Welcome to the Landscape Summit
AGENDA

• State of Water in CA/Santa Clara Co.
• Case Studies
• Break
• Small Group Break Out Session
• Lunch
• Report out from Small Groups
• End of Summit – prize drawing
• Vendor Fair
California’s Historic 5 Year Drought

California has experienced near-record temperatures in recent years. 
Source: California Department of Water Resources
Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. NOAA

Also, the April 1, northern Sierra Nevada, the manual survey at Phillips Station snowpack’s water content as 183 percent of average.
2016/17 Hydrologic and Reservoir Conditions

HYDROLOGIC CONDITIONS ABOVE AVERAGE

**Hydrology**
As of April 18, 2017

- **Snow Water Equivalent (SWE) (Northern Sierra)**: 24.6 inches (148%)
- **Northern Sierra Precipitation (PPT) 8-Station Index**: 44.0 inches (209%)
- **Rainfall in Santa Clara County (San Jose Station)**: 13.3 inches (128%)

**Reservoir Storage**
As of April 1, 2017

- **Shasta**: 117%
- **Oroville**: 108%
- **San Luis**: 114%
- **SCVWD Reservoirs**: 149%
- **SFPUC Total Storage**: 80%

*SFPUC as of April 16, 2017*
Governor Executive Order

Terminate Drought State of Emergency (except some counties)

Rescinds Emergency Proclamation and Executive Orders

Keeps provisions in EO B-37-16, such as: monthly reporting and water waste prohibitions.

Rescinds mandatory conservation and stress tests

“This drought emergency is over, but the next drought could be around the corner. Conservation must remain a way of life.”

— Gov. Jerry Brown

(April 7, 2017; LA Times)
Permanent Prohibitions on Water Waste

Permanent Landscape

Related Prohibitions:

- Hosing off sidewalks, driveways and other hardscapes;
- Application of potable water to outdoor landscapes during and within 48 hours after measurable rainfall;
- Watering lawns in a manner that causes runoff;
- Irrigating ornamental turf on public street medians;
- Using non-recirculated water in a fountain or other decorative water feature;
Governor Executive Order

State Board transitions away from monthly and annual percent reductions

Move towards water use efficiency and water budgeting targets after 2020 - performance based targets will be in place.
2017 Local Outlook

85% - SWP Allocation (85 TAF)
100% - CVP M&I Allocation (152.5 TAF)
Up to 74% - Semitropic Storage (up to 60 TAF)
308 TAF - End of Year Groundwater Storage

Water Shortage Contingency Plan Stages

- Normal (Stage 1)
  No water use reductions
- Projected 2017 EOY Storage
- Alert (Stage 2)
  0-10% reductions
- Severe (Stage 3)
  10% -20% reductions
- Critical (Stage 4)
  20% -40% reductions
- Emergency (Stage 5)
  40% -50% reductions

End of Year (EOY) Groundwater Storage

- Above 300,000 AF
- 250,000 – 300,000 AF
- 200,000 – 250,000 AF
- 150,000 – 200,000 AF
- Below 150,000 AF
# 2016 Retail Water Use and Reductions

