2014

Groundwater Extraction Summary Report

Monterey County Water Resources Agency

October 2015


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 possible to effectively manage water 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 above-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.

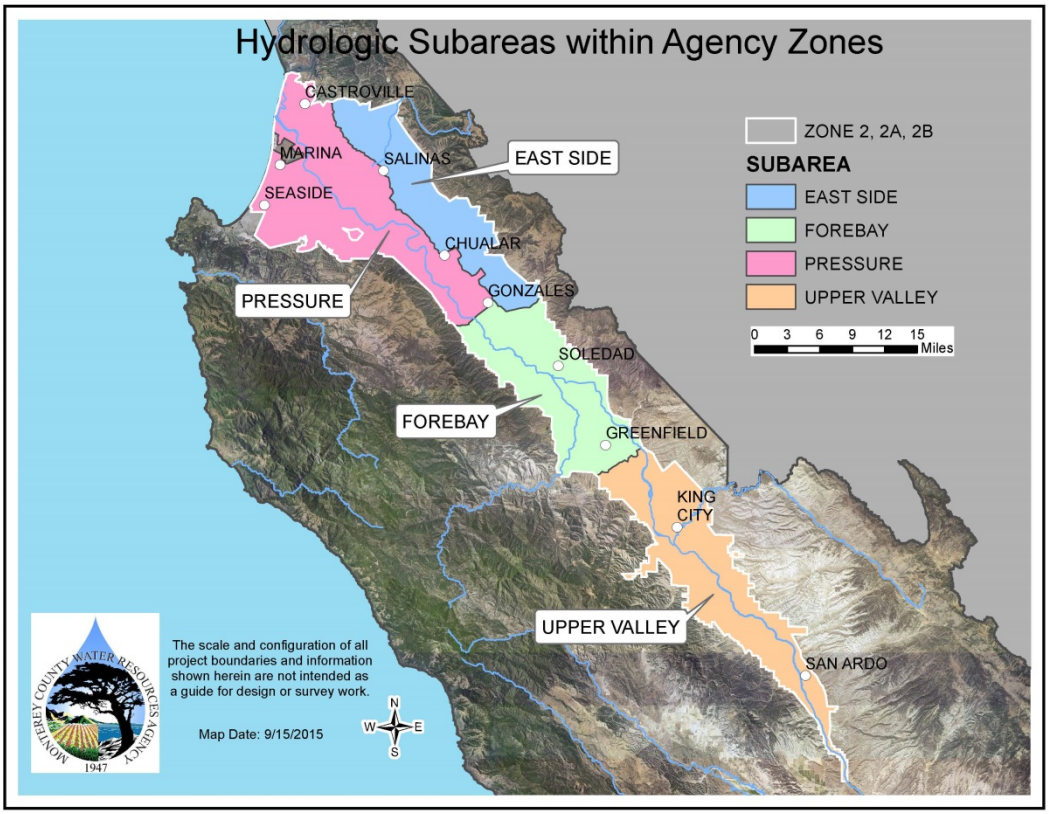


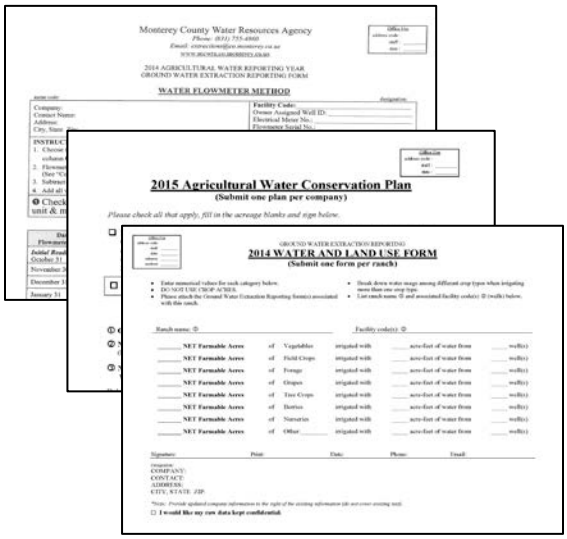
Figure 1. Salinas Valley Groundwater Basin Subareas and Agency Zones.

The Salinas Valley Groundwater Basin 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 2015 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, 2013, through October 31, 2014; the urban data covers calendar year 2014. The agricultural and urban water conservation plans adopted for 2015 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

Ground water 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 2014 reporting year was: 73% Flowmeter, 25% Electrical Meter, and 2% 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 1879 wells in the Salinas Valley for the 2014 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2015 were ninety-six percent (96%) 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 is 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	101,465	19,425	120,890
East Side	91,160	14,484	105,644
Forebay	150,890	6,745	157,635
Upper Valley	136,645	3,673	140,318
Total (AF)	480,160	44,327	524,487
Percent of Total	91.55%	8.45%	100%

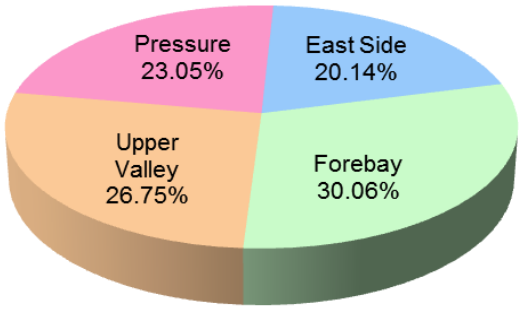


Figure 2. Percentage of Total Extractions by Subarea.

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.

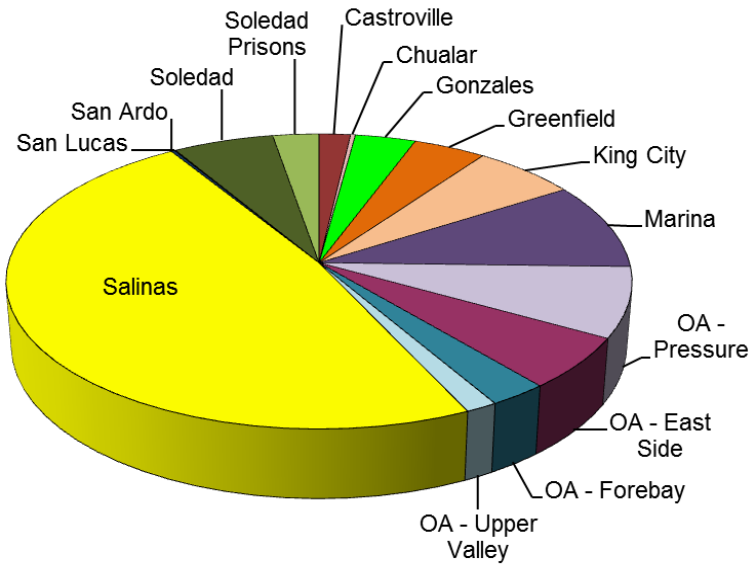


Figure 3. Distribution of Urban Extractions by City or Area.

Table 2. Urban Extractions by City or Area

City or Area	Urban Pumping (AF)	Percentage
Castroville	812	1.83%
Chualar	121	0.27%
Gonzales	1,565	3.53%
Greenfield	1,879	4.24%
King City	2,694	6.08%
Marina	4,192	9.46%
OA* - Pressure	3,423	7.72%
OA - East Side	2,553	5.76%
OA - Forebay	1,189	2.68%
OA - Upper Valley	647	1.46%
Salinas	21,338	48.14%
San Ardo	94	0.21%
San Lucas	29	0.07%
Soledad	2,600	5.87%
Soledad Prisons	1,191	2.69%
Total	**44,327**	**100.00%**

*OA=Other Area

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

This figure provides a spatial representation of total groundwater extraction within Zone 2, 2A, and 2B for the 2014 report year. The figures and tables on the next four pages provide extraction information by subarea.

