

Planning for Water Shortages

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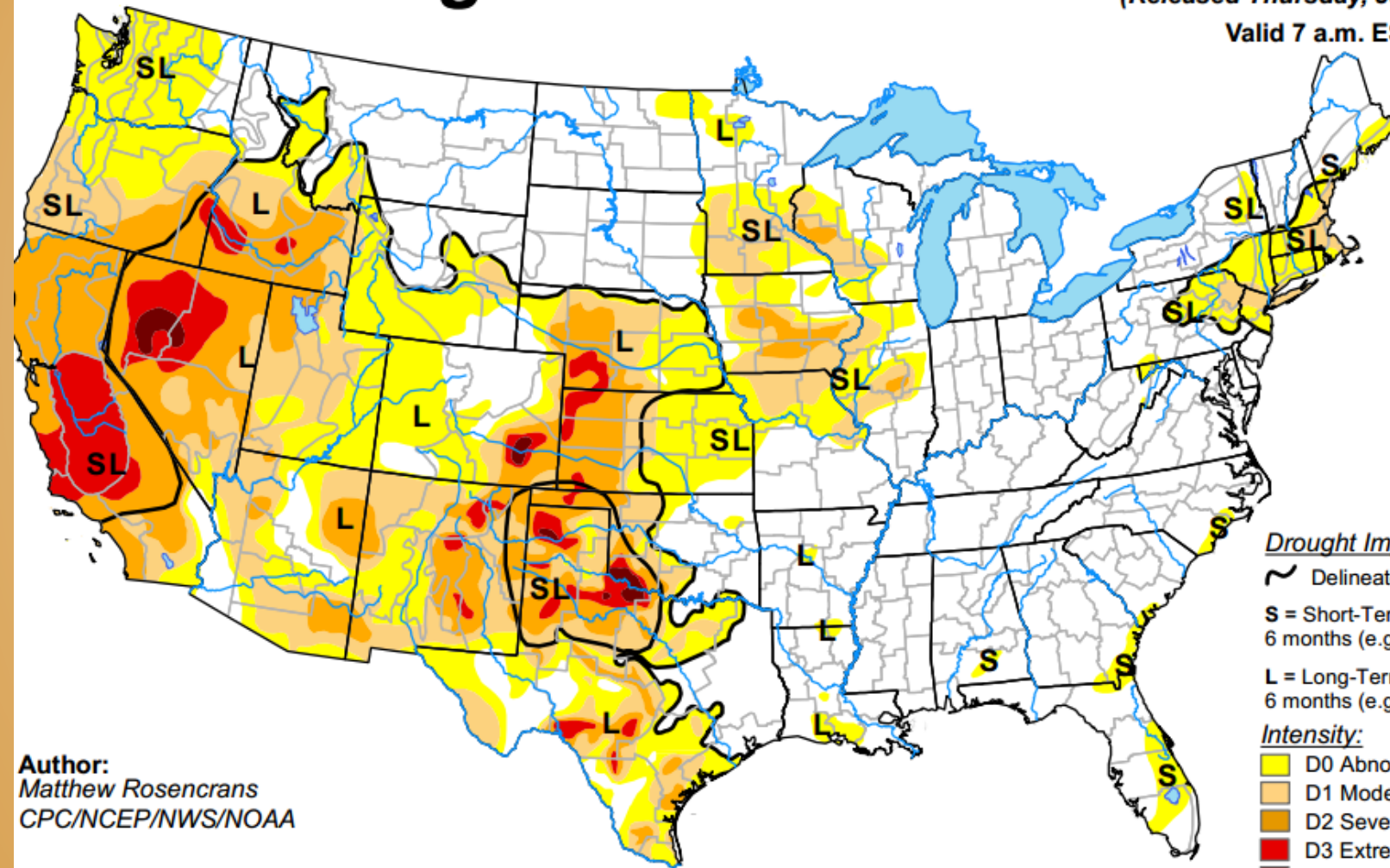
**Stanford University – Utilities Services
And Maddaus Water Management**



U.S. Drought Monitor

December 31, 2013
(Released Thursday, Jan. 2, 2014)

Valid 7 a.m. EST



Drought Impact Types:

- ~ Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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CPC/NCEP/NWS/NOAA

