2016

Groundwater Extraction Summary Report

Monterey County Water Resources Agency

July 2019


MONTEREY COUNTY WATER RESOURCES AGENCY
1947

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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.

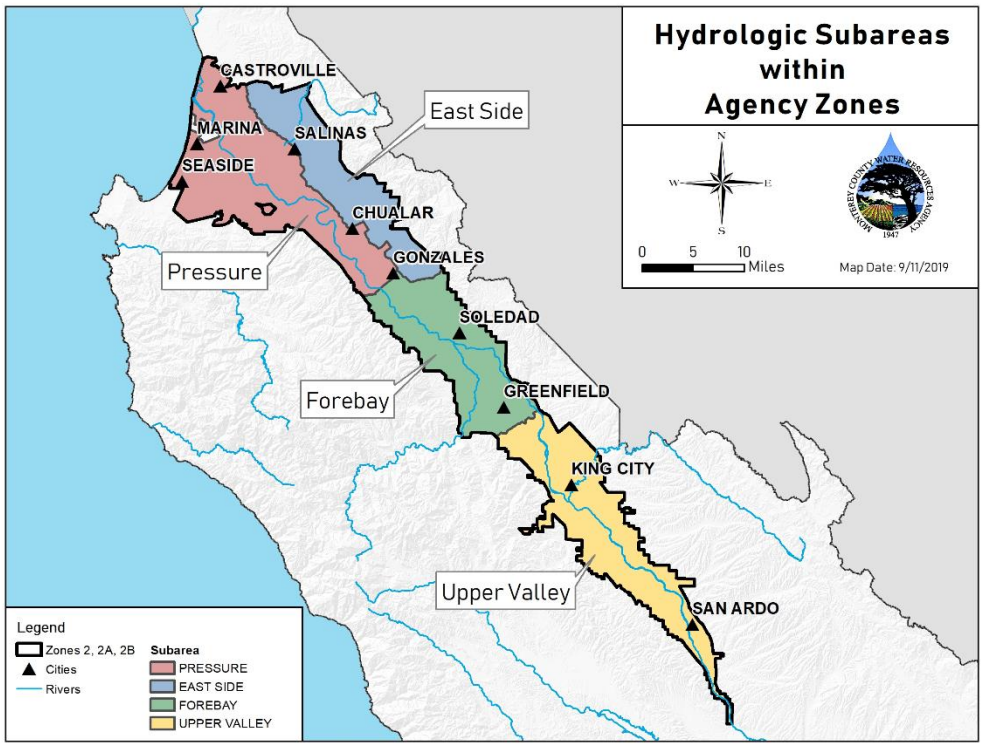


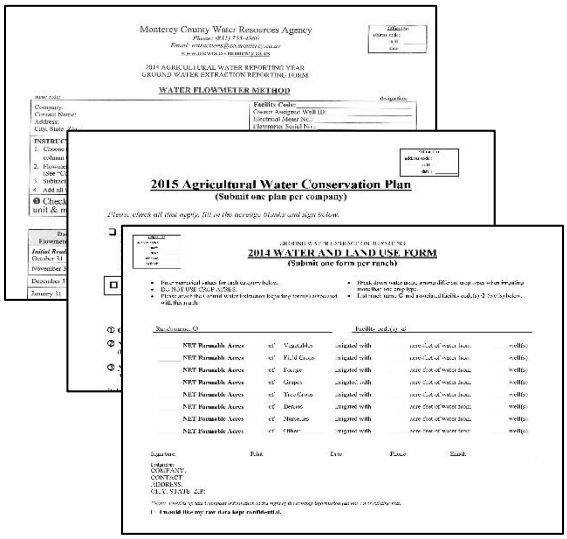
Figure 1. Salinas Valley Groundwater Basin Subareas and Agency Zones

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 2017 from the following annual forms:

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



The agricultural data from the groundwater extraction program covers the reporting year of November 1, 2015, through October 31, 2016; the urban data covers calendar year 2016. The agricultural and urban water conservation plans for 2017 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.

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-six percent (96%) of the 1,908 wells in the Salinas Valley for the 2016 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2017 were eighty-nine percent (89%) and eighty-two percent (82%), 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	98,890	14,605	**113,495**
East Side	80,379	11,802	**92,181**
Forebay	141,163	4,866	**146,029**
Upper Valley	124,678	2,991	**127,669**
Total (AF)	**445,110**	**34,264**	**479,374**
Percent of Total	**92.9%**	**7.1%**	**100.0%**

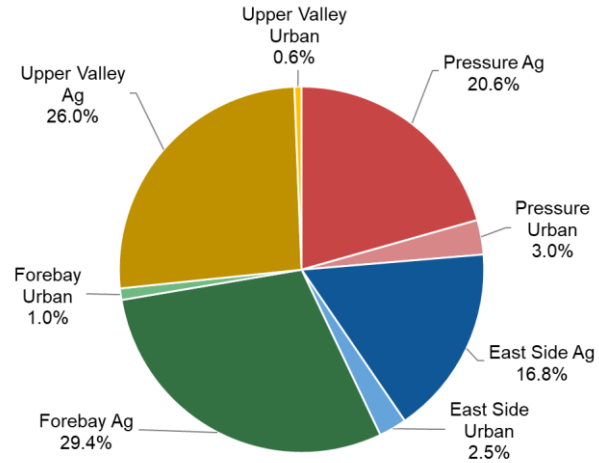


Figure 2. Percentage of Ag and Urban Extractions by Subarea.

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.

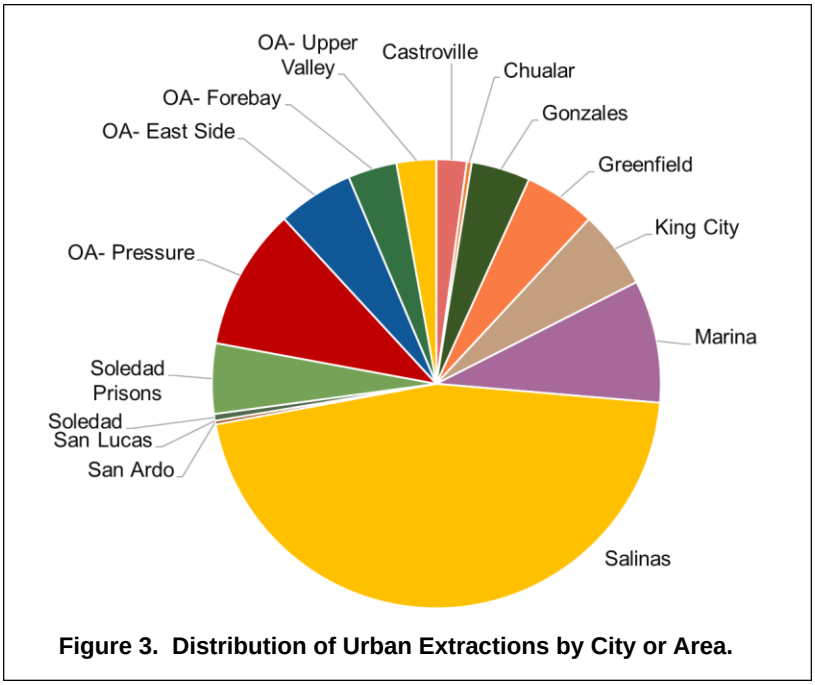


Figure 3. Distribution of Urban Extractions by City or Area.

Table 2. Urban Extractions by City or Area

City or Area	Urban Pumping (AF)	Percentage
Castroville	747	2.18%
Chualar	121	0.35%
Gonzales	1,455	4.25%
Greenfield	1,756	5.13%
King City	1,923	5.61%
Marina	3,027	8.83%
Salinas	15,677	45.75%
San Ardo	91	0.26%
San Lucas	No Data	No Data
Soledad	**166	0.48%
Soledad Prisons	1,734	5.06%
OA- Pressure	3,504	10.23%
OA- East Side	1,877	5.48%
OA- Forebay	1,210	3.53%
OA- Upper Valley	978	2.85%
Total	**34,264**	**100.00%**

OA=Other Area **Missing Data

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 2016 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.

