

2011
Ground Water
Summary Report

Monterey County Water Resources Agency

October 2012

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Overview of the Ground Water Reporting Program

History of the Ground Water Reporting Program

In February 1993, the Monterey County Board of Supervisors adopted Ordinance No. 3663 that required water suppliers within Zones 2, 2A, and 2B to report water-use information for ground water extraction facilities (wells) and service connections to the Monterey County Water Resources Agency (Agency). Monterey County Ordinance No. 3717, which replaced Ordinance No. 3663 and was adopted in October 1993, modified certain other requirements in the previous ordinance while keeping the ground water extraction reporting requirements in place for wells with a discharge pipe having an inside diameter of at least three inches.

The Agency has collected ground water extraction data from well operators, for the period beginning November 1 and ending October 31, starting with the 1992-1993 reporting year. Information received from the 300-plus well operators in the above-referenced zones of the Salinas Valley is compiled by the Ground Water Extraction Management System (GEMS) portion of the Water Resources Agency Information Management System (WRAIMS), a relational database maintained by the Agency. The intent of the ground water reporting program is to provide documentation of the reported amount of ground water that is extracted from Zones 2, 2A, and 2B of the Salinas Valley Ground Water Basin each year.

Since 1991, the Agency has required the annual submittal of Agricultural Water Conservation Plans (Ordinance 3851), which outline the best management practices 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 best management practices being implemented by urban water purveyors as conservation measures.

2011 Ground Water Summary Report

The purpose of this report is to summarize the data submitted to the Agency by well operators in February 2012 from the following annual reports:

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

The agricultural data from the ground water extraction program covers the reporting year of November 1, 2010, through October 31, 2011; the urban data covers calendar year 2011. The agricultural and urban water conservation plans adopted for 2012 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 Methods

The Ground Water Conservation and Extraction Program provides well operators with a choice of three different reporting methods for each of their wells: Water Flowmeter, Electrical Meter, or Hour Meter (timer). The summary of ground water 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 is submitted by individual reporting parties and is not verified by Agency staff. In addition, since so many factors can affect the extraction calculations, 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. The Agency received Ground Water Extraction Reports from ninety-seven percent (97%) of the 1847 wells in the Salinas Valley for the 2011 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2012 were ninety-two percent (92%) and ninety-five percent (95%), respectively.

Reporting Format

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

Ground Water Extraction Data Summary

The Salinas Valley Ground Water Basin is divided into four major hydrologic subareas whose boundaries are derived from discernible changes in the hydrogeologic conditions of the underground aquifers. Figure 1 (below) illustrates the Agency-designated Zones of the Salinas Valley in relation to the hydrologic subareas.