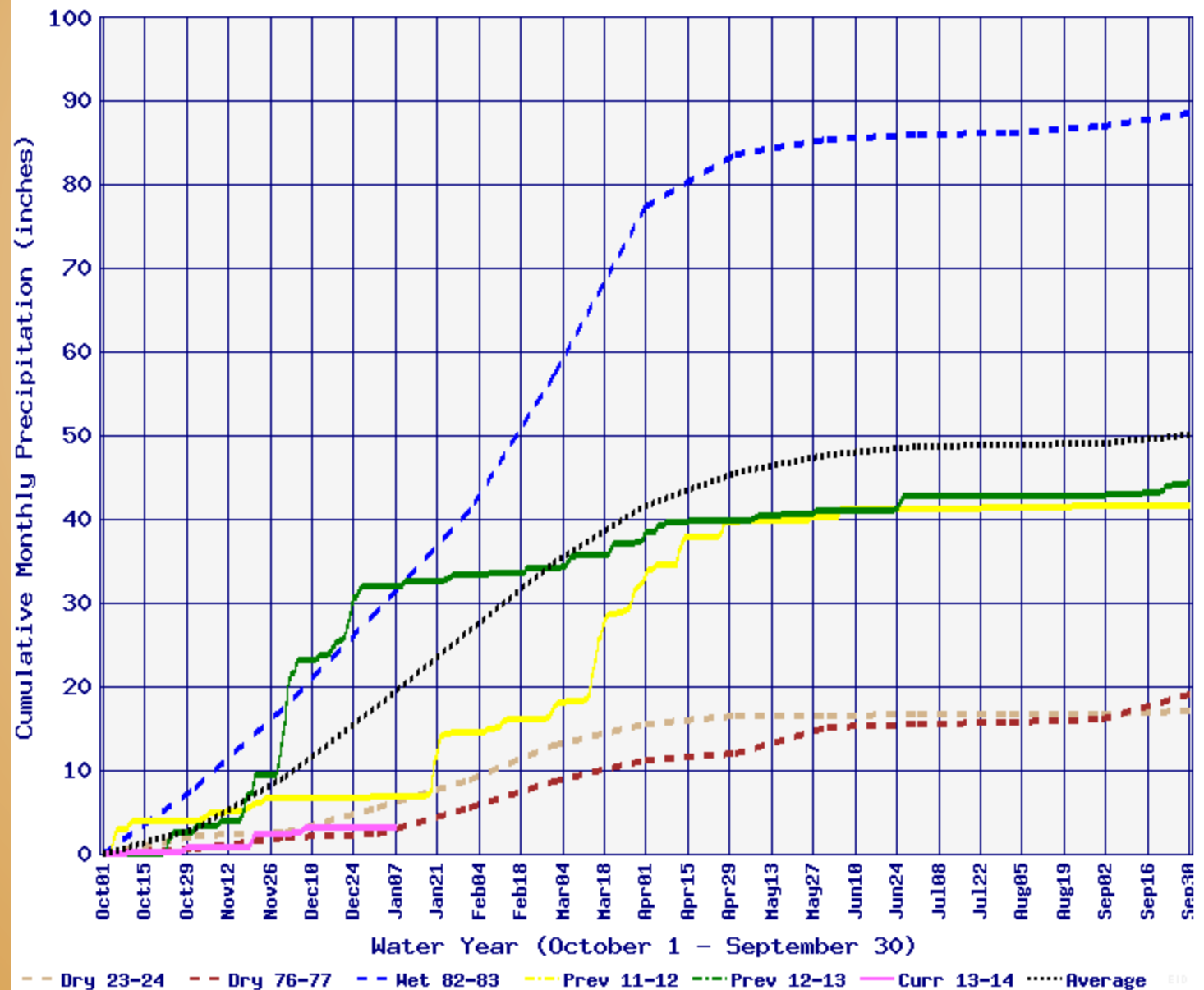


Planning for Water Shortages - Overview

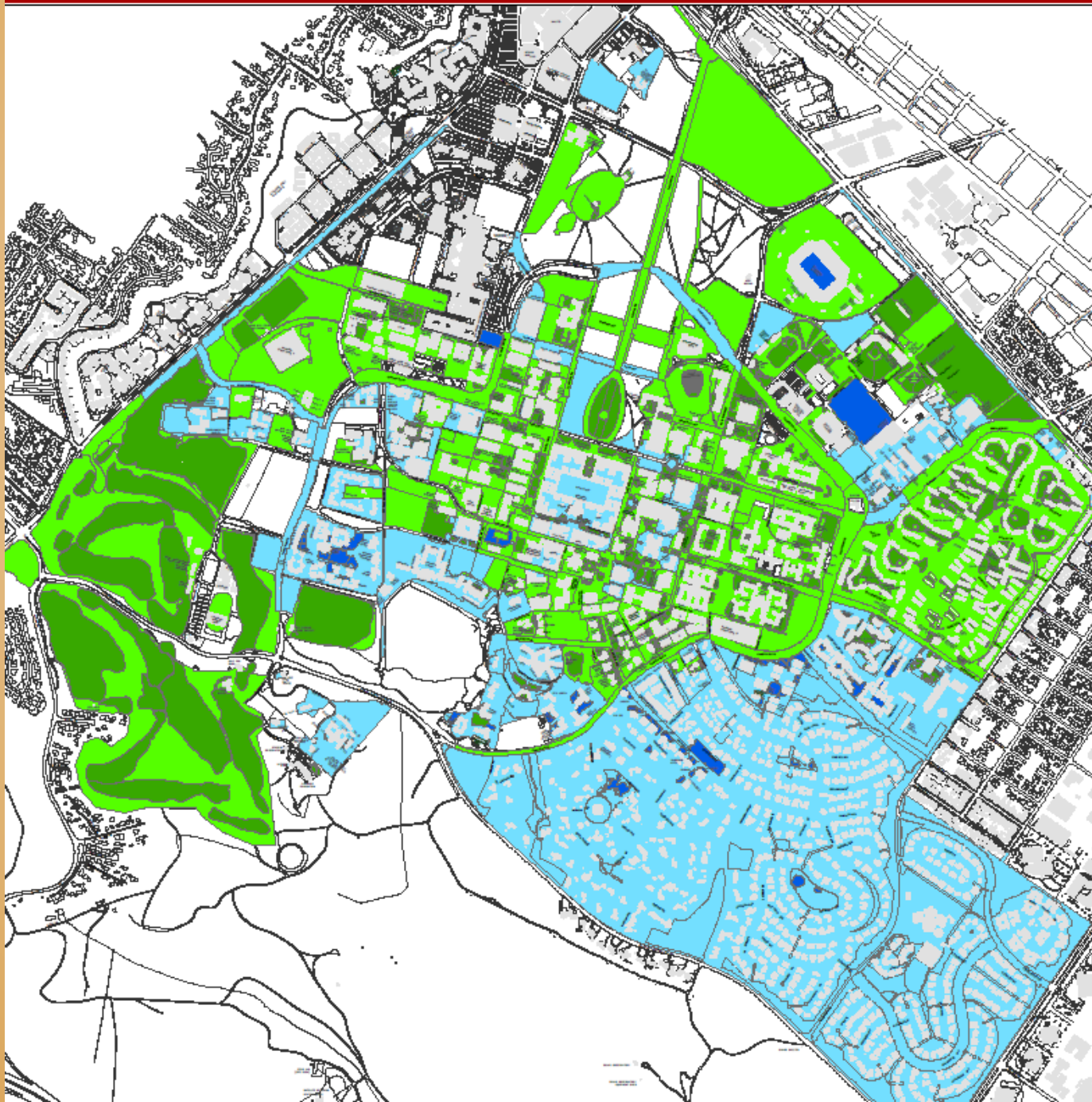
- **Goal – Water Shortage Contingency Plan that clearly identifies implementation criteria, reduction measures, and expectations**
- **Identify key networking group – representatives**
- **Identify, obtain current and relevant water use information that will be used to back up the plan**
- **Develop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

