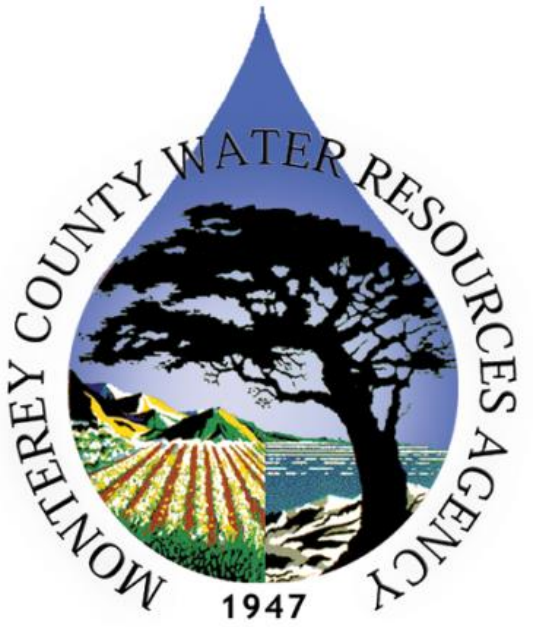
# 2018

# Groundwater Extraction Summary Report

Monterey County Water Resources Agency

September 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.

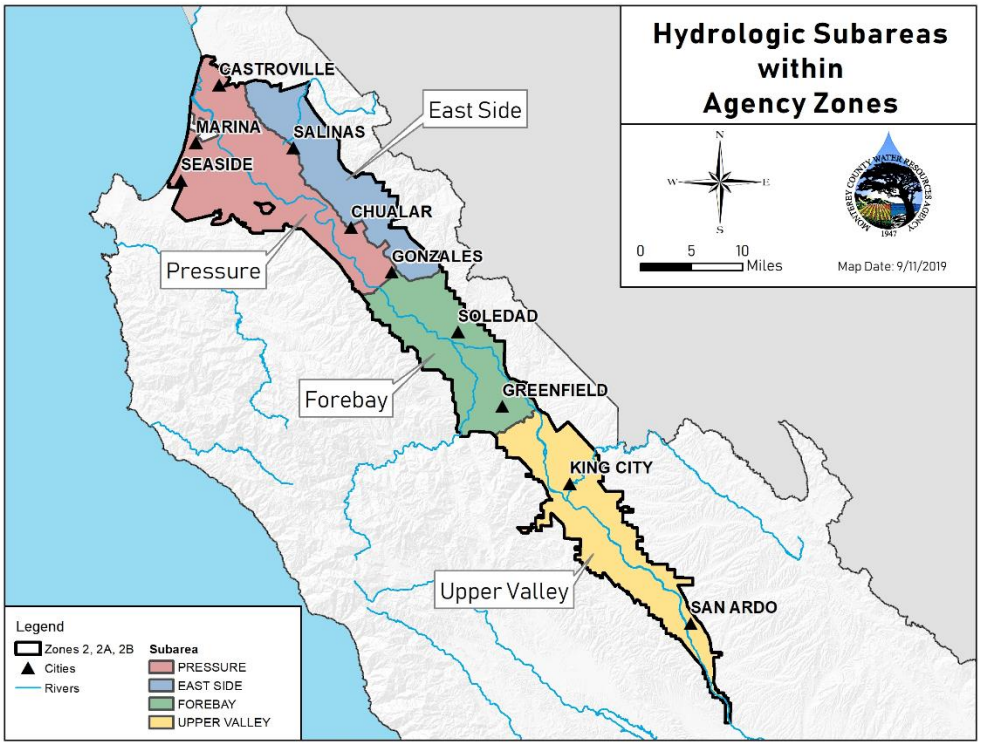


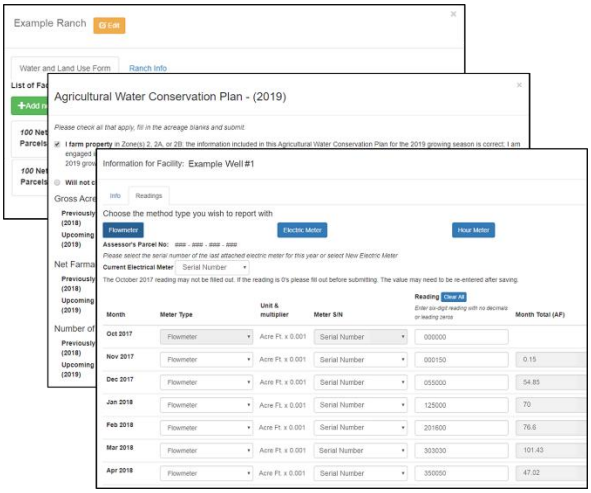

**Figure 1. Salinas Valley Groundwater Basin Subareas and Agency Zones**

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 2019 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, 2017, through October 31, 2018; the urban data covers calendar year 2018. The agricultural and urban water conservation plans for 2019 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 2018 reporting year was: 84% Flowmeter; 15% 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-four percent (94%) of the 1,931 wells in the Salinas Valley for the 2018 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2019 were seventy-nine percent (79%) and eighty-seven percent (87%), 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 | 92,010 | 17,246 | **109,256** |
| East Side | 75,629 | 13,938 | **89,567** |
| Forebay | 138,838 | 7,303 | **146,141** |
| Upper Valley | 126,919 | 3,418 | **130,337** |
| **Total (AF)** | **433,396** | **41,905** | **475,301** |
| **Percent of Total** | **91.2%** | **8.8%** | **100.0%** |

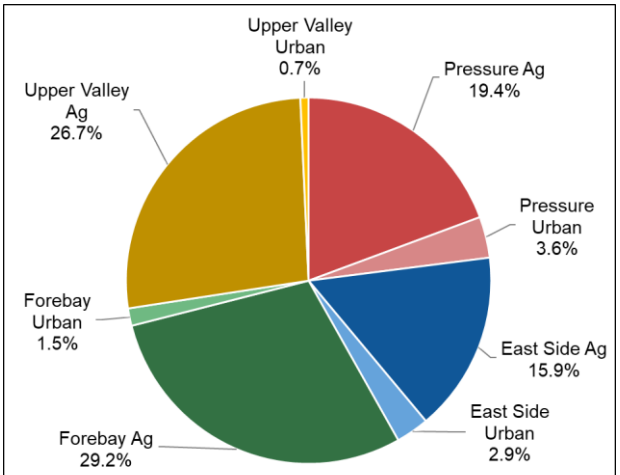



**Figure 2. Percentage of Ag and Urban Extractions by Subarea.**

## 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.

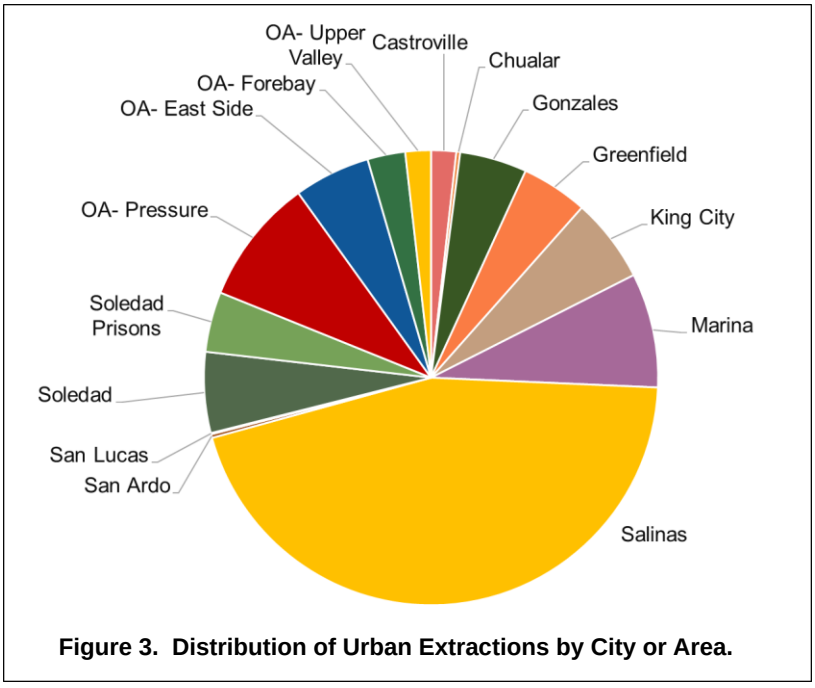



**Figure 3. Distribution of Urban Extractions by City or Area.**

**Table 2. Urban Extractions by City or Area**

| City or Area | Urban Pumping (AF) | Percentage |
|---|---|---|
| Castroville | 747 | 1.78% |
| Chualar | 115 | 0.27% |
| Gonzales | 2,003 | 4.78% |
| Greenfield | 1,979 | 4.72% |
| King City | 2,511 | 5.99% |
| Marina | 3,410 | 8.14% |
| Salinas | 18,879 | 45.05% |
| San Ardo | 107 | 0.26% |
| San Lucas | 37 | 0.09% |
| Soledad | 2,406 | 5.74% |
| Soledad Prisons | 1,792 | 4.28% |
| OA- Pressure | 3,758 | 8.97% |
| OA- East Side | 2,273 | 5.42% |
| OA- Forebay | 1,126 | 2.69% |
| OA- Upper Valley | 763 | 1.82% |
| **Total** | **41,905** | **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 2018 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.

