

**SURVEY OF FUTURE WATER
RECLAMATION POTENTIAL**

FINAL REPORT

PREPARED BY



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EXECUTIVE SUMMARY

This is a report of a survey of public and private water and sewerage agencies in California involved in water recycling. The central purpose of the survey was to determine the agencies' plans, projections and vision for future water reuse by category of use and by region. Even though the report frequently refers to this as the "potential" for reuse, readers should bear in mind that the real potential reuse is the total wastewater stream in the state—currently being wasted—some 2.5 to 3 million acre-ft per year (AFY). In addition, the survey set out to determine what factors stimulated growth in water reuse and which ones were deterrents. The survey was commissioned by the Board of Directors of the **WaterReuse** Association of California. The mission of this Association is to promote and increase water recycling in the State.

RATE OF WATER REUSE

The most startling finding of the survey is that water reclamation projects are being built at a rapid rate. Perhaps water reuse is not as difficult to accomplish as it is often portrayed to be. The survey results indicate that, over the past several years, great progress has been made in spite of the costs and other barriers. Current reuse has jumped from about 270,000 AFY in 1987 to over 380,000 AFY—more than 40 percent increase in less than five years. Agencies that are most successful at water recycling have developed the necessary attitudes and expertise to continue increasing water reuse and to expand the envelope aggressively, projecting relatively rapid increases in the future in spite of a variety of hardships. If the attitudes and expertise of the successful agencies could be transferred to other agencies, the statewide water recycling potential would certainly increase.

One hundred eleven agencies participated in the survey, reporting 230 existing and planned projects at 313 reuse sites. The rapid rate of increase in water reclamation activity over the past five years is projected to continue through the year 2000 by which time total reuse could exceed one million AFY. Projection for 2010 is over 1.3 million AFY with an "ultimate" reuse potential of close to 1.5 million AFY. Clearly, the word "ultimate" was not interpreted by most respondents to mean total recycling or zero

discharge. The results of the survey indicate that the State's goal¹ of achieving 700,000 acre-ft per year water reclamation by the year 2000 and surpassing one million acre-ft per year by the year 2010 is definitely within reach. In fact, the 2010 goal can be exceeded by over 30 percent if the responding agencies accomplish their own predictions.

The water recycling capital of the state is the area represented by Los Angeles and Orange counties. The aggressive rate of water reclamation and the sustained rapid increases projected into the future for these counties must be credited at least in part to the role of the Metropolitan Water District of Southern California's Local Projects Program (providing significant financial subsidies for water recycling to local entities). Geographic and other factors favoring water reuse in these areas have been cited as partial explanations for their early prominence in this field. Nonetheless, the lessons learned in these regions can be transferred to resolve the institutional and other barriers holding back water reuse in other parts of the State. This illustrates a clear need for statewide technology transfer and uniform policy development. **WaterReuse** must continue to play a major role in assuring that both of these needs are met.

Most of the growth in water reuse is expected to occur in the Los Angeles and Santa Ana regions. (Regions are defined as the California Regional Water Quality Control Board regions, separated by major watershed boundaries.) The San Diego region also is expected to undergo significant growth in reclaimed water use over the next two decades, nearly tripling its share of the statewide water reuse from the present four percent to an "ultimate" 11 percent. The San Francisco Bay region also is projected to undergo significant increase in both water reuse volume and its relative share statewide (from the current 6 percent to nearly 11 percent.) The Central Valley and Colorado River Basin regions' growth in water reuse is projected to be modest. Central Coast region will experience a substantial jump in reuse in the 1993 to 1995 period with very little additional growth in future years. Other regions (North Coast and Lahontan) project relatively slow growth in water reuse at this time. None of the nine regions project a decline in the rate of water recycling.

CATEGORIES AND PURPOSES OF REUSE

All traditional uses of reclaimed water are expected to grow in absolute volume while a number of new and unusual uses (aggregated as a Miscellaneous category) develop and grow. None of the uses is projected to decline in volume. The

¹The State's goals were enacted by the Legislature with the passage of the Water Recycling Act of 1991 (AB 673), Water Code Section 13577, Water Recycling Goal

relative proportions of the various categories of reuse will undergo significant change. Groundwater recharge currently accounts for nearly half the total volume of water reused in the State. This proportion will gradually decline to about a third, as landscape irrigation grows from a mere 10 percent to almost a third of all reuse volume. Another major use of reclaimed water—agricultural irrigation—though expected to grow steadily, will decline in relative percent of total from 21 percent at present to 13 percent in the “ultimate” horizon. Other categories experiencing the greatest relative increases will be industrial uses and seawater intrusion barriers.

These changes in relative proportion reflect the increasing value of reclaimed water as a resource for direct utilization within the urban areas of origin. (For example, the dramatic increase in landscape irrigation use of reclaimed water is indicative of a strong shift in attitude on water reuse.) When asked for the “purpose” of project, most respondents (63 percent) cite *water supply* as the sole purpose, and only one percent mention *disposal* or *pollution control* as the only purpose of the project. Another 14 percent include *water supply* among a list of purposes.

INFLUENCES ON WATER REUSE

Survey respondents ranked the current statewide economic recession and local budgetary problems as the greatest impediments to implementing their water recycling projects. On the other hand, water shortage and the six-year drought were ranked as the factors most influential in motivating greater and faster development of water reclamation projects. The overwhelming thrust of the survey findings is that water recycling continues to be highly successful in California in spite of the impediments—real or imagined.

An interesting finding of the survey is that most respondents rated public opinion as a motivating influence for water reuse project development. About 75 percent rated public opinion as having a “positive” or “somewhat positive” influence on project development. This is probably due to the increased familiarity that most Californians have gained—especially in recent years—with water reclamation projects and their unblemished safety record. Many respondents attribute positive influence to recent legislative mandates for use of reclaimed water for all non-potable uses—where available at acceptable quality and reasonable cost. Others decry the strictness of regulatory agencies (and some local health authorities) in interpreting public health regulations, issuing permits and processing loan applications.

COSTS

Survey respondents providing cost data cumulatively expect to spend about \$2,850,000,000 in treatment and distribution capital costs over the next two decades to build capacity to reclaim about 830,000 AFY. This is a huge investment of resources and yet represents only a portion of the total projected water reuse costs. The implication of this commitment of resources is that water recycling is widely viewed as a proven, reliable, safe and economical locally controlled source of water supply. Viewed another way, three billion dollars is a huge commitment of resources at a time when all agencies in California are feeling the disastrous effects of the ongoing recession. The need for financial assistance, affordable financing mechanisms and achieving economies of scale is dramatized in this single figure.

POTENTIAL FOR THE FUTURE

The future looks bright for water reclamation, not only because of the numbers projected by the survey respondents, but also because of movements in the legislative, regulatory and other arenas. The *California Wastewater Reclamation Criteria* (Title 22) are being revised to reflect actual practice and to respond to the need for more streamlined and uniform public health regulation. The proposed revised regulations are expected to name over 30 new “allowed” uses of reclaimed water. The long-awaited groundwater recharge guidelines are expected to be included in this new version. The California Legislature also has been active in water reuse, expanding the envelope to allow mandated use of reclaimed water where available, and to specify several new uses of reclaimed water.

Another major event which will increase water recycling potential in the future substantially is the recent formation of two state-wide potable reuse committees (one is officially co-sponsored by the Department of Health Services and the Department of Water Resources while the other is a subcommittee of the **Water Reuse Association's** Regulations Committee). Possibly, the next time survey questionnaires are mailed out, a new category of reuse will be potable, through surface water augmentation, river discharge or other acceptable routes.

INTRODUCTION

SECTION I

The WaterReuse Association of California is committed to helping the state realize the untapped potential of water recycling. Its Board of Directors directed the preparation and conduct of a survey that would reveal this potential, to the year 2010 and beyond. This report presents the results of the survey, conducted over a 12-month period, among agencies active in the field of water recycling.

Obviously, this resource is underutilized because many of the agencies that could *potentially* reclaim wastewater currently have no plans to do so. (Many agencies now engaged in water reuse did not have any reclamation plans two decades ago.) Therefore, any survey would be incapable of truly revealing the full potential that exists for water reclamation.

One way to circumvent this inability to peer into the future would be to consider the entire four-million-plus acre-feet per year of wastewater effluent² as the true ultimate potential for water recycling in the state. How soon that potential will be realized is the question this and future surveys are attempting to answer. Thus, the results reported here represent only a partial response to the Association's need for an ultimate goal.

DEFINING WATER REUSE

One of the early questions raised in the course of preparation of the survey instrument (questionnaire) was the definition of water reuse. Many in the water supply profession prefer to distinguish between that reuse which directly frees up fresh water and that which puts reclaimed water to a use which otherwise would not occur. Examples of the latter type of use (some have dubbed it "soft reuse") are recreational impoundments and environmental enhancement. Rather than disallow such uses from the total potential, this survey asked for all types of reuse and reported the results directly.

The reader may choose to separate the projects reported under the "environmental" category of uses which include all uses that do not displace potable water demands. However, the increasing awareness of the environmental water requirements dictates that this category of use be regarded as a legitimate beneficial use of reclaimed water. For this reason, the respondents were urged to report any and all categories of water reuse planned for future implementation.

²California Municipal Wastewater Reclamation in 1987, California State Water Resources Control Board (SWRCB), Office of Water Recycling, June, 1990, p. 3. Note: The SWRCB projected a state wastewater pool of 3.4 to 3.9 million acre-feet per year in 1987. For purposes here, a slight increase was used.

³Water Recycling 2000, p. 4.

SURVEY DESCRIPTION

SECTION II

PURPOSE OF THE SURVEY

Reclaimed water has been used as a non-potable water supply source in California — intentionally — for nearly a century.³ Reuse has significantly increased in the past two decades in spite of impediments and will continue to expand, reflecting a growing awareness of the importance of water reclamation in overall water resource management.

As part of its mission to promote water recycling, the WaterReuse Association of California conducted this survey to explore the potential for water reuse in California over the next 20 years. Previous surveys were more interested in existing or shorter-term water reclamation. This survey updates water reclamation figures for the present and documents future potential beyond 2010.

Besides obtaining data on planned water reuse development, other important information were also solicited. These included:

- Types and volumes of future reuse potential.
- Major factors that influence success of implementation of water reclamation projects.
- Capital and operating costs of water recycling projects.
- Purpose of each project.

In summary, data will be useful to legislators, water reuse advocates, project financiers, and water managers in planning future directions. The survey results are expected to help promote and encourage additional water recycling as a reasonable and economical means to extend available water resources. Another objective is to assist agencies which might benefit from the professional services of the newly established WaterReuse Finance Corporation through a compilation of relevant data.

Another purpose of this survey report is to enable agencies to set realistic or aggressive goals and develop long-term strategies to better meet future water needs. The survey did not include an assessment of firm water supply which agencies would then be committed to deliver at a certain time.

FINDINGS

SECTION III

OVERVIEW OF SURVEY RESULTS

Survey respondents provided incremental water recycling development data for their existing projects as well as planned projects for delivery by 1995, 2000, 2010, and "Ultimate" development. A summation of all the respondents' volume data is presented in Figure 1. For each planning horizon, a distinction is shown between prior volume of water reuse and the increment coming on-line during that specific time frame. The increments are shown with a darker color, and the volume of incremental reuse is shown thereon. Cumulative total water reuse will evidently exceed the one million acre-ft per year mark by the turn of the century.

Although water reuse development is expected to continue increasing to the year 2010 and beyond, it is noteworthy that projected incremental growth in water reuse is expected to decline after the year 2000. If this is indeed a true trend, its causes need to be explored. If it is an artifact of short planning horizons, similar future survey results will be most useful for updating and re-assessing these results.

An overview of the survey results by reuse category and region is presented in Figures 2 and 3 respectively.

Figure 1. PROJECTED WATER RECYCLING IN CALIFORNIA

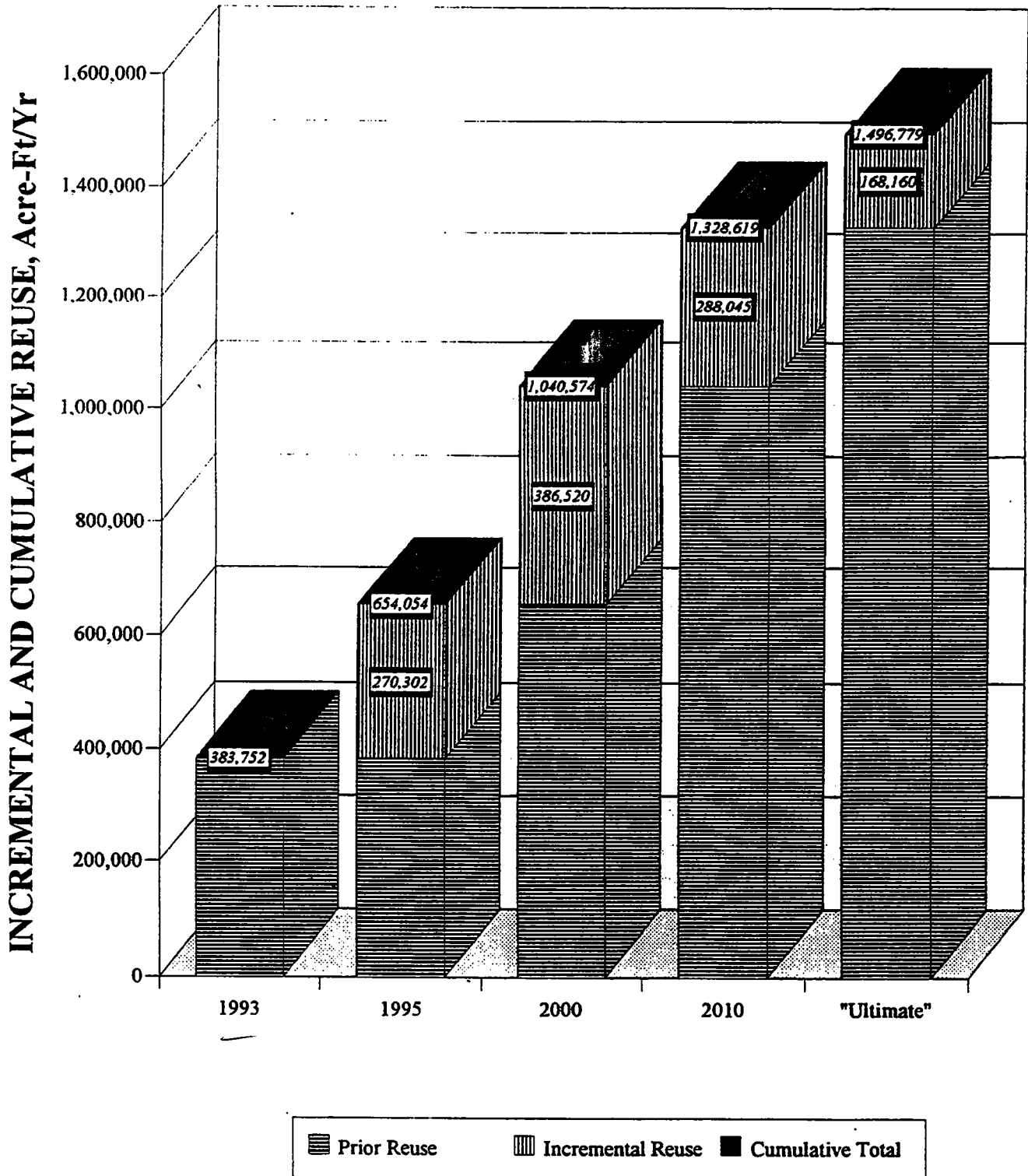


Figure 2. TOTAL POTENTIAL WATER REUSE IN CALIFORNIA BY USER CATEGORY

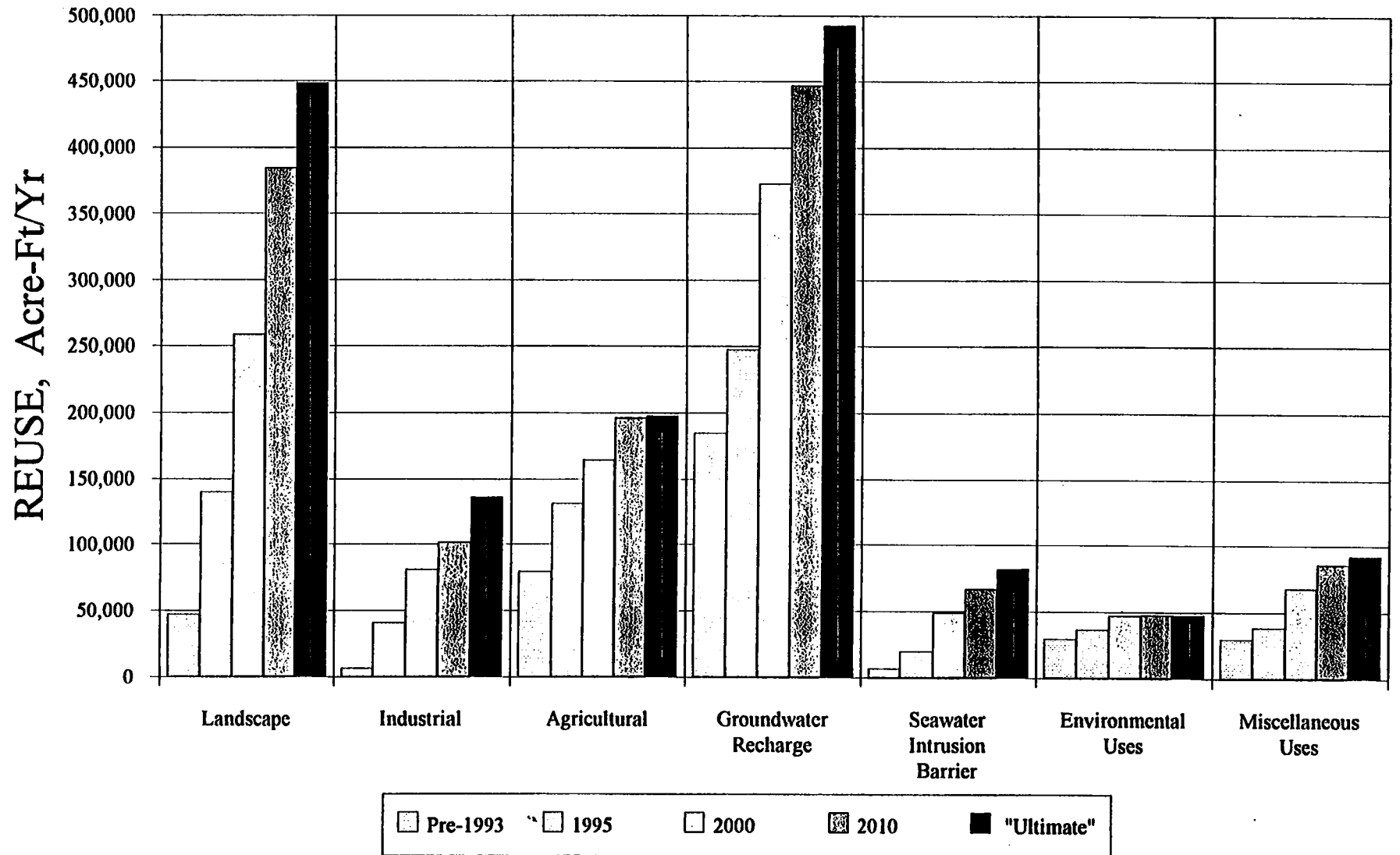
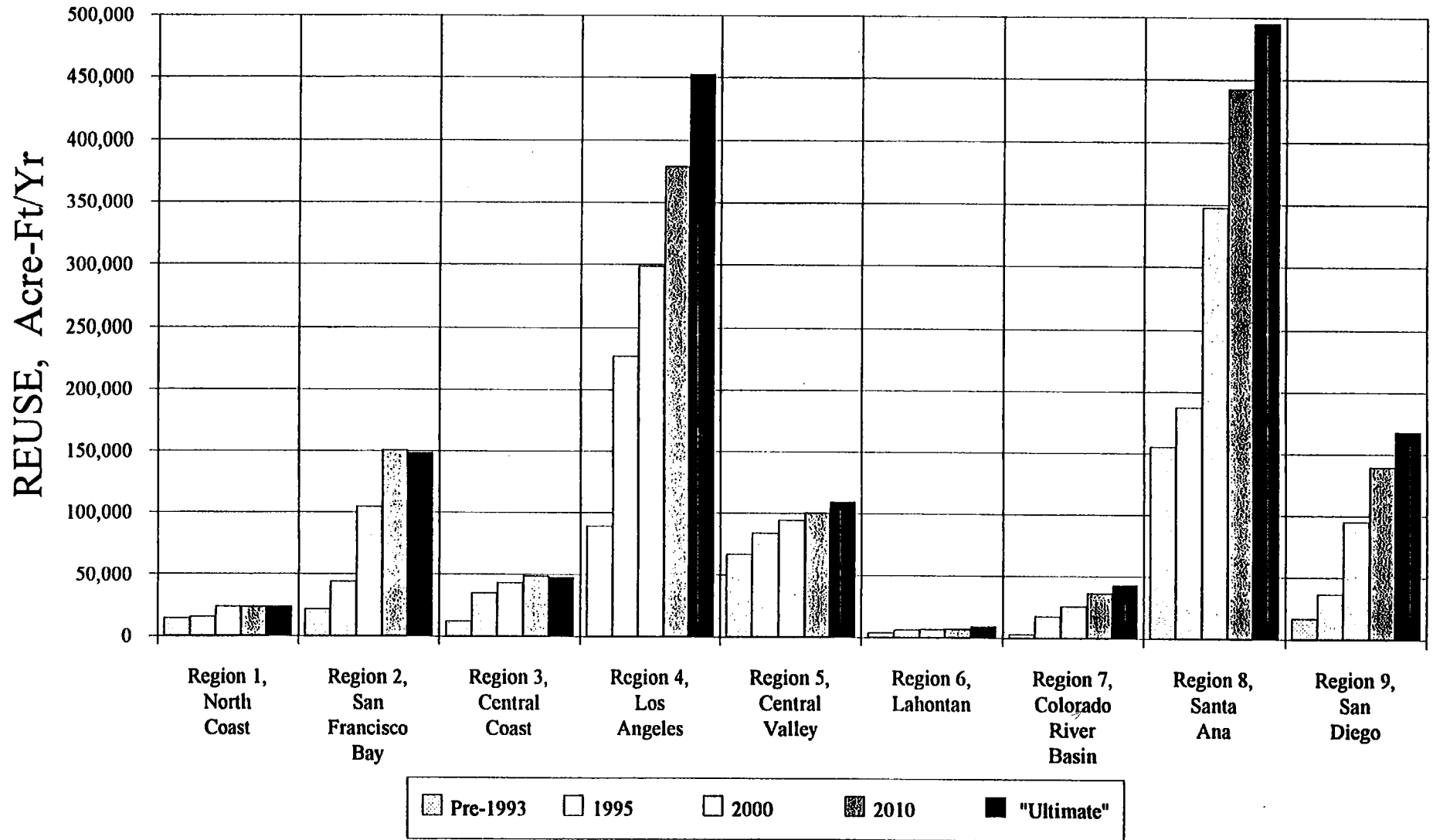


Figure 3. TOTAL POTENTIAL WATER REUSE IN CALIFORNIA BY REGION



NUMBERS OF PARTICIPANTS, PROJECTS AND SITES

A total of 230 projects were reported by the 111 respondents. Total reclaimed water potential by region and reuse type by years, water agencies and projects is presented in Appendices D. (A map of the State of California divided into the nine Regional Water Quality Control Board regions is shown in Appendix C.)

The number of respondents and reuse sites by region is summarized in Table 1.

The number of reuse sites, by type, is shown in Table 2.

Table 1. NUMBER OF SURVEY RESPONSES RECEIVED AND PROJECTS REPORTED

Region*	Number of Respondents	Number of Projects
1. North Coast	4	9
2. San Francisco Bay	18	35
3. Central Coast	7	12
4. Los Angeles	20	53
5. Central Valley	17	17
6. Lahontan	3	2
7. Colorado River Basin	3	4
8. Santa Ana	13	43
9. San Diego	26	55
Totals:	111	230

* Throughout this report, "Region" refers to the California Regional Water Quality Control Board regions as defined in Appendix C.

Table 2. Number of Total Reuse Sites by Category.

