
2007
Ground Water
Summary Report
MONTEREY COUNTY WATER RESOURCES AGENCY
1947
Monterey County Water Resources Agency
August 2008

Table of Contents

List of Tables

List of Figures

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. 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 Monterey County Water Resources Agency (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 extraction reporting program is to measure and document the amount of ground water 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.

2007 Ground Water Summary Report
The purpose of this report is to summarize the data submitted by well operators in February 2008 from the following annual reporting programs: ***Ground Water Extraction Reporting (agricultural and urban), Water Conservation Plans (agricultural and urban), and Water and Land Use Information (agricultural)***. The *agricultural* data from the ground water extraction reporting program covers the reporting year of **November 1, 2006, through October 31, 2007**; the *urban* data covers **calendar year 2007**. The agricultural and urban water conservation plans adopted for 2008 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 allows well operators to report water extractions by one of three different measuring methods: Water Flowmeter, Electrical Meter, or Hour Meter (timer). Ordinance 3717 requires annual pump efficiency tests for each well to ensure the accuracy of the data reported. The summary of ground water extractions presented in this report is compiled from data generated by all three reporting methods.

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 the individual reporting parties and is not verified by Agency staff. In addition, since so many factors can affect the 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 approximately ninety-seven percent (97%) of the 1793 wells in the Salinas Valley for the 2007 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2008 were ninety-four percent (94%) and ninety-three percent (93%), 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 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.