**THE COMMUNITY HAS EXCEEDED THE CALL FOR 20%!**

<table>
<thead>
<tr>
<th>2016</th>
<th>North County Ground water</th>
<th>South County Ground water</th>
<th>Treated Water</th>
<th>SFPUC</th>
<th>SJWC Surface</th>
<th>2016 Monthly Use</th>
<th>2016 Cumulative Use</th>
<th>Cumulative District Source Savings</th>
<th>Cumulative NonDistrict Source Savings</th>
<th>All Sources Cumulative %Savings from 2013 +&gt; savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan</td>
<td>3,894</td>
<td>1,085</td>
<td>4,789</td>
<td>2,458</td>
<td>489</td>
<td>12,715</td>
<td>12,715</td>
<td>4%</td>
<td>44%</td>
<td>18%</td>
</tr>
<tr>
<td>Feb</td>
<td>3,238</td>
<td>1,041</td>
<td>5,037</td>
<td>2,581</td>
<td>951</td>
<td>12,848</td>
<td>25,563</td>
<td>10%</td>
<td>37%</td>
<td>19%</td>
</tr>
<tr>
<td>Mar</td>
<td>3,562</td>
<td>1,149</td>
<td>4,950</td>
<td>3,053</td>
<td>1,282</td>
<td>13,996</td>
<td>39,559</td>
<td>22%</td>
<td>24%</td>
<td>23%</td>
</tr>
<tr>
<td>Apr</td>
<td>4,367</td>
<td>1,315</td>
<td>5,050</td>
<td>3,355</td>
<td>1,857</td>
<td>15,944</td>
<td>55,503</td>
<td>30%</td>
<td>17%</td>
<td>27%</td>
</tr>
<tr>
<td>May</td>
<td>3,864</td>
<td>1,622</td>
<td>7,855</td>
<td>4,396</td>
<td>1,919</td>
<td>19,654</td>
<td>75,157</td>
<td>35%</td>
<td>12%</td>
<td>29%</td>
</tr>
<tr>
<td>Jun</td>
<td>5,291</td>
<td>1,849</td>
<td>10,264</td>
<td>4,472</td>
<td>1,005</td>
<td>22,882</td>
<td>98,039</td>
<td>34%</td>
<td>11%</td>
<td>28%</td>
</tr>
<tr>
<td>Jul</td>
<td>6,405</td>
<td>2,060</td>
<td>11,365</td>
<td>4,647</td>
<td>0.3</td>
<td>24,477</td>
<td>122,516</td>
<td>32%</td>
<td>14%</td>
<td>28%</td>
</tr>
<tr>
<td>Aug</td>
<td>5,447</td>
<td>2,178</td>
<td>11,834</td>
<td>4,648</td>
<td>0.3</td>
<td>24,107</td>
<td>146,623</td>
<td>31%</td>
<td>16%</td>
<td>28%</td>
</tr>
<tr>
<td>Sep</td>
<td>3,696</td>
<td>2,062</td>
<td>12,328</td>
<td>4,591</td>
<td>0.3</td>
<td>22,678</td>
<td>169,301</td>
<td>30%</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td>Oct</td>
<td>2,905</td>
<td>1,788</td>
<td>10,561</td>
<td>3,277</td>
<td>0.3</td>
<td>18,532</td>
<td>187,833</td>
<td>30%</td>
<td>18%</td>
<td>27%</td>
</tr>
<tr>
<td>Nov</td>
<td>3,265</td>
<td>1,393</td>
<td>7,099</td>
<td>2,695</td>
<td>1.8</td>
<td>14,454</td>
<td>202,286</td>
<td>30%</td>
<td>19%</td>
<td>28%</td>
</tr>
<tr>
<td>Dec*</td>
<td>3,539</td>
<td>1,333</td>
<td>6,190</td>
<td>2,428</td>
<td>60</td>
<td>13,550</td>
<td>215,836</td>
<td>30%</td>
<td>20%</td>
<td>28%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*Jan to Current</th>
<th>49,472</th>
<th>18,874</th>
<th>97,321</th>
<th>42,602</th>
<th>7,566</th>
<th>215,836</th>
</tr>
</thead>
<tbody>
<tr>
<td>%Savings by Source of Supply</td>
<td>43%</td>
<td>18%</td>
<td>23%</td>
<td>22%</td>
<td>3%</td>
<td>28%</td>
</tr>
</tbody>
</table>
January 31, 2017, the Board of Directors approved a resolution calling for 20 percent reduction and continued certain water waste prohibitions, but removed the recommendation that retailers implement mandatory measures. The Board also called for continued restrictions on watering schedules to a maximum of three times a week.

Continue to make conservation a way of life.
SCVWD Response to 2016 Summit

**Education/Outreach**
- VOW Campaign
- Increased nursery outreach
- Greywater Workshops and handouts

**Landscape Design/Maintenance**
- Assistance Program
- Water Wise Survey Program
- Landscape professional training workshops
Landscape Rebate

Program Improvements:
- Development of online application in progress
- In-Line Drip Rebate added
- Top 100 Plant list in the works
- Low water use plant signs for nurseries

