2017

Groundwater Extraction Summary Report

Monterey County Water Resources Agency

July 2019

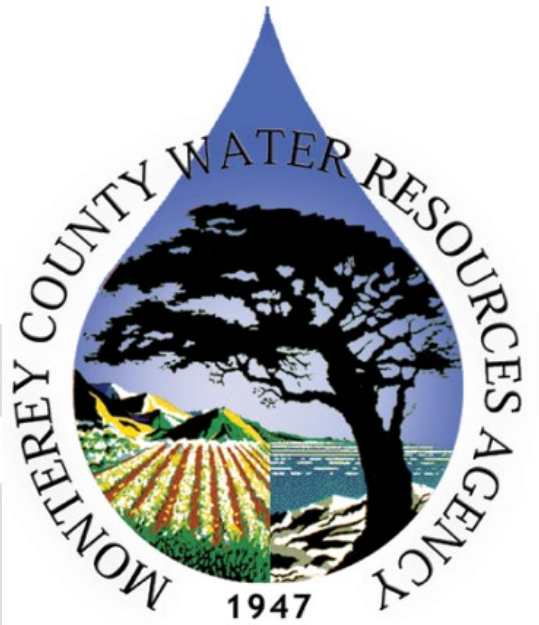


Table of Contents

List of Tables

List of Figures

Overview of the Groundwater Reporting Program

History of the Groundwater Reporting Program

In 1993, the Monterey County Board of Supervisors adopted Ordinances No. 3717 and 3718 that required water suppliers within Zones 2, 2A, and 2B to report water-use information for groundwater extraction facilities (wells) and service connections, with a discharge pipe having an inside diameter of at least three inches, to the Monterey County Water Resources Agency (Agency).

The purpose of the Groundwater Reporting Program is to provide the Agency with the most accurate water use information available to effectively manage groundwater resources. In order to obtain accurate water pumping information, methods of directly measuring water extractions have been implemented.

The Agency collects groundwater extraction data from well operators, beginning November 1 and ending October 31, each year. Data collection began with the 1992-1993 reporting year. Information received from more than three hundred well operators in the below-referenced zones of the Salinas Valley is stored in an Agency database.

Since 1991, the Agency has required the annual submittal of Agricultural Water Conservation Plans (Ordinance 3851), which outline the best management practices (BMPs) that are to be adopted each year by growers in the Salinas Valley. In 1996, an ordinance was passed that requires the filing of Urban Water Conservation Plans (Ordinance 3886). Developed as the urban counterpart of the agricultural water conservation plans, this program provides an overview of the BMPs to be implemented by urban water purveyors as conservation measures.

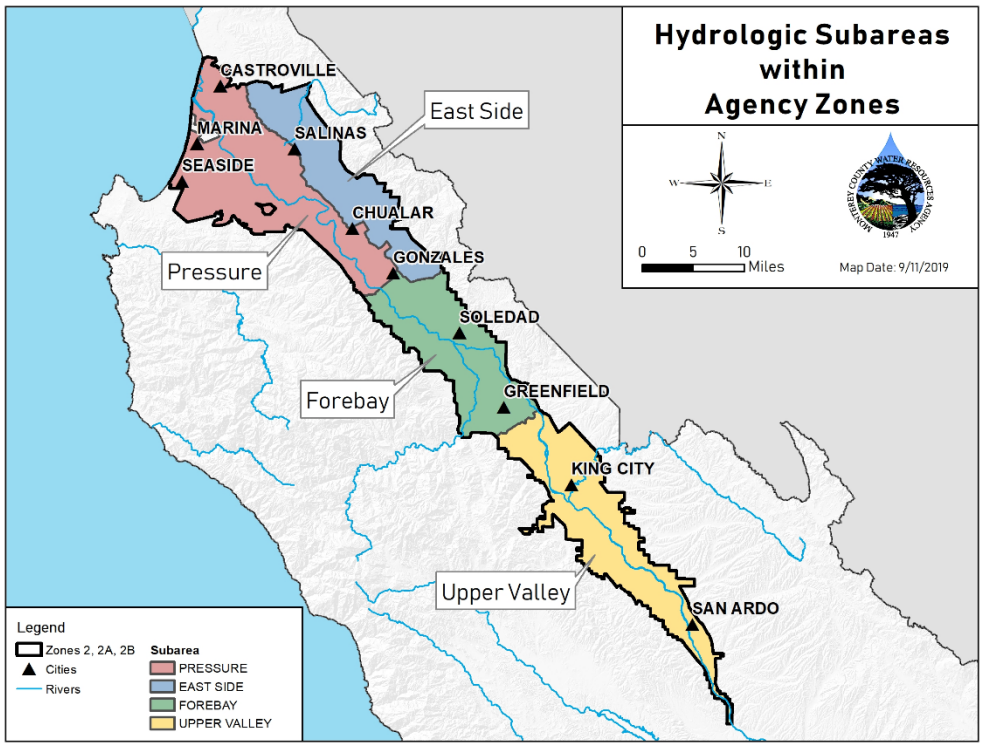


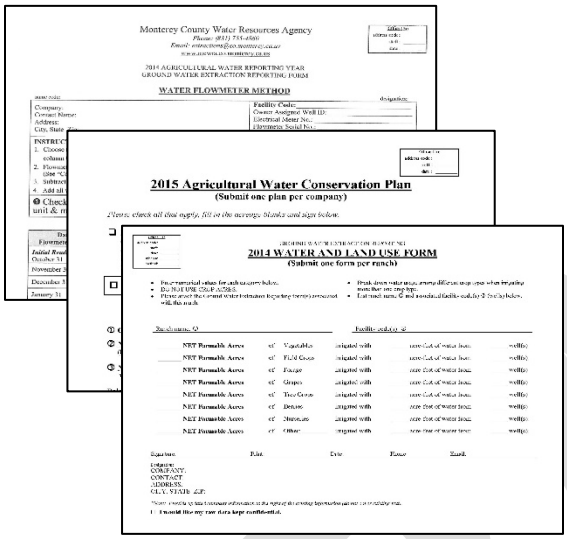
Figure 1. Salinas Valley Groundwater Basin Subareas and Agency Zones

The Salinas Valley Groundwater Basin, within the Agency's Zones, is divided into four major hydrologic subareas; Pressure, East Side, Forebay, and Upper Valley. These subareas are hydrologically and hydraulically connected and their boundaries are defined by differences in local hydrogeology and recharge.

Groundwater Summary Report

The purpose of this report is to summarize the data submitted to the Agency by well operators in February 2018 from the following annual forms:

- Groundwater Extraction Forms (agricultural and urban)
- Water Conservation Plans (agricultural and urban)
- Water and Land Use Forms (agricultural)


Monterey County Water Resources Agency

WATER FLOWMETER METHOD

2015 Agricultural Water Conservation Plan
(Submit one plan per company)

2014 WATER AND LAND USE FORM
(Submit one form per ranch)

The agricultural data from the groundwater extraction program covers the reporting year of November 1, 2016, through October 31, 2017; the urban data covers calendar year 2017. The agricultural and urban water conservation plans for 2018 are also summarized. This report is intended to present a synopsis of current water extraction within the Salinas Valley, including agricultural and urban water conservation improvements that are being implemented to reduce the total amount of water pumped. It is not the purpose of this report to thoroughly analyze the factors that contribute to increases or decreases in pumping.

Reporting Format

Groundwater extraction data are presented in this report by measurement in acre-feet. One acre-foot is equal to 325,851 gallons.

Reporting Methods

The Groundwater Reporting Program provides well operators with a choice of three different reporting methods: Water Flowmeter, Electrical Meter, or Hour Meter (timer). The summary of groundwater extractions presented in this report is compiled from data generated by all three reporting methods. Ordinance 3717 requires annual pump efficiency tests and/or meter calibration of each well to ensure the accuracy of the data reported. The distribution of methods used for the 2017 reporting year was: 82% Flowmeter; 17% Electrical Meter and 1% Hour Meter.

Disclaimer

While the Agency has made every effort to ensure the accuracy of the data presented in this report, it should be noted that the data are submitted by individual reporting parties. In addition, since so many factors can affect the extraction calibration, it is understood that no reporting method is 100 percent accurate. The Agency maintains strict quality assurance in the compilation, standardization, and entry of the data received. Changes to historical data may occur due to additional submittals after the due date or database upgrades. Rounding errors may cause the total extraction values displayed to be within 5 AF of actual totals. The Agency received Groundwater Extraction Reports from ninety-five percent (95%) of the 1,913 wells in the Salinas Valley for the 2017 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2018 were eighty-eight percent (88%) and ninety percent (90%), respectively.

Groundwater Extraction Form – Data Summary

Total Extractions by Subarea and Type of Use

All data presented in this section are derived from the agricultural and urban Groundwater Extraction Forms.

Table 1. Extraction Data by Subarea and Type of Use.