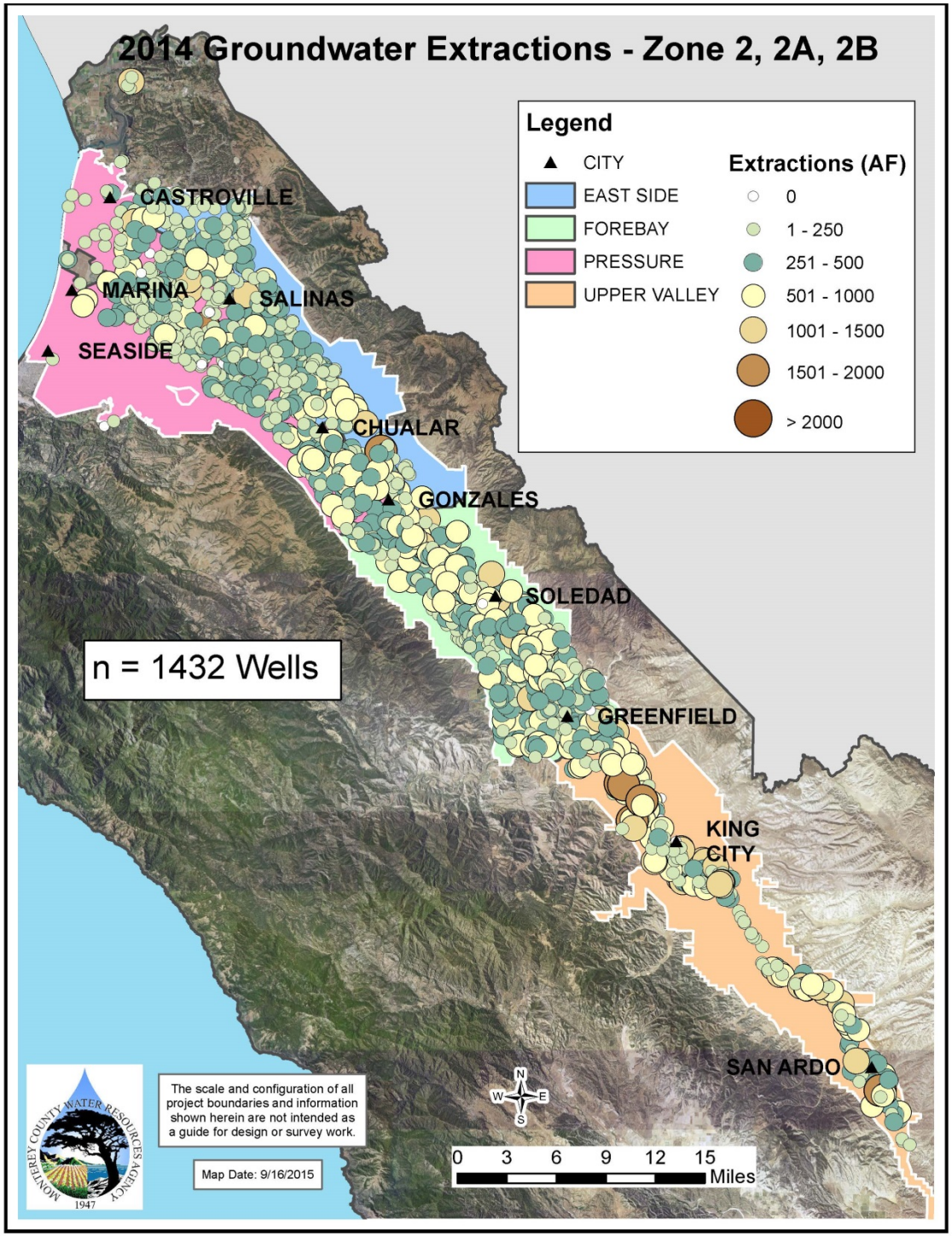


Figure 4. 2014 Groundwater Extractions.

Pressure Subarea – Extraction Data

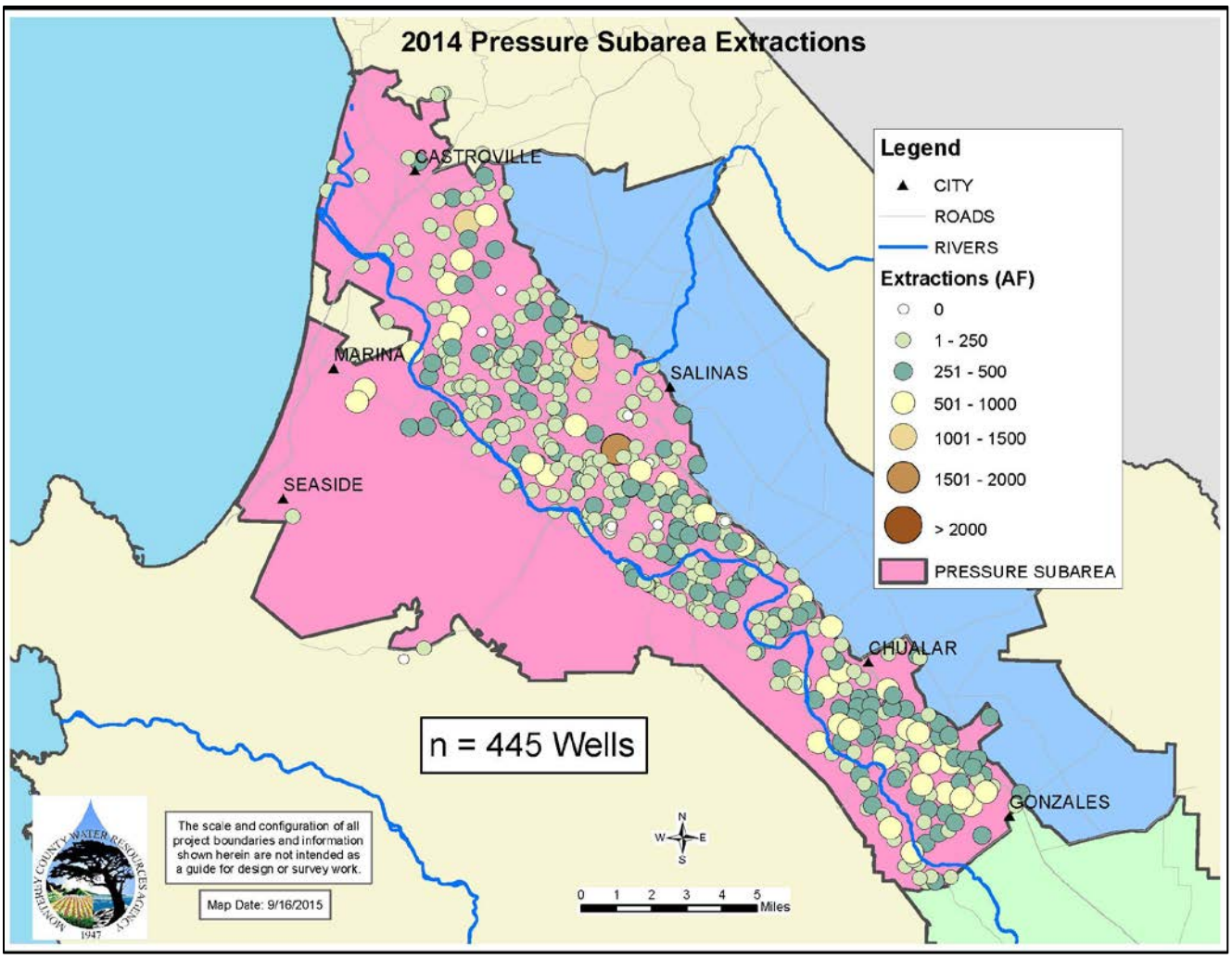


Figure 5. 2014 Groundwater Extraction in the Pressure Subarea.

