

# This presentation premiered at WaterSmart Innovations

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# Digging for Data:

**Data Mining Five Years of  
Commercial Landscape Audits  
shows the Pros and Cons of the  
Audit Program**

*JoEllen Jacoby, ASLA*



# Overview

- City of San Diego
  - 1.3 million people / Covers 342 square miles
  - Public Utilities Department services **286,400** meters
    - Approximately 6,200 irrigation only meters



# City of San Diego

- Import up to 90% of water from Northern California and the Colorado River
- Currently in a Level **2** Water Emergency



# Creation of the CLSP

## (Commercial Landscape Survey Program)

- Begun summer 2003
- 21,800+ budgets prepared
- 2,402 acres surveyed (including mixed meter sites)
- 785,646 H.C.F. potential water savings



# CLSP - Site Visit

Irrigation specialist walks site with knowledgeable landscape maintenance personnel:

- identifies the landscape area that is serviced by each meter
- checks water pressure at the backflow





# CLSP – Site Visit cont.

- notes broken/missing equipment and mismatched heads
- notes over-spray and poor coverage
- notes blocked spray heads and inadequate clearance
- identifies mixed plant material on the same valve



# CLSP – Site Visit cont.

- checks for mulch coverage
- discusses irrigation schedule
- performs one or more catch can test
- checks pressure at various irrigation heads

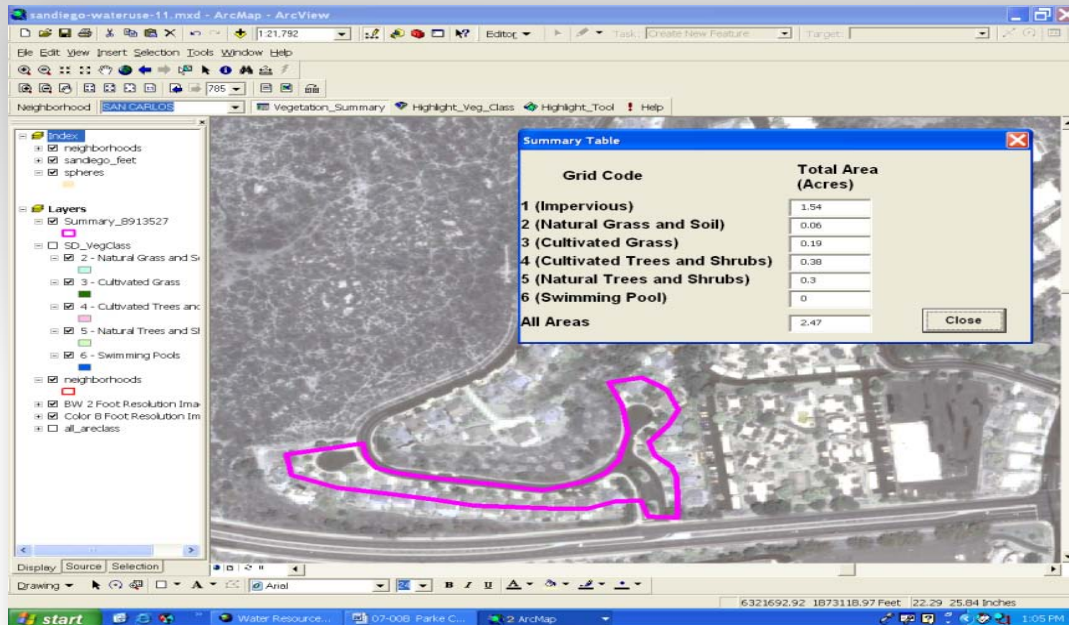




# CLSP - Back in the Office

Irrigation specialist prepares a report:

- using satellite imagery the landscape area can be identified as grass, shrubs and groundcover, native plant material or hardscape



# CLSP Report Preparation

Annual water requirement is determined per meter based on:

- crop coefficient
- distribution uniformity
- evapotranspiration (regionally based)
- area measure



# Calculating the Water Use

Water budget = sum of:

$$\frac{ET_o * K_c * LA}{1200 * DU}$$

for each plant material type

ET<sub>o</sub>= Evapotranspiration (inches)