Subarea	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
Pressure	91,901	15,523	**107,424**
East Side	77,353	13,258	**90,611**
Forebay	139,359	6,764	**146,123**
Upper Valley	123,446	3,407	**126,853**
Total (AF)	**432,059**	**38,952**	**471,011**
Percent of Total	**92.9%**	**7.1%**	**100.0%**

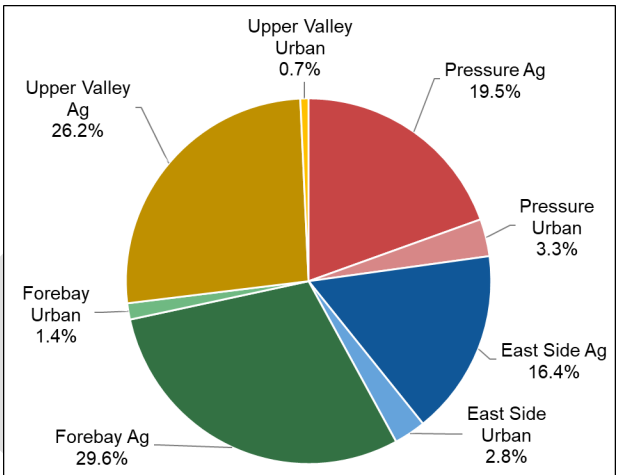


Figure 2. Percentage of Ag and Urban Extractions by Subarea.

Urban Extraction Data by City or Area

The total groundwater extractions attributed to urban use include residential, commercial, institutional, industrial and governmental pumping, and are summarized below.

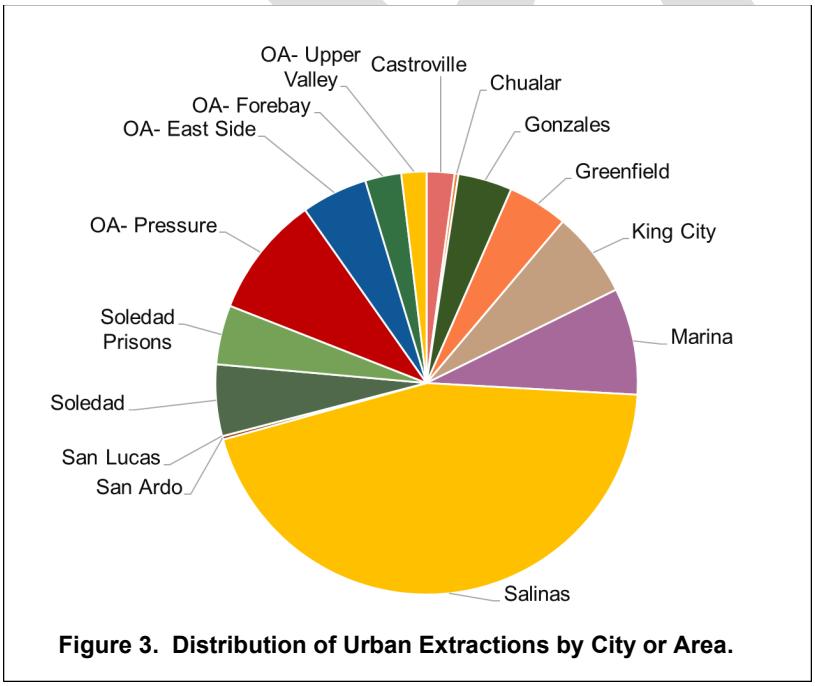


Figure 3. Distribution of Urban Extractions by City or Area.

Table 2. Urban Extractions by City or Area

City or Area	Urban Pumping (AF)	Percentage
Castroville	830	2.13%
Chualar	113	0.29%
Gonzales	1,614	4.14%
Greenfield	1,795	4.61%
King City	2,553	6.55%
Marina	3,176	8.15%
Salinas	17,453	44.81%
San Ardo	103	0.26%
San Lucas	No Data	No Data
Soledad	2,127	5.46%
Soledad Prisons	1,765	4.53%
OA- Pressure	3,621	9.30%
OA- East Side	1,973	5.07%
OA- Forebay	1,077	2.77%
OA- Upper Valley	750	1.93%
Total	**38,950**	**100.00%**

OA=Other Area

Total Groundwater Extractions in Zones 2, 2A, 2B

This figure provides a spatial representation of groundwater extractions within Zones 2, 2A, and 2B for the 2017 report year. The figures and tables on the next four pages provide extraction information by subarea. The number of wells shown in Figures 4 to 11 may be different than the total number of wells in the program, as stated on Page 2. This is due to delinquent extraction reports and the exact location of some wells being unknown.

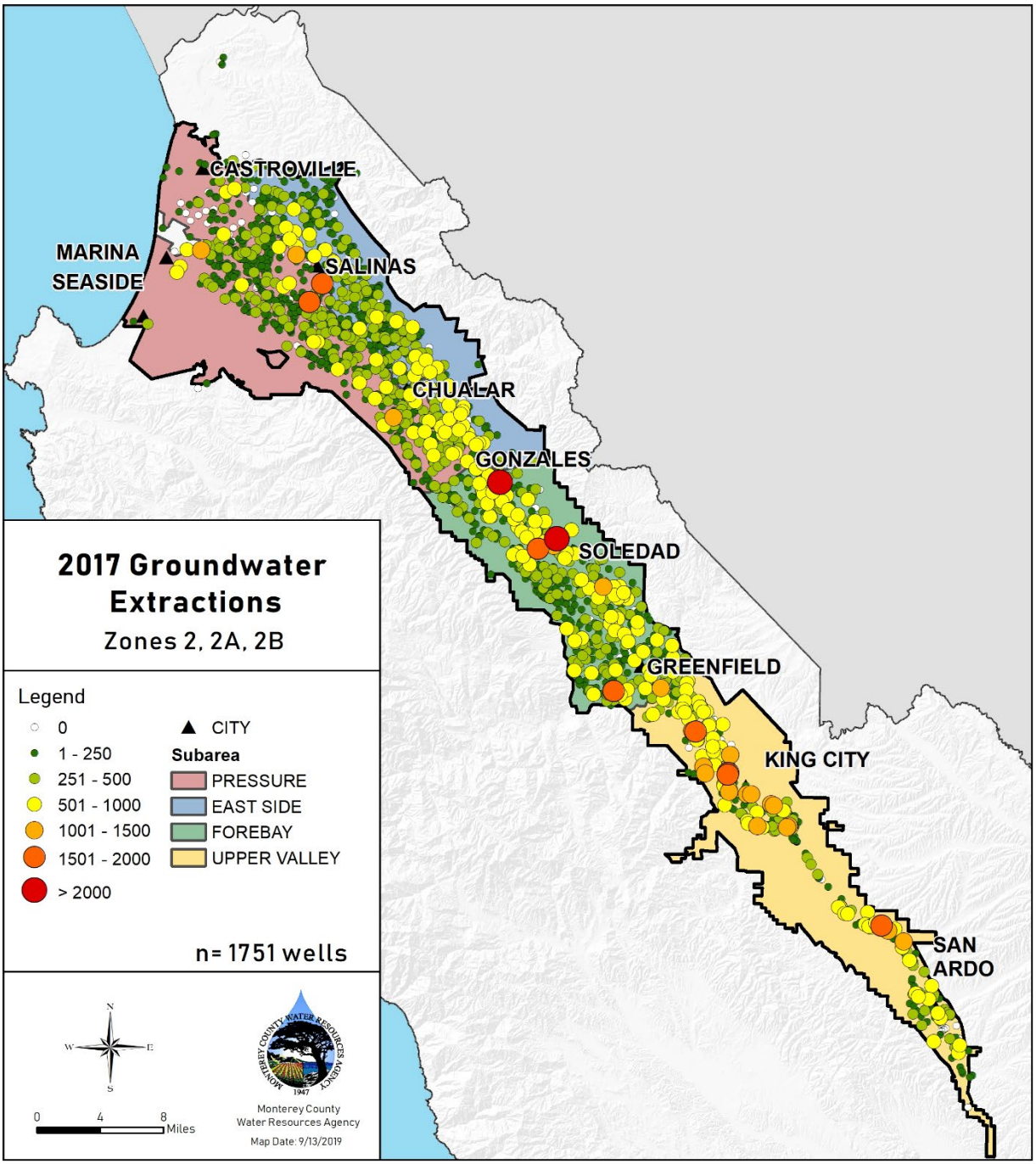


Figure 4. 2017 Groundwater Extractions.

