

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Multi-Family/HOA Water Use Analysis: A Conservation Decision-Making Tool

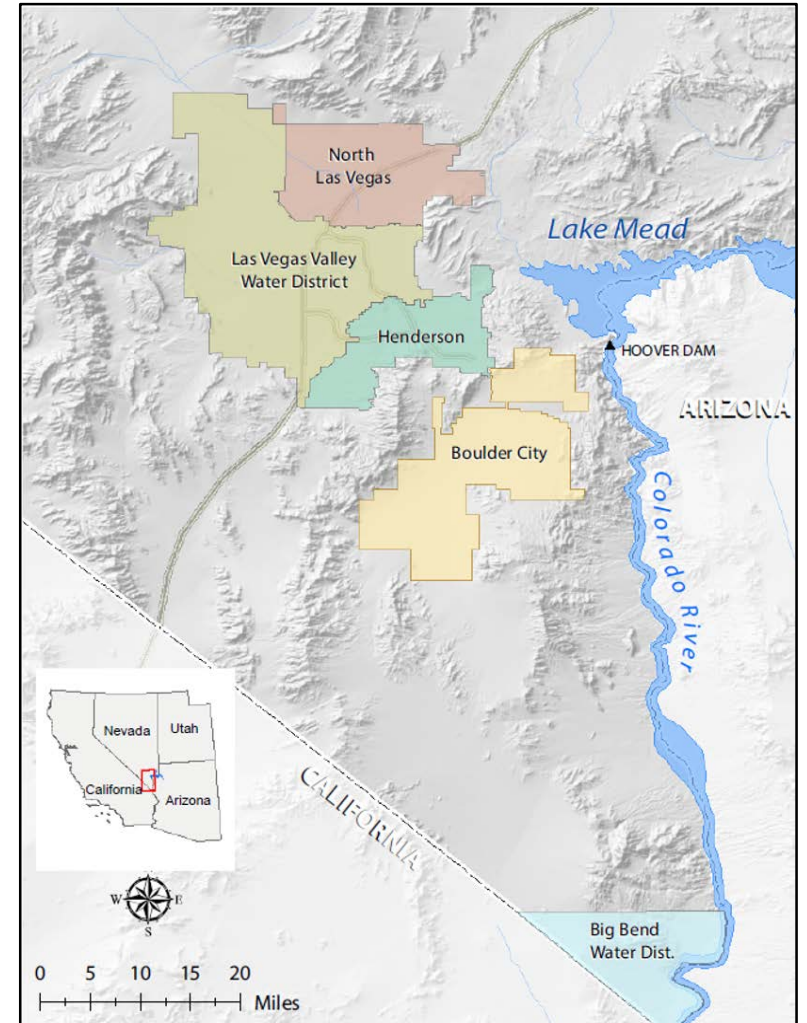
Hillery Francis

Conservation Programs Coordinator

Southern Nevada Water Authority

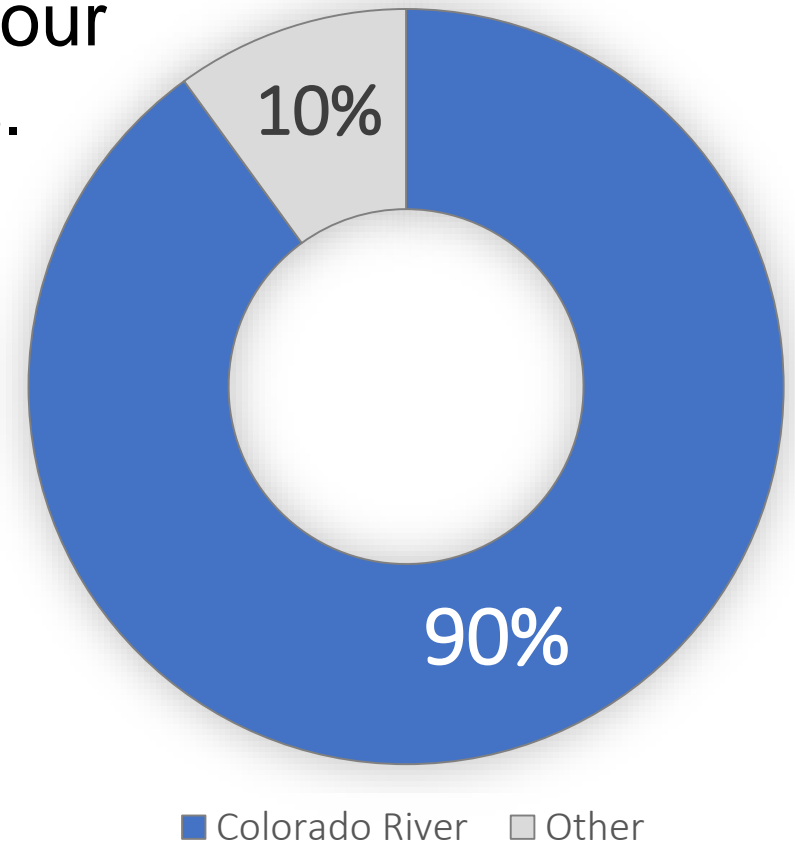
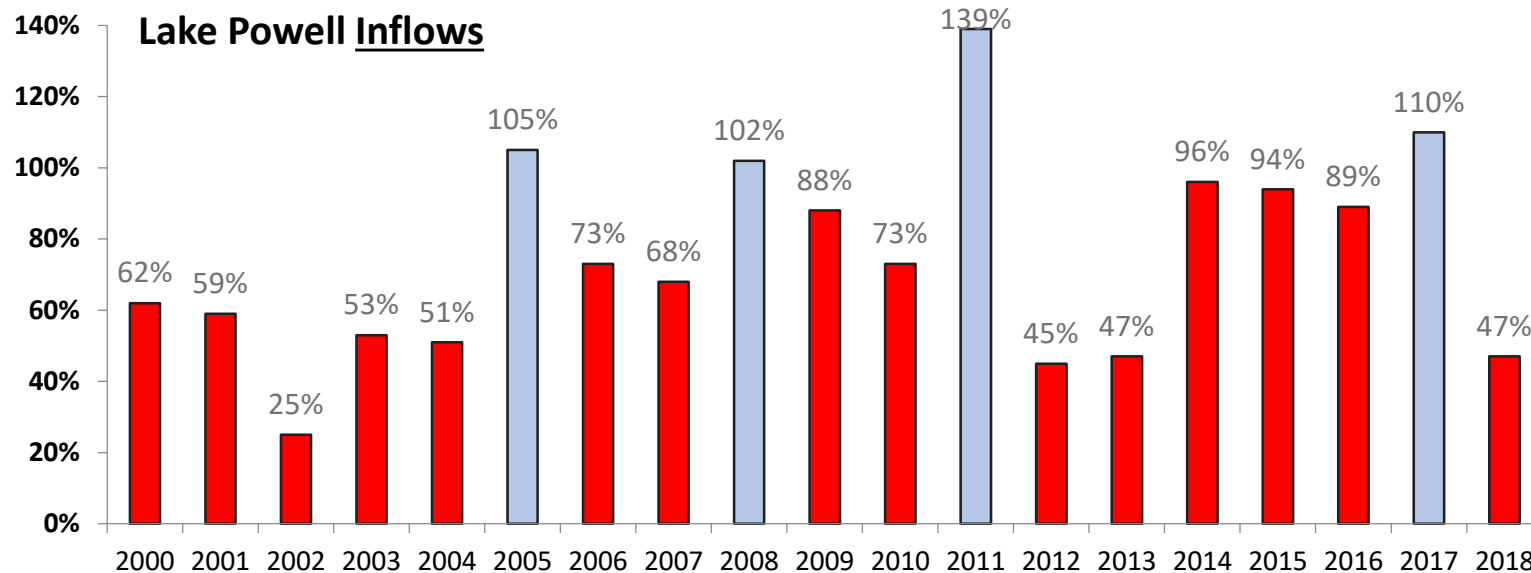
Southern Nevada Water Authority

- **The SNWA is a cooperative agency that manages the water supply for nearly all Southern Nevadans**
- **Member Agencies include:**
 - Big Bend Water District (Laughlin)
 - Boulder City
 - Clark County Water Reclamation District
 - City of Henderson
 - City of Las Vegas
 - Las Vegas Valley Water District
 - North Las Vegas



SNWA Water Resources

Southern Nevada relies on the Colorado River to meet 90 percent of our community's water needs.