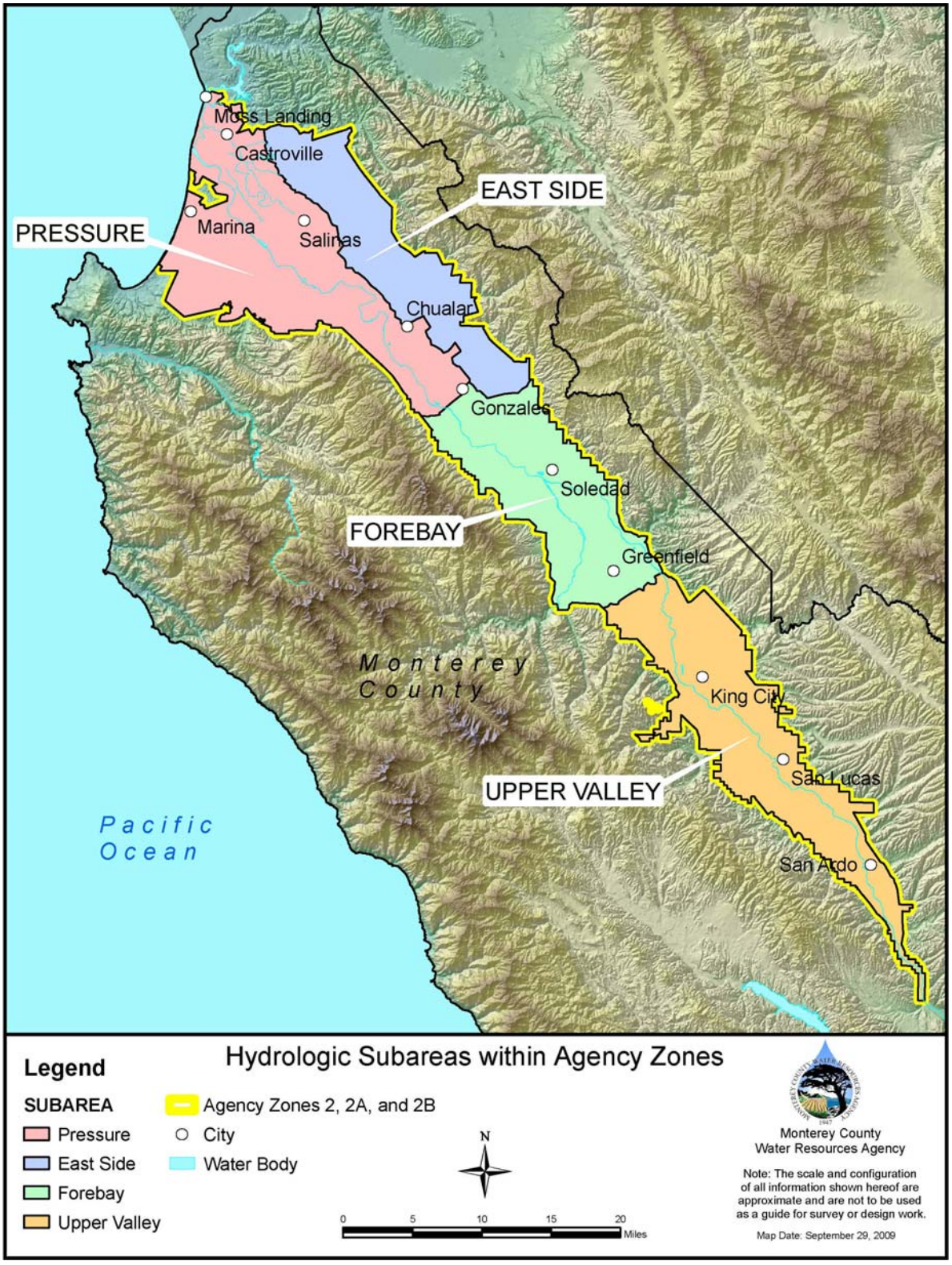


Figure 1. Agency Zones and hydrologic subareas of the Salinas Valley Ground Water Basin

Ground Water Extraction Data Summary (continued)

Summary of Methods Used for Extraction Reporting

The distribution of methods used for ground water extraction reporting (agricultural and urban) for the 2011 reporting year is shown in Table 1; a percentage distribution by volume is shown in Figure 2.

Table 1. Total extraction data by reporting method

Reporting Method	*Acre-Feet per Reporting Method*	*Wells per Reporting Method*
Water Flowmeter	315,905	1,360
Electrical Meter	123,686	410
Hour Meter	8,993	14
Total (2011)	448,584	1,784
Average ('02-'11)	**499,085**	**1,742**

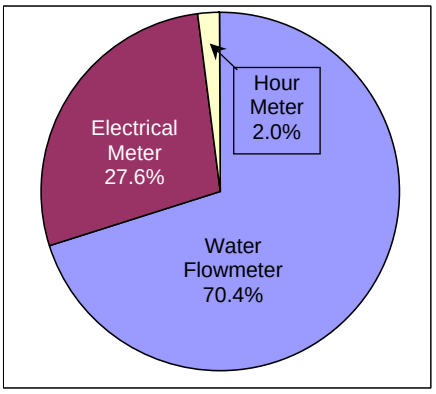


Figure 2. Percentage distribution by volume of methods used for extraction reporting

Total Extraction Data by Hydrologic Subarea and Type of Use

The total ground water extractions for the 2011 reporting year are summarized by hydrologic subarea, type of use (agricultural and urban in Table 2), and percentage (Figure 3).

Table 2. Total extraction data by hydrologic subarea and type of use

Subarea	*Agricultural Pumping (acre-feet)*	*Urban Pumping (acre-feet)*	*Total Pumping (acre-feet)*
Pressure	87,290	17,882	105,172
East Side	73,495	15,557	89,052
Forebay	122,903	6,834	129,737
Upper Valley	120,422	4,201	124,623
Total	404,110	44,474	448,584
Percent of Total	**90.1%**	**9.9%**	**100%**

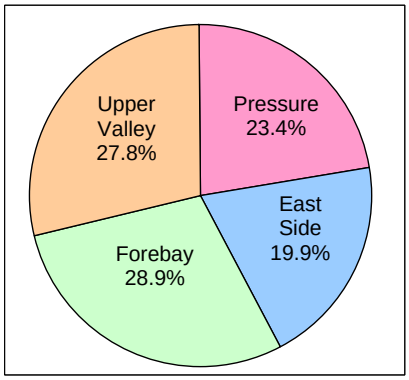


Figure 3. Percentage of total extractions by hydrologic subarea

Urban Extraction Data by City or Area

The total ground water extractions attributed to urban (residential, commercial/institutional, industrial, and governmental) pumping for the 2011 reporting year are summarized by city or area in Table 3. Figure 4 shows how the total urban pumping for 2011 is apportioned among each city or area.

Table 3. Urban extraction data by city or area

City or Area	*Urban Pumping (AF)*	*Percentage of Total*
Castroville	776	1.74%
Chualar	118	0.27%
Former Fort Ord	2,390	5.37%
Gonzales	1,371	3.08%
Greenfield	2,325	5.23%
King City	2,932	6.59%
Marina	1,667	3.75%
Other Areas (OA)		
OA-Pressure	3,930	8.84%
OA-East Side	4,550	10.23%
OA-Forebay	982	2.21%
OA-Upper Valley	1,130	2.54%
Salinas	18,638	41.91%
San Ardo	105	0.24%
San Lucas	32	0.07%
Soledad	2,368	5.32%
Soledad Prisons	1,160	2.61%
Total	44,474	100.00%