Pressure Subarea – Extraction Data

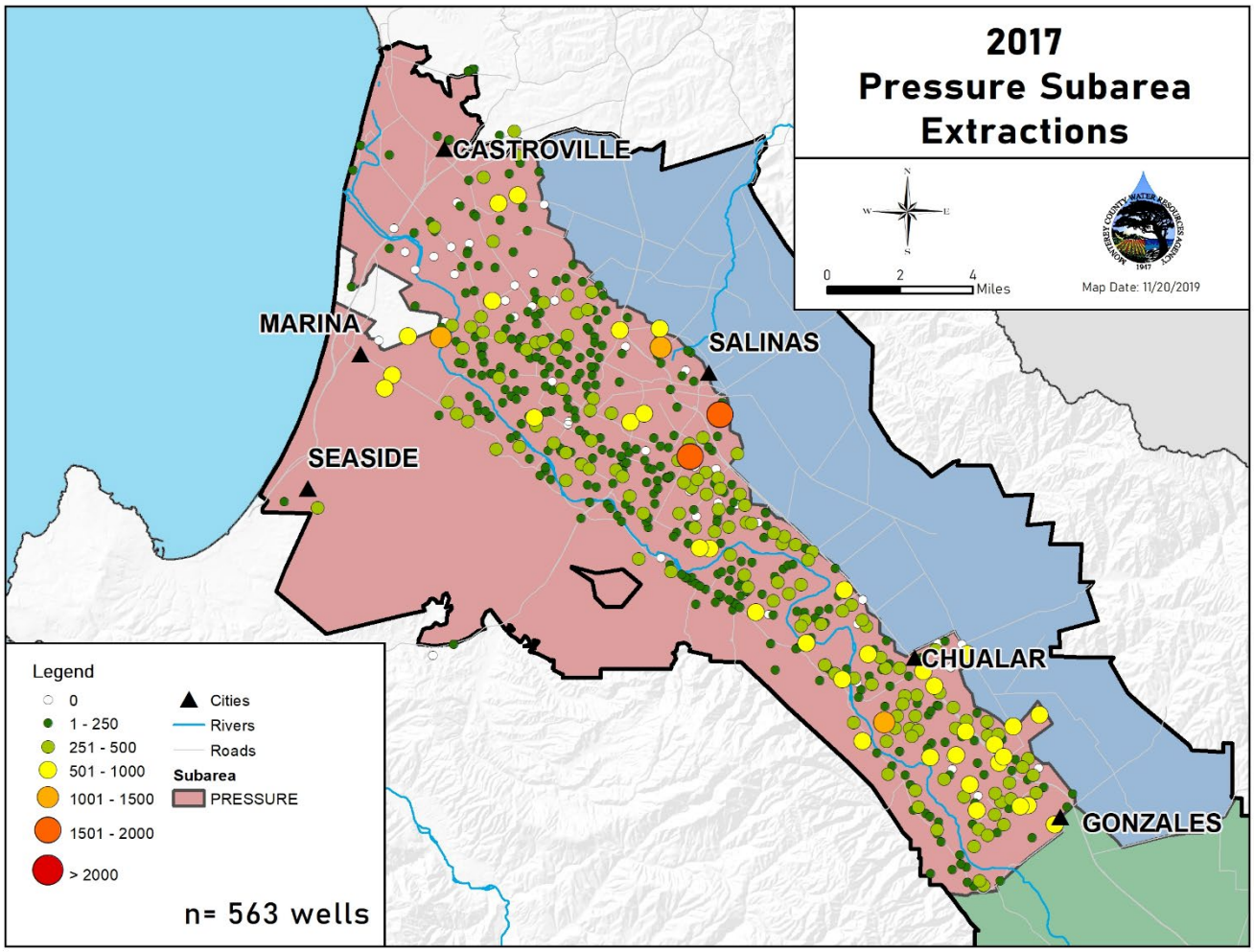


Figure 5. 2017 Groundwater Extraction in the Pressure Subarea.

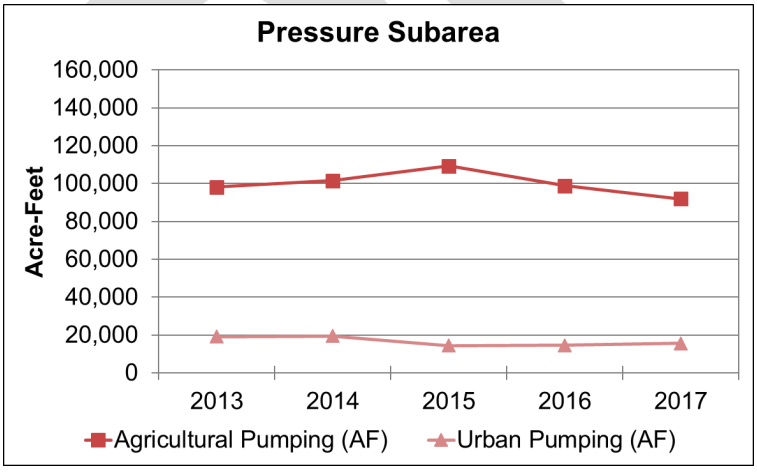


Figure 6. Agricultural and Urban Extractions (AF) in the Pressure Subarea 2013-2017.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2013	98,141	19,101	117,242
2014	101,465	19,425	120,890
2015	109,214	14,443	123,657
2016	98,890	14,605	113,495
2017	91,901	15,523	107,424

Table 3. Total, Agricultural, and Urban Extractions (AF) in the Pressure Subarea 2013-2017.

East Side Subarea – Extraction Data

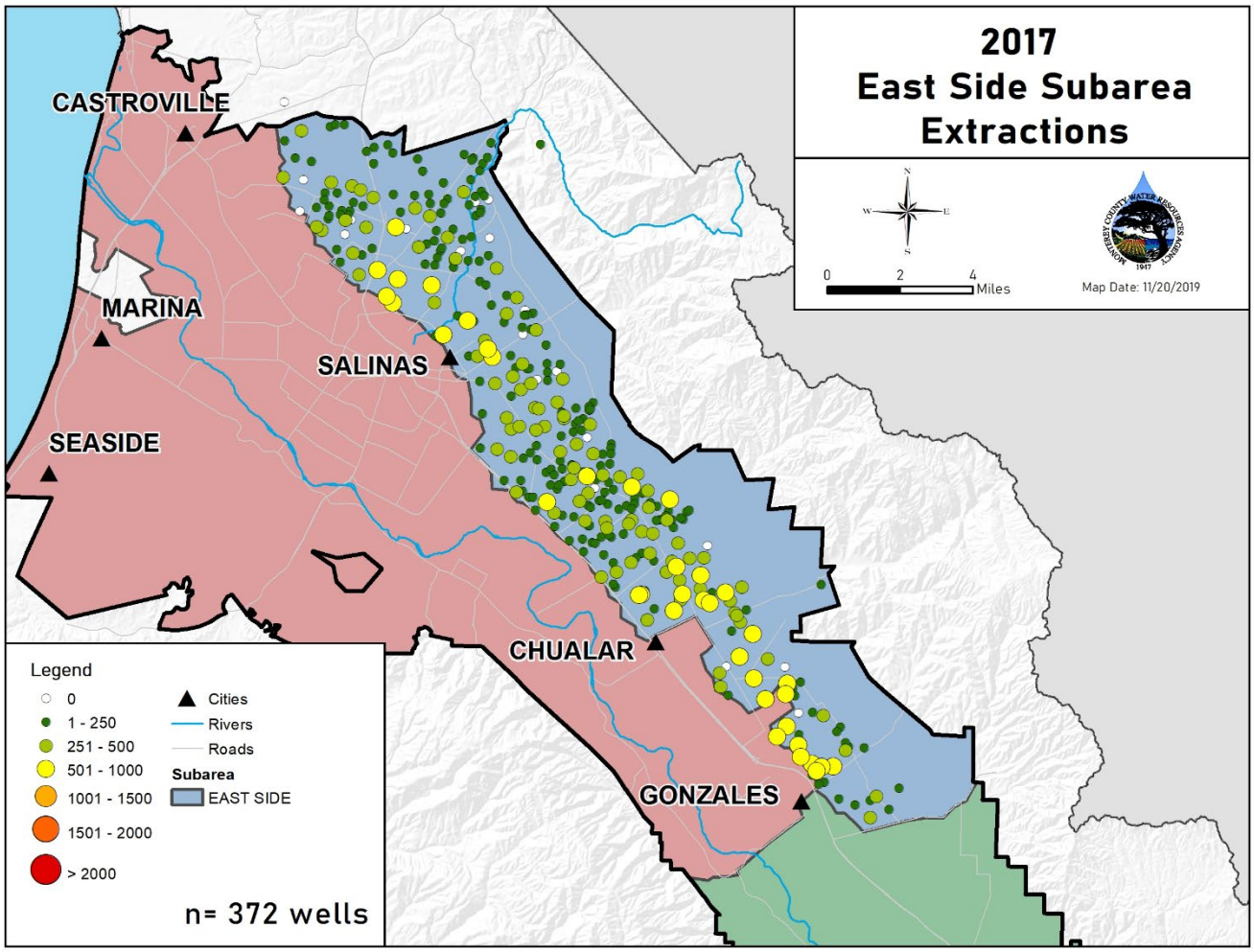


Figure 7. 2017 Groundwater Extraction in the East Side Subarea.

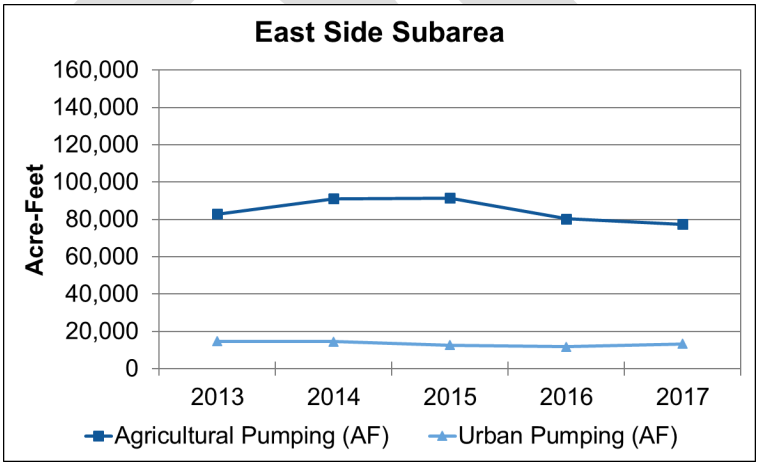


Figure 8. Agricultural and Urban Extractions (AF) in the East Side Subarea 2013-2017.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2013	82,895	14,727	97,622
2014	91,160	14,484	105,644
2015	91,491	12,631	104,122
2016	80,379	11,802	92,181
2017	77,353	13,258	90,611

Table 4. Total, Agricultural, and Urban Extractions (AF) in the East Side Subarea 2013-2017.