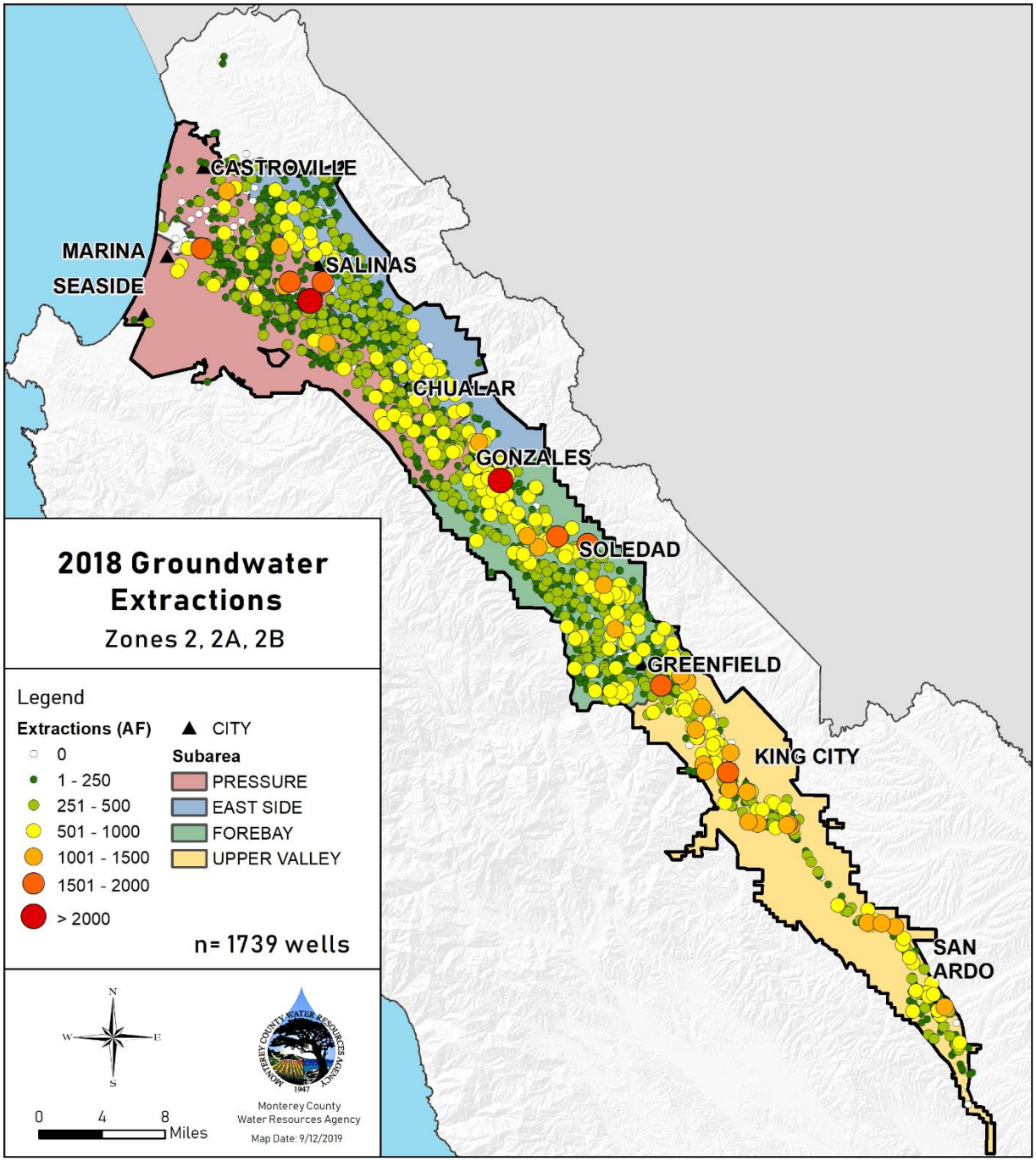



**Figure 4. 2018 Groundwater Extractions.**

## Pressure Subarea – Extraction Data

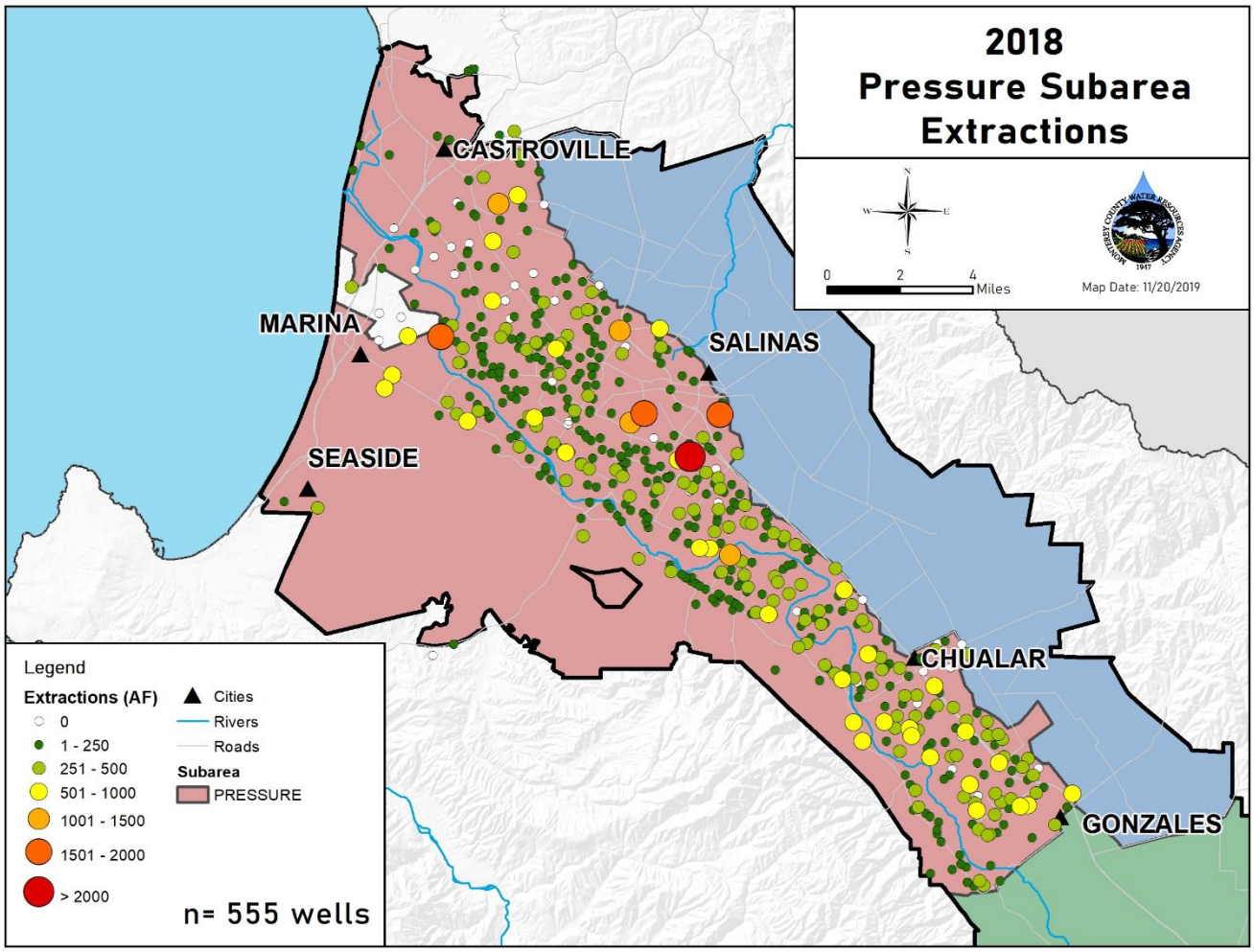



**Figure 5. 2018 Groundwater Extraction in the Pressure Subarea.**

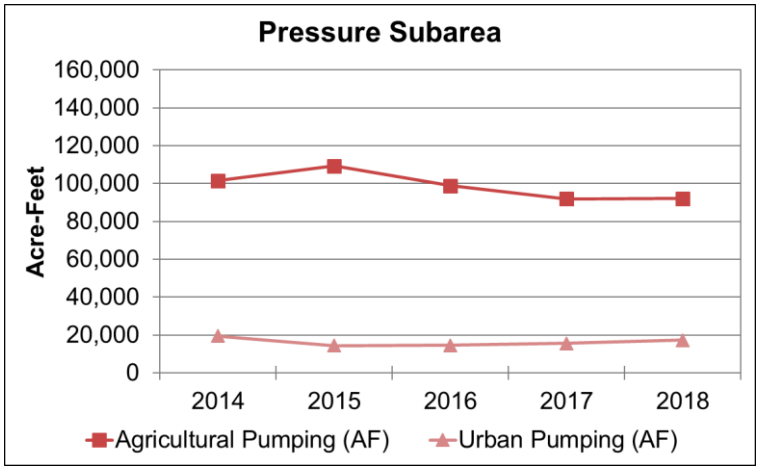



**Figure 6. Agricultural and Urban Extractions (AF) in the Pressure Subarea 2014-2018.**

| Year | Agricultural Pumping (AF) | Urban Pumping (AF) | Total Pumping (AF) |
|---|---|---|---|
| 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 |
| 2018 | 92,010 | 17,246 | 109,256 |