K<sub>c</sub>= Crop Coefficient (cool season turf, warm season turf, trees and shrubs, native) (%)

LA= Landscape Area of plant type (sq. ft)

DU=Irrigation Distribution Uniformity (%)

1200= conversion to HCF

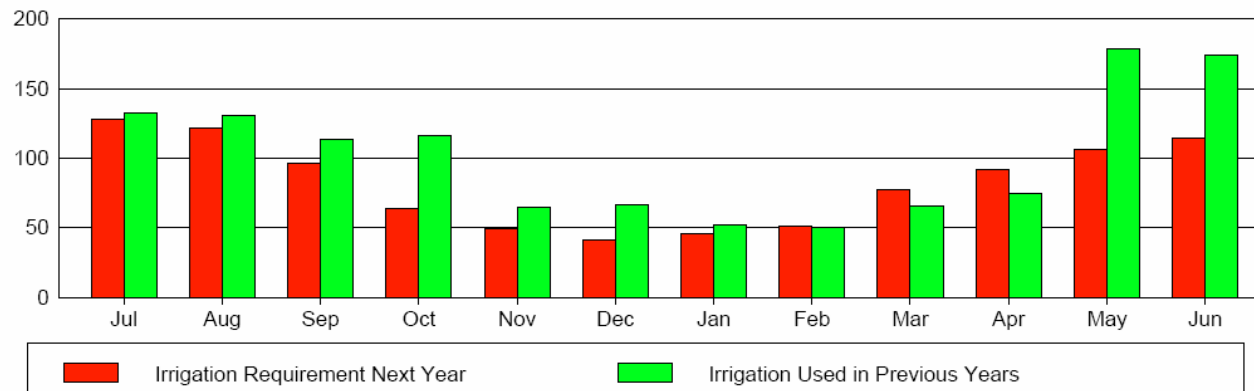


# Water Use vs. Budget

This landscape irrigation estimate compares the average water used for Landscape Irrigation in previous years to the Estimated Irrigation Requirement for next year. The amount of water is measured in hundred cubic feet (HCF) units.

One HCF equals 748 gallons of water.

Landscape Water Consumption													
Billing Period	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
Irrigation Usage Averaged over Past 5 years (HCF)	132	131	114	116	65	66	52	50	66	74	179	174	1,219
Irrigation Requirement Next Year (Estimated HCF)	128	121	96	64	49	41	46	51	78	92	106	115	986



# CLSP Report Preparation

Report includes:

- current condition of the irrigation system
- short term and long term goals
- irrigation analysis checklist
- descriptive pictures of problems





# Report Preparation cont.

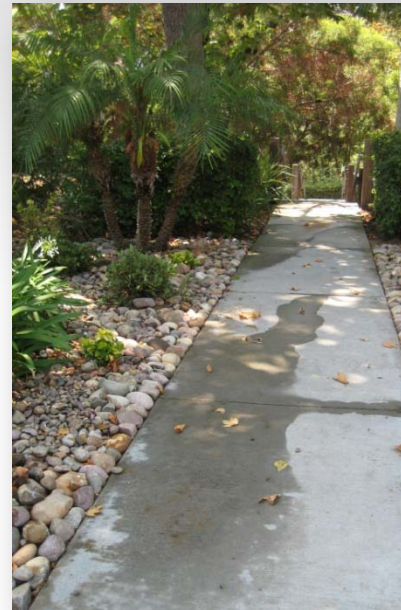
Report includes:

- suggested irrigation schedules
- glossary of terms
- information about current incentive programs
- cut sheets of products that may assist with an upgrade



# CLSP Results

- 35% of Surveys completed through 2007 were irrigating in excess of 100%\*
- sites with a pre-survey water consumption greater than 100% ETo, were evaluated post survey to see what if any water savings resulted



\*New state law will require sites to water at 80% ETo or less



# Evaluating the data

- annual water consumption for one calendar year prior to the survey
- year of survey excluded
- annual water consumption one calendar year after the survey, and each subsequent year
- each consumption prorated relative to the actual ET of the respective year (weather normalized)