Forebay Subarea – Extraction Data

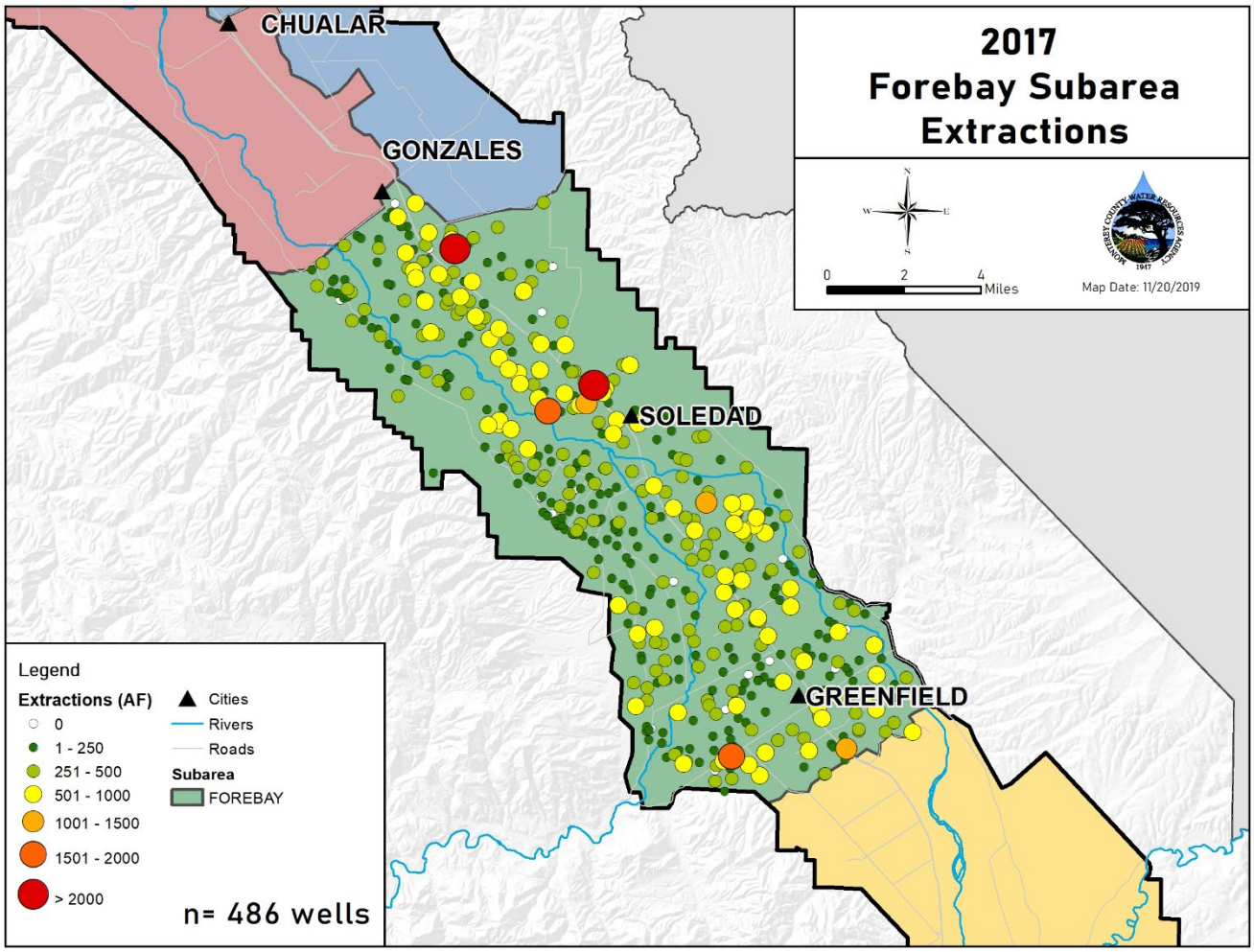


Figure 9. 2017 Groundwater Extraction in the Forebay Subarea.

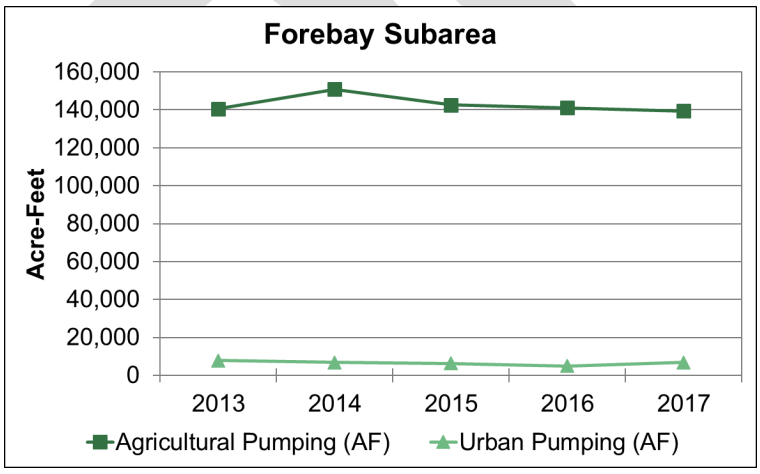


Figure 10. Agricultural and Urban Extractions (AF) in the Forebay Subarea 2013-2017.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2013	140,574	7,893	148,467
2014	150,890	6,745	157,635
2015	142,668	6,221	148,889
2016	141,163	4,866	146,029
2017	139,359	6,764	146,123

Table 5. Total, Agricultural, and Urban Extractions (AF) in the Forebay Subarea 2013-2017.