**Table 3. Total, Agricultural, and Urban Extractions (AF) in the Pressure Subarea 2014-2018.**

## East Side Subarea – Extraction Data

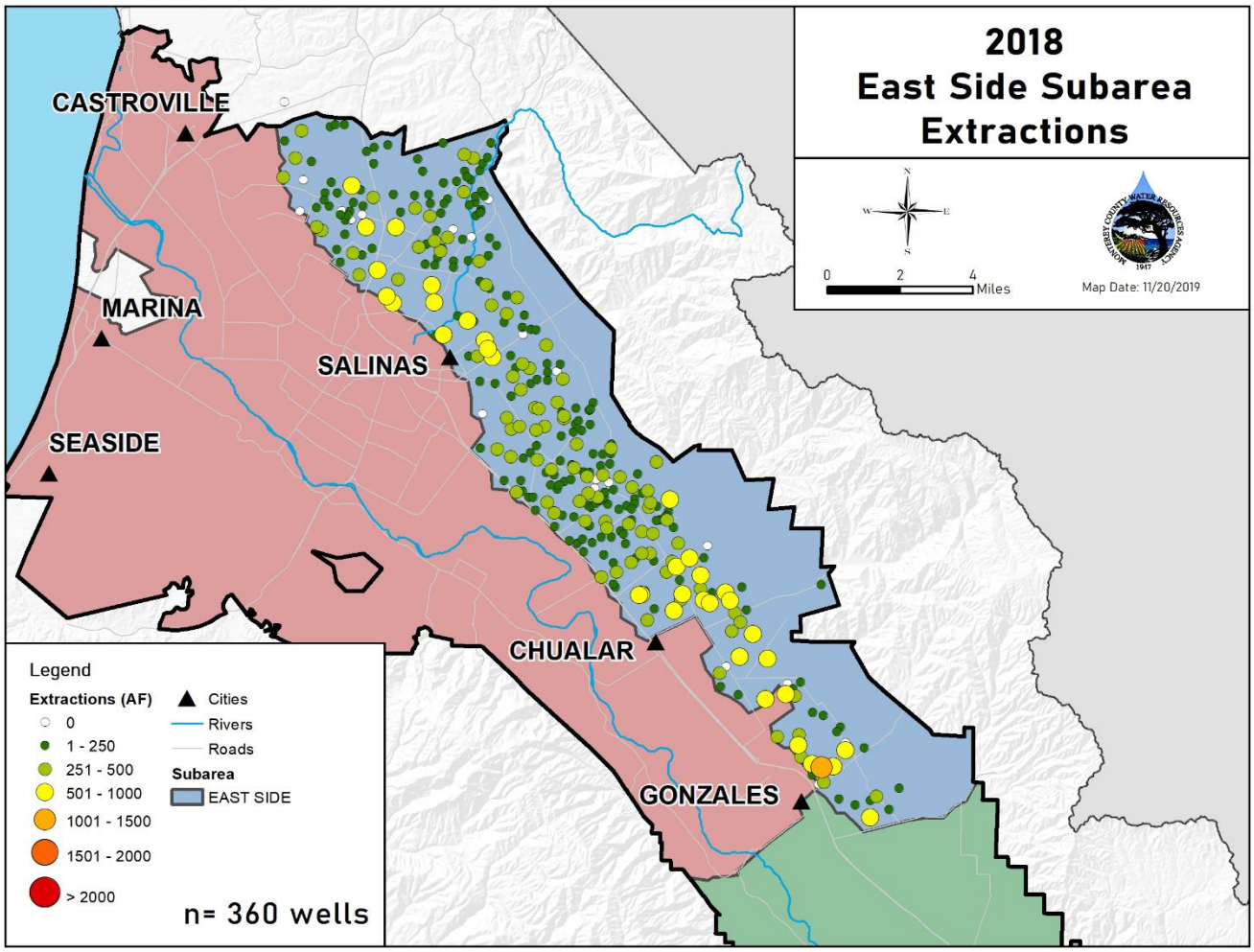



**Figure 7. 2018 Groundwater Extraction in the East Side Subarea.**

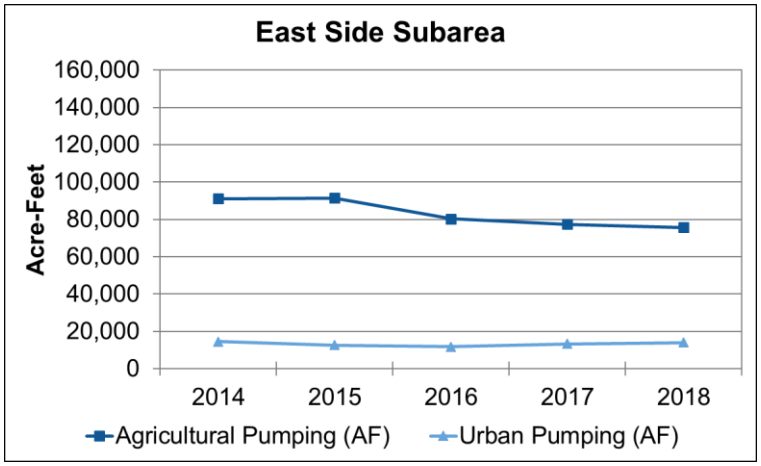



**Figure 8. Agricultural and Urban Extractions (AF) in the East Side Subarea 2014-2018.**

| Year | Agricultural Pumping (AF) | Urban Pumping (AF) | Total Pumping (AF) |
|---|---|---|---|
| 2014 | 91,160 | 14,484 | 105,644 |
| 2015 | 91,491 | 12,631 | 104,122 |
| 2016 | 80,379 | 11,802 | 92,181 |
| 2017 | 77,435 | 13,258 | 90,693 |
| 2018 | 75,629 | 13,938 | 89,567 |