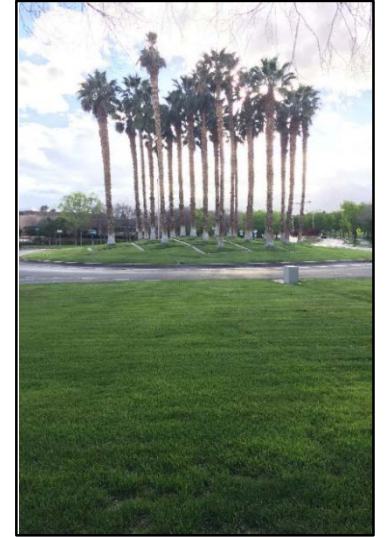
SNWA Water Use



Common Area Water Use

Water used for common area and streetscape irrigation cannot be recaptured

HOAs collectively consume far more water than the entire resort industry and nearly as much as all of Southern Nevada's golf courses combined.



Multi-family/HOA Properties

- “Multi-family” defined
 - Apartments, condominiums, townhomes
 - 2 or greater attached residential units
- “HOA” defined
 - Homeowner’s Association
 - Common area landscape
- 2,600 associations in Clark County, NV



Conservation Programs Available

- Water Smart Landscapes Program
 - “Cash for Grass” rebate
- Smart Irrigation Rebate
 - Smart Irrigation Controllers
- Water Efficient Technologies
 - High-efficiency toilets, efficient showerheads, cooling tower drift eliminators, etc.
- Outreach
 - HOA Board meetings, community events, print media, etc.



Challenges

- Multi-family
 - Master metering
 - Rentals
- HOA
 - Large landscape areas
 - Multiple decision makers (community managers, HOA board, homeowners, landscape contractors)
 - Homeowners resistant to change
- General lack of understanding of how water is used



Approach

- Property decision makers need information
- Landscape water use has greatest potential for use reduction
- However...
 - On-site audits are time intensive
 - Limited staff resources



Water Use Analysis

What it is:

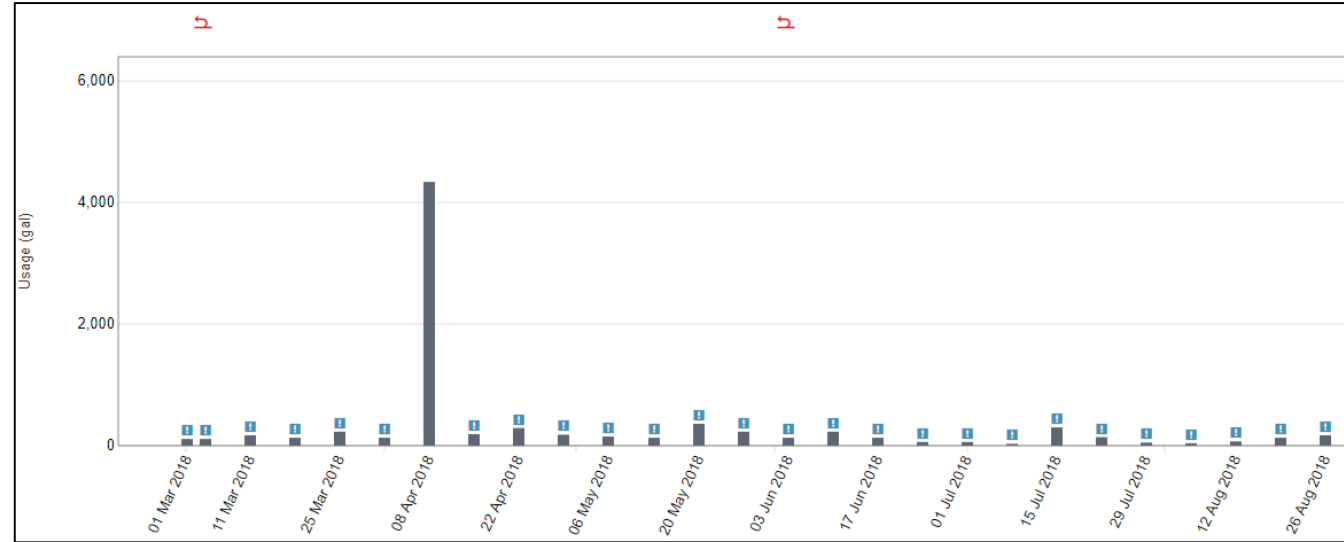
- Method of estimating efficiency of landscape irrigation

