2015

Groundwater Extraction Summary Report

Monterey County Water Resources Agency

April 2017


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. 3663 and 3717 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 inside diameter of at three inches or greater, 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 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 being implemented by urban water purveyors as conservation measures.

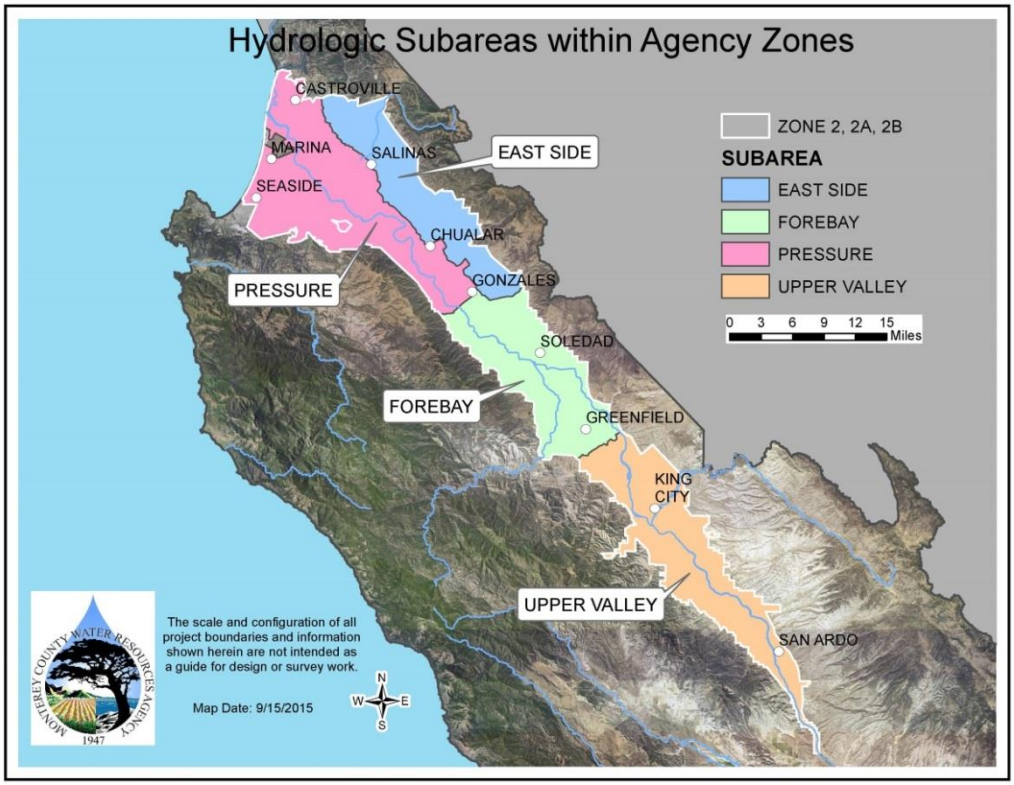


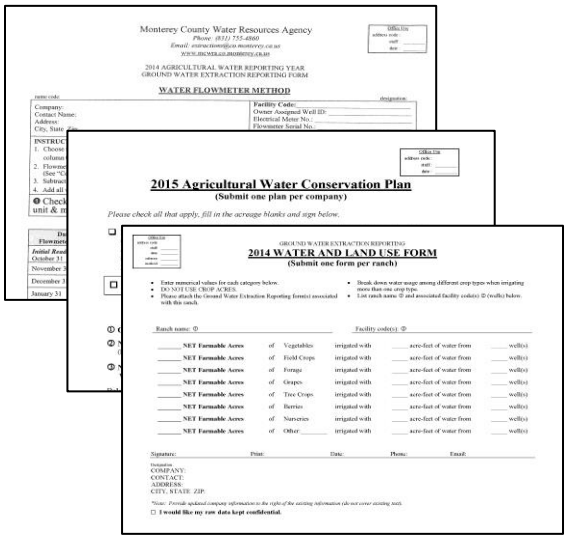
Figure 1. Salinas Valley Groundwater Basin Subareas and Agency Zones

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 derived from 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 2016 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

2014 AGRICULTURAL WATER REPORTING YEAR
GROUND WATER EXTRACTION REPORTING FORM

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, 2014, through October 31, 2015; the urban data covers calendar year 2015. The agricultural and urban water conservation plans for 2016 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 2015 reporting year was: 71% Flowmeter, 28% 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. The Agency received Groundwater Extraction Reports from ninety-eight percent (98%) of the 1,901 wells in the Salinas Valley for the 2015 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2016 were ninety percent (90%) and one hundred percent (100%), 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	109,214	14,443	123,657
East Side	91,491	12,631	104,122
Forebay	142,668	6,221	148,889
Upper Valley	134,740	3,306	138,046
Total (AF)	478,113	36,601	514,714
Percent of Total	92.89%	7.11%	100.00%

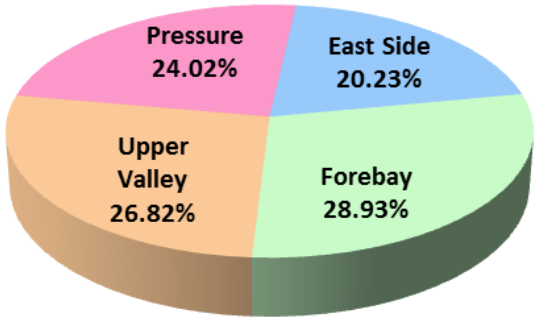


Figure 2. Percentage of Total Extractions by Subarea.

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.

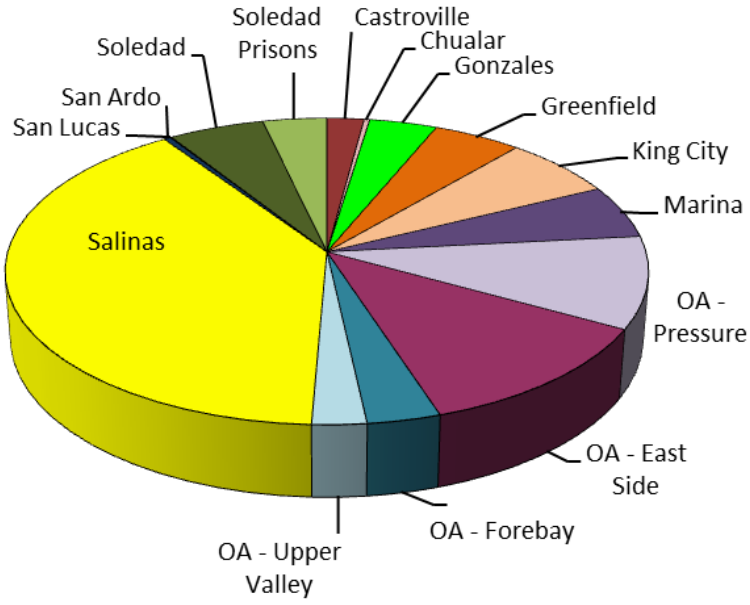


Figure 3. Distribution of Urban Extractions by City or Area.

Table 2. Urban Extractions by City or Area

City or Area	Urban Pumping (AF)	Percentage
Castroville	771	2.12%
Chualar	115	0.31%
Gonzales	1,407	3.84%
Greenfield	1,842	5.03%
King City	2,354	6.43%
Marina	2,056	5.62%
OA - Pressure	3,548	9.69%
OA - East Side	4,360	11.91%
OA - Forebay	1,202	3.28%
OA - Upper Valley	891	2.43%
Salinas	14,568	39.80%
San Ardo	141	0.39%
San Lucas	26	0.07%
Soledad	1,991	5.45%
Soledad Prisons	1,330	3.63%
Total	**36,602**	**100.00%**

*OA=Other Area

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

This figure provides a spatial representation of total groundwater extractions within Zones 2, 2A, and 2B for the 2015 report year. The figures and tables on the next four pages provide extraction information by subarea.