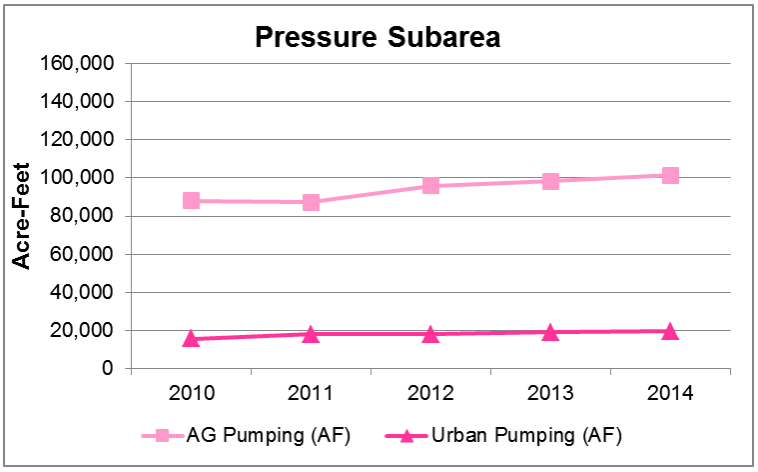


Figure 6. Agricultural and Urban Extractions (AF) in the Pressure Subarea 2010-2014.

Table 3. Total, Agricultural, and Urban Extractions (AF) in the Pressure Subarea 2010-2014.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2010	103,543	87,880	15,663
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

East Side Subarea – Extraction Data

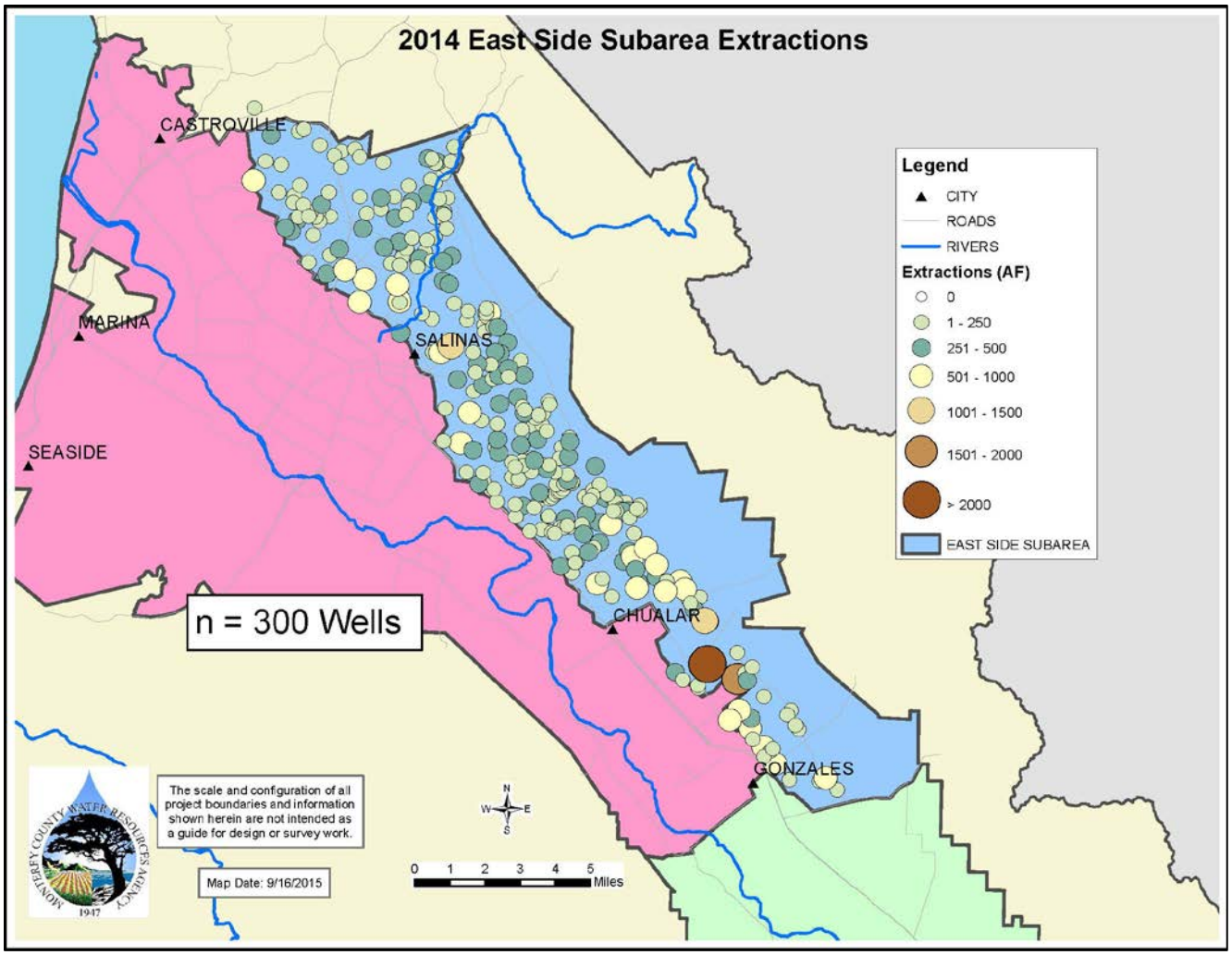


Figure 7. 2014 Groundwater Extraction in the East Side Subarea.

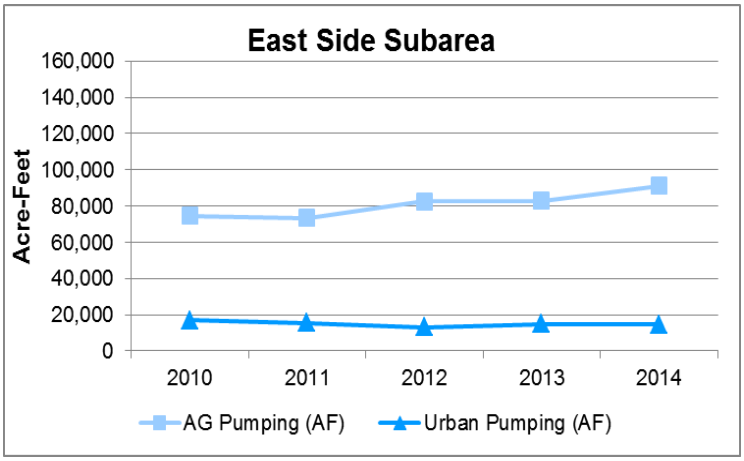


Figure 8. Agricultural and Urban Extractions (AF) in the East Side Subarea 2010-2014.

