Analyzing customer water conservation while accounting for population and climate changes

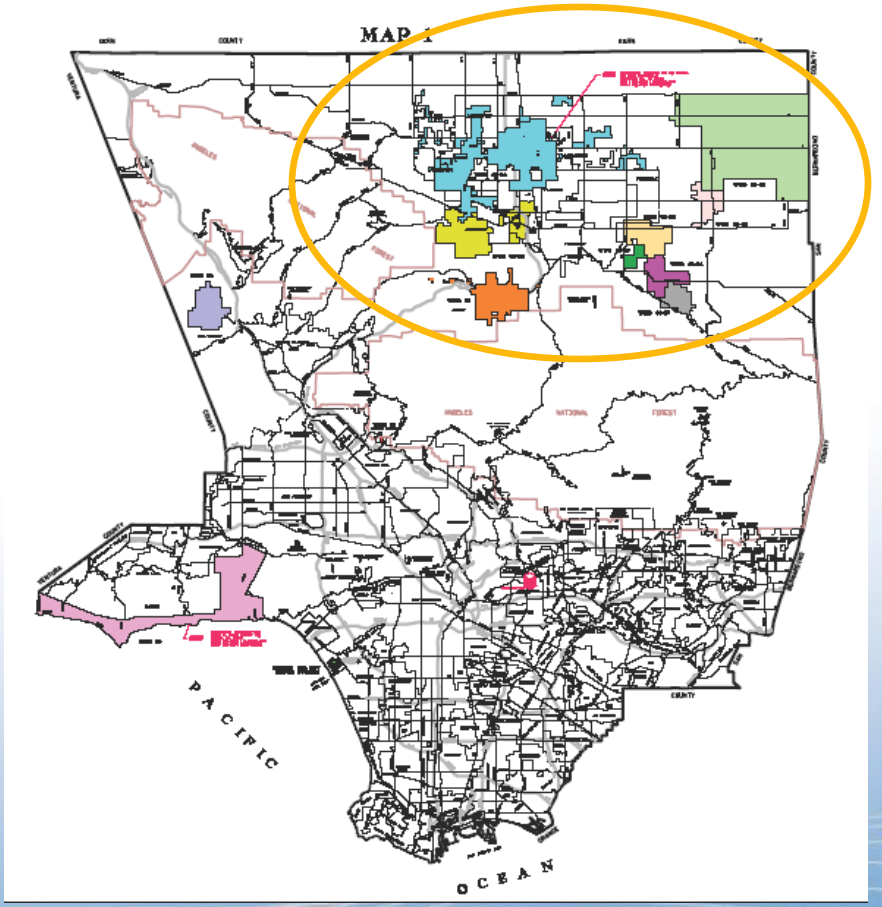
Objectives

*To analyze the impacts of **population** and **climate** changes on customer water conservation levels*

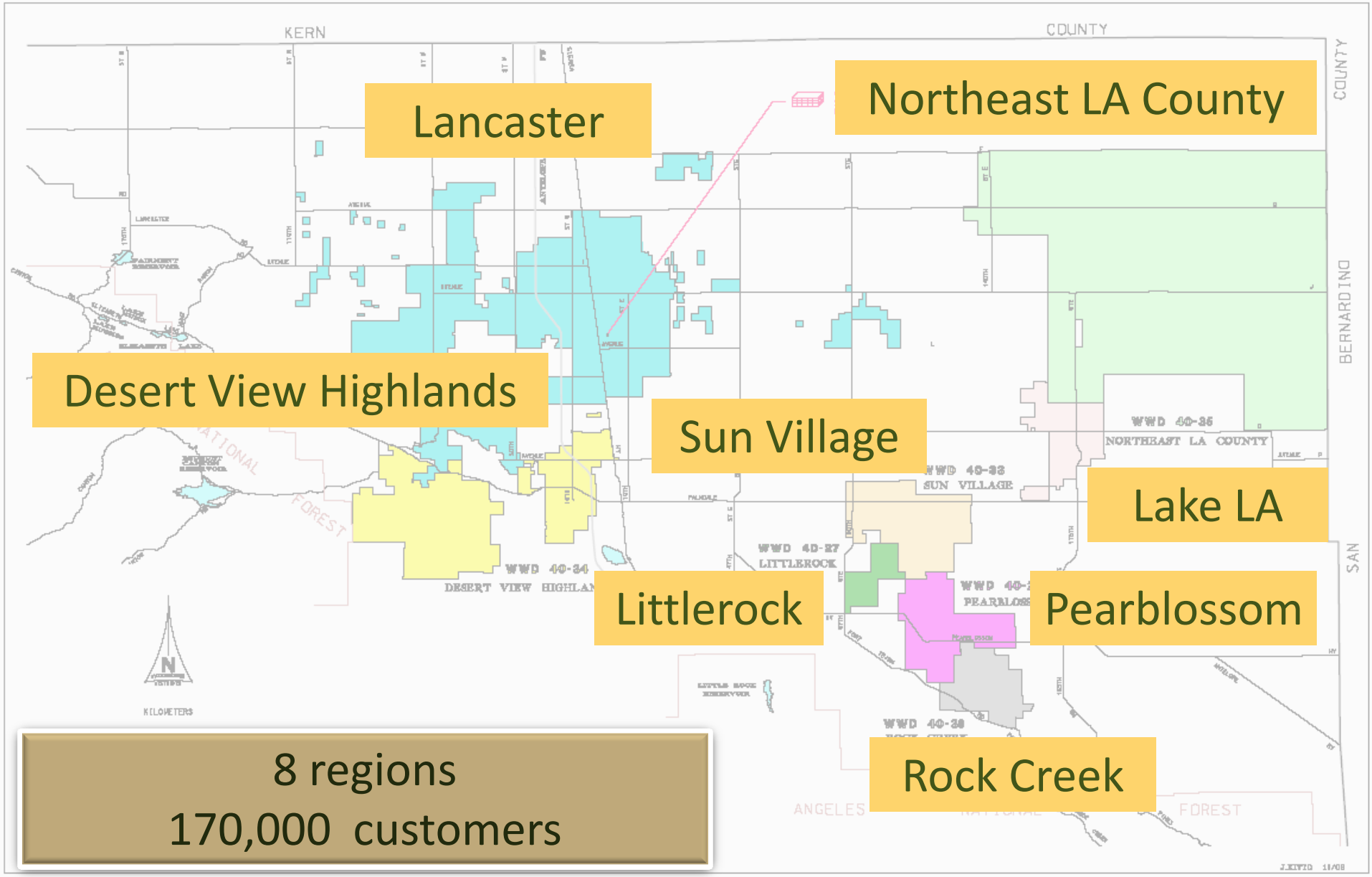
To determine the effectiveness of the conservation program