# Post Survey Results

- Surveys completed in **2005** attained water savings of:  
(36 sample size)
- -4% in 2006
- -7% in 2007
- -16% in 2008



# Post Survey Results cont.

- Surveys completed in **2006** attained water savings of:  
(65 sample size)
- **-.2%** in 2007
- **-6%** in 2008



- Surveys completed in **2007** attained water savings of:  
(57 sample size)
- **+3%** in 2008





# Post Survey Results cont.

- Modified results after removing sites that increased by 50% or more :

**2005**

- No modification required for 2006
- Modified savings of -7% for 2007  
(sample size decreased from 36 to 33)
- modified savings -19% in 2008  
(sample size decreased from 36 to 33)



# Post Survey Results cont.

- Modified results after removing sites that increased by 50% or more :

## 2006

- *modified savings -4% in 2007*
  - *(sample size decreased from 60 to 65)*
- *modified savings -14% in 2008*
  - *(sample size decreased from 59 to 65)*



## 2007

*modified savings -6% in 2008 (32/38)*



# Post Survey Results cont.

➤ Modified results after removing sites that increased by 50% or more :

Year	2005	2006	mod	2007	mod	2008	mod
%	Survey year	-4%	-4%	-7%	-16%	-16%	-19%
Qty.		36	36	36	33	36	33
		Survey year		-.2%	-5%	-6%	-14%
				65	60	65	59
				Survey year		+3%	-6%
						57	51



# Factors Impacting Savings

- property management
  - dynamics of Homeowner's Association
  - remote Property Management
  - relationship of landscape contractor and property owner
- funding
- availability of incentives
- fear of '% reductions' causes over-watering





# % of ET

- the average ET was 104% (2006, 2007, 2008)\*
- a site with grass only would require 115% ET
- new landscape ordinance requires 80% ET (except for playing fields)



*\*Sample size = 59 sites*





# Distribution Uniformity

- the average Distribution Uniformity (DU) = 59%
- low DU (below 80) is a function of design, equipment performance and maintenance
- upgrading equipment and reinforcing the need for maintenance can improve DU and reduce irrigation run times



# Outside Influences

- increasing water rates
- available irrigation incentives:
  - Weather Based Irrigation Controllers
  - low application rate rotating heads
  - irrigation equipment modernization
- increasing awareness of water conservation - media campaign