How it works:

- Evaluate water use history
- Evaluate how water use compares to site characteristics
- Provide recommendations

Inputs

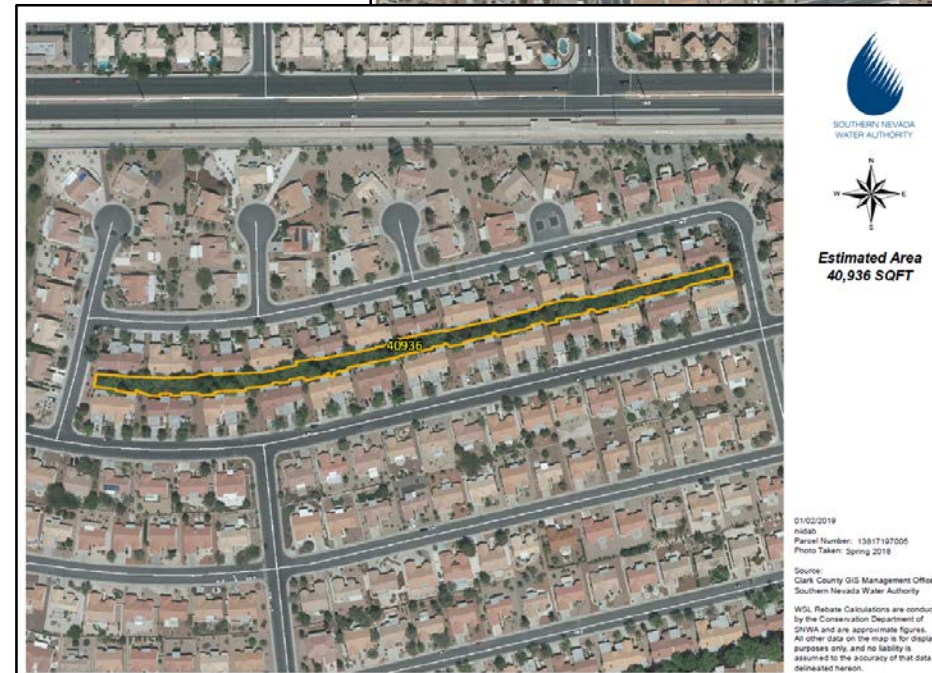
- 5 years of water use history
 - Consumption
 - Meters (location and ID)
 - Trickle indicators (iTron)