Upper Valley Subarea – Extraction Data

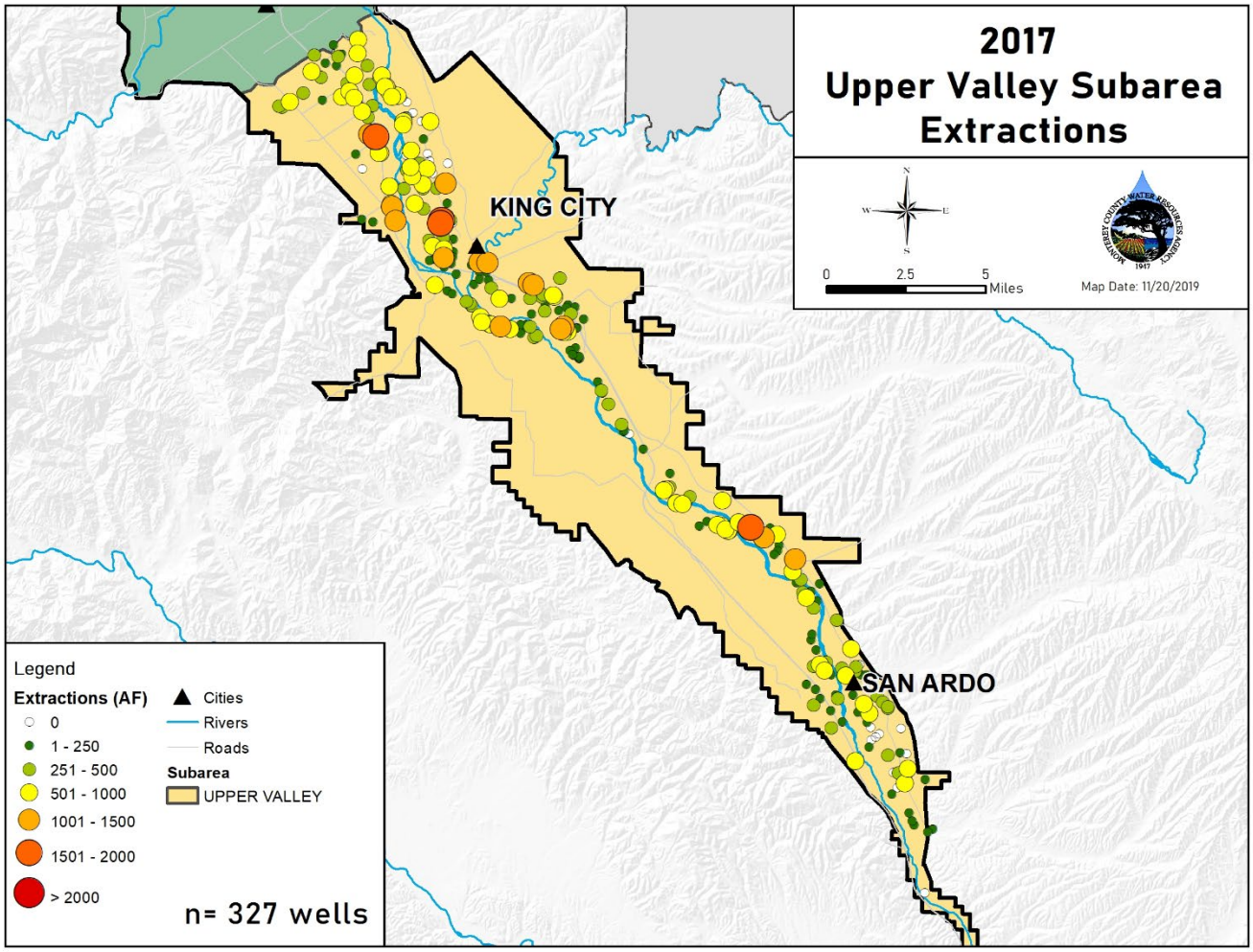


Figure 11. 2017 Groundwater Extraction in the Upper Valley Subarea

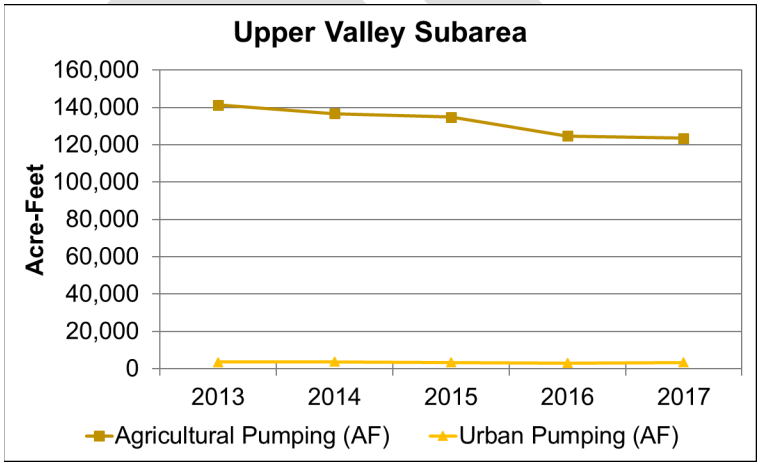


Figure 12. Agricultural and Urban Extractions (AF) in the Upper Valley Subarea 2013-2017.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2013	141,263	3,611	144,874
2014	136,645	3,673	140,318
2015	134,740	3,306	138,046
2016	124,678	2,991	127,669
2017	123,446	3,407	126,853

Table 6. Total, Agricultural, and Urban Extractions (AF) in the Upper Valley Subarea 2013-2017.

Agricultural Water Conservation – Data Summary

The Agricultural Water Conservation Plans include information on net irrigated acreage, irrigation methods, and crop type. This information is forecasted and indicates what the grower plans to do in the upcoming year. The first figure (13) and table (7) presents a breakdown of irrigation methods by crop type. The next figure (14) shows the change in irrigation methods over the length of the program and the final figure (15) shows the top ten Best Management Practices (BMPs) to be implemented in 2018.

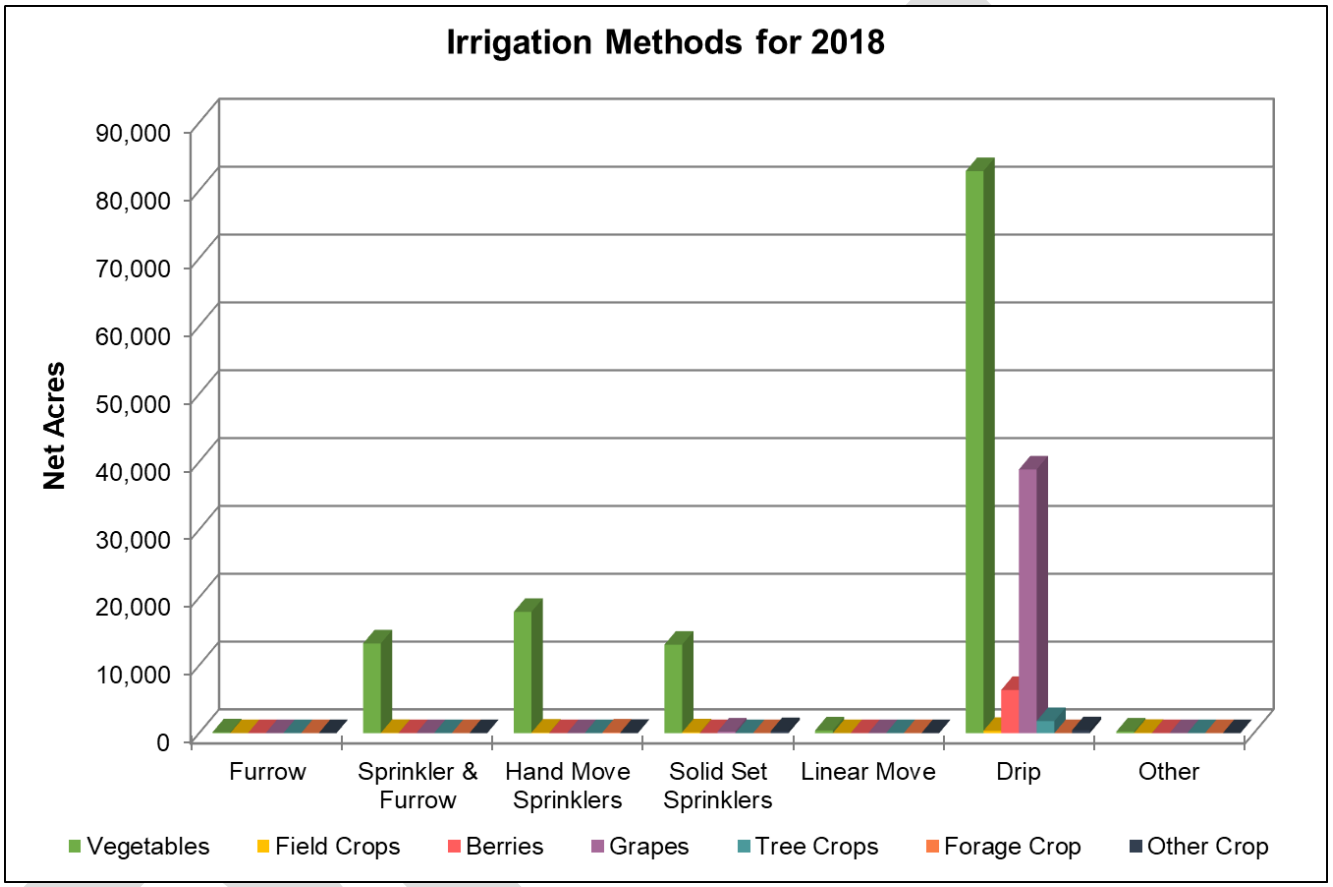


Figure 13. 2018 Forecasted Net Acre Distribution of Irrigation Methods by Crop Type.

2018	Furrow	Sprinkler & Furrow	Hand Move Sprinklers	Solid Set Sprinklers	Linear Move	Drip	Other	Total
Vegetables	120	13,225	17,877	13,038	406	82,858	251	127,776
Field Crops	0	32	80	120	0	340	37	609
Berries	0	0	0	0	0	6,360	0	6,360
Grapes	0	0	0	242	0	38,877	0	39,119
Tree Crops	0	0	0	0	0	1,781	0	1,781
Forage Crop	0	0	93	0	0	0	0	93
Other Crop	0	0	36	295	5	425	0	761
Unirrigated								2,641
Total	**120**	**13,257**	**18,086**	**13,695**	**411**	**130,641**	**288**	**179,139**

Table 7. Net Acres by Irrigation Method and Crop Type.