Los Angeles County Waterworks Districts

- Districts
  - Kagel Canyon
  - Malibu and Topanga
  - Val Verde
  - Acton
  - Antelope Valley
  - Marina del Rey Water System
- 200,000 customers



District 40, Antelope Valley

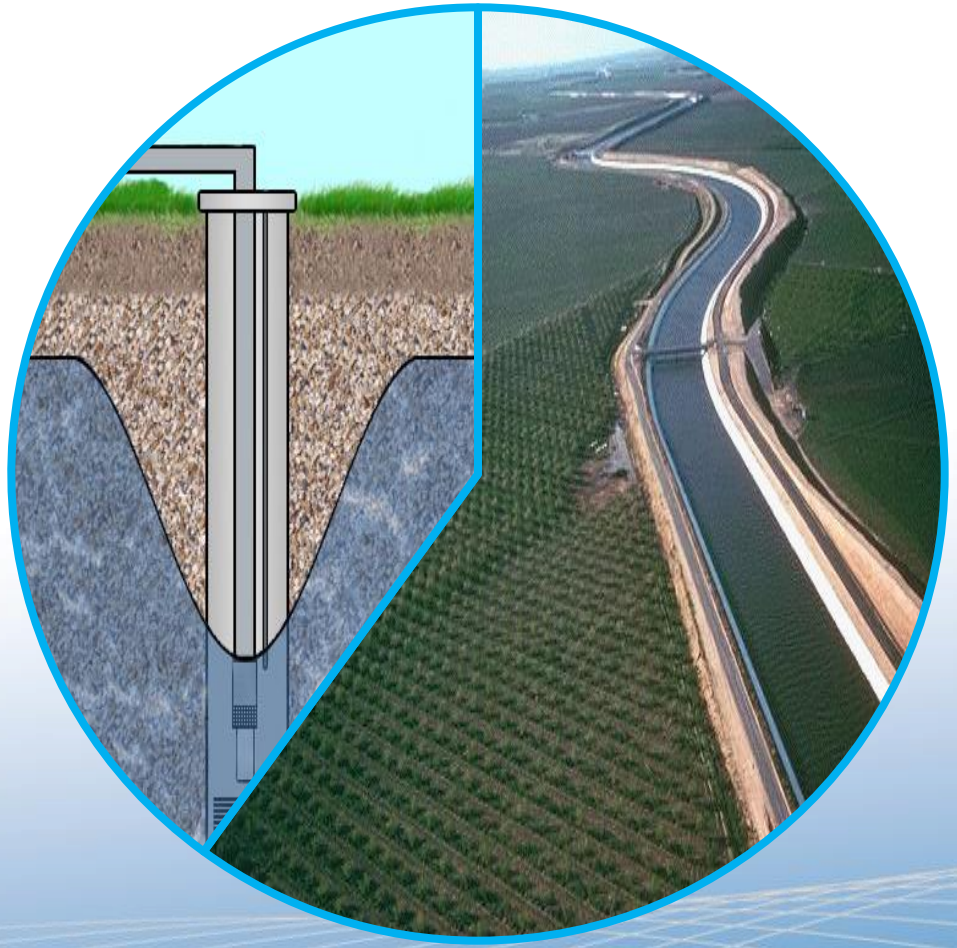


8 regions
170,000 customers

This is the Antelope Valley

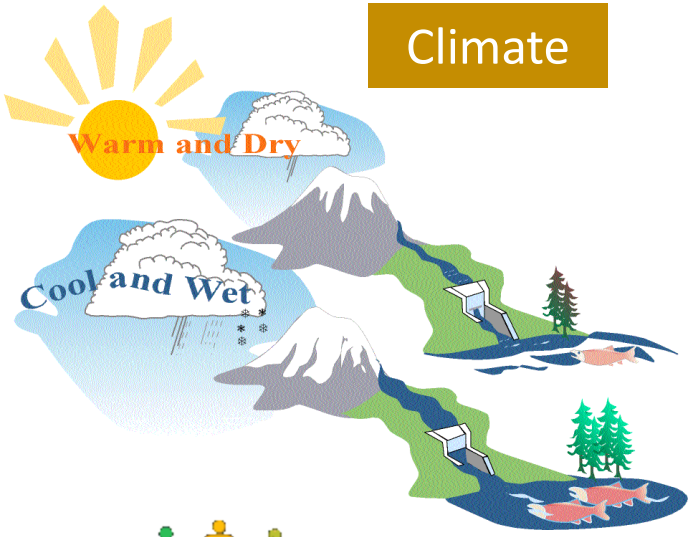