California Northern Sierra Precipitation

8-STATION INDEX, JANUARY 07, 2014



Domestic and Lake Water Irrigation Areas and Meters





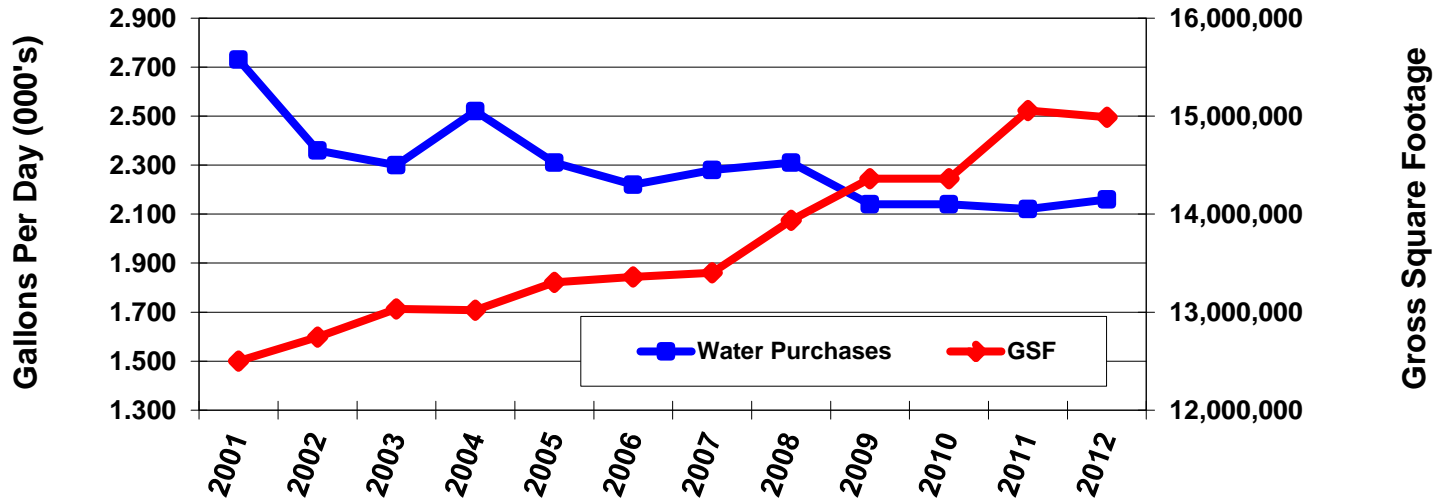
Planning for

Water Shortages - Plan Elements

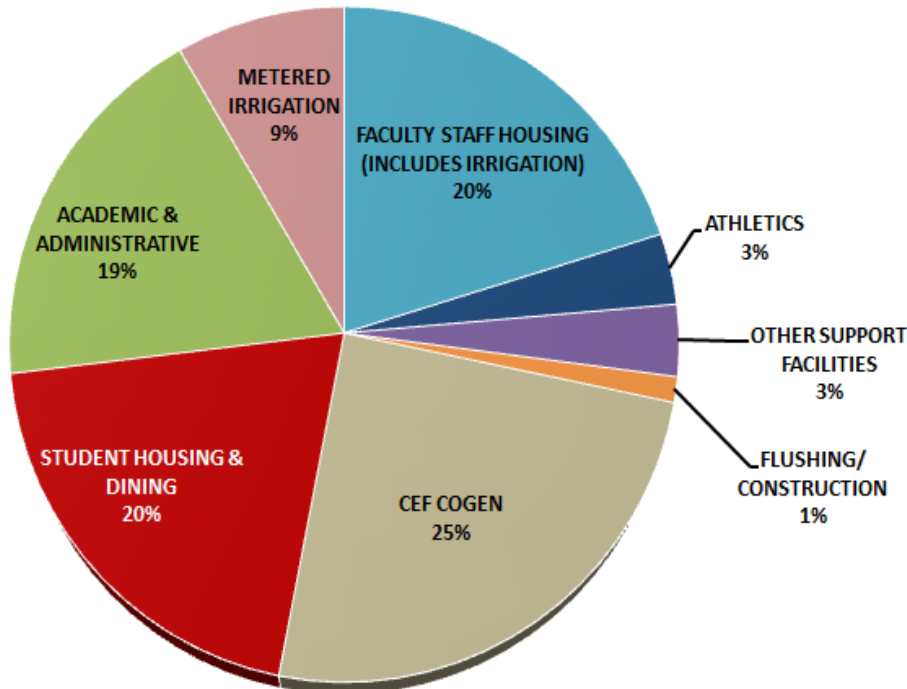
- **Get Intelligence - History of water supply and demand – use annual, seasonal, monthly, trend meter data**
- **Identify “intelligence loop” - factual information from customer groups, use trends – define group profiles, multi-year trends**
- **Survey customers - early in the season, request current 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**