Research Efforts:
- Study launched to quantify the water savings from Landscape Rebate Program.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Response Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attended trainings on water-efficient landscape/irrigation practices</td>
<td>57.1%</td>
</tr>
<tr>
<td>Organized a training or workshop to promote water-efficient landscape/irrigation practices</td>
<td>35.7%</td>
</tr>
<tr>
<td>Created educational materials (handouts, newsletters, etc.) for clients to promote water efficiency</td>
<td>42.8%</td>
</tr>
<tr>
<td>Offered new services to clients aimed at water efficiency</td>
<td>50.0%</td>
</tr>
<tr>
<td>Promoted water efficient inventory (i.e. drought-tolerant plants, efficient irrigation equipment, Weather-Based Irrigation Controllers, etc.)</td>
<td>92.8%</td>
</tr>
<tr>
<td>Other</td>
<td>14.2%</td>
</tr>
</tbody>
</table>
Case Studies

Stephanie Morris

Landscape Architect
Stephanie Morris, Landscape Architect

Lawn Conversion to California Natives

Stephanie Morris, Landscape Architect
Before: August 2009

Project Location: Palo Alto
December 2009 – sheet mulch and planting
March 2010 – 3 months after planting
May 2011: 17 months after planting
May 2011: 17 months after planting
July 2015: 5.5 years old
July 2015: 5.5 years old
Storm Water Catchment

Water from downspouts flows into dry creek feature
California Native Plants

- Western Redbud
- Coyote Mint
- Wildflowers
- Bees Bliss
- Sulfur Buckwheat
- Sage
- Groundcover Coyote Bush
NOTE: This project was installed 7 years ago.
In current irrigation design projects, I now use inline drip systems which water the entire plant’s mature root zone.
- Reduces weeds!
- Maintains soil temperature from extremes
- Holds water in the soil
- Decomposes +/- a year
- Improves soil biology
Google Maps View