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	HANSEN	MTR SIZE	USE YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOT
2	544555	2" Water	2013	99,000	333,304	333,304	309,571	653,583	674,505	837,912	736,813	507,188	371,103	183,260	68,249	4,920,613
3	544555	2" Water	2014	143,543	324,469	324,469	354,000	596,188	662,813	626,179	632,174	452,647	407,273	229,091	175,666	4,748,417
4	544555	2" Water	2015	124,912	293,414	293,414	433,966	567,722	646,946	672,276	696,091	595,161	385,445	159,091	159,636	4,902,304
5	544555	2" Water	2016	134,333	403,241	403,241	370,456	429,303	812,788	737,424	692,788	510,143	388,975	255,882	108,000	4,959,667
6	544555	2" Water	2017	93,000	528,803	528,803	630,532	859,389	939,551	1,019,242	761,448	464,123	460,429	294,138	201,834	6,434,971
7	544555	2" Water	2018	85,029	305,133	305,133	690,829	935,314	1,131,212	1,351,788						
8																
9	544556	2" Water	2013	151,000	494,393	494,393	549,107	938,607	933,952	832,441	944,625	744,375	522,310	242,781	97,232	6,678,323
10	544556	2" Water	2014	196,834	453,469	453,469	536,000	891,313	919,688	841,357	854,349	665,294	337,273	253,889	6,764,324	
11	544556	2" Water	2015	175,059	400,000	400,000	600,069	758,587	847,410	901,964	914,970	36,316	337,896	198,182	191,515	5,581,262
12	544556	2" Water	2016	59,182	464,035	464,035	430,460	506,333	933,121	902,758	848,121	619,857	468,496	302,647	244,059	5,944,150
13	544556	2" Water	2017	196,941	684,812	684,812	848,373	1,088,918	1,204,748	1,388,424	1,090,759	681,384	645,372	421,312	301,744	8,868,513
14	544556	2" Water	2018	159,429	205,249	205,249	85,271	135,514	177,606	195,394						1,540,429
15																
16	553150	1" Water	2013	1,000	2,054	2,054	1,071	1,031	938	2,031	4,125	1,875	1,069	1,022	941	18,032
17	553150	1" Water	2014	996	1,171	1,171	1,000	2,818	1,182	1,069	2,204	2,727	2,061	909	60	16,997
18	553150	1" Water	2015	912	1,910	1,910	1,228	1,153	1,813	59	912	996	1,094	909	61	12,001
19	553150	1" Water	2016	939	1,103	1,103	2,113	2,818	1,030	939	2,030	1,036	1,200	1,765	3,176	19,146
20	553150	1" Water	2017	1,824	1,070	1,070	1,237	2,762	1,147	2,818	1,034	1,108	2,009	917	1,045	17,938
21	553150	1" Water	2018	886	1,357	1,357	4,757	886	1,000	-						

Inputs

- Landscape area and type
 - Estimate based on aerial imaging
- Historic evapotranspiration (ET) rates



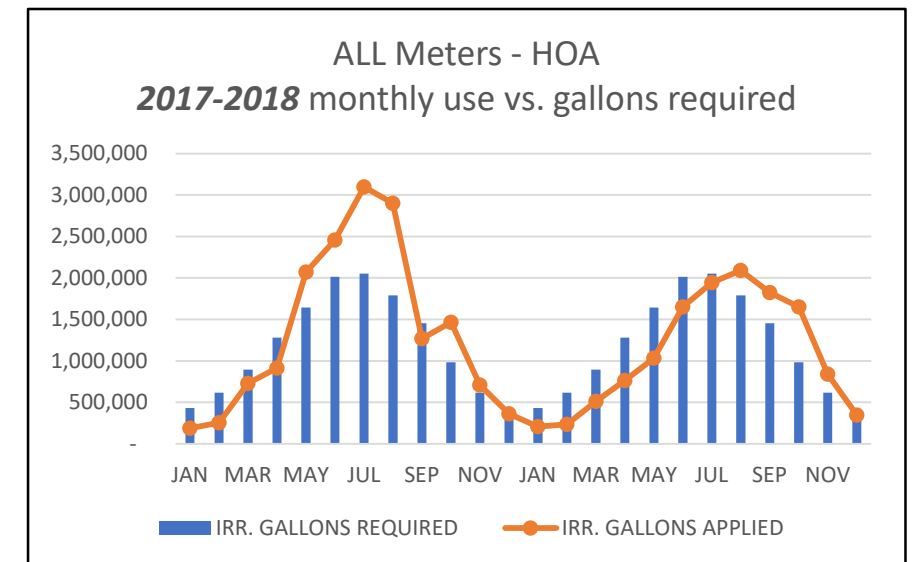
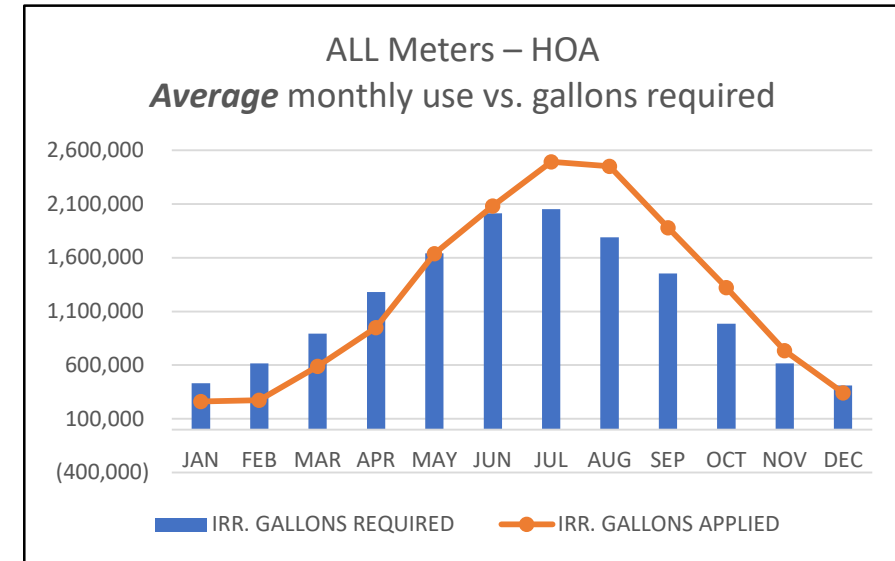
Inputs