Type of Reuse	Total Sites ^(a)	Percent of Total
Landscape	150	48
Industrial	29	9
Agricultural	48	15
Groundwater Recharge	36	12
Seawater Intrusion Barrier	6	2
Environmental	16	5
Others ^(b)	28	9
TOTAL	313	100

(a). One project can have many sites.

(b). Other reuse types include: toilet flushing, dust-suppression, cooling, and uses unclassified by respondent.

The number of reuse sites, by region, is depicted in Table 3.

Table 3. Number of Total Reuse Sites by Region.

Region	Name of Region	Total Sites	Percent of Total
1	North Coast	11	3
2	San Francisco Bay	49	16
3	Central Coast	15	5
4	Los Angeles	85	27
5	Central Valley	21	7
6	Lahontan	3	1
7	Colorado River Basin	6	2
8	Santa Ana	43	14
9	San Diego	80	25
TOTAL		313	100

EXISTING WATER REUSE

In 1993, at least 383,752 AFY was being reclaimed in California. Compared to the June, 1990, SWRCB study of the 1987 reuse, there has been an increase of 117,193 AFY, a 44% rise over the last five-year period. Incremental reuse for each future horizon can be obtained by subtracting the corresponding figure from the previous horizon. Survey respondents actually reported incremental reuse volumes.

Water Reuse by Category

Cumulative total water reuse volumes by type of use are shown in Table 4. Figure 4 shows relative distribution of existing water reuse quantities by reuse categories.

Landscape Irrigation All regions reported this reuse type. Regions 2, 4, 8, and 9 reported the most landscape irrigation reuse sites, 134 out of 150. These are also the most densely populated regions.

Industrial Use Industrial reuse has the least quantity for the current time period, a mere 2 percent. Most current industrial reuse is found in Regions 2, 4 and 9, which are also where most of the largest urban areas are located. Regions 1, 3, 6, and 7 have no reported industrial use. This is expected since these areas are rural. Regions 5 and 8 have minimal industrial reuse.

Agricultural Use Regions 5 and 9 reported the greatest volumes of agricultural reuse. There were no agricultural uses reported in Region 7 and only one in Region 6. Agricultural use of reclaimed water appears to be the second largest of all existing users. As the state has a huge

agricultural base, this is important not only to the state and nation, but to some other parts of the world as well, both economically and in terms of food supply. There is a large potential market for additional use of reclaimed water for agriculture, displacing potable water. The agricultural industry grows a wide assortment of crops which can be irrigated with reclaimed water. Some examples of crops where reclaimed water is being used are: alfalfa, apple, avocado, orange, pistachio, plum, barley, cotton, grape, and wheat.

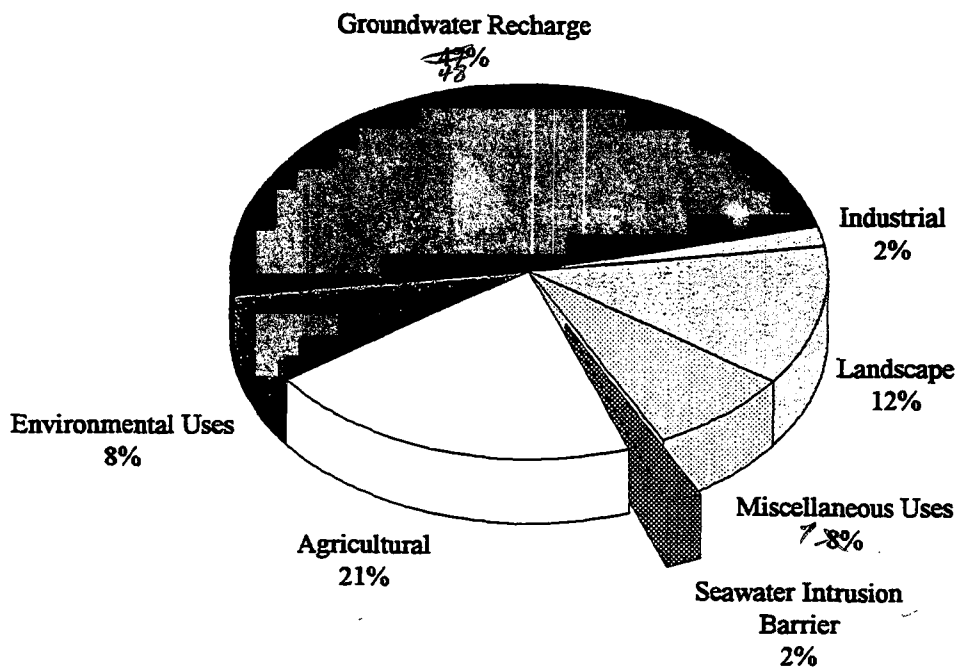
Groundwater Recharge This reuse type accounts for the highest rate (48 percent of the total) based upon survey data supplied by participants. It is also the most common reuse in Central and Southern California. Over the decades most aquifers have been over-pumped, leading to deeper pumps, higher pumping costs and seawater intrusion. To help improve conditions for the future use of reclaimed water for groundwater, many water agencies have adopted the strategy of recharging these important reservoirs. Recharge is strongest in Regions 3, 4, 5, 8, and 9. There is very little recharge in Regions 2 and 7 and none in Regions 1 and 6. The three major rechargers are in Region 4 (County Sanitation Districts of Los Angeles County and the Water Replenishment District of Southern California) and 8 (Orange County Water District). Nearly 60 percent of the total volume of water used for this purpose comes from the Orange County Water District at its Santa Ana River Project. Another 27 percent of the total comes from the Montebello Forebay Project of the Sanitation Districts of Los Angeles County and the Water Replenishment District.

Table 4. PRESENT WATER REUSE BY CATEGORY

Type of Reuse	Rate of Reuse (AFY)	Percent of Total
Landscape	47,112	12% ^{12.3}
X Industrial	6,557	2% ^{1.7}
Agricultural	79,591	21% ^{20.7}
Groundwater Recharge	185,057	48% ^{48.9}
X Seawater Intrusion Barrier	7,000	2% ^{1.8}
Environmental Uses	29,164	8% ^{7.6}
X Miscellaneous Uses	29,271	8% ^{7.6}
Totals:	383,752	100% ^{100.9}

② 7/10/11

Figure 4. EXISTING WATER REUSE BY CATEGORY



Seawater Intrusion Barrier Injection of reclaimed water at seawater intrusion barriers was one of the least in terms of volume, 7,000 AFY. Only one reuse project was reported from Region 8. (An additional five projects in Regions 4 and 8 will be discussed in the next section on future reuse.) Due to over-pumping of coastal aquifers, seawater is moving inland and contaminating them. Reclaimed water is a safe, reliable and economical alternative to potable water to inject into these coastal aquifers, helping to stabilize and eventually reverse the intrusion of salt water.

Environmental Enhancement This type of reuse was reported in all regions except 6 and 7. Regions 2 and 4 reported the largest quantities, 90 percent of the total. The City of Los Angeles Department of Water and Power and the Union Sanitary District (Fremont, Newark and Union City) are using reclaimed water to sustain a recreational lake and a marsh, respectively, in these regions.

Others Twenty-eight reuse sites were reported with either specific uses such as toilet flushing, snow making or fire protection, or without an identified use (11 cases). Due to the inland locations of Regions 8 and 9, these reuse sites are most likely agricultural and landscape.

Water Reuse by Region

Table 5 and Figure 5 show current quantities and percentages of reuse by region.

Region 1 — North Coast Only two water agencies responded with data. The agency with the largest use of reclaimed water in Region 1 is the City of Santa Rosa, with nearly 86 percent of the total.

Region 2 — San Francisco Bay Seventeen agencies provided data in Region 2. The three largest suppliers at the present, as reported in the survey, are the East Bay Municipal Utility District, City of Petaluma and Union Sanitary District. The latter has a large (11,200 AFY) environmental reuse project.

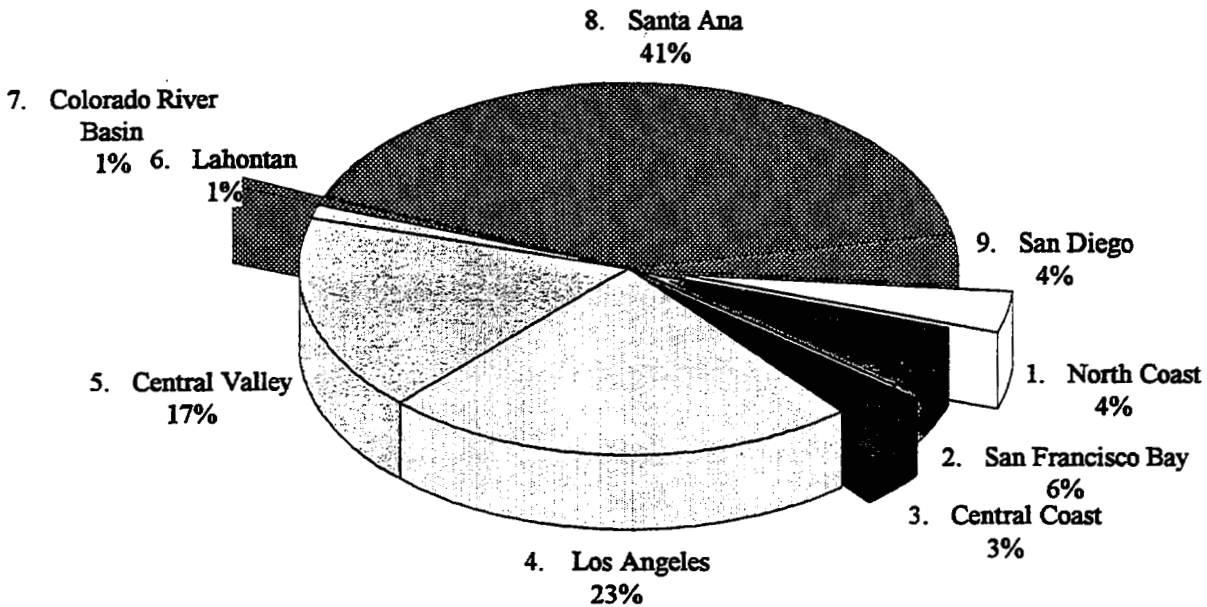
Region 3 — Central Coast Seven agencies responded with data. The largest supplier in this region is the Santa Barbara County Water District. It reports about 67 percent of the total volume.

Region 4 — Los Angeles Nineteen agencies reported reuse volumes for Region 4. This region has the second highest total, 89,217 AFY, amounting to about 23 percent of all regions combined. The City of Los Angeles and the County Sanitation Districts of Los Angeles County report the largest uses for environmental enhancement and groundwater recharge, respectively.

Table 5. PRESENT WATER REUSE BY REGION

Region	Total Capacity (AFY)	Percent of Total
1. North Coast	14,192	4%
2. San Francisco Bay	21,752	6%
3. Central Coast	12,415	3%
4. Los Angeles ✓	89,217	23% ✓
5. Central Valley	66,735	17% -
6. Lahontan	4,000	1%
7. Colorado River Basin	3,248	1%
8. Santa Ana ✓	155,471	41% ✓
9. San Diego ✓	16,722	4%
Totals:	383,752	100%

Figure 5. EXISTING WATER REUSE BY REGION



Region 5 — Central Valley Fourteen agencies returned data. Two-thirds of the total comes from Kern County Water Agency. More than two-thirds is used for agriculture which would be expected since the region hosts a majority of the state's agriculture industry.

Region 6 — Lahontan Only two water agencies in Region 6 responded with data to the survey. At present, all the reclaimed water in the Lahontan Region is used for agriculture.

Region 7 — Colorado River Basin Only two agencies responded with data. Over 77 percent of the total use is for landscape irrigation. The remainder is designated for groundwater recharge.

Region 8 — Santa Ana Twelve agencies reported data for Region 8. This region has the greatest volume of reclaimed water use (155,471 AFY) because of the large Santa Ana River Groundwater Recharge Project of the Orange County Water District, representing 70 percent of the total for the region.

Region 9 — San Diego Twenty-four agencies provided data. Over 40 percent of the total present reuse is for landscape irrigation. Seventeen percent is for industrial use, and 37 percent is miscellaneous, which may include agriculture and landscape uses.

FUTURE REUSE POTENTIAL

A summary of cumulative future water reuse potential is presented by categories and regions in Table 6. Data have been resorted and are presented separately, categories and regions, in Tables 7 and 8. Incremental reuse for each future horizon can be obtained by subtracting the corresponding figure from the previous horizon. Survey respondents actually reported incremental reuse volumes.

The "Ultimate" category of water reclamation is the total of all previous years plus any additional reclamation beyond the year 2010. In few cases, agencies have plans for post-2010 water reclamation; however, there is difficulty for most agencies to forecast so far in advance. Many events can alter planned reuse. Thus, interpretation of the "Ultimate" category must carry necessary caution. It should not be viewed as the final upper limit of future potential for water reclamation.

As can be seen from the totals at the end of Tables 7 and 8, 59 percent increase in additional on-line water reclamation is expected between the years 1995 and 2000. The 2010 and "Ultimate" projections represent incremental jumps of only 13 percent or less.

Table 6. WATER REUSE CATEGORIES BY REGIONS

Region 1. North Coast--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	13,040	13,890	15,890	15,890	15,890
Environmental	358	358	6,108	6,108	6,108
Landscape	794	1,344	1,944	1,944	1,944
Total	14,192	15,592	23,942	23,942	23,942

Region 2. San Francisco Bay--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	1,320	2,500	10,080	18,310	18,710
Environmental	11,200	11,200	11,400	11,400	5,800
Industrial	1	6,001	23,286	31,106	31,106
Landscape	3,391	17,528	46,159	71,040	73,790
Miscellaneous	5,840	6,690	13,921	18,863	18,863
Total	21,752	43,919	104,846	150,719	148,269

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Region 3. Central Coast--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	9	20,409	25,409	30,409	30,410
Environmental	0	0	2,000	2,400	2,400
Landscape	708	2,608	3,808	3,808	5,008
Groundwater Recharge	11,698	12,098	12,098	12,098	9,732
Total	12,415	35,115	43,315	48,715	47,550

Region 4. Los Angeles--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	2,381	14,274	15,024	21,180	21,785
Barrier	0	5,600	18,000	31,000	46,000
Environmental	15,375	22,380	22,383	22,385	27,085
Industrial	3,662	31,320	52,395	62,780	97,008
Landscape	16,906	54,622	77,482	106,130	124,873
Groundwater Recharge	50,700	99,100	113,400	135,400	135,400
Miscellaneous	193	200	238	246	38
Total	89,217	227,496	298,922	379,121	452,189

Table 6. WATER REUSE CATEGORIES BY REGIONS

(continued)

Region 5. Central Valley--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	53,169	66,643	74,324	77,738	82,738
Environmental	1,456	1,456	1,656	1,656	1,656
Industrial	100	715	1,330	1,330	1,430
Landscape	78	758	903	1,370	1,420
Groundwater Recharge	11,932	13,531	15,363	17,090	21,522
Miscellaneous	0	895	895	895	895
Total	66,735	83,998	94,471	100,079	109,661

Region 6. Lahontan--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	4,000	4,500	5,000	5,000	5,000
Landscape	0	1,000	1,000	1,000	3,000
Snow-making	0	698	808	1,088	1,120
Total	4,000	6,198	6,808	7,088	9,120

Region 7. Colorado River Basin--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Landscape	2,521	14,742	20,742	28,742	33,743
Snow-making	727	2,719	5,219	8,219	9,179
Total	3,248	17,461	25,961	36,961	42,922

Region 8. Santa Ana--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	5,000	5,000	5,000	5,000	1,000
Barrier	7,000	14,000	31,000	36,000	36,000
Environmental	775	775	775	775	550
Industrial	0	0	430	1,076	1,076
Landscape	15,841	26,715	51,094	85,304	101,934
Groundwater Recharge	110,000	118,430	214,235	257,041	291,041
Miscellaneous	16,855	22,503	44,804	57,078	63,578
Total	155,471	187,423	347,338	442,274	495,179

Table 6. WATER REUSE CATEGORIES BY REGIONS

(continued)

Region 9. San Diego--Cumulative Reuse By Category of Use

Category	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)
Agriculture	672	4,366	13,474	22,709	22,165
Environmental	0	36	2,736	2,736	3,736
Industrial	2,895	2,927	3,594	5,492	5,993
Landscape	6,873	20,781	55,425	84,698	102,968
Groundwater Recharge	0	710	11,710	15,740	24,740
Miscellaneous	6,282	8,032	8,032	8,345	8,345
Total	16,722	36,852	94,971	139,720	167,947

STATE GRAND TOTALS:	383,752	654,054	1,040,574	1,328,619	1,496,779
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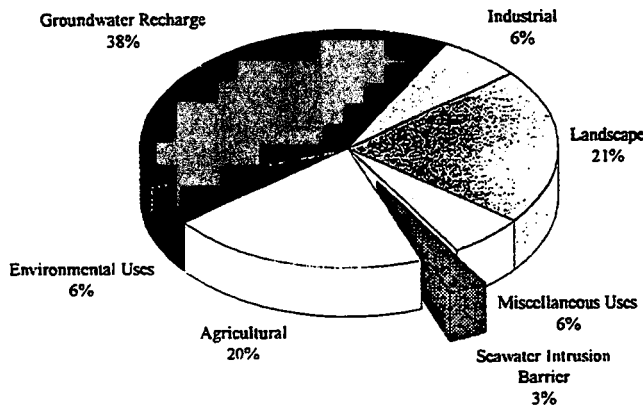
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Table 7. CUMULATIVE POTENTIAL WATER RECYCLING TOTAL BY CATEGORY OF REUSE

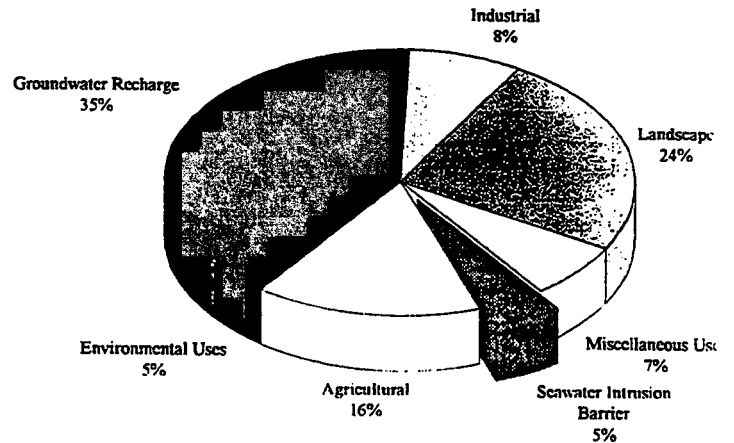
Category of Reuse	1995	2000	2010	"Ultimate"
Landscape	140,098	258,557	384,036	448,680
Industrial	40,862	80,934	101,683	136,412
Agricultural	131,582	164,201	196,236	197,698
Groundwater Recharge	247,428	372,865	446,428	492,454
Seawater Intrusion Barrier	19,600	49,000	67,000	82,000
Environmental Uses	36,205	47,058	47,460	47,335
Miscellaneous Uses	38,279	67,959	85,776	92,200
Totals:	654,054	1,040,574	1,328,619	1,496,779

Figure 6. FUTURE TRENDS IN WATER REUSE POTENTIAL BY CATEGORY OF USE

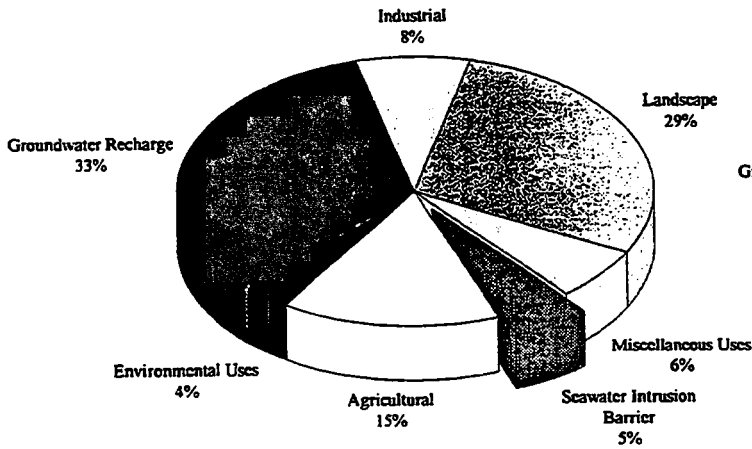
1995



2000



2010



"ULTIMATE"

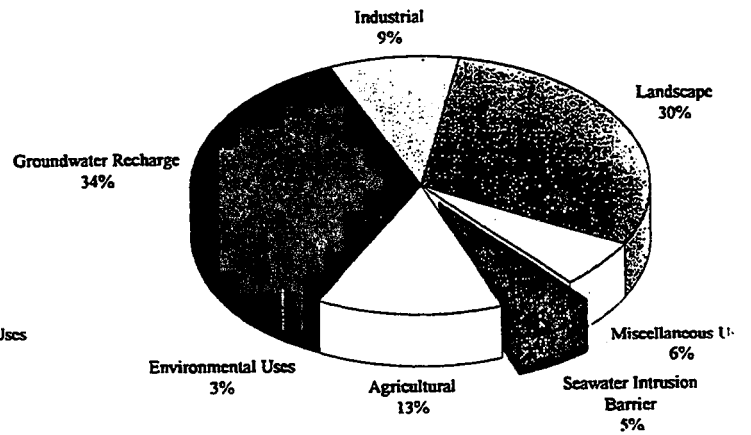


Table 8. CUMULATIVE POTENTIAL WATER RECYCLING TOTAL BY REGION

Region	1995	2000	2010	"Ultimate"
1. North Coast	15,592	23,942	23,942	23,942
2. San Francisco Bay	43,919	104,846	150,719	148,269
3. Central Coast	35,115	43,315	48,715	47,550
4. Los Angeles	227,496	298,922	379,121	452,189
5. Central Valley	83,998	94,471	100,079	109,661
6. Lahontan	6,198	6,808	7,088	9,120
7. Colorado River Basin	17,461	25,961	36,961	42,922
8. Santa Ana	187,423	347,338	442,274	495,179
9. San Diego	36,852	94,971	139,720	167,947
Totals:	654,054	1,040,574	1,328,619	1,496,779

Probability of Implementation

Survey respondents filled in the column soliciting percentage of probability of project implementation. Some, not all, reported probabilities from 40 percent up to 100 percent for implementation of their projects, and a few in the 5 to 10 percent range. Generally most reported probabilities were above 75 percent. The survey instrument did not provide an opportunity for respondents to distinguish probability of implementation for various time horizons.

Future Water Reuse by Category

Table 7 and Figure 6 show future water reclamation by reuse category. The largest water recycling potential will continue to be in landscape, agriculture and groundwater recharge. The percentage of landscape and groundwater recharge will rise the fastest. As a percentage, agricultural use will decline, and industrial and seawater intrusion barrier use will rise relatively slowly.

Landscape Irrigation Landscape irrigation accounts for the most number of existing and planned reuse projects and sites. Large increases in this category will occur in each survey period. From the present to 1995, there will be an almost 200 percent rise; the next period will see an 87 percent increase; there will be a 50 percent increase by 2010. These percentages illustrate steady continuing increases of reclaimed water use in this category.

Industrial Use The Los Angeles Region (4) will contribute almost exclusively to the large increase by 1995, which will be 520 percent over the present. By the year 2000, the San Francisco Bay Region (2), in addition to Region 4, will contribute a significant portion of the almost 100 percent increase over 1995. As reported, after the year 2000, another large rise in demand will occur. Thus, industrial reuse will steadily and continually increase over the next two decades.

Agricultural Use The largest jump in this reuse type will come between the present and 1995 when an additional 51,977 AFY will be added, a 65 percent increase over 1993. The additional capacity will be delivered in Regions 3, 4 and 5S. Subsequent increases are much smaller, about 20 percent each. In Monterey County, plans call for irrigation of lettuce, cauliflower, broccoli, celery, and artichokes, on a large scale, with reclaimed water.

Groundwater Recharge Substantial increases will occur throughout the survey periods. The largest rise will take place between 1995 and 2000, about 50 percent. This change is due to the completion of recharge capability at the Orange County Water District in which the Santa Ana River Project will be expanded by an estimated 90,000 AFY. Region 4 will also have important additions, notably the City of Los Angeles' East

Valley project. Groundwater recharge with reclaimed water will climb steadily and continuously through the next 20 years.