Table 4. Total, Agricultural, and Urban Extractions (AF) in the East Side Subarea 2010-2014.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2010	91,300	74,512	16,788
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

Forebay Subarea – Extraction Data

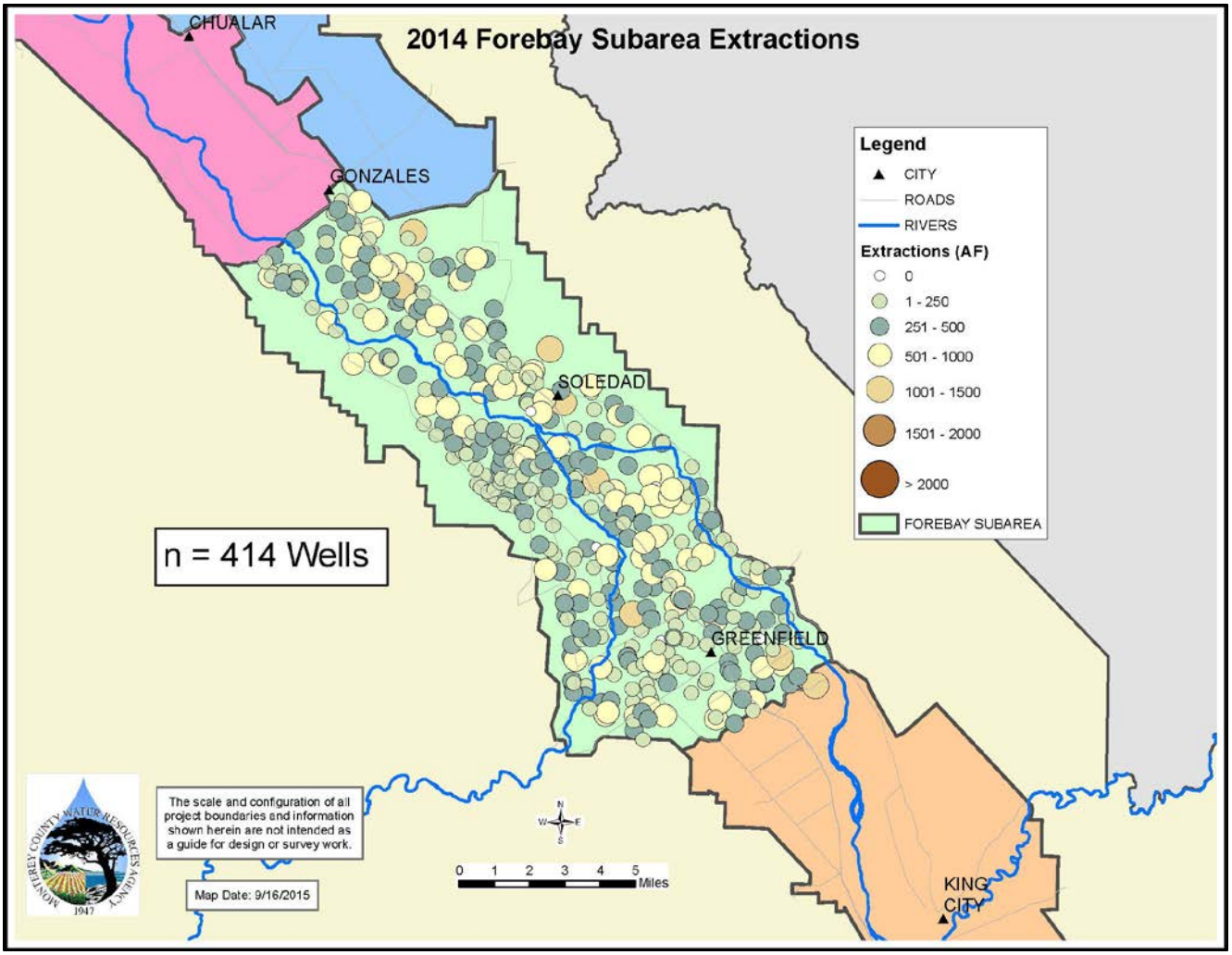


Figure 9. 2014 Groundwater Extraction in the Forebay Subarea.

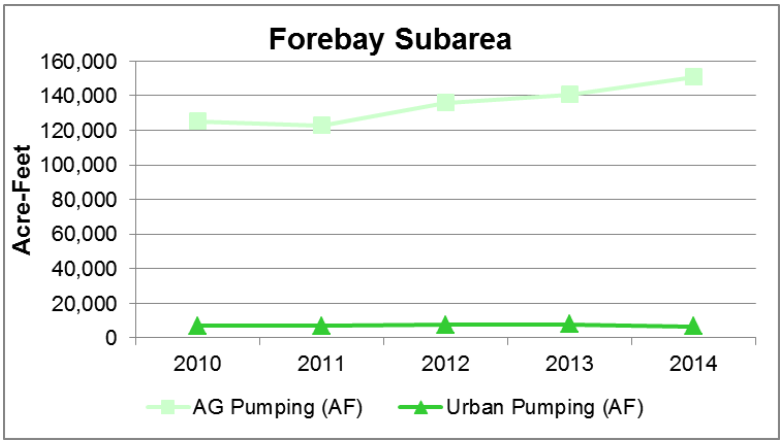


Figure 10. Agricultural and Urban Extractions (AF) in the Forebay Subarea 2010-2014.

Table 5. Total, Agricultural, and Urban Extractions (AF) in the Forebay Subarea 2010-2014.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2010	132,147	125,145	7,002
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

