

# **WATER BUDGETS, NOT WATER RATIONING**

## **SUMMARY**

Orange County faces a looming water crisis. A prolonged drought throughout the West, coupled with a court order curtailing water imports, now threatens Orange County's future ability to satisfy the thirst of its growing population.

The 2007-2008 Orange County Grand Jury agrees that the best and most immediate solution is further water conservation. Past conservation efforts have achieved considerable success through improved appliance and plumbing technology inside the home, a trend that is expected to continue as older units are replaced. Yet, a sizeable amount of water is still wasted, especially outdoors where the greatest opportunity for further conservation lies. According to water agencies, most people water gardens and lawns too often and too much.

The Grand Jury calls upon water agencies to expand efforts to motivate and educate residential customers to conserve water. It specifically recommends a two-step approach:

- Water agencies should establish conservation pricing based upon an allotment or water budget for each household with tiered pricing to encourage conservation from those who exceed their allotments; and
- These agencies must implement more effective ways to motivate and educate the public on how to water gardens and lawns without wasting water. The Grand Jury identified several techniques and devices, such as smart timers and water calculators to improve the efficiency of residential landscape watering.

## **REASON FOR INVESTIGATION**

Water agencies and news accounts warn of a potential water crisis in Orange County because of a multiyear drought in the Western United States, especially in California, that contributes to reduced water levels in the Colorado River and a reduced Sierra Nevada snow pack. A court order to protect an endangered fish, the Delta smelt, has reduced imported water from the Sacramento-San Joaquin Delta, where levee problems further threaten that water supply. These developments, plus a growing population, are putting additional strain on another important Orange County water source, its underground water basin or aquifer. For these reasons, the Grand Jury felt compelled to review the effectiveness of measures currently being taken to avert a severe water shortage in the near future.

## **METHOD OF INVESTIGATION**

The method of investigation included:

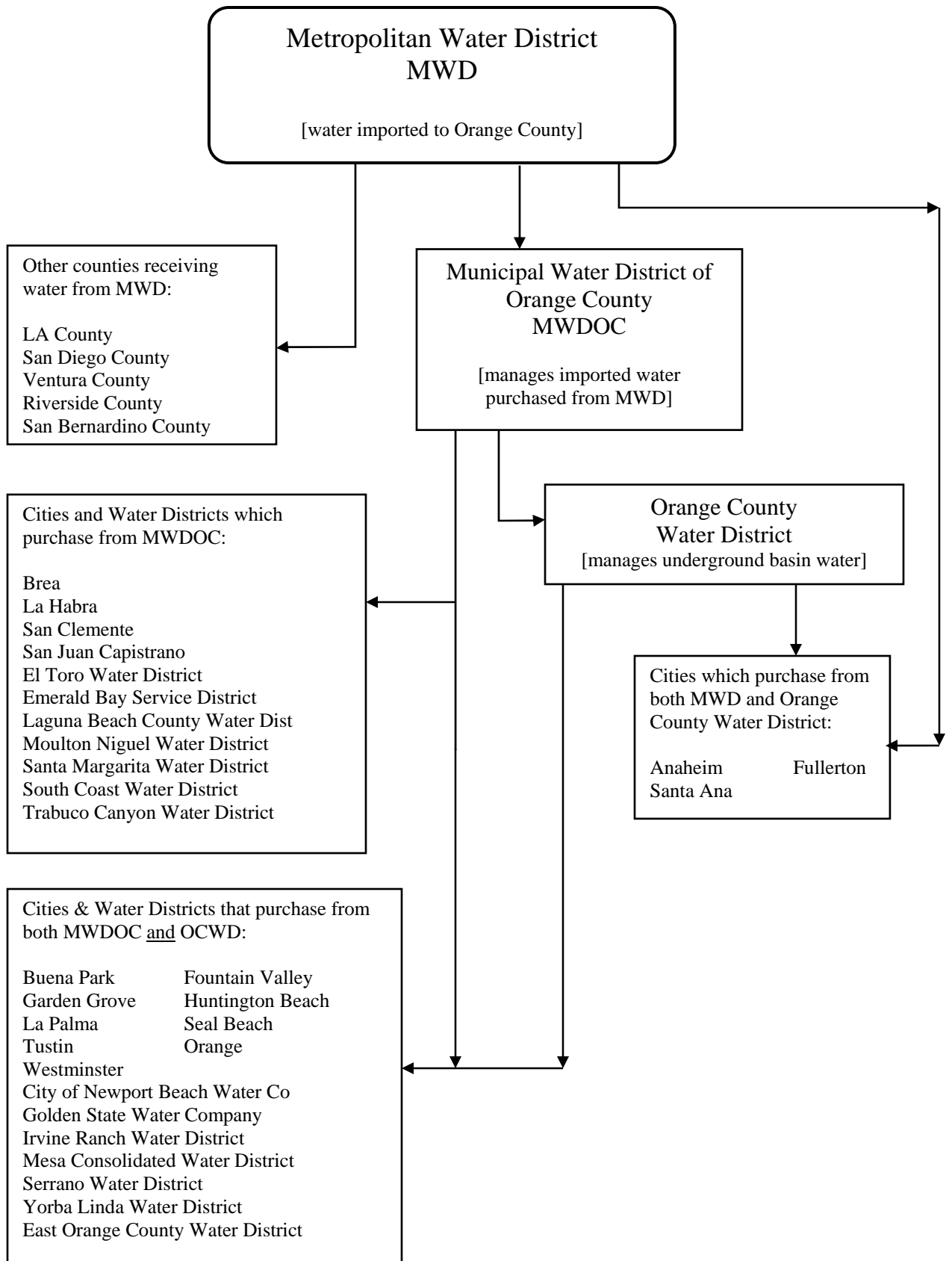
- A review of literature on current and future water needs in Orange County
- A tour of the State Water Project in Oroville and the Sacramento-San Joaquin Delta
- Interviews with representatives of the Orange County Water District, the Municipal Water District of Orange County, Irvine Ranch Water District and the Fullerton College Horticulture Program
- A survey of water bills issued by different Orange County water agencies
- A review of questionnaires sent to all retail water agencies in Orange County
- Review of landscape watering principles and practices from various sources
- Review of local Internet sites that promote water conservation
- Inspection of drought-resistant landscaping and water-saving irrigation devices