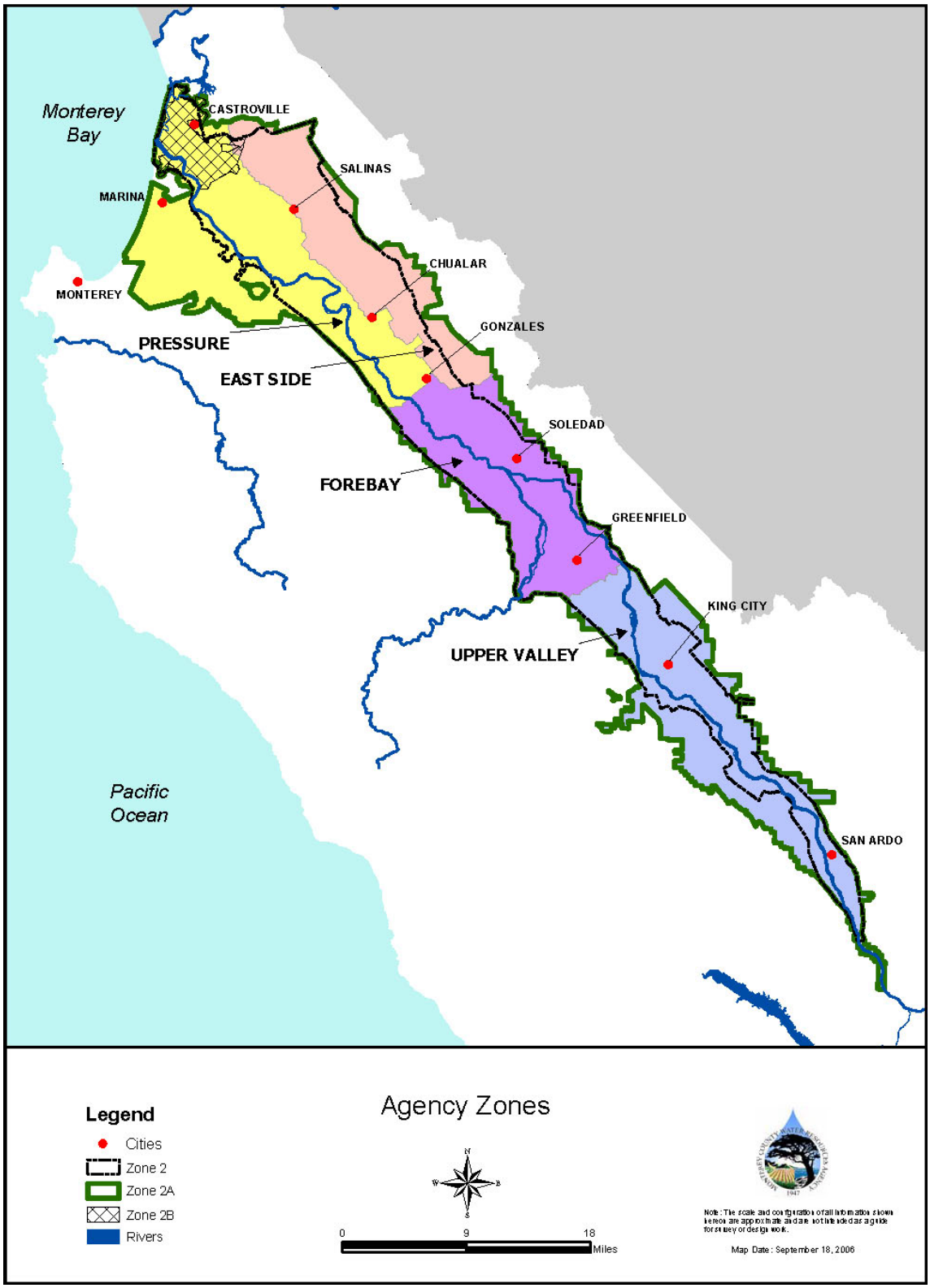

Figure 1. Agency Zones and hydrologic subareas of the Salinas Valley Ground Water Basin

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 2007 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	362,040	1,275
Electrical Meter	147,773	435
Hour Meter	15,782	27
Total (2007)	**525,595**	**1,737**
Average ('97-'07)	**490,255**	**1,666**

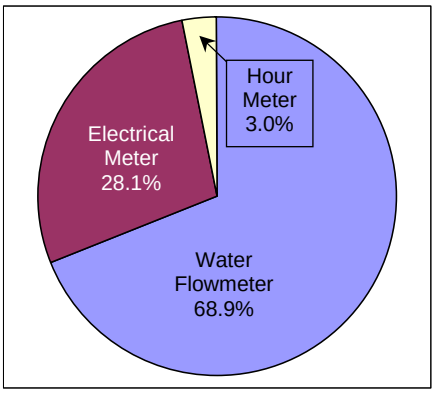

Figure 2. Percentage distribution by volume of methods used for extraction reporting

Total Extraction Data by Hydrologic Subarea and Type of Use

The total ground water extractions for the 2007 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	103,803	21,817	125,620
East Side	89,065	15,118	104,183
Forebay	149,723	9,052	158,775
Upper Valley	132,564	4,453	137,017
Total	**475,155**	**50,440**	**525,595**

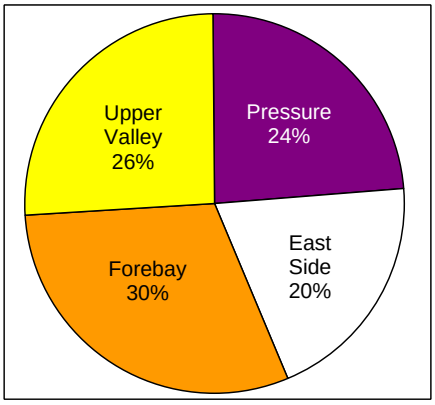

Figure 3. Percentage of total extractions by hydrologic subarea

Urban Extraction Data by City or Area