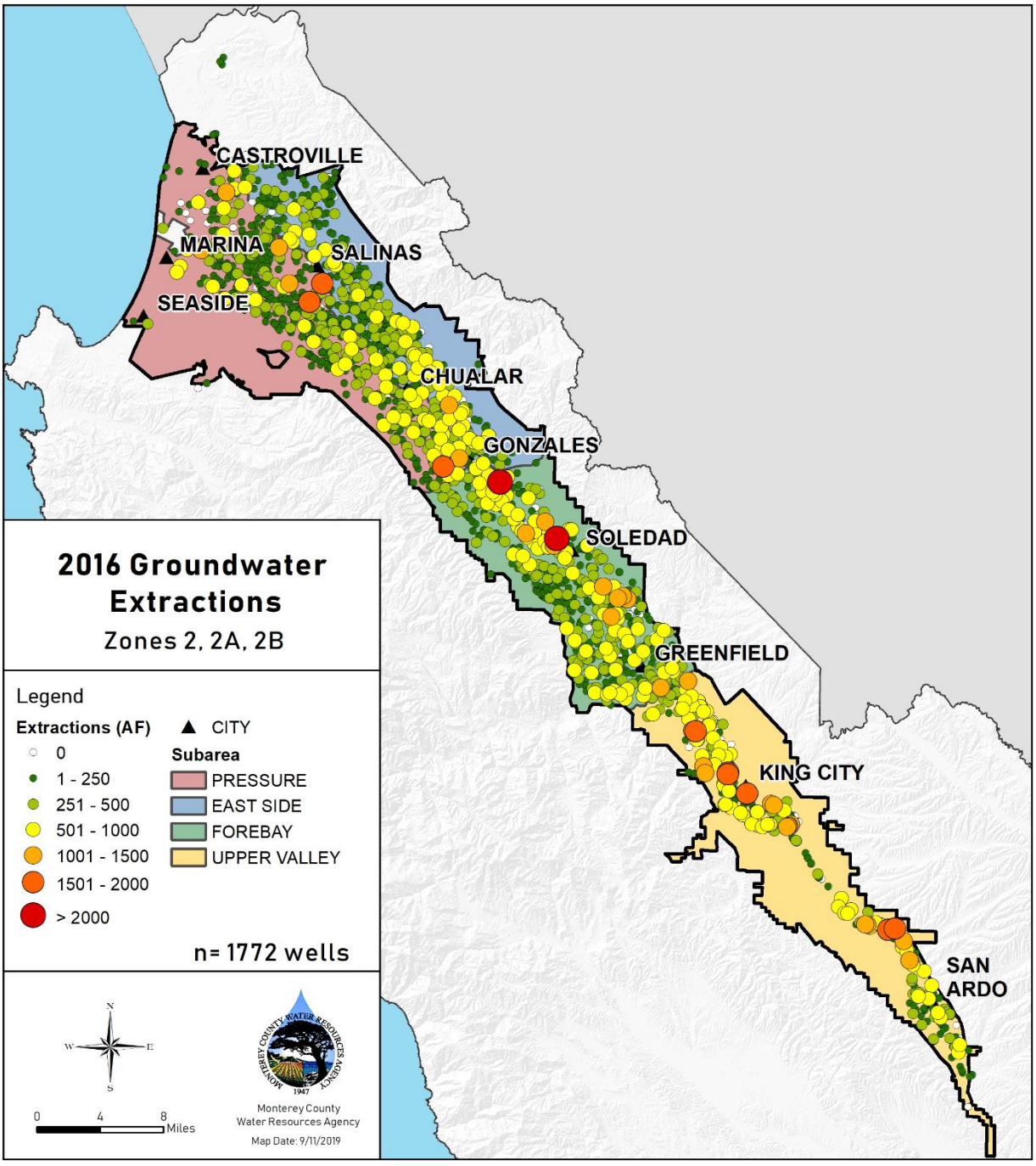


Figure 4. 2016 Groundwater Extractions.

Pressure Subarea – Extraction Data

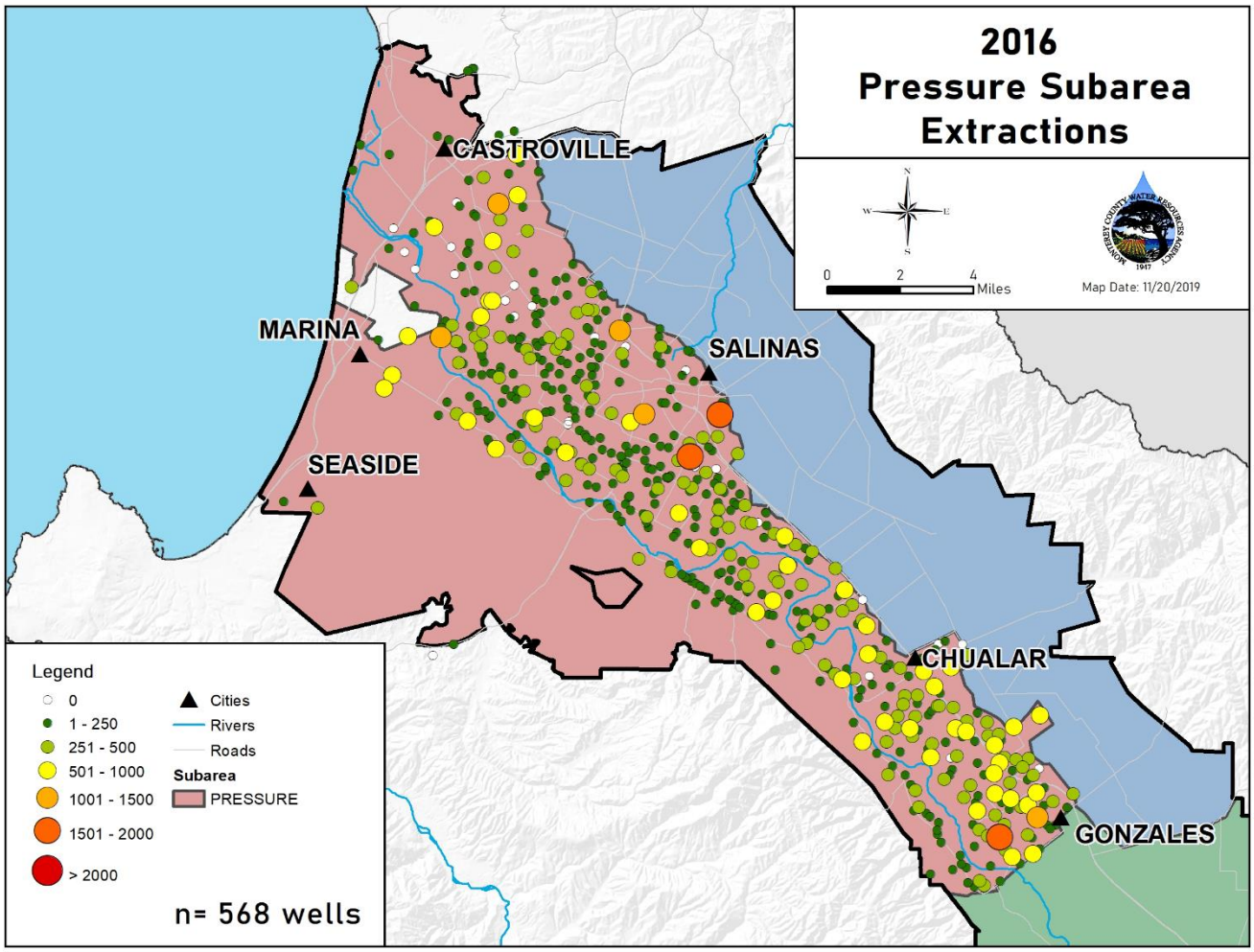


Figure 5. 2016 Groundwater Extraction in the Pressure Subarea.