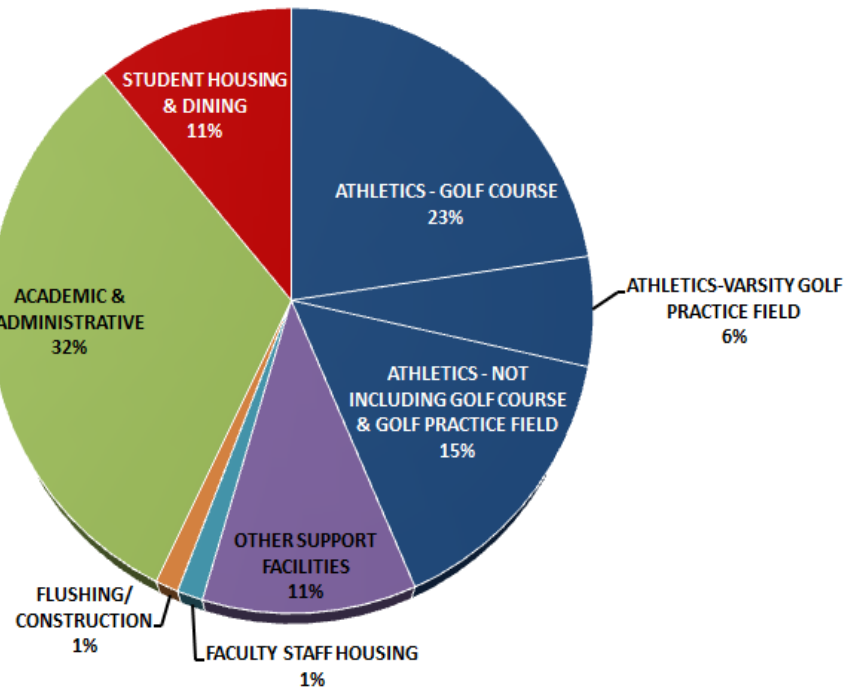
Stanford University Domestic Water Use 2001-2012



STANFORD UNIVERSITY DOMESTIC WATER CONSUMPTION
FY2012 (2.13 million gals/day)