**Table 4. Total, Agricultural, and Urban Extractions (AF) in the East Side Subarea 2014-2018.**

## Forebay Subarea – Extraction Data

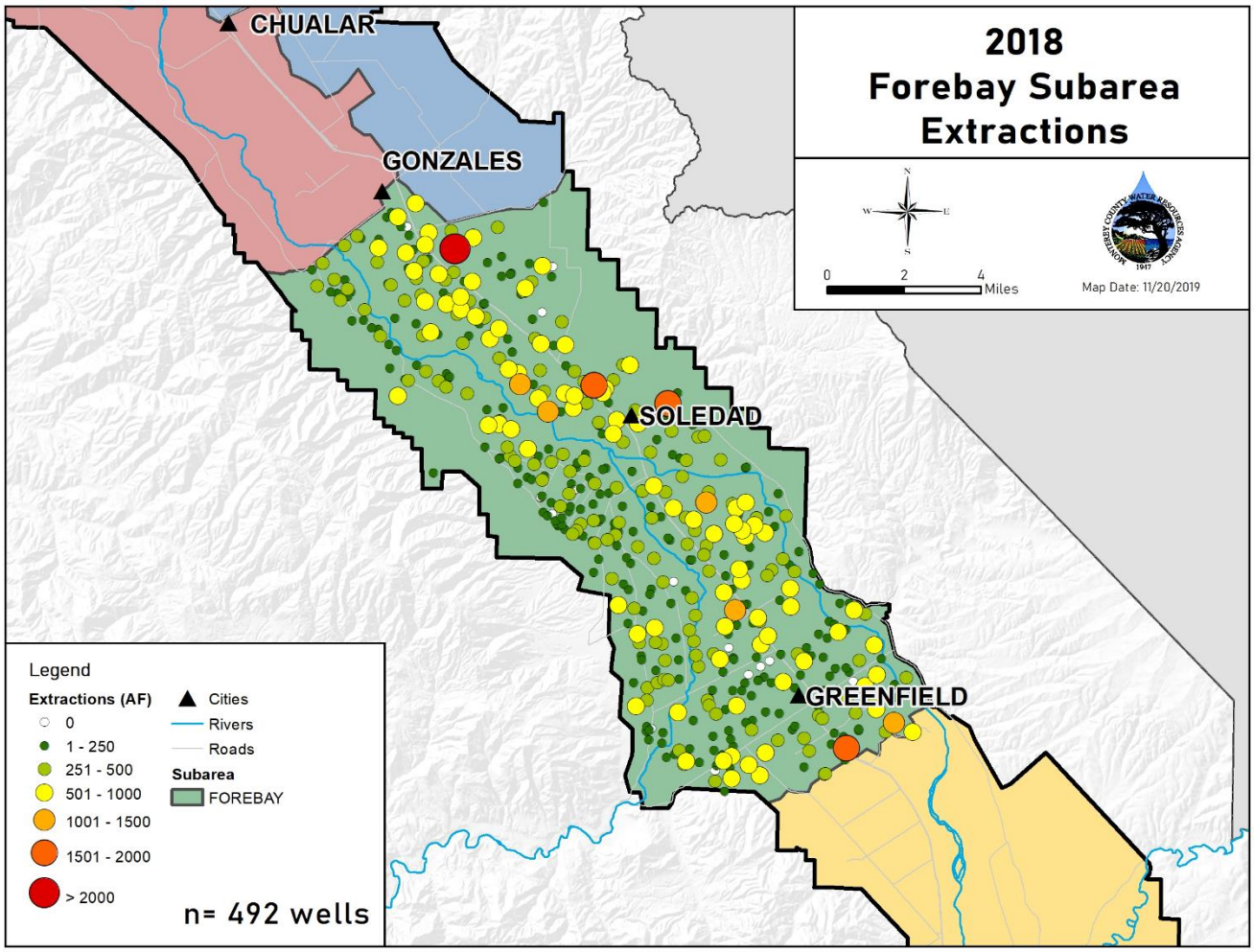



**Figure 9. 2018 Groundwater Extraction in the Forebay Subarea.**

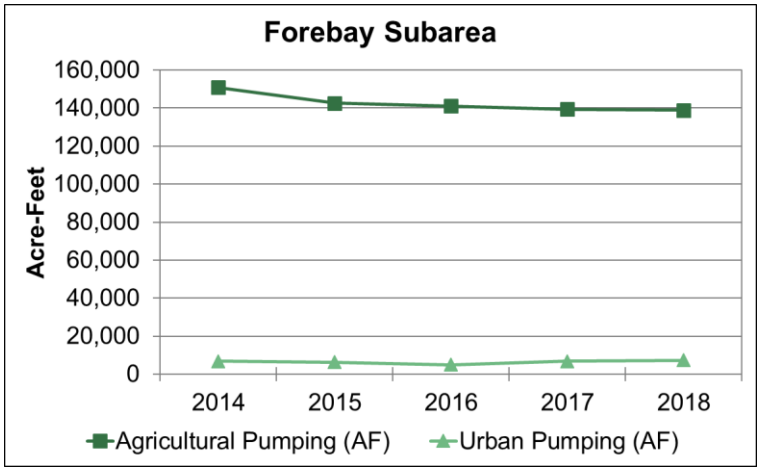



**Figure 10. Agricultural and Urban Extractions (AF) in the Forebay Subarea 2014-2018.**

| Year | Agricultural Pumping (AF) | Urban Pumping (AF) | Total Pumping (AF) |
|---|---|---|---|
| 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 |
| 2018 | 138,838 | 7,303 | 146,141 |

**Table 5. Total, Agricultural, and Urban Extractions (AF) in the Forebay Subarea 2014-2018.**

## Upper Valley Subarea – Extraction Data

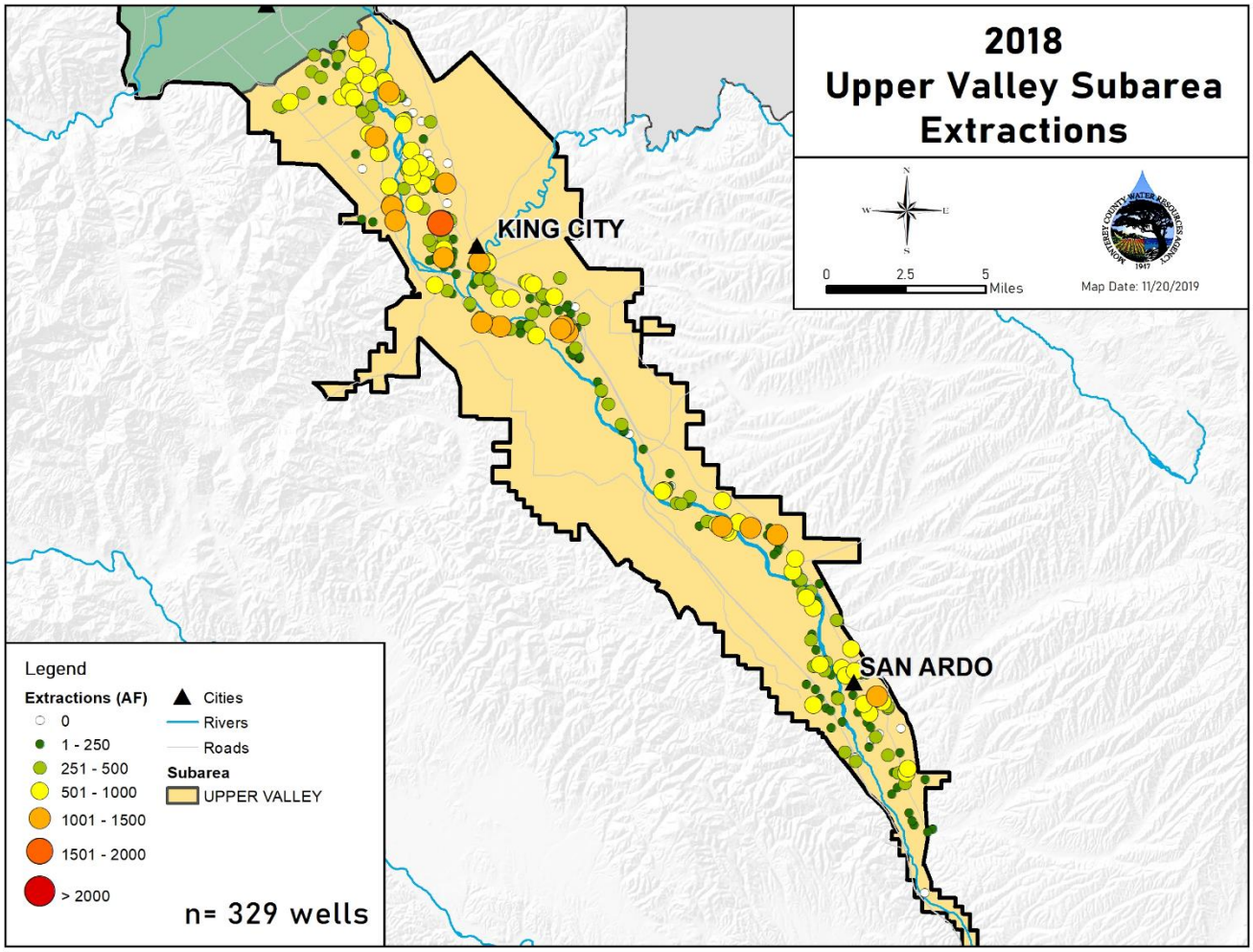



**Figure 11. 2018 Groundwater Extraction in the Upper Valley Subarea**

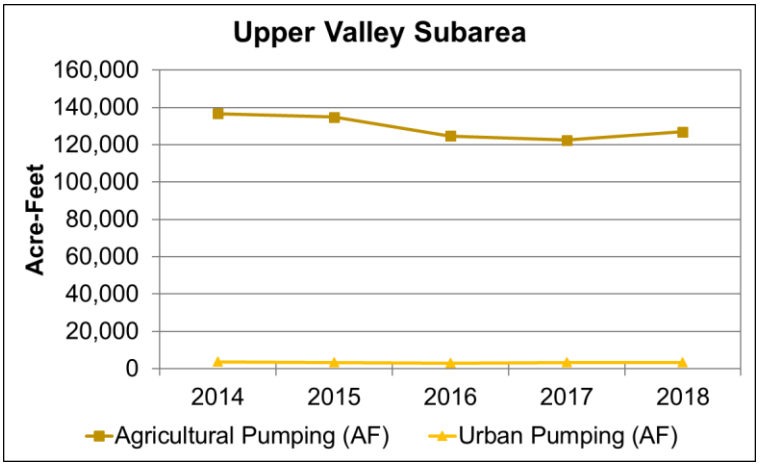



**Figure 12. Agricultural and Urban Extractions (AF) in the Upper Valley Subarea 2014-2018.**

| Year | Agricultural Pumping (AF) | Urban Pumping (AF) | Total Pumping (AF) |
|---|---|---|---|
| 2014 | 136,645 | 3,673 | 140,318 |
| 2015 | 134,740 | 3,306 | 138,046 |
| 2016 | 124,678 | 2,991 | 127,669 |
| 2017 | 122,396 | 3,407 | 125,802 |
| 2018 | 126,919 | 3,418 | 130,337 |

