 15 days per year</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>2.45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CEF Demand Reduction

| Reduction Percent | 30% |
| Reduction Start Year | 2016 |

### Cutbacks

<table>
<thead>
<tr>
<th>Cutback</th>
<th>Warm Season Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan</td>
</tr>
<tr>
<td>Student Housing</td>
<td>10%</td>
</tr>
<tr>
<td>Athletics</td>
<td>10%</td>
</tr>
</tbody>
</table>
Developed BMPs and Metrics for Irrigated Landscaping

**BMPs**

1. Develop historical base/seasonal water use record.
2. Automate leak alert notices and customize thresholds by site.
3. Use weather-based irrigation controller(s).
4. Implement and repeat site audits every 3-5 years.
5. Develop simple, routine reports (on a weekly and monthly basis) to communicate water use.

**Metrics**

- Compare current base/seasonal use to historical base/seasonal water use record.
- Compare number, duration and volume of leaks per site.
- Compare water use per acre at weather-based sites vs. non weather-based sites.
- Compare management practices, site characteristics and water use to prior audit recommendations.
- Compare current water use to historical average (last 3 to 5 years): gallons per irrigated acre, total volume of leaks (gallons), duration of leaks and response to weather.

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**GALLONS OF WATER USED PER ACRE OF LANDSCAPING PER DAY (FOR STUDY SITES WITH MOSTLY TURF) FROM MAY 2011 TO APRIL 2012 BILL PERIODS**

- May 2011 – April 2012
- Lomita Mall
- EV Studios 5 & 6
- Oval
- LKSC
- SCRA
- Arrillaga Rec. Cntr.

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QUESTIONS?

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http://lbre.stanford.edu/sem/Environmental_WaterEfficiency