The total ground water extractions attributed to urban (residential, commercial/institutional, industrial, and governmental) pumping for the 2007 reporting year are summarized by city or area in Table 3. Figure 4 shows how the total urban pumping for 2007 is divided among each city or area.

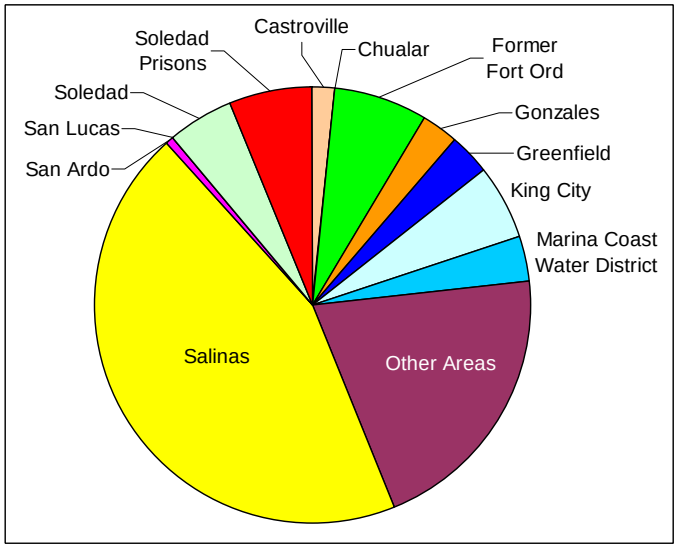

Figure 4. Distribution of urban extraction by city or area

Table 3. Urban extraction data by city or area

City or Area	*Urban Pumping (AF)*	*Percentage of Total*
Castroville	788	1.6%
Chualar	117	0.2%
Former Fort Ord	3,399	6.7%
Gonzales	1,499	3.0%
Greenfield	1,448	2.9%
King City	2,893	5.7%
Marina Coast WD	1,596	3.2%
Other Areas	10,398	20.6%
Salinas	22,478	44.6%
San Ardo	162	0.3%
San Lucas	50	0.1%
Soledad	2,549	5.0%
Soledad Prisons	3,063	6.1%
Total	**50,440**	**100.0%**

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, 2006, 2007, and 2008, respectively. Figure 5 (on the following page) illustrates the irrigation method trends from 1993 to 2008.