Front lawn: 432 SF

Front shrubs: 448 SF

Rear and side (no design changes): 751 SF

TOTAL 1631 SF
Front lawn: 26.5% of the landscape area

Lawn plus all front shrubs: 54% of landscape area
## Gallons Used Spreadsheet

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>209.4</td>
<td>119.7</td>
<td>187.0</td>
<td>314.2</td>
<td>306.7</td>
<td>374.0</td>
<td>359.0</td>
<td>246.8</td>
<td>314.2</td>
<td>261.8</td>
<td>127.2</td>
<td>157.1</td>
<td>248.1</td>
</tr>
<tr>
<td>2001</td>
<td>172.0</td>
<td>74.8</td>
<td>254.3</td>
<td>284.2</td>
<td>344.1</td>
<td>374.0</td>
<td>359.0</td>
<td>359.0</td>
<td>306.7</td>
<td>269.3</td>
<td>231.9</td>
<td>172.0</td>
<td>266.8</td>
</tr>
<tr>
<td>2002</td>
<td>97.2</td>
<td>142.1</td>
<td>209.4</td>
<td>246.8</td>
<td>418.9</td>
<td>426.4</td>
<td>381.5</td>
<td>336.6</td>
<td>314.2</td>
<td>306.7</td>
<td>239.4</td>
<td>164.6</td>
<td>273.7</td>
</tr>
<tr>
<td>2003</td>
<td>164.6</td>
<td>127.2</td>
<td>202.0</td>
<td>231.9</td>
<td>254.3</td>
<td>411.4</td>
<td>359.0</td>
<td>374.0</td>
<td>307.9</td>
<td>314.2</td>
<td>179.5</td>
<td>216.9</td>
<td>261.9</td>
</tr>
<tr>
<td>2004</td>
<td>193.0</td>
<td>154.8</td>
<td>306.3</td>
<td>317.3</td>
<td>309.5</td>
<td>349.1</td>
<td>385.3</td>
<td>374.0</td>
<td>277.0</td>
<td>232.1</td>
<td>280.5</td>
<td>192.3</td>
<td>280.9</td>
</tr>
<tr>
<td>2005</td>
<td>198.0</td>
<td>154.8</td>
<td>220.0</td>
<td>293.9</td>
<td>265.4</td>
<td>327.3</td>
<td>398.9</td>
<td>374.0</td>
<td>374.0</td>
<td>103.2</td>
<td>197.9</td>
<td>264.4</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>103.2</td>
<td>154.8</td>
<td>136.0</td>
<td>299.2</td>
<td>283.7</td>
<td>327.3</td>
<td>423.9</td>
<td>361.1</td>
<td>320.6</td>
<td>181.3</td>
<td>206.3</td>
<td>204.0</td>
<td>250.1</td>
</tr>
<tr>
<td>2007</td>
<td>124.7</td>
<td>138.5</td>
<td>249.3</td>
<td>233.8</td>
<td>598.4</td>
<td>149.6</td>
<td>408.0</td>
<td>398.9</td>
<td>240.4</td>
<td>303.9</td>
<td>249.3</td>
<td>158.7</td>
<td>271.1</td>
</tr>
<tr>
<td>2008</td>
<td>120.6</td>
<td>96.5</td>
<td>249.3</td>
<td>206.3</td>
<td>397.4</td>
<td>548.5</td>
<td>336.3</td>
<td>351.9</td>
<td>332.4</td>
<td>289.5</td>
<td>136.0</td>
<td>181.3</td>
<td>270.5</td>
</tr>
<tr>
<td>2009</td>
<td>181.3</td>
<td>133.6</td>
<td>106.9</td>
<td>129.0</td>
<td>308.0</td>
<td>257.9</td>
<td>199.5</td>
<td>249.3</td>
<td>217.2</td>
<td>221.6</td>
<td>232.1</td>
<td>187.0</td>
<td>202.0</td>
</tr>
<tr>
<td>2010</td>
<td>144.8</td>
<td>120.7</td>
<td>80.1</td>
<td>193.0</td>
<td>232.1</td>
<td>313.7</td>
<td>397.4</td>
<td>265.2</td>
<td>217.2</td>
<td>232.1</td>
<td>241.3</td>
<td>180.6</td>
<td>218.2</td>
</tr>
<tr>
<td>2011</td>
<td>176.0</td>
<td>124.7</td>
<td>106.9</td>
<td>74.8</td>
<td>193.0</td>
<td>224.4</td>
<td>286.0</td>
<td>335.3</td>
<td>283.7</td>
<td>154.8</td>
<td>187.0</td>
<td>154.8</td>
<td>191.8</td>
</tr>
<tr>
<td>2012</td>
<td>154.0</td>
<td>129.0</td>
<td>154.8</td>
<td>136.0</td>
<td>213.7</td>
<td>174.5</td>
<td>249.3</td>
<td>300.0</td>
<td>272.0</td>
<td>232.1</td>
<td>180.6</td>
<td>158.7</td>
<td>196.2</td>
</tr>
<tr>
<td>2013</td>
<td>174.5</td>
<td>103.2</td>
<td>163.6</td>
<td>213.7</td>
<td>206.3</td>
<td>174.5</td>
<td>226.7</td>
<td>274.3</td>
<td>233.8</td>
<td>206.3</td>
<td>199.5</td>
<td>187.0</td>
<td>197.0</td>
</tr>
<tr>
<td>2014</td>
<td>174.5</td>
<td>136.0</td>
<td>106.9</td>
<td>77.4</td>
<td>199.5</td>
<td>257.1</td>
<td>257.9</td>
<td>224.4</td>
<td>210.4</td>
<td>149.6</td>
<td>129.0</td>
<td>113.3</td>
<td>169.7</td>
</tr>
<tr>
<td>2015</td>
<td>129.0</td>
<td>90.7</td>
<td>103.2</td>
<td>199.5</td>
<td>160.3</td>
<td>204.0</td>
<td>180.6</td>
<td>181.3</td>
<td>174.5</td>
<td>133.6</td>
<td>181.3</td>
<td>106.9</td>
<td>153.7</td>
</tr>
<tr>
<td>2016</td>
<td>106.9</td>
<td>99.7</td>
<td>110.8</td>
<td>176.0</td>
<td>154.8</td>
<td>199.5</td>
<td>283.7</td>
<td>241.3</td>
<td>265.4</td>
<td>226.7</td>
<td>129.0</td>
<td>103.2</td>
<td>174.7</td>
</tr>
</tbody>
</table>

Install

Average gallons used per day for each month. Includes total water onsite (indoor + outdoor)
Average of 260 gal/day in the 5 years before installation, reduced to 196 gal/day in the 5 years after installation
August 2008 – baseline
352 avg. gal/day x 31 days = used 10,912 gal

August 2013 – garden 3.5 years old
274 avg. gal/day x 31 = 8494 gal = 22% savings

August 2014 – 3968 gal saved = 36% savings

August 2015 – 5301 gal saved = 48.5% savings

August 2016 – 3441 gal saved = 31.5% savings
Average Water Saved per Year

- 2008 – baseline – **98,732 gal**
- 2011 – **70,007 gal** (saved 28,725 gal)
- 2012 – **71,613 gal** (saved 27,119 gal)
- 2013 – **71,905 gal** (saved 26,827 gal)
- 2014 – **61,940 gal** (saved 35,792 gal)
- 2015 – **56,100 gal** (saved 42,632 gal)
- 2016 – **63,765 gal** (saved 34,967 gal)

Water savings over 6 years = 196,062 gallons
What does that look like?