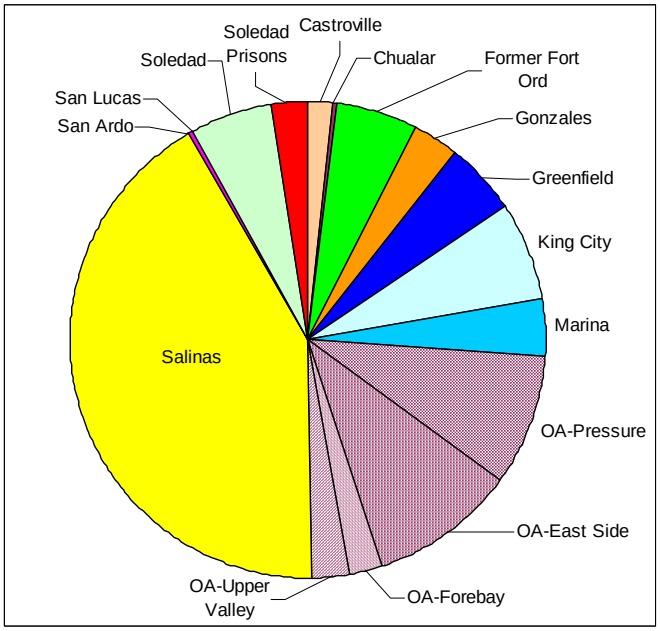


Figure 4. Distribution of urban extraction by city or area

Agricultural Water Conservation Plans

The Agricultural Water Conservation Plans include net irrigated acreage, irrigation method, and crop category. This information is forecasted and indicates what the grower plans to do in the upcoming year. It reflects the changing trends in irrigation methods in the Salinas Valley. Tables 4, 5, 6, and 7 show the distribution of irrigation methods by crop type for 1993, 2010, 2011 and 2012, respectively. Figure 5 (on the following page) illustrates the irrigation method trends from 1993 to 2012.

Table 4. 1993 - net acre distribution of irrigation methods by crop type (based on 94% companies reported)

1993	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other[1]*	*Total*
Vegetables	2,349	84,060	30,764	6,607	3,827	3,682	0	131,289
Field Crops	575	2,173	2,236	90	50	48	0	5,172
Berries	1	0	0	0	0	4,158	0	4,159
Grapes	261	0	0	13,347	0	15,976	0	29,584
Tree Crops	0	0	122	251	0	1,216	10	1,599
Forage	41	202	1,327	0	48	0	189	1,807
Unirrigated								N/A
Total	**3,227**	**86,435**	**34,449**	**20,295**	**3,925**	**25,080**	**199**	**173,610**

Table 5. 2010 - net acre distribution of irrigation methods by crop type (based on 95% companies reported)

2010	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other[1]*	*Total*
Vegetables	1,190	27,828	22,191	8,474	808	58,352	1,857	120,700
Field Crops	40	750	540	28	1,416	367	0	3,141
Berries	0	38	0	400	0	6,761	0	7,199
Grapes	0	0	0	678	0	36,270	0	36,948
Tree Crops	0	0	0	366	0	1,354	0	1,720
Forage	18	0	185	10	0	32	0	245
Other Type[2]	0	149	2,429	190	15	1,566	202	4,551
Unirrigated								6,511
Total	**1,248**	**28,765**	**25,345**	**10,146**	**2,239**	**104,702**	**2,059**	**181,015**

Table 6. 2011 - net acre distribution of irrigation methods by crop type (based on 94% companies reported)

2011	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other[1]*	*Total*
Vegetables	30	24,027	23,409	9,907	869	62,275	185	120,702
Field Crops	35	444	266	80	1,416	544	0	2,785
Berries	0	38	0	340	0	6,810	0	7,188
Grapes	0	0	0	620	0	33,008	0	33,628
Tree Crops	0	0	0	366	0	1,742	0	2,108
Forage	18	0	133	0	0	0	132	283
Other Type[2]	0	126	2,427	175	12	1,321	100	4,161
Unirrigated								6,137
Total	**83**	**24,635**	**26,235**	**11,488**	**2,297**	**105,700**	**417**	**176,992**

Table 7. 2012 - net acre distribution of irrigation methods by crop type (based on 92% companies reported)

2012	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other[1]*	*Total*
Vegetables	0	22,556	19,469	7,476	677	69,040	2,001	121,219
Field Crops	0	323	284	206	1,416	389	140	2,758
Berries	0	122	0	100	0	7,707	0	7,929
Grapes	0	0	0	363	0	34,381	0	34,744
Tree Crops	0	0	0	0	0	1,724	0	1,724
Forage	0	138	172	0	0	1	0	311
Other Type[2]	36	126	2,297	126	12	886	20	3,503
Unirrigated								6,317
Total	**36**	**23,265**	**22,222**	**8,271**	**2,105**	**114,128**	**2,161**	**178,505**

[1] "Other" may include an irrigation system not listed here or a different combination of systems
[2] "Other Type" are for other crop types not included, i.e. cactus, flower bulbs, etc.
NOTE: Percentage of companies reported varies from year to year

Agricultural Water Conservation Plans (continued)