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. 2006 - net acre distribution of irrigation methods by crop type based on 97% companies reported

2006	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other*	*Total*
Vegetables	590	42,577	27,873	9,553	1,640	37,368	732	120,333
Field Crops	156	447	270	85	0	206	78	1,242
Berries	0	0	0	0	0	5,312	0	5,312
Grapes	0	0	0	1,947	0	35,229	0	37,176
Tree Crops	0	0	2,338	441	0	3,042	0	5,821
Forage	0	0	362	15	0	0	97	474
Other Type[2]	18	0	64	554	0	222	68	926
Unirrigated								3,254
Total	**764**	**43,024**	**30,907**	**12,595**	**1,640**	**81,379**	**975**	**174,538**

Table 6. 2007 - net acre distribution of irrigation methods by crop type based on 94% companies reported

2007	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other*	*Total*
Vegetables	1,043	31,097	23,516	11,017	1,941	52,644	13	121,271
Field Crops	41	277	311	0	0	1,585	78	2,292
Berries	0	0	0	0	0	4,647	0	4,647
Grapes	0	0	0	990	0	33,559	0	34,549
Tree Crops	0	0	2,262	441	0	2,898	0	5,601
Forage	0	45	135	0	0	0	100	280
Other Type	18	0	0	512	0	382	174	1,086
Unirrigated								1,501
Total	**1,102**	**31,419**	**26,224**	**12,960**	**1,941**	**95,715**	**365**	**171,227**

Table 7. 2008 - net acre distribution of irrigation methods by crop type based on 94% companies reported

2008	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other*	*Total*
Vegetables	547	31,818	23,616	10,622	1644	54,577	4	122,828
Field Crops	107	215	341	1,528	0	226	80	2,497
Berries	0	192	276	0	0	4,595	0	5,063
Grapes	0	0	0	659	0	35,805	0	36,464
Tree Crops	0	0	2,807	412	0	2287	0	5,506
Forage	0	0	320	0	0	0	18	338
Other Type	0	0	0	28	0	940	0	968
Unirrigated								1,402
Total	**654**	**32,225**	**27,360**	**13,249**	**1,644**	**98,430**	**102**	**175,066**

[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 companies reported varies from year to year

Agricultural Water Conservation Plans (continued)