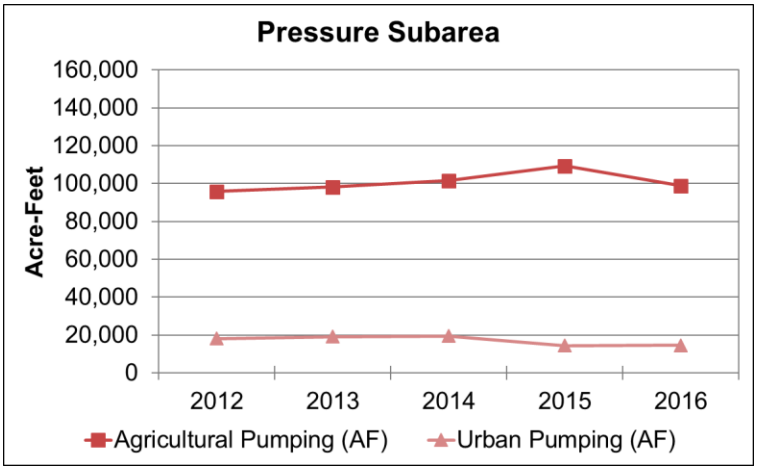


Figure 6. Agricultural and Urban Extractions (AF) in the Pressure Subarea 2012-2016.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2012	95,814	18,084	113,898
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

Table 3. Total, Agricultural, and Urban Extractions (AF) in the Pressure Subarea 2012-2016.

East Side Subarea – Extraction Data

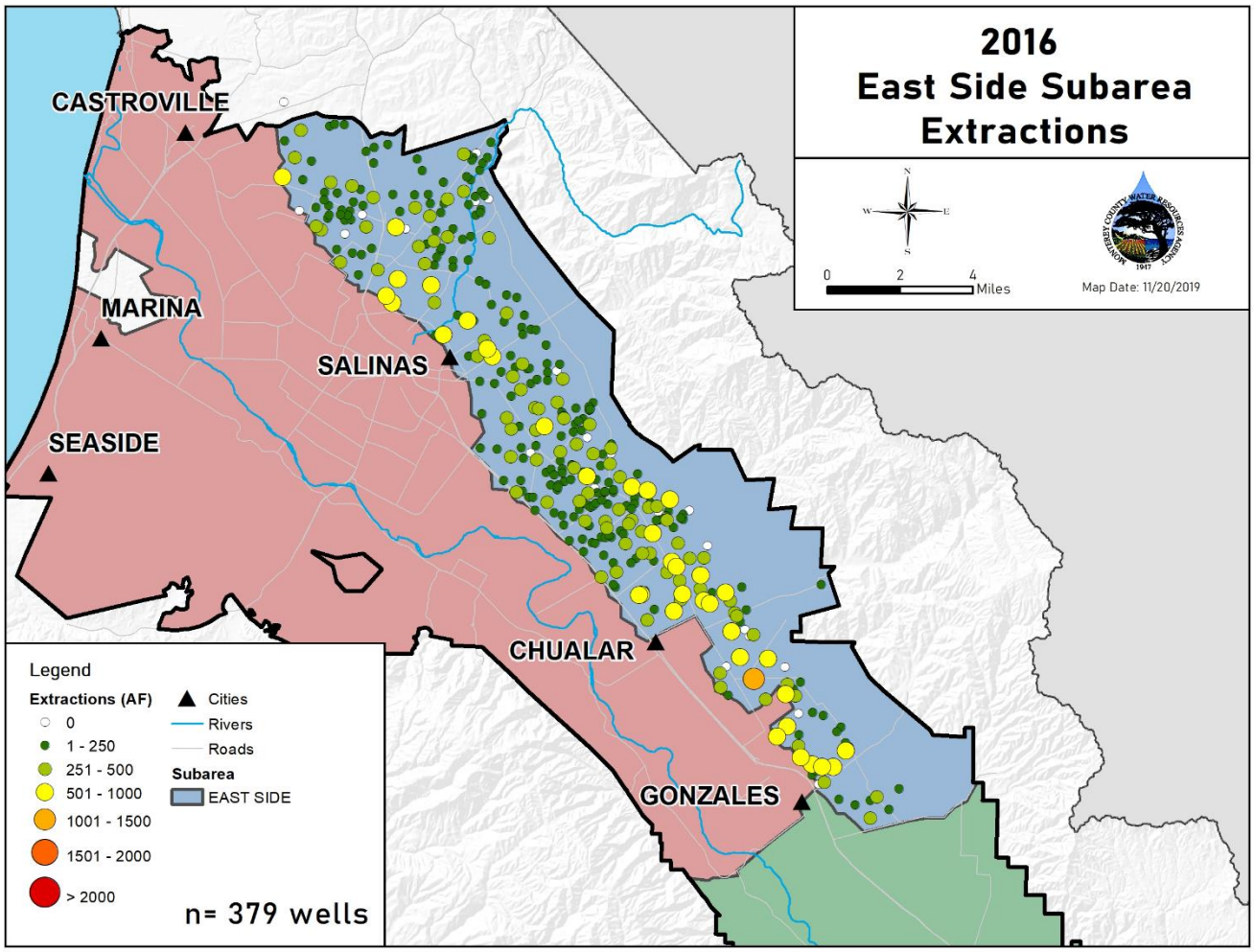


Figure 7. 2016 Groundwater Extraction in the East Side Subarea.

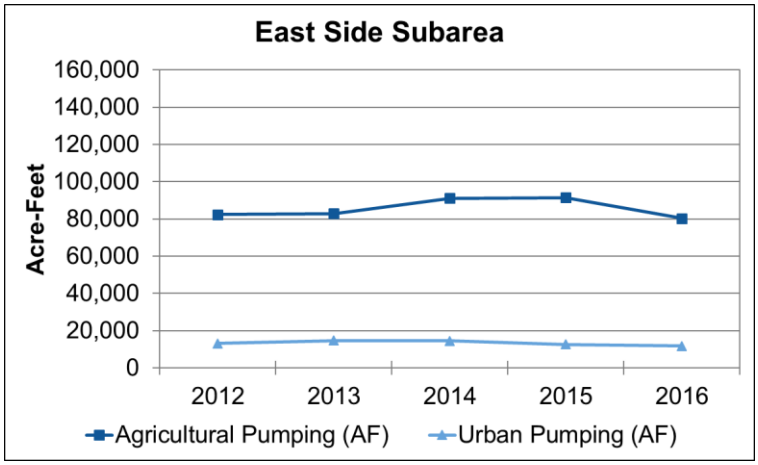


Figure 8. Agricultural and Urban Extractions (AF) in the East Side Subarea 2012-2016.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2012	82,451	13,092	95,543
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

Table 4. Total, Agricultural, and Urban Extractions (AF) in the East Side Subarea 2012-2016.