Seawater Intrusion Barrier From the present to 1995, there will be a 180 percent rise in use of reclaimed water to combat seawater intrusion. During the 1995-2000 period, there will be an increase of 150 percent. The dramatic increases will come from three new projects in Region 4 and two in Region 8. By the end of the survey period, Region 4 will surpass Region 8 in total quantity.

Environmental Enhancement There will be no major increase or decrease for this reuse type. The largest jump will take place between 1995 and 2000, 30 percent. Regions 1, 3, 4, and 9 will experience the most significant changes.

Others The largest increase will occur between 1995 and 2000 when there is expected to be a 77 percent rise in this ill-defined category. Almost all the increase is in Region 8 and some in Region 2. Eleven of these reuse sites were unclassified and most likely are for agriculture and landscape.

Future Water Reuse by Region

Table 8 and Figure 7 show future water reuse projections by region. Note that the major population centers have the most on-line and planned water reclamation facilities. Some regions will have less reuse in the year 2010 than in 1993! As reported by some water agencies, this is believed to be due to the decline in water demands for agriculture and environmental enhancement as land is converted for urban uses.

Region 1 — North Coast The only substantial increase will occur by the year 2000, a 53 percent rise, when the City of Santa Rosa will add over 8,000 AFY for agricultural, environmental (68 percent of this increase) and landscape reuse.

Region 2 — San Francisco Bay The region will double its use of reclaimed water by 1995. Another 138 percent increase will occur by 2000.

Region 3 — Central Coast This region will achieve a 182 percent increase in reclaimed water use by 1995. The major contributor, 90 percent, will be an agricultural project by the Monterey Regional Water Pollution Control Agency for use of 20,000 AFY of reclaimed water on raw-eaten food crops.

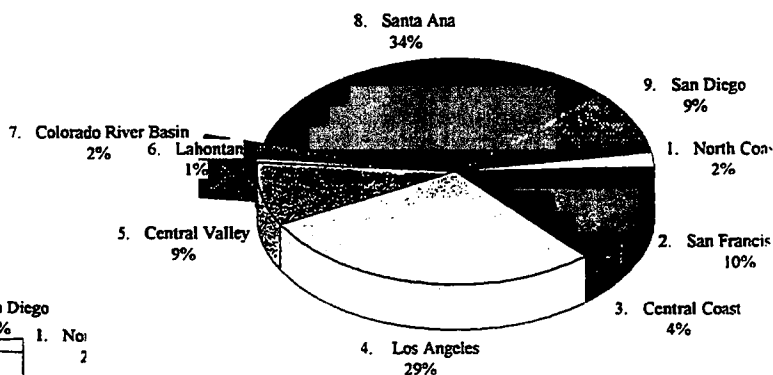
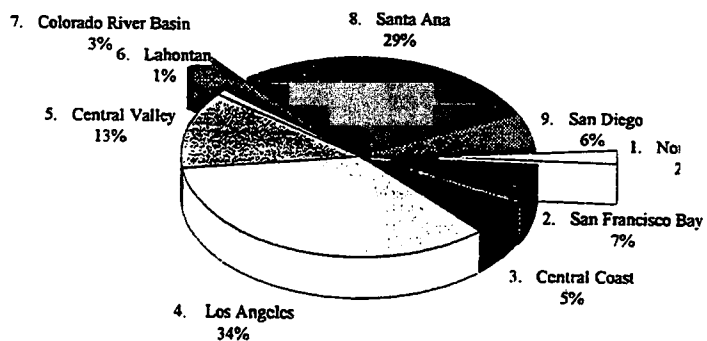
Region 4 — Los Angeles By 1995, this region expects to add 155 percent more water reclamation capability. The major contributors are industrial, landscape and groundwater recharge uses. The next two periods will see 25 to 30 percent rise. Besides the above mentioned uses, seawater intrusion barrier will become more prominent. "Ultimately," this region will have the second highest reuse total, 452,189 AFY.

Region 5 — Central Valley There are no

Figure 7. FUTURE TRENDS IN WATER REUSE POTENTIAL BY REGION

2000

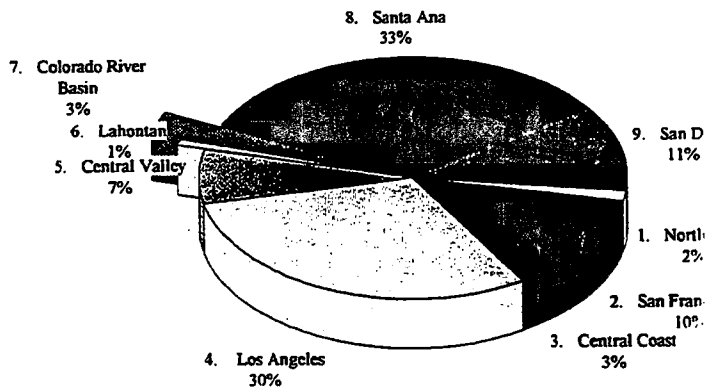
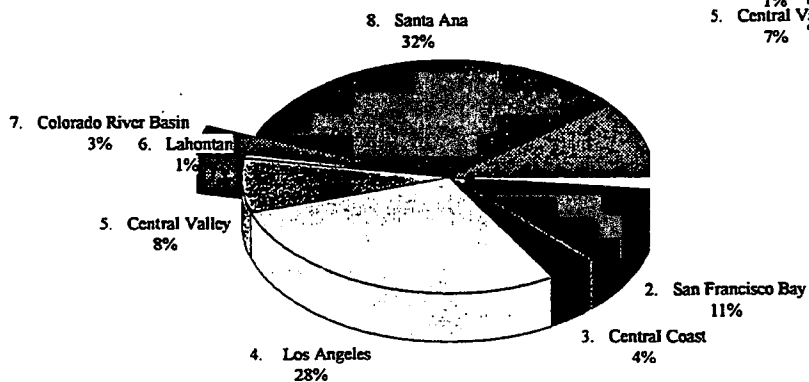
1995



"ULTIMATE"

19

2010



dramatic increases in reuse during the survey time frame. Reuse will rise from 66,735 AFY at present to "ultimately" 110,000 AFY. The largest increase will be by 1995 when an estimated 25 percent rise will occur.

Region 6 — Lahontan There are no major increases anticipated during the survey time frame. Additional reclaimed water will be used for landscape irrigation and one unique use — snow-making by the Running Springs Water District in the San Bernardino Mountains. This reclamation project will direct reclaimed water to a reservoir where it will be stored for production of snow during the winter season. Snow melt will be collected and directed back into the reservoir.

Region 7 — Colorado River Basin The most impressive increase will occur in the near term. This is forecast to be a 437 percent increase when additional capacity for landscape irrigation will come on-line. The next two time periods will see increases of 48 and 42 percent.

Region 8 — Santa Ana The largest increases, 85 percent, will be between 1996 and 2000. Landscape irrigation (15 percent of the total increase), groundwater recharge (60 percent of total, from the Santa Ana River Project), seawater intrusion barrier (10 percent of total), and miscellaneous (13 percent of total) are the most important contributors. The latter may include many landscape uses as no specific use type was given in the respondents' data. In the time period 2001 to 2010, there will be a 27 percent rise, and the same uses will be involved. "Ultimately," this region will have the largest statewide quantity of reclaimed water in use, 495,179 AFY or 33 percent of the state's total reuse.

Region 9 — San Diego Relatively large increases of 120, 157 and 47 percent will come about in 1995, 2000 and 2010, respectively. Landscape irrigation and groundwater recharge will be the two major uses that will be responsible for these increases.

EXTERNAL INFLUENCES ON WATER RECLAMATION

Survey participants were asked to rate factors that determine whether water reclamation projects were implemented or not. A summary of the responses is presented graphically in Figures 8 through 15. As can be seen, drought and long-term shortages drew the highest responses and the most positive scores. Budget problems and the economic recession were rated the most negative influences for water reclamation. Public opinion and political pressure were reported by the respondents to have somewhat positive impacts on water recycling implementation. Regulatory mandates and other factors were mixed, but were

on the overall positive side. Table 9 lists "other" influences as specified by some of the respondents.

"PURPOSE" OF WATER REUSE PROJECTS

Table 10 shows the distribution of "purpose" of water reuse projects. The survey reveals that about 63 percent of respondents rated water supply as the leading reason for their projects. Another three percent rated *water supply* as part of the reason. Pollution abatement/control received one percent with another three percent indicating pollution abatement as the part of the purpose of the project. Water supply and pollution abatement/control overlapped in responses of another 14 percent of the respondents. Another six percent answered with other reasons, including multi-purpose (which may include water supply and pollution control) and 11 percent failed to respond. (Appendix E shows the distribution of purposes as reported by responding agencies.)

CAPITAL EXPENDITURES

The survey asked respondents to include the capital treatment and distribution costs of planned water reclamation projects. Often the costs were lump sums (treatment plus distribution in one figure) or were given as cost per acre-foot. Based upon dollar figures supplied by water purveyors, approximately \$840 million will be spent on treatment facilities and \$1.1 billion on distribution infrastructure to produce and distribute about 0.6 MAFY additional capacity. These totals were obtained using the most probable projections of water reuse given by agencies which gave cost figures only. Implementation periods corresponding to these cost figures range from 1995 in most to 2010 in some cases

Of the total number of respondents, 51 percent provided usable fiscal information. In most cases it was unclear whether the given costs corresponded with one or more phases of project development. Table 11 gives a breakdown by region where reclamation dollars will be spent. Appendix F contains the detailed data on costs.

ENVIRONMENTAL USE OF RECYCLED WATER

Existing and projected uses of reclaimed water include deliveries that serve beneficial uses including those that replace the need for additional potable water supplies and uses that would not, under most circumstances, have received fresh water if reclaimed water were not available. Some uses such as stream or river enhancement involve reuse downstream or percolation for incidental groundwater recharge.