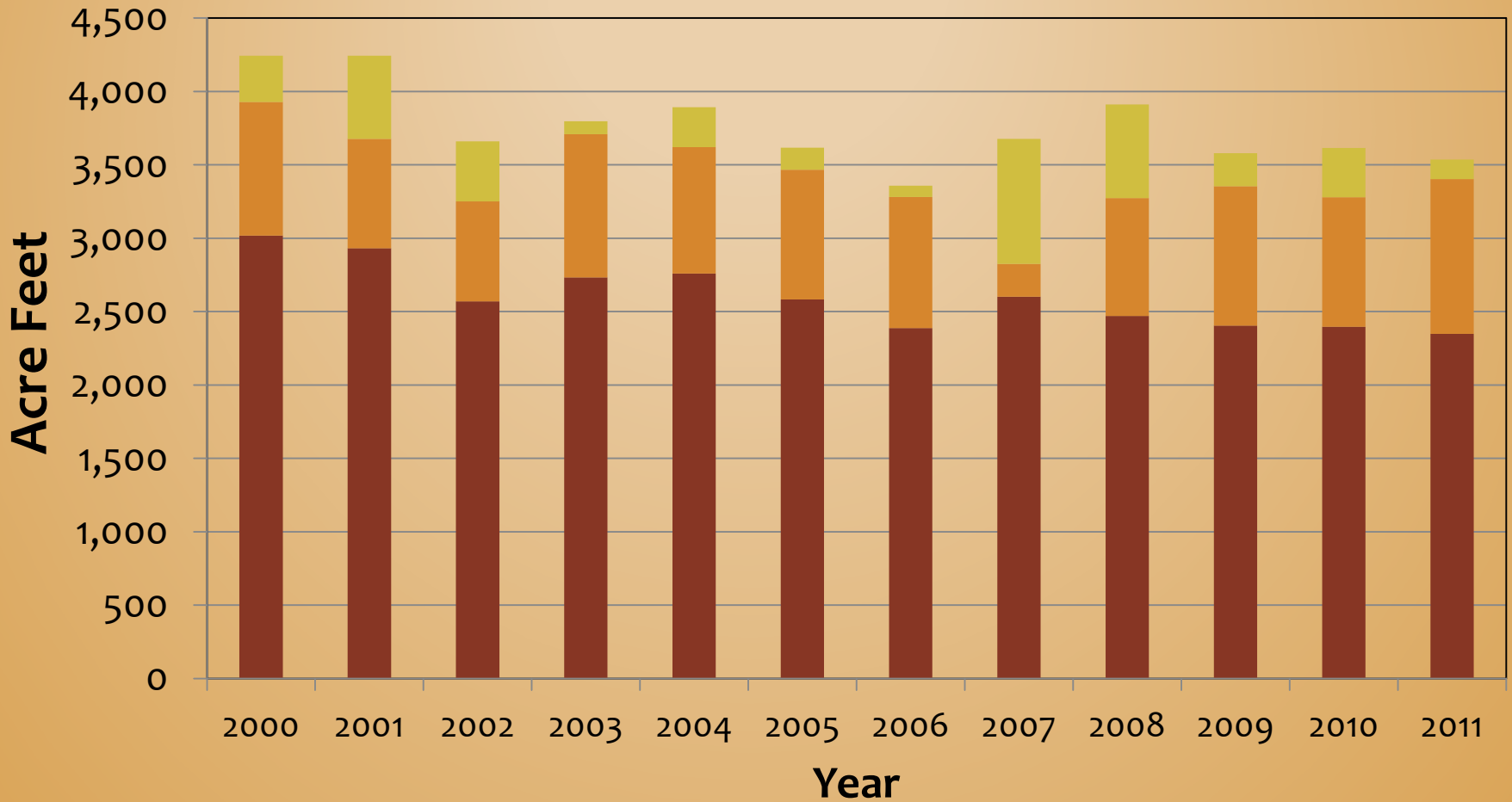


STANFORD UNIVERSITY LAKE WATER CONSUMPTION
FY2012 (1.03 million gals/day)

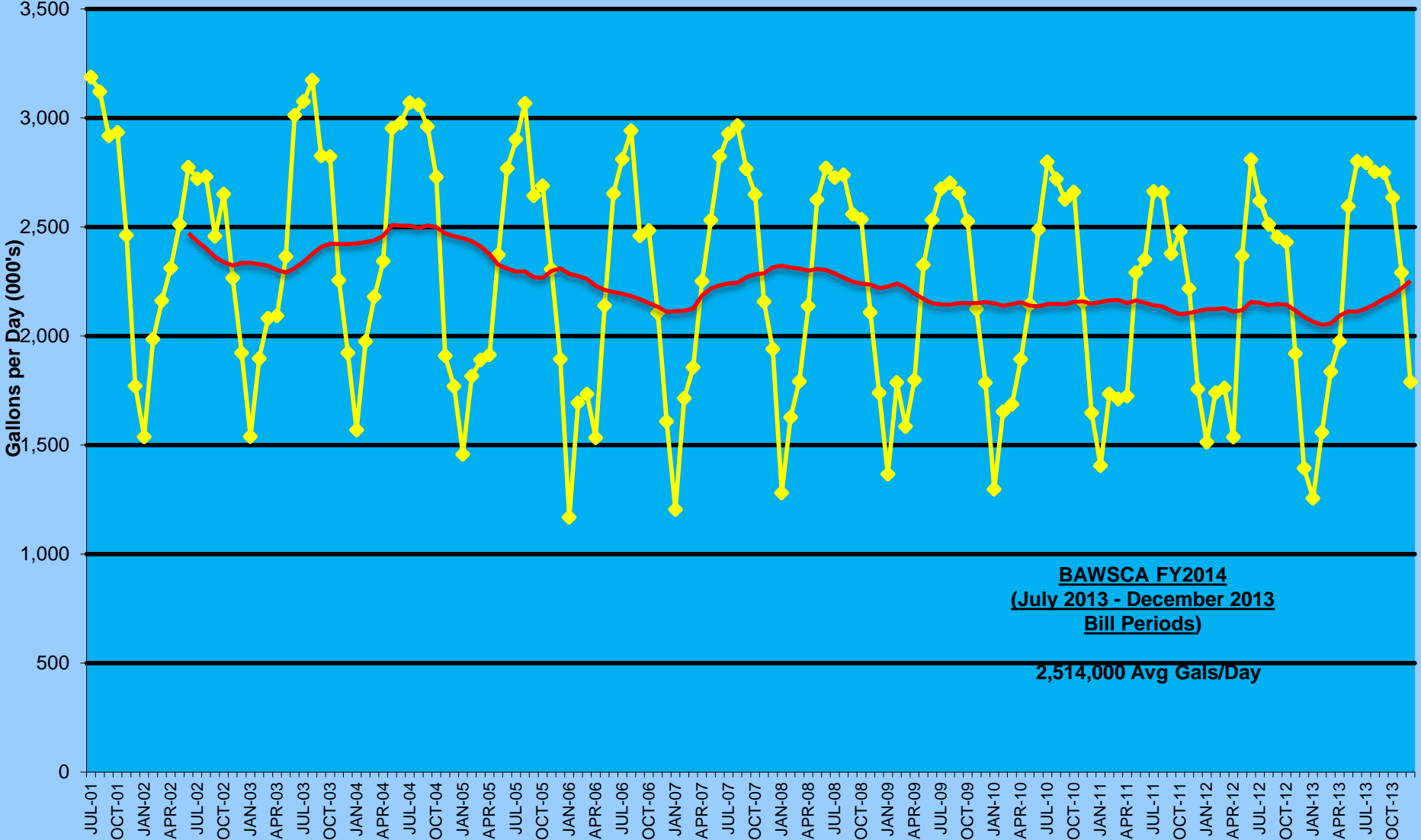


Stanford University's Water Consumption of SFPUC, Surface Water, and Groundwater for Jan. - Dec. (2000-2011) by Bill Period, in Acre Feet