Forebay Subarea – Extraction Data

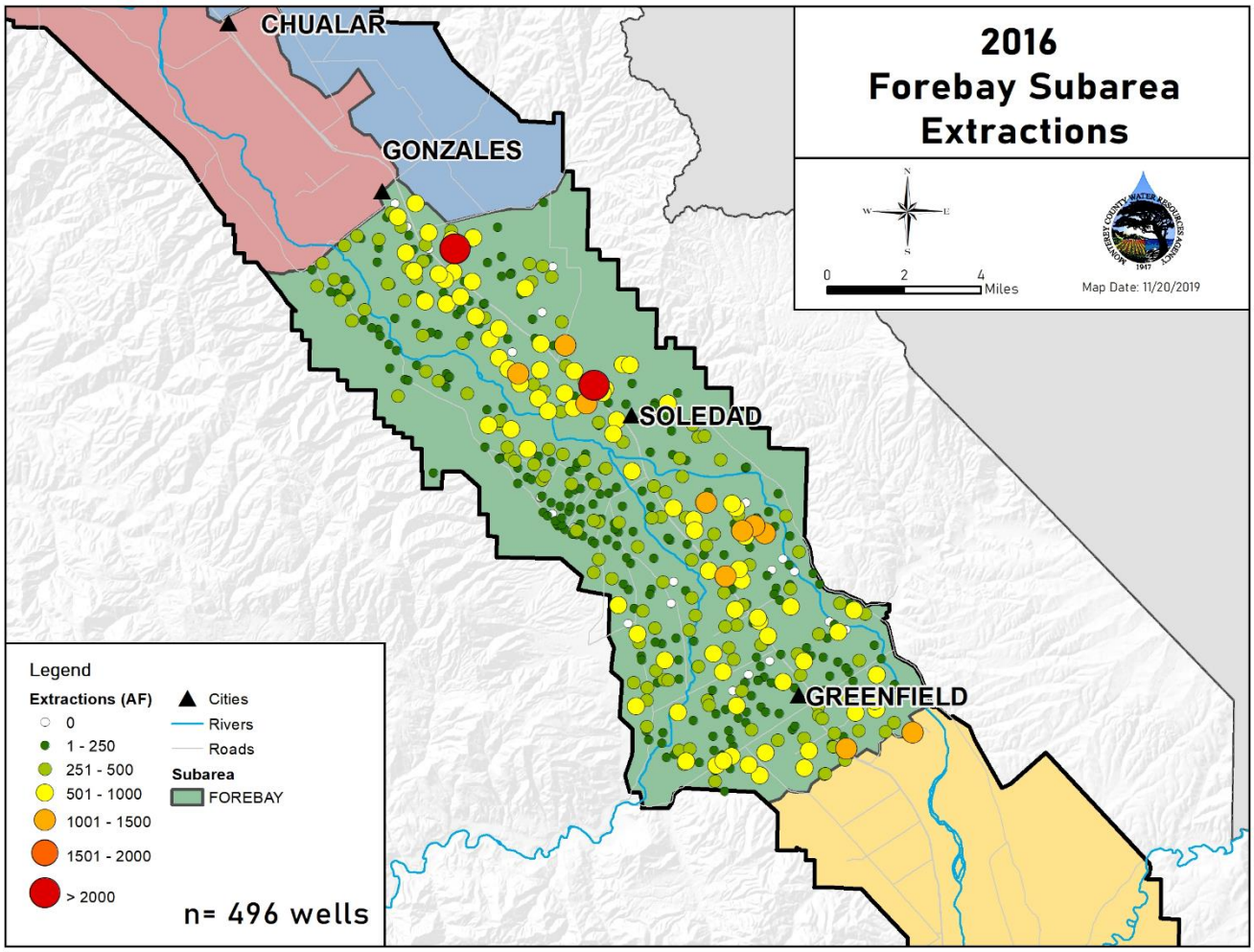


Figure 9. 2016 Groundwater Extraction in the Forebay Subarea.

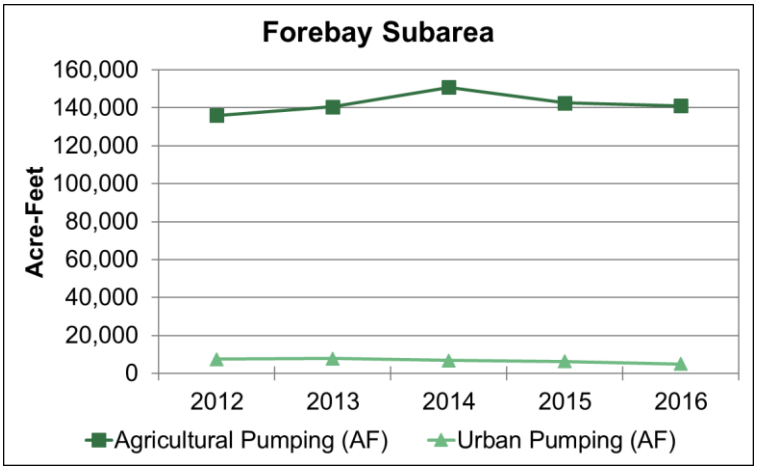


Figure 10. Agricultural and Urban Extractions (AF) in the Forebay Subarea 2012-2016.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2012	135,971	7,488	143,459
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

Table 5. Total, Agricultural, and Urban Extractions (AF) in the Forebay Subarea 2012-2016.

Upper Valley Subarea – Extraction Data

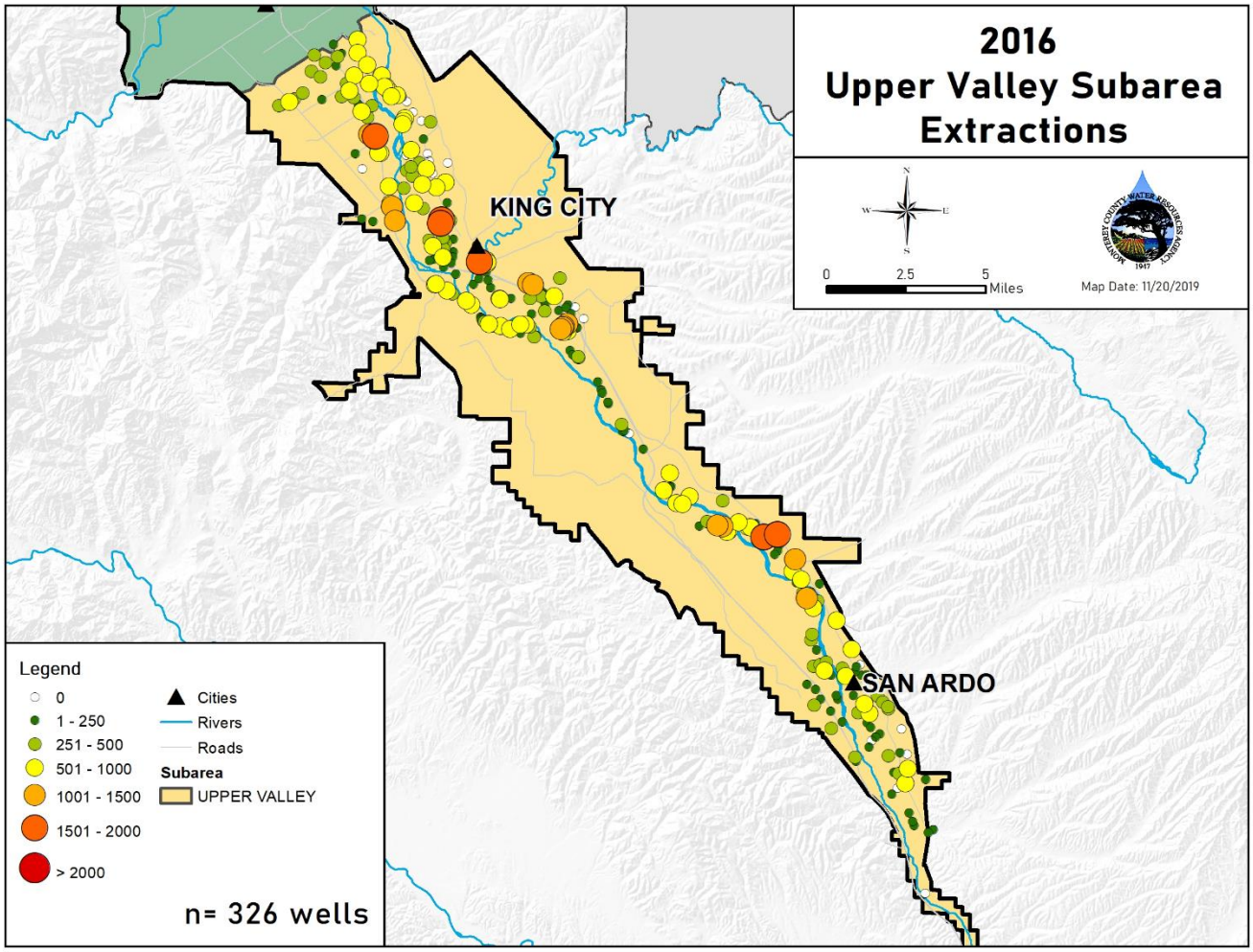


Figure 11. 2016 Groundwater Extraction in the Upper Valley Subarea

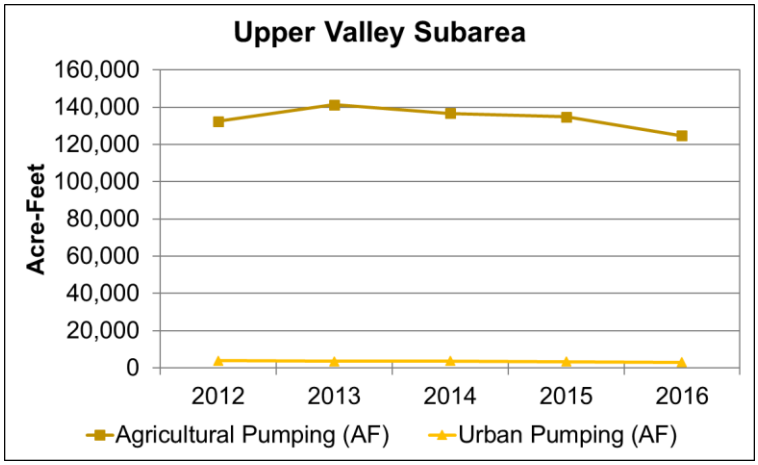


Figure 12. Agricultural and Urban Extractions (AF) in the Upper Valley Subarea 2012-2016.