Figure 8. BUDGETARY PROBLEMS IMPACTING WATER RECYCLING

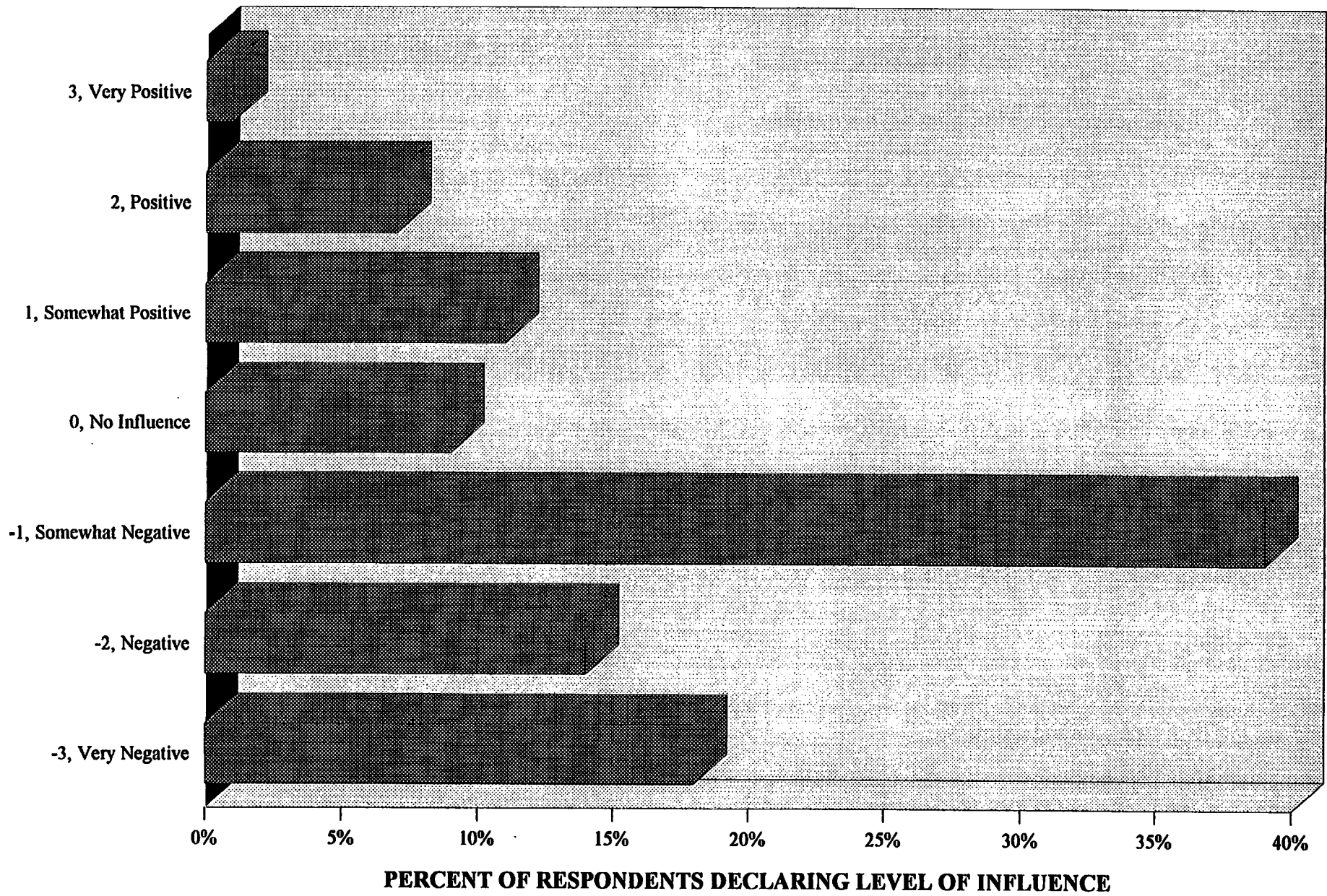


Figure 9. ECONOMIC RECESSION IMPACTING WATER RECYCLING

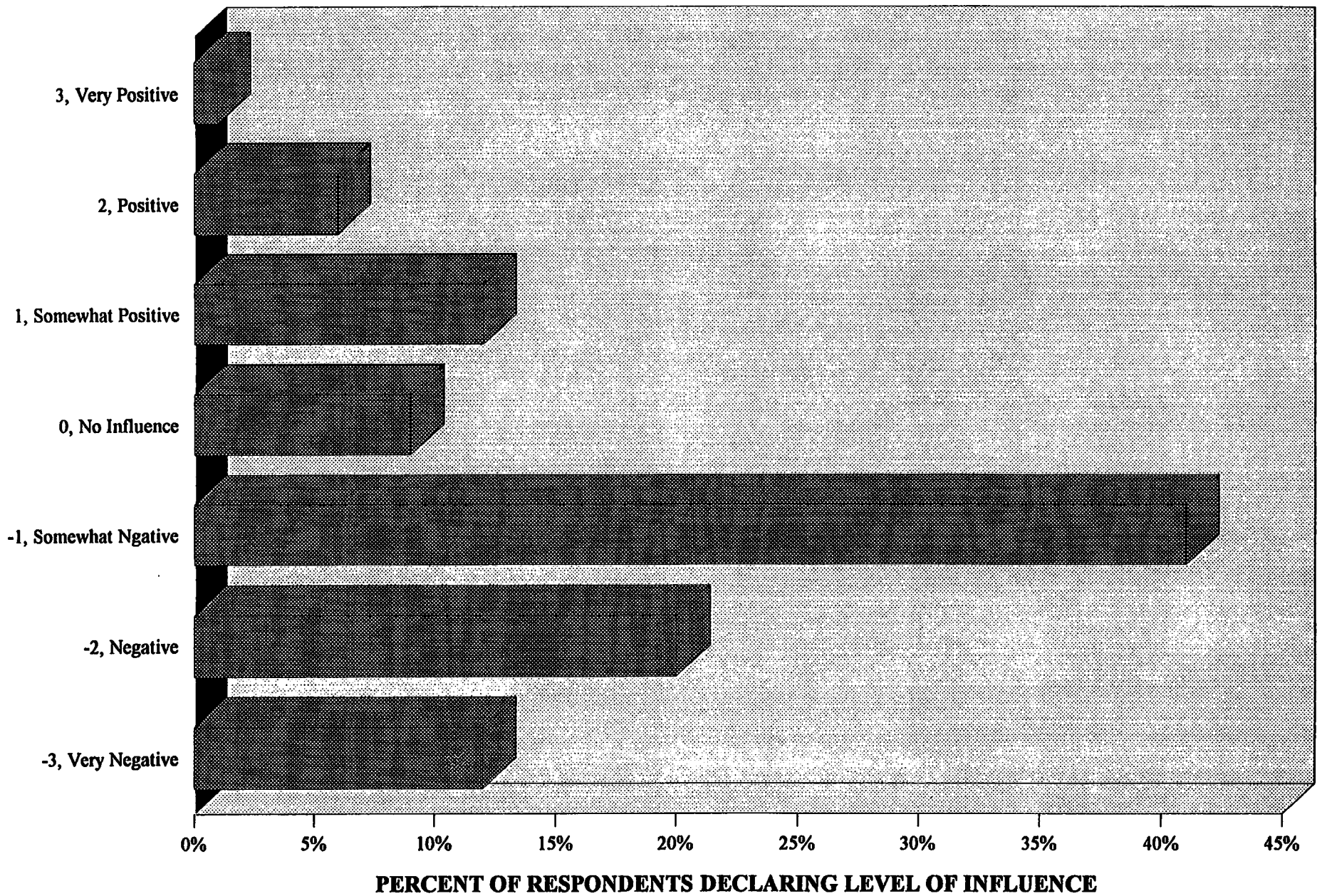


Figure 10. DROUGHT IMPACTING WATER RECYCLING

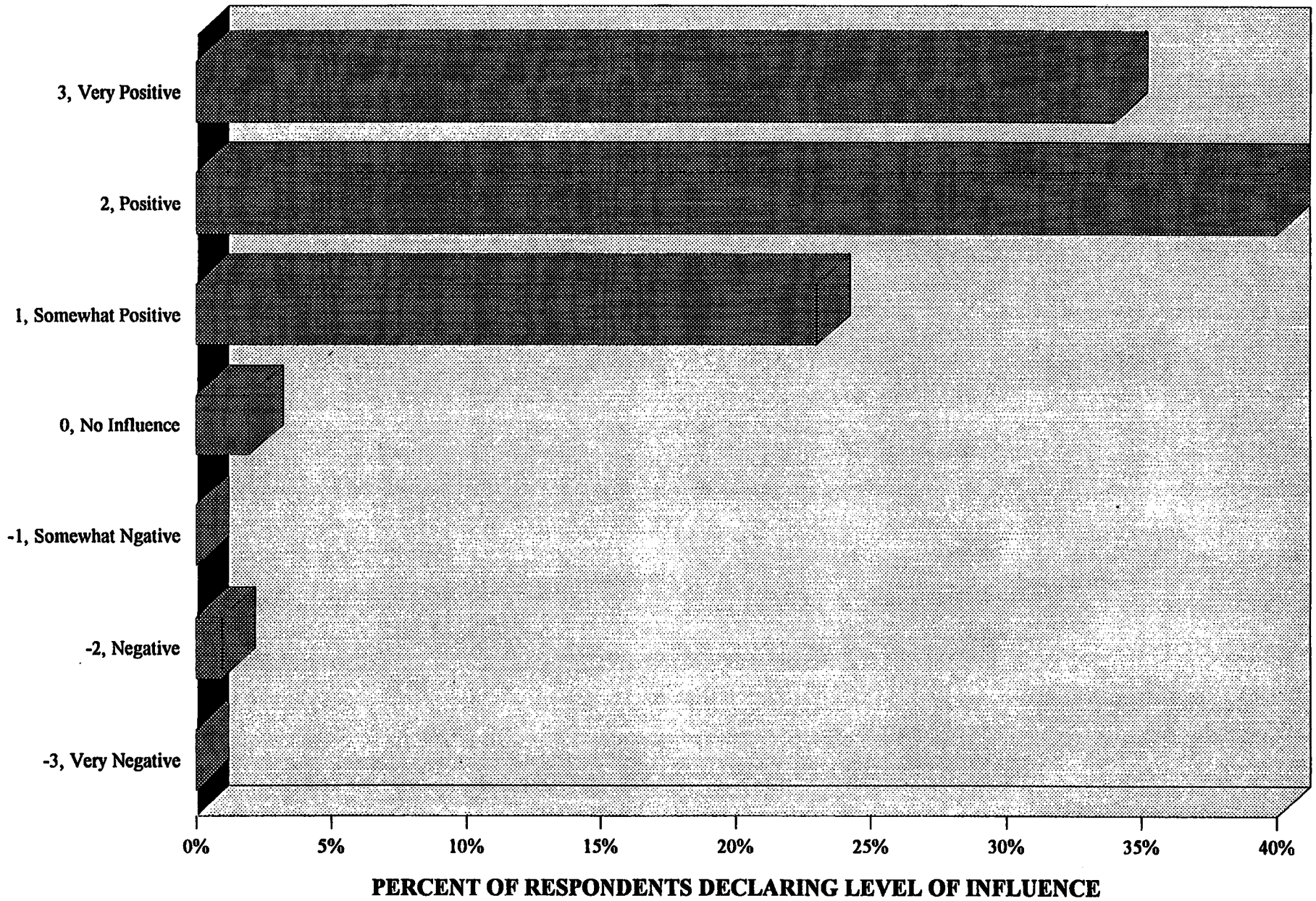


Figure 11. WATER SHORTAGE IMPACTING WATER RECYCLING

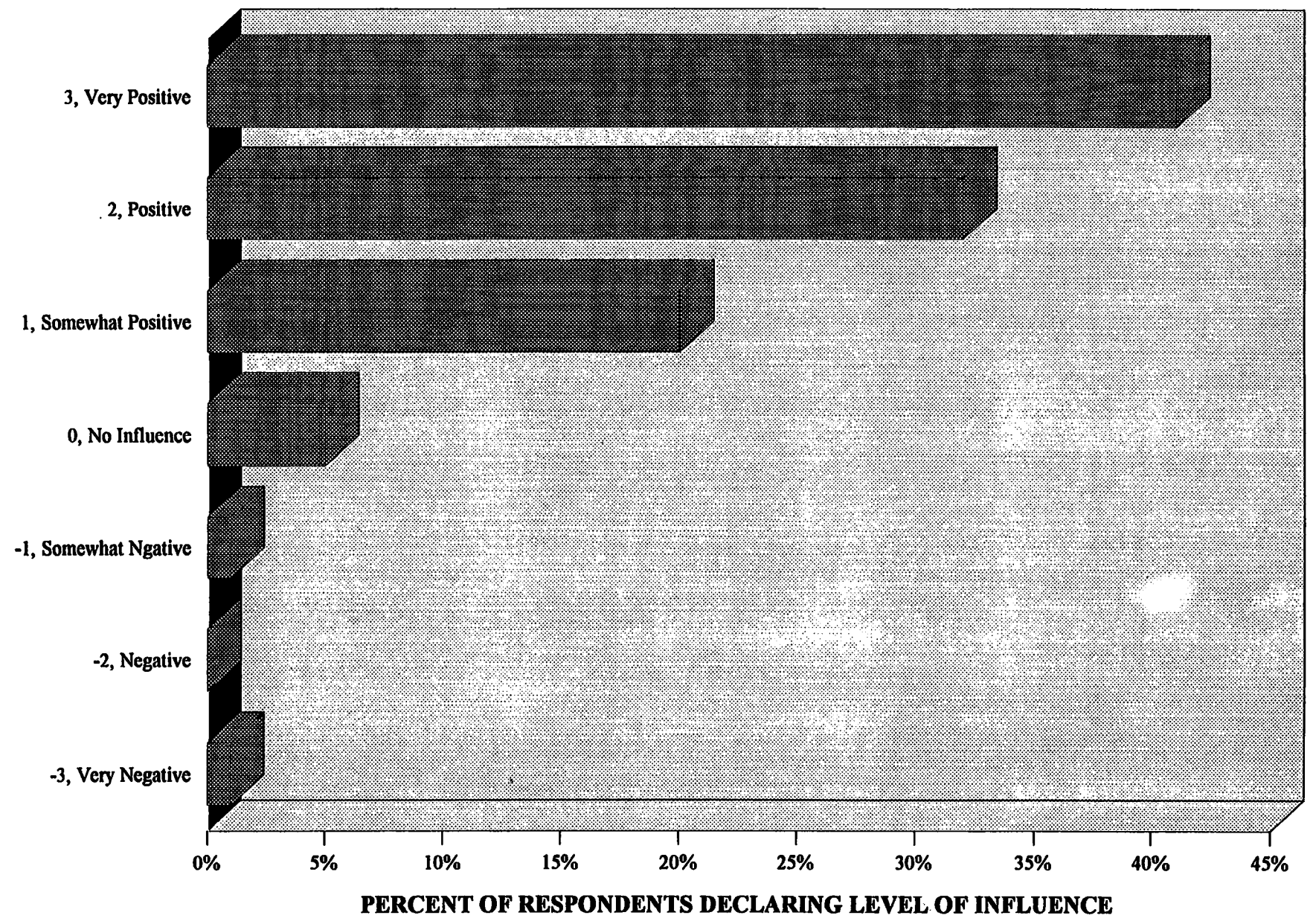


Figure 12. REGULATORY MANDATES IMPACTING WATER RECYCLING

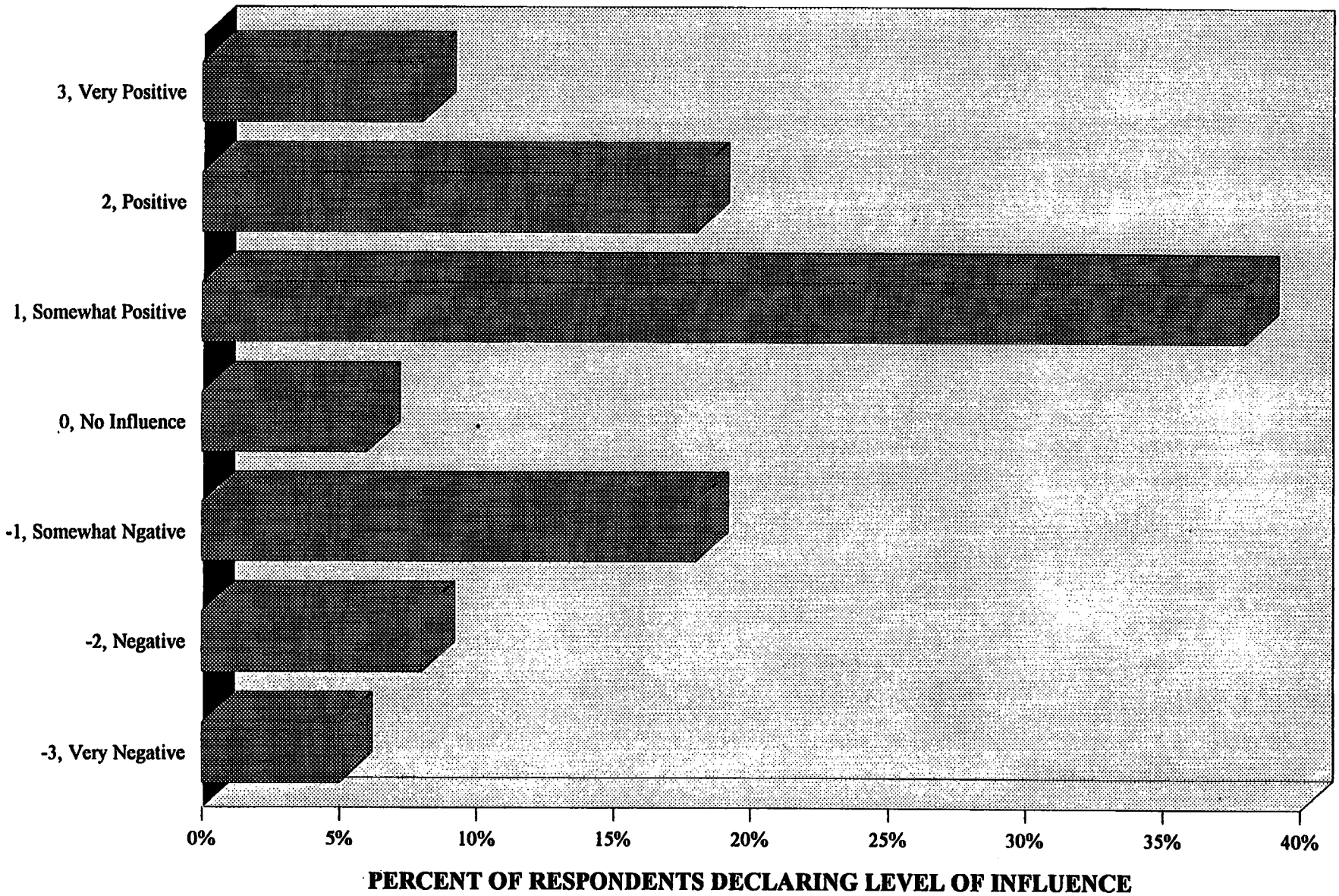


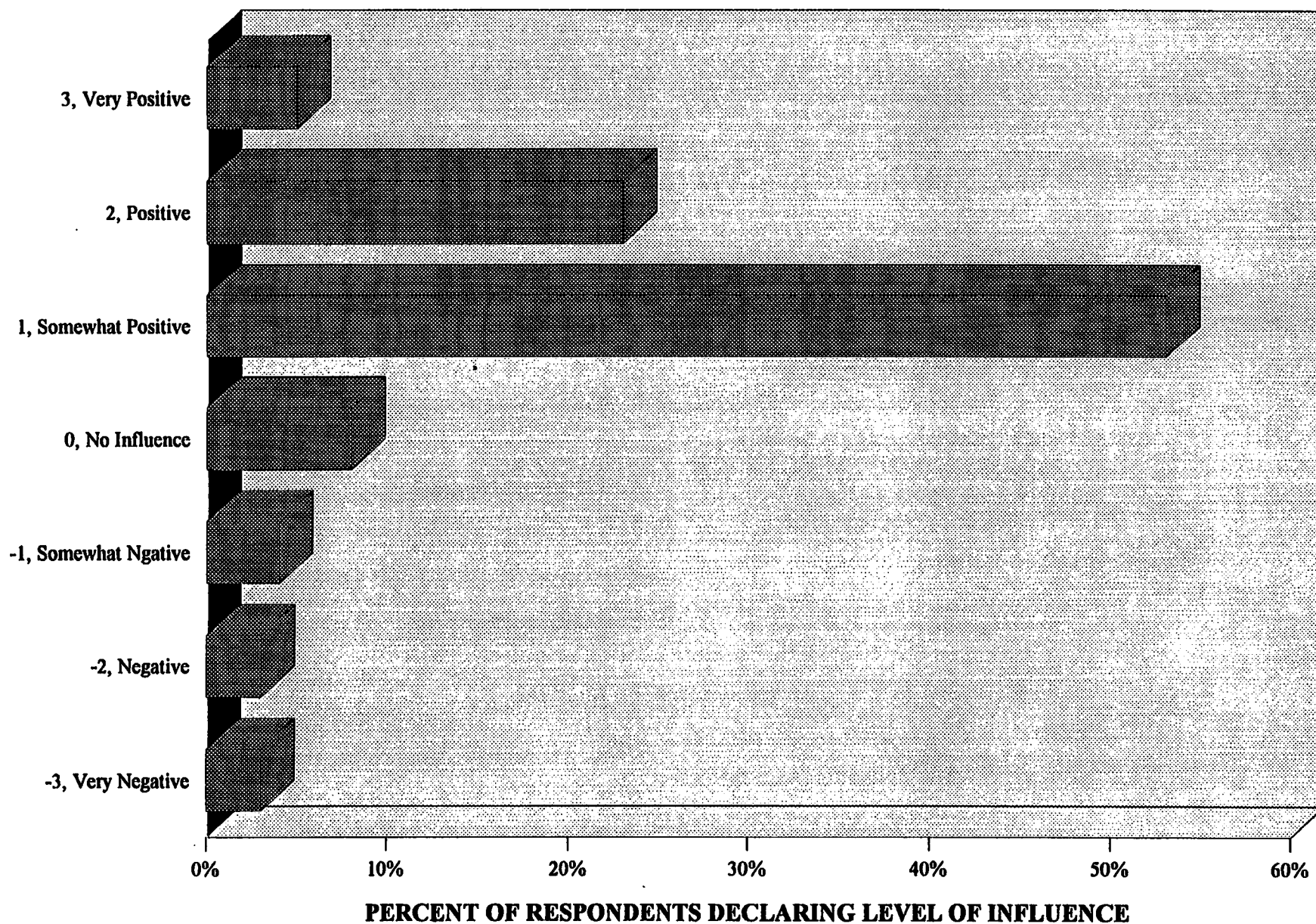
Figure 13. PUBLIC OPINION IMPACTING WATER RECYCLING

Figure 14. POLITICAL PRESSURES IMPACTING WATER RECYCLING

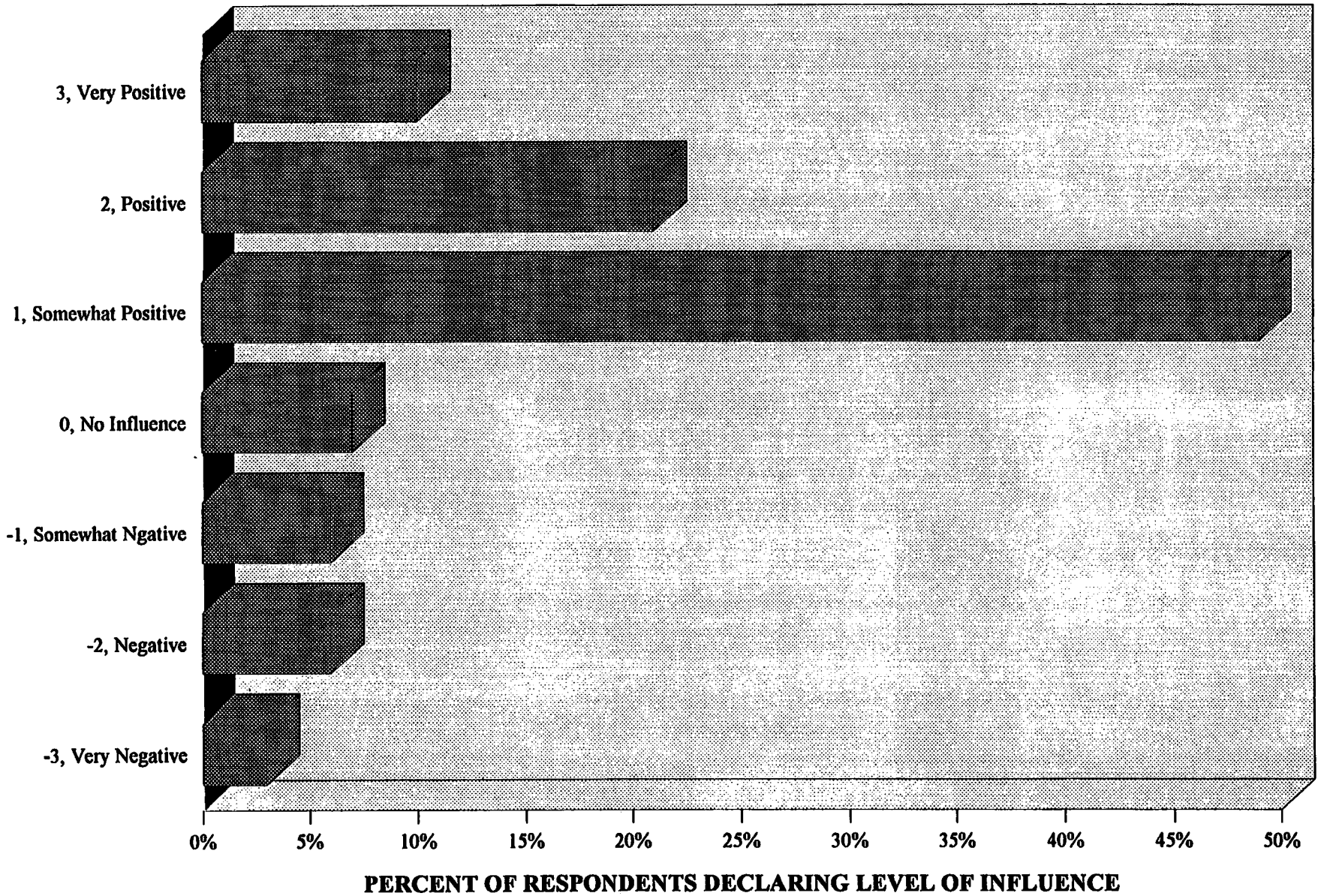


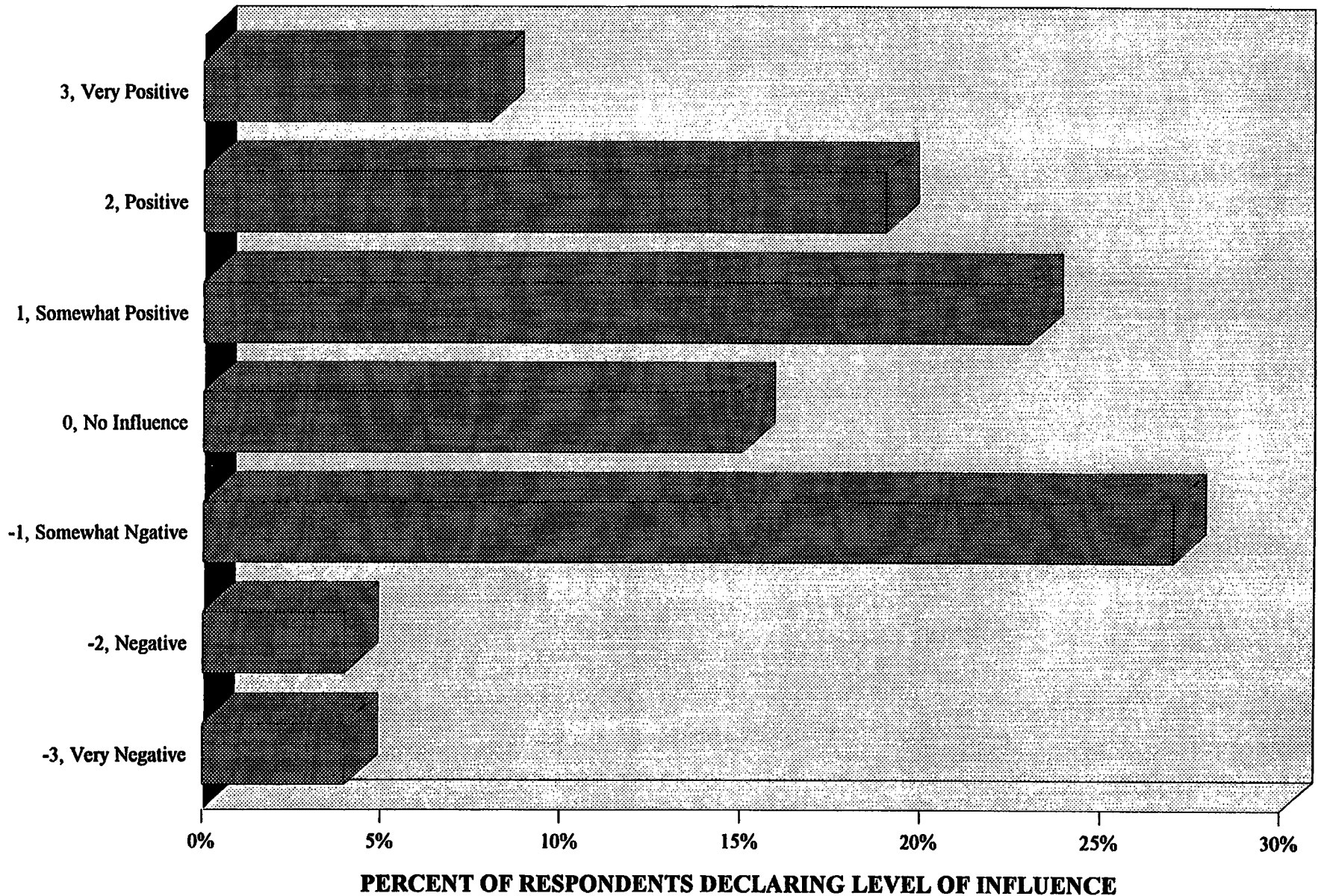
Figure 15. OTHER INFLUENCES IMPACTING WATER RECYCLING

Table 9. LIST OF OTHER INFLUENCES AND THEIR IMPACT ON WATER REUSE

Impact	Other Influences As Identified By Individual Respondents
3	Opportunities Provided via Developer
3	Formation of New Agency
2	Increasing Imported Water Costs
2	Lack of Potable Water
2	New Golf Course
2	User Demand
2	Availability
1	Long-Term Water Supply
-1	Development Approval
-1	Building Moratorium
-1	Jurisdictional Issues
-1	Closure of Fort Ord
-1	Staff Availability
-1	Water Quality
-1	Salt Intrusion
-2	Anti-Growth Faction
-3	Regional Board Staff

Table 10. "PURPOSE" OF WATER REUSE PROJECTS

"Purpose"	Number of Agencies	Percent of Agencies	Volume (AFY)	Percent of Total Volume
Water supply only	70	63%	921,825	62%
Water supply plus other uses except pollution control	3	3%	298,000	20%
Pollution abatement/control	1	1%	570	0%
Pollution control plus other uses except water supply	3	3%	59,137	4%
Combined water supply and pollution control	15	14%	109,605	7%
"Other" and "multi-purpose"	7	6%	39,221	3%
No response	12	11%	68,421	5%
TOTALS:	111	100%	1,496,779	100%

Table 11. PROJECTED CAPITAL EXPEDITURES FOR WATER REUSE PROJECTS

(Figures available only for agencies responding to specific questions.)

Region	Capital Costs		Probable* Water Reuse Capacity (AFY)
	Treatment	Distribution	
	(millions of dollars)		
1. North Coast	NA	NA	NA
2. San Francisco Bay	\$199.65	\$301.76	93,754
3. Central Coast	\$41.00	\$63.30	33,500
4. Los Angeles	\$288.32	\$415.30	333,465
5. Central Valley	\$51.79	\$2.45	20,420
6. Lahontan	NA	NA	NA
7. Colorado River Basin	\$10.25	\$4.00	8,684
8. Santa Ana	\$127.94	\$101.37	32,158
9. San Diego	\$121.67	\$278.97	78,009
TOTALS:	\$840.62	\$1,167.15	599,990

* In many cases, the associated volume of water reuse capacity was estimated from the respondents' data, using subjective assumptions and comparisons.

NA = Not Available

For the purposes of the current survey, all uses, as reported by the respondents, are presented in this report without consideration as to which might displace an existing volume of fresh water use.

Future Prospects for Water Recycling

Section IV

Population growth, increasing demand for higher quality water and uncertainty about developed sources of water supply and their future reliability are now widely recognized. Government agencies and water suppliers increasingly adopt policies based on the premise that a reliable water supply comes from a multiplicity of resources, including water reclamation. It has been successfully demonstrated by several agencies that this water supply can be readily, safely and economically reused. There are no technical impediments to water recycling. Systems to treat wastewater to various qualities required for any reuse have been on the market and in successful use for decades. Potable reuse is on the horizon. Probably the next survey of water reclamation will report this category of reuse for the first time in California.

WATER RECLAMATION AS A WATER RESOURCE

A significant amount of water will be reclaimed over the next two decades; however, this will remain a small part of the total available wastewater resource. Based upon figures of total statewide municipal wastewater,⁴ only about 13 percent is reused. If the survey projections are realized in 1995, 23 percent of the total wastewater could be reclaimed, increasing to 28 percent in 2000, 36 percent in 2010, and "ultimately," 52 percent. These figures do not take into account an increase in municipal wastewater due to population growth.⁵

There is no shortage of demand for reclaimed water. Besides irrigation uses, existing and planned groundwater recharge and seawater intrusion barriers are large users of water and suitable for conversion to recycled water. These demands can be met with non-potable water supplies, leaving finite potable supplies for drinking, cooking, cleaning, manufacturing, environmental, and other essential purposes.

Future uses of reclaimed water for irrigation of residential landscaping will open new markets

⁴Each Regional Water Quality Board region was contacted to request the most recent average dry weather flow of municipal wastewater. The results are as follows: Region 1 - 40,656 AFY; Region 2 - 604,800 AFY; Region 3 - 98,705 AFY; Region 4 - 784,000 AFY; Region 5 - 501,849 AFY; Region 6 - 34,608 AFY; Region 7 - 48,286 AFY; Region 8 - 486,000 AFY; and Region 9 - 267,120 AFY. This total equals 2.87 MAFY.

⁵While technically not valid, a constant wastewater volume might better reflect the effects of water conservation on present and future wastewater flow quantities.

which will be significant in some communities.

The public is willing to use more reclaimed water if it is presented with accurate information early in the planning stages. Potentially, industrial uses, residential landscaping and most other non-potable demands for water can be met with reclaimed water. With criteria under development at this writing, potable reuse might significantly change the picture of future water reuse. A special state committee sponsored by the State Department of Health Services and the Department of Water Resources is working toward assessment of feasibility of potable reuse. The state committee is expected to report to the respective Departments over the next two to three years. Potable reuse could take one of two forms: introduction to surface reservoir or a direct linkage to the potable water system.

IMPEDIMENTS TO WATER RECLAMATION

The major impediment reported by most respondents to water recycling is the combination of economic recession and local budgetary problems. Like new potable water projects, water reclamation projects require additional funding. Funding is currently highly problematic at all levels of government because of the economic recession gripping the country, and affecting California in particular. Promoting and implementing greater water conservation and water use efficiency strategies will reduce the overall water demand. This should reduce the total costs of additional supplies. Whether there is a recession or not, as long as California's population continues to grow along with environmental demands (e.g. adequate water to the Delta, replenishment of overdrafted aquifers and supply to seawater intrusion barriers), more water will be needed. The water supply industry will view reclaimed water as another source of supply, to be used efficiently wherever it is available.

WATER RECLAMATION POTENTIAL ELSEWHERE

California has a large number of water reclamation projects on-line and in various planning stages. This is an important accomplishment. However, there is much more wastewater remaining to be reclaimed to meet the state's needs for economic growth and environmental protection. Similar environmental and population needs must be met in other dry regions of the world.

Israel

Whereas California reclaims about 13 percent of its wastewater resources, Israel currently reuses about 70 percent of its wastewater, and has plans to increase this to 80 percent by the turn of the century.^{6,7}

Arizona

In Arizona, 66,500 AFY is reclaimed out of 191,000 AFY; this represents 35 percent of the state's wastewater. Reclaimed water is used in agriculture, groundwater recharge, industrial processing, and landscape irrigation. Water reclamation will increase to 55 percent by 1996 when the cities of Phoenix and Tucson add increased water recycling capacities. The City of Phoenix has further expansion planned starting in 2000 (up to 15,000 AFY additional reuse by 2015). At present, about 40 percent of its effluent is reclaimed. This is expected to increase to 80 percent by 2015. Many of the smaller cities in Arizona have achieved complete reclamation of their wastewater.

Florida

In Florida, 30 percent or 324,800 AFY is being reclaimed out of about 1.06 million AFY.^{9,10} About 123,000 AFY is used for public landscape (i.e. parks and golf courses), 97,000 AFY for agriculture, 44,800 AFY for groundwater recharge, 24,600 AFY for environmental enhancement, and 19,000 AFY for industrial purposes. In 1986, the state identified 118 facilities with beneficial reuse. Four years later, 199 reuse facilities were contained in the state's water reuse inventory of 1990. By 1992, there were almost 300 reuse projects.

Nevada

The State of Nevada reclaims about 87 percent of its wastewater for agricultural and landscape irrigation, environmental enhancement and industrial uses.¹¹ In 1990, over 147,000 AF were reclaimed from a resource pool of 170,500 AF.

Conclusion

Section V

SURPASSING THE STATE'S GOAL

One conclusion of this survey is that the state's legislated goal of accomplishing one million acre-feet of water recycling by the year 2010 is well within the realm of possibility. Local water and sewerage agencies have set their sights high enough to achieve the state's collective goal. Local agencies are in effect saying that, in aggregate, the state will easily exceed its established goals. The legislature can now assist local agencies with removal of the financing constraints so that the impetus gained during the six-year drought will not be lost. Examples of legislative assistance include funding through water reclamation bonds, reclaimed water use mandates and a statewide ban on salt discharges to sewer systems. It can also review and revise — upwards — the existing goals so as to stimulate additional planning and implementation of water recycling projects.

ECONOMIC BENEFIT

As mentioned earlier, at least \$2 billion could be spent over the next 25 years on construction of water reclamation capital facilities. This is a conservative figure as many agencies did not provide cost data in a usable format. This is a substantial financial investment.

The cost for a new acre-foot of fresh potable water in Southern California can exceed \$800, depending on treatment requirements and distance from the source.^{12,13} By comparison, most types of water reclamation cost much less than \$750/AF. Additionally, the need for environmental mitigation associated with

⁶State Comptroller Report: The Water Quantity Crisis," *Israel Environment Bulletin*, No. 4(2), 1991, pp. 4-11.