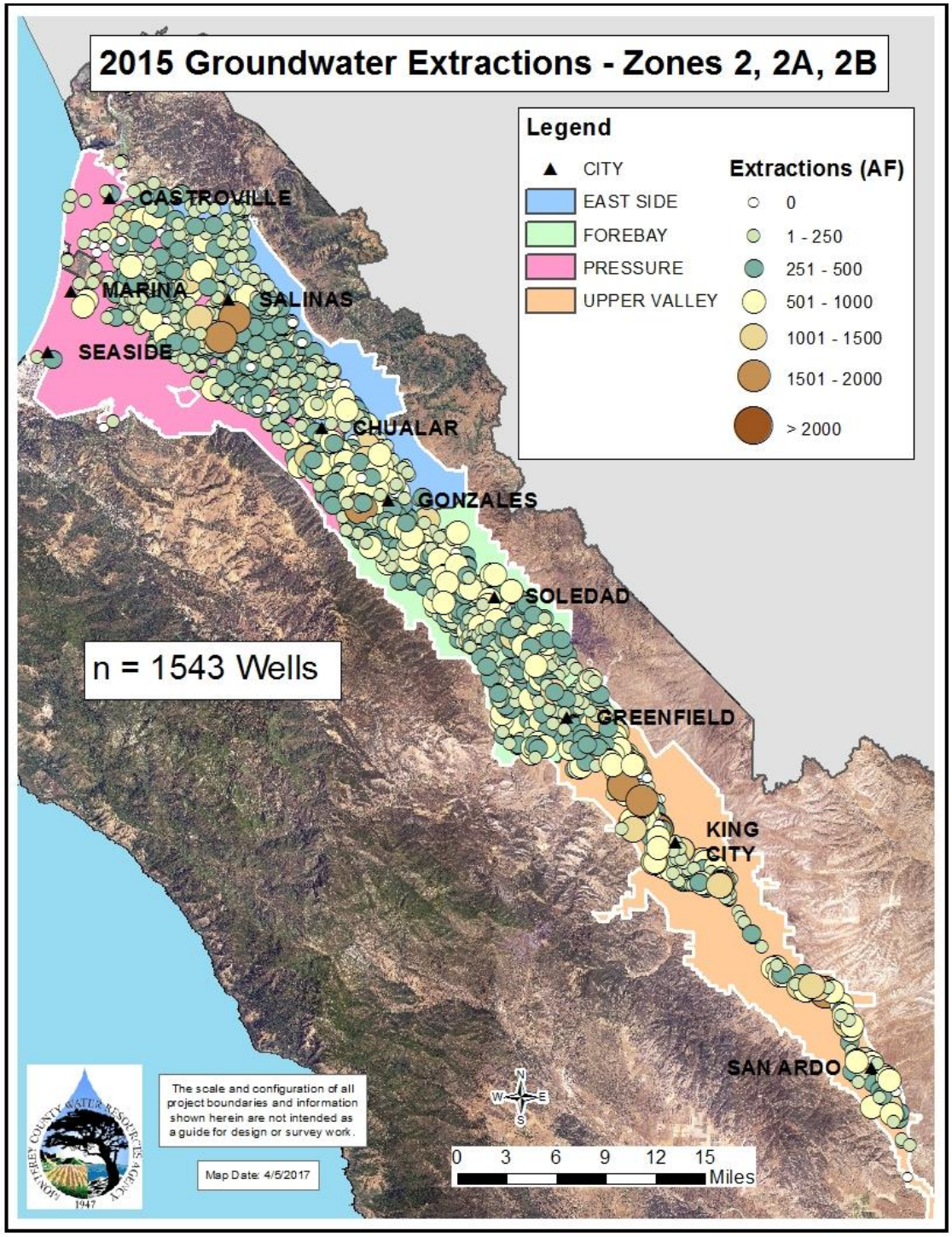


Figure 4. 2015 Groundwater Extractions.

Pressure Subarea – Extraction Data

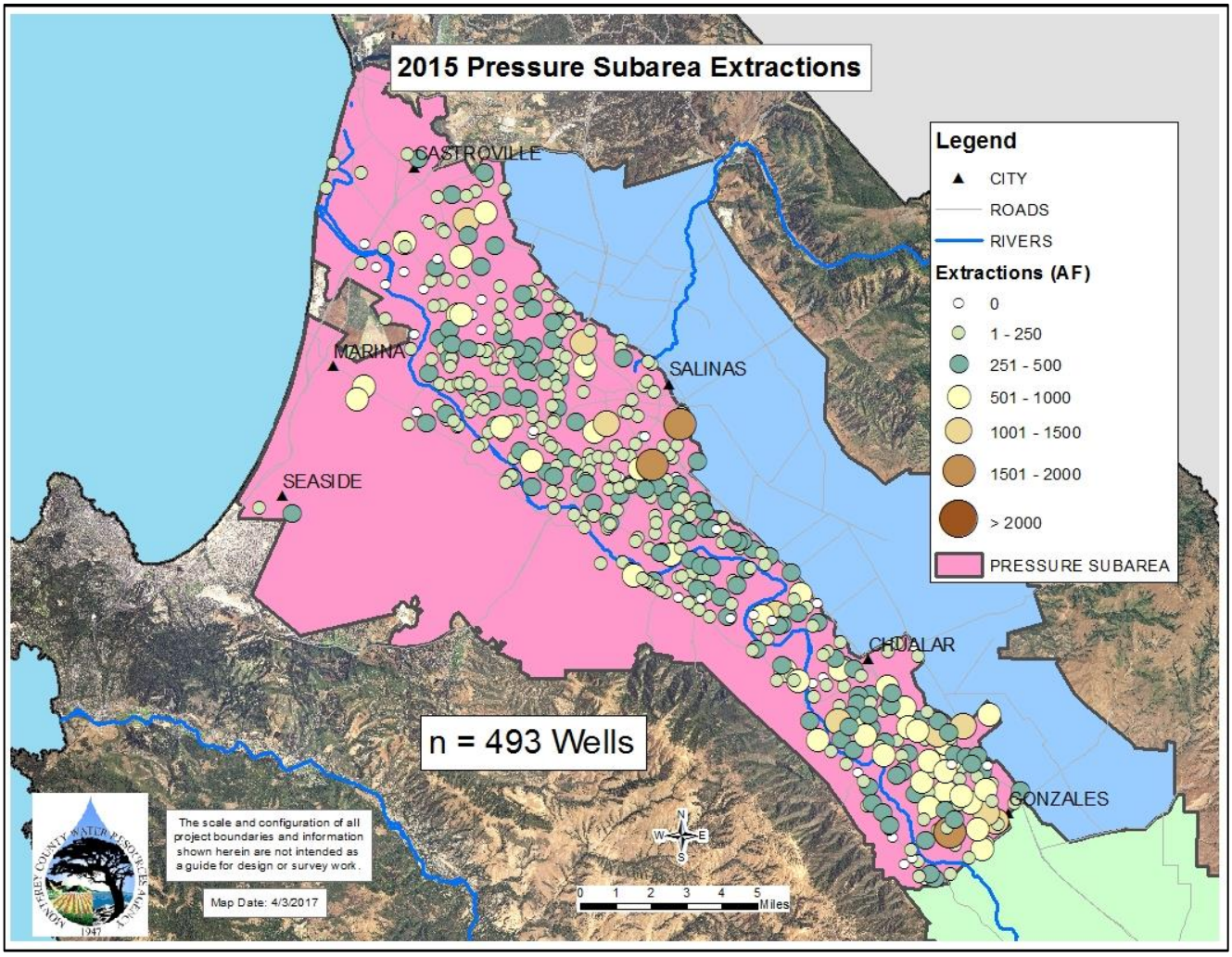


Figure 5. 2015 Groundwater Extraction in the Pressure Subarea.