**Table 6. Total, Agricultural, and Urban Extractions (AF) in the Upper Valley Subarea 2014-2018.**

# 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 2019.

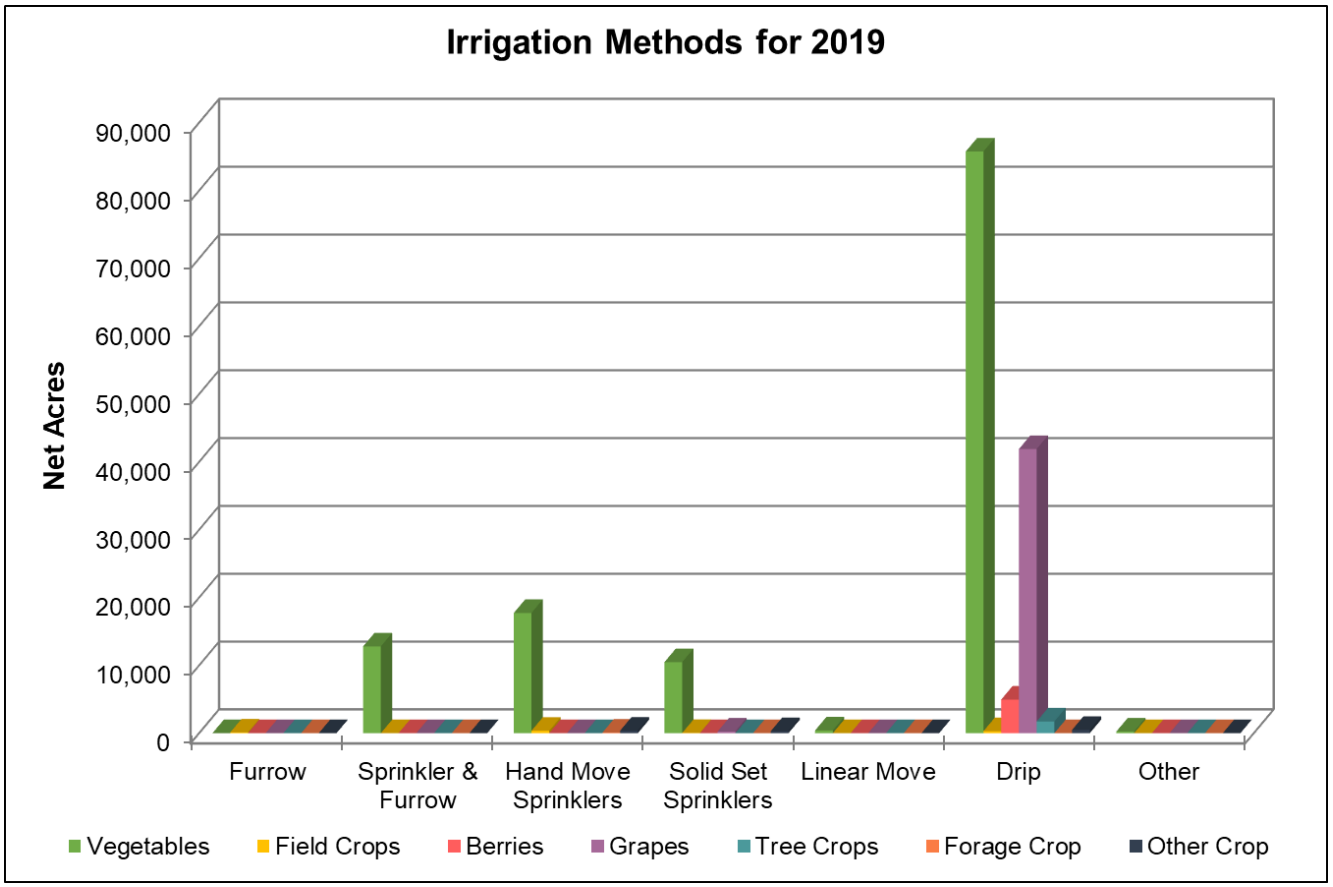



**Figure 13. 2019 Forecasted Net Acre Distribution of Irrigation Methods by Crop Type**.

| 2019 | Furrow | Sprinkler & Furrow | Hand Move Sprinklers | Solid Set Sprinklers | Linear Move | Drip | Other | Total |
|---|---|---|---|---|---|---|---|---|
| Vegetables | 0 | 12,789 | 17,721 | 10,467 | 406 | 85,747 | 251 | 127,381 |
| Field Crops | 101 | 0 | 359 | 29 | 0 | 294 | 0 | 782 |
| Berries | 0 | 0 | 0 | 0 | 0 | 4,950 | 0 | 4,950 |
| Grapes | 0 | 0 | 0 | 242 | 0 | 41,884 | 0 | 42,126 |
| Tree Crops | 0 | 0 | 0 | 0 | 0 | 1,723 | 0 | 1,723 |
| Forage Crop | 0 | 0 | 74 | 0 | 5 | 0 | 0 | 79 |
| Other Crop | 0 | 0 | 364 | 295 | 0 | 486 | 0 | 1,145 |
| Unirrigated | | | | | | | | 1,641 |
| **Total** | **101** | **12,789** | **18,518** | **11,033** | **411** | **135,083** | **251** | **179,826** |