⁷While this high rate of reclamation is laudable, it has been reported that much of the wastewater is reused in Israel without adequate treatment. Though it can be used for many agricultural purposes, there has been contamination of groundwater with industrial and agricultural chemicals. Through the legal system, local Israeli environmental groups are forcing municipalities to comply with wastewater treatment laws. The City of Elat recently was forced to comply with laws, and will soon divert wastewater for reclamation and reuse in agriculture. *Econet Israel News*, 8(1), January-March, 1993, p. 3.

⁸Twelve cities were contacted in the May, 1993, to compile data: Casa Grande, Flagstaff, Holbrook, Kingman, Lake Havasu City, Payson, Phoenix, Prescott, Tucson, Wickenburg, Winslow, and Yuma. Wastewater effluent from Yuma was not included in the calculations, estimated to be on the order of 50,000 AFY; no reclamation occurs in this city. Kingman has indirect reuse (65 percent of effluent) via environmental enhancement and groundwater recharge; the other 35 percent evaporates. Many of the cities have plans for expansion of water reclamation.

⁹Personal communication with David York, Florida Water Reuse Coordinator, State Department of Environmental Regulations, May 5, 1993.

¹⁰1992 Reuse Inventory. Use it Again. Florida, Florida Department of Environmental Regulation, 1992.

¹¹Data supplied by the Division of Water Planning, Nevada Department of Conservation and Natural Resources, Mr. Ret Jesse, May 25, 1993. The data is based upon 1990 wastewater discharges.

traditional water supply development, is virtually non-existent in water recycling projects. In fact, environmental enhancements are observed as less pollutant loading is placed in the environment. Economically, and environmentally, water reclamation is the right choice. If the environmental benefits and prevention of pollution of receiving waters are credited properly to water reclamation, there is no question about its feasibility and economic advantages.

CLOSING THE STATE'S WATER SUPPLY GAP

The State Department of Water Resources predicts a shortfall of 2.2 to 6.2 million AFY by the year 2020.¹⁴ Though water reclamation alone cannot close this gap completely, it can reduce it substantially. This is especially true in the larger urban areas which import water over long distances. Achieving total water reclamation may not be realistic now, but setting a goal of 75 percent water reclamation (i.e. at least 2.2 million AFY) can bring the state to the low end of the shortage bracket. Any solution to the water supply shortfall will require a combination of transfers and water use efficiencies, but inevitably it must include water recycling.

Appendices

Section VI

- Appendix A SURVEY QUESTIONNAIRE
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¹²"Reclaimed Water is Cost-Effective Now," *QWR News*, No. 3(1), April, 1992, p. 5.

¹³David Richard, T. Asano, and G. Tchoanoglous, The Cost of Wastewater Reclamation in California, University of California, Davis, CA, November, 1992, p. 7-1.

¹⁴Personal communication with Naser Bateni, DWR, Division of Planning, update to Draft of Bulletin 160-93, California's Water Needs, the year 2020, May 12, 1993.

Survey Questionnaire

Appendix A

WATER REUSE

ASSOCIATION OF CALIFORNIA

September 20, 1993

mail merge

{Agency General Manager}

{Address}

{City, State, Zip}

SUBJECT: 1992 SURVEY OF STATE WATER RECYCLING POTENTIAL

Dear {_____}

As part of its mission to promote water recycling, the Board of Directors of the WaterReuse Association of California has decided to conduct a survey to explore the most recent potential for water reuse in California over the next 20 years. In addition, it is hoped to obtain an estimate of the deliery of projects completed to date. The survey data will assist WaterReuse to disseminate information regarding all types of proposed water reclamation projects and projected reclaimed water supplies. This information is vital to legislators, water reuse advocates, and those planning water reuse funding. The survey results will help promote water recycling as a reasonable means of extending our available water resources. Another purpose of this survey is to assist agencies which might benefit from the newly established WaterReuse Finance Corporation.

The WaterReuse Board has set a deadline of January 15, 1993 for presentation of the data to the Board. To meet this deadline, we need your response to the enclosed questionnaire no later than October 15, 1992. After receiving the responses and a telephone follow-up, we will compile the data and prepare a report. Your prompt response will be highly appreciated. If you have any questions about the survey, please call Ms. Stephanie Williams at (916) 442-2746 or Dr. Bahman Sheikh at (213) 237-0887. Thank you in advance for your valuable input.

Sincerely,

DAVID NAGLER
Executive Director

W A T E R R E U S E

ASSOCIATION OF CALIFORNIA

1992 SURVEY OF STATE WATER RECYCLING POTENTIAL

1. Name of Responding Agency: _____ Principal Activity: _____
2. Name(s) of Your Regional Water Quality Control Board(s)? _____
3. If there are any private water purveyors in your service area that represent an opportunity for use of reclaimed water, please identify:

4. **PLEASE COMPLETE PROJECT DATA SHEET. USE A SEPARATE SHEET FOR EACH PROJECT.**

5. Would you be interested in assistance--at no cost to your agency--in applying for low-interest state loans? Yes No
6. The newly formed WaterReuse Finance Corporation can provide a mechanism to finance water reclamation projects through a certificate of participation lease/purchase pooled program. Would you be interested in a presentation to discuss the WaterReuse Finance Corporation and to get more information? Yes No
7. In the last two years, have your water reclamation plans and projects been affected by any of the following factors? Circle the appropriate numbers in all boxes that apply:

	<i>Positive Impact, More Reuse</i>			<i>Negative Impact, Less Reuse</i>		
Budget Problems <input type="checkbox"/>	3	2	1	-1	-2	-3
Recession <input type="checkbox"/>	3	2	1	-1	-2	-3
Drought <input type="checkbox"/>	3	2	1	-1	-2	-3
Long-Term Water Shortage <input type="checkbox"/>	3	2	1	-1	-2	-3
Changes In the Regulatory Climate <input type="checkbox"/>	3	2	1	-1	-2	-3
Public Pressure Re/ Water Reclamation <input type="checkbox"/>	3	2	1	-1	-2	-3
Political/Legislative Mandates <input type="checkbox"/>	3	2	1	-1	-2	-3
Other Influences <input type="checkbox"/>	3	2	1	-1	-2	-3
	3	2	1	-1	-2	-3

8. Would you like to receive a copy of the report of the results of this survey? Yes No

9. This survey questionnaire was completed by: _____

Title _____ Telephone: _____

Date: _____ Thank you very much for your prompt response.

Please FAX the completed questionnaire, along with the project data sheet(s) to:

F A X : 213 / 237-0077

WaterReuse Association of California
ATTENTION: Bahman Sheikh

WATER REUSE ASSOCIATION OF CALIFORNIA ***** 1992 SURVEY OF WATER RECYCLING POTENTIAL

Project Name(1): _____ *{Please use a separate sheet for each distinct project, by first copying the blank}*

Purpose of Project(2): Water Reclamation/Reuse ; Pollution Control/Disposal ; Other _____; Multi-Purpose

Project Location: _____ *{Counties and any cities}*

Other Participating Agencies: _____

Roles of Other Agencies(3): _____

Source(s) of Reclaimed Water: _____

Stage of Implementation(4): Conceptual ; Feasibility Study ; Preliminary Design ; Final Design ; Construction Completed

Type of reuse	Completed Projects(5) (AF/Yr)	Begin Delivery (year)	Projected Reuse (AF/Yr) in			Ultimate Reuse (AF/Yr)	Capital Cost(6)		Proba- bility(7)
			1995	2000	2010		Treatment	Distribution	
Landscape, Golf Courses									
Industrial									
Agricultural									
Groundwater Recharge									
Seawater Intrusion Barrier									
Environmental Enhancement									
Other:									

- (1) Your internal project designation. If the project is phased, complete a separate sheet for each phase of the project.
- (2) If the purpose of this project does not include any water recycling, do not include the project in this survey.
- (3) Other agencies may be: supplier of reclaimed water/effluent, wholesaler of the product, or purveyor of water at the retail level.
- (4) Project stage refers to its current (end of 1992) implementation status.
- (5) In this column give Acre-ft/yr for completed/operating water recycling project
- (6) Estimate incremental cost of treatment (beyond NPDES requirements for discharge) and reclaimed water distribution to customers.
- (7) Give your best estimate of the probability (in percent) that each element of the project will be implemented.

List of Respondents

Appendix B

Appendix B. LIST OF RESPONDENTS

Name of Agency	No. of projects	Region RWQCB	Loan	Presenta- tion ?	Report Copy ?	Name	Number
Santa Rosa, City of	1	1	Y	Y	Y	Scott Stinebaugh	(707) 524-5189
Sonoma County Public Works	8	1	Y	Y	Y	R Laufer	(707) 527-2231
Sonoma County Water Agency	0	1	N	N	Y	Carl Jackson	(707) 526-5370
Valley of the Moon Water District	0	1	N	N	N	Jerry Olrich	(707) 996-1037
<i>Total In Region 1:</i>	<i>9</i>						
Alameda County Water District	1	2	Y	N	Y	Jill Duerig	(510) 659-1970
Central Contra Costa Sanitary District	2	2	Y	Y	Y	James Kelly	(510) 689-3890
Contra Costa Water District	1	2	Y	Y	Y	Greg Sullivan	(510) 674-8083
East Bay Municipal Water District	11	2	Y	N	Y	Richard Harris	(510) 287-1675
Fairfield, City of	0	2	Y	N	Y	Rick Wood	(707) 428-7481
Fairfield-Suisun Sewer District	1	2	Y	Y	Y	R. Luthy	(707) 429-8930
Livermore, City of	1	2	Y	Y	Y	William Adams	(510) 373-5230
Marin Municipal Water District	2	2	Y	Y	Y	Bob Castle	(415) 924-4600
Napa Sanitation District	2	2	Y	Y	Y	Ernest Erskine	(707) 258-6025
North Marin Water District	2	2	Y	Y	Y	Chris DeGabriele	(415) 897-4133
Palo Alto Water Quality Control Plant	1	2	Y	Y	Y	Daisy Stark	(415) 329-2287
Petaluma, City of	1	2	Y		N	Thomas Hargis	(707) 778-4304
San Francisco, City and County of	1	2	Y	Y	Y	Karen Kubick	(415) 554-8206
San Jose, City of	1	2	Y	Y	Y	Kristine Cozza	(408) 277-2991
Santa Clara Valley Water District	2	2	Y	Y	Y	Bill Molnar	(408) 265-2600
Santa Clara, City of	1	2	Y	N	Y	Robin Saunders	(408) 984-3183
Sunnyvale, City of	1	2	Y	Y	Y	Christine Fischer	(408) 730-7426
Union Sanitary District	4	2	Y	N	Y	Richard Cortes	(510) 790-0100
<i>Total In Region 2:</i>	<i>35</i>						
Goleta Sanitary District	1	3	N	N	Y	Felix Martinez	(805) 967-4510
Lompoc, City of	1	3	Y	Y	Y	Gary Keefe	(805) 736-1261
Monterey Regional Water Pollution Control Agency	1	3	Y	Y	Y	Robert Jaques	(408) 372-3367
San Luis Obispo, City of	1	3	Y		Y	David Pierce	(805) 781-7220
San Luis Obispo, County of	3	3	Y	Y	Y	Wendell Wilkes	(805) 781-4657
Santa Barbara County Water Agency	4	3	Y	Y	Y	Lynn Anderson	(805) 568-3545
Santa Barbara, City of	1	3	N	N	Y	Alison Whitney	(805) 564-5574
<i>Total In Region 3:</i>	<i>12</i>						
Burbank, City of	1	4	Y	Y	Y	Leighton Fong	(818) 953-9647
Calleguas Municipal Water District	1	4	Y	Y	Y	Donald Kendall	(805) 526-9323
Castaic Lake Water Agency	1	4	N	N	N	Robert Sagehorn	(805) 255-2866
Central Basin Municipal Water District	3	4	Y	N	Y	Virginia Grebbien	(310) 217-2222
Cerritos, City of	3	4	N	N	Y	Ron Babel	(310) 860-0311
Glendale, City of	4	4	N	Y	Y	Ray Notario	(818) 548-3962
Las Virgenes Municipal Water District	3	4	N	Y	Y	Jim Colbaugh	(818) 880-4110
Los Angeles County Sanitation Districts	6	4	Y	Y	Y	Earle Hartling	(310) 699-7411
Los Angeles, City of (DWP)	12	4	Y	Y	Y	Thomas Dollente	(213) 481-5593
Ojai Valley Sanitary District	0	4	Y	N	N	Eric Oltmann	(805) 648-7067
Pomona, City of	1	4	Y	Y	Y	Tony Skvarek	(909) 620-2231
San Buenaventura, City of	1	4	Y	Y	Y	Dan Raybura	(805) 644-1141

Appendix B. LIST OF RESPONDENTS

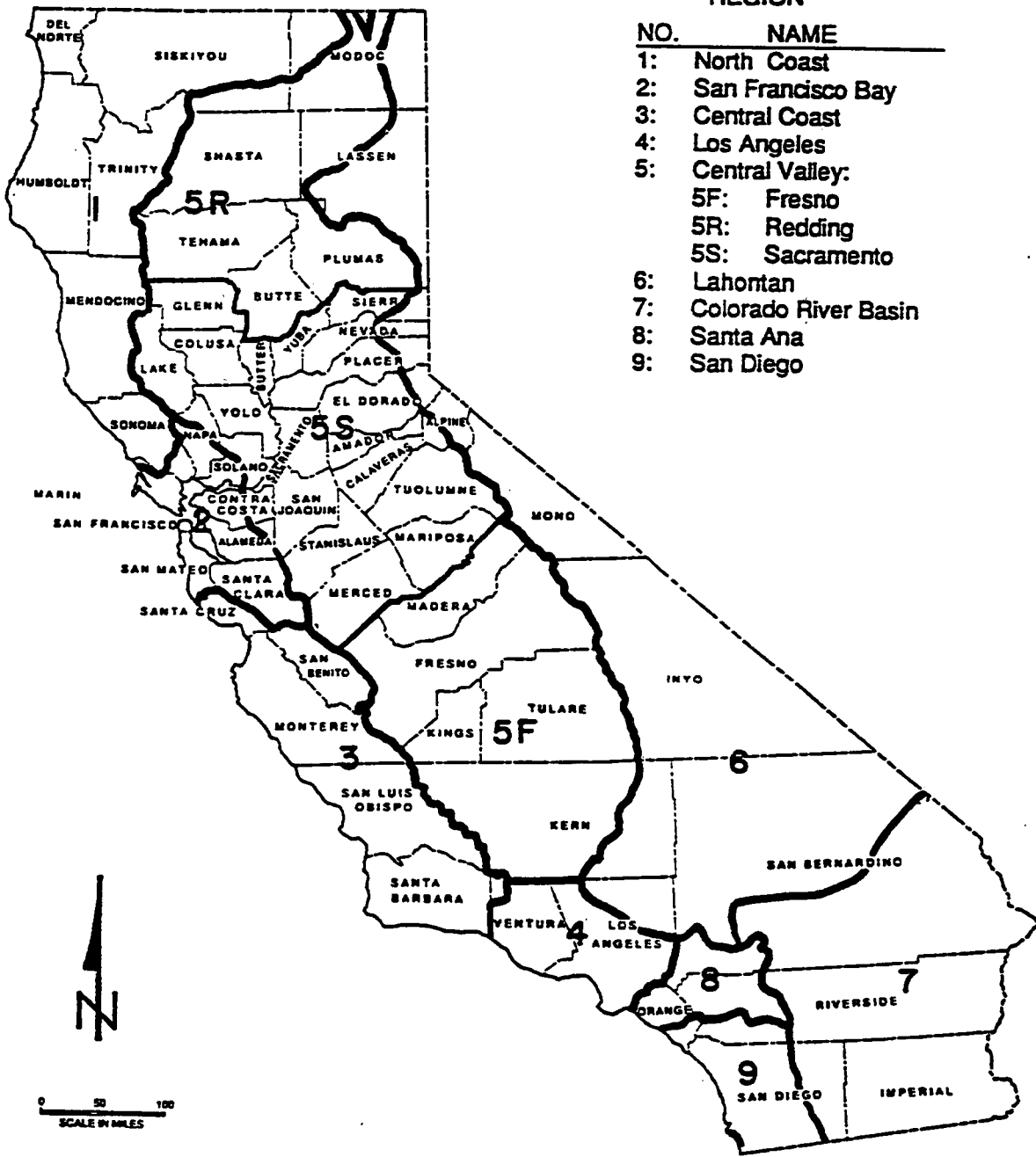
Name of Agency	No. of projects	RWQCB	Loan	Presenta-tion ?	Report Copy ?	Name	Number
Santa Monica, City of	4	4	N	N	Y	Craig Perkins	(310) 458-2255
Thousand Oaks, City of	2	4	Y	Y	Y	Donald Nelson	(805) 497-8611
United Water Conservation District	1	4	Y	Y	Y	Kari White	(805) 525-4431
Upper San Gabriel Valley Municipal Water District	1	4	Y	Y	Y	Timothy Jochem	(818) 443-2297
Ventura County Waterworks District #1	1	4	Y	N	Y	Reddy Pakala	(805) 584-4830
Walnut Valley Water District	3	4	Y	Y	Y	Denis Hernandez	(909) 595-1268
Water Replenishment District of Southern California	4	4	N	N	Y	Melinda Sperry	(310) 921-5521
West Basin Municipal Water District	1	4	Y	N	Y	Virginia Grebbien	(310) 217-2222
<i>Total In Region 4:</i>	<i>53</i>						
Ceres, City of	1	5	Y	N	Y	John Wilson	(209) 538-5789
Dinuba, City of	1	5	Y	Y	Y	Ben Mumuz Jr.	(209) 591-2980
Lodi, City of	2	5	N	N	Y	Mr. Fran Forkas	(209) 333-6740
Los Banos, City of	1	5	N	N	N	Gerald Herman	(209) 827-7033
Manteca, City of	0	5	N	N	N	Diane Baxter	(209) 239-8460
Reclamation District 2068	1	5	N	N	N	Mike Hardesty	(916) 678-5412
Alpaugh Irrigation District	0	5 F	N	N		Lavon Penrod	(209) 949-8323
Hanford, City of	1	5 F	Y			Clee Haley	(209) 585-2560
Kern County Water Agency	1	5 F	N	N	Y	James Beck	(805) 634-1400
Taft WTP, City of	1	5 F	N	N	Y	Webb Dyson	(805) 765-2716
Woodlake, City of	1	5 F	Y		Y	Jack Justice	(209) 564-8055
Calaveras County Water District	2	5 S	Y	N	N	Larry Diamond	(209) 754-3543
Merced, City of	2	5 S	Y	Y	Y	Nicholas Pinhey	(209) 385-6848
Modesto Irrigation District	0	5 S	N	N	Y	Jack Krieg	(209) 526-7393
Parlier, City of	1	5 S	Y	Y	Y	Leonard Encinas	(209) 646-3545
Sacramento Regional County	1	5 S	Y	Y	Y	Cecilia Jensen	(916) 395-5465
Tuolumne Utility District	1	5 S	N	Y	Y	Tim McCullough	(209) 532-5536
<i>Total In Region 5:</i>	<i>17</i>						
Mammoth County Water District	0	6	Y	Y	Y	Dave Callan	(619) 934-2596
South Tahoe Public Utility District	1	6	Y		Y	Ross Johnson	(916) 544-6474
Running Springs Water District	1	6, 8	Y	Y	N	Jim Towns	(909) 867-2766
<i>Total In Region 6:</i>	<i>2</i>						
Barstow, City of	0	7	Y	Y	Y	Jennifer Riley	(619) 256-3531
Coachella Valley Water District	2	7	N	N	Y	Erric Wessels	(619) 398-2661
Desert Water Agency	2	7	Y	Y	Y	Michael Bergan	(619) 323-4971
<i>Total In Region 7:</i>	<i>4</i>						
Chino Basin Municipal Water District	7	8	Y	Y	Y	Traci Stewart	(909) 987-1712
Corona, City of	0	8	N	N	N	Fred Imani	(909) 736-2239
Eastern Municipal Water District	7	8	N	N	N	Peter Archuleta	(909) 925-7676
Elsinore Valley Municipal Water District	3	8	N	N	Y	John Hoagland	(909) 674-3146
Irvine Ranch Water District	10	8	Y	Y	Y	Richard Diamond	(714) 453-5594
Orange County Sanitation Districts	2	8	Y	Y	Y	Suson Bradford	(714) 962-2411
Orange County Water District	6	8	N	N	Y	Jame Van Haun	(714) 378-3221
San Bernardino, City of	1	8	Y	Y	Y	Bernard Kersey	(714) 384-5091
Santa Ana Watershed Project Authority	2	8	Y	Y	Y	Mark Norton	(714) 785-5411

Appendix B. LIST OF RESPONDENTS

Name of Agency	No. of projects	RWQCB	Loan	Presenta-tion ?	Report Copy ?	Name	Number
Vista, City of	1	8			N	Peter Nieblas	(619) 726-1340
Yucaipa Valley Water District	1	8	Y	Y	Y	Ray Jure	(909) 797-5118
El Toro Water District	1	8,9	Y	Y	Y	John Concar	(714) 837-7050
South Orange County Reclamation Authority	2	8,9	Y	N	Y	Lisa Ohlund	(714) 768-6098
<i>Total In Region 8:</i>	43						
Capistrano Beach Water	1	9	N	Y	Y	D. Erdman	(714) 496-5261
Capistrano Valley Water District	1	9	Y	Y	Y	Bob Clark	(714) 493-1515
Carlsbad Municipal Water District	1	9	Y	Y	Y	Robert Greaney	(619) 438-2722
Encina Wastewater Authority	1	9	Y	N	Y	William Hunter	(619) 438-3941
Esccondido, City of	1	9	Y	N	Y	C. Ferguson-Salvalli	(619) 741-4811
Fallbrook Public Utility District	2	9	N	Y	Y	Joe Jackson	(619) 728-1125
Fallbrook Sanitary District	5	9	Y	Y	Y	Joyce Shand	(619) 728-8319
La Mesa, City of	0	9	N	N	Y	Driss Elwardi	(619) 463-6611
Leucadia County Water District	1	9	Y	N	Y	Joan Geiselhart	(619) 753-0155
Moulton Niguel Water District	2	9	Y	Y	Y	Larry Dees	(714) 643-2584
Oceanside, City of	3	9	y	N	Y	Donna Rickman	(619) 966-4869
Olivenhain Municipal Water District	3	9	Y	Y	Y	Edward Suhay	(619) 753-6466
Otay Water District	3	9	N	N	Y	Keith Lewinger	(619) 670-2222
Padre Dam Municipal Water District	1	9	Y	Y	Y	Harry Barber	(619) 448-3111
Poway, City of	2	9	Y	Y	Y	Mark Weston	(619) 679-4351
Ramona Municipal Water District	2	9	Y	Y	Y	Ted Bares	(619) 789-1330
Rancho California Water District	1	9	Y	Y	Y	Kenneth Dealy	(714) 676-4101
San Clemente, City of	1	9	Y	Y	Y	A.J. Howard	(714) 366-1553
San Diego, City of	1	9			Y	Tibor Varga	(619) 668-2040
San Diego, City of (Clean Water)	4	9	Y	Y	Y	Harold Bailey	(619) 533-4205
San Elijo Joint Powers Authority	1	9	Y		Y	Kellene Burn-Lucht	(619) 438-7755
South Coast Water District	4	9	Y	N	Y	Michael Dunbar	(714) 499-4555
Vallecitos Water District	2	9	N	N	Y	Mary Clinkscates	(619) 744-0460
Valley Center Municipal Water District	6	9	Y	N	Y	Wally Grabbe	(619) 749-1600
Vista Irrigation District	2	9	Y	Y	Y	Thomas Wilson	(619) 724-8811
Western Municipal Water District	4	9					
<i>Total In Region 9:</i>	55						
<i>Estimated Number of Potential Future Projects:</i>	230						
<i>Total Number of Participants:</i>	111						

**California Regional
Water Quality Control
Board Regions**

Appendix C



REGION	
NO.	NAME
1:	North Coast
2:	San Francisco Bay
3:	Central Coast
4:	Los Angeles
5:	Central Valley:
5F:	Fresno
5R:	Redding
5S:	Sacramento
6:	Lahontan
7:	Colorado River Basin
8:	Santa Ana
9:	San Diego