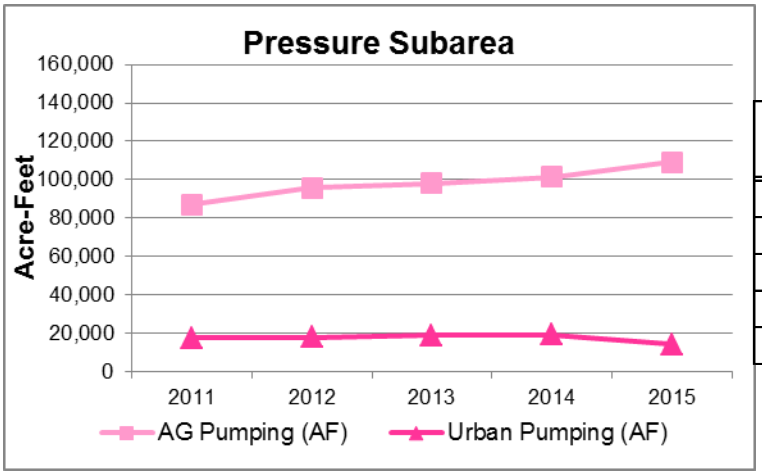


Figure 6. Agricultural and Urban Extractions (AF) in the Pressure Subarea 2011-2015.

Table 3. Total, Agricultural, and Urban Extractions (AF) in the Pressure Subarea 2011-2015.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2011	105,172	87,290	17,882
2012	113,898	95,814	18,084
2013	117,242	98,141	19,101
2014	120,890	101,465	19,425
2015	123,657	109,214	14,443

East Side Subarea – Extraction Data

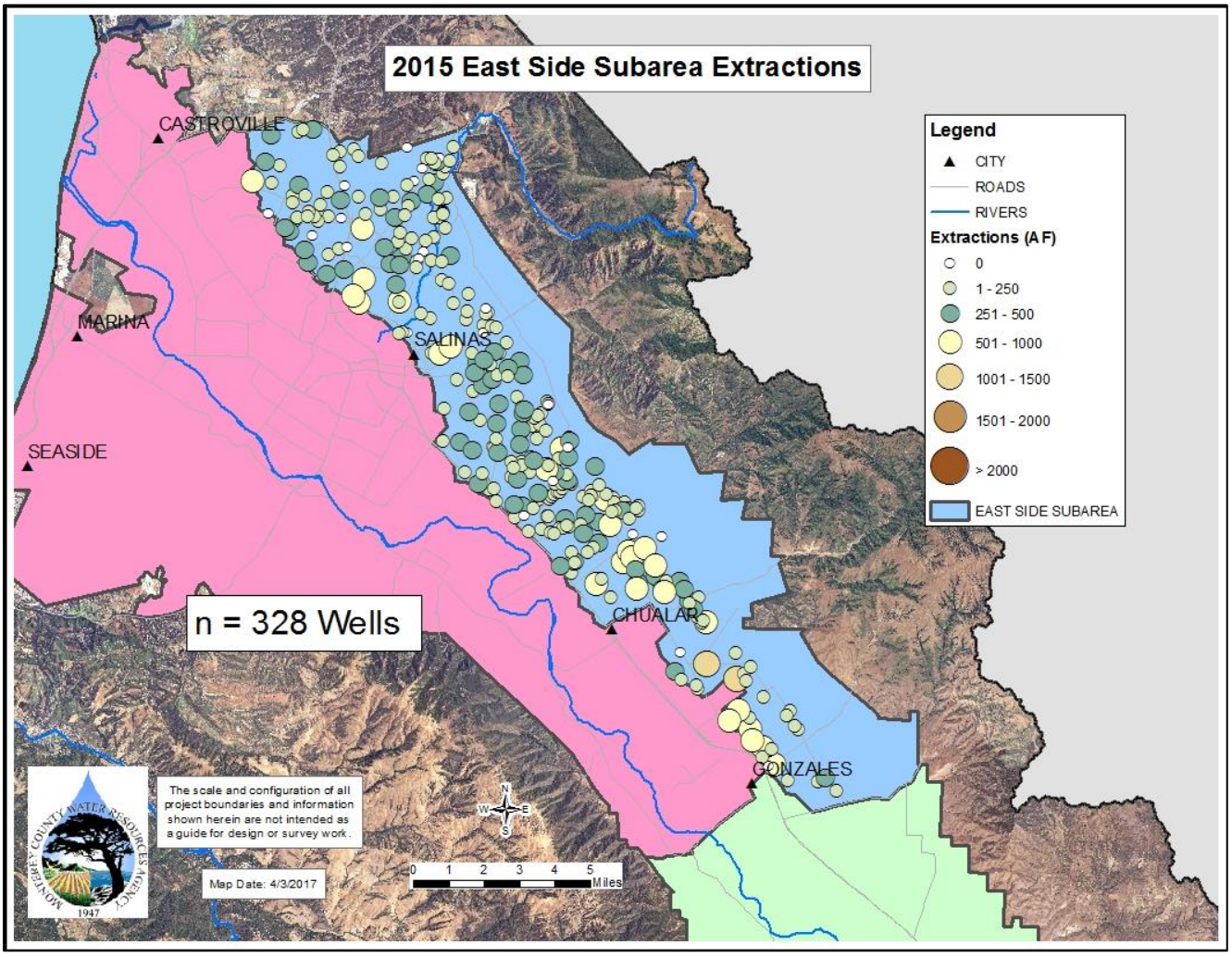


Figure 7. 2015 Groundwater Extraction in the East Side Subarea.

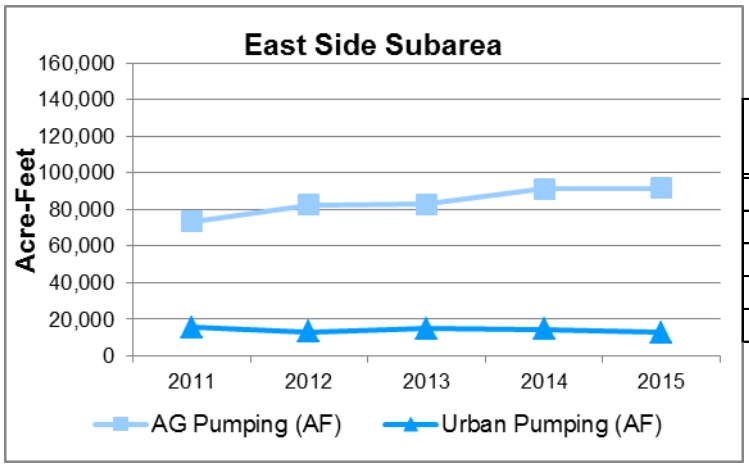


Figure 8. Agricultural and Urban Extractions (AF) in the East Side Subarea 2011-2015.

Table 4. Total, Agricultural, and Urban Extractions (AF) in the East Side Subarea 2011-2015.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2011	89,052	73,495	15,557
2012	95,543	82,451	13,092
2013	97,622	82,895	14,727
2014	105,644	91,160	14,484
2015	104,122	91,491	12,631