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2012	132,383	3,957	136,340
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

Table 6. Total, Agricultural, and Urban Extractions (AF) in the Upper Valley Subarea 2012-2016.

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 2017.

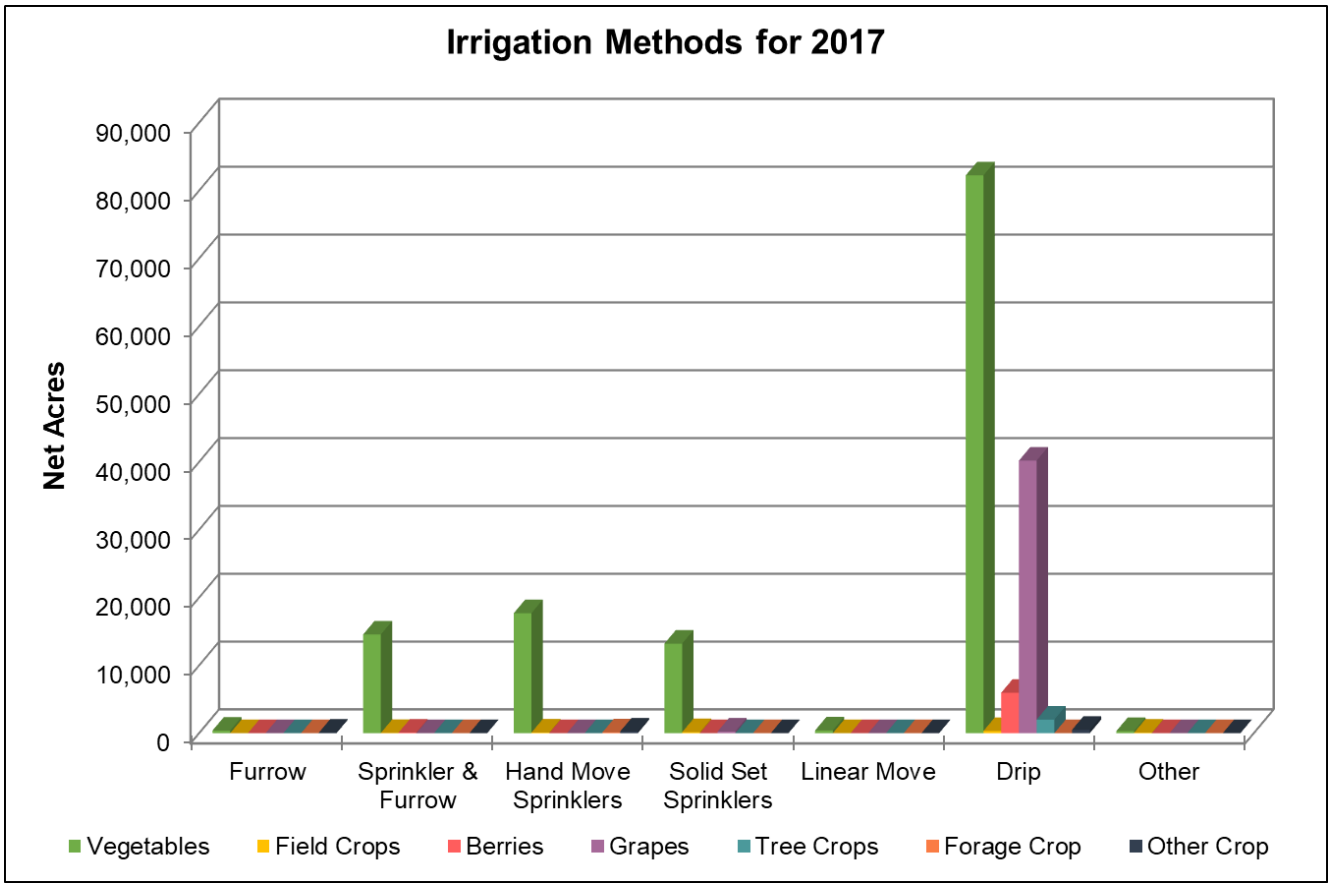


Figure 13. 2017 Forecasted Net Acre Distribution of Irrigation Methods by Crop Type.

2017	Furrow	Sprinkler & Furrow	Hand Move Sprinklers	Solid Set Sprinklers	Linear Move	Drip	Other	Total
Vegetables	376	14,542	17,692	13,194	406	82,232	315	128,757
Field Crops	0	28	97	151	0	320	78	673
Berries	0	84	0	0	0	5,952	0	6,036
Grapes	0	0	0	242	0	40,183	0	40,425
Tree Crops	0	0	0	0	0	2,000	0	2,000
Forage Crop	8	0	111	0	0	0	0	119
Other Crop	71	0	237	0	0	493	0	801
Unirrigated								2,773
Total	**454**	**14,654**	**18,137**	**13,587**	**406**	**131,181**	**393**	**181,586**