- Irrigation system efficiency
 - Assumption based on landscape type and method of irrigating (spray vs drip)
 - More spray, lower efficiency
- Crop coefficient
 - Assumption based on landscape type
 - Look at ratio of turf vs xeric
 - More turf, higher crop coefficient



Output

- Irrigation patterns
- Comparison of irrigation required versus irrigation applied
 - Average over study period
 - Monthly, yearly snapshots



Reporting

- Account Summary
 - Number of meters
 - Domestic versus irrigation
- Data Gathered
 - Years of water use
 - Method of calculating landscape area
 - Discussion of irrigation system efficiency and crop coefficient
- Landscape Description
 - Square feet of landscape
 - Ratio of turf versus xeriscape
 - Park versus streetscape

Water Consumption Analysis

Prepared by:
Hillary Francis
Conservation Programs Coordinator – Southern Nevada Water Authority
702-691-5201 hillary.francis@snwa.com

Account summary

There are five active irrigation meters supplying [REDACTED]. Each residential unit is individually metered. These meters will not be considered, as this report will discuss landscape water use only.

Data Gathered

Water consumption and location of each meter was obtained through the Las Vegas Valley Water District. SNWA staff calculated the landscape area throughout the HOA using a GIS application and aerial photography. The landscape area square footage, irrigation system efficiency coefficient¹, and crop coefficients² used for this analysis are approximations.

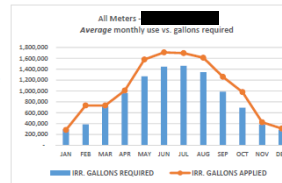
Water use history was gathered for each meter for the years 2013 through April 2018, giving a five-year snapshot into monthly use patterns. Based on the type of landscape in each area and an assumed irrigation system efficiency, the gallons required to sustain the landscape was calculated to demonstrate a comparison to the amount of water applied.

The calculations for irrigation gallons and irrigation inches required are based upon principles developed by the Irrigation Training and Research Center at Cal-Poly State University and used by the Irrigation Association in training for Landscape Irrigation Auditors. The landscape area is an estimate based on aerial imaging and heavy tree cover may affect the accuracy of the calculated square footage. It is important to note that on-site water use audits may demonstrate differing results.

Water Consumption

All meters

Approximately 180,000 square feet (4.1 acres) of landscape exist throughout the HOA, with the majority as turf grass. Included in the irrigated landscape area are numerous mature trees. To calculate the gallons of water required to sustain the landscape, an irrigation system efficiency of 0.65 and crop coefficient of 0.7 were assumed.