Swimming pool  40’ x 20’ x 5’ =30,000 gallons

196,062 gallons = 6 swimming pools full of water
Water Cost
Adjusting for Water Price Increases

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual water $</th>
<th>Annual water $ at 2008 rate</th>
<th>Annual water $ at 2015 rate</th>
<th>Annual saving at 2015 rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>628</td>
<td>631</td>
<td>1102</td>
<td>470</td>
</tr>
<tr>
<td>2013</td>
<td>692</td>
<td>460</td>
<td>802</td>
<td>342</td>
</tr>
<tr>
<td>2014</td>
<td>636</td>
<td>396</td>
<td>691</td>
<td>295</td>
</tr>
<tr>
<td>2015</td>
<td>616</td>
<td>359</td>
<td>619</td>
<td></td>
</tr>
</tbody>
</table>

Average $ rate per gallon of water

<table>
<thead>
<tr>
<th>Year</th>
<th>Average $ rate/ gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>0.0064</td>
</tr>
<tr>
<td>2013</td>
<td>0.0096</td>
</tr>
<tr>
<td>2014</td>
<td>0.0105</td>
</tr>
<tr>
<td>2015</td>
<td>0.0112</td>
</tr>
</tbody>
</table>

If water usage had remained consistent at the price before installation, the 2015 Water bill would have been $1090 instead of $616
Garden Installation Expenses

- Installed by high end landscape contractor
- Lawn area planting/irrigation/mulch: $4300
- Shrubs area planting/irrigation/mulch: $4300
- Dry creek: $1500
- About $11.50 per SF. (Rebate: $1.50 per SF)
- Self install would be about $4 per SF
  (roughly $3520 for lawn + shrub conversion)
Non-Monetary Returns on Investment

- No mowing, reduction in fossil fuel use
- Reduction in green waste
- Increase habitat value – bees, birds, pollinators
- Water retention to increase groundwater
- Improved soil biology
- Improved curb appeal and interest
- Feel good factor
Summary

- Landscape area converted: 880 SF
- Money spent on softscape $8600 (or a budget of $3520 for self install)
- Water Saved 196,062 over 6 years.
- Cost of water increased, so water bill stayed similar (would have been $400 more/year)
- Owners are considering water savings and other benefits as well as $ savings
CASE STUDIES

Brian Boyer

Golf Course Superintendent

Cinnabar Hills Golf Club
CINNABAR HILLS GOLF CLUB
LESSONS LEARNED FROM A HISTORIC DROUGHT

Brian Boyer, Golf Course Superintendent
CINNABAR HILLS GOLF CLUB
BACKGROUND INFORMATION

- Opened in 1998
- 27 hole golf course and practice facility
- Full restaurant and bar
- Property is 380 acres
  - 120 acres of irrigated turfgrass
  - 10.2 acres of mitigated wetlands
- Surface water from the water district
- 2 pumping stations capable of 2000gpm
- 2,932 irrigation heads, 491 isolation valves
THE DROUGHT IS OFFICIAL

• Like 99% of Santa Clara County, we began saving 20% March 1\textsuperscript{st} 2014.
• Had to decide three items:
  • Where we’d conserve
  • How we’d conserve
  • How are we going to message our efforts
MESSAGING