Upper Valley Subarea – Extraction Data

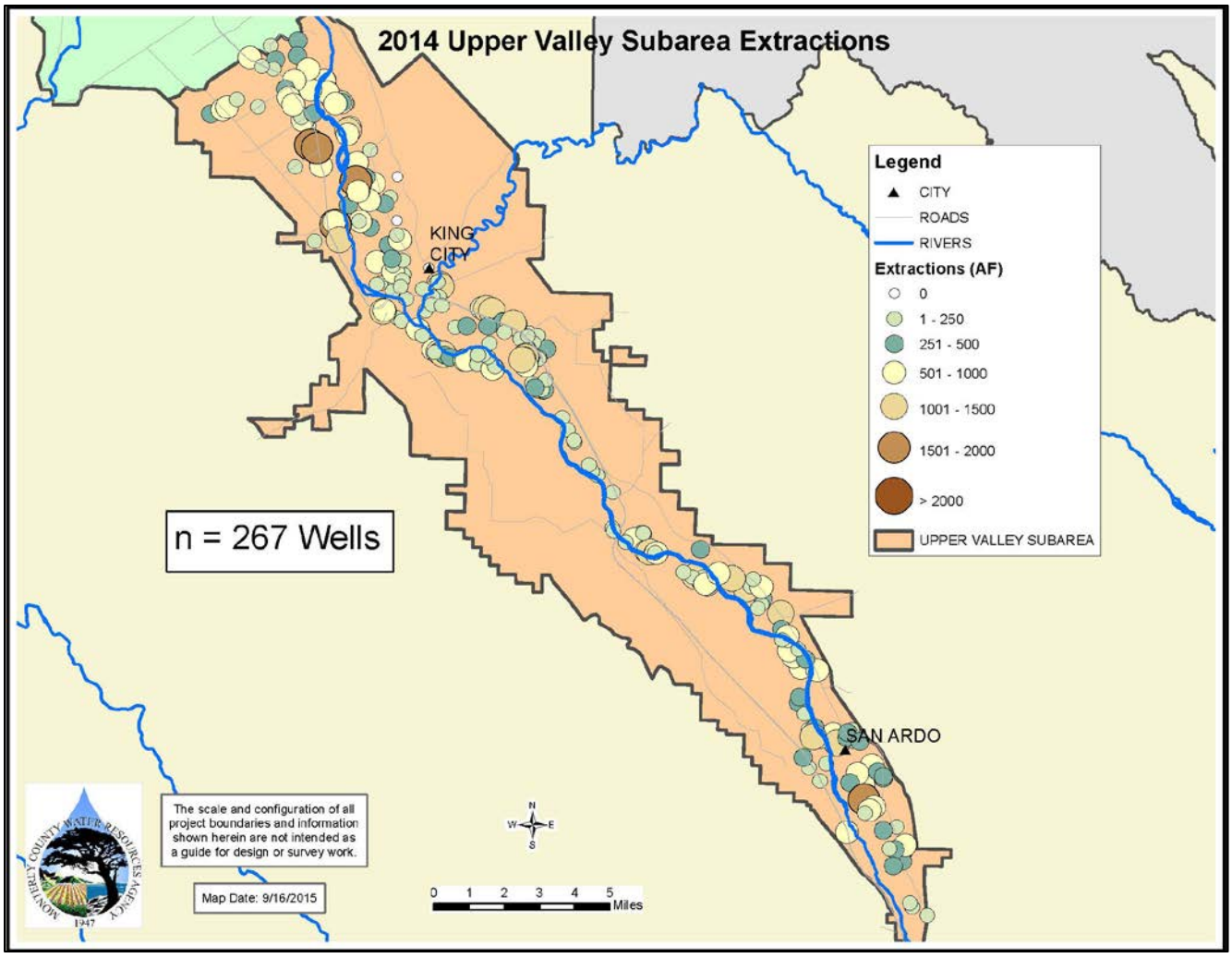


Figure 11. 2014 Groundwater Extraction in the Upper Valley Subarea

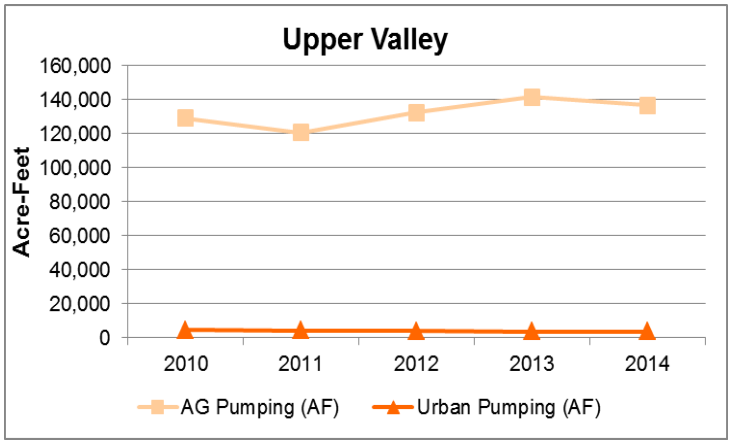


Figure 12. Agricultural and Urban Extractions (AF) in the Upper Valley Subarea 2010-2014.

Table 6. Total, Agricultural, and Urban Extractions (AF) in the Upper Valley Subarea 2010-2014.

Year	Total Pumping (AF)	AG Pumping (AF)	Urban Pumping (AF)
2010	133,451	128,883	4,568
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

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 2015.

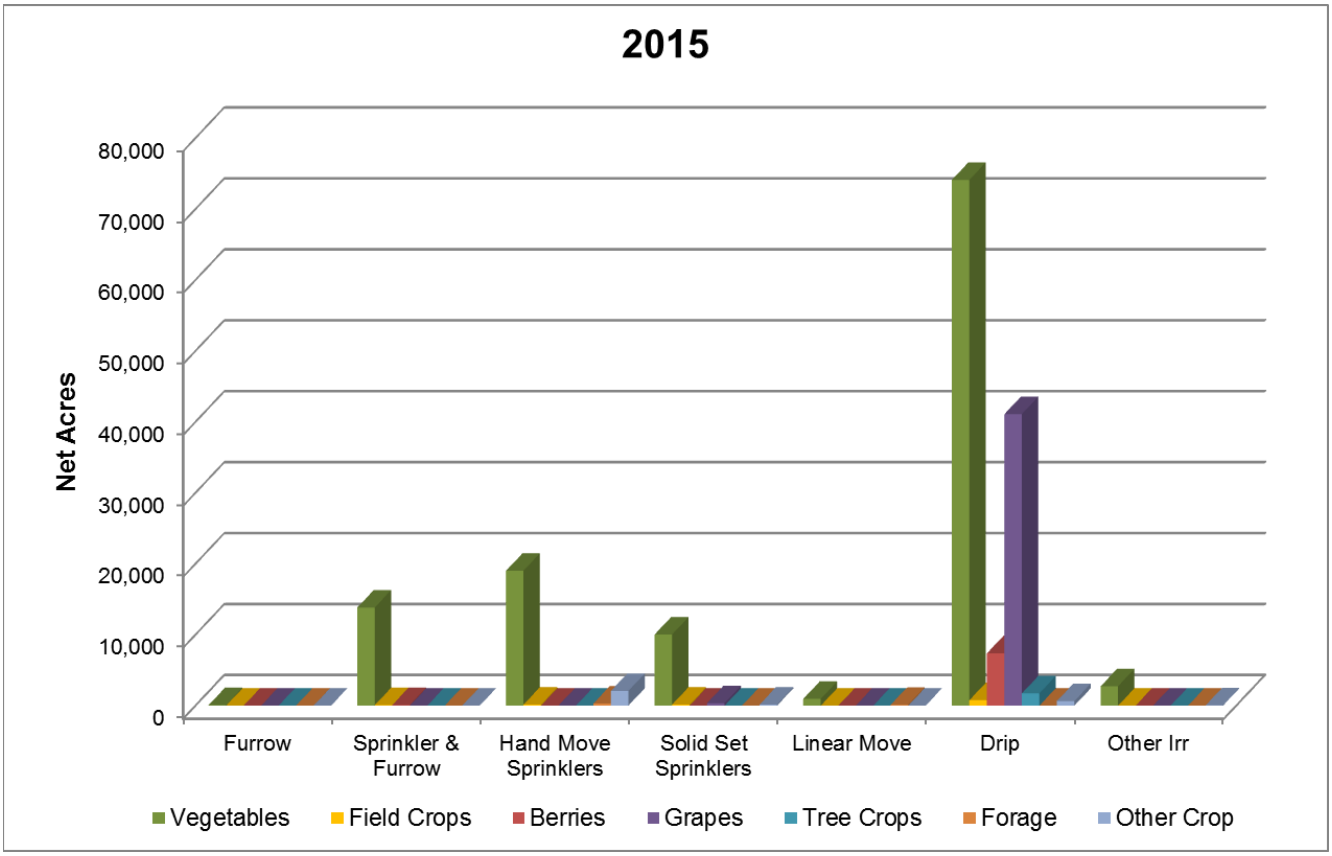


Figure 13. 2015 Net Acre Distribution of Irrigation Methods by Crop Type.

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

2015	Furrow	Sprinkler & Furrow	Hand Move Sprinklers	Solid Set Sprinklers	Linear Move	Drip	Other Irr	Total
Vegetables	80	13,826	18,998	10,020	949	74,108	2,724	120,705
Field Crops	0	72	137	140	0	771	0	1,120
Berries	0	84	0	0	0	7,369	0	7,453
Grapes	0	0	0	346	0	41,091	0	41,437
Tree Crops	0	0	0	0	0	1,726	0	1,726
Forage	7	0	301	3	126	0	4	441
Other Crop	0	0	2,071	146	0	643	25	2,885
Unirrigated								3,754
Total	**87**	**13,982**	**21,507**	**10,655**	**1,075**	**125,708**	**2,753**	**179,521**