Overall, total water consumption increased 5% from 2013 to 2017. The HOA used 12.7 million gallons in 2017, compared to 12.1 million

¹ Estimated efficiency of the irrigation system. This variable can account for drift, evaporation, and distribution uniformity. Average efficiency = 0.65

² A figure comparing relative water use of the plants being studied to the evapotranspiration for alfalfa. High water use = 0.8, Low water use = 0.3

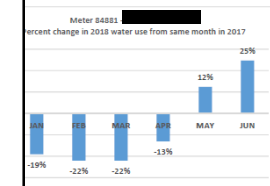
2

7 water consumption decreased 5%. Year-to-date

period aligns closely with the gallons required to sustain [REDACTED] along with March and April. However, the irrigation [REDACTED] on average 134% of required irrigation gallons.

de-sac.

meter has increased 14% compared to the same time [REDACTED] per hour leak event occurred beginning on April [REDACTED] of May.



used immediately. A thorough inspection of all irrigation [REDACTED] components are functional.

variations of the existing irrigation system components [REDACTED] by outdated spray irrigation. Mismatched pop-up [REDACTED] areas of functional grass that will remain, it is [REDACTED] system to include matched precipitation rate

pop-up spray nozzles. This may require a redesign and relocation of the existing system to increase efficiency.

Matched precipitation rate multi-stream rotor nozzles should also be considered for functional grass areas. The multi-stream rotor nozzles apply water more slowly than typical pop-up spray nozzles. This allows water to more easily reach the root zone of the grass and typically applies water more evenly throughout the area. Reprogramming of the irrigation controllers is necessary to account for the slower application rate.

After ruling out system malfunctions, irrigation scheduling should be evaluated. The average irrigation efficiency for all meters combined throughout the HOA is 121%. It is recommended to initially examine

3

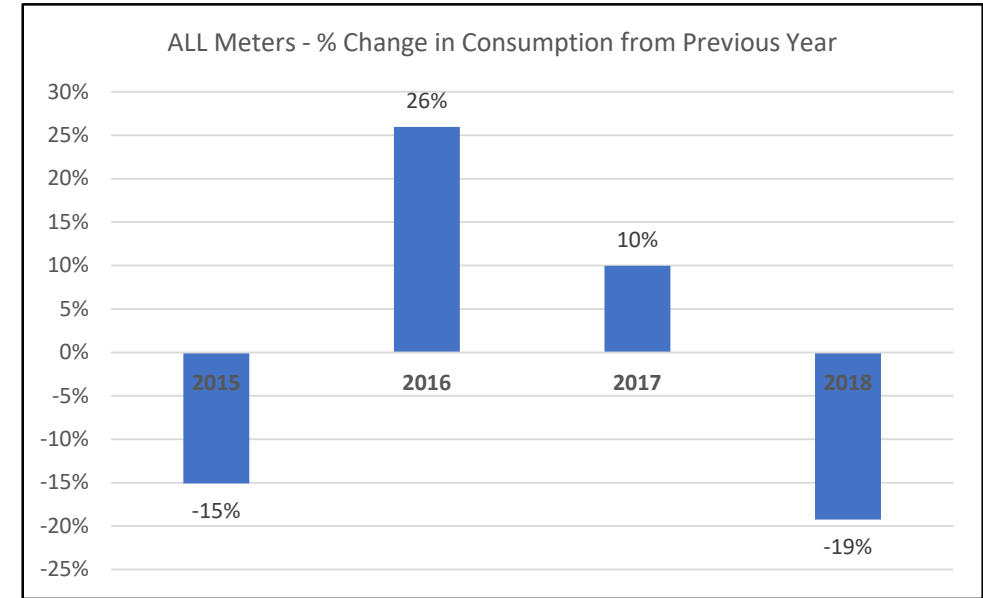
meter results in nearly 25% of the total consumption for 2018, despite there not being any indication of a leak at [REDACTED] leak, number of irrigation cycles per day, and total [REDACTED] suction possibilities.

the year based on plant water needs and local weather [REDACTED] controllers is recommended. SNWA offers a rebate for the [REDACTED] ers. Studies have indicated that smart controllers may [REDACTED] additional irrigation controllers.