• Equally as important as efforts on golf course to save water.
• “Commitment to Community”
  “We thank you for your continued support and ask that you do your part to conserve water while visiting us here at Cinnabar Hills and when at your home or place of business. Visit the Santa Clara Valley Water District's website at www.valleywater.org/drought. As a result of all engaged in a commitment to community, we'll together make a positive difference.”
• Facebook, blogs, emails, twitter, table tents and signage.
• Links & QR codes to SCVWD drought page.
## THE WHERE

| Area          | Acres | % Area | Acre ft water/per year | 20% Scenario | 30% Scenario | 40% Scenario | 20% Scenario | 30% Scenario | 40% Scenario | 20% Scenario | 30% Scenario | 40% Scenario | 20% Scenario | 30% Scenario | 40% Scenario |
|---------------|-------|--------|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Greens        | 5.0   | 4.2    | 4.2                    | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           |
| Green Complexes | 18.0  | 15.0   | 15.0                   | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 10.0          | 1.3           | 1.3           |
| Tees          | 15.0  | 12.5   | 12.5                   | 5.0           | 0.6           | 5.0           | 0.6           | 10.0          | 1.3           | 10.0          | 1.3           | 10.0          | 1.3           | 10.0          | 1.3           |
| Fairways      | 35.0  | 29.2   | 29.2                   | 12.0          | 3.5           | 35.0          | 10.2          | 35.0          | 10.2          | 35.0          | 10.2          | 35.0          | 10.2          | 35.0          | 10.2          |
| Clubhouse     | 2.0   | 1.7    | 1.7                    | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           |
| DR tee        | 1.0   | 0.8    | 0.8                    | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           | 0.0           |
| Rough         | 39.0  | 32.5   | 32.5                   | 36.0          | 11.7          | 46.0          | 15.0          | 75.0          | 24.4          | 75.0          | 24.4          | 75.0          | 24.4          | 75.0          | 24.4          |
| DR range      | 5.0   | 4.2    | 4.2                    | 100.0         | 4.2           | 100.0         | 4.2           | 100.0         | 4.2           | 100.0         | 4.2           | 100.0         | 4.2           | 100.0         | 4.2           |
| **total**     | 120.0 | 100 ac ft/year | 100.0 | 4.2 | 100.0 | 4.2 | 100.0 | 4.2 | 100.0 | 4.2 | 100.0 | 4.2 | 100.0 | 4.2 | 100.0 | 4.2 |
HOW WE CONSERVED

• Turfgrass conversion
  • Changed start times from 9pm to 12am
  • ET based irrigation and deep, infrequent
  • Slow release nitrogen fertilizers
  • Aeration
  • Calcium applications
CINNABAR HILLS GOLF CLUB
TURFGRASS CONVERSION

- SCVWD approved 74,000 sq ft in October 2014
- Native grasses were selected and given approval by the district.
  - *Bromus carinatus* (California brome)
  - *Hordeum brachyantherum* (meadow barley)
  - *Nassella pulchra* (purple needlegrass)
Central Coast Wilds in Santa Cruz did the plant grow for 3 months

- 6,000 plants of each species grown
- "Plugged" them on 3’ x 3’ spacing starting mid-December
CINNABAR HILLS GOLF CLUB
TURFGRASS CONVERSION

- Cost to grow seeds was $3,100, $2,100 for wood chips, and $600 for rental.
- Over 300 labor hours required.
- Was so successful that we did another 90,000 square feet on our own.
- Will annually require broadleaf herbicide applications and fall cut downs.
- No financial ROI for Cinnabar Hills, but we are irrigating 4 less acres, saving 16 ac/ft per year.
TURF REMOVAL

Sod removed with Bobcat 4 in 1 bucket
BEFORE AND AFTER

9 Lake before

9 Lake after
BEFORE AND AFTER

7 lake – originally wood chipped, but later seeded with *Elymus glaucus* (blue wild rye), *Vulpia microstachys* (three week fescue), *Trifolium obtusiflorum* (native clover), & *Bromus carinatus* (California brome).
CINNABAR HILLS GOLF CLUB
WATER CONSERVATION STRATEGIES

• Turfgrass conversion
• **Changed start times from 9pm to 12am**
  • ET based irrigation and deep, infrequent
  • Slow release nitrogen fertilizers
  • Aeration
  • Calcium applications
## THE WHERE