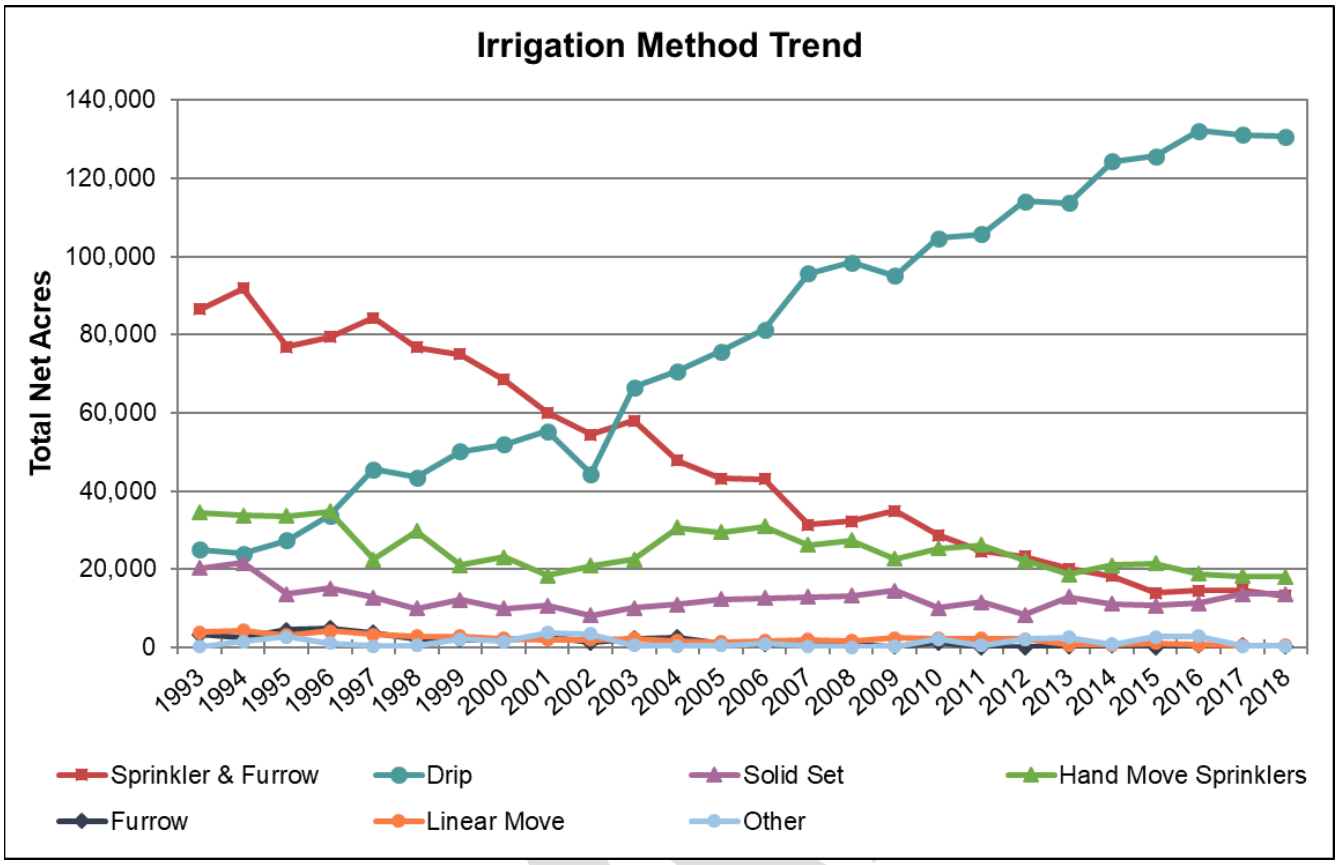


Figure 14. Changes in Irrigation Methods Used Over Time (1993 – 2018) in Zones 2, 2A, and 2B.

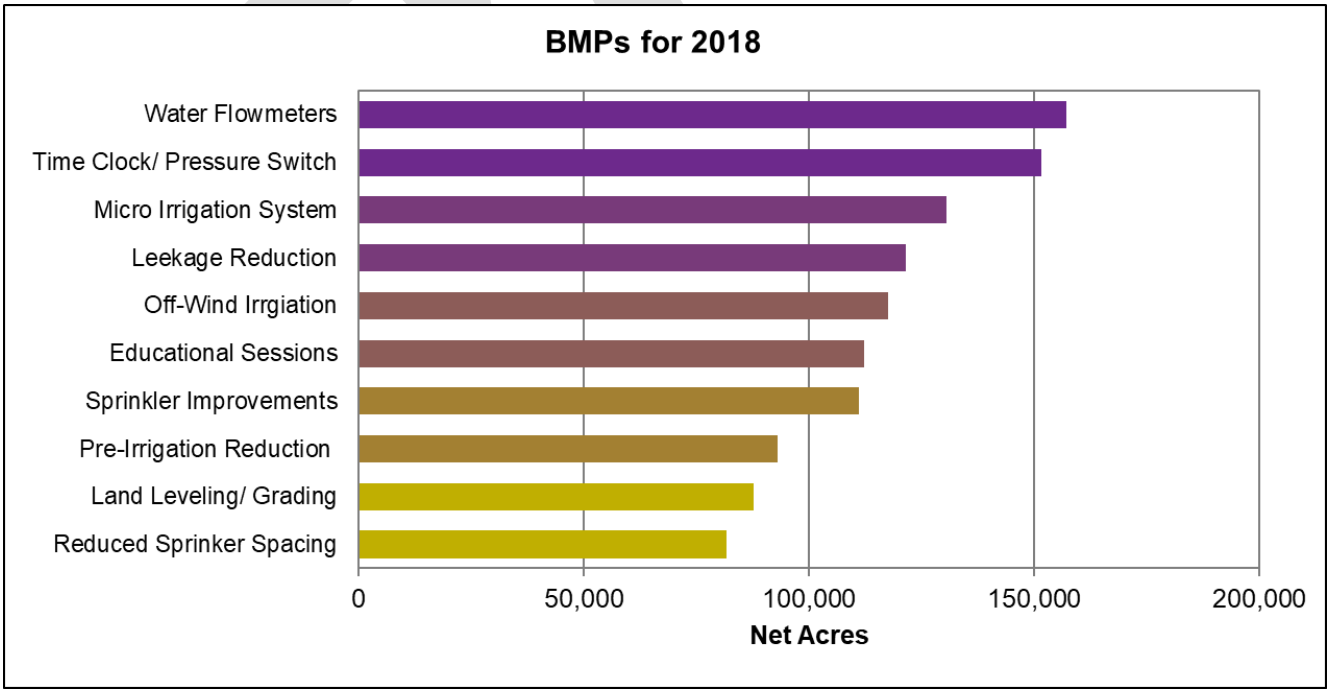


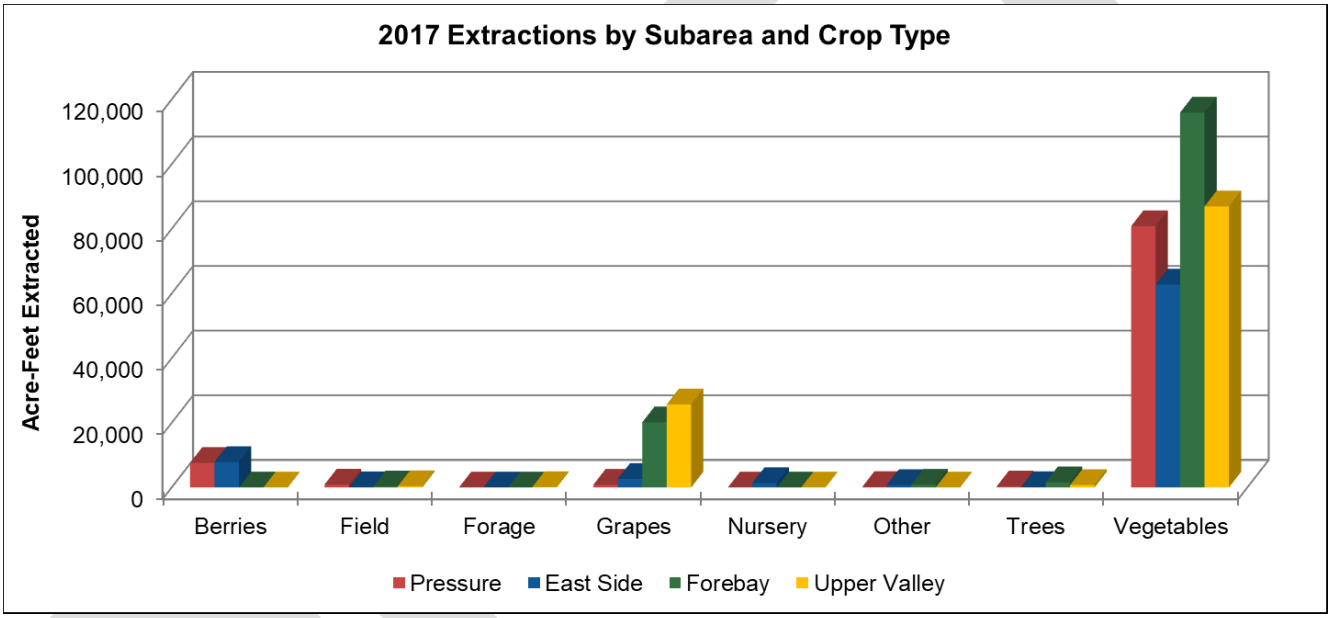
Figure 15. Top Ten BMPs Forecasted for 2018 Based on Reported Net Acres.

Water and Land Use Form – Data Summary

The following three figures are generated from the data submitted on the Water and Land Use forms and show the agricultural water extracted (Fig. 16), irrigated net acres (Fig. 17), and amount of water used per acre (Fig. 18) by hydrologic subarea and crop type. The data account for all crop types reported and all reporting methods: Water Flowmeter, Electrical Meter, and Hour Meter.