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

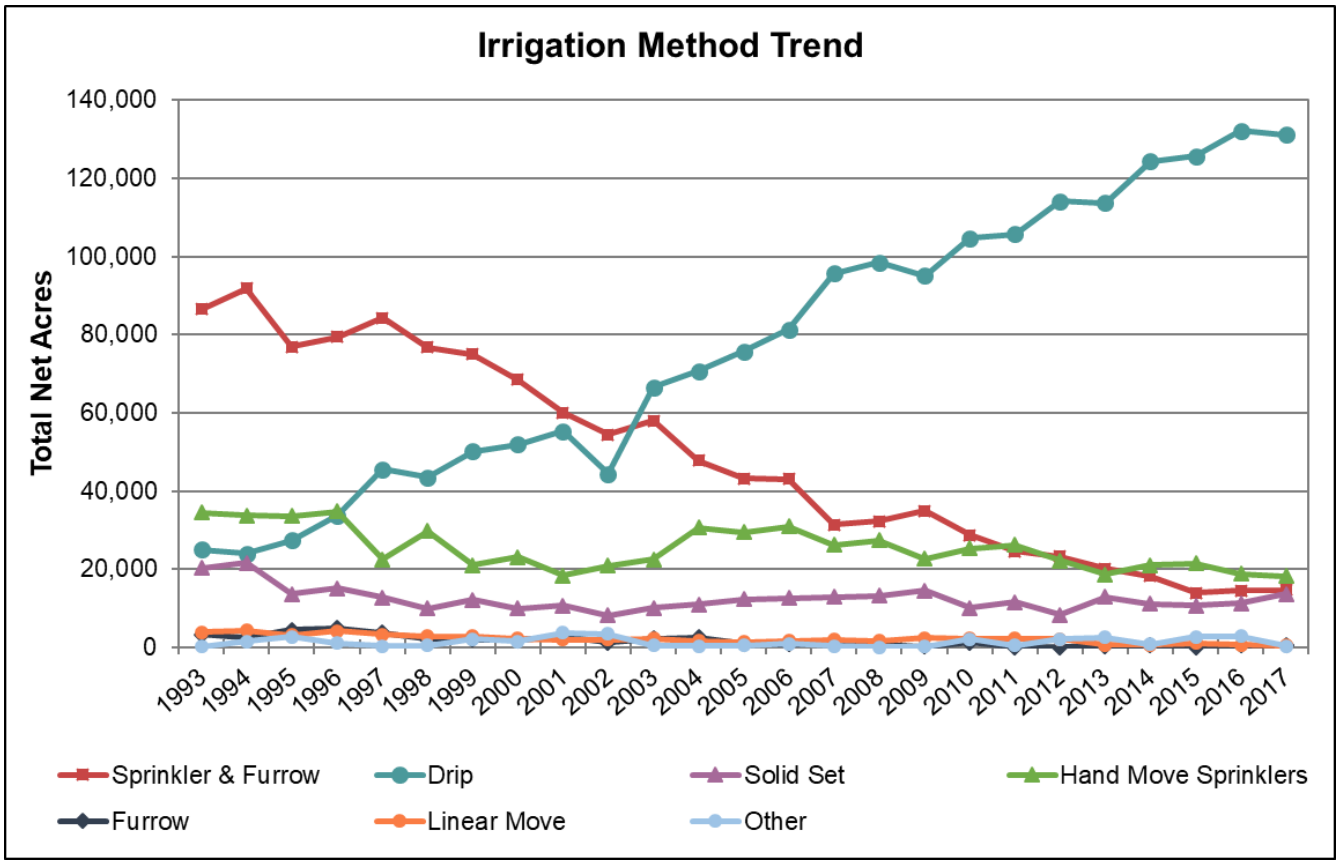


Figure 14. Changes in Irrigation Methods Used Over Time (1993 – 2017) in Zones 2, 2A, and 2B.

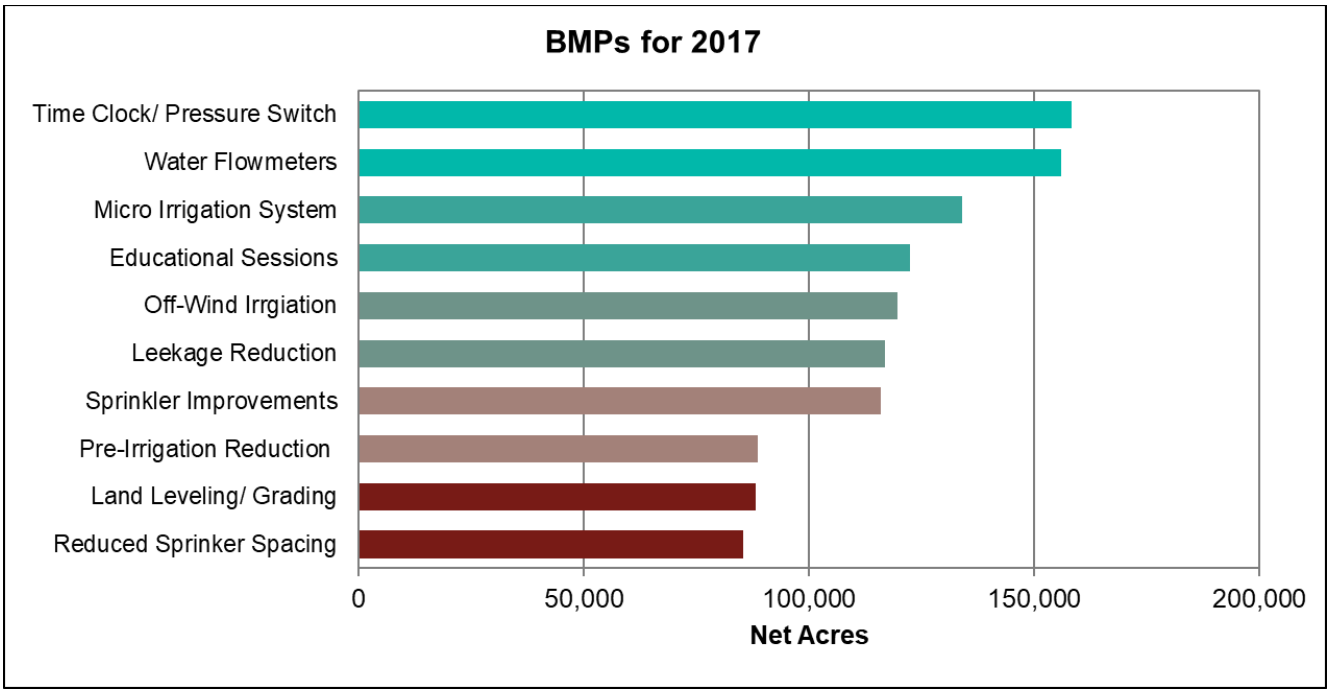


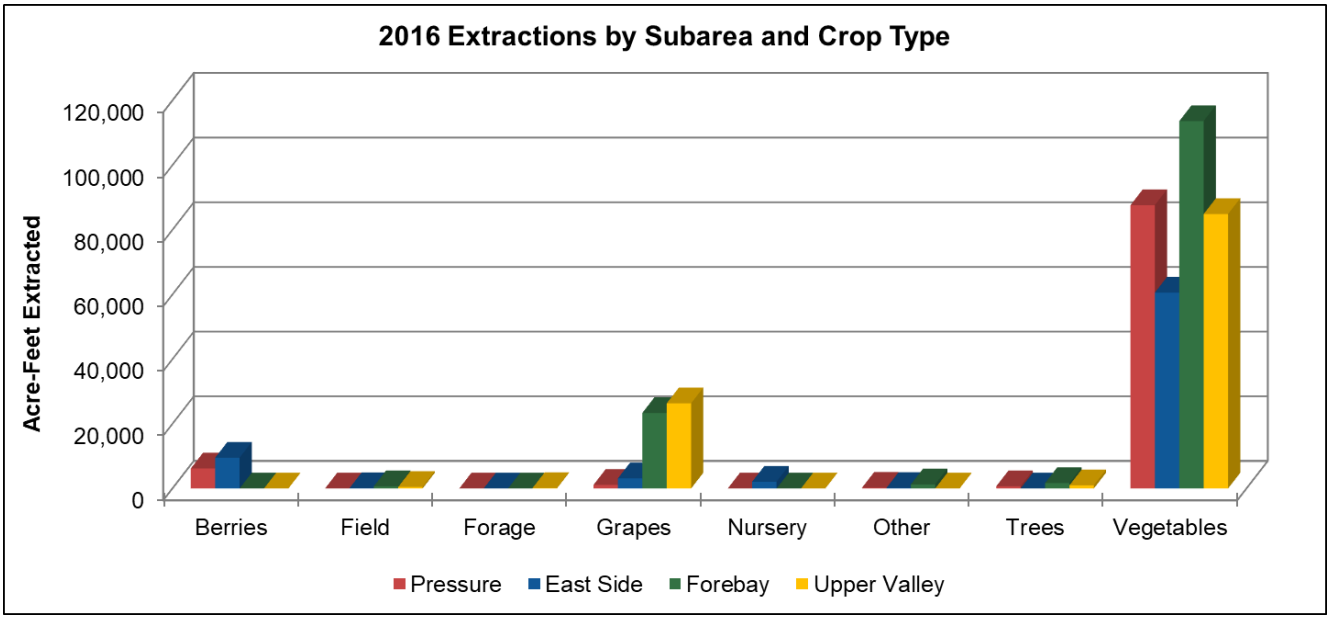
Figure 15. Top Ten BMPs Forecasted for 2017 Based on Reported Net Acres.

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.