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

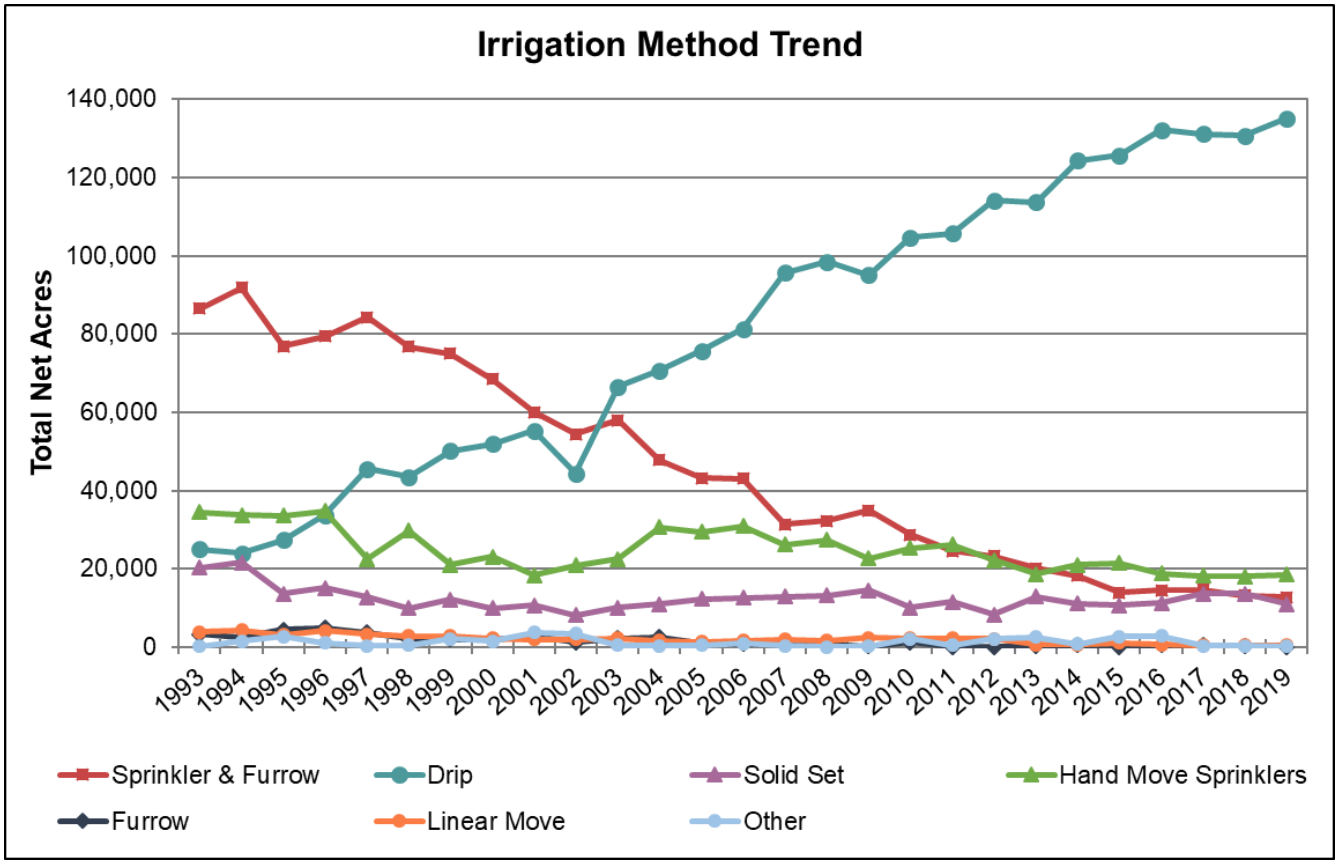



**Figure 14. Changes in Irrigation Methods Used Over Time (1993 – 2019) in Zones 2, 2A, and 2B.**

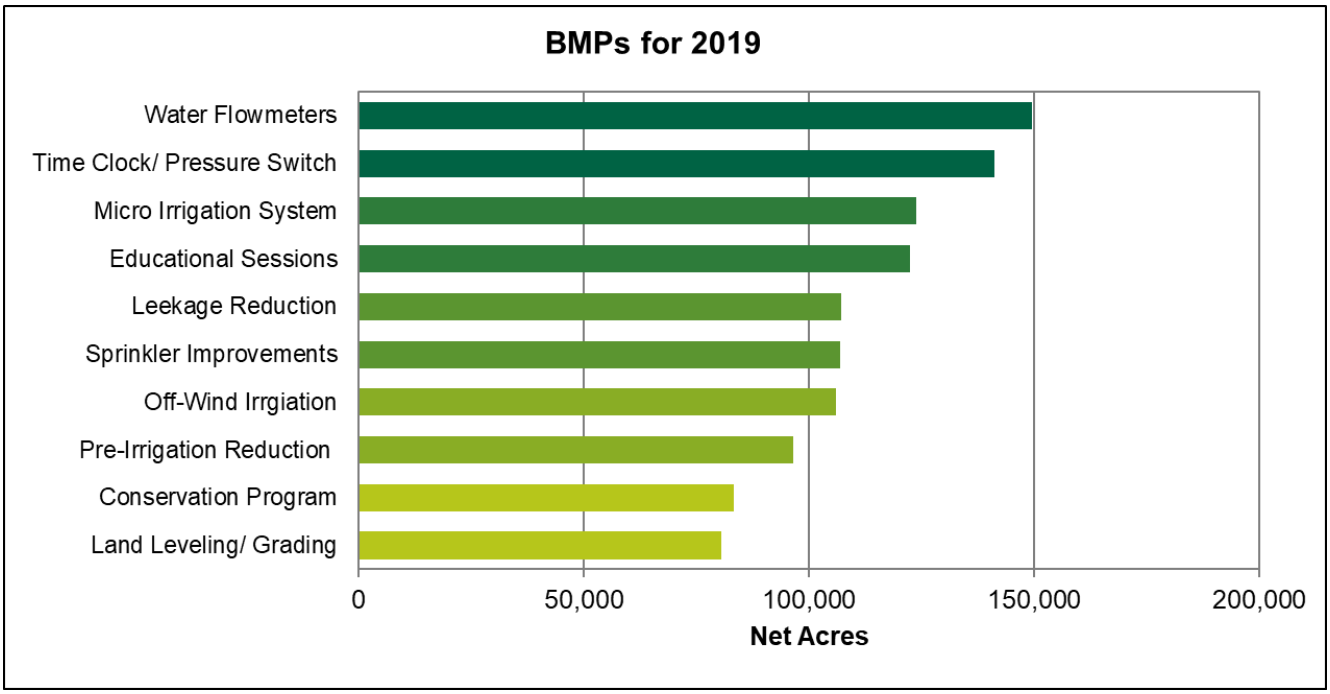


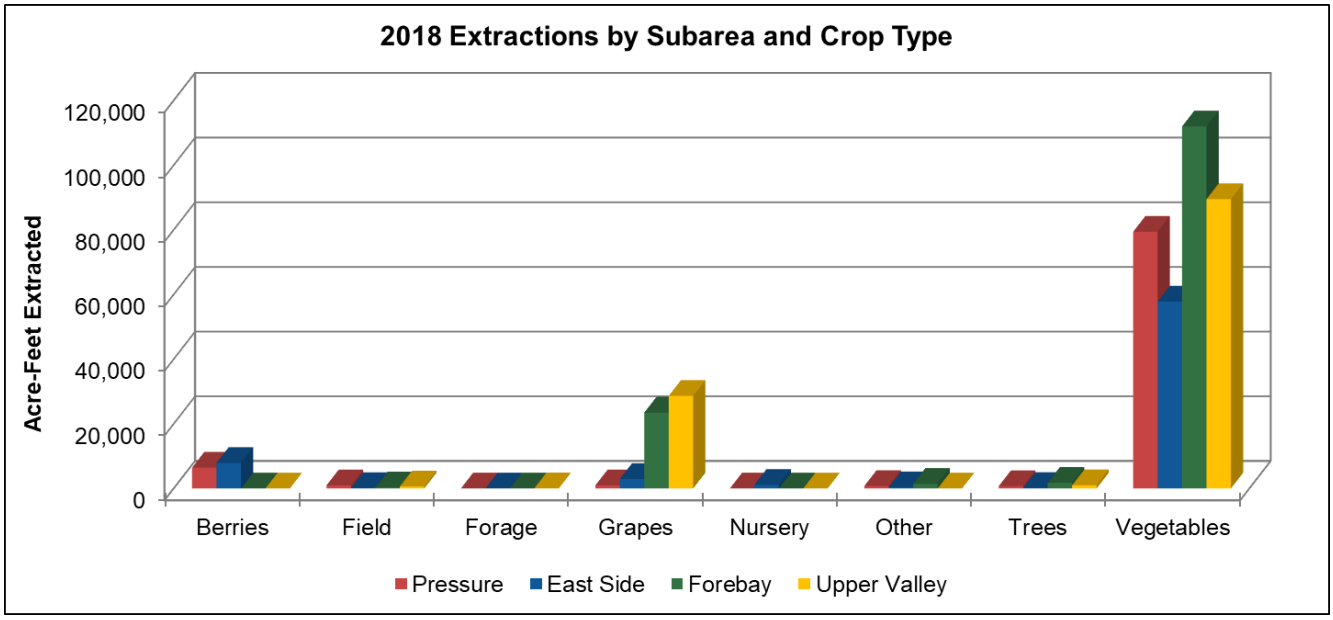

**Figure 15. Top Ten BMPs Forecasted for 2019 Based on Reported Net Acres.**

# 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.

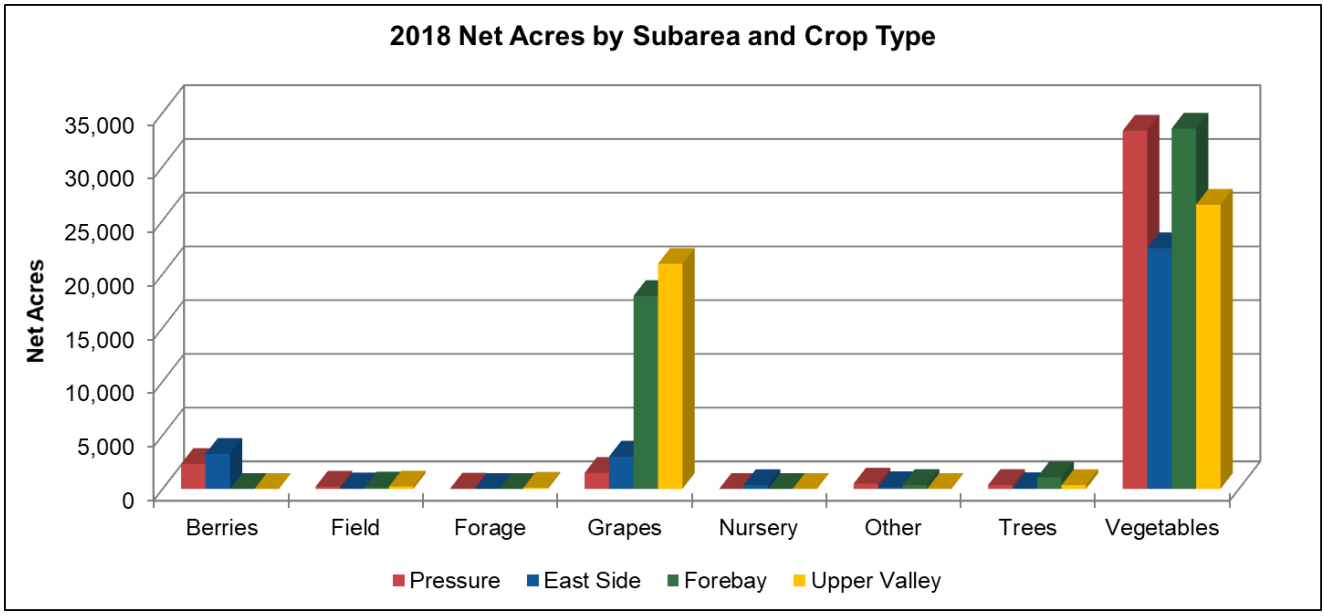
Changing weather patterns, variable soils, and crop types affect the amount of water needed for efficient irrigation. Even during a normal rain year, pumping rates will vary from one subarea to another and crop types will vary depending on economic demand.

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.



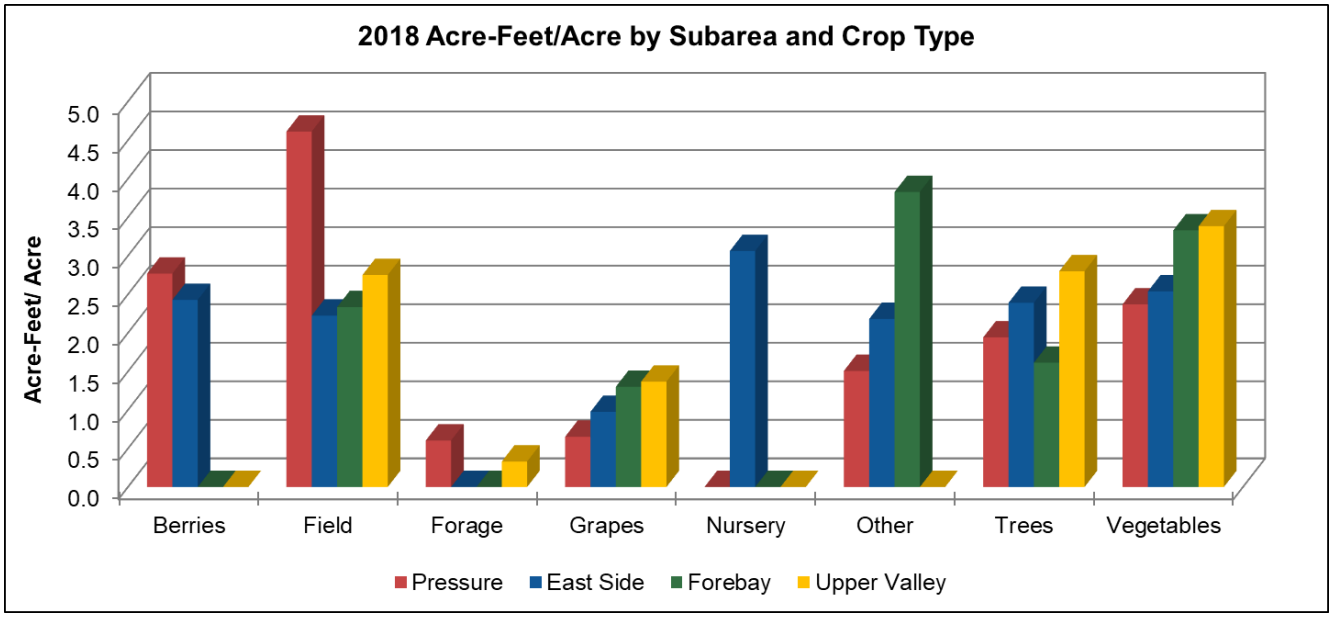

| 2018 | Berries (AF) | Field (AF) | Forage (AF) | Grapes (AF) | Nursery (AF) | Other (AF) | Trees (AF) | Vegetables (AF) |
|---|---|---|---|---|---|---|---|---|
| **Pressure** | 6,437 | 958 | 15.1 | 973 | - | 751 | 725 | 79,399 |
| **East Side** | 7,916 | 112 | - | 2,939 | 1,108 | 356 | 162 | 57,791 |
| **Forebay** | - | 323 | - | 23,461 | - | 1,429 | 1,745 | 111,964 |
| **Upper Valley** | - | 605 | 38.0 | 28,638 | - | - | 1,002 | 89,478 |

**Figure 16. 2018 Extractions Reported by Crop Type and Subarea.**




| 2018 | 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** | 2,326 | 208 | 25.0 | 1,491 | - | 499 | 374 | 33,337 |
| **East Side** | 3,262 | 50.2 | - | 3,015 | 362 | 163 | 68.0 | 22,400 |
| **Forebay** | - | 139 | - | 17,954 | - | 374 | 1,082 | 33,535 |
| **Upper Valley** | - | 220 | 115 | 20,952 | - | - | 358 | 26,447 |

**Figure 17. 2018 Net Acres Reported by Crop Type and Subarea.**




| 2018 | 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** | 2.8 | 4.6 | 0.6 | 0.7 | - | 1.5 | 1.9 | 2.4 |
| **East Side** | 2.4 | 2.2 | - | 1.0 | 3.1 | 2.2 | 2.4 | 2.5 |
| **Forebay** | - | 2.3 | - | 1.3 | - | 3.8 | 1.6 | 3.3 |
| **Upper Valley** | - | 2.7 | 0.3 | 1.4 | - | - | 2.8 | 3.4 |

**Figure 18. 2018 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 2019, 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 | 2019 |
|---|---|