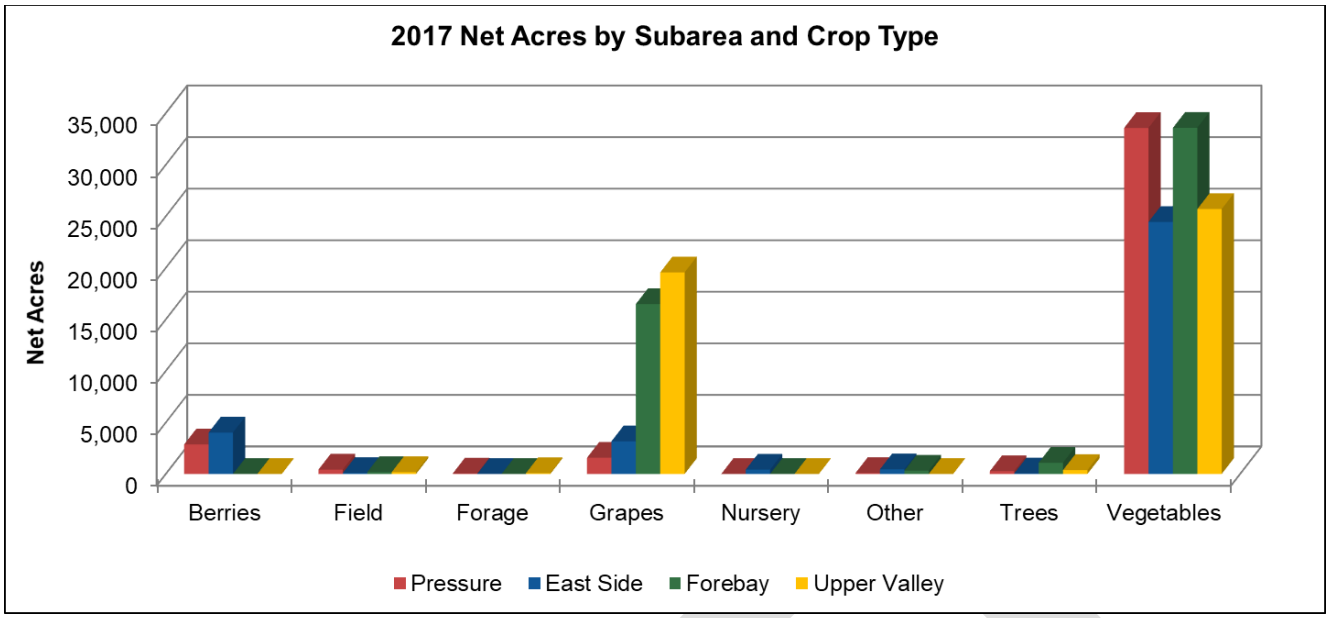
Changing weather patterns, variable soils, and crop types affect the amount of water needed for efficient irrigation. Even during a normal rain year, pumping rates will vary from one subarea to another and crop types will vary depending on economic demand.

Examples of products categorized as the following Crop Types include: strawberries and raspberries under Berries; beans and grains under Field Crops; alfalfa and pasture under Forage Crops; avocados and lemons under Tree Crops; and sod, flower bulbs, ornamentals, and cactus pears under Other Crops.



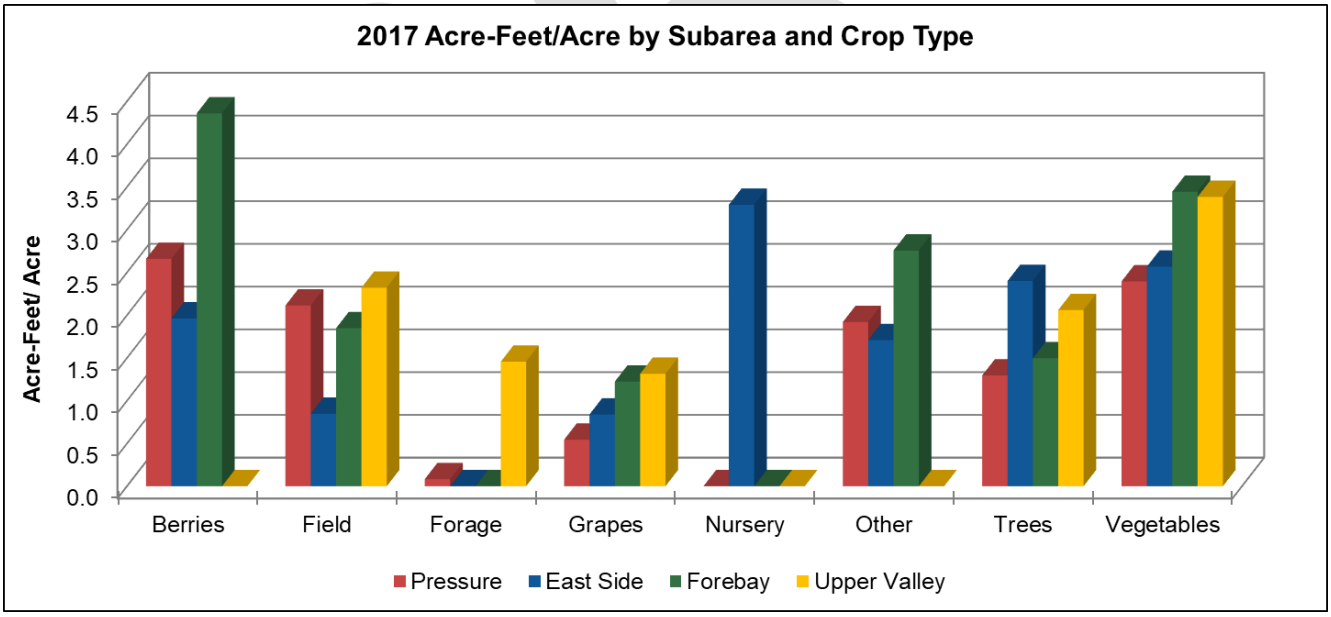
2017	Berries (AF)	Field (AF)	Forage (AF)	Grapes (AF)	Nursery (AF)	Other (AF)	Trees (AF)	Vegetables (AF)
Pressure	7,619	891	3.3	854	-	172	350	80,826
East Side	7,876	76.2	-	2,651	1,358	766	120	62,773
Forebay	0.9	332	-	20,147	-	883	1,620	115,933
Upper Valley	-	409	113	25,707	-	-	777	86,940

Figure 16. 2017 Extractions Reported by Crop Type and Subarea.



2017	Berries (Net Acres)	Field (Net Acres)	Forage (Net Acres)	Grapes (Net Acres)	Nursery (Net Acres)	Other (Net Acres)	Trees (Net Acres)	Vegetables (Net Acres)
Pressure	2,865	422	40.0	1,570	-	89.5	271	33,564
East Side	4,014	90.0	-	3,161	413	448	50.0	24,445
Forebay	0.2	180	-	16,478	-	321	1,083	33,573
Upper Valley	-	176	77.7	19,551	-	-	377	25,697

Figure 17. 2017 Net Acres Reported by Crop Type and Subarea.



2017	Berries (AF/Acre)	Field (AF/Acre)	Forage (AF/Acre)	Grapes (AF/Acre)	Nursery (AF/Acre)	Other (AF/Acre)	Trees (AF/Acre)	Vegetables (AF/Acre)
Pressure	2.7	2.1	0.1	0.5	-	1.9	1.3	2.4
East Side	2.0	0.8	-	0.8	3.3	1.7	2.4	2.6
Forebay	4.4	1.8	-	1.2	-	2.8	1.5	3.4
Upper Valley	-	2.3	1.5	1.3	-	-	2.1	3.4

Figure 18. 2017 Acre-Feet/Acre by Crop Type and Subarea

Urban Water Conservation – Data Summary

Since 1996, the Agency has collected data on the Urban Water Conservation Plan program. Tables 8 and 9 show the top ten Best Management Practices (BMPs) for 2018, as a percentage of total acreage reported for "large" water systems (200 or more customer connections), and "small" water systems (between 15 and 199 customer connections). Tables 10 and 11, and figures 19 and 20 give the reported Water Use per Connection for different Connection Classes for both "large" and "small" water systems.

Table 8. Top Ten BMPs – Large Water Systems.

Top Ten BMPs Implemented for Large Water Systems	2018
Advise customers when it appears possible that leaks exist on customer's side of water meter	100%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost-effective	100%
Implement requirements that all new connections be metered and billed by volume of use	99%
Enforcement and support of water conserving plumbing fixture standards, including gradual requirement for High Efficiency Toilets (HET) in all new construction	99%
Provide conservation information in bill inserts	99%
Provide speakers to community groups and media	99%
Provide individual historical water use information on water bills	98%
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	97%
Support of legislation prohibiting sale of toilets using more than 1.6 gpf	97%
Identify irrigators of large landscapes (3 acres or more) and offer landscape audits to determine conservation opportunities	96%

Table 9. Top Ten BMPs – Small Water Systems.

Top Ten BMPs Implemented for Small Water Systems	2018
Support of legislation prohibiting sale of toilets using more than 1.6 gpf	99%
Advise customers when it appears possible that leaks exist on customer's side of water meter	99%
Implement requirements that all new connections be metered and billed by volume of use	96%
Establish a program to retrofit any existing unmetered connections and bill by volume of use	93%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost-effective	93%
Provide conservation information in bill inserts	87%
Provide individual historical water use information on water bills	85%
Implementation of conservation pricing policy	84%
Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies	84%
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water saving practices	84%

Small Water Systems: Water Use (AF) Per Connection Class	2014	2015	2016	2017
Single-Family Residential	0.504	0.416	0.426	0.516
Multi-Family Residential	0.573	0.603	0.640	0.689
Commercial/ Institutional	1.429	0.963	0.709	0.940
Industrial	4.795	5.001	12.652	12.562
Landscape Irrigation	1.927	1.945	1.100	1.934
Other	1.077	1.130	0.454	1.098

Table 10. Water Use per Connection – Small Water Systems (2014-2017).