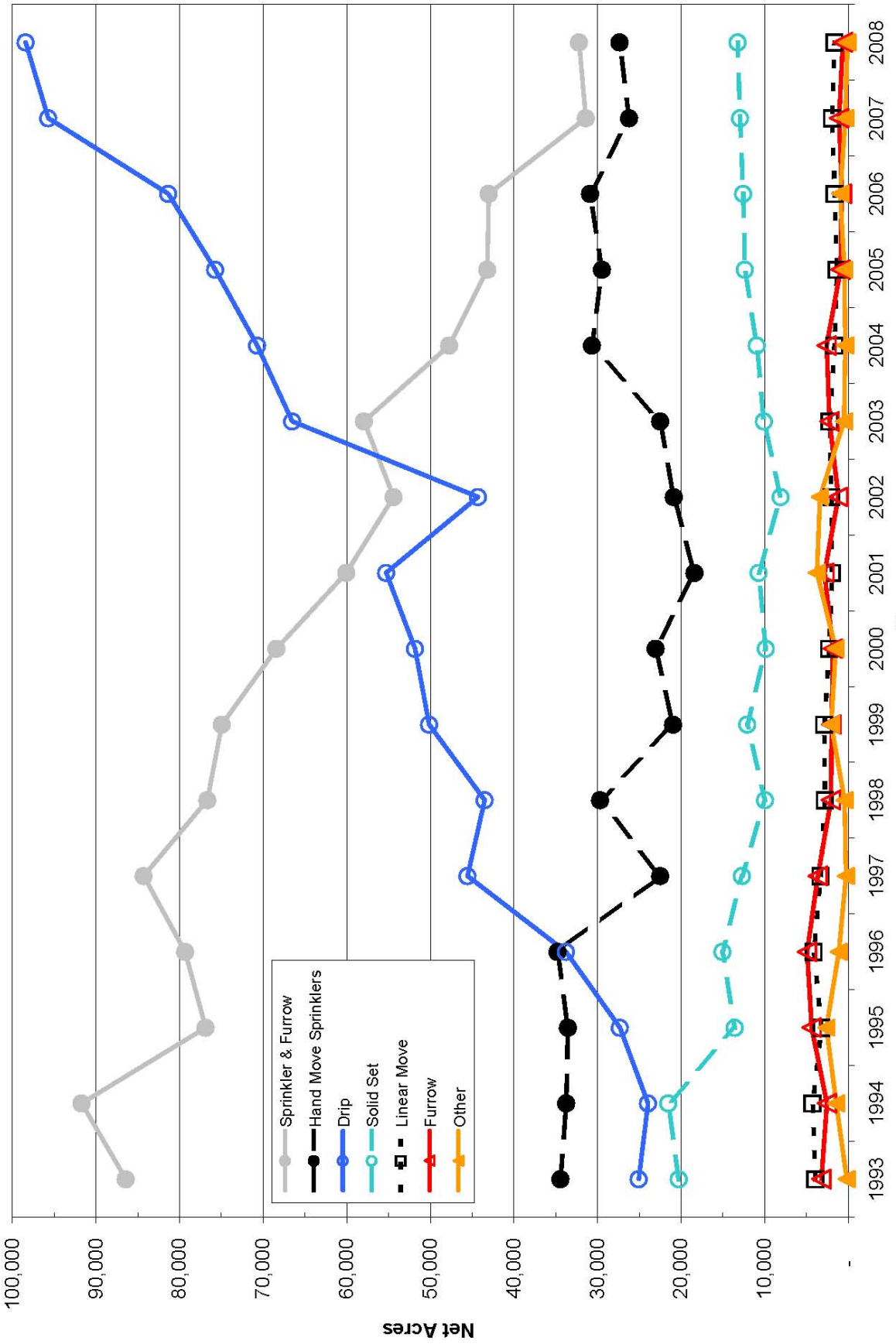

Figure 5. Types of irrigation methods used in the Salinas Valley based on companies reported

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 have been implemented over the past eight years.

Table 8. Agricultural Best Management Practices implemented from 2001 through 2008

Best Management Practices	Net Acres[1]							
	2001	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
12 Months Set Aside	2,363	3,940	2,742	6,012	3,337	2,557	2,282	768
Summer Fallow	1,532	2,652	2,278	2,025	2,535	5,797	464	703
Water Flowmeters	125,624	106,739	124,342	133,349	131,711	133,148	137,701	105,374
Time Clock/Pressure Switch	124,427	116,062	133,405	140,167	138,707	142,184	148,993	117,554
Soil Moisture Sensors	56,148	45,927	50,460	49,328	48,824	50,130	53,269	37,631
Pre-Irrigation Reduction	82,791	80,501	90,878	93,094	88,576	96,082	102,103	73,186
Reduced Sprinkler Spacing	68,963	61,607	76,691	82,292	81,068	87,159	85,105	72,287
Sprinkler Improvements	89,505	85,302	110,194	102,041	105,544	102,642	105,491	89,973
Off-Wind Irrigation	93,387	91,706	111,278	111,862	117,254	113,867	112,952	92,160
Leakage Reduction	95,304	95,217	121,890	118,125	115,117	116,662	117,655	94,694
Micro Irrigation System	55,261	44,078	58,742	62,796	68,861	74,829	77,107	55,749
Surge Flow Irrigation	10,677	7,084	8,538	6,708	7,180	7,117	4,551	4,549
Tailwater Return System	26,236	25,263	23,914	27,653	23,097	23,968	14,410	15,906
Land Leveling/Grading	54,319	56,361	69,420	71,682	69,673	71,873	73,993	60,710

[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.