Water Sources

40%
Groundwater



60%
AVEK - SWP

Factors affecting water usage



Climate

Efficiency of appliances and fixtures

Cost of water

Landscape watering needs

Population

Customer awareness and proactiveness

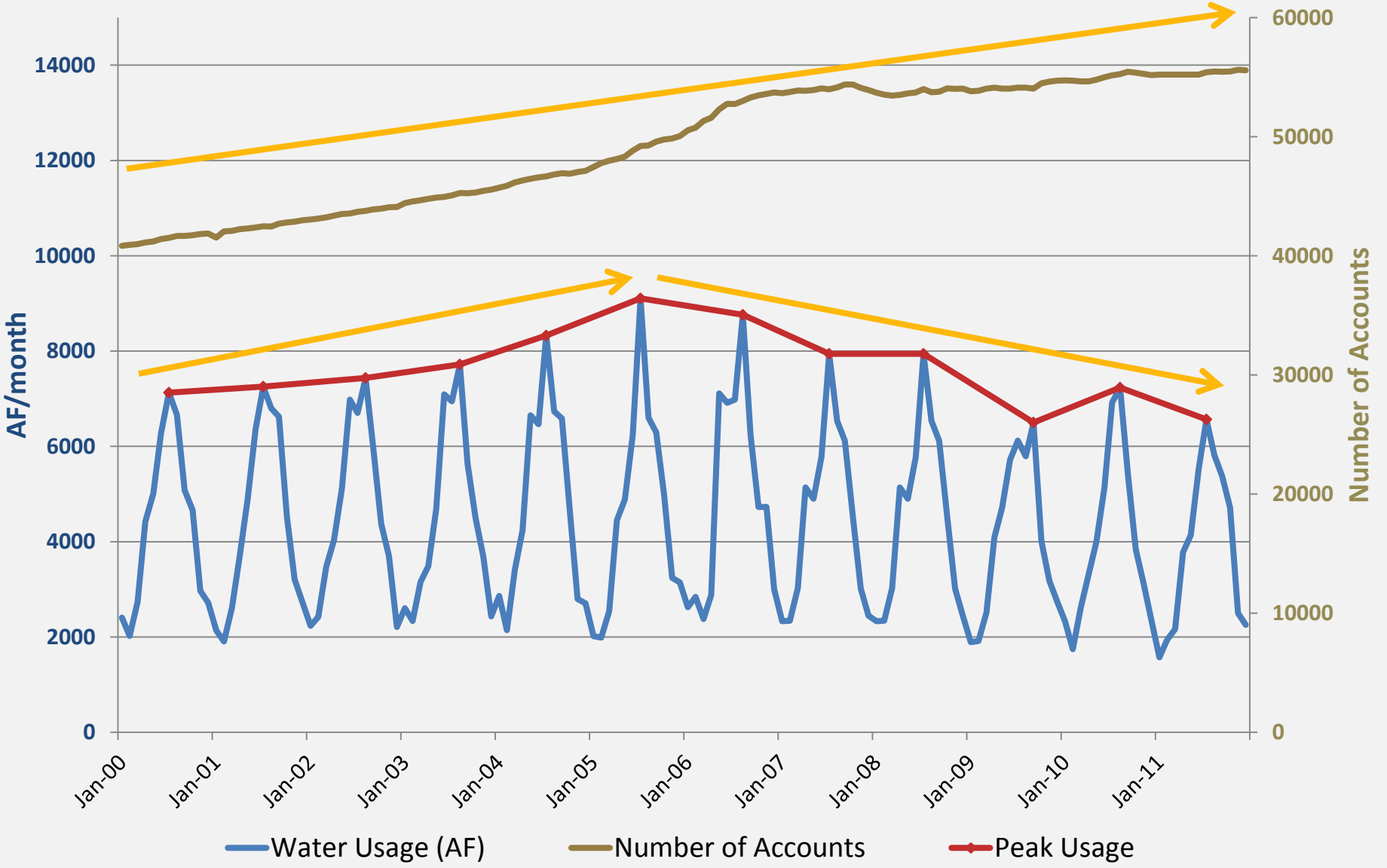
Ordinances

Social and economic factors

Population of District 40

	Accounts	Population
2000	41,000	127,000