■ HH ■ Surface ■ GW



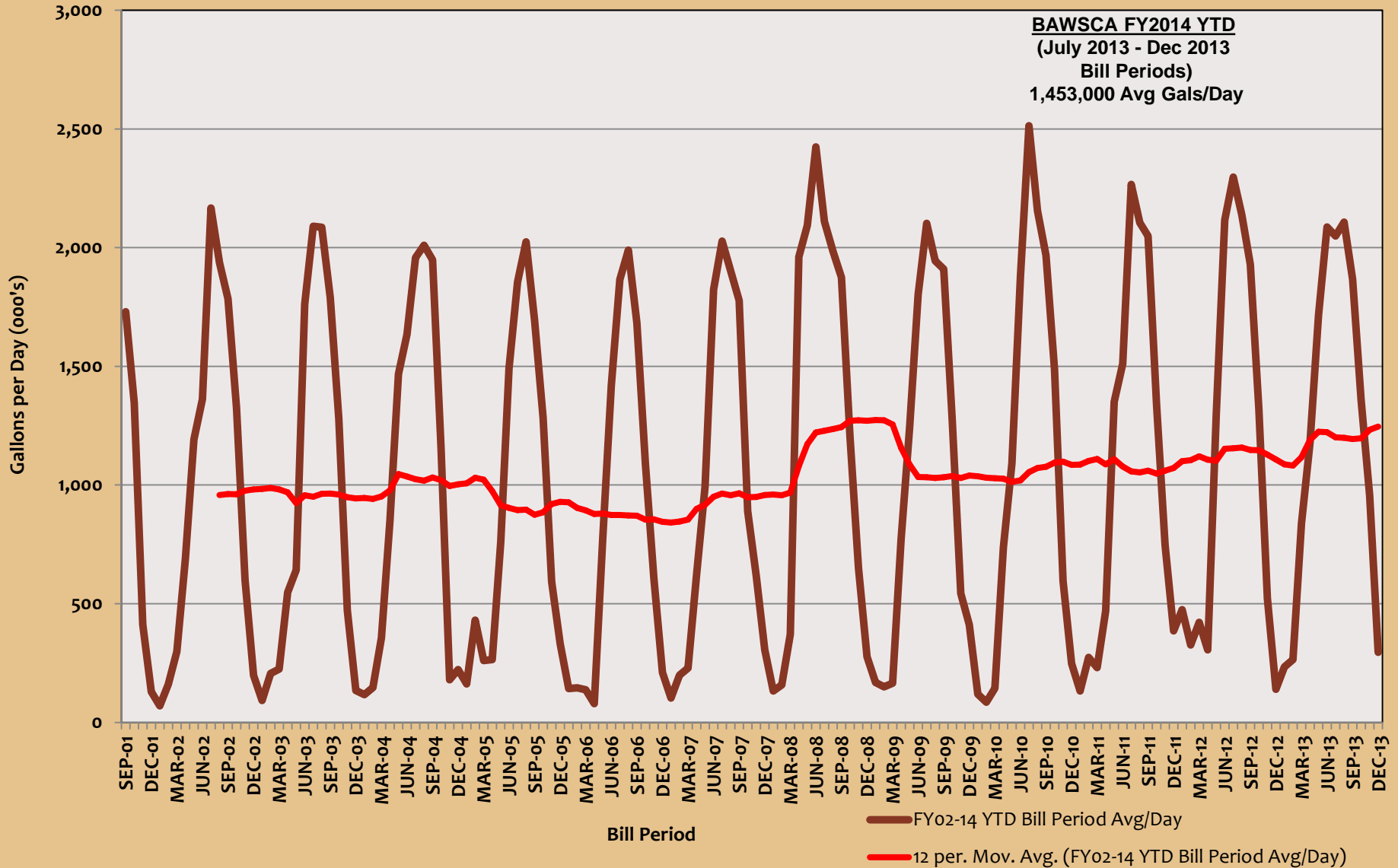
Domestic Water Consumption BAWSCA FY2002 - FY2014 YTD



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

Bill Period

LAKE WATER SYSTEM FY2002-FY2014 YTD Bill Period Average per 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**

PLANNING FOR WATER SHORTAGES – CRITERIA FOR DEVELOPING THE MODEL

Web-based interface, with dashboard

Model criteria:

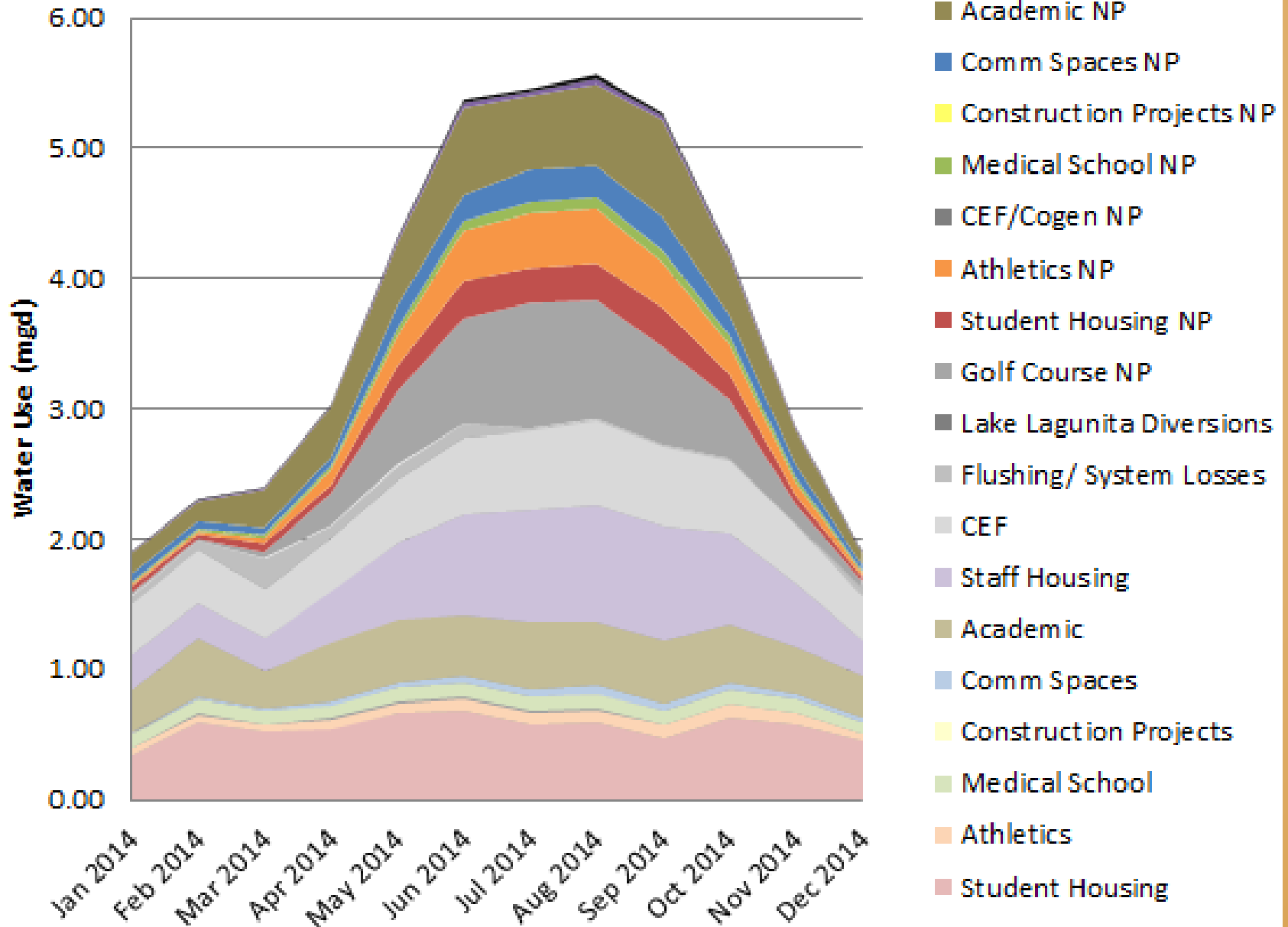
- Easy to use, clear**
- Flexible**
- Captures all background data used in the model**
- Relevant references**
- Sources of information and data**
- Historical metered data**
- Supply and demand projections**
- Wholesaler requirements**

WATER SHORTAGE MANAGEMENT MODEL

Includes:

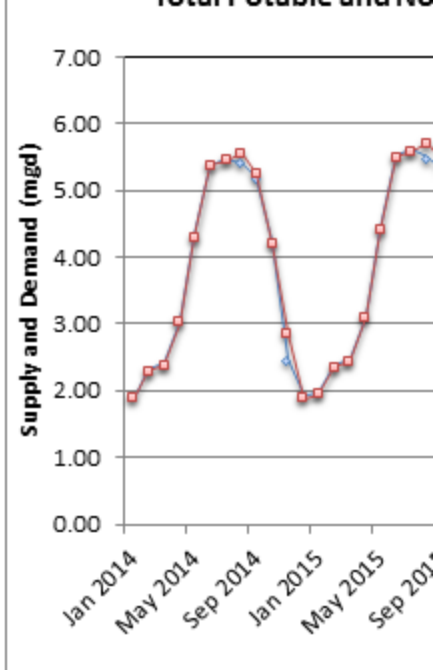
- ✓ **All water sources, independently and combined**
- ✓ **Cutbacks/limitations for each source**
- ✓ **Pre-programed and new scenarios**
- ✓ **Identified categories of use**
- ✓ **Monthly use for each category**
- ✓ **Seasonal supply and demand**
- ✓ **Growth: population, business, sqft**

Projected Demand for Each Category by Month

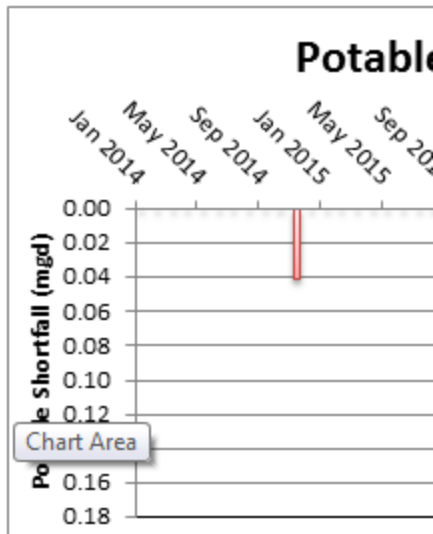


Scenario Name	Start Date	Comments	Notes
SFPUC Drought DRIP Tier 1 - Current Demands 2014	Jan 2014		Build out is estimated in 2026