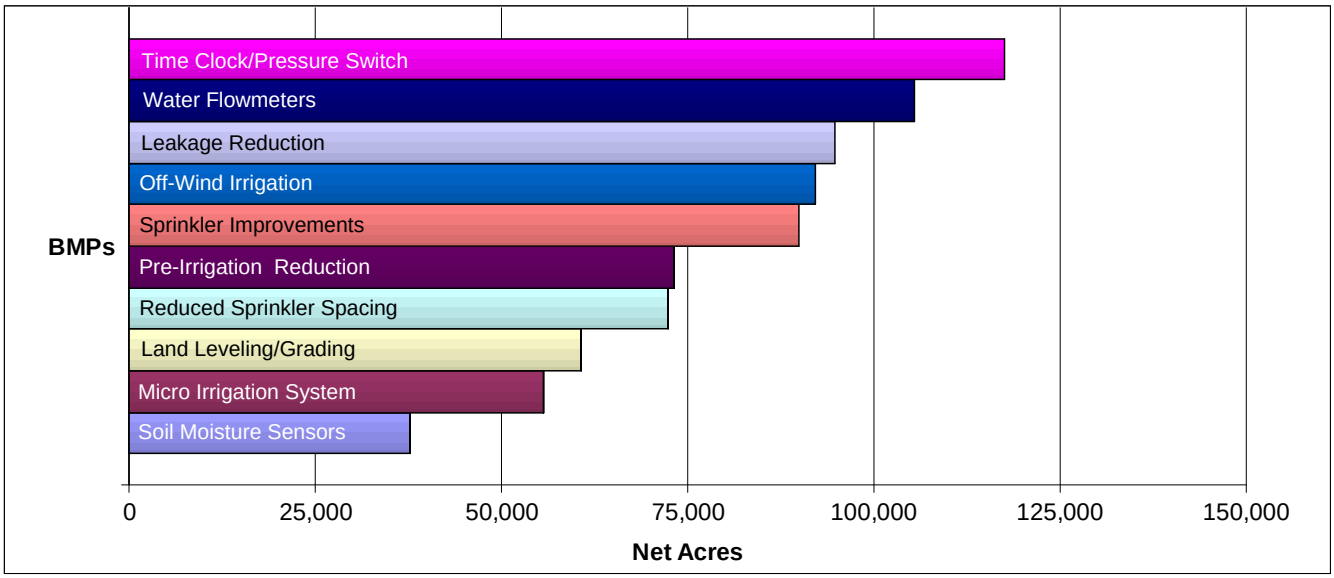

Figure 6. Top ten Best Management Practices forecasted for 2008 by reported net acres

Water and Land Use Form

Agricultural Water Pumped

The following three figures present the agricultural water pumped (Fig. 7), irrigated net acres (Fig. 8), and amount of water pumped per acre (Fig. 9) by hydrologic subarea and crop type. The data was compiled using the reported acreage and water pumped from the 2007 Water and Land Use Form. 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.