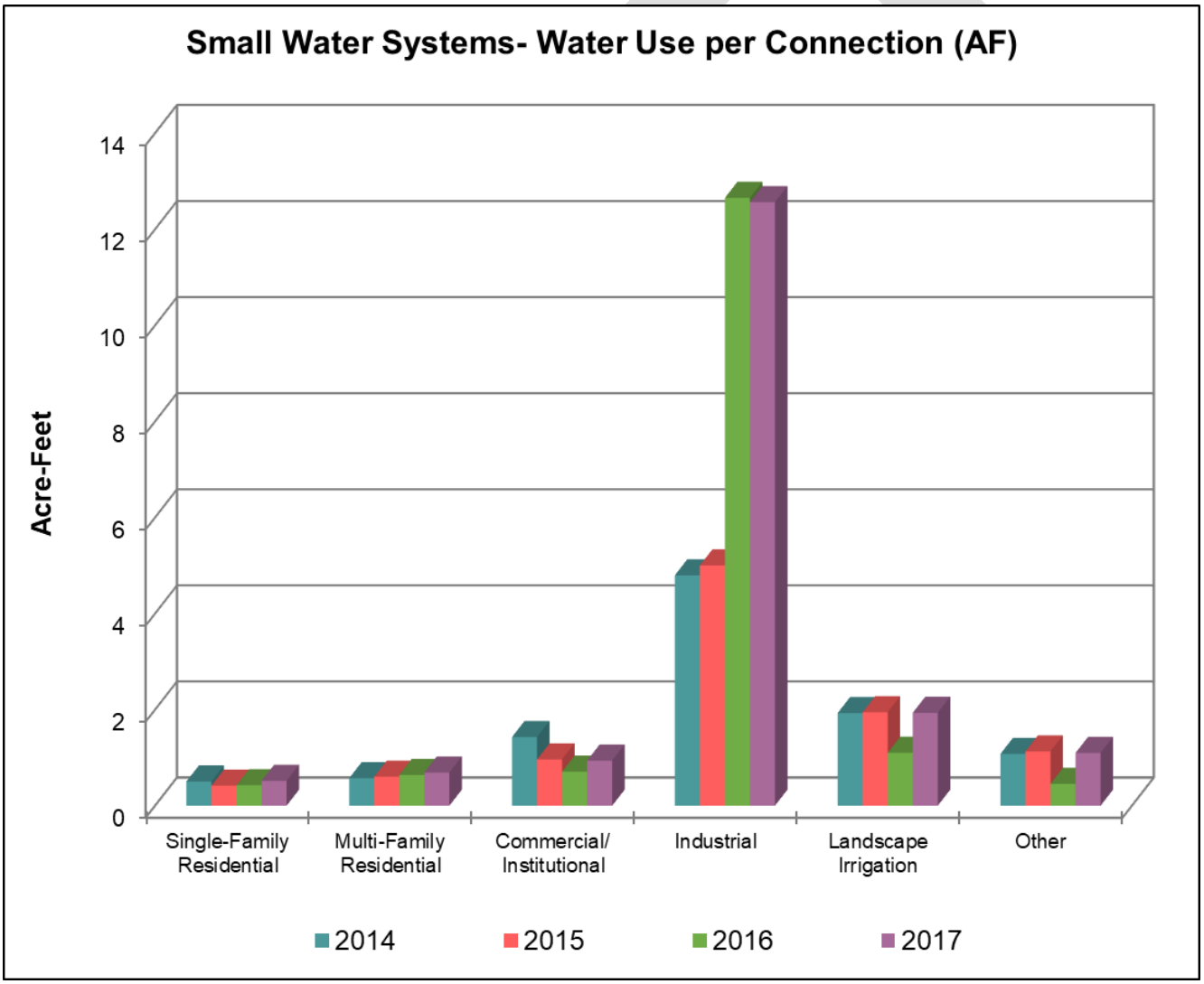


Figure 19. Urban Water Use per Connection – For Small Water Systems

Large Water Systems: Water Use (AF) Per Connection Class	2014	2015	2016	2017
Single-Family Residential	0.372	0.314	0.274	0.292
Multi-Family Residential	1.025	1.296	0.858	1.026
Commercial/ Institutional	2.997	0.965	1.579	1.583
Industrial	10.928	3.910	15.491	15.718
Landscape Irrigation	1.956	4.828	1.195	2.138
Agricultural Irrigation	-	-	38.649	21.223
Other	12.574	15.591	1.918	0.934

Table 11. Water Use per Connection – Large Water Systems (2014-2017).

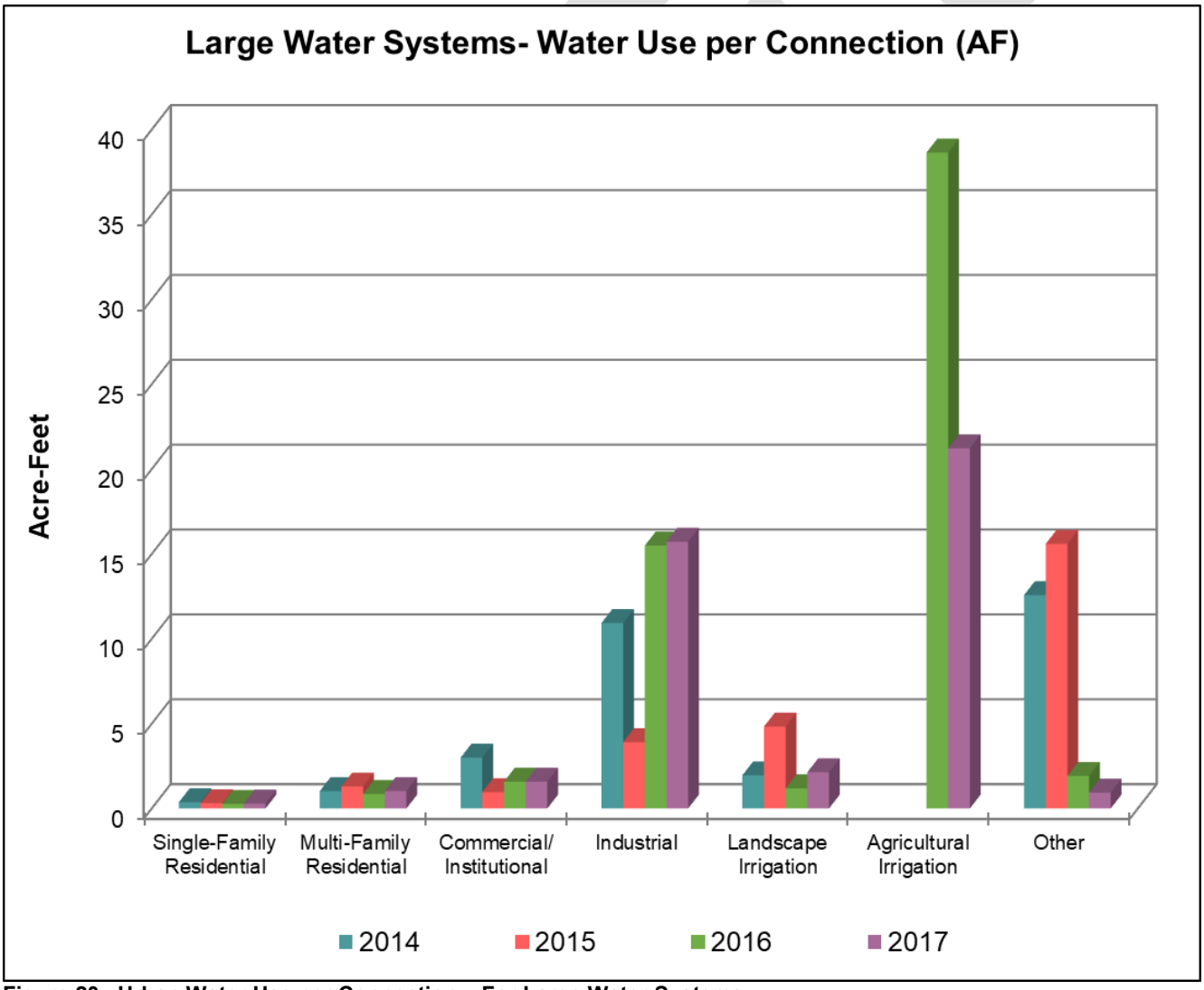


Figure 20. Urban Water Use per Connection – For Large Water Systems

Monterey County
Board of Supervisors

Luis Alejo	District #1
John M. Phillips	District #2
Chris Lopez	District #3
Jane Parker	District #4
Mary Adams, Chair	District #5

Monterey County Water Resources Agency
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Mike Scattini	District #2
Richard Ortiz	District #3
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Ken Ekelund	District #5
Matt Simis	Grower-Shipper Association
Jason Smith	Monterey County Farm Bureau
John Baillie, Vice-Chair	Agricultural Advisory Committee
Mike LeBarre	City Select Committee

Monterey County Water Resources Agency
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