2005	49,000	149,000
2010	55,000	172,000

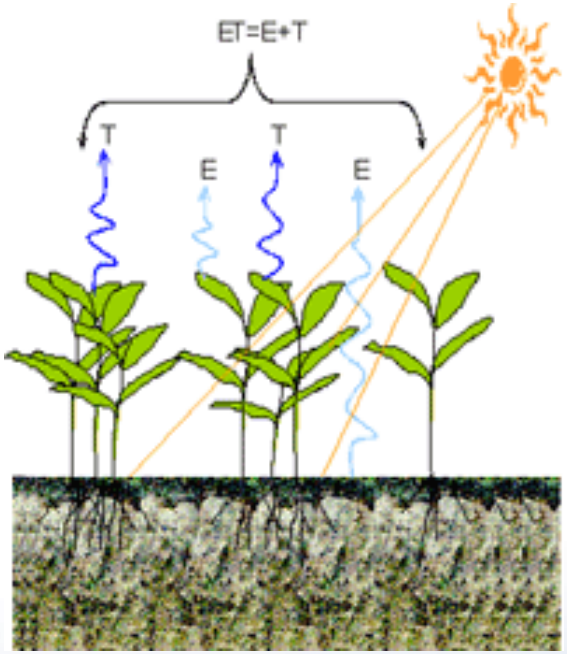
Total Water Usage vs. Accounts



Climate

Evapotranspiration (ET)

Loss of water to the atmosphere by the combined process of evaporation from soil and plant surface, and transpiration from plant tissues.



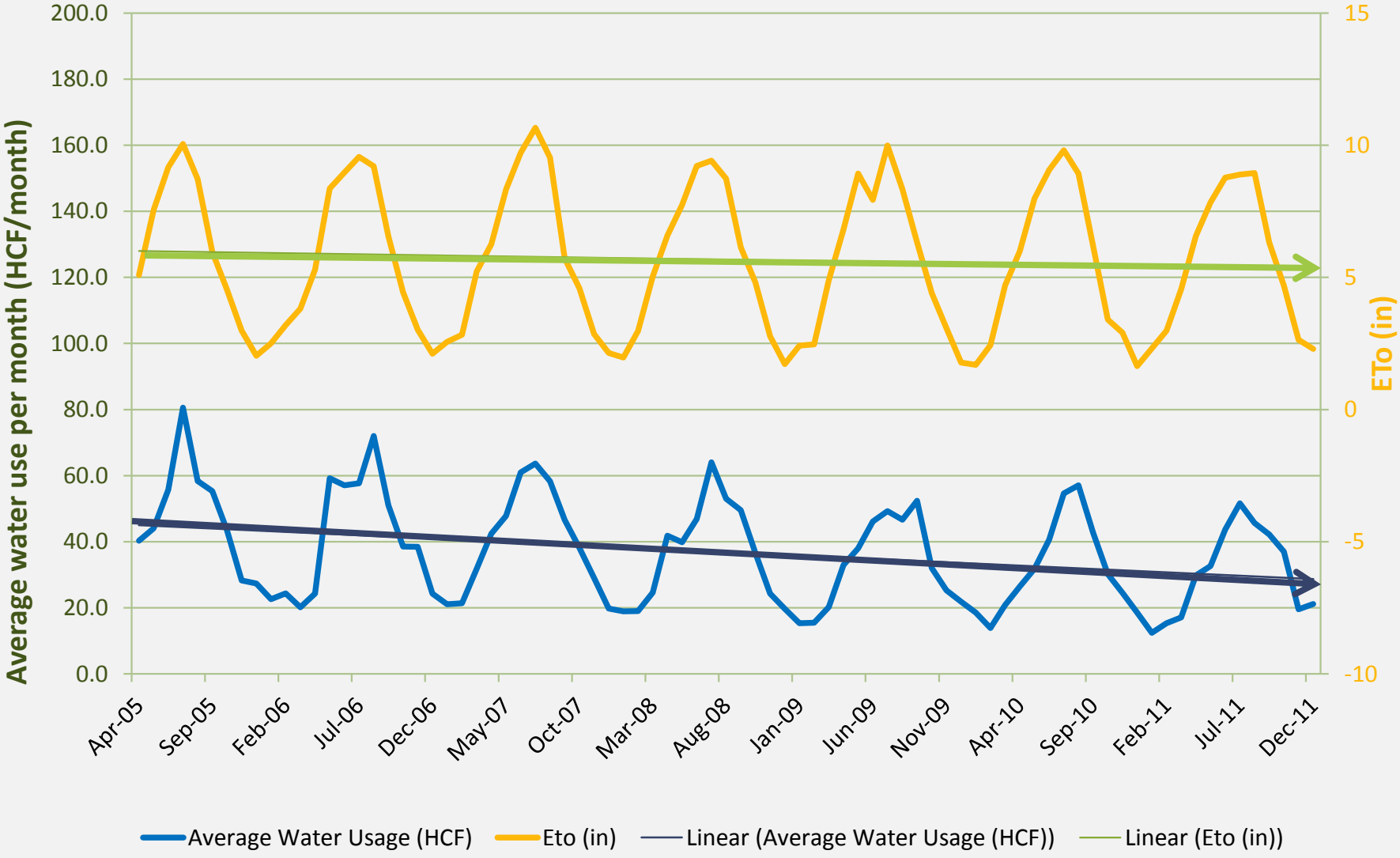
Reference Evapotranspiration (ETo)