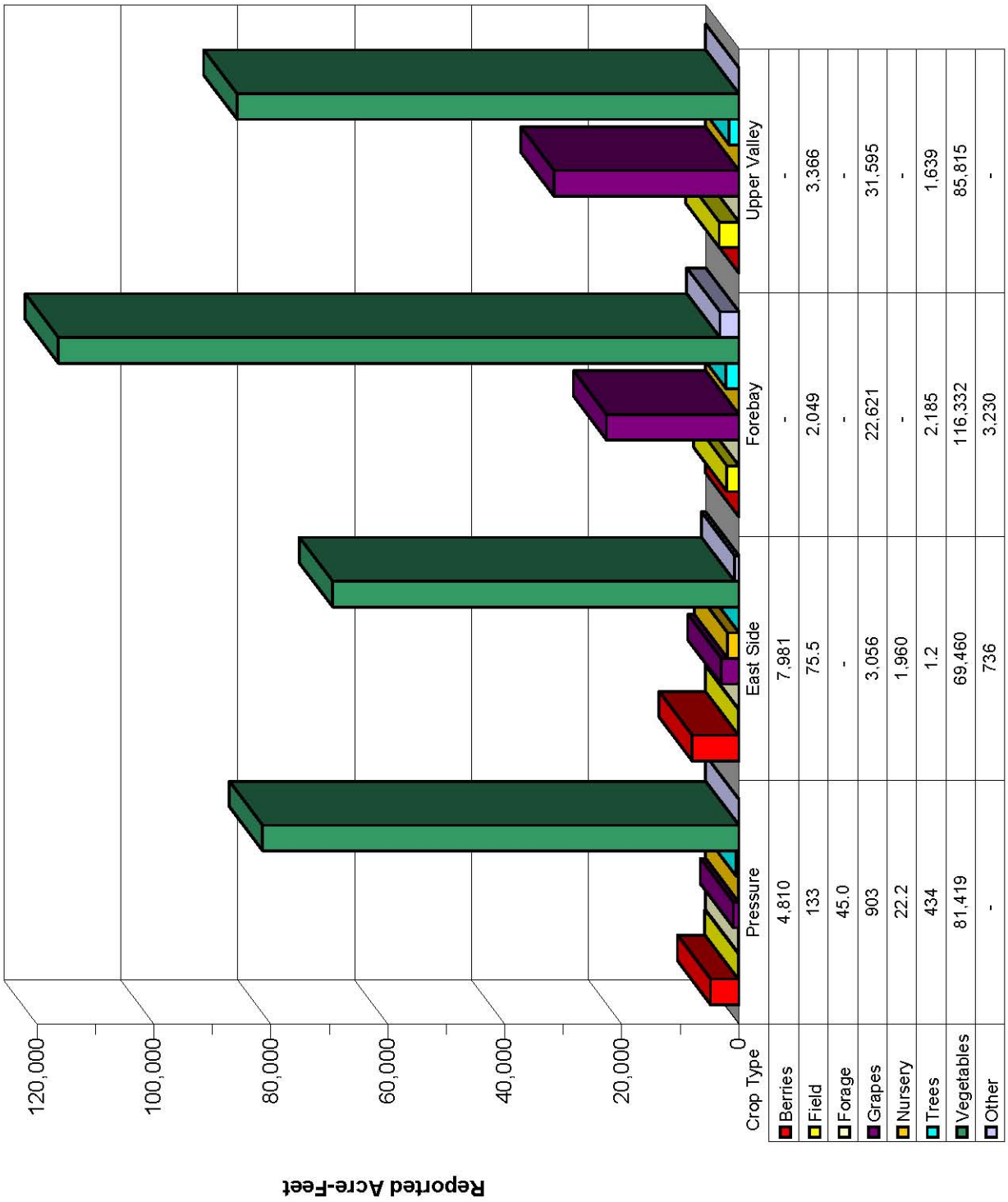

Figure 7. 2007 reported acre-feet by crop type & hydrologic subarea

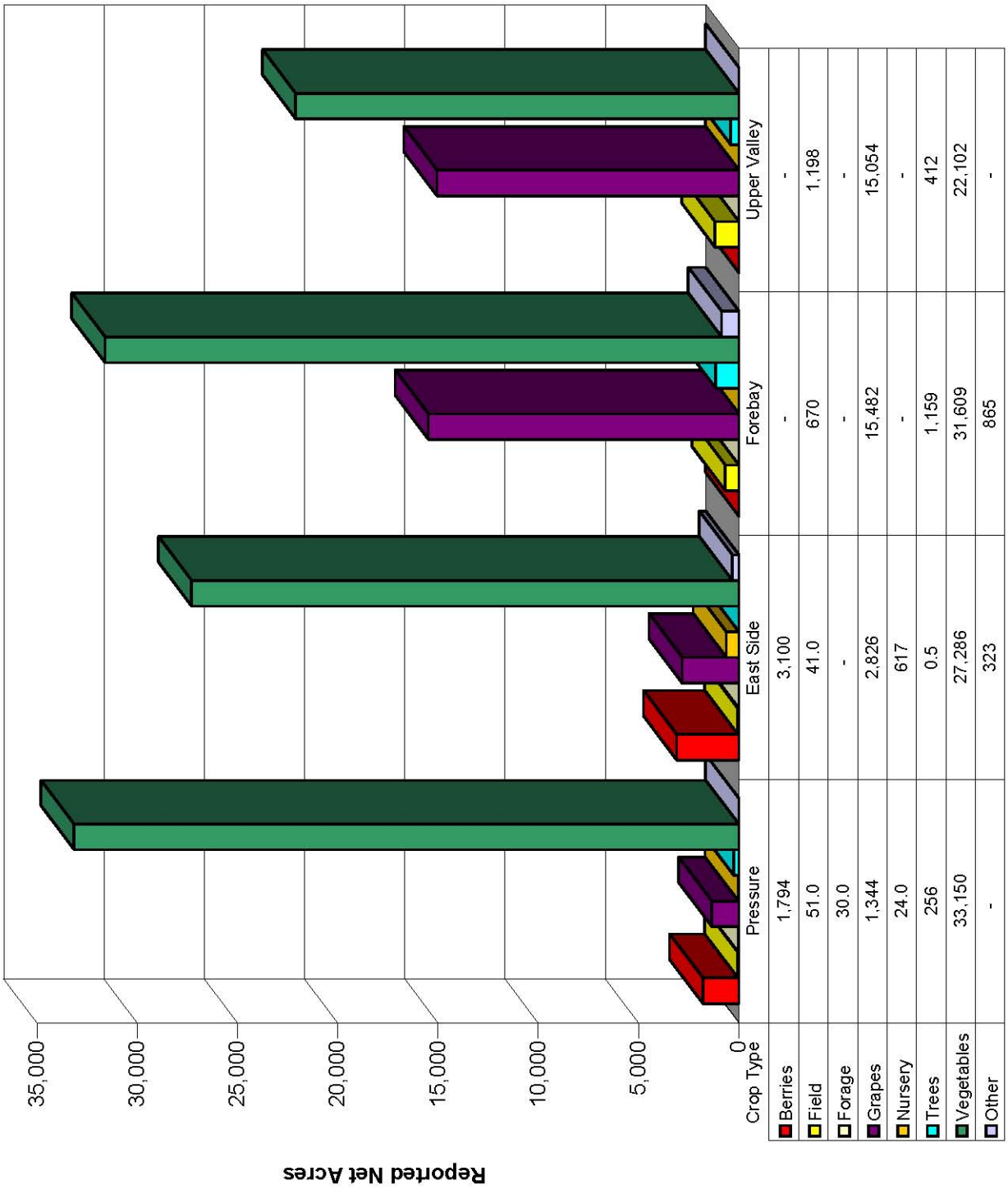

Figure 8. 2007 reported net acres by crop type & hydrologic subarea

Water and Land Use Form (continued)