| Advise customers when it appears possible that leaks exist on customer's side of water meter | 100% |
| Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association | 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 | 98% |
| Enforcement and support of water conserving plumbing fixture standards, including gradual requirement for High Efficiency Toilets (HET) in all new construction | 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% |
| Review proposed water uses for new commercial and industrial water service, and make recommendations for improving efficiency before completion of building permit process | 93% |
| Work with school districts to provide educational materials and instructional assistance | 92% |
| Provide conservation information in bill inserts | 92% |

**Table 9. Top Ten BMPs – Small Water Systems.**

| Top Ten BMPs Implemented for Small Water Systems | 2019 |
|---|---|
| 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% |
| Support of legislation prohibiting sale of toilets using more than 1.6 gpf | 95% |
| Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association | 95% |
| Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies | 95% |
| Implementation of conservation pricing policy | 95% |
| Implement requirements that all new connections be metered and billed by volume of use | 94% |
| Establish a program to retrofit any existing unmetered connections and bill by volume of use | 92% |
| Designate a water conservation coordinator responsible for preparing the water conservation plan, managing its implementation, and evaluating its results | 68% |
| Provide individual historical water use information on water bills | 58% |

| Small Water Systems: Water Use (AF) Per Connection Class | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Single-Family Residential | 0.504 | 0.416 | 0.426 | 0.516 | 0.411 |
| Multi-Family Residential | 0.573 | 0.603 | 0.640 | 0.689 | 0.567 |
| Commercial/ Institutional | 1.429 | 0.963 | 0.709 | 0.940 | 0.769 |
| Industrial | 4.795 | 5.001 | 12.652 | 12.562 | 12.055 |
| Landscape Irrigation | 1.927 | 1.945 | 1.100 | 1.934 | 3.220 |
| Other | 1.077 | 1.130 | 0.454 | 1.098 | 2.819 |