Forebay Subarea – Extraction Data

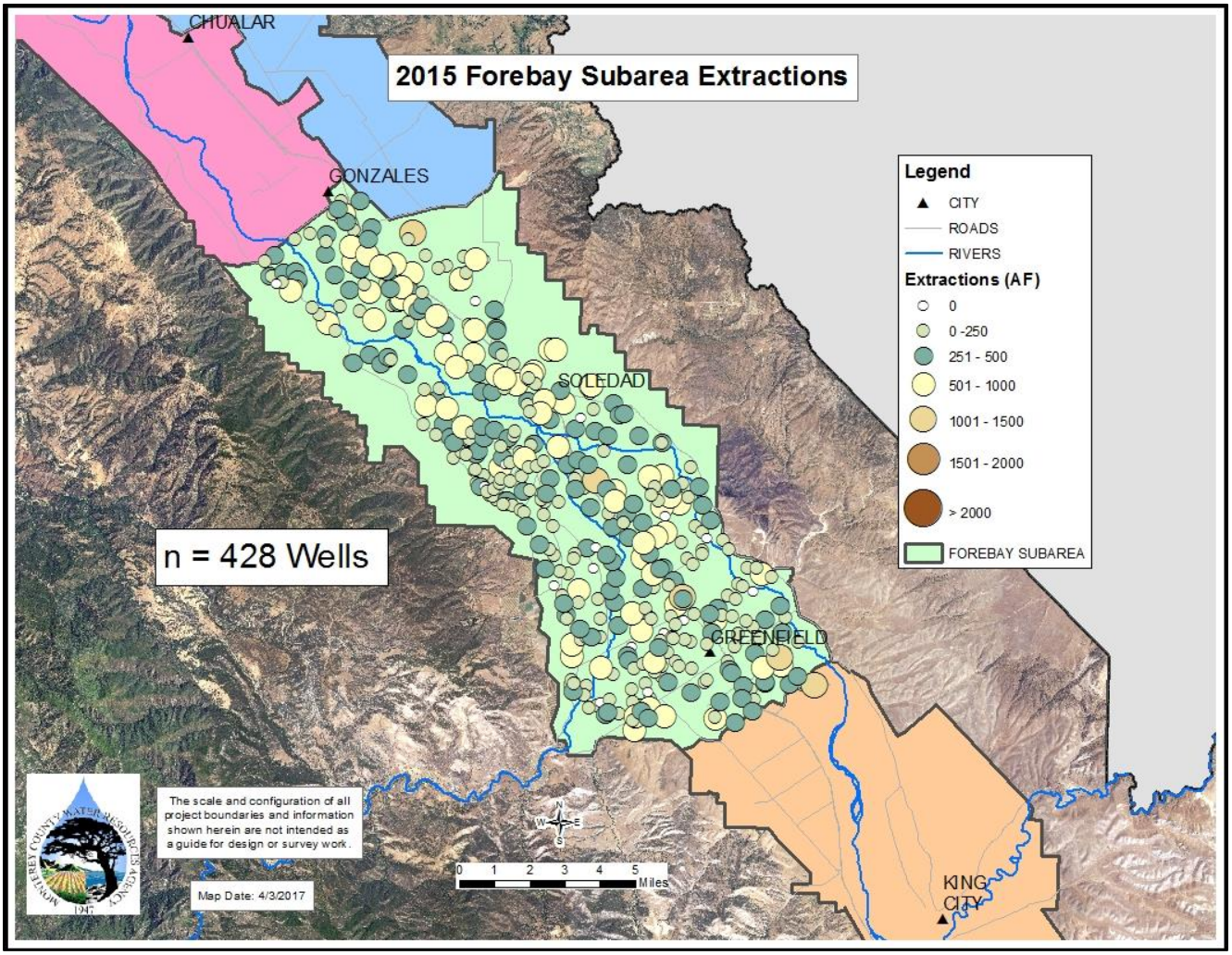


Figure 9. 2015 Groundwater Extraction in the Forebay Subarea.

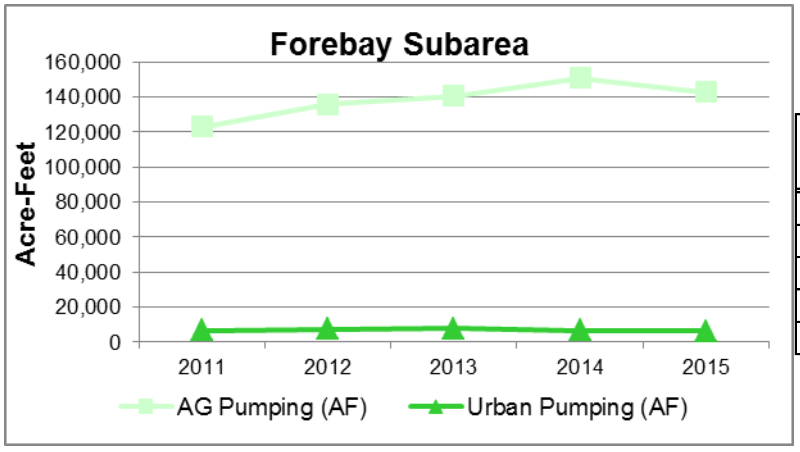


Figure 10. Agricultural and Urban Extractions (AF) in the Forebay Subarea 2011-2015.

Table 5. Total, Agricultural, and Urban Extractions (AF) in the Forebay Subarea 2011-2015.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2011	129,737	122,903	6,834
2012	143,459	135,971	7,488
2013	148,467	140,574	7,893
2014	157,635	150,890	6,745
2015	148,889	142,668	6,221

Upper Valley Subarea – Extraction Data

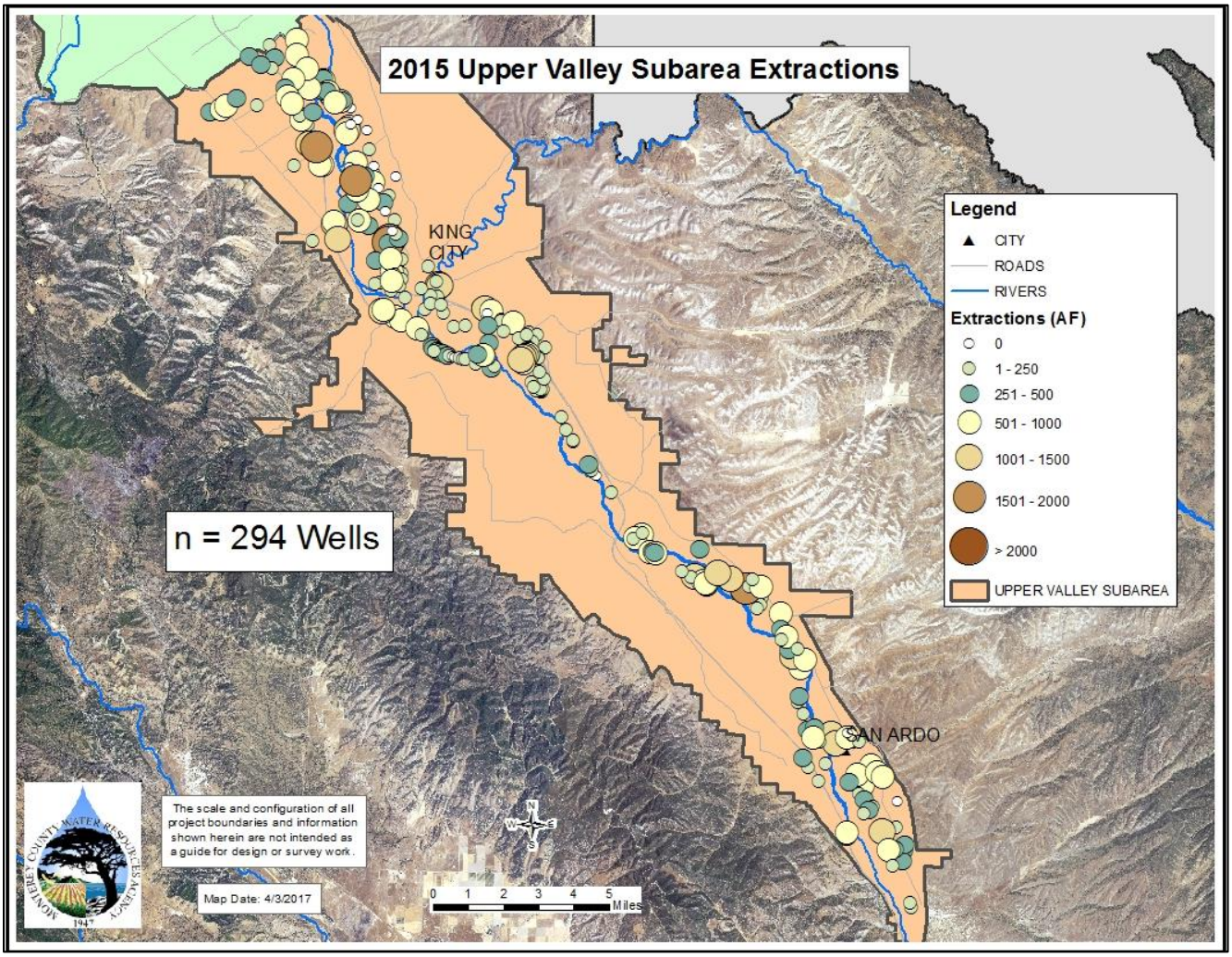


Figure 11. 2015 Groundwater Extraction in the Upper Valley Subarea

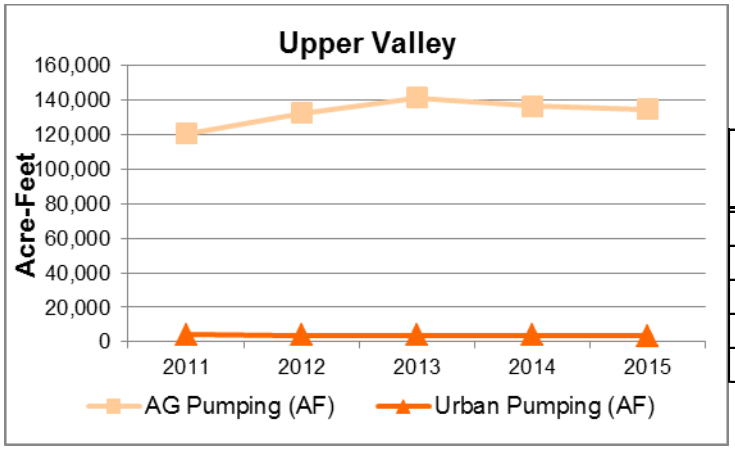


Figure 12. Agricultural and Urban Extractions (AF) in the Upper Valley Subarea 2011-2015.