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD REGIONS

Projections of Water Recycling Capacity by Region

Appendix D

D

Appendix D: PROJECTIONS OF WATER RECYCLING CAPACITY BY REUSE CATEGORY

Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Santa Rosa, City of	Subregional Water Reclamation System	1	Agriculture	12,150	850	2,000	0	15,000	
Santa Rosa, City of	Subregional Water Reclamation System	1	Environmental	250	0	5,750	0	6,000	
Santa Rosa, City of	Subregional Water Reclamation System	1	Landscape	750	550	600	0	1,900	
Sonoma County Public Works	Sonoma Valley Reclamation Project-Domaine Vineyards	1	Agriculture	360	0	0	0	360	100%
Sonoma County Public Works	Sonoma Valley Reclamation Project-Buena Vista Winery	1	Agriculture	75	0	0	0	75	100%
Sonoma County Public Works	Sonoma Valley Reclamation Project-Dale Ricci	1	Agriculture	18	0	0	0	18	100%
Sonoma County Public Works	Sonoma Valley Reclamation Project-Mitchell Mulas	1	Agriculture	140	0	0	0	140	100%
Sonoma County Public Works	Sonoma Valley Reclamation Project-Helen Larson	1	Agriculture	3	0	0	0	3	100%
Sonoma County Public Works	Golf Course Irrigation	1	Landscape	44	0	0	0	44	100%
Sonoma County Public Works	Land Irrigation of Tertiary-Guemeville	1	Environmental	108	0	0	0	108	100%
Sonoma County Public Works	Airport Irrigation Plan	1	Agriculture	294	0	0	0	294	100%
Total for Region 1			Region 1	14,192	1,400	8,350	0	23,942	
Alameda County Water District	Joint Master Plan	2	Landscape	0	1,620	1,051	1,360	4,031	70%
Central Contra Costa Sanitary District	CCCS/CCWD	2	Industrial	0	0	5,000	5,000	10,000	80%
Central Contra Costa Sanitary District	CCCS/CCWD/EBMUD ?	2	Landscape	0	1,325	1,275	5,000	10,000	80%
Contra Costa Water District	DDSD	2	Industrial	0	0	7,000	0	7,000	60%
East Bay Municipal Utility District	EBMUD-Chevron Water Reclamation Project	2	Industrial	0	6,000	400	550	6,950	100%
East Bay Municipal Utility District	Franklin Canyon Water Reclamation Project	2	Industrial	0	0	170	440	610	80%
East Bay Municipal Utility District	Water Supply Management Plan	2	Industrial	0	0	2,500	0	2,500	75%
East Bay Municipal Utility District	Sunset View Cemetery Irrigation Project	2	Landscape	0	50	10	10	70	95%
East Bay Municipal Utility District	Willow Park Golf Course Irrigation	2	Landscape	100	0	0	0	100	100%
East Bay Municipal Utility District	Chabot Municipal Golf Course Irrigation	2	Landscape	150	0	0	0	150	100%
East Bay Municipal Utility District	Galbraith Reclamation Project	2	Landscape	200	0	0	0	200	100%
East Bay Municipal Utility District	Richmond Gold & Country Club ?	2	Landscape	200	0	0	0	200	100%
East Bay Municipal Utility District	CalTrans Water Reclamation Project	2	Landscape	0	135	165	0	300	100%
East Bay Municipal Utility District	Franklin Canyon Water Reclamation Project	2	Landscape	0	300	25	0	325	85%
East Bay Municipal Utility District	Alameda Reclamation Project	2	Landscape	550	0	0	0	550	100%
East Bay Municipal Utility District	Water Supply Management Plan	2	Landscape	0	0	6,000	0	6,000	80%
East Bay Municipal Utility District	Wastewater Treatment Plant	2	Process Water	5,000	0	1,000	0	6,000	100%
Fairfield-Suisun Sewer District	Central Solano Dual Water System	2	Agriculture	0	0	2,910	0	2,910	
Fairfield-Suisun Sewer District	Central Solano Dual Water System	2	Landscape	0	0	5,882	0	5,882	
Livermore, City of	AWT Demonstration Project	2	Fire Protection	1	0	0	0	1	100%
Livermore, City of	AWT Demonstration Project	2	Landscape	439	0	0	0	439	100%
Livermore, City of	AWT Demonstration Project	2	Recharge	0	840	0	0	840	95%
Marin Municipal Water District	Las Gallinas Valley Reclamation Plant	2	Landscape	400	200	250	250	1,100	90%
Marin Municipal Water District	Central Marin Reclamation Plant	2	Landscape	0	100	750	350	1,200	70%
Marin Municipal Water District	Las Gallinas Valley Reclamation Plant	2	Toilets	0	5	5	5	15	70%
Marin Municipal Water District	Central Marin Reclamation Plant	2	Toilets	0	5	295	0	300	70%

Appendix D: PROJECTIONS OF WATER RECYCLING CAPACITY BY REUSE CATEGORY

Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Napa Sanitation District	Careros	2	Agriculture	0	500	0	0	1,000	100%
Napa Sanitation District	Careros	2	Environmental	0	0	200	0	200	75%
Napa Sanitation District	Careros	2	Landscape	0	460	0	0	460	85%
Napa Sanitation District	Kennedy Golf Course	2	Landscape	0	385	15	200	600	95%
North Marin Water District	Bel Marin Keys Unit V Golf Course	2	Landscape	0	0	382	0	382	50%
North Marin Water District	Renaissance Estates Golf Course	2	Landscape	0	382	0	0	382	50%
Palo Alto Water Quality Control Plant	Water Reclamation	2	Landscape	600	1,800	1,600	800	4,800	50%
Petaluma, City of	City of Petaluma	2	Agriculture	1,320	680	600	1,200	3,800	100%
Petaluma, City of	City of Petaluma	2	Landscape	300	0	150	0	450	100%
San Francisco, City and County	San Francisco Reclamation Program	2	Industrial	0	0	345	700	1,045	90%
San Francisco, City and County	San Francisco Reclamation Program	2	Landscape	0	0	2,966	6,021	8,987	90%
San Francisco, City and County	San Francisco Reclamation Program	2	Toilets	0	0	1,310	2,661	3,971	90%
San Francisco, City and County	San Francisco Reclamation Program	2	Treatment Plant	0	0	4,621	2,276	6,897	90%
San Jose, City of	Golden Triangle Water Reclamation	2	Agriculture	0	0	4,070	7,030	11,000	70%
San Jose, City of	Golden Triangle Water Reclamation	2	Industrial	0	0	1,870	1,130	3,000	70%
San Jose, City of	Golden Triangle Water Reclamation	2	Landscape	0	0	5,060	10,840	15,900	70%
Santa Clara Valley Water District	Gilroy Reclamation Plant	2	Landscape	0	0	3,000	0	3,000	70%
Santa Clara, City of	Water Reclamation	2	Landscape	450	100	50	50	1,000	
Sunnyvale, City of	Sunnyvale Water Reclamation	2	Landscape	0	7,280	0	0	7,280	
Union Sanitary District	Hayward Reclaimed Water Marsh	2	Environmental	11,200	0	0	0	5,600	
Union Sanitary District	Nonpotable Wastewater Reuse Master Plan	2	4,031 AFY included in Alameda County Water District						
Union Sanitary District	USD Truck Fill Station	2	Median Strips	2	0	0	0	2	
Union Sanitary District	Treatment Plant Reclaimed Water System	2	WWTP Spray	840	0	0	0	840	
Total for Region 2			Region 2	21,752	22,167	60,927	45,873	148,269	
Goleta Sanitary District	GSD Reclaimed Wastewater Project	3	Landscape	0	600	600	0	1,200	100%
Lompoc, City of	City of Lompoc	3	Environmental	0	0	2,000	400	2,400	90%
Lompoc, City of	City of Lompoc	3	Landscape	0	0	600	0	600	60%
Lompoc, City of	City of Lompoc	3	Recharge	3,200	400	0	0	1,000	100%
Monterey Regional Water Pollution Control Agency	Food Crop Irrigation	3	Agriculture	0	20,000	5,000	5,000	30,000	80%
San Luis Obispo, City of	Water Reclamation Plant	3	Agriculture	0	400	0	0	400	80%
San Luis Obispo, City of	Water Reclamation Plant	3	Landscape	0	800	0	0	2,000	80%
San Luis Obispo, County of	Country Club Estates CSA-7A	3	Agriculture	9	0	0	0	10	
San Luis Obispo, County of	Black Lakes Development CSA-1G	3	Landscape	46	0	0	0	46	
San Luis Obispo, County of	Oak Shores Development CSA-18	3	Landscape	62	0	0	0	62	
Santa Barbara County Water District	Buellton	3	Recharge	353	0	0	0	353	
Santa Barbara County Water District	Guadalupe	3	Recharge	468	0	0	0	702	
Santa Barbara County Water District	Solvang	3	Recharge	822	0	0	0	822	
Santa Barbara County Water District	Santa Maria	3	Recharge	6,855	0	0	0	6,855	

Appendix D: PROJECTIONS OF WATER RECYCLING CAPACITY BY REUSE CATEGORY

Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Santa Barbara, City of	Water Reclamation	3	Landscape	600	500	0	0	1,100	100%
Total for Region 3			Region 3	12,415	22,700	8,200	5,400	47,550	
Burbank, City of	System Expansion	4	Landscape	0	539	108	0	793	90%
Calleguas Municipal Water District	Oak Park/North Ranch Water Reclamation Project	4	Landscape	0	1,300	0	0	1,300	100%
Castaic Lake Water Agency	CLWA Reclaimed Water Master Plan	4	Agriculture	0	174	0	6	180	100%
Castaic Lake Water Agency	CLWA Reclaimed Water Master Plan	4	Industrial	0	0	0	700	700	100%
Castaic Lake Water Agency	CLWA Reclaimed Water Master Plan	4	Landscape	0	476	3,465	5,540	9,481	100%
Central Basin Municipal Water District	Century Reclamation Project II	4	Industrial	0	3,800	0	0	5,000	100%
Central Basin Municipal Water District	Rio Hondo Reclamation Project	4	Industrial	0	6,300	2,500	0	9,100	100%
Central Basin Municipal Water District	Century Reclamation Project I	4	Landscape	613	107	80	0	1,000	100%
Central Basin Municipal Water District	Century Reclamation Project II	4	Landscape	190	3,238	0	0	4,000	100%
Central Basin Municipal Water District	Rio Hondo Reclamation Project	4	Landscape	0	3,700	1,900	0	5,900	100%
Cerritos, City of	Reclaimed Water System	4	Landscape	1,886	614	1,100	0	3,600	100%
Cerritos, City of	Reclaimed Water System Expansion - Area 6	4	Landscape	75	50	0	0	125	100%
Cerritos, City of	Reclaimed Water System Expansion - Studebaker	4	Landscape	0	150	0	0	150	50%
Glendale, City of	Power Plant Reclamation Project	4	Landscape	450	0	0	0	450	
Glendale, City of	Brand Park Reclamation Expansion Project	4	Landscape	0	100	400	0	500	50%
Glendale, City of	Forest Lawn East Reclamation Project	4	Landscape	600	0	0	0	600	
Glendale, City of	Verdugo-Scholl Canyon Reclamation Project	4	Landscape	0	800	400	600	2,150	100%
Las Virgenes Municipal Water District	Las Virgenes Existing System - L. V. Valley	4	Agriculture/Land	286	14	0	0	300	100%
Las Virgenes Municipal Water District	Reclaimed Water Seasonal Storage	4	Landscape	0	400	0	0	400	100%
Las Virgenes Municipal Water District	Las Virgenes Existing System - Western & Calabasas	4	Landscape	4,151	49	100	900	7,000	100%
Los Angeles, City of	Harbor - Dominguez Gap	4	Barrier	0	0	0	5,000	10,000	40%
Los Angeles, City of	Japanese Garden	4	Environmental	0	5,000	0	0	5,000	100%
Los Angeles, City of	Sepulveda Basin - Wildlife Pond	4	Environmental	5,300	0	0	0	10,000	100%
Los Angeles, City of	Sepulveda Basin - Lake Balboa	4	Environmental	10,000	0	0	0	10,000	100%
Los Angeles, City of	West Valley	4	Industrial	0	0	0	350	350	40%
Los Angeles, City of	Eastside Greenbelt-Rio Hondo	4	Industrial	0	100	300	480	880	40%
Los Angeles, City of	Central City-Elysian Park Water Reuse Project	4	Industrial	0	0	900	200	1,100	60%
Los Angeles, City of	East Valley Water Reclamation Project	4	Industrial	0	0	1,000	500	1,500	70%
Los Angeles, City of	Harbor - UNOCAL, etc.	4	Industrial	0	0	2,200	0	20,000	40%
Los Angeles, City of	CalTrans	4	Landscape	100	0	0	0	100	100%
Los Angeles, City of	Eastside Greenbelt-Rio Hondo	4	Landscape	0	100	300	200	600	40%
Los Angeles, City of	Sepulveda Basin I	4	Landscape	1,200	0	0	0	1,200	100%
Los Angeles, City of	East Valley Water Reclamation Project	4	Landscape	0	500	500	500	1,500	70%
Los Angeles, City of	Los Angeles Greenbelt Project - Forest Lawn West	4	Landscape	1,170	430	0	0	1,600	100%
Los Angeles, City of	West Valley	4	Landscape	0	0	0	2,000	2,000	40%
Los Angeles, City of	Sepulveda Basin II	4	Landscape	0	1,000	1,300	0	2,300	100%

Appendix D: PROJECTIONS OF WATER RECYCLING CAPACITY BY REUSE CATEGORY

Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Los Angeles, City of	Central City-Elysian Park Water Reuse Project	4	Landscape	0	700	1,000	1,300	3,000	60%
Los Angeles, City of	Griffith Park	4	Landscape	900	0	3,000	6,000	9,900	40%
Los Angeles, City of	Westside Water Reclamation Project	4	10,000 AFY included in West Basin MWD						
Los Angeles, City of	Headworks	4	Recharge	700	0	9,300	0	10,000	70%
Los Angeles, City of	East Valley Water Reclamation Project	4	Recharge	0	10,000	5,000	17,000	32,000	70%
Los Angeles, County of	Alamitos Seawater Intrusion Barrier	4	Barrier	0	0	3,000	3,000	6,000	50%
Los Angeles, County of	Puente Hills Reclaimed Water Distribution System	4	Industrial	0	770	0	0	670	100%
Los Angeles, County of	Long Beach Master Plan	4	Industrial	0	2,680	0	0	2,680	90%
Los Angeles, County of	Long Beach Master Plan	4	Landscape	3,100	2,100	0	0	5,200	90%
Los Angeles, County of	Puente Hills Reclaimed Water Distribution System	4	Landscape	0	1,750	290	560	2,645	100%
Los Angeles, County of	Whittier Narrows Recreation Area	4	Landscape	0	3,000	0	0	3,000	75%
Los Angeles, County of	City of Industry Expansion	4	Landscape	0	5,000	3,600	0	8,600	85%
Los Angeles, County of	Rio Hondo Program	4	16,700 AFY included in Central Basin MWD						
Los Angeles, County of	Montebello Forebay Recharge Expansion	4	Recharge	50,000	10,000	0	0	60,000	60%
Pomona, City of	Pomona Reclaimed Water System	4	Agriculture	1,095	5	50	50	1,205	100%
Pomona, City of	Pomona Reclaimed Water System	4	Environmental	75	5	3	2	85	100%
Pomona, City of	Pomona Reclaimed Water System	4	Industrial	3,662	8	175	155	4,028	100%
Pomona, City of	Pomona Reclaimed Water System	4	Landscape	821	4	37	38	1,200	100%
Pomona, City of	Pomona Reclaimed Water System	4	Other	193	7	2	8	2	100%
San Buenaventura, City of	Reclamation Master Plan	4	Landscape	650	0	0	0	650	
Santa Monica, City of	Arboretum I	4	Landscape	0	7	0	0	7	
Santa Monica, City of	Water Garden I	4	Landscape	0	23	0	0	23	
Santa Monica, City of	Arboretum II	4	Toilets	0	0	14	0	14	
Santa Monica, City of	Water Garden II	4	Toilets	0	0	23	0	23	
Thousand Oaks, City of	Hill Canyon Wastewater Treatment Plant	4	Agriculture	0	10,100	700	1,100	12,500	80%
Thousand Oaks, City of	Hill Canyon Wastewater Treatment Plant	4	Environmental	0	2,000	0	0	2,000	100%
Thousand Oaks, City of	Olsen Road Water Reclamation Plant	4	Landscape	0	0	250	0	280	80%
Thousand Oaks, City of	Hill Canyon Wastewater Treatment Plant	4	Landscape	0	1,400	0	0	1,400	70%
Thousand Oaks, City of	Hill Canyon Wastewater Treatment Plant	4	Recharge	0	1,400	0	0	1,400	
United Water Conservation District	Oxnard Treated Water Project	4	Agriculture	0	0	0	5,000	5,000	100%
United Water Conservation District	Oxnard Treated Water Project	4	Industrial	0	0	0	5,000	5,000	100%
United Water Conservation District	Oxnard Treated Water Project	4	Landscape	0	0	0	5,000	5,000	100%
United Water Conservation District	Oxnard Treated Water Project	4	Recharge	0	0	0	5,000	5,000	100%
Upper San Gabriel Valley Municipal Water District	San Gabriel Valley Water Reuse Program	4	Agriculture	1,000	0	0	0	1,000	100%
Upper San Gabriel Valley Municipal Water District	San Gabriel Valley Water Reuse Program	4	Industrial	0	5,000	0	3,000	8,000	100%
Upper San Gabriel Valley Municipal Water District	San Gabriel Valley Water Reuse Program	4	Landscape	0	3,000	0	1,000	4,000	100%
Upper San Gabriel Valley Municipal Water District	San Gabriel Valley Water Reuse Program	4	Recharge	0	27,000	0	0	27,000	100%
Ventura County Waterworks District	Moorpark Wastewater Treatment Plant	4	Agriculture	0	1,600	0	0	1,600	

Appendix D: PROJECTIONS OF WATER RECYCLING CAPACITY BY REUSE CATEGORY

Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Walnut Valley Water District	Golden Springs	4	Landscape	0	30	0	0	30	80%
Walnut Valley Water District	Currier Road	4	Landscape	0	50	30	10	90	80%
Walnut Valley Water District	Business Parkway	4	Landscape	0	100	0	0	100	80%
Walnut Valley Water District	Pre-existing projects	4	Landscape	1,000	0	0	0	1,000	100%
Water Replenishment District of Southern California	Alamitos Barrier Recycled Water Project	4	5,000-10,000 AFY (1997) included in County Sanitation Districts of Los Angeles						
Water Replenishment District of Southern California	Dominguez Gap Barrier Water Reuse	4	5,000-10,000 AFY (1998) included in City of Los Angeles, Harbor						
Water Replenishment District of Southern California	Montebello Forebay	4	50,000-75,000 AFY included in County Sanitation Districts of Los Angeles						
Water Replenishment District of Southern California	Montebello Forebay Advanced Treatment Project	4	10,000 AFY (1996) included in County Sanitation Districts of Los Angeles						
West Basin Municipal Water District	West Basin Reclamation Project	4	Barrier	0	5,600	9,400	5,000	30,000	100%
West Basin Municipal Water District	West Basin Reclamation Project	4	Industrial	0	9,000	14,000	0	38,000	100%
West Basin Municipal Water District	West Basin Reclamation Project	4	Landscape	0	7,000	5,000	5,000	32,000	100%
Total for Region 4			Region 4	89,217	138,279	71,426	80,199	452,189	
Ceres, City of	SJR Wastewater Reclamation Facility	5	Recharge	2,352	281	728	0	3,361	
Dinuba, City of	TL Wastewater Reclamation Facility	5	Agriculture	0	715	1,694	2,920	5,329	
Dinuba, City of	TL Wastewater Reclamation Facility	5	Recharge	1,569	1,073	423	0	3,065	100%
Lodi, City of	SJR Water Reuse	5	Agriculture	1,185	500	15	0	1,700	100%
Lodi, City of	SJR 49 Megawatt Steam Injected Gas Turbine	5	Industrial	0	615	615	0	1,230	100%
Los Banos, City of	SJR Wastewater Treatment Plant	5	Environmental	0	0	200	0	200	10%
Reclamation District 2068	SR Drain Water Recovery & Reuse	5	Agriculture	8,000	1,000	0	0	9,000	100%
Hanford, City of	TL City of Hanford	5F	Recharge	4,011	245	681	1,727	10,096	
Kern County Water Agency	TL County Sewage Treatment Plants	5F	Agriculture	40,000	0	0	0	45,000	100%
Kern County Water Agency	TL County Sewage Treatment Plants	5F	Evaporation	100	0	0	0	200	100%
Kern County Water Agency	TL County Sewage Treatment Plants	5F	Recharge	4,000	0	0	0	5,000	100%
Taft WTP, City of	TL Water Reclamation	5F	Agriculture	424	59	72	94	649	100%
Woodlake, City of	TL Woodlake Wastewater Treatment Plant	5F	Agriculture	790	0	0	0	790	100%
Calaveras County Water District	SJR Forest Meadows	5S	Landscape	78	0	0	322	450	100%
Calaveras County Water District	SJR La Contenta I	5S	Landscape	0	40	40	40	120	75%
Merced, City of	SJR Wastewater Treatment Plant Expansion	5S	Agriculture	0	11,200	5,600	0	16,800	80%
Merced, City of	SJR Wetlands Area	5S	Environmental	1,456	0	0	0	1,456	100%
Parlier, City of	SJR City of Parlier Wastewater Treatment Plant	5S	Agriculture	1,270	0	0	0	1,270	100%
Sacramento Regional County Sanitation District	SR Sacramento County Water Reclamation Facility	5S	Landscape	0	640	105	105	850	95%
Sacramento Regional County Sanitation District	SR Sacramento County Water Reclamation Facility	5S	Treatment Plant	0	895	0	0	895	100%
Tuolumne Utility District	SJR Regional Sewer Reclaim Water	5S	Agriculture	1,500	0	300	400	2,200	100%
Total for Region 5			Region 5	66,735	17,263	10,473	5,608	109,661	
Running Springs Water District	Advanced Wastewater Treatment & Reclamation	6,8	Snow-making	0	698	110	280	1,120	75%
South Tahoe Public Utility District	Harvey Place Dam	6	Agriculture	4,000	500	500	0	5,000	100%
South Tahoe Public Utility District	Harvey Place Dam	6	Landscape	0	1,000	0	0	3,000	5%
Total for Region 6			Region 6	4,000	2,198	610	280	9,120	