ET rate of a reference crop (grass) in inches

Measured daily by DWR through the CIMIS weather stations

Station 197 - Palmdale

Average Water Usage vs. ETo



Theoretical Demand

$$\text{Total Water Use} = \text{Indoor Water Use} + \text{Outdoor Water Use}$$

$$\text{Indoor Water Use} = \text{gpcd} \times \text{pph} \times \frac{\text{days}}{\text{month}}$$

$$\text{Outdoor Water Use} = \text{area} \times \text{ETo} \times \frac{\text{plant factor}}{\text{efficiency}}$$

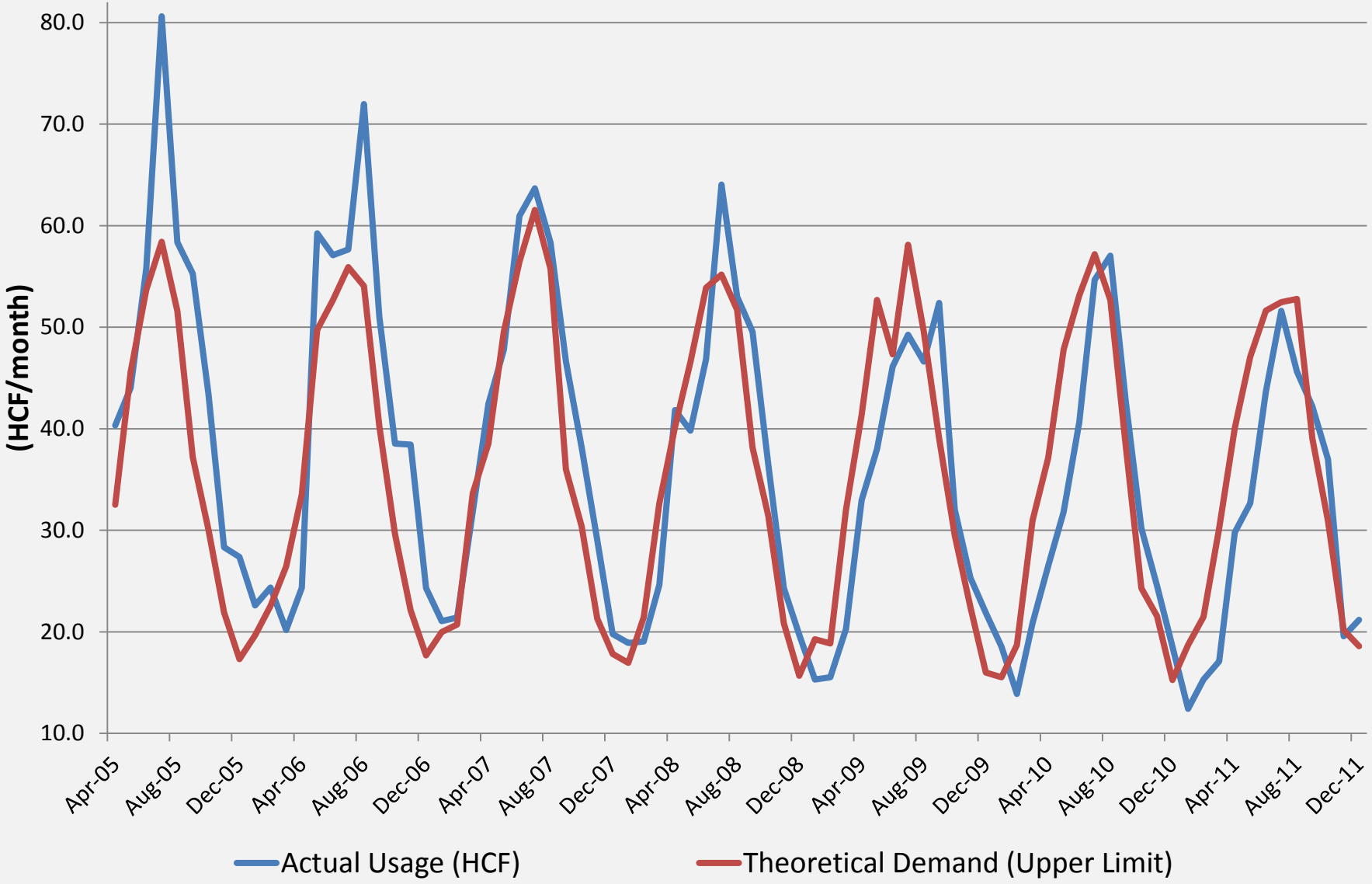
Theoretical Demand (Upper Limit)