Table 6. Total, Agricultural, and Urban Extractions (AF) in the Upper Valley Subarea 2011-2015.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2011	124,623	120,422	4,201
2012	136,340	132,383	3,957
2013	144,874	141,263	3,611
2014	140,318	136,645	3,673
2015	138,046	134,740	3,306

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 2016.

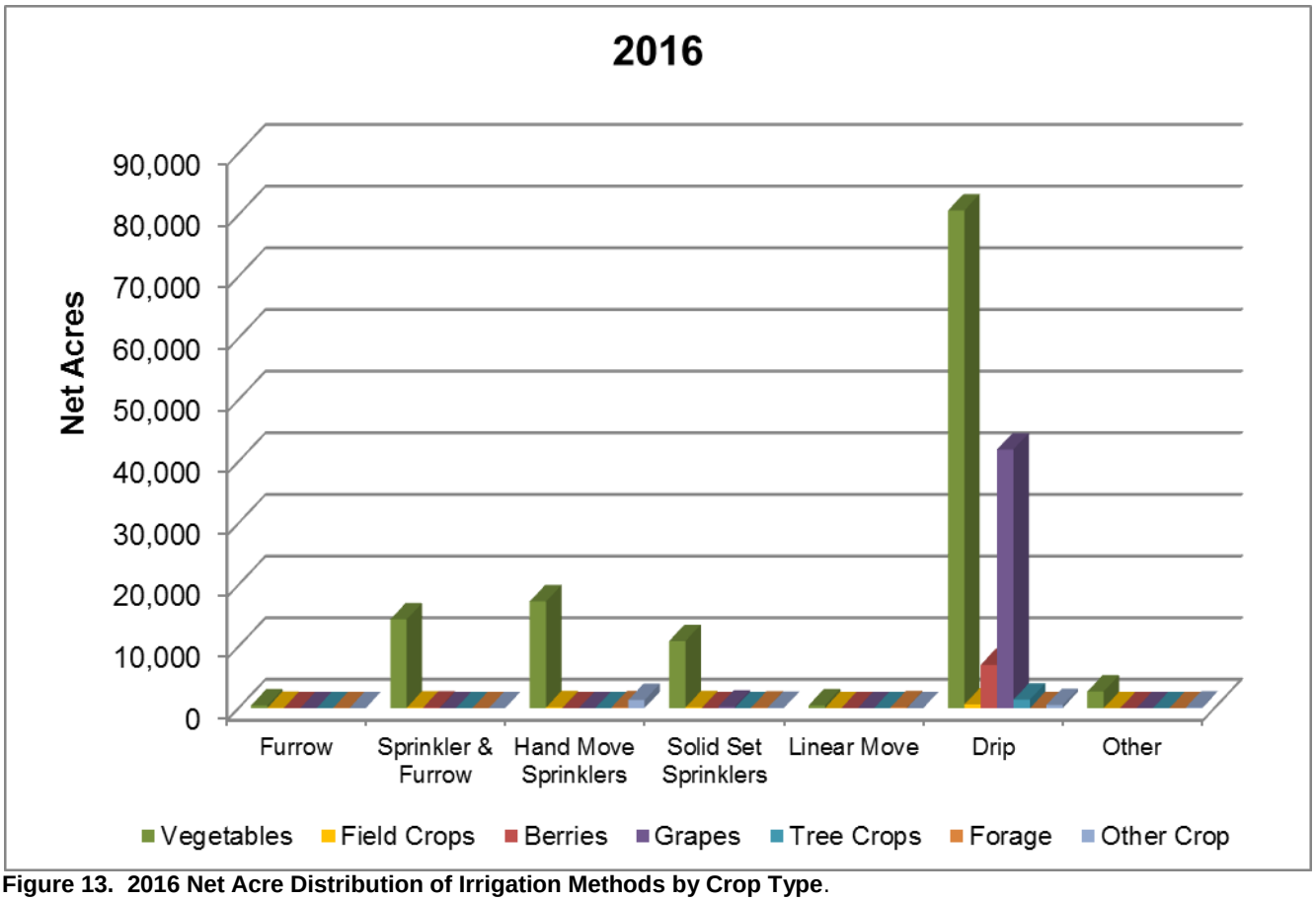


Figure 13. 2016 Net Acre Distribution of Irrigation Methods by Crop Type.

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

2016	Furrow	Sprinkler & Furrow	Hand Move Sprinklers	Solid Set Sprinklers	Linear Move	Drip	Other	Total
Vegetables	424	14,391	17,298	10,876	431	80,686	2,703	126,809
Field Crops	40	72	118	112	0	576	0	918
Berries	0	84	0	0	0	7,014	0	7,098
Grapes	0	0	0	242	0	41,939	0	42,181
Tree Crops	0	0	0	0	0	1,389	0	1,389
Forage	7	0	143	80	126	0	0	356
Other Crop	0	0	1,292	20	0	482	83	1,877
Unirrigated								982
Total	**471**	**14,547**	**18,851**	**11,330**	**557**	**132,086**	**2,786**	**181,610**