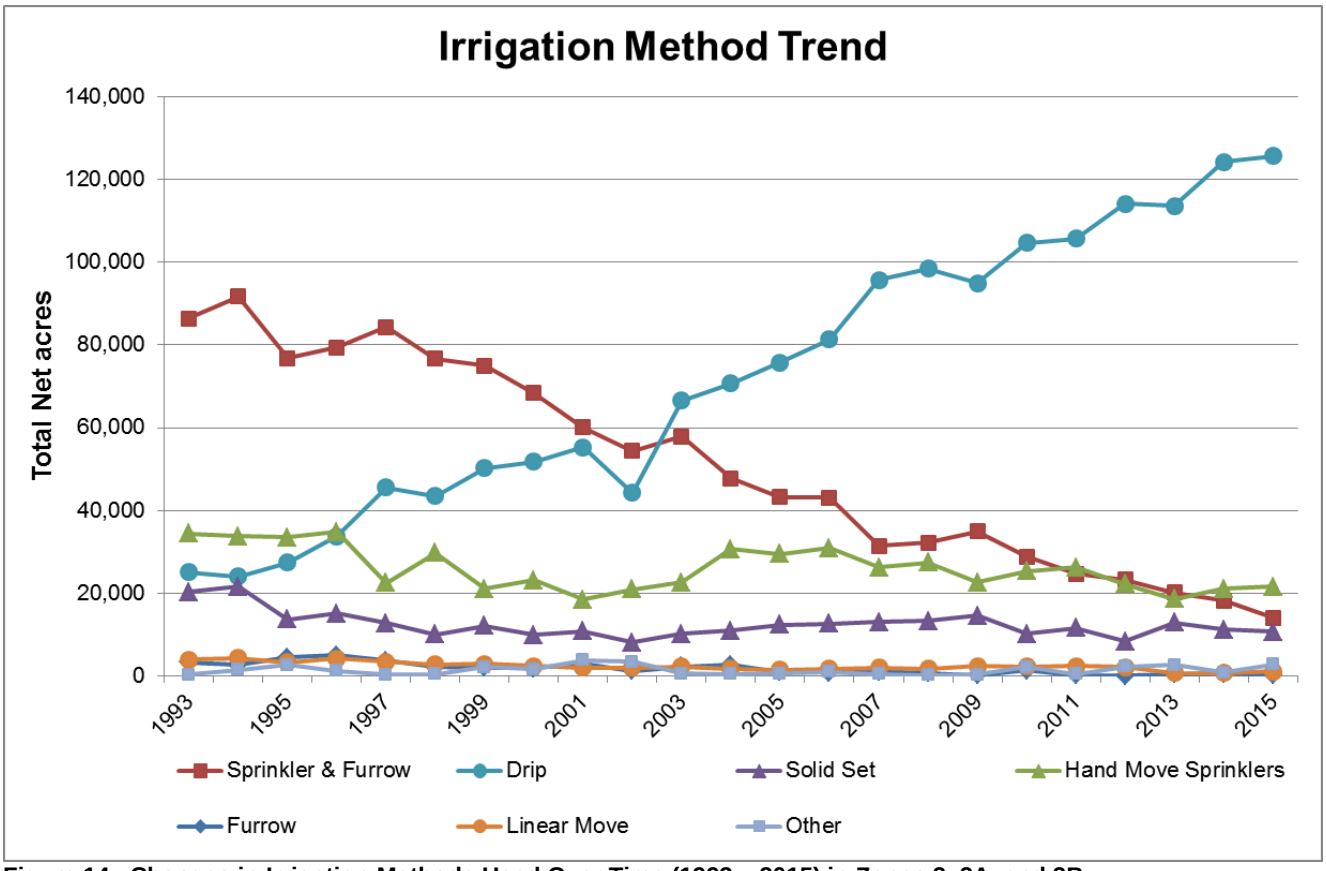


Figure 14. Changes in Irrigation Methods Used Over Time (1993 – 2015) in Zones 2, 2A, and 2B.