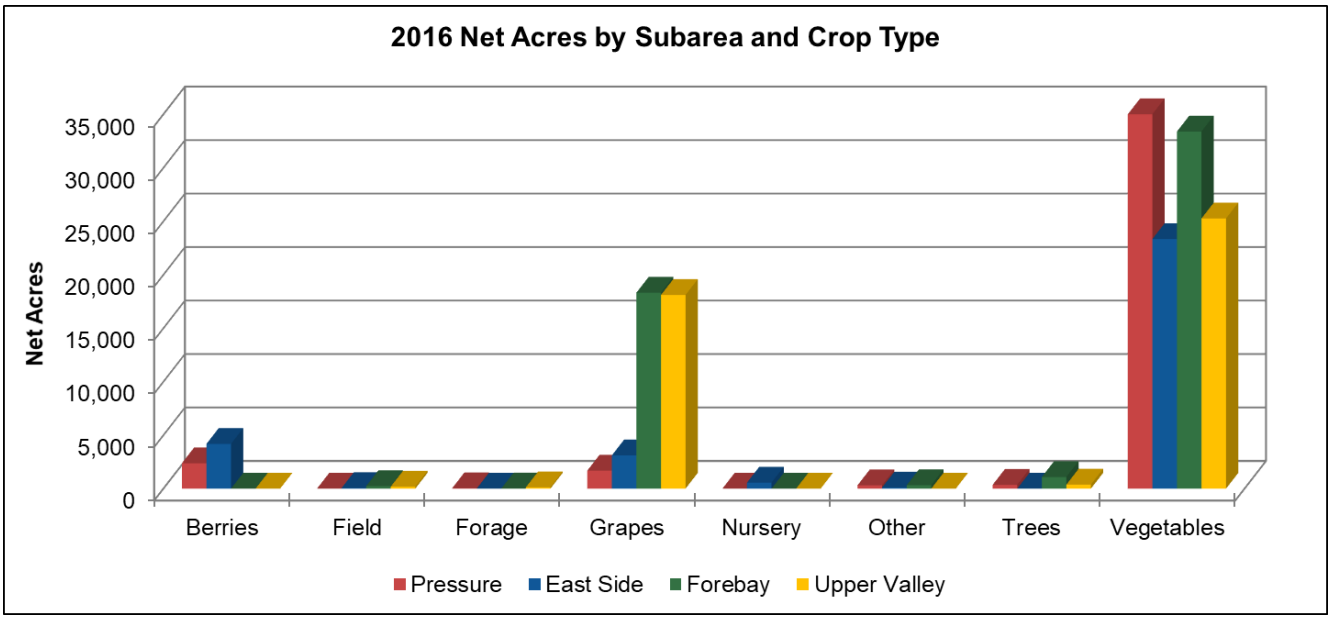
Changing weather patterns, variable soils, and crop types affect the amount of water needed for efficient irrigation. Even during a normal rain year, pumping rates will vary from one subarea to another and crop types will vary depending on economic demand.

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.



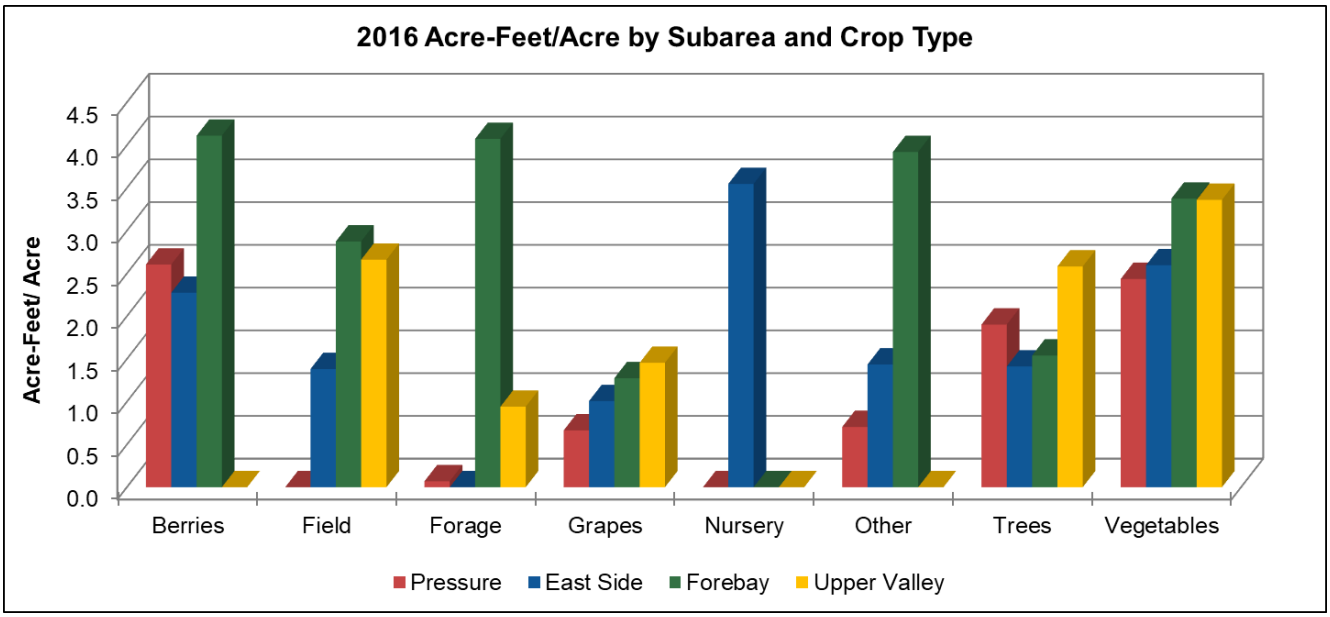
2016	Berries (AF)	Field (AF)	Forage (AF)	Grapes (AF)	Nursery (AF)	Other (AF)	Trees (AF)	Vegetables (AF)
Pressure	6,179	-	2.2	1,119	-	221	674	87,611
East Side	9,513	71.9	-	3,128	2,085	145	0.7	60,568
Forebay	1.2	675	30.5	23,353	-	1,256	1,668	113,614
Upper Valley	-	491	112	26,341	-	-	973	84,884

Figure 16. 2016 Extractions Reported by Crop Type and Subarea.



2016	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	2,373	-	32.0	1,684	-	313	355	35,842
East Side	4,183	52.0	-	3,105	558	101	0.5	23,334
Forebay	0.3	235	7.5	18,321	-	321	1,083	33,385
Upper Valley	-	185	119	18,105	-	-	377	25,261

Figure 17. 2016 Net Acres Reported by Crop Type and Subarea.



2016	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	2.6	-	0.1	0.7	-	0.7	1.9	2.4
East Side	2.3	1.4	-	1.0	3.5	1.4	1.4	2.6
Forebay	4.1	2.9	4.1	1.3	-	3.9	1.5	3.4
Upper Valley	-	2.7	0.9	1.5	-	-	2.6	3.4

Figure 18. 2016 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 2017, 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	2017
Advise customers when it appears possible that leaks exist on customer's side of water meter	100%
Implement requirements that all new connections be metered and billed by volume of use	100%
Offer free interior and exterior water audits to identify water conservation opportunities	100%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost-effective	100%
Provide conservation information in bill inserts	100%
Provide individual historical water use information on water bills	100%
Provide speakers to community groups and media	100%
Enforcement and support of water conserving plumbing fixture standards, including gradual requirement for High Efficiency Toilets (HET) in all new construction	99%
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water saving practices	98%
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	97%

Table 9. Top Ten BMPs – Small Water Systems.

Top Ten BMPs Implemented for Small Water Systems	2017
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%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost-effective	98%
Implement requirements that all new connections be metered and billed by volume of use	91%
Establish a program to retrofit any existing unmetered connections and bill by volume of use	85%
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	85%
Provide conservation information in bill inserts	84%
Enact and enforce measure prohibiting water waste as specified in Monterey County Water Resources Agency Ordinance No. 3932 or as subsequently amended, and encourage the efficient use of water	82%
Implementation of conservation pricing policy	79%
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water saving practices	79%

Table 10. Water Use per Connection – Small Water Systems (2014-2016).