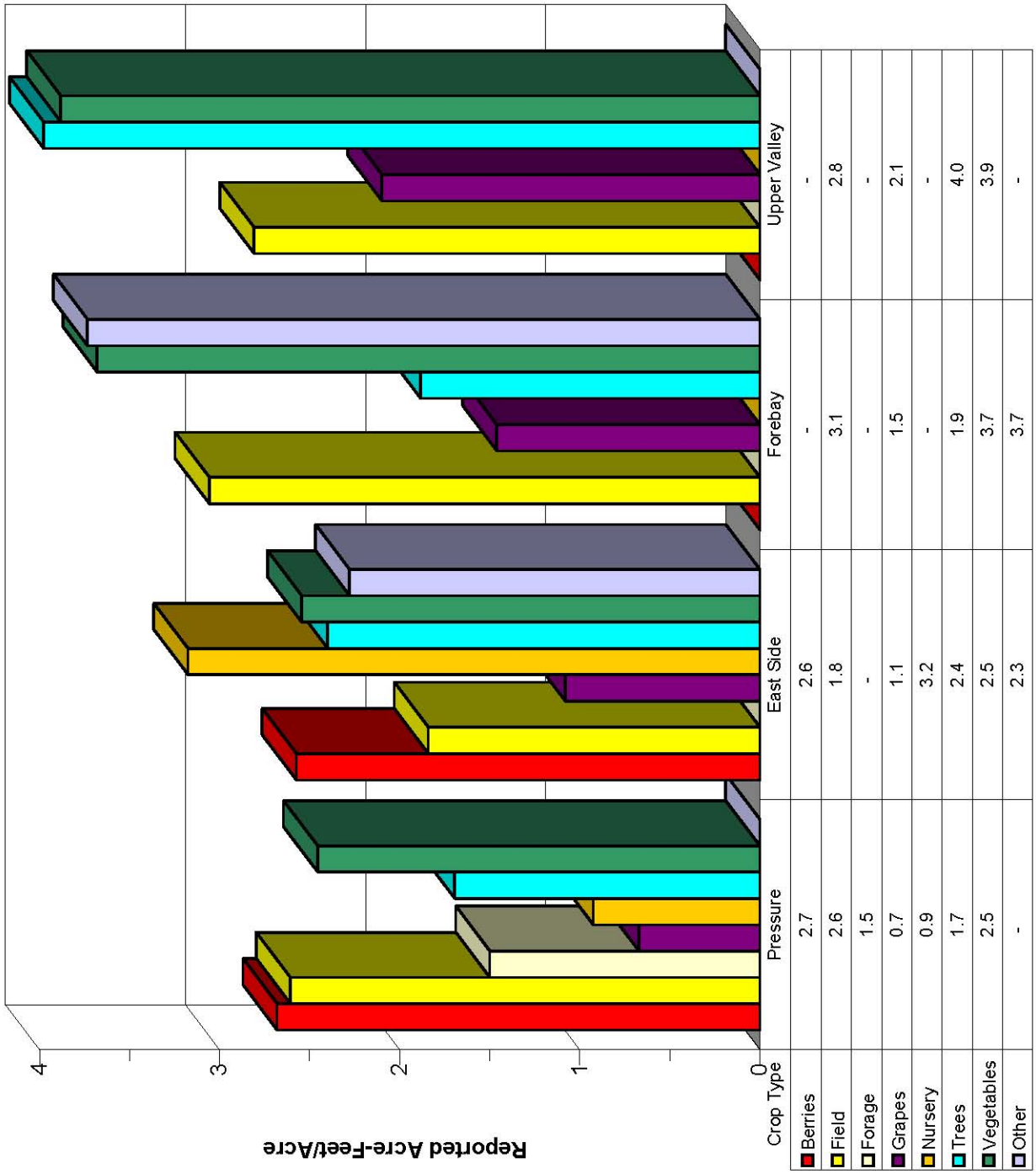

Figure 9. 2007 reported acre-feet/acre by crop type & hydrologic subarea

Urban Water Conservation Plans

Since 1996, the Agency has been collecting data for the Urban Water Conservation Plan program. Table 9 shows the implementation 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 implemented from 2004 through 2008

Best Management Practices	*2004*	*2005*	*2006*	*2007*	*2008*
Provide speakers to community groups and media	**71%**	**42%**	**70%**	**67%**	**67%**
Use paid and public service advertising	**74%**	**45%**	**70%**	**67%**	**67%**
Provide conservation information in bill inserts	65%	52%	76%	54%	79%
Provide individual historical water use information on water bills	77%	72%	81%	80%	85%
Coordinate with other entities in regional efforts to promote water conservation practices	91%	68%	92%	82%	91%
Work with school districts to provide educational materials and instructional assistance	**33%**	**46%**	**72%**	**68%**	**69%**
Implement requirements that all new connections be metered and billed by volume of use	95%	76%	93%	81%	94%
Establish a program to retrofit any existing unmetered connections and bill by volume of use	49%	45%	57%	54%	58%
Offer free interior and exterior water audits to identify water conservation opportunities	**58%**	**96%**	**92%**	**100%**	**54%**
Provide incentives to achieve water conservation by way of free conservation fixtures (showerheads, hose end timers) and/or conservation "adjustments" to water bills	**35%**	**70%**	**68%**	**61%**	**67%**
Enforcement and support of water conserving plumbing fixture standards, including requirement for ultra low flush toilets in all new construction	**95%**	**94%**	**94%**	**100%**	**55%**
Support of State/Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush	96%	95%	90%	88%	61%
Program to retrofit existing toilets to reduce flush volume (with displacement devices)	56%	54%	62%	41%	28%
Program to encourage replacement of existing toilets with ultra low flush (through rebates, incentives, etc.)	**71%**	**33%**	**71%**	**67%**	**67%**
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water-saving practices	93%	86%	83%	63%	87%
Encourage local nurseries to promote use of low water use plants	3%	53%	59%	35%	62%
Develop and implement landscape water conservation ordinances pursuant to the "Water Conservation in Landscaping Act"	**51%**	**36%**	**35%**	**11%**	**33%**
Identify and contact top industrial, commercial, and/or institutional customers directly; offer and encourage water audits to identify conservation opportunities	**4%**	**67%**	**68%**	**59%**	**65%**
Review proposed water uses for new commercial and industrial water service, and make recommendations for improving efficiency before completion of building permit process	**10%**	**73%**	**73%**	**62%**	**72%**
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	76%	58%	64%	36%	24%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost effective	77%	60%	71%	47%	28%
Advise customers when it appears possible that leaks exist on customer's side of water meter	96%	94%	94%	84%	94%
Identify irrigators of large landscapes (3 acres or more) and offer landscape audits to determine conservation opportunities	**4%**	**29%**	**30%**	**8%**	**65%**
Provide conservation training, information, and incentives necessary to encourage use of conservation practices	**8%**	**34%**	**32%**	**61%**	**67%**
Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies	20%	24%	30%	30%	64%
Implementation of conservation pricing policies	21%	26%	29%	30%	64%
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	83%	51%	46%	33%	80%
Implement and/or support programs for the treatment and reuse of industrial waste water / storm water / waste water	**37%**	**40%**	**40%**	**26%**	**32%**

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Jess Barreras, Hydrologist
Carla James, Water Resources Technician
Tamara Voss, Water Resources Technician
Teresa Campa, Engineering Aide II

In Remembrance

The *2007 Ground Water Summary Report* is dedicated to the memory of the following Monterey County Water Resources Agency Board of Directors:

Tim Handley, Paul Martin, and Leo Poppoff.

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MONTEREY COUNTY WATER RESOURCES AGENCY
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