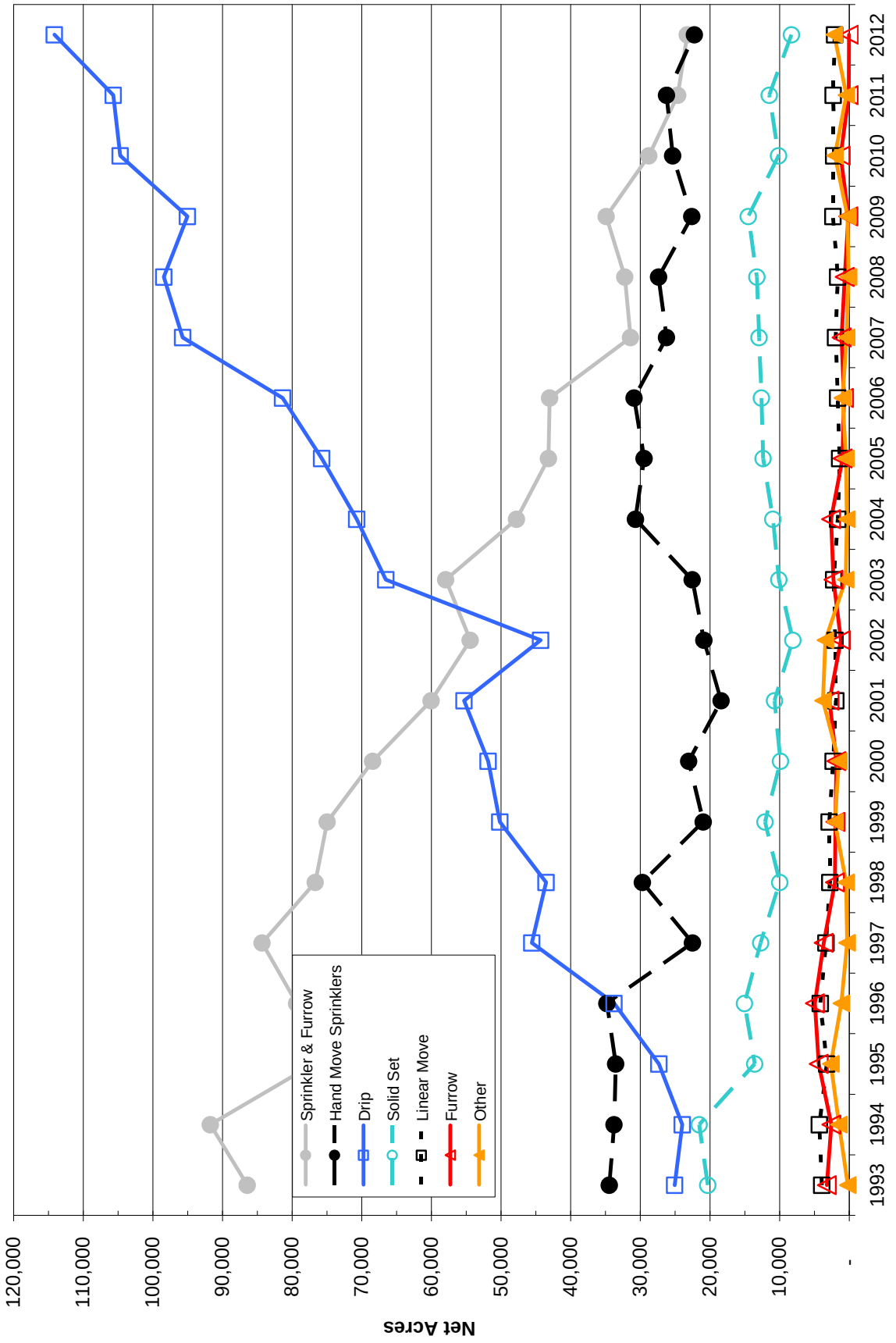


Figure 5. Types of irrigation methods used in the Salinas Valley based on companies reported

NOTE: Reported net acres vary from year to year

Agricultural Water Conservation Plans (continued)

Since 1991, Salinas Valley growers have submitted Agricultural Water Conservation Plans to the Agency. Table 8 shows the number of net acres, by year, for selected Best Management Practices (BMPs) or water conservation measures which were reported to be implemented over the past eight years.

Table 8. Agricultural Best Management Practices reported to be adopted from 2005 through 2012

Best Management Practices	Net Acres[1]							
	2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
12 Months Set Aside	3,337	2,557	2,282	768	9,043	7,447	3,285	8,172
Summer Fallow	2,535	5,797	464	703	509	692	1,944	688
Water Flowmeters	131,711	133,148	137,701	105,374	124,561	138,957	144,353	141,595
Time Clock/Pressure Switch	138,707	142,184	148,993	117,554	126,694	144,853	153,715	152,488
Soil Moisture Sensors	48,824	50,130	53,269	37,631	32,427	44,644	46,121	46,309
Pre-Irrigation Reduction	88,576	96,082	102,103	73,186	84,693	96,908	99,362	94,954
Reduced Sprinkler Spacing	81,068	87,159	85,105	72,287	83,046	90,065	97,926	90,503
Sprinkler Improvements	105,544	102,642	105,491	89,973	105,495	111,889	115,517	115,946
Off-Wind Irrigation	117,254	113,867	112,952	92,160	107,552	114,843	116,209	114,110
Leakage Reduction	115,117	116,662	117,655	94,694	105,702	113,820	115,255	113,372
Micro Irrigation System	68,861	74,829	77,107	55,749	71,710	67,383	87,464	93,146
Surge Flow Irrigation	7,180	7,117	4,551	4,549	7,182	8,785	11,473	12,275
Tailwater Return System	23,097	23,968	14,410	15,906	10,046	16,581	15,402	13,577
Land Leveling/Grading	69,673	71,873	73,993	60,710	56,482	73,361	76,436	79,534

[1] Due to unique crop rotations, it is difficult to account for each BMP used on total Crop Acres; therefore Net Acres were used.