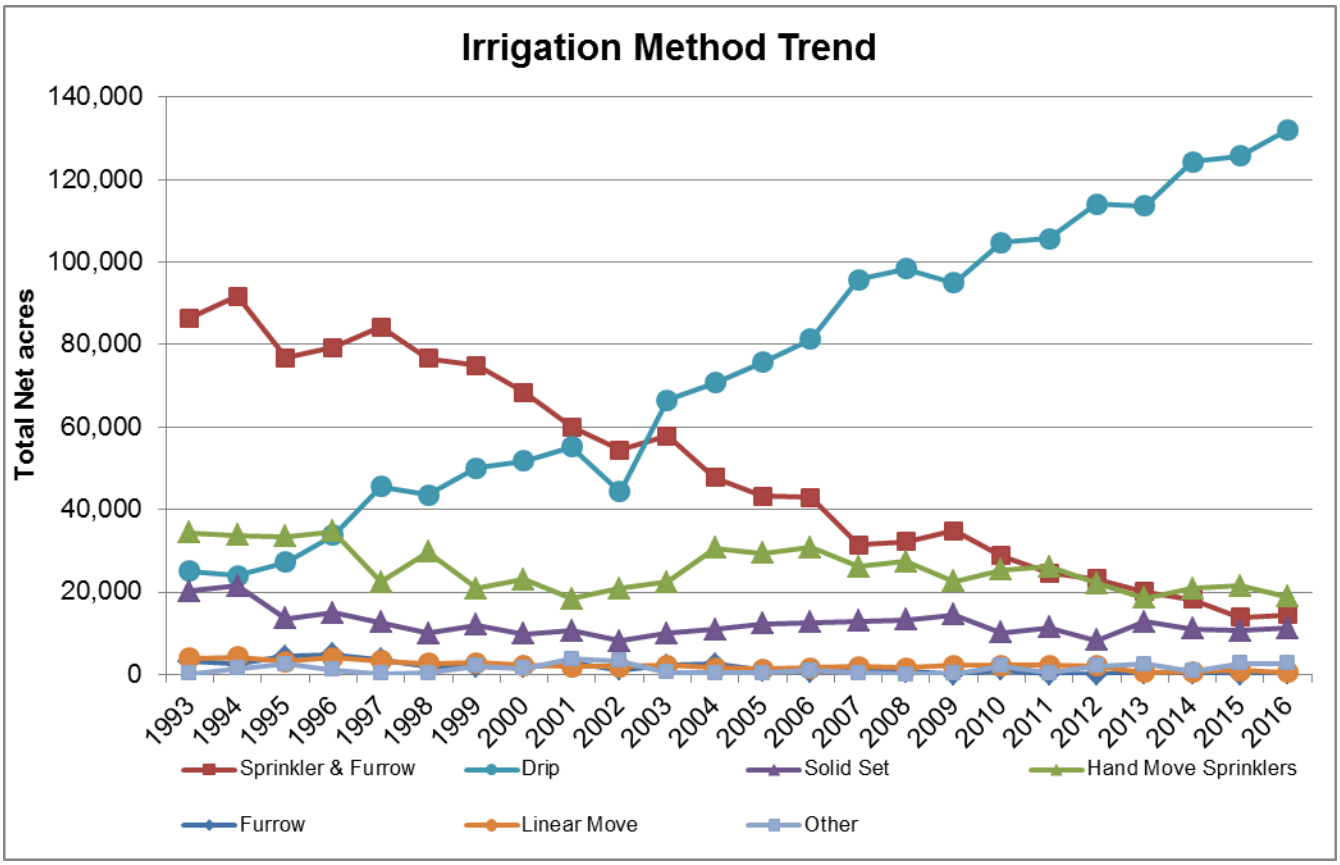


Figure 14. Changes in Irrigation Methods Used Over Time (1993 – 2016) in Zones 2, 2A, and 2B.

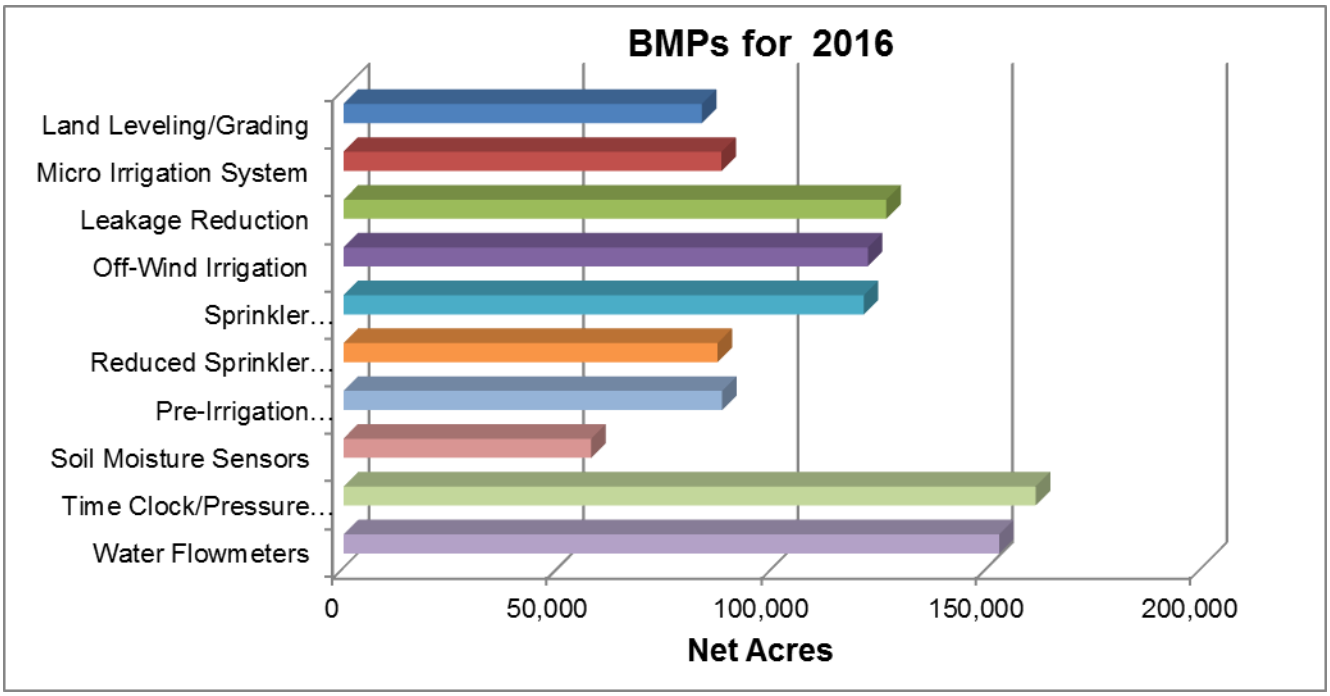


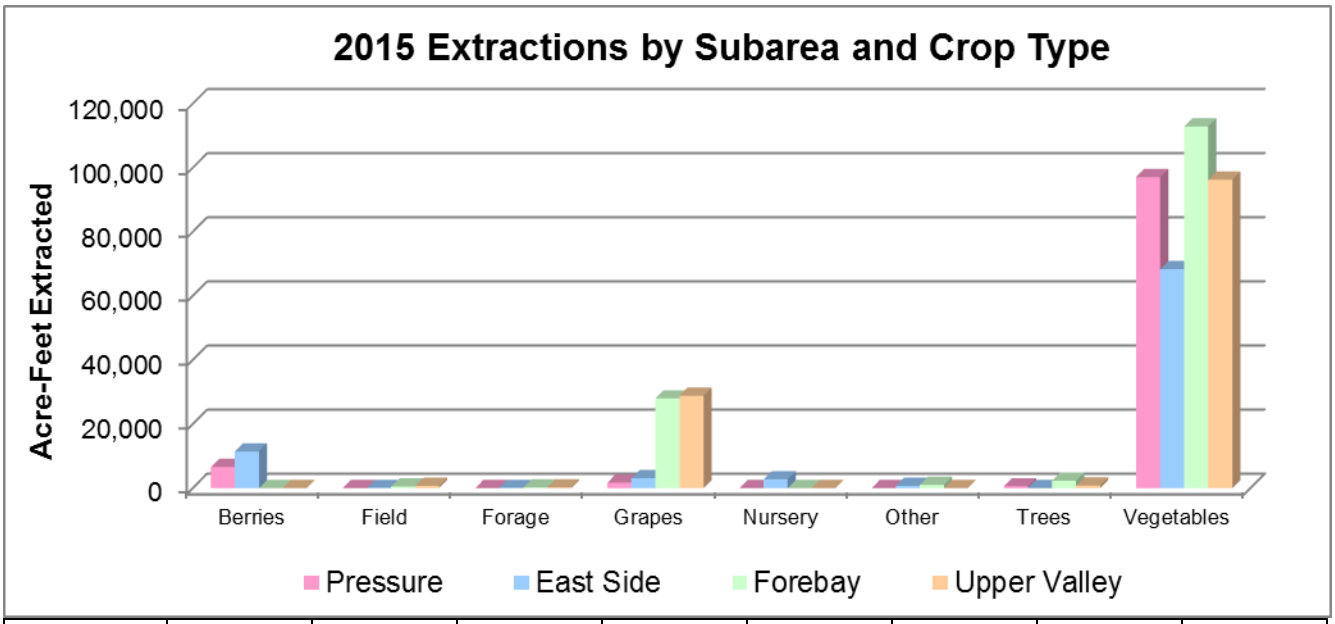
Figure 15. Top Ten BMPs Forecasted for 2016 Based on Reported Net Acres.

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.