<table>
<thead>
<tr>
<th>Area</th>
<th>Acres</th>
<th>% Area</th>
<th>Acre ft water/per year</th>
<th>20% Scenario</th>
<th>30% Scenario</th>
<th>40% Scenario</th>
<th>Water Saved</th>
<th>Percent Reduction</th>
<th>Water Saved</th>
<th>Percent Reduction</th>
<th>Water Saved</th>
<th>Percent Reduction</th>
<th>Water Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greens</td>
<td>5.0</td>
<td>4.2</td>
<td>4.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Green Complexes</td>
<td>18.0</td>
<td>15.0</td>
<td>15.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Tees</td>
<td>15.0</td>
<td>12.5</td>
<td>12.5</td>
<td>5.0</td>
<td>0.6</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
<td>0.6</td>
<td>10.0</td>
<td>1.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Fairways</td>
<td>35.0</td>
<td>29.2</td>
<td>29.2</td>
<td>12.0</td>
<td>3.5</td>
<td>35.0</td>
<td>10.2</td>
<td>35.0</td>
<td>10.2</td>
<td>35.0</td>
<td>10.2</td>
<td>35.0</td>
<td>10.2</td>
</tr>
<tr>
<td>Clubhouse</td>
<td>2.0</td>
<td>1.7</td>
<td>1.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DR tee</td>
<td>1.0</td>
<td>0.8</td>
<td>0.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Rough</td>
<td>39.0</td>
<td>32.5</td>
<td>32.5</td>
<td>36.0</td>
<td>11.7</td>
<td>46.0</td>
<td>15.0</td>
<td>75.0</td>
<td>24.4</td>
<td>75.0</td>
<td>24.4</td>
<td>75.0</td>
<td>24.4</td>
</tr>
<tr>
<td>DR range</td>
<td>5.0</td>
<td>4.2</td>
<td>4.2</td>
<td>100.0</td>
<td>4.2</td>
<td>100.0</td>
<td>4.2</td>
<td>100.0</td>
<td>4.2</td>
<td>100.0</td>
<td>4.2</td>
<td>100.0</td>
<td>4.2</td>
</tr>
<tr>
<td>total</td>
<td>120.0</td>
<td>100 ac ft/ year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CINNABAR HILLS GOLF CLUB
WATER CONSERVATION STRATEGIES

• Turfgrass conversion
• Changed start times from 9pm to 12am
• **ET based irrigation and deep, infrequent**
  • Slow release nitrogen fertilizers
  • Aeration
  • Calcium applications
Previously watered 70-80% ET every night on fairways and rough. Now 60% every other night.

- ET data available at [www.cimis.water.ca.gov](http://www.cimis.water.ca.gov)
- Once ET loss determined, use your sprinkler precipitation rate to determine run time.

\[
ET = 0.25''
\]

Sprinkler precip rate = 0.41''/hr

Run time = ET/precip rate * 60min

Or \(0.25'' / 0.41'' \times 60 = 36\)m @ 100% ET

Turf requirement of 60% ET = 22m
CINNABAR HILLS GOLF CLUB
WATER CONSERVATION STRATEGIES

• Turfgrass conversion
• Changed start times from 9pm to 12am
• ET based irrigation and deep, infrequent
• Slow release nitrogen fertilizers
• Aeration
• Calcium applications
- Excessive nitrogen leads to increased rate of photosynthesis.
- Increased rate of photosynthesis leads to increased rate of transpiration.
- Increased transpiration leads to increased water loss from the plant.
- Organic fertilizers are slow releasing nitrogen fertilizers.
- If you want green without excessive growth, look for fertilizer with low nitrogen content and >3% iron content.
CINNABAR HILLS GOLF CLUB
WATER CONSERVATION

• Turfgrass conversion
• Changed start times from 9pm to 12am
• ET based irrigation and deep, infrequent
• Slow release nitrogen fertilizers

• Aeration
• Calcium applications
Aeration

- Relieves compaction;
- Can increase oxygen in the rootzone for beneficial bacteria;
- Increases water penetration;
- In a home lawn or commercial property, a core is not necessary.
Turfgrass conversion
- Changed start times from 9pm to 12am
- ET based irrigation and deep, infrequent
- Slow release nitrogen fertilizers
- Aeration

Calcium applications
- Calcium will aide in aggregating or “loosening” the soil, i.e. increasing infiltration rates.
- Can be applied granularly in the form of gypsum or lime.
- Great to do after aeration.
- There are OMRI options
- Cheap to do with application rates of 10#/1000 sq ft
- It’s a program, not a one time fix.
CINNABAR HILLS GOLF CLUB
WATER SAVINGS

• Saved 24.3% in 2014
• Saved 31.4% in 2015
• Saved 35.1% in 2016
• Volume saved = 421.29 ac/ft
CINNABAR HILLS GOLF CLUB

Brian Boyer
Golf Course Superintendent
bboyer@cinnabarhills.com
408-323-7820
Alan Hackler

Bay Maples, Wild California Gardens
Advancements in greywater
Flotender™ Instant Distribution Greywater System
Greywater Filtration for Drip Irrigation Systems

In a Flotender™ Instant Distribution Greywater System, the incoming greywater produced is immediately filtered, pressurized and distributed to the landscape. No greywater is stored for future use in this application.