Appendix D: PROJECTIONS OF WATER RECYCLING CAPACITY BY REUSE CATEGORY

Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Coachella Valley Water District	Water Reclamation Plant 9	7	Landscape	142	0	0	0	142	100%
Coachella Valley Water District	Water Reclamation Plant 10	7	Landscape	195	2,305	2,500	3,000	11,201	100%
Coachella Valley Water District	Water Reclamation Plant 9	7	Recharge	219	0	0	0	219	100%
Coachella Valley Water District	Water Reclamation Plant 10	7	Recharge	508	1,992	2,500	3,000	8,960	100%
Desert Water Agency	Desert Water Reclamation Facility I	7	Landscape	2,184	3,416	0	0	5,600	100%
Desert Water Agency	Desert Water Reclamation Facility II	7	Landscape	0	6,500	3,500	5,000	16,800	90%
Total for Region 7			Region 7	3,248	14,213	8,500	11,000	42,922	
Chino Basin Municipal Water District	Kaiser Steel-Inland Empire Commercial Center	8	Industrial	0	0	430	646	1,076	
Chino Basin Municipal Water District	Carbon Canyon	8	Landscape	0	1,500	0	5,500	7,000	
Chino Basin Municipal Water District	Ontario Golf & West Wind Park	8	Landscape	590	105	0	0	695	100%
Chino Basin Municipal Water District	Prado Park & Golf Course	8	Landscape	1,204	181	115	0	1,500	100%
Chino Basin Municipal Water District	Regional Plant 1	8	Landscape	0	0	7,133	367	7,300	
Chino Basin Municipal Water District	Regional Plant 3	8	Landscape	0	0	2,595	405	3,000	
Chino Basin Municipal Water District	Regional Plant 4	8	Landscape	0	0	3,937	1,563	11,000	
Chino Basin Municipal Water District	Upland Hills Reclamation	8	Landscape	218	0	0	0	218	100%
Chino Basin Municipal Water District	Western Hills Country Club	8	Landscape	0	200	0	0	200	100%
Eastern Municipal Water District	Moreno Valley Reclamation	8		6,960	0	940	1,700	9,600	100%
Eastern Municipal Water District	Perris Valley Regional Reclamation	8		635	0	7,651	5,494	13,780	100%
Eastern Municipal Water District	Rancho California Reclamation	8		1,502	698	800	1,300	4,300	100%
Eastern Municipal Water District	Rancho California Reclamation Expansion Project	8		0	4,800	1,200	0	6,000	
Eastern Municipal Water District	Sun City Reclamation	8		630	0	170	200	1,000	100%
Eastern Municipal Water District	Temecula Regional Reclamation System	8		0	0	8,318	2,080	10,398	
Eastern Municipal Water District	E/Hemet/SJ Regional Reclamation	8		7,078	0	2,922	1,000	11,000	100%
Eastern Municipal Water District	E/Hemet/SJ Regional Reclamation	8	Recharge	0	0	3,200	800	4,000	
Elsinore Valley Municipal Water District	Horseshief Canyon Wastewater Reclamation Facility	8	Landscape	61	15	204	280	560	
Elsinore Valley Municipal Water District	Railroad Canyon Wastewater Reclamation Facility	8	Landscape	418	119	361	446	1,344	
Elsinore Valley Municipal Water District	Regional Wastewater Reclamation Facility	8	Agriculture	2,000	0	0	0	0	100%
Elsinore Valley Municipal Water District	Regional Wastewater Reclamation Facility	8	Environmental	775	0	0	0	550	100%
Elsinore Valley Municipal Water District	Regional Wastewater Reclamation Facility	8	Landscape	0	1,000	1,000	2,000	8,000	
Irvine Ranch Water District	IRWD Reclamation System	8	Agriculture	3,000	0	0	0	1,000	100%
Irvine Ranch Water District	IRWD Reclamation System	8	Landscape	9,000	4,500	3,000	6,500	28,000	90%
Irvine Ranch Water District	IRWD Reclamation System	8	Toilets	50	150	300	500	1,500	90%
Orange County Sanitation Districts/OCWD	Seal Beach Reclamation Project	8	Landscape	0	0	0	3,900	3,900	50%
Orange County Water District/OCSD	Seal Beach Reclamation Project	8	Barrier	0	0	5,000	5,000	10,000	50%
Orange County Water District	WF 21 Expansion	8	Barrier	7,000	5,000	10,000	0	22,000	90%
Orange County Water District	Alamitos Barrier Injection	8	Barrier	0	2,000	2,000	0	4,000	75%
Orange County Water District	Green Acres Project I	8	Landscape	3,300	0	0	0	3,300	100%
Orange County Water District	Green Acres Project II	8	Landscape	0	0	5,000	0	5,000	90%

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Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability	
Orange County Water District/OCSD	Anaheim-Fullerton Reclamation Project	8	Landscape	0	0	0	10,000	10,000	75%	
Orange County Water District/OCSD	Anaheim-Fullerton Reclamation Project ✓	8	Recharge	0	0	0	12,000	12,000	75%	
Orange County Water District	Santa Ana River Recharge Project	8	Recharge	110,000	0	90,000	25,000	225,000	100%	
San Bernardino, City of	Colton-San Bernardino Rapid Infiltration	8	Recharge	0	30	5	6	41	100%	
Santa Ana Watershed Project Authority	Western Riverside County Regional Treatment Plant	8	Recharge	0	8,000	2,000	5,000	15,000	95%	
Santa Ana Watershed Project Authority	Project Agreement 16	8	Recharge	0	0	0	0	34,000	90%	
Vista, City of	Shadowridge Reclamation Plant	8	Landscape	650	726	0	1,624	3,000	100%	
Yucaipa Valley Water District	Yucaipa Valley Water District	8	Landscape	0	770	230	1,000	3,330	70%	
El Toro Water District	ETWD Wastewater Reclamation	8, 9	Landscape	400	0	475	625	1,500	51%	
South Orange County Reclamation Authority	Serra Water Reclamation Project	8, 9	Landscape	0	1,758	329	0	3,087	75%	
South Orange County Reclamation Authority	Serra Water Reclamation Project	8, 9	Recharge	0	400	600	0	1,000	75%	
South Orange County Reclamation Authority	SOCRA Regional Storage Project	8, 9	Storage	0	0	0	0	6,000	80%	
Total for Region 8 (Includes overlap with Region 9)			Region 8	155,471	31,952	159,915	94,936	495,179		
Capistrano Beach Water	Golden Lantern Median	9	Landscape	0	100	100	100	500		
Capistrano Valley Water District	Serra Reclamation Project	9	600 AFY included in South Orange County Reclamation Authority							50%
Capistrano Valley Water District	Serra Reclamation Project	9	1,400 AFY included in South Orange County Reclamation Authority							70%
Carlsbad Municipal Water District	Encina Basin Reclamation Project	9	Agriculture	0	700	669	0	400	100%	
Carlsbad Municipal Water District	Encina Basin Reclamation Project	9	Industrial	0	0	667	1,128	1,796	100%	
Carlsbad Municipal Water District	Encina Basin Reclamation Project	9	Landscape	647	0	1,880	6,757	9,284	100%	
Encina Wastewater Authority	Encina Reclaimed Water Filter	9	Industrial	2,895	0	0	70	2,965	100%	
Encina Wastewater Authority	Encina Reclaimed Water Filter	9	Landscape	10	0	0	0	10	100%	
Escondido, City of	Escondido Water Reuse Program	9	Agriculture	0	0	1,289	0	1,289	80%	
Escondido, City of	Escondido Water Reuse Program	9	Environmental	0	36	0	0	36	80%	
Escondido, City of	Escondido Water Reuse Program	9	Landscape	0	0	7,270	0	7,270	80%	
Escondido, City of	Escondido Water Reuse Program	9	Recharge	0	0	0	2,000	2,000	40%	
Fallbrook Public Utility District	Fallbrook Reclaimed Water Project	9	Agriculture	0	600	50	50	900	100%	
Fallbrook Public Utility District	Fallbrook Reclaimed Water Project	9	Landscape	0	40	10	10	100	100%	
Fallbrook Public Utility District	Camp Pendelton Conjunctive Use	9	Recharge	0	0	6,000	0	15,000	50%	
Fallbrook Sanitary District	Southern Fallbrook Airpark Area	9	Agriculture	0	340	0	0	340	100%	
Fallbrook Sanitary District	Reclaimed Water - Truck Sales	9	Dust Control	1	0	0	1	2	100%	
Fallbrook Sanitary District	Silverthorn-Good Earth Nurseries	9	Landscape	26	0	0	0	26	100%	
Fallbrook Sanitary District	CalTrans	9	Landscape	326	0	0	0	326		
Fallbrook Sanitary District	Camp Pendleton	9	Landscape	336	0	0	0	336	100%	
Fallbrook Sanitary District	Southern Fallbrook Airpark Area	9	Landscape	0	340	0	0	340	100%	
Leucadia County Water District	Gafner Reclamation Project	9	Landscape	0	840	0	0	840	100%	
Moulton Niguel Water District	Serra-Side Water Reclamation	9	Landscape	200	1,300	600	0	2,100		
Moulton Niguel Water District	AWMA-Side Water Reclamation	9	Landscape	450	2,350	1,200	1,200	5,200		
Oceanside, City of	La Salina Wastewater Treatment Plant	9	Landscape	0	560	0	0	560		

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Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Oceanside, City of	San Luis Rey Wastewater Treatment Plant	9	Landscape	0	1,120	0	4,440	5,560	70%
Oceanside, City of	Oceanside Phase I Reclaimed Water Distribution System	9	Landscape	0	1	5	0	8	75%
Olivenhain Municipal Water District	San Elijo Basin JPA	9	Landscape	0	0	500	0	500	65%
Olivenhain Municipal Water District	Carlsbad-Green Valley Reclaimed Water Project	9	Landscape	0	0	2,000	0	2,000	65%
Olivenhain Municipal Water District	San Dieguito Valley Reclaimed Water Project	9	Landscape	0	1,000	3,000	0	4,000	80%
Olivenhain Municipal Water District	San Dieguito Valley Reclaimed Water Project	9	Recharge	0	0	0	2,000	2,000	
Otay Water District	Otay River WRP	9	Environmental	0	0	2,000	0	3,000	50%
Otay Water District	Hidden Valley Estates	9	Landscape	0	50	100	0	150	100%
Otay Water District	Jamacha Basin Water Reclamation Facility	9	Landscape	1,456	0	0	0	1,456	100%
Otay Water District	Otay River WRP	9	Landscape	0	0	4,000	2,000	10,000	50%
Padre Dam Municipal Water District	Santee Plant Expansion	9	Landscape	150	150	0	0	300	50%
Padre Dam Municipal Water District	Santee Plant Expansion	9	Recharge	0	0	5,000	0	5,000	50%
Poway, City of	North Poway Reclaimed Water Project	9	2,000 AFY included from Escondido						80%
Poway, City of	South Poway Reclaimed Water Project	9	3,000 AFY included from San Diego (Clean Water)						95%
Ramona Municipal Water District	San Vicente Wastewater Treatment Plant	9	Agriculture	448	224	448	0	1,120	100%
Ramona Municipal Water District	Santa Maria Wastewater Treatment Plant	9	Agriculture	224	616	840	0	1,600	100%
Ramona Municipal Water District	Santa Maria Wastewater Treatment Plant	9	Landscape	12	0	0	0	80	100%
Rancho California Water District	Live Stream Discharge	9	Landscape	600	5,562	0	0	6,162	95%
San Clemente, City of	Wastewater Plant Expansion-Modification	9	Landscape	2,400	0	0	2,400	4,800	90%
San Diego, City of	Water Reclamation Distribution Master Plan (N)	9	Agriculture	0	0	0	1,200	1,200	90%
San Diego, City of	Water Reclamation Distribution Master Plan (S)	9	Agriculture	0	0	0	1,000	1,000	50%
San Diego, City of	Water Reclamation Distribution Master Plan (S)	9	Industrial	0	0	0	200	200	50%
San Diego, City of	Water Reclamation Distribution Master Plan (N)	9	Industrial	0	0	0	250	500	90%
San Diego, City of	Water Reclamation Distribution Master Plan (C)	9	Industrial	0	0	0	250	500	90%
San Diego, City of	Water Reclamation Distribution Master Plan (S)	9	Landscape	0	0	0	1,000	1,000	50%
San Diego, City of	San Pasqual Aquatic Treatment Facilities	9	Agriculture	0	400	0	0	400	
San Diego, City of	San Pasqual Aquatic Treatment Facilities	9	Landscape	0	400	0	0	400	
San Diego, City of	San Pasqual Aquatic Treatment Facilities	9	Recharge	0	400	0	0	400	
San Diego, City of	Water Reclamation Distribution Master Plan (SP)	9	Landscape	0	0	0	0	5,600	
San Diego, City of	Water Reclamation Distribution Master Plan (C)	9	Landscape	0	0	4,500	5,500	14,000	90%
San Diego, City of	Water Reclamation Distribution Master Plan (N)	9	Landscape	0	0	4,500	5,500	14,000	90%
San Elijo Joint Powers Authority	San Elijo Basin Water Reclamation Project	9	Agriculture	0	0	860	0	860	75%
San Elijo Joint Powers Authority	San Elijo Basin Water Reclamation Project	9	Landscape	0	0	1,250	30	1,280	90%
South Coast Water District	Three Arch Bay Reclamation	9	Landscape	0	3	2	0	5	
South Coast Water District	Niguel Shores Reclamation	9	Landscape	0	7	0	3	10	
South Coast Water District	Monarch Bay Reclamation	9	Landscape	0	10	2	3	15	
South Coast Water District	Monarch Bay Resort Reclamation	9	Landscape	0	75	25	0	100	
Vallecitos Water District	Central San Marcos Water Reclamation Facility	9	Environmental	0	0	700	0	700	

Appendix D: PROJECTIONS OF WATER RECYCLING CAPACITY BY REUSE CATEGORY

Name of Agency	Project Name	RWQCB	Reuse Type	Existing Reuse (AFY)	1995 (AFY)	2000 (AFY)	2010 (AFY)	"Ultimate" (AFY)	Probability
Vallecitos Water District	Meadowlark Water Reclamation Facility	9	Ag/Ind/Land	0	0	1,100	2,300	3,400	80%
Vallecitos Water District	Central San Marcos Water Reclamation Facility	9	Ag/Ind/Land	0	0	2,600	3,400	6,000	50%
Valley Center Municipal Water District	Skyline Wastewater Treatment Plant	9	Agriculture	0	34	22	0	56	75%
Valley Center Municipal Water District	Lower Moose Canyon WRF 1.65 Ultimate	9	Agriculture	0	0	0	0	410	75%
Valley Center Municipal Water District	Lake Turner WRF	9	Agriculture	0	780	0	780	780	20%
Valley Center Municipal Water District	Central Valley Sewer 1.3	9	Agriculture	0	0	30	505	1,210	90%
Valley Center Municipal Water District	Central Valley Sewer 1.3	9	Landscape	0	0	250	0	250	90%
Valley Center Municipal Water District	Lower Moose Canyon WRF 1.65 Ultimate	9	Landscape	0	0	410	330	1,100	75%
Valley Center Municipal Water District	Lower Moose Canyon WRF 1.65 Ultimate	9	Recharge	0	310	0	30	340	75%
Vista Irrigation District	VID Reclamation Plan	9	Agriculture	0	0	1,200	0	1,200	10%
Vista Irrigation District	VID Reclamation Plan	9	Industrial	0	32	0	0	32	90%
Vista Irrigation District	Shadow Ridge Country Club	9	Landscape	260	0	0	0	260	100%
Vista Irrigation District	VID Reclamation Plan	9	Landscape	0	0	3,040	0	3,040	50%
Western Municipal Water District	Arlington Basin Groundwater Desalter Project	9		4,441	1,659	0	0	6,100	100%
Western Municipal Water District	Indian Hills Reclamation Project	9		1,310	0	0	0	1,310	
Western Municipal Water District	March Reclamation Project	9		261	0	0	0	261	
Western Municipal Water District	Rancho California/Joaquin Ranch Reclamation	9		269	91	0	312	672	
Total for Region 9			Region 9	16,722	20,130	58,119	44,749	167,947	
INCREMENTAL TOTALS:				383,752	270,302	386,520	288,045	168,160	
CUMULATIVE TOTALS:				383,752	654,054	1,040,574	1,328,619	1,496,779	

List of Respondents & "Purpose" of Projects

Appendix E

Appendix E. LIST OF RESPONDENTS AND "PURPOSE" OF PROJECTS

Name of Agency	Number of projects	Purpose*	RWQCB
Santa Rosa, City of	1	W,P	1
Sonoma County Public Works	8	W,P	1
Sonoma County Water Agency	0		1
Valley of the Moon Water District	0		1
<i>Total In Region 1:</i>	9	4	
Alameda County Water District	1	M	2
Central Contra Costa Sanitation District	2	W	2
Contra Costa Water District	1	W	2
East Bay Municipal Water District	11	W	2
Fairfield, City of	0		2
Fairfield-Suisun Sewer District	1	W	2
Livermore, City of	1	M	2
Marin Municipal Water District	2	W	2
Napa Sanitation District	2	M	2
North Marin Water District	2	W	2
Palo Alto Water Quality Control Plant	1	W	2
Petaluma, City of	1	W,P	2
San Francisco, City and County of	1	W	2
San Jose, City of	1	W	2
Santa Clara Valley Water District	2	W,P	2
Santa Clara, City of	1	W,P,M	2
Sunnyvale, City of	1	W,P	2
Union Sanitary District	4	ALL	2
<i>Total In Region 2:</i>	35	18	
Goleta Sanitation District	1	W	3
Lompoc, City of	1	W	3
Monterey Regional Water Pollution Control Agency	1	W	3
San Luis Obispo, City of	1	W	3
San Luis Obispo, County of	3	W,P	3
Santa Barbara County Water Agency	4	W	3
Santa Barbara, City of	1	W	3
<i>Total In Region 3:</i>	12	7	
Burbank, City of	1	W	4
Calleguas Municipal Water District	1	W	4
Castaic Lake Water Agency	1	W	4
Central Basin Municipal Water District	3	W	4
Cerritos, City of	3	W	4
Glendale, City of	4	W	4
Las Virgenes Municipal Water District	3	W	4
Los Angeles County Sanitation Districts	6	W	4
Los Angeles, City of (DWP)	12	W	4
Ojai Valley Sanitary District	0		4
Pomona, City of	1	W	4
San Buenaventura, City of	1	W	4
Santa Monica, City of	4	W	4

Appendix E. LIST OF RESPONDENTS AND "PURPOSE" OF PROJECTS

Name of Agency	Number of projects	Purpose*	RWQCB
Thousand Oaks, City of	2	W,P	4
United Water Conservation District	1	W	4
Upper San Gabriel Valley Municipal Water District	1	W	4
Ventura County Waterworks District #1	1	W	4
Walnut Valley Water District	3	W	4
Water Replenishment District of Southern CA	4	W	4
West Basin Municipal Water District	1	W	4
<i>Total In Region 4:</i>	53	20	
Ceres, City of	1	W,P	5
Dimuba, City of	1	W	5
Lodi, City of	2	W	5
Los Banos, City of	1	W	5
Manteca, City of	0		5
Reclamation District 2068	1	W	5
Alpaugh Irrigation District	0		5 F
Hanford, City of	1	P,O	5 F
Kern County Water Agency	1	W	5 F
Taft WTP, City of	1	W	5 F
Woodlake, City of	1	O	5 F
Calaveras County Water District	2	P	5 S
Merced, City of	2	O	5 S
Modesto Irrigation District	0		5 S
Parlier, City of	1	W	5 S
Sacramento Regional County	1	W	5 S
Tuolumne Utility District	1	W,P,M	5 S
<i>Total In Region 5:</i>	17	17	
Mammoth County Water District	0		6
Running Springs Water District	1	W,P	6, 8
South Tahoe Public Utility District	1	W	6
<i>Total In Region 6:</i>	2	3	
Barstow, City of	0	W,P	7
Coachella Valley Water District	2	W	7
Desert Water Agency	2	W	7
<i>Total In Region 7:</i>	4	3	
Chino Basin Municipal Water District	7	W	8
Corona, City of	0		8
Eastern Municipal Water District	7		8
Elsinore Valley Municipal Water District	3	W,P	8
Irvine Ranch Water District	10	W,P	8
Orange County Sanitation Districts	2	W,M	8
Orange County Water District	6	W,O	8
San Bernardino, City of	1	P,M	8
Santa Ana Watershed Project Authority	2	P,O	8
Vista, City of	1	W	8
Yucaipa Valley Water District	1	W	8

Appendix E. LIST OF RESPONDENTS AND "PURPOSE" OF PROJECTS

Name of Agency	Number of projects	Purpose*	RWQCB
El Toro Water District	1	W	8,9
South Orange County Reclamation Authority	2	W	8,9
<i>Total In Region 8:</i>	43	13	
Capistrano Beach Water	1	W	9
Capistrano Valley Water District	1	W	9
Carlsbad Municipal Water District	1	W	9
Encina Wastewater Authority	1	W	9
Escondido, City of	1	W	9
Fallbrook Public Utility District	2	W	9
Fallbrook Sanitary District	5	W	9
La Mesa, City of	0		9
Leucadia County Water District	1	W	9
Moulton Niguel Water District	2	W	9
Oceanside, City of	3	W	9
Olivenhain Municipal Water District	3	W	9
Otay Water District	3	W	9
Padre Dam Municipal Water District	1	W	9
Poway, City of	2	W	9
Ramona Municipal Water District	2	W,O	9
Rancho California Water District	1	M	9
San Clemente, City of	1	W,P	9
San Diego, City of	1	W	9
San Diego, City of (Clean Water)	4	W	9
San Elijo Joint Powers Authority	1	W	9
South Coast Water District	4	W	8,9
Vallecitos Water District	2	W	9
Valley Center Municipal Water District	6	W	9
Vista Irrigation District	2	W	9
Western Municipal Water District	4		9
<i>Total In Region 9:</i>	55	26	
<i>Total Number of Potential Future Projects:</i>	230	111	<i>:Total Participants</i>
* W=Water Reuse; P=Pollution Control; O=Other; M=Multi-Purpose			

Capital Costs By Respondents

Appendix F

F

Appendix F. CAPITAL COSTS OF WATER RECLAMATION

NAME OF AGENCY	PROJECT NAME	CAPITAL COSTS		WATER REUSE POTENTIAL (AFY)				
		Treatment	Distribution	Existing	1995	2000	2010	"Ultimate"
Central Contra Costa Sanitary District	CCCSD/CCWD/EBMUD	\$2,000,000	\$12,000,000	0	1,325	1,275	5,000	10,000
East Bay Municipal Utility District	EBMUD-Chevron Water Reclamation Project	\$28,200,000	\$1,500,000	0	6,000	400	550	6,950
East Bay Municipal Utility District	Franklin Canyon Water Reclamation Project		\$3,100,000	0	0	170	440	610
East Bay Municipal Utility District	Water Supply Management Plan		\$10,000,000	0	0	2,500	0	2,500
East Bay Municipal Utility District	Sunset View Cemetery Irrigation Project		\$100,000	0	50	10	10	70
East Bay Municipal Utility District	Willow Park Golf Course Irrigation		\$400,000	100	0	0	0	100
East Bay Municipal Utility District	Chabot Municipal Golf Course Irrigation		\$2,600,000	150	0	0	0	150
East Bay Municipal Utility District	Galbraith Reclamation Project		\$800,000	200	0	0	0	200
East Bay Municipal Utility District	CalTrans Water Reclamation Project		\$500,000	0	135	165	0	300
East Bay Municipal Utility District	Franklin Canyon Water Reclamation Project		\$3,100,000	0	300	25	0	325
East Bay Municipal Utility District	Alameda Reclamation Project		\$2,500,000	550	0	0	0	550
East Bay Municipal Utility District	Water Supply Management Plan		\$65,000,000	0	0	6,000	0	6,000
Livermore, City of	AWT Demonstration Project	\$5,000,000		0	840	0	0	840
Marin Municipal Water District	Las Gallinas Valley Reclamation Plant	\$4,500,000	\$13,500,000	400	200	250	250	1,100
Marin Municipal Water District	Central Marin Reclamation Plant	\$6,000,000	\$11,300,000	0	100	750	350	1,200
Napa Sanitation District	Cameros		\$1,000,000	0	500	0	0	1,000
Napa Sanitation District	Kennedy Golf Course		\$3,500,000	0	385	15	200	600
North Marin Water District	Bel Marin Keys Unit V Golf Course		\$2,040,000	0	0	382	0	382
North Marin Water District	Renaissance Estates Golf Course	\$300,000	\$1,410,000	0	382	0	0	382
Palo Alto Water Quality Control Plant	Water Reclamation		\$30,000,000	600	1,800	1,600	800	4,800
Petaluma, City of	City of Petaluma		\$800,000	1,320	680	600	1,200	3,800
Petaluma, City of	City of Petaluma		\$800,000	300	0	150	0	450
San Francisco, City and County	San Francisco Reclamation Program	\$120,000,000	\$40,000,000	0	0	2,966	6,021	8,987
San Jose, City of	Golden Triangle Water Reclamation	\$7,700,000	\$51,000,000	0	0	11,000	19,000	29,900
Santa Clara Valley Water District	Gilroy Reclamation Plant	\$4,612,000		0	0	3,000	0	3,000
Santa Clara, City of	Water Reclamation	\$10,000	\$2,000,000	450	100	50	50	1,000
Sunnyvale, City of	Sunnyvale Water Reclamation	\$14,000,000		0	7,280	0	0	7,280
Union Sanitary District	Hayward Reclaimed Water Marsh	\$3,000,000		11,200	0	0	0	5,600
Union Sanitary District	Nonpotable Wastewater Reuse Master Plan	\$4,261,000	\$42,808,000	0	1,620	1,051	1,360	4,031
Union Sanitary District	USD Truck Fill Station	\$70,000		2	0	0	0	2
Total for Region 2		\$199,653,000	\$301,758,000	15,272	21,697	32,359	35,231	102,109
Goleta Sanitary District	GSD Reclaimed Wastewater Project	\$11,000,000	\$4,500,000	0	600	600	0	1,200
Monterey Regional Water Pollution Control Agency	Food Crop Irrigation	\$27,000,000	\$43,000,000	0	20,000	5,000	5,000	30,000
San Luis Obispo, City of	Water Reclamation Plant		\$5,800,000	0	1,200	0	0	2,400
Santa Barbara, City of	Water Reclamation	\$3,000,000	\$10,000,000	600	500	0	0	1,100
Total for Region 3		\$41,000,000	\$63,300,000	600	22,300	5,600	5,000	34,700