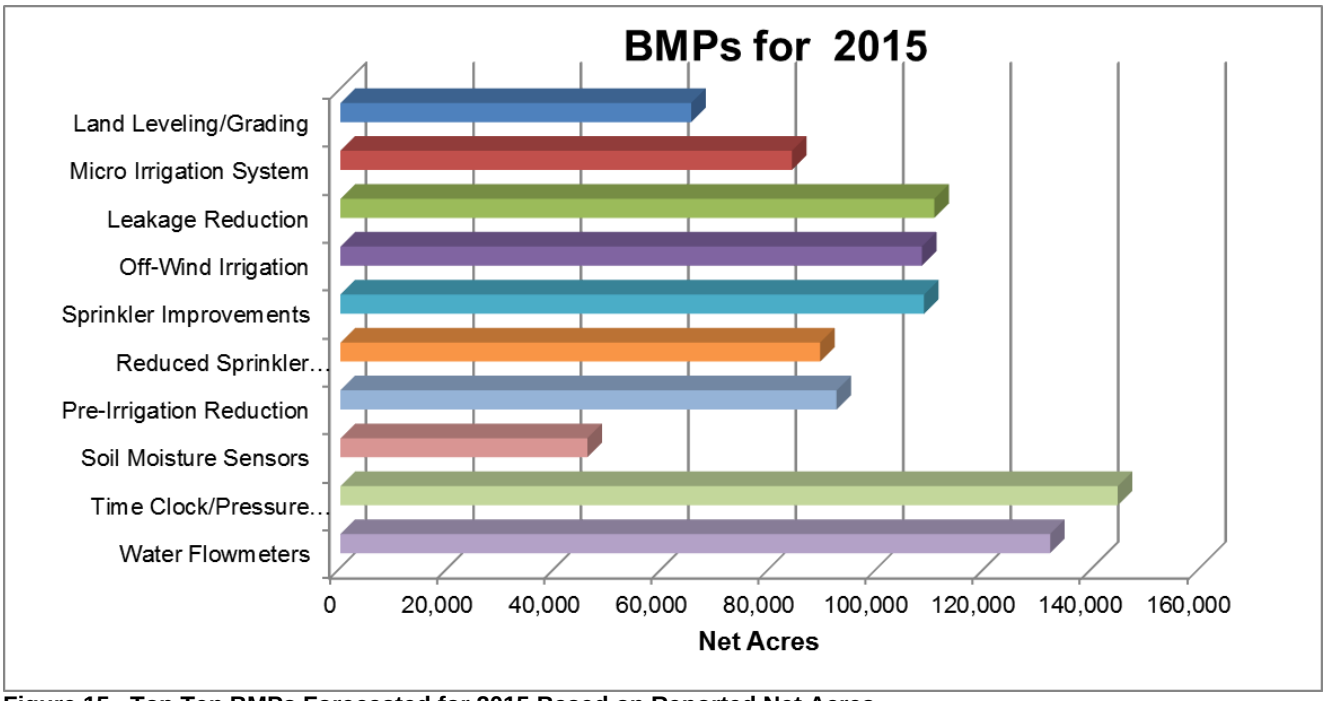


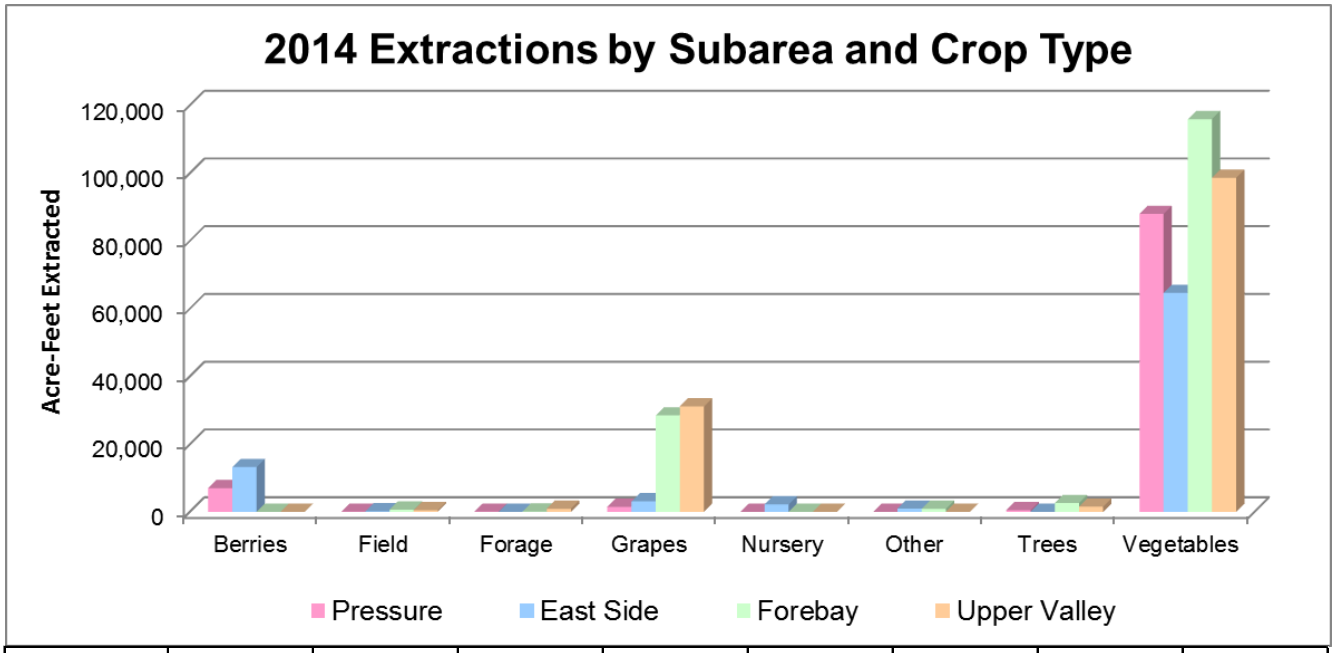
Figure 15. Top Ten BMPs Forecasted for 2015 Based on Reported Net Acres.

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 accounts for all crop types reported and all reporting methods: Water Flowmeter, Electrical Meter, and Hour Meter.

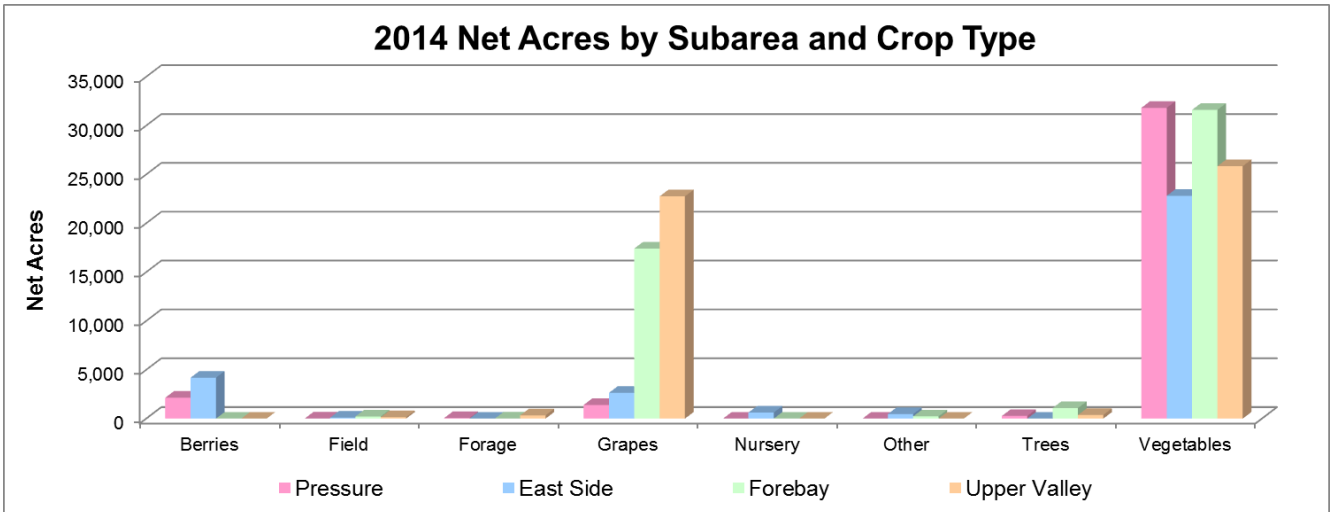
Changing weather patterns, variable soils, and crop types affect the amount of water needed for efficient irrigation. Even during a normal rain year, pumping rates will vary from one subarea to another and crop types will vary depending on economic demand.

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.



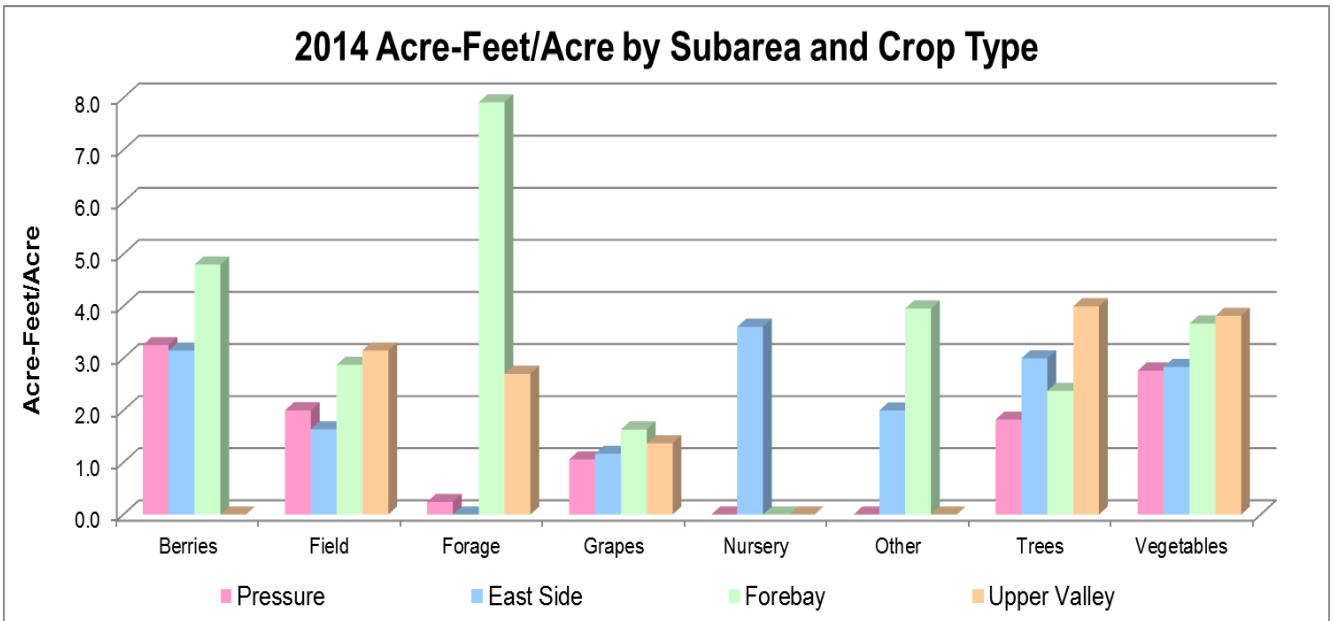
2015	Berries (AF)	Field (AF)	Forage (AF)	Grapes (AF)	Nursery (AF)	Other (AF)	Trees (AF)	Vegetables (AF)
Pressure	6,945	10.0	12.8	1,474	-	-	494	87,912
East Side	13,191	154	-	3,077	2,217	923	-	64,601
Forebay	2.4	624	55.4	28,433	-	886	2,572	115,893
Upper Valley	-	444	905	31,095	-	-	1,487	98,593

Figure 16. 2014 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	2,135	5.0	53.0	1,393	-	-	271	31,818
East Side	4,190	94.1	-	2,638	615	462	0.3	22,812
Forebay	0.5	217	7.0	17,413	-	224	1,083	31,605
Upper Valley	-	141	335	22,756	-	-	372	25,847

Figure 17. 2014 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	3.3	2.0	0.2	1.1	-	-	1.8	2.8
East Side	3.1	1.6	-	1.2	3.6	2.0	3.0	2.8
Forebay	4.8	2.9	7.9	1.6	-	4.0	2.4	3.7
Upper Valley	-	3.1	2.7	1.4	-	-	4.0	3.8

Figure 18. 2014 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 2015, 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 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	2015
Offer free interior and exterior water audits to identify water conservation opportunities	100%
Advise customers when it appears possible that leaks exist on customer's side of water meter	100%
Provide individual historical water use information on water bills	99%
Enforcement and support of water conserving plumbing fixture standards, including requirement for ultra low flush toilets in all new construction	99%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost effective	99%
Implement requirements that all new connections be metered and billed by volume of use	98%
Support of State/Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush	98%
Identify irrigators of large landscapes (3 acres or more) and offer landscape audits to determine conservation opportunities	97%
Use paid and public service advertising	96%
Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies	96%

Table 9. Top Ten BMPs – Small Water Systems.