**Table 10. Water Use per Connection – Small Water Systems (2014-2018).**

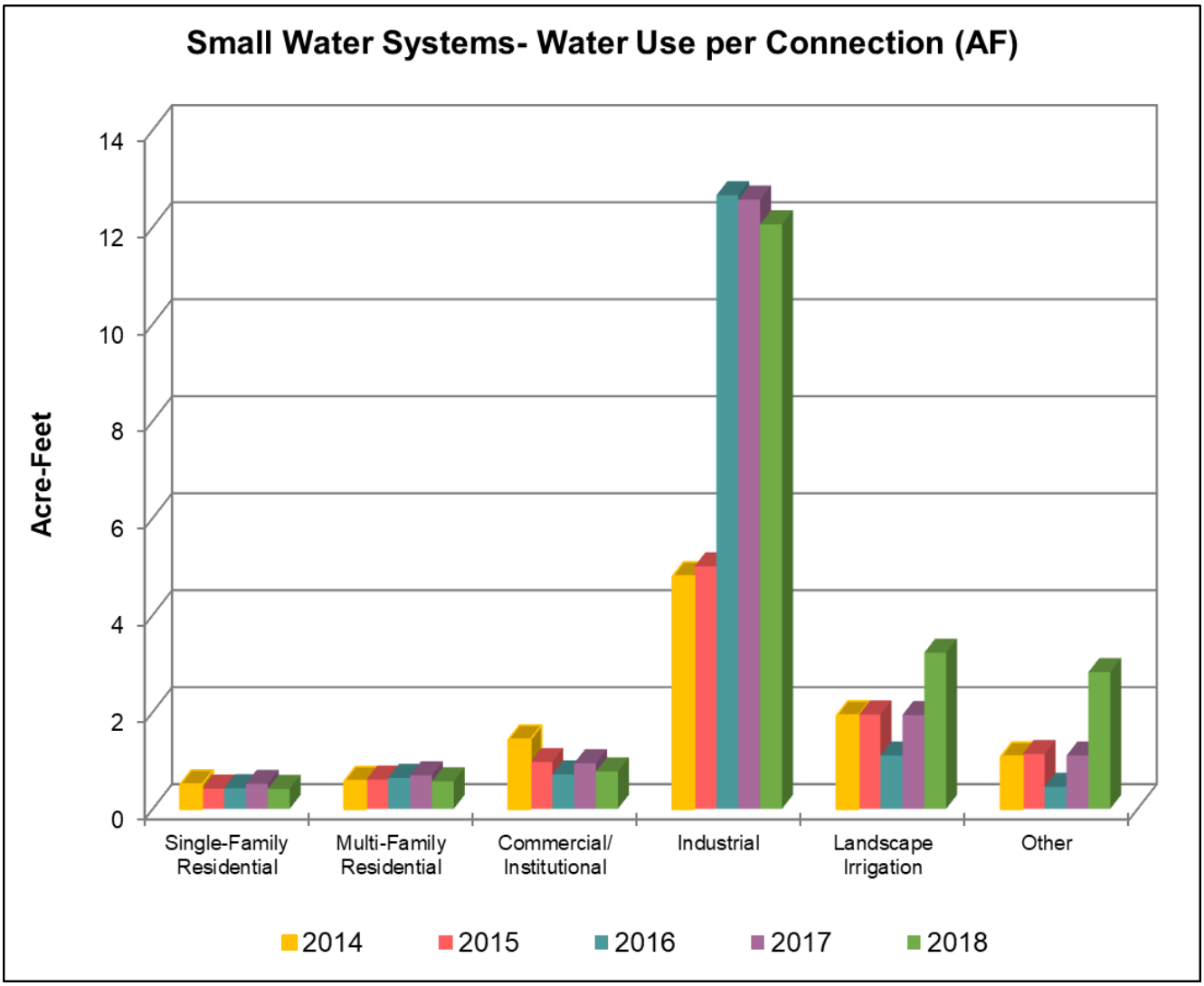



**Figure 19. Urban Water Use per Connection – For Small Water Systems**

**Table 11. Water Use per Connection – Large Water Systems (2014-2018).**

| Large Water Systems: Water Use (AF) Per Connection Class | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Single-Family Residential | 0.372 | 0.314 | 0.274 | 0.292 | 0.282 |
| Multi-Family Residential | 1.025 | 1.296 | 0.858 | 1.026 | 0.892 |
| Commercial/ Institutional | 2.997 | 0.965 | 1.579 | 1.583 | 1.635 |
| Industrial | 10.928 | 3.910 | 15.491 | 15.718 | 19.879 |
| Landscape Irrigation | 1.956 | 4.828 | 1.195 | 2.138 | 2.157 |
| Agricultural Irrigation | - | - | 38.649 | 21.223 | 87.650 |
| Other | 12.574 | 15.591 | 1.918 | 0.934 | 2.382 |

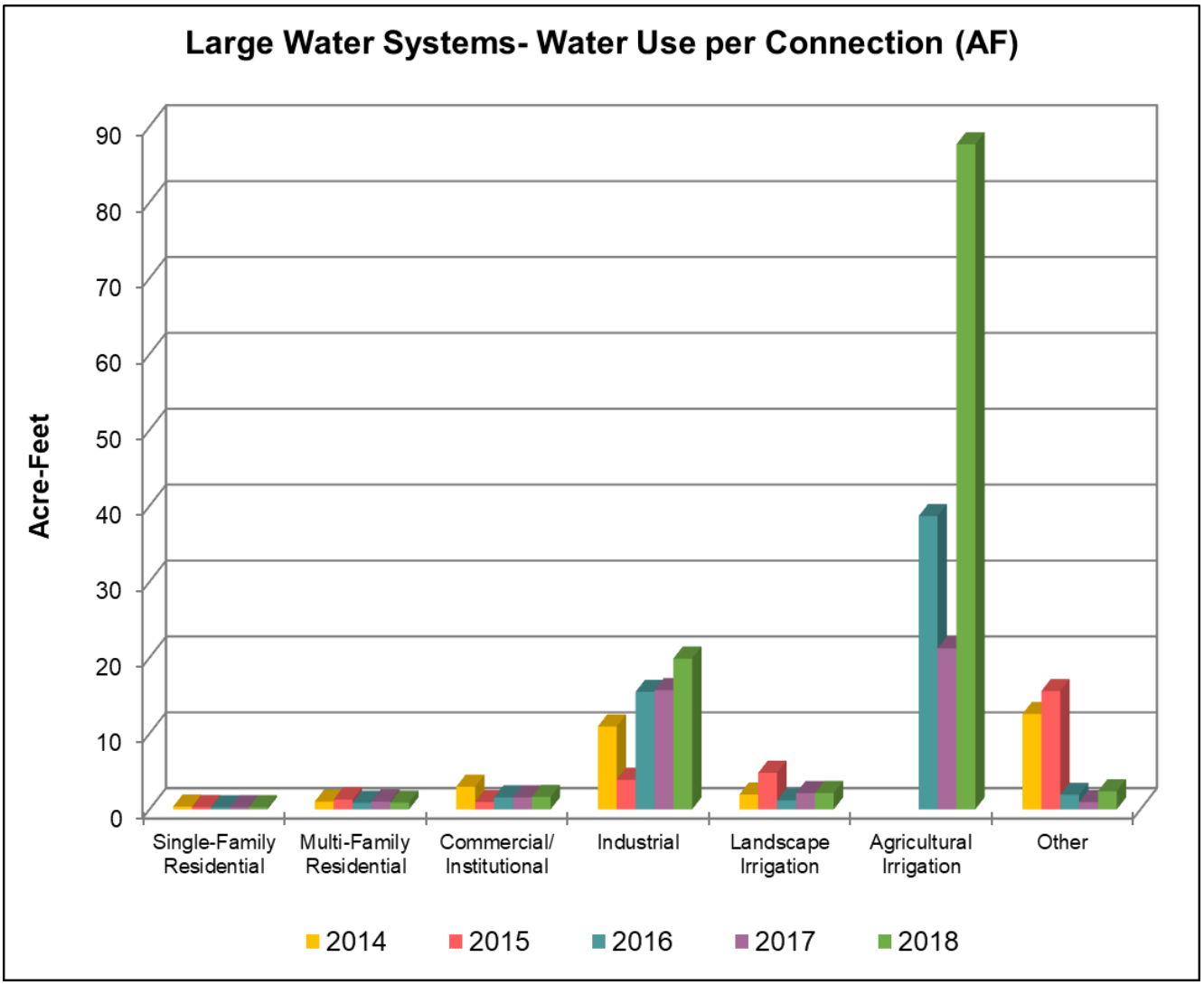



**Figure 20. Urban Water Use per Connection – For Large Water Systems**

**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**
**Board of Directors**

| | |
|---|---|
| Mark Gonzalez, Chair | District #1 |
| Mike Scattini | District #2 |
| Richard Ortiz | District #3 |
| Deidre Sullivan | District #4 |
| 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**
**Executive Management**

Brent Buche, General Manager
Elizabeth Krafft, Interim Deputy General Manager
Howard Franklin, Senior Hydrologist

**Groundwater Extraction Summary Report Team**

Tamara Voss, Associate Hydrologist
Nicole Koerth, Water Resources Technician

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