Appendix F. CAPITAL COSTS OF WATER RECLAMATION

NAME OF AGENCY	PROJECT NAME	CAPITAL COSTS		WATER REUSE POTENTIAL (AFY)				
		Treatment	Distribution	Existing	1995	2000	2010	"Ultimate"
Burbank, City of	System Expansion		\$3,880,000	0	539	108	0	793
Calleguas Municipal Water District	Oak Park/North Ranch Water Reclamation Project		\$3,000,000	0	1,300	0	0	1,300
Castaic Lake Water Agency	CLWA Reclaimed Water Master Plan	\$33,516,000		0	650	3,465	6,246	10,361
Central Basin Municipal Water District	Century Reclamation Project II		\$9,000,000	0	3,800	0	0	5,000
Central Basin Municipal Water District	Rio Hondo Reclamation Project		\$13,500,000	0	6,300	2,500	0	9,100
Central Basin Municipal Water District	Century Reclamation Project I		\$4,000,000	613	107	80	0	1,000
Central Basin Municipal Water District	Century Reclamation Project II		\$9,000,000	190	3,238	0	0	4,000
Central Basin Municipal Water District	Rio Hondo Reclamation Project		\$13,500,000	0	3,700	1,900	0	5,900
Cerritos, City of	Reclaimed Water System		\$10,000,000	1,886	614	1,100	0	3,600
Cerritos, City of	Reclaimed Water System Expansion - Area 6		\$456,000	75	50	0	0	125
Cerritos, City of	Reclaimed Water System Expansion - Studebaker		\$700,000	0	150	0	0	150
Glendale, City of	Power Plant Reclamation Project	\$1,500,000	\$500,000	450	0	0	0	450
Glendale, City of	Brand Park Reclamation Expansion Project		\$2,500,000	0	100	400	0	500
Glendale, City of	Forest Lawn East Reclamation Project		\$2,250,000	600	0	0	0	600
Glendale, City of	Verdugo-Scholl Canyon Reclamation Project		\$8,500,000	0	800	400	600	2,150
Las Virgenes Municipal Water District	Reclaimed Water Seasonal Storage		\$500,000	0	400	0	0	400
Las Virgenes Municipal Water District	Las Virgenes Existing System - Western & Calabasas		\$30,000,000	4,151	49	100	900	7,000
Los Angeles, City of	Sepulveda Basin - Wildlife Pond		\$2,475,000	5,300	0	0	0	10,000
Los Angeles, City of	Sepulveda Basin - Lake Balboa		\$6,034,000	10,000	0	0	0	10,000
Los Angeles, City of	East Valley Water Reclamation Project		\$160,000	0	0	1,000	500	1,500
Los Angeles, City of	Harbor - UNOCAL, etc.		\$55,000,000	0	0	2,200	0	20,000
Los Angeles, City of	Sepulveda Basin I		\$275,000	1,200	0	0	0	1,200
Los Angeles, City of	East Valley Water Reclamation Project		\$160,000	0	500	500	500	1,500
Los Angeles, City of	Los Angeles Greenbelt Project - Forest Lawn West		\$6,100,000	1,170	430	0	0	1,600
Los Angeles, City of	Sepulveda Basin II		\$525,000	0	1,000	1,300	0	2,300
Los Angeles, City of	Central City-Elysian Park Water Reuse Project		\$15,000,000	0	700	1,000	1,300	3,000
Los Angeles, City of	Griffith Park		\$2,500,000	900	0	3,000	6,000	9,900
Los Angeles, City of	Headworks		\$1,500,000	700	0	9,300	0	10,000
Los Angeles, City of	East Valley Water Reclamation Project		\$39,680,000	0	10,000	5,000	17,000	32,000
Los Angeles, County of	Alamitos Seawater Intrusion Barrier	\$22,200,000	\$5,500,000	0	0	3,000	3,000	6,000
Los Angeles, County of	Long Beach Master Plan		\$33,200,000	3,100	4,780	0	0	7,880
Los Angeles, County of	Puente Hills Reclaimed Water Distribution System		\$5,100,000	0	4,780	290	560	3,315
Los Angeles, County of	Whittier Narrows Recreation Area		\$8,600,000	0	3,000	0	0	3,000
Los Angeles, County of	City of Industry Expansion		\$26,000,000	0	5,000	3,600	0	8,600
Los Angeles, County of	San Gabriel Valley Water Reuse Program		\$23,200,000	1,000	35,000	0	4,000	40,000
Los Angeles, County of	Montebello Forebay Recharge Expansion	\$1,800,000		50,000	10,000	0	0	60,000

Appendix F. CAPITAL COSTS OF WATER RECLAMATION

NAME OF AGENCY	PROJECT NAME	CAPITAL COSTS		WATER REUSE POTENTIAL (AFY)				
		Treatment	Distribution	Existing	1995	2000	2010	"Ultimate"
Thousand Oaks, City of	Hill Canyon Wastewater Treatment Plant		\$6,500,000	0	10,100	700	1,100	12,500
Thousand Oaks, City of	Olsen Road Water Reclamation Plant	\$1,300,000	\$100,000	0	0	250	0	280
United Water Conservation District	Oxnard Treated Water Project	\$10,000,000		0	0	0	5,000	5,000
United Water Conservation District	Oxnard Treated Water Project	\$10,000,000		0	0	0	5,000	5,000
United Water Conservation District	Oxnard Treated Water Project	\$10,000,000		0	0	0	5,000	5,000
United Water Conservation District	Oxnard Treated Water Project	\$10,000,000		0	0	0	5,000	5,000
Ventura County Waterworks District	Moorpark Wastewater Treatment Plant	\$2,000,000	\$750,000	0	1,600	0	0	1,600
Walnut Valley Water District	Golden Springs		\$210,000	0	30	0	0	30
Walnut Valley Water District	Currier Road		\$248,000	0	50	30	10	90
Walnut Valley Water District	Business Parkway		\$271,000	0	100	0	0	100
West Basin Municipal Water District	West Basin Reclamation Project	\$48,000,000	\$7,000,000	0	5,600	9,400	5,000	30,000
West Basin Municipal Water District	West Basin Reclamation Project	\$69,000,000	\$29,000,000	0	9,000	14,000	0	38,000
West Basin Municipal Water District	West Basin Reclamation Project	\$69,000,000	\$29,000,000	0	7,000	5,000	5,000	32,000
Total for Region 4		\$288,316,000	\$415,374,000	81,335	130,467	69,623	71,716	418,824
Ceres, City of	Wastewater Reclamation Facility	\$4,500,000		2,352	281	728	0	3,361
Lodi, City of	Water Reuse	\$35,000,000		1,185	1,115	630	0	2,930
Reclamation District 2068	Drain Water Recovery & Reuse		\$250,000	8,000	1,000	0	0	9,000
Hanford, City of	City of Hanford	\$618,350	\$10,000	4,011	245	681	1,727	10,096
Calaveras County Water District	Forest Meadows	\$260,000	\$94,000	78	0	0	322	450
Parlier, City of	City of Parlier Wastewater Treatment Plant	\$3,000,000		1,270	0	0	0	1,270
Sacramento Regional County Sanitation District	Sacramento County Water Reclamation Facility	\$8,420,000	\$2,100,000	0	1,535	105	105	1,745
Total for Region 5		\$51,798,350	\$2,454,000	16,896	4,176	2,144	2,154	28,852
Desert Water Agency	Desert Water Reclamation Facility I	\$254,398	\$3,851	2,184	3,416	0	0	5,600
Desert Water Agency	Desert Water Reclamation Facility II	\$10,000,000	\$4,000,000	0	6,500	3,500	5,000	16,800
Total for Region 7		\$10,254,398	\$4,003,851	2,184	9,916	3,500	5,000	22,400
Orange County Sanitation Districts/OCWD	Seal Beach Reclamation Project	\$40,000,000	\$29,600,000	0	0	5,000	8,900	13,900
Orange County Water District	Green Acres Project I	\$10,000,000	\$20,000,000	3,300	0	0	0	3,300
San Bernardino, City of	Colton-San Bernardino Rapid Infiltration	\$43,000,000		0	30	5	6	41
Yucaipa Valley Water District	Yucaipa Valley Water District	\$15,000,000	\$27,000,000	0	770	230	1,000	3,330
El Toro Water District	ETWD Wastewater Reclamation	\$9,243,000	\$4,567,420	400	0	475	625	1,500
South Orange County Reclamation Authority	Serra Water Reclamation Project	\$10,000,000	\$5,000,000	0	1,758	329	0	3,087
South Orange County Reclamation Authority	Serra Water Reclamation Project	\$700,000	\$200,000	0	400	600	0	1,000
South Orange County Reclamation Authority	SOCRA Regional Storage Project		\$15,000,000	0	0	0	0	6,000
Total for Region 8		\$127,943,000	\$101,367,420	3,700	2,958	6,639	10,531	32,158
Capistrano Beach Water	Golden Lantern Median		\$350,000	0	100	100	100	500
Carlsbad Municipal Water District	Encina Basin Reclamation Project	\$360,000	\$2,040,000	0	700	669	0	400

Appendix F. CAPITAL COSTS OF WATER RECLAMATION

NAME OF AGENCY	PROJECT NAME	CAPITAL COSTS		WATER REUSE POTENTIAL (AFY)				
		Treatment	Distribution	Existing	1995	2000	2010	"Ultimate"
Carlsbad Municipal Water District	Encina Basin Reclamation Project	\$710,000	\$4,870,000	0	0	667	1,128	1,796
Carlsbad Municipal Water District	Encina Basin Reclamation Project	\$6,060,000	\$34,700,000	647	0	1,880	6,757	9,284
Encina Wastewater Authority	Encina Reclaimed Water Filter	\$250,000		10	0	0	0	10
Escondido, City of	Escondido Water Reuse Program	\$39,947,000	\$18,829,000	0	36	8,559	0	8,595
Leucadia County Water District	Oafner Reclamation Project	\$2,100,000		0	840	0	0	840
Moulton Niguel Water District	Serra-Side Water Reclamation	\$1,500,000	\$9,000,000	200	1,300	600	0	2,100
Moulton Niguel Water District	AWMA-Side Water Reclamation	\$10,000,000	\$21,000,000	450	2,350	1,200	1,200	5,200
Oceanside, City of	La Salina Wastewater Treatment Plant	\$1,100,000		0	560	0	0	560
Oceanside, City of	San Luis Rey Wastewater Treatment Plant	\$950,000		0	1,120	0	4,440	5,560
Oceanside, City of	Oceanside Phase I Reclaimed Water Distribution System		\$2,800,000	0	1	5	0	8
Olivenhain Municipal Water District	San Elijo Basin JPA		\$1,000,000	0	0	500	0	500
Olivenhain Municipal Water District	Carlsbad-Green Valley Reclaimed Water Project		\$2,000,000	0	0	2,000	0	2,000
Olivenhain Municipal Water District	San Dieguito Valley Reclaimed Water Project		\$40,000,000	0	1,000	3,000	2,000	6,000
Otay Water District	Jamacha Basin Water Reclamation Facility	\$2,500,000	\$2,500,000	1,456	0	0	0	1,456
Otay Water District	Otay River WRP	\$12,000,000	\$10,000,000	0	0	4,000	2,000	10,000
Padre Dam Municipal Water District	Santee Plant Expansion	\$6,500,000	\$6,500,000	150	150	0	0	300
Poway, City of	North Poway Reclaimed Water Project		\$9,000,000	0	0	0	2,000	2,000
Rancho California Water District	Live Stream Discharge		\$32,000,000	600	5,562	0	0	6,162
San Clemente, City of	Wastewater Plant Expansion-Modification	\$5,000,000	\$15,000,000	2,400	0	0	2,400	4,800
San Elijo Joint Powers Authority	San Elijo Basin Water Reclamation Project	\$2,900,000	\$9,000,000	0	0	1,250	30	1,280
South Coast Water District	Three Arch Bay Reclamation		\$5,000	0	3	2	0	5
South Coast Water District	Niguel Shores Reclamation		\$10,000	0	7	0	3	10
South Coast Water District	Monarch Bay Reclamation		\$20,000	0	10	2	3	15
South Coast Water District	Monarch Bay Resort Reclamation	\$50,000	\$100,000	0	75	25	0	100
Vallecitos Water District	Meadowlark Water Reclamation Facility	\$3,600,000	\$6,500,000	0	0	1,100	2,300	3,400
Vallecitos Water District	Central San Marcos Water Reclamation Facility	\$5,000,000	\$6,500,000	0	0	2,600	3,400	6,000
Valley Center Municipal Water District	Skyline Wastewater Treatment Plant	\$4,000		0	34	22	0	56
Valley Center Municipal Water District	Lake Turner WRF	\$25,000	\$1,025,000	0	780	0	780	780
Valley Center Municipal Water District	Central Valley Sewer 1.3	\$1,140,000	\$9,000,000	0	0	280	505	1,210
Valley Center Municipal Water District	Lower Moose Canyon WRF 1.65 Ultimate	\$2,970,000	\$4,223,357	0	310	410	360	1,850
Vista Irrigation District	VID Reclamation Plan	\$17,000,000	\$31,000,000	260	32	4,240	0	4,532
Total for Region 9		\$121,666,000	\$278,972,357	6,173	14,970	33,111	29,406	87,309
INCREMENTAL TOTALS:		\$840,630,748	\$1,167,229,628	141,430	228,181	185,335	194,269	79,244
CUMULATIVE TOTALS:		\$840,630,748	\$2,007,860,376	141,430	369,611	554,946	749,215	828,459

Other Studies

Appendix G

OTHER STUDIES

The following section reviews past survey results on the subject of existing and future water reclamation.

State Water Resources Control Board

The State Water Resources Control Board's Office of Water Recycling completed a survey of state water reclamation for the year 1987. In September, 1990, it reported a statewide total of 266,559 AFY of reuse based on 200 survey respondents' data.¹⁵ It solicited water reclamation projections and types of reuse from water agencies across the state. This 1990 survey included 200 water reclamation plants. About 10 reclamation plants may have been missing from the analysis.¹⁶ A total of 854 user sites were recorded. Almost 67 percent of the projects were designated for landscape irrigation followed by agriculture (28 percent), environmental (1.1 percent), industrial (1.4 percent), and groundwater recharge (0.8 percent). Agricultural use accounted for 63 percent of the total volume of water followed by groundwater recharge (14 percent), landscape irrigation (13 percent) and environmental use (4 percent). The regions reclaiming the most wastewater were Central Valley (Fresno and Sacramento, 43 percent), Los Angeles (23 percent) and Santa Ana (10 percent). The 1987 data recorded 140 treatment plants (129,651 AFY freshwater savings) for pollution abatement/control and 60 treatment plants (95,000 AFY freshwater savings) for water supply.¹⁷

The SWRCB survey report concludes with a projected use for 1988-89 of additional 48,460 AFY of reclaimed water. A useful appendix in this report lists all survey participants and various information about reuse amounts and types, treatment, price, and specific end users.

Another SWRCB-DWR study, Bulletin 4, estimated that California could acquire almost 800,000 AFY of additional water by the year 2000 through water reclamation.¹⁸

There was substantial overlap of respondents between the SWRCB survey and the present WaterReuse survey. Agencies that did not respond to the WaterReuse survey but did submit existing reuse data to the state survey account for 84,400 AFY of reclaimed water.

Water Recycling 2000

In September, 1991, the State Water Conservation Coalition Reclamation/Reuse Task Force and the Bay Delta Reclamation Sub-Work Group published a report on the potential to increase the use of recycled water by the year

2000.¹⁹ The objective of the Water Recycling 2000 survey was to assess firm and reliable potential to the year 2000. The report discussed firm water reclamation potential and addressed the various regulatory, financial and institutional constraints.

Water Recycling 2000 updated the data from the 1990 SWRCB survey for the period 1987-89 and found an additional 58,000 AFY reclaimed water use. The analysis of the survey showed that agriculture used 53 percent of all reclaimed water, groundwater recharge 21 percent, landscape irrigation 16 percent, and wildlife habitat 6 percent.

Water Recycling 2000 reported a summary of the raw data (region by region) from respondents but also adjusted reported reuse projections to account for uncertainties due to the identified constraints. If a project was under construction, its reported yield was adjusted downward by 20 percent. If it was in the design stage, its yield was cut by 40 percent. Planned projects were de-escalated by 60 percent. Further, this survey made a major distinction between projects that displace fresh water use and those that would not. After these adjustments and distinctions, additional displacement water generated from water recycling was reported at 244,100 AFY by the year 2000. Without the adjustments, total reported reuse for the year 2000 was reported at 826,240 AFY.

Metropolitan Water District

The Metropolitan Water District of Southern California currently (July, 1993) is preparing an analysis of water reuse forecasts by its member agencies (RWQCB regions 4,6,7,8, and 9) as part of its Resource Assessment Survey. To resolve reported differences and to the extent practicable and reasonable, WaterReuse survey data were reconciled with MWD data in consultation with the original respondents. However, minor differences remain in some of the projected reuse volumes. Only time will tell which prediction of future potential is more closely realized.

In Southern California, a number of water agencies did not respond to the WaterReuse survey. Data on these projects were obtained from MWD from a draft compilation of its as yet unpublished survey. Some of these reuse projects did not specify the types of reuse and are listed under the "Miscellaneous" category.

Central Basin Municipal Water District

Central Basin MWD with the County Sanitation Districts of Los Angeles County, Upper San Gabriel Valley MWD, Three Valleys MWD, and Water Replenishment District of Southern

¹⁵Ibid., p. 1.

¹⁶Ibid., p. 3

¹⁷CSWRCB, p. 11.

¹⁸Policies and Goals for California Water Management: The Next 20 Years, Bulletin 4, DWR/SWRCB, p. 46.

¹⁹Water Recycling 2000: California's Plan for the Future, State Water Conservation Coalition Reclamation/Re-Use Task Force and Bay Delta Reclamation Sub-Work Group, printed by the WaterReuse Association, Sacramento, September 1991.

California, recently completed a survey of water reuse in the Los Angeles County region.²⁰ It compiled water reclamation data for FY 1991-92 and presented the forecast for FY 2020-21. Quantities found in this report were used for comparison and verification of reuse volumes in areas with common respondents.

DIFFERENCES FROM OTHER SURVEYS

There are significant differences in scope, horizon and methodology between this survey by the WaterReuse Association and each of the previous surveys reviewed above. For example, the present survey sought to assess water reclamation potential beyond the year 2000. Whereas the SWRCB survey inferred the purpose of a reclamation project (i.e. whether for pollution abatement/control or water supply) based upon a number of factors, the present survey asked this question specifically on the questionnaire.

A major distinction of this survey is that it was conducted to obtain an accurate but as optimistic a measure of the future potential as possible, while investigating existing constraints. While no single agency would be held to a commitment to reclaim the exact volumes projected by the precise date indicated, the overall figures are believed to be a fair representation, at this point in time, of water reclamation potential in the years 2000 and 2010.

Another objective of this survey was to obtain a measure of the "ultimate" reuse potential. Clearly, the word ultimate meant different things to different respondents. In many cases, no more water recycling was projected for the ultimate than for the year 2010 or even earlier.

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²⁰Regional Wastewater Reclamation and Reuse Operations Coordination Study, Central Basin MWD, Carson, CA, by Engineering-Science, Pasadena, May, 1993.

Survey Responses

Appendix H

SURVEY RESPONSES & DATA VALIDITY

A variety of water services organizations and their memberships were contacted as the initial participant pool. Additional names were added from agencies such as the California Department of Water Resources, information from WaterReuse members and the 1990 SWRCB survey. The initial mailing included 163 agencies. A total of about 240 agencies were contacted by the end of the survey. There were a few duplications in the latter figure. Although an attempt was made to be comprehensive, this survey does not include all water agencies in the state. The final tally of returned questionnaires was 111, only a 45 percent rate of response. However, this does not translate to a 45 percent underestimate of the actual potential for water reclamation. The true underestimation of this survey is probably less than 20 percent because of the overlapping jurisdictions of water agencies throughout the state. Many non-responders should not have been on the initial mailing list to begin. The SWRCB survey had 200 respondents.

Some agencies declined to respond to the survey because they had no need for or were not in a position to reclaim wastewater. Efforts were made (in the form of numerous follow-up telephone calls and faxes to potential participants) to encourage those with data to contribute.

The survey analysis was based upon data supplied by agency personnel directly responsible for or involved with a water reclamation. Figures reported were not adjusted unless authorized by the respondents. Duplications were avoided to the best of our ability. After draft results were sent to all participants, we depended upon participants to inform us of any necessary corrections. When duplications and misinformation were noted, the survey data were adjusted or removed and notes explaining the changes were inserted into the data base.

This survey is not intended to be used exclusively as a planning document, but to project future potential of water reclamation based upon input from many, not all, water agencies. The conclusions should be used carefully by those interested solely in planning future water supply to meet projected demands. The results of this survey do not commit any water agency or state or local government to fulfill the potential stated herein. The data presented should serve as another benchmark for planners to gauge the potential for water reclamation into the next century. While it might be expected that many agencies will eventually revise their water reuse potential upward, some may be forced to revise downward for fiscal and other reasons.

Copies of all raw data are available from the WaterReuse Association office in Sacramento. Raw data can also be made available on magnetic media to persons and agencies interested in further analysis and re-aggregation of the survey results by contacting the City of Los Angeles, Office of Water Reclamation at (213) 237-0887.

Survey Procedures

Appendix I



SURVEY DEVELOPMENT

The WateReuse Association survey was developed by the Survey Task Force of the Association.²¹ Previous experience with past water recycling surveys was incorporated to the extent applicable and practicable.

A copy of the survey instrument (questionnaire) is reproduced in Appendix A. Three key areas surveyed were (a) the factors which influence water reclamation plans and projects, (b) the actual water reuse potential including types and amounts of reuse and (c) capital costs of treatment and distribution.

DISTRIBUTION

The process of data acquisition began in October, 1992, and continued through May, 1993. Survey instruments were sent to participants based upon selection from several mailing lists. The initial list was provided by the California Department of Water Resources. This was supplemented by respondents to other surveys and membership lists of various professional associations.

SURVEY CONTENT

The two-page questionnaire (survey instrument) requested the following information:

- Positive or negative impacts that influence water reclamation.
- Purpose of project - Pollution Control, Water reuse, Multi-purpose, or Other.
- Stage of project implementation.
- Types of reuse.
- Quantities of water to be recycled: Present, 1995, 2000, 2010, "Ultimate."
- Estimated capital costs.
- Overall probability of project completion.
- Name of responding agency/person.
- Interest in low-interest loan through the WateReuse Finance Corporation.

SURVEY DATA DEFICIENCIES

There were difficulties in obtaining consistent, reliable, comparable, and accurate data. The following problems were encountered in the course of data acquisition:

- Variance within an agency — Depending upon whom we contacted, the figures would change. And as plans were discussed, over time, estimates changed.
- Missing data — Where no "ultimate" volume was given by a respondent, all previous incremental volumes were totaled and placed in the "Ultimate" column.
- Variance between agencies — The same types of data gathered from different agencies often were very different because of changes over

time and interpretation of questions and assumptions.

Participation — Several agencies that were contacted did not provide data, although they do practice water reclamation. Many agencies with water reclamation were probably not contacted because of inadequate contact information.

Appendix B lists the names of water agencies, number of projects, contacts, and other information.

REVIEW OF DATA

After the data were received and entered into an electronic data management system (Excel spreadsheet), a number of tables (sorts) and figures were generated for review by the WateReuse Survey Task Force and the Board of Directors of the WateReuse Association. Necessary modifications were made only in consultation with the respondents in question.

²¹The Survey Task Force included Steve Kasower, Water Recycling Program, California Department of Water Resources, Julie Lie, Metropolitan Water District of Southern California, Ken Weinberg, San Diego County Water Authority, and Bahman Sheikh, Office of Water Reclamation, City of Los Angeles.

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Appendix J

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- Bob Miele
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- Bob Whitley
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Survey Task Force:

- Bahman Sheikh, Chair
- Julie Lie
- Ken Weinberg
- Steve Kasower
- Karen Roberts

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