Note: For Urban Water Conservation Plan information, see page 10.

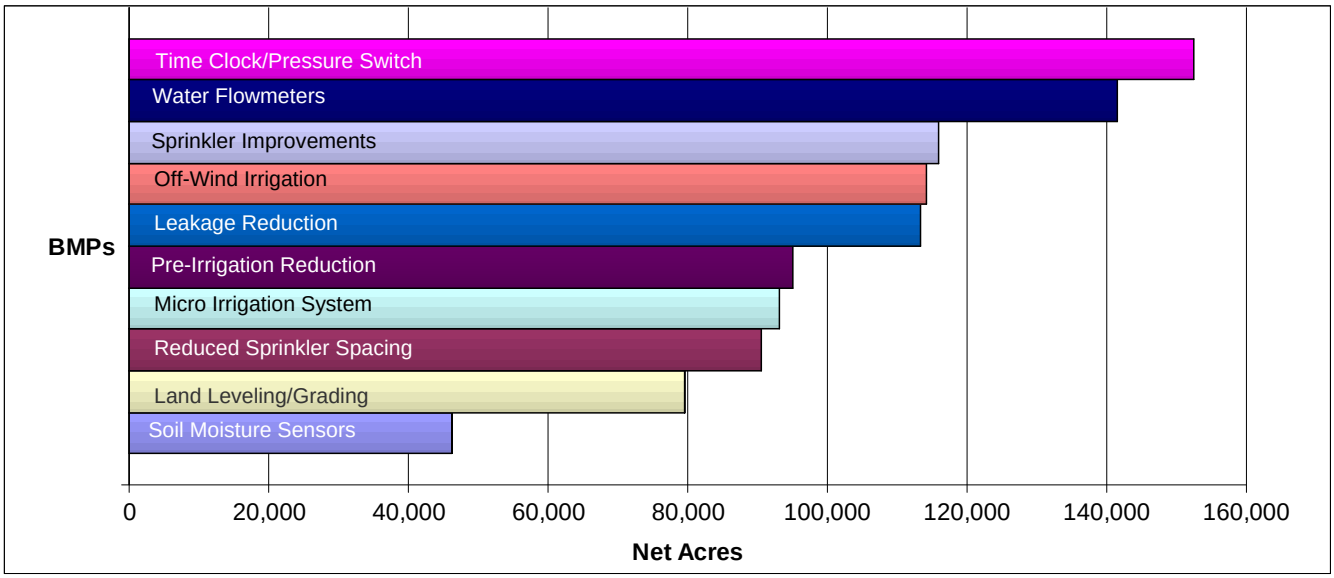


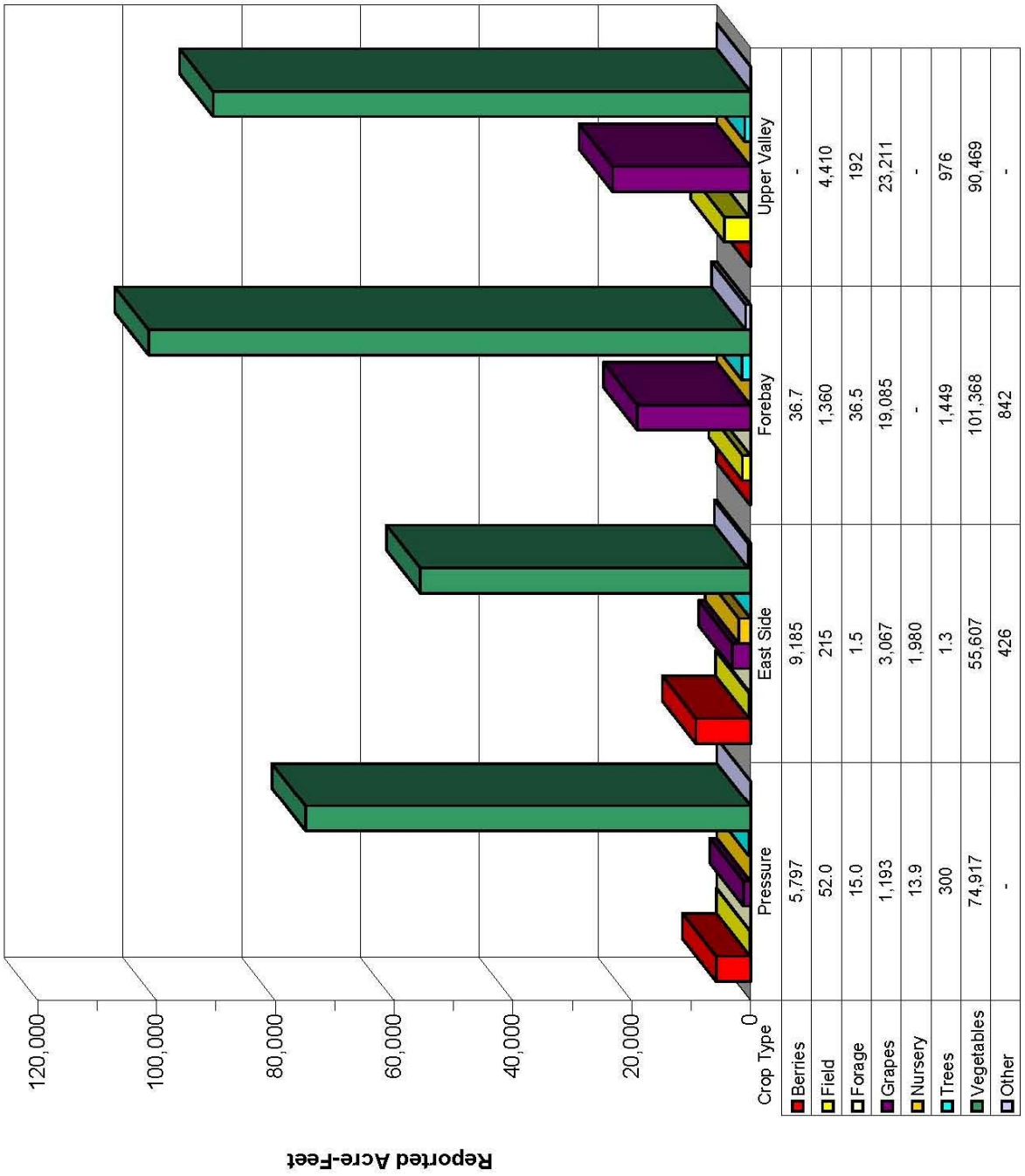
Figure 6. Top Ten Best Management Practices forecasted for 2012 based on reported net acres