Top Ten BMPs Implemented for Small Water Systems	2015
Advise customers when it appears possible that leaks exist on customer's side of water meter	100%
Provide individual historical water use information on water bills	99%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost effective	99%
Implement requirements that all new connections be metered and billed by volume of use	98%
Support of State/Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush	98%
Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies	96%
Implementation of conservation pricing policies	96%
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water-saving practices	95%
Provide conservation information in bill inserts	93%
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	89%

Table 10. Water Use per Connection – Large Water Systems.

Connection Class For Large Water Systems	Water Use per Connection (AF)
Single-Family Residential	0.372
Multi-Family Residential	1.025
Commercial/Institutional	2.997
Industrial	10.928
Landscape Irrigation	1.956
Other	12.574

Table 11. Water Use per Connection – Small Water Systems.

Connection Class For Small Water Systems	Water Use per Connection (AF)
Single-Family Residential	0.504
Multi-Family Residential	0.573
Commercial/Institutional	1.429
Industrial	4.795
Landscape Irrigation	1.927
Other	1.077

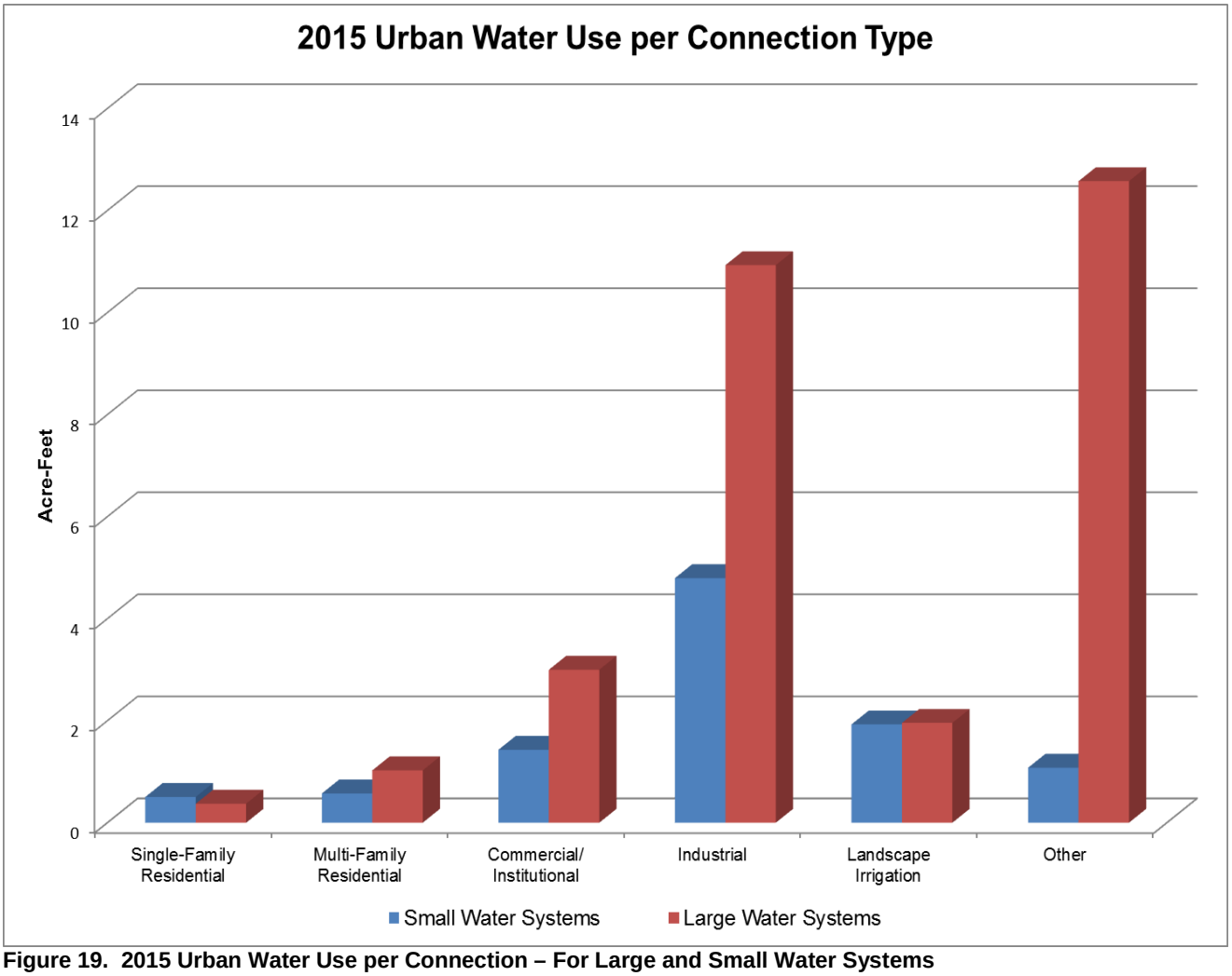


Figure 19. 2015 Urban Water Use per Connection – For Large and Small Water Systems

Monterey County
Board of Supervisors

Fernando Armenta	District #1
John M. Phillips	District #2
Simón Salinas, Chair	District #3
Jane Parker	District #4
Dave Potter	District #5

Monterey County Water Resources Agency
Board of Directors

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

Monterey County Water Resources Agency
Executive Management

David Chardavoyne, General Manager
Robert Johnson, Deputy General Manager, Chief of Water Resources Planning and Management
Brent Buche, Deputy General Manager, Chief of Operations and Maintenance
Cathy Paladini, Finance Manager
Wini Chambliss, Administrative Services Assistant

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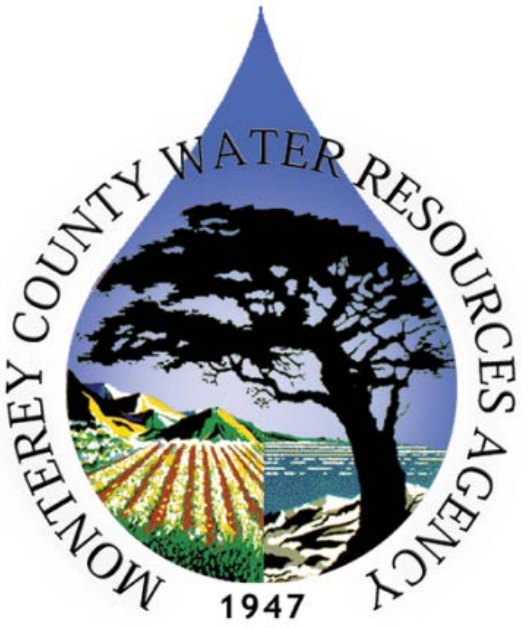
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