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

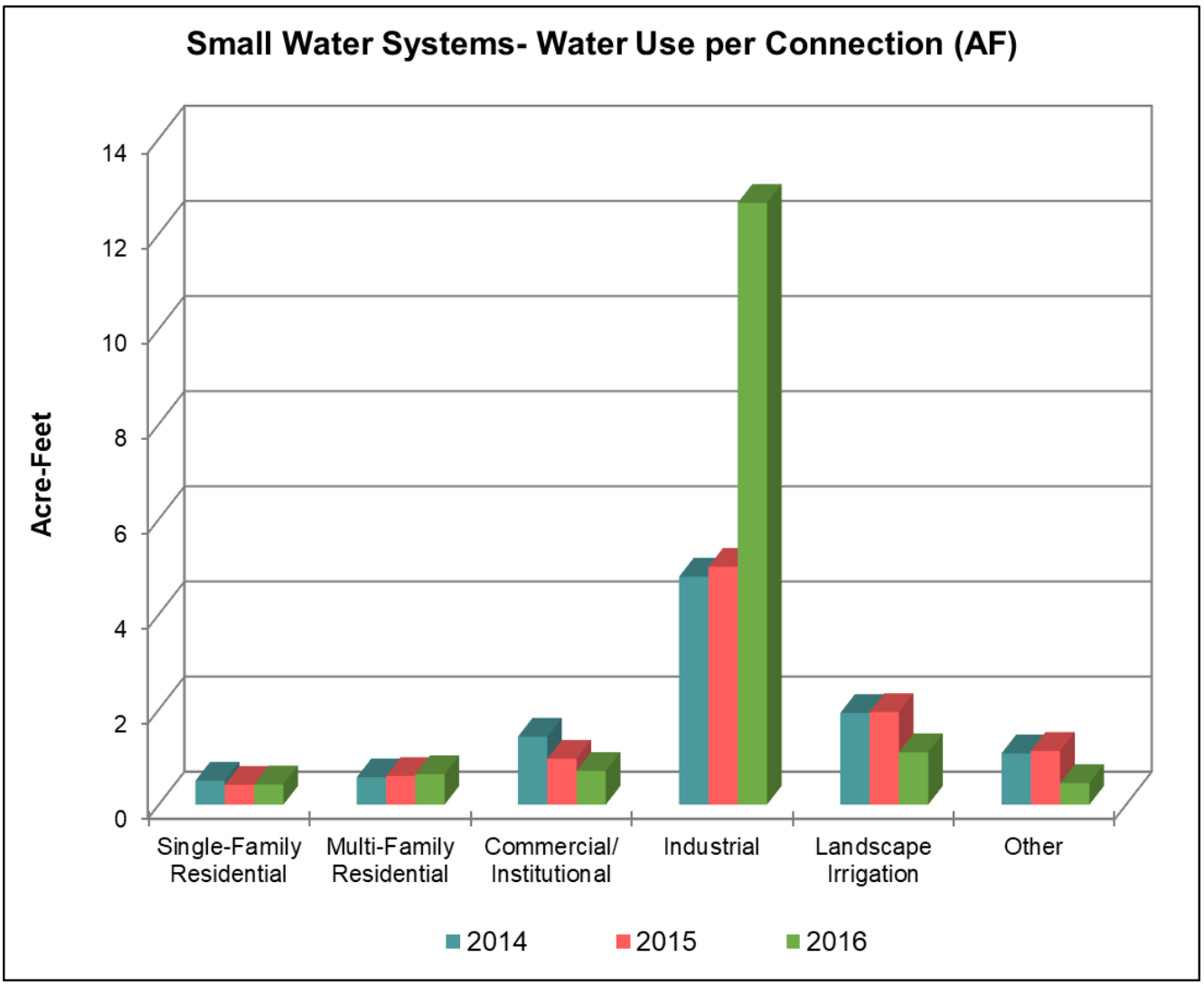


Figure 19. Urban Water Use per Connection – For Small Water Systems

Table 11. Water Use per Connection – Large Water Systems (2014-2016).

Large Water Systems: Water Use (AF) Per Connection Class	2014	2015	2016
Single-Family Residential	0.372	0.314	0.274
Multi-Family Residential	1.025	1.296	0.858
Commercial/ Institutional	2.997	0.965	1.579
Industrial	10.928	3.910	15.491
Landscape Irrigation	1.956	4.828	1.199
Agricultural Irrigation	-	-	38.649
Other	12.574	15.591	2.044

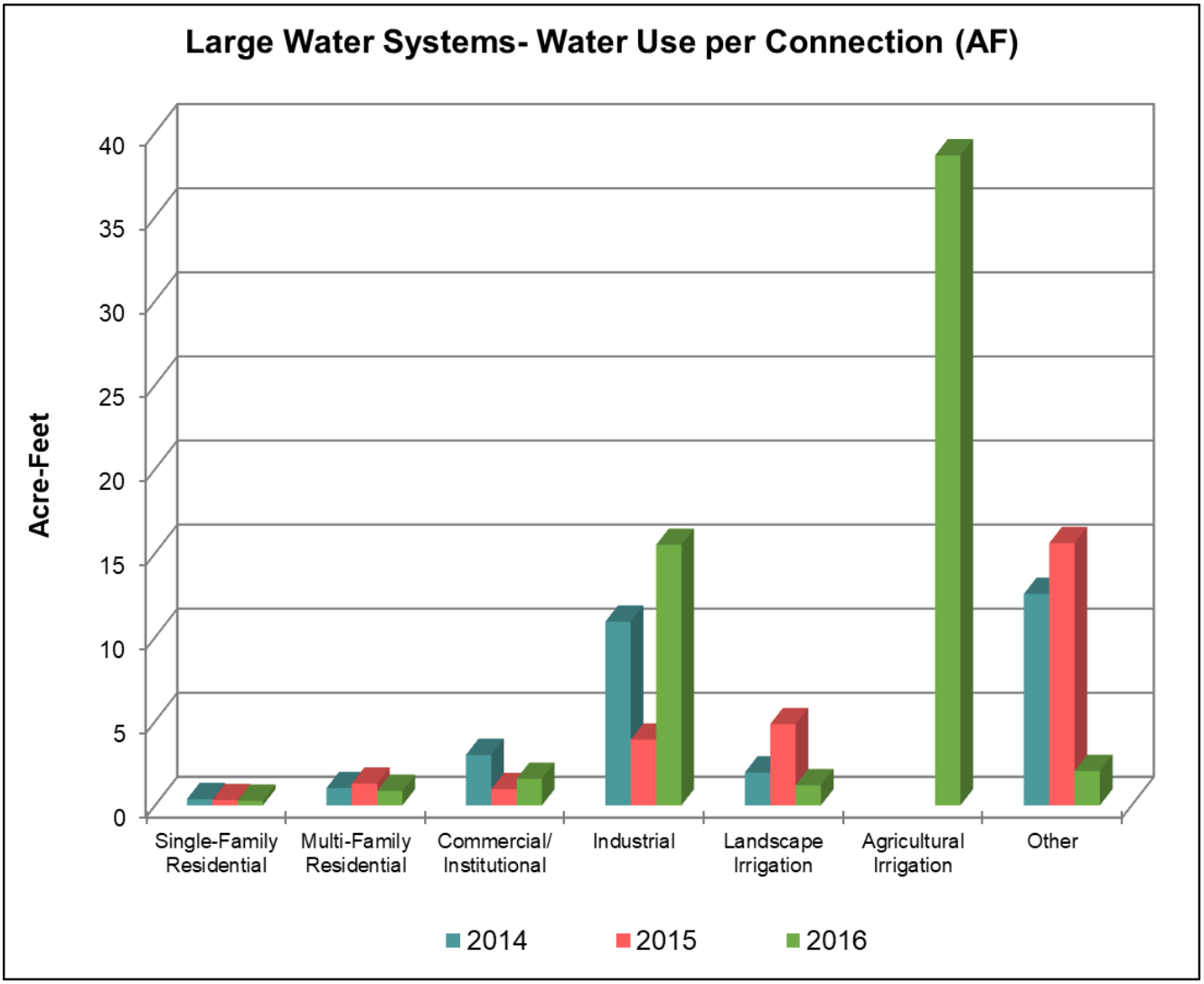


Figure 20. Urban Water Use per Connection – For Large Water Systems

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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Mark Gonzalez, Chair	District #1
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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