Water and Land Use Forms

Agricultural Water Pumped

The following three figures present the agricultural water pumped (Fig. 7), irrigated net acres (Fig. 8), and amount of water used per acre (Fig. 9) by hydrologic subarea and crop type. The data was compiled using the reported acreage and water pumped from the 2011 Water and Land Use Forms. 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 area to another and crop types will vary depending on economic demand.



Crop Type	Pressure	East Side	Forebay	Upper Valley
Berries	5,797	9,185	36.7	-
Field	52.0	215	1,360	4,410
Forage	15.0	1.5	36.5	192
Grapes	1,193	3,067	19,085	23,211
Nursery	13.9	1,980	-	-
Trees	300	1.3	1,449	976
Vegetables	74,917	55,607	101,368	90,469
Other	-	426	842	-

Figure 7. 2011 reported acre-feet by crop type & hydrologic subarea

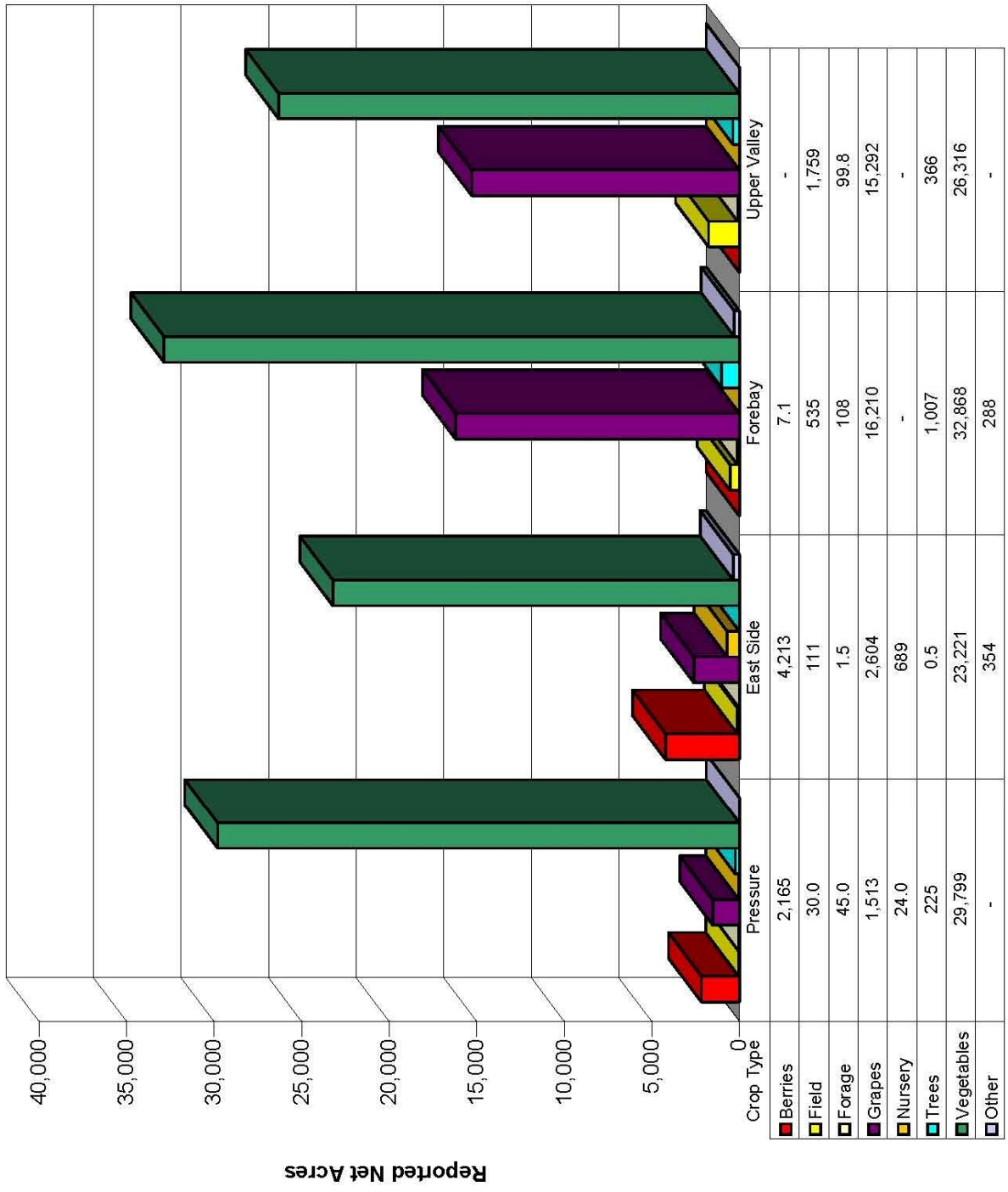


Figure 8. 2011 reported net acres by crop type & hydrologic subarea

Water and Land Use Forms (continued)