Total Water Use = Indoor Water Use + Outdoor Water Use

Indoor Water Use = 55 gpcd × 3 × $\frac{\text{days}}{\text{month}}$

Outdoor Water Use = 5,600 sq ft × ETo × 1.1

Water Usage vs. Theoretical Demand



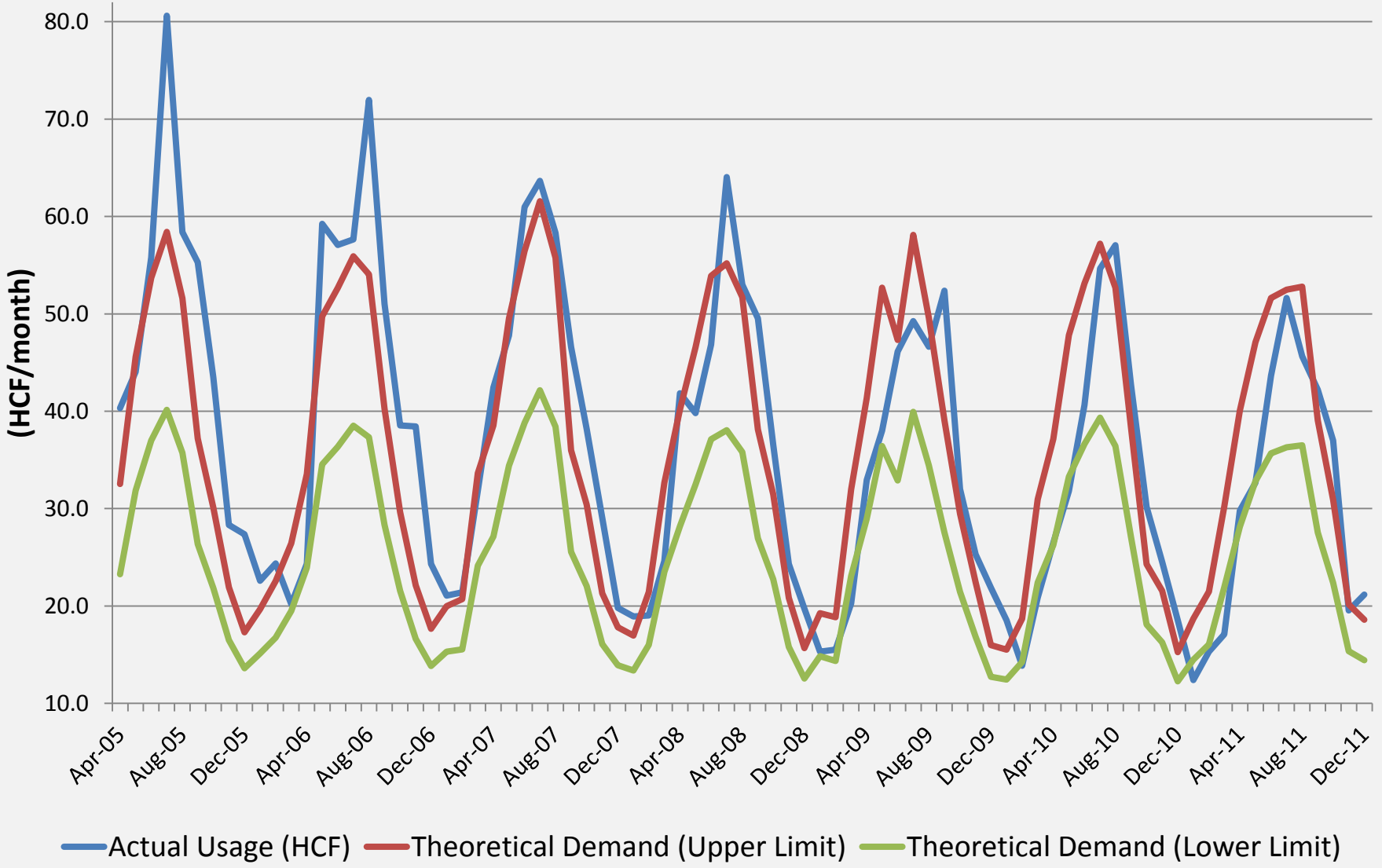
Theoretical Demand (Lower Limit)