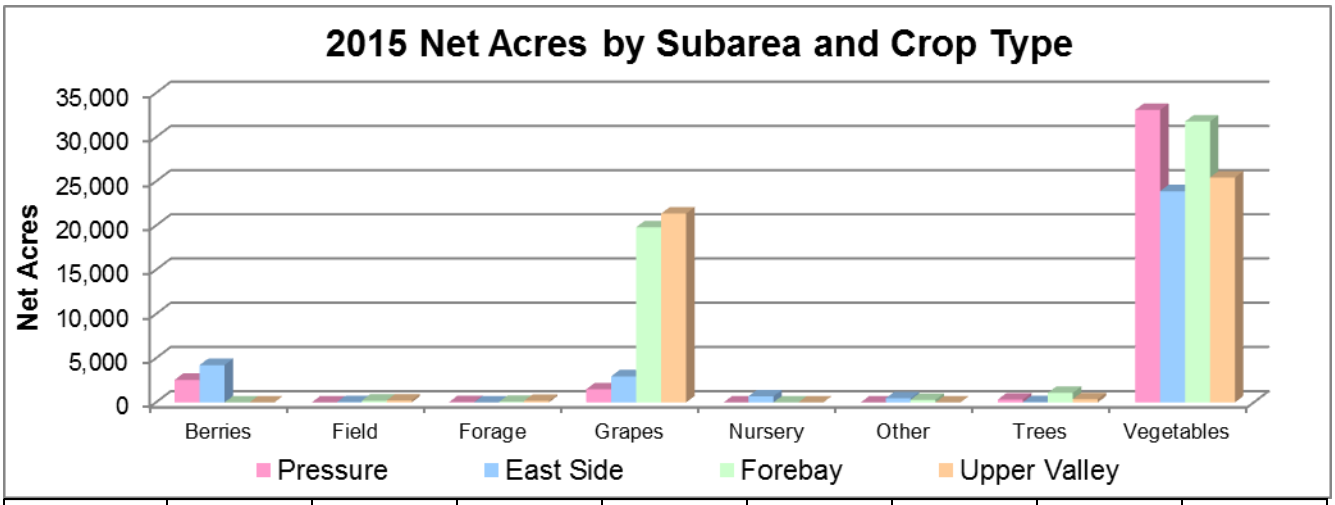
Changing weather patterns, variable soils, and crop types affect the amount of water needed for efficient irrigation. Even during a normal rain year, pumping rates will vary from one subarea to another and crop types will vary depending on economic demand.

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.



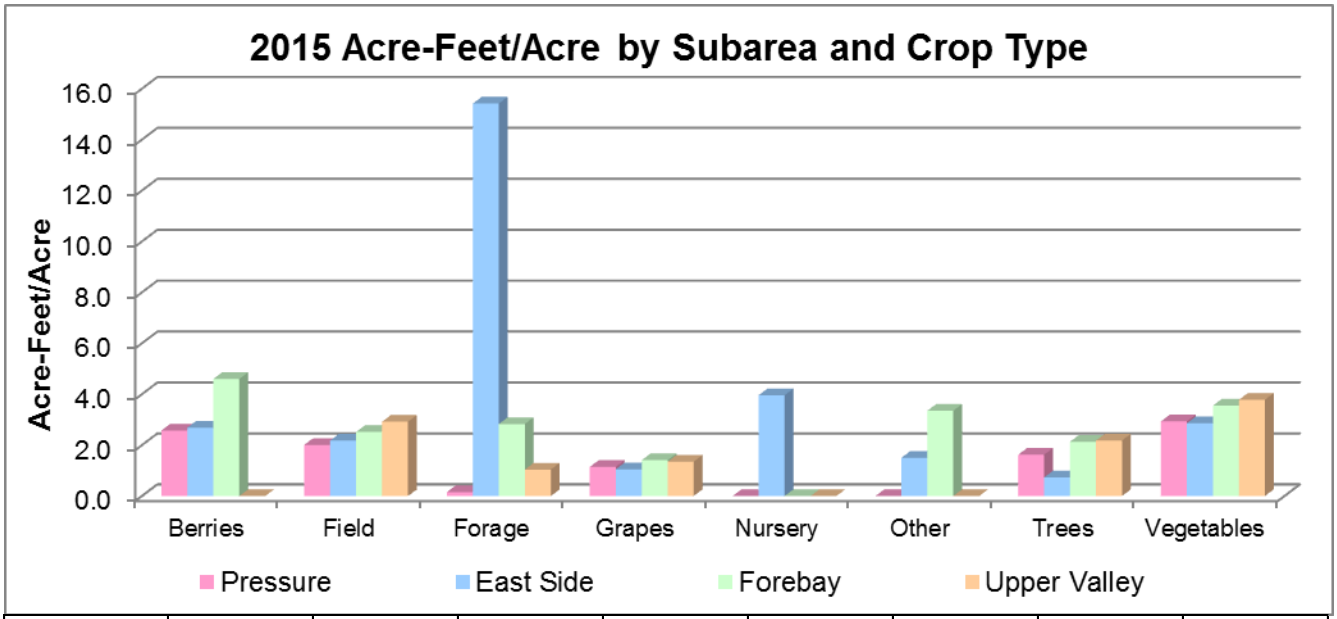
2015	Berries (AF)	Field (AF)	Forage (AF)	Grapes (AF)	Nursery (AF)	Other (AF)	Trees (AF)	Vegetables (AF)
Pressure	6,590	22.1	5.9	1,707	-	-	544	97,072
East Side	11,363	51	48	3,112	2,735	684	15	68,338
Forebay	2.3	496	167	27,949	-	1,002	2,314	112,858
Upper Valley	-	657	175	28,824	-	-	812	96,227

Figure 16. 2015 Extractions Reported by Crop Type and Subarea.



2015	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	2,558	11.0	37.0	1,491	-	-	335	33,080
East Side	4,224	23.4	3	2,957	691	456	20.5	23,895
Forebay	0.5	197	59.0	19,818	-	299	1,083	31,771
Upper Valley	-	225	168	21,365	-	-	372	25,447

Figure 17. 2015 Net Acres Reported by Crop Type and Subarea.



2015	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	2.0	0.2	1.1	-	-	1.6	2.9
East Side	2.7	2.2	15.4	1.1	4.0	1.5	0.7	2.9
Forebay	4.6	2.5	2.8	1.4	-	3.4	2.1	3.6
Upper Valley	-	2.9	1.0	1.3	-	-	2.2	3.8

Figure 18. 2015 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 2016, 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	2016
Advise customers when it appears possible that leaks exist on customer's side of water meter	100%
Enforcement and support of water conserving plumbing fixture standards, including requirement for ultra low flush toilets in all new construction	100%
Implement requirements that all new connections be metered and billed by volume of use	100%
Provide conservation training, information, and incentives necessary to encourage use of conservation practices	100%
Offer free interior and exterior water audits to identify water conservation opportunities	99%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost effective	98%
Provide speakers to community groups and media	99%
Use paid and public service advertising	99%
Identify irrigators of large landscapes (3 acres or more) and offer landscape audits to determine conservation opportunities	96%
Provide individual historical water use information on water bills	96%

Table 9. Top Ten BMPs – Small Water Systems.

Top Ten BMPs Implemented for Small Water Systems	2016
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%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost effective	98%
Provide individual historical water use information on water bills	96%
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water-saving practices	95%
Support of State/Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush	94%
Provide conservation information in bill inserts	92%
Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies	91%
Implementation of conservation pricing policies	91%
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	90%

Table 10. Water Use per Connection – Small Water Systems (2015-2016).