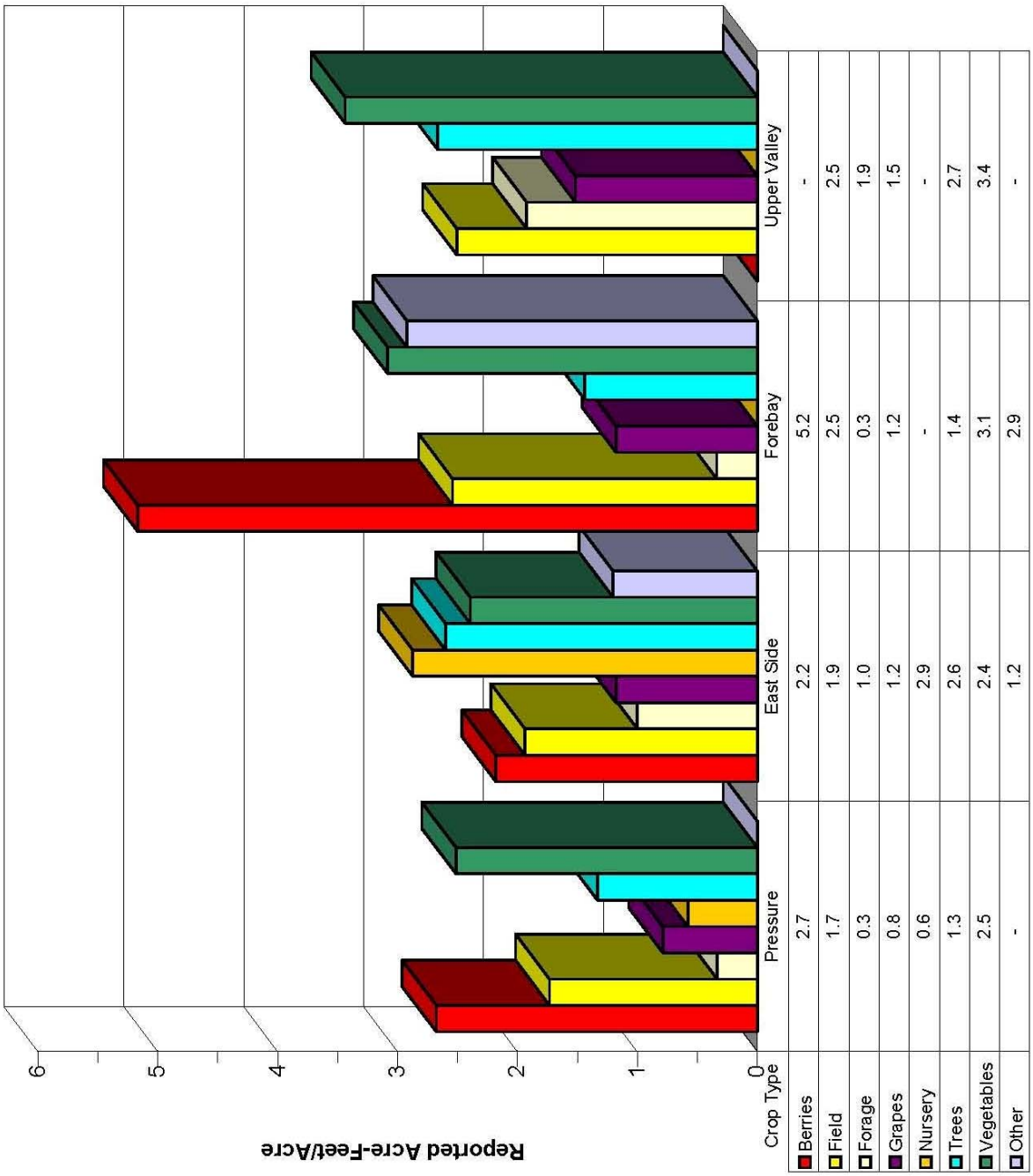


Figure 9. 2011 reported acre-feet/acre by crop type & hydrologic subarea

Urban Water Conservation Plans

Since 1996, the Agency has been collecting data for the Urban Water Conservation Plan program. Table 9 shows the forecasted adoption of "Best Management Practices" (water conservation measures) for the past five years, as a percentage of total acreage reported. It is important to note that, while all of the listed practices apply to "large" water systems (200 or more customer connections), not all apply to "small" water systems (between 15 and 199 customer connections). The practices that apply *only* to large systems are printed in **bold** below.

Table 9. Urban Best Management Practices reported to be adopted from 2008 through 2012

Best Management Practices	***2008***	***2009***	***2010***	***2011***	***2012***
Provide speakers to community groups and media	**67%**	**85%**	**86%**	**85%**	**81%**
Use paid and public service advertising	**67%**	**85%**	**89%**	**74%**	**96%**
Provide conservation information in bill inserts	79%	96%	90%	94%	95%
Provide individual historical water use information on water bills	85%	90%	85%	92%	92%
Coordinate with other entities in regional efforts to promote water conservation practices	91%	94%	85%	94%	95%
Work with school districts to provide educational materials and instructional assistance	**69%**	**87%**	**87%**	**61%**	**92%**
Implement requirements that all new connections be metered and billed by volume of use	94%	98%	99%	99%	99%
Establish a program to retrofit any existing unmetered connections and bill by volume of use	58%	97%	97%	77%	78%
Offer free interior and exterior water audits to identify water conservation opportunities	**54%**	**79%**	**78%**	**98%**	**100%**
Provide incentives to achieve water conservation by way of free conservation fixtures (showerheads, hose end timers) and/or conservation "adjustments" to water bills	**67%**	**85%**	**94%**	**94%**	**90%**
Enforcement and support of water conserving plumbing fixture standards, including requirement for ultra low flush toilets in all new construction	**55%**	**100%**	**99%**	**78%**	**98%**
Support of State/Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush	61%	78%	76%	96%	97%
Program to retrofit existing toilets to reduce flush volume (with displacement devices)	28%	83%	87%	66%	34%
Program to encourage replacement of existing toilets with ultra low flush (through rebates, incentives, etc.)	**67%**	**80%**	**95%**	**89%**	**95%**
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water-saving practices	87%	90%	95%	94%	90%
Encourage local nurseries to promote use of low water use plants	62%	58%	55%	78%	78%
Develop and implement landscape water conservation ordinances pursuant to the "Water Conservation in Landscaping Act"	**33%**	**63%**	**68%**	**63%**	**63%**