SFPUC & Surface Supply Limit				
Year	SFPUC Supply Limit (mgd)	Surface Water Supply Limit (mgd)	Comments	Notes
2014	1.99	0.75		SFPUC max supply: 3.03 mgd
2015	1.99	0.75		SFPUC Estimated Demand for 2012 (up 3%): 2.1
2016	1.99	0.75		SFPUC DRIP supply limit: 1.81 mgd
2017	2.05	0.75		Lake Water Production Min: 0.2 mgd in 2007 Max
2018	2.12	0.75		
2019	2.18	0.75		

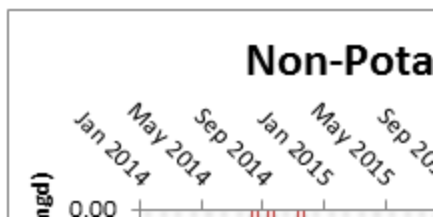


Well Supply Limit					
Well Name	Use Percent	Max Capacity (mgd)	Usable Capacity (mgd)	Use Type	Notes
Well #1	65%	0.72	0.47	Domestic/Non-Potable	Tom is working to get the sustainable
Well #2	65%	0.72	0.47	Domestic/Non-Potable	All wells can be valved for Dom/NP
Well #3	65%	1.73	1.12	Domestic/Non-Potable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



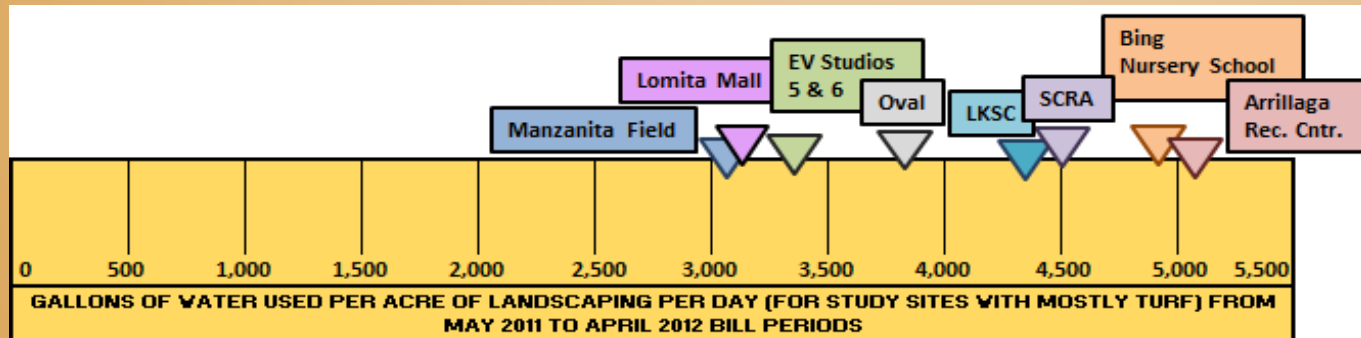
CEF Demand Reduction		
Reduction Percent	30%	
Reduction Start Year	2016	

Cutbacks														
	Dry Year Demand Increase	Amount Cutback (mgd)	Warm Season Months											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Student Housing	10%	0.00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Athletics	10%	0.00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

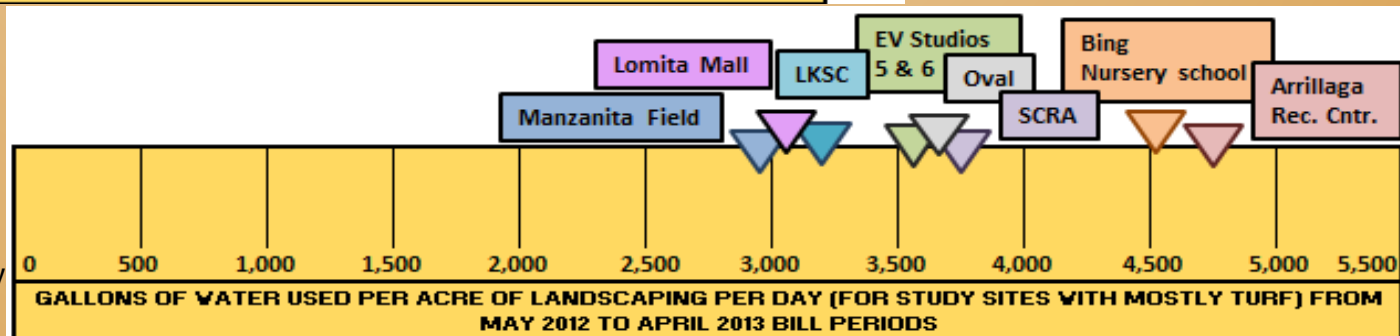


Developed BMPs and Metrics for Irrigated Landscaping

	BMPs	Metrics
1	Develop historical base/seasonal water use record.	Compare current base/seasonal use to historical base/seasonal water use record.
2	Automate leak alert notices and customize thresholds by site.	Compare number, duration and volume of leaks per site.
3	Use weather-based irrigation controller(s) .	Compare water use per acre at weather-based sites vs. non weather-based sites.
4	Implement and repeat site audits every 3-5 years.	Compare management practices, site characteristics and water use to prior audit recommendations
5	Develop simple, routine reports (on a weekly and monthly basis) to communicate water use.	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



May 2011 – April 2012



May 2012 – April 2013

QUESTIONS?

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