Connection Class For Small Water Systems	2015 - Water Use per Connection (AF)	2016 - Water Use per Connection (AF)
Single-Family Residential	0.504	0.416
Multi-Family Residential	0.573	0.603
Commercial/Institutional	1.429	0.963
Industrial	4.795	5.001
Landscape Irrigation	1.927	1.945
Other	1.077	1.130

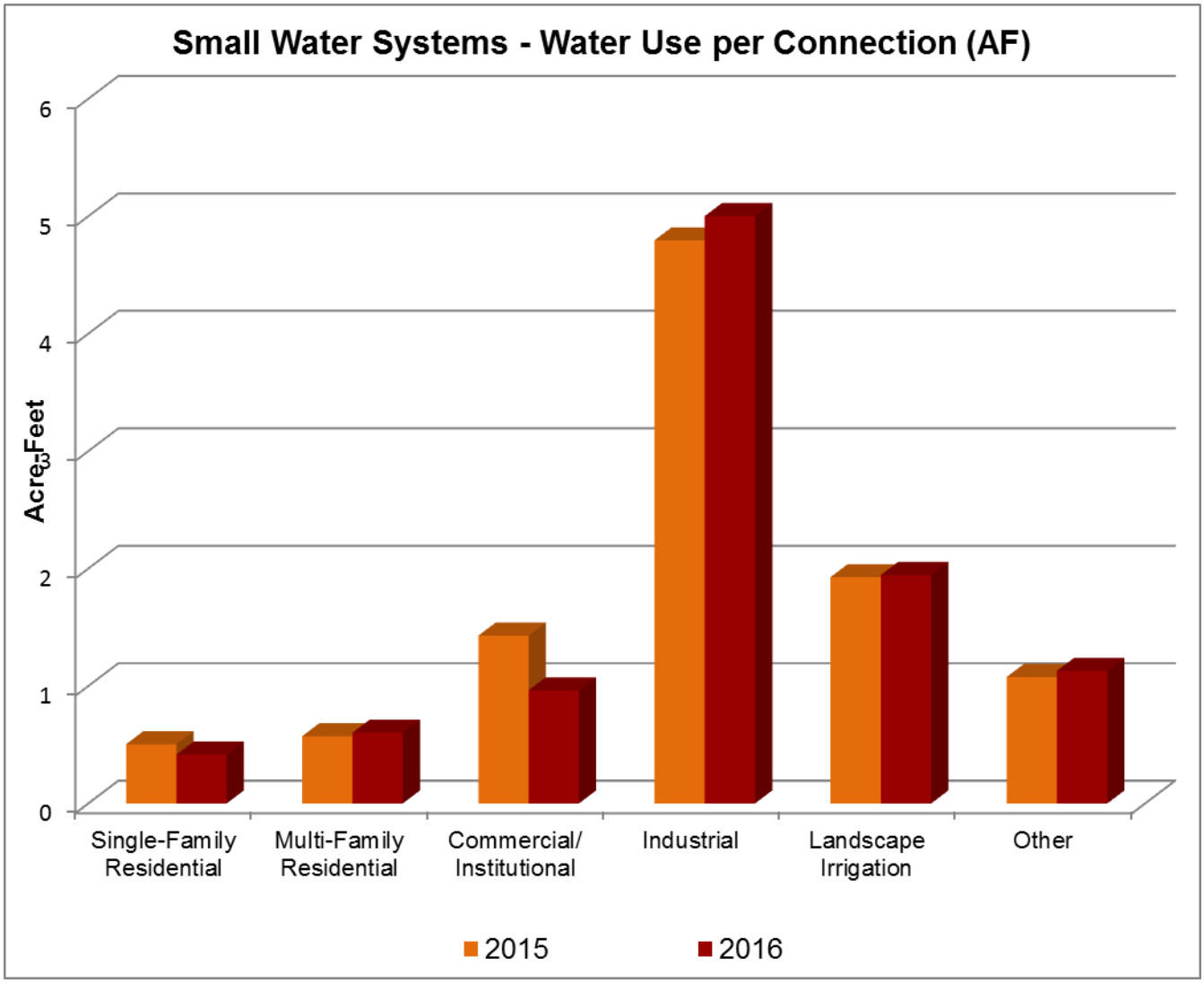


Figure 19. Urban Water Use per Connection – For Small Water Systems

Table 11. Water Use per Connection – Large Water Systems (2015-2016).

Connection Class For Large Water Systems	2015 - Water Use per Connection (AF)	2016 - Water Use per Connection (AF)
Single-Family Residential	0.372	0.314
Multi-Family Residential	1.025	1.296
Commercial/Institutional	2.997	0.965
Industrial	10.928	3.910
Landscape Irrigation	1.956	4.828
Other	12.574	15.591

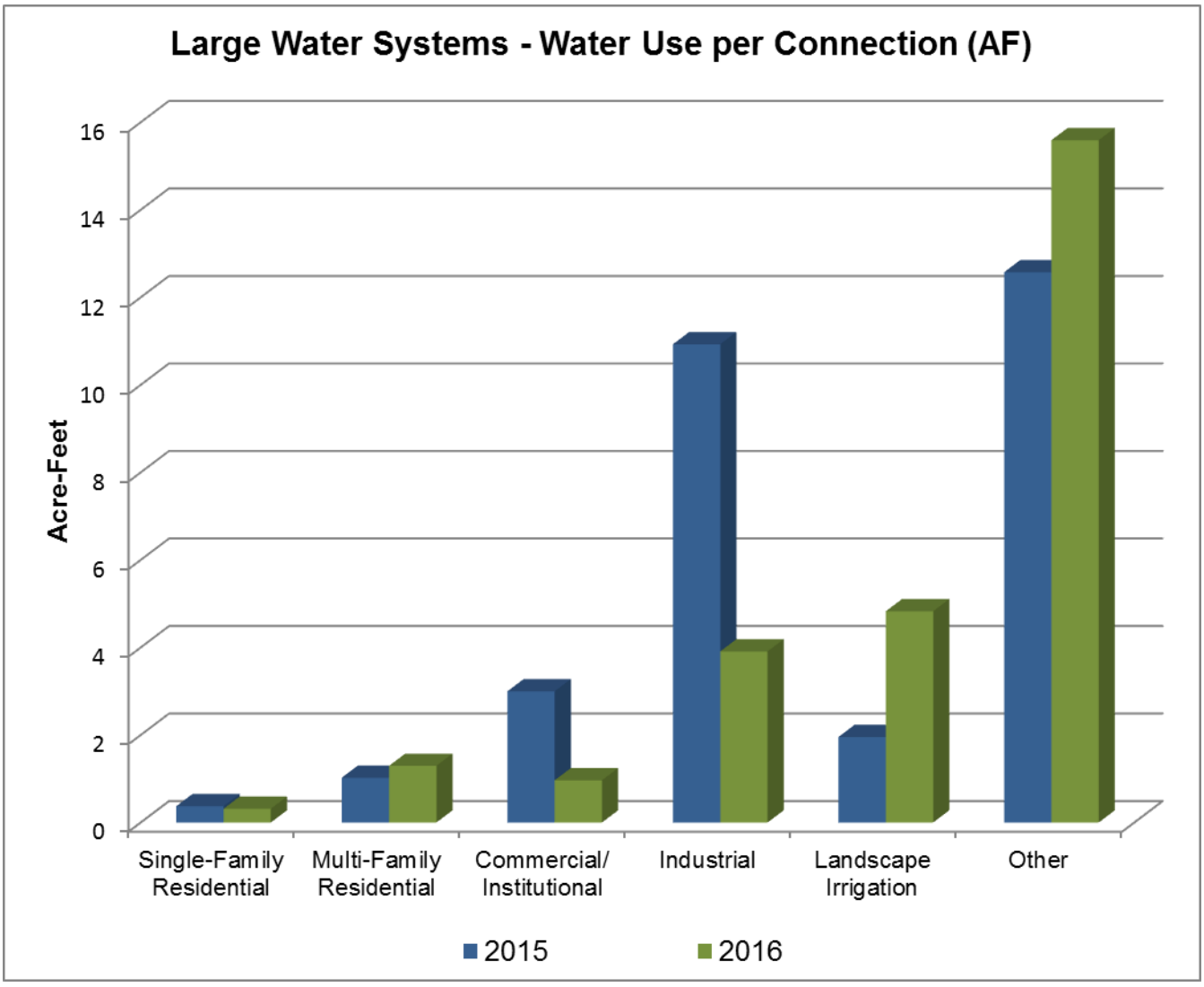


Figure 20. Urban Water Use per Connection – For Large Water Systems

Monterey County
Board of Supervisors

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

Monterey County Water Resources Agency
Board of Directors

Mark Gonzalez	District #1
Mike Scattini	District #2
Richard Ortiz, Vice-Chair	District #3
Deidre Sullivan	District #4
Ken Ekelund	District #5
Glen Dupree	Grower-Shipper Association
Claude Hoover	Monterey County Farm Bureau
David Hart, Chair	Agricultural Advisory Committee
John Huerta	City Select Committee

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