Identify and contact top industrial, commercial, and/or institutional customers directly; offer and encourage water audits to identify conservation opportunities	**65%**	**57%**	**67%**	**89%**	**87%**
Review proposed water uses for new commercial and industrial water service, and make recommendations for improving efficiency before completion of building permit process	**72%**	**64%**	**64%**	**64%**	**84%**
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	24%	60%	69%	74%	92%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost effective	28%	85%	98%	79%	97%
Advise customers when it appears possible that leaks exist on customer's side of water meter	94%	100%	100%	99%	99%
Identify irrigators of large landscapes (3 acres or more) and offer landscape audits to determine conservation opportunities	**65%**	**57%**	**73%**	**90%**	**89%**
Provide conservation training, information, and incentives necessary to encourage use of conservation practices	**67%**	**81%**	**97%**	**91%**	**92%**
Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies	64%	84%	89%	91%	86%
Implementation of conservation pricing policies	64%	88%	93%	96%	91%
Enact and enforce measures prohibiting water waste as specified in Agency Ordinance No. 3932 or as subsequently amended, and encourage the efficient use of water	80%	78%	54%	64%	71%
Implement and/or support programs for the treatment and reuse of industrial waste water / storm water / waste water	**32%**	**61%**	**50%**	**53%**	**67%**

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Monterey County
Board of Supervisors

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Louis Calcagno	District #2
Simón Salinas	District #3
Jane Parker, Chair	District #4
Dave Potter	District #5

Monterey County Water Resources Agency
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Vacant	District #1
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Ken Ekelund, Vice Chair	District #5
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Claude Hoover	Monterey County Farm Bureau
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Monterey County Water Resources Agency
Executive Management

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Robert Johnson, Assistant General Manager, Chief – Water Resources Planning and Management
Brent Buche, Assistant General Manager, Chief – Operations and Maintenance
Nerahoo Hemraj, Interim Finance Manager – Administrative Services
Wini Chambliss, – Administrative Services Assistant

Summary Report Team

Kathleen Thomasberg, Senior Hydrologist
Tamara Voss, Hydrologist
Teresa Campa, Engineering Aide II

In Remembrance

The *2011 Ground Water Summary Report* is dedicated to the memory of Board of Director:

Bill Petrovic

And original Agricultural Water Advisory Committee member (1994-2010)

Jim Manassero

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