- **Surge Tank Vents**
  - Allows unrestricted water flow from one tank to another

- **In From City Water**
  - Provides supplemental water to the system

- **Electric Valve**
  - Controlled by the irrigation clock
  - Provides additional water if needed

- **Pop-Up Indicators**
  - Displays the pumping and system status

- **Secondary Filter**
  - Provides a second stage of filtration

- **Auto-Flush Device**
  - Includes air-gap for back-flow prevention

- **Surge Tanks**
  - Provides surge capacity for in-flowing greywater

- **Greywater Filter**
  - Filters & pressurizes the greywater

- **Greywater Stub-Out**
  - Greywater in from building

- **To Sewer (optional)**

- **3-Way Valve**
  - Provides the option of diverting greywater back to the sewer instead of to the irrigation system

- **Overflow**
  - Can be routed back to the sewer or to a mulch box placed in well drained soil

- **Spray Ring Valve**
  - Allows for spray ring flow control

- **3-Way Valve**
  - Allows for multiple irrigation zones
  - Can be electrically or manually operated

- **Drip Irrigation System**
  - Filtered and pressurized greywater is sent to above or below ground drip irrigation
Flotender GXL Series System Detail

Click on a blue box below for additional information.
ACCESS CAP WITH COMPRESSION LATCH
Provides easy access to the filters without removing the bolt down lid

FILTER BASKET
Features a detachable 150 mesh filter element

BOLT DOWN LID
The two piece lid system allows the Filter Baskets to be removed without having to remove the entire lid

FILTER CARRIAGE
Supports the Filter Basket and is easily removed to allow complete access to the pumping chamber

SELF REGULATING BACKWASH SYSTEM
Provides multi-point rotary spray to the greywater filter elements ensuring that water flows freely through the filter element

GREYWATER FILTER TANK
The heavy-duty polyethylene tank provides a sturdy housing for the elements and pumping equipment
Rain Catchment System
(5) 265 gallon tanks
‘Slim-line’ style tanks
First flush before tank
½ HP pump
Connects to existing irrigation system
Bushman Slim-Lime tank specs
265 gallon
Connecting to irrigation: Aqua-Saver valve switches irrigation sources Rain water or municipal
Project Challenges?

• Working around mature established garden with extensive planting
• Modifying existing hardscape
• Scheduling with other parties involved in project: general contractor, architect, city building department, installation team, home owner, etc.
Water savings from greywater?

• 35-50 gallons of greywater sent to garden daily (single person household)

• System has been operational for under 1 year

• Estimated 11,000-18,000 gallons/per year of municipal water is being off-set by system

• Double bonus: 11,000-18,000 gallons/per year, less waste water is being sent to treatment plant each year
Water Savings: Rainwater

Tanks fill & drain 2-3 times a year= 1,325-3,975 gallons of water being off-set from municipal water demand, annually.
Return on Investment?

• What is the ROI on a traditional irrigation system?
  • With current pricing structures & lack of rebates & incentives, traditional ROI are N/A
  • Reduction in household and municipal sewer wear & tear
  • Water security, sustainability, increase in home value, POM…..

• Greywater systems and traditional irrigations systems have the same ROI:
  • Keep your plants alive
  • Keep your plants looking green
  • Ecological benefits
Thanks for listening
Questions and Answers
Back at 11:15 am
1. What’s one lesson learned from the drought?

2. What can the landscape industry collectively do to ensure that new landscapes are efficient?

3. How can we all work better together in the areas of irrigation design, installation, and maintenance?

4. How can the landscape industry partner with the District to educate your clients about conservation?
Back at 12:45 am
ACTION PLANNING

Let’s hear your ideas...
End of Summit

1) Thank you so much for attending!

2) Keep an eye out for our follow up emails in the coming weeks.

3) Prize Drawing

4) Vendor Fair