Total Water Use = Indoor Water Use + Outdoor Water Use

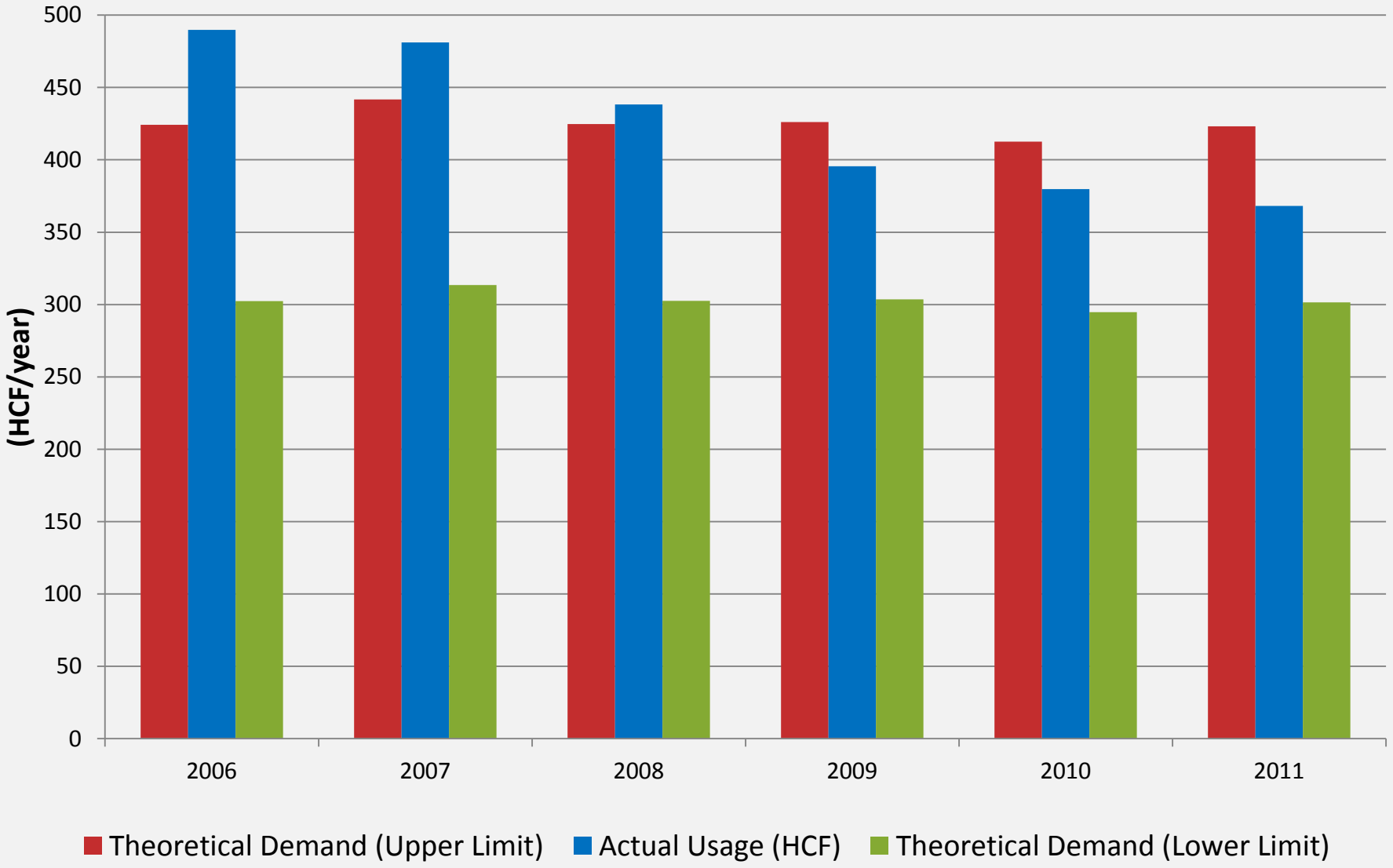
Indoor Water Use = 55 gpcd × 3 × $\frac{\text{days}}{\text{month}}$