In areas that do not receive recreational use by [REDACTED] functional areas of grass are also those that are small, [REDACTED] spray irrigation. In addition, ancillary benefits from [REDACTED] on of water waste via run-off and overspray. The [REDACTED] ed that the replacement of turfgrass with xeriscape [REDACTED] per square foot per year. SNWA offers a rebate of \$3 [REDACTED] 20 square feet and \$1.50 thereafter. Properties are [REDACTED] multiple years.

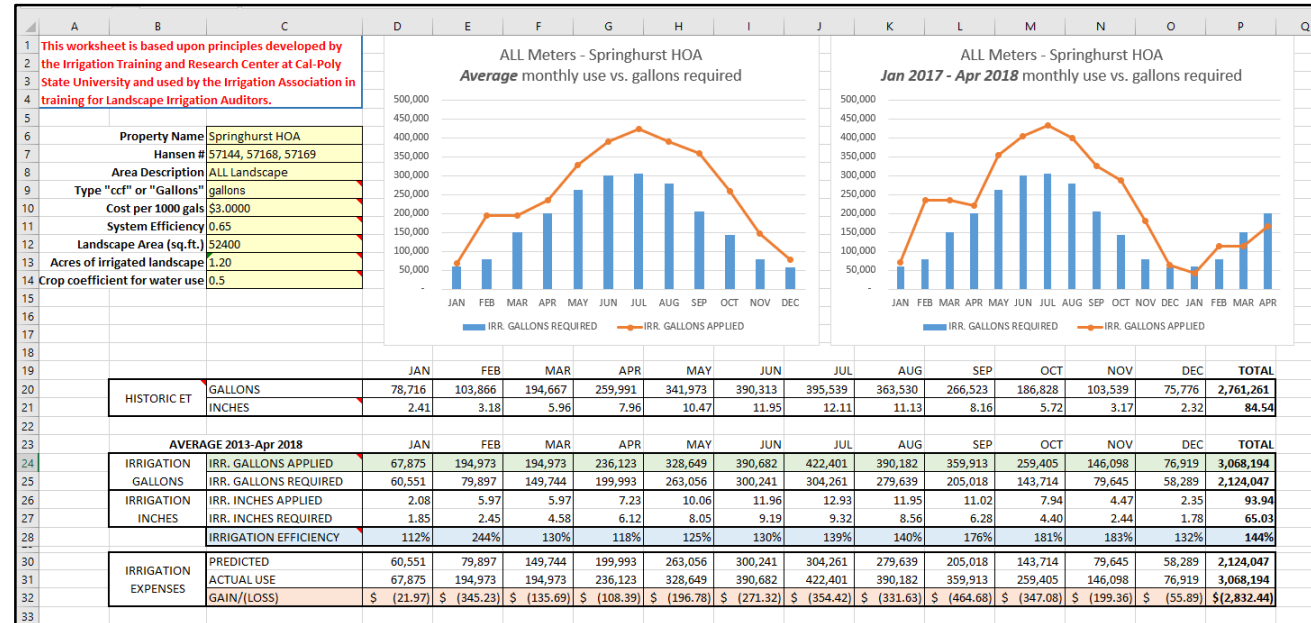
Reporting

- Water Consumption
 - Overall consumption patterns
 - Percent change throughout study period
- Irrigation Efficiency
 - Required irrigation compared to applied
- Discussion and Recommendations
 - Management
 - Programs



Challenges and Limitations

- Master metered properties
 - Estimating indoor usage
- Aerial imaging
 - Resolution affects analysis of landscape
- Assumption heavy
 - Communicate limitations in report
- Reporting at level of understanding for average homeowner
 - Gallons versus inches
 - Avoid heavy use of industry terminology



Preliminary Results

- Participation levels
 - Began in early 2018
 - 23 analyses completed
 - Word-of-mouth marketing only
- Resulting conservation program participation
 - Water Smart Landscapes Program – 7 properties
 - Smart Irrigation Rebate Program – 2 properties



Next Steps

- Water Savings
 - Need 3-5 years post reporting to determine long-term consumption changes
- Program Participation
 - Need additional time to determine how analyses drive program participation
- Larger Sample Size
 - Need more analyses to determine overall effectiveness

Questions?

Hillery Francis
hillery.francis@snwa.com