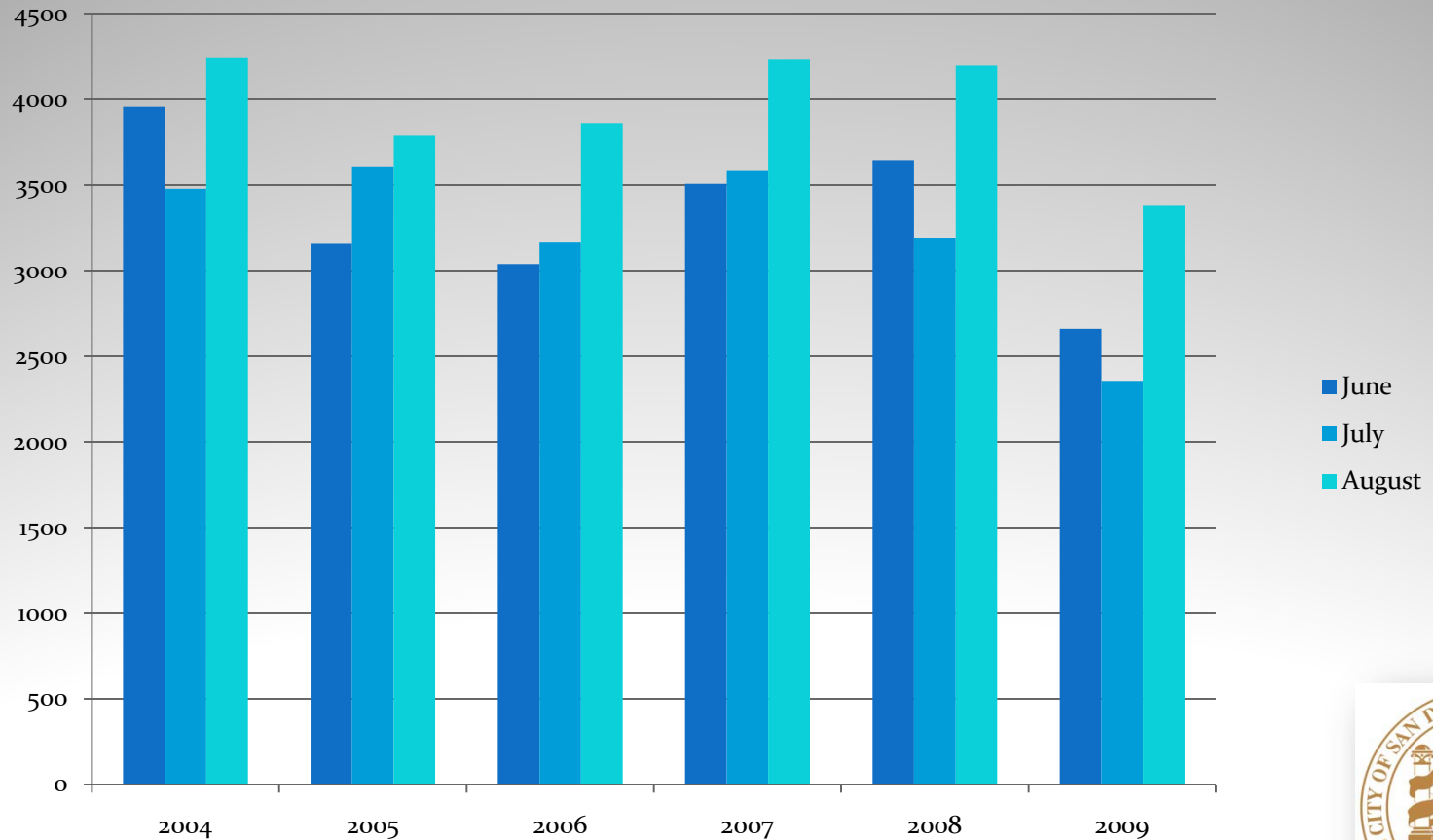


# The Impact of Restrictions

- Since June 2009 **Level 2** water restrictions allowed a maximum of 3 watering days a week, time of day restrictions and a maximum of 10 minute total run time for traditional fan sprays
- 24% savings for all irrigation meters compared to 2008



# Water Savings



# Long Term Outcomes

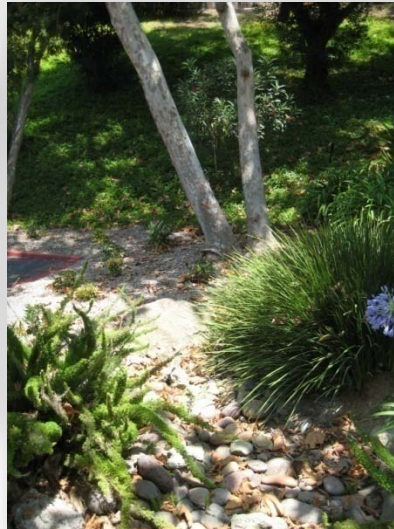
- Sites with a commercial landscape survey have a 'target budget' based on irrigated landscape area and plant material
- This can be used to set tiered rate structures, or percent reduction budgets in times of water restrictions
- Meets BMP 5 for the State of California





# Immeasurable Impacts

- Landscape contractors learn from their first Commercial Landscape Survey
- Apply the same principles to other sites
- The mere act of requesting a survey brings attention to water conservation



# Planning in times of Shortage

- Information about % ET allows for realistic estimation of potential savings from irrigation
- Knowledge of DU suggests the potential to improve performance – grants, vouchers, rebates and education
- Range of %ET implies the diversity of landscapes and the variability of maintenance practices – change landscape, lower %ET



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