Outdoor Water Use = 5,600 sq ft × ETo × **0.71**

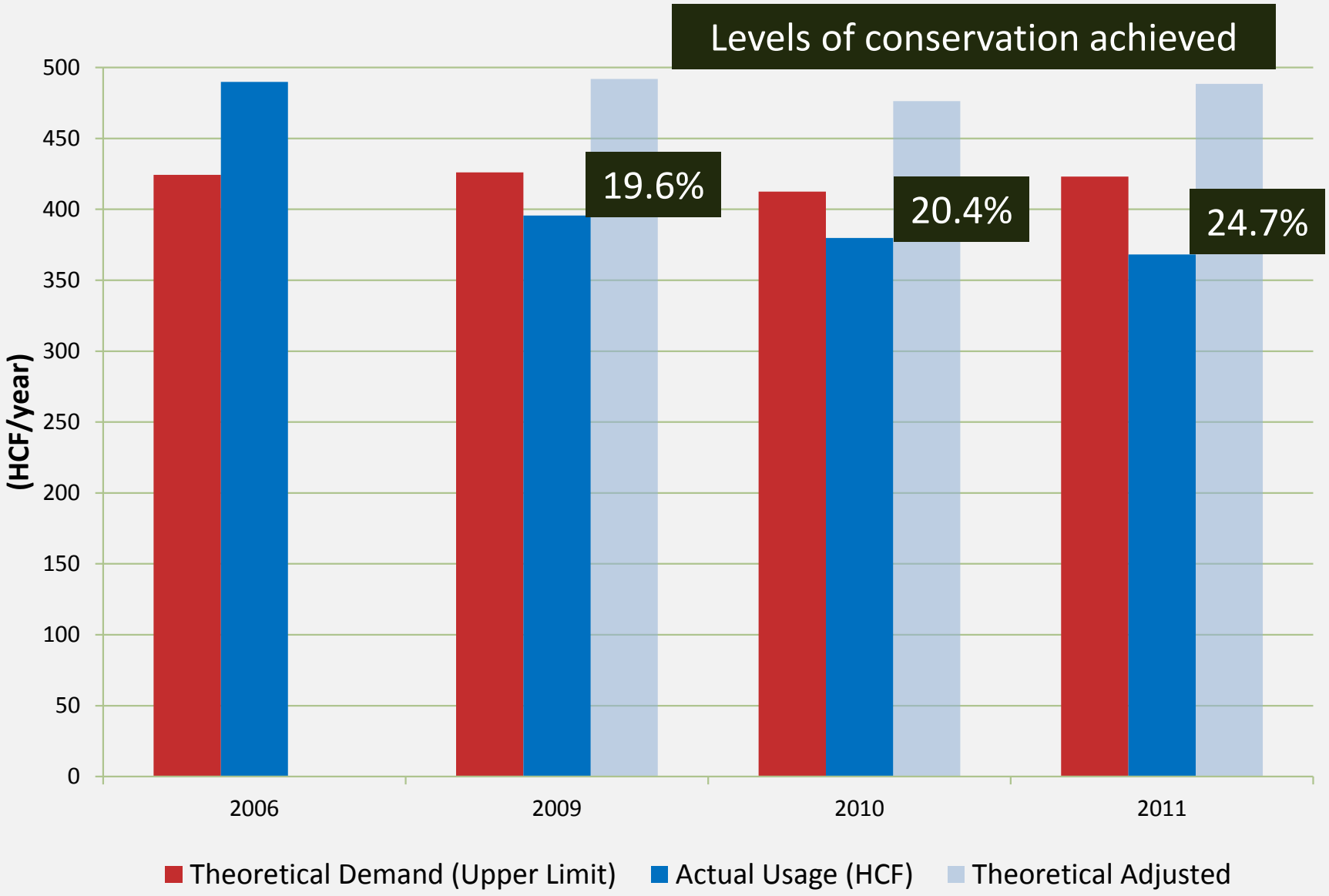
Water Usage vs. Theoretical Demand



Water Usage vs. Theoretical Demand



Water Usage vs. Theoretical Demand



Conservation Analysis

Using total water usage data	Using average usage per account	Using ET ratio
2009 – 16.9%	2009 – 19.2%	2009 – 19.6%
2010 – 18.9%	2010 – 22.4%	2010 – 20.4%
2011 – 21.7%	2011 – 24.9%	2011 – 24.7%

*Base year: 2006

Designing Conservation Programs

1. Identify conservation level goals

2. Identify and evaluate conservation opportunities

Designing Conservation Programs

3. Identify and assess programs and incentives

Turf Removal Program
Incentives on high efficiency nozzles and smart controllers
Landscape Irrigation Efficiency Program
Landscape Educational Program

4. Analyze costs and benefits

Summary

Population and climate impact water usage

There are different methods of measuring conservation levels

Population and climate can be factored out of the equation to determine the conservation level achieved

There are conservation programs to help achieve agency's conservation goal

Objectives

*To analyze the impacts of **population** and **climate** changes on customer water conservation levels*

To determine the effectiveness of the conservation program

Questions

Los Angeles County Waterworks Districts

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