## **BACKGROUND AND FACTS**

Orange County is a densely populated, semi-arid region which gets relatively little precipitation. More than half of its water, 53%, is imported by the Metropolitan Water District of Southern California (MWD), which in turn sells to the Municipal Water District of Orange County (MWDOC) and three cities. The MWDOC was formed in 1951 to contract with MWD to acquire this supplemental imported water and to coordinate the water supply for 29 Orange County water agencies. The cities of Anaheim, Fullerton and Santa Ana purchase water directly from the MWD, a practice initiated before the MWDOC was created.

The remaining 47% of the water used in Orange County comes primarily from an underground basin or aquifer, located under the northern half of Orange County and managed by the Orange County Water District. The OCWD was formed in 1933 for the purpose of managing and replenishing this underground basin. Aquifer water is pumped from wells by 20 Orange County water agencies that are within the basin boundaries, supplying approximately 74% of their water needs. The actual amount differs with each member and is adjusted annually on the basis of conditions in the basin.

The following chart demonstrates the distribution of water in Orange County.



## Reliability of future water supplies

Recent events have generated major concerns about Orange County's ability to meet the demand for water in the years ahead. Some of the challenges that now face Orange County and other recipients of MWD imported water are:

- A recent federal court ruling that cut water supplies from the state's two largest water delivery systems by up to one-third to protect the endangered smelt
- A prolonged drought in the West which has reduced the mountain snow pack, a critical natural supply of water, and has reduced water levels in the Colorado River
- Extremely low water reserves statewide
- Aging levees in the Sacramento-San Joaquin Delta, at risk of a natural disaster, could cripple the water deliveries for an extended period of time
- No significant improvements in the statewide water system over the past 30 years despite California's rapidly growing population

These problems cannot be easily resolved. Solutions will be costly and possibly politically charged. Reducing water demand through conservation remains the most cost-effective and timely solution to remedy the looming shortage. Conservation is not a new concept. It has been promoted for years and has served as a quick resolution in the past when temporary shortages occurred.

## The 10% challenge

In response to this impending shortage, Orange County water agencies are asking the public to voluntarily conserve. The regional goal for voluntary conservation is 10%. The Grand Jury found that many Orange County water agencies structure water bills to show customers current usage compared to usage during the same period the previous year. This is intended to help customers measure the difference in their current and past water use, but it does not measure their water-use efficiency. Nor does it tell them how much water they should be using commensurate with their household and landscape needs.

## Why focus on residential water use?

All categories of water users are called upon to conserve. But the primary focus of this report is on residential customers. Why? Because, as the following data<sup>1</sup> shows, single-family and multi-family residences are collectively the largest water consumers:

- |  |     |
|--|-----|
| • Single-family residential                | 49% |
| • Multi-family residential                 | 14% |
| • Commercial, industrial and institutional | 29% |
| • Agricultural                             | 1%  |
| • Recycles & non-domestic                  | 7%  |

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<sup>1</sup> Percentage extrapolated from Orange County Water Agencies Water Rate\$ Water Systems Operations and Financial Information 2006 - Table 5, MDOC, 2006

Based on responses to a Grand Jury questionnaire sent to all of the Orange County water agencies, more than half of this residential water is used outdoors. And it is estimated that half of outdoor water usage is wasted. Thus, landscape irrigation presents the greatest opportunity for potential water savings.

The figures shown in the aforementioned countywide data, however, do not reflect the vast differences in urban design found in Orange County. Historically, central and northern county communities were developed with single-family homes on large lots. In newer developments, especially in South County, the emphasis is on communities with small lots with large greenbelt areas and wide, landscaped boulevards and slopes. Water used to irrigate greenbelts owned by homeowners associations is generally quantified in the “multi-family residential” category. City-owned and city-maintained landscaping along boulevards is included in “the commercial, industrial and institutional category.”

### **Conservation history in Orange County**

A memorandum of understanding<sup>2</sup> (MOU), developed in 1991 by the California Urban Water Conservation Council, includes 14 recommended cost-effective best management practices (BMP) for advancing the efficient use of water. They are:

1. Residential water surveys
2. Residential plumbing retrofit
3. System water audits, leak detection and repair
4. Metering with commodity rates
5. Large landscape conservation programs
6. High-efficiency washing machine rebate programs
7. Public information programs
8. School education programs
9. Commercial, institutional and industrial programs
10. Wholesale agency assistance programs
11. Conservation pricing, or tiered pricing
12. Conservation coordinator
13. Water waste prohibition
14. Residential ultra low-flow toilet replacement programs

The Municipal Water District of Orange County (MWDOC) signed the MOU in 1991 and agreed to develop, obtain funding for and implement regional BMP programs on behalf of all retail water agencies in Orange County. Only half of these agencies currently are signatories to the MOU but, according to MWDOC, all are actively implementing BMP-based programs.

The public is familiar with many of these practices. Since these programs have been in effect, water usage has been reduced substantially through conservation. Water agencies agree that improved plumbing fixtures and water-efficient appliances have contributed to

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<sup>2</sup> “Memorandum of Understanding Regarding Urban Water Conservation in California”, California Urban Water Conservation Council, 1991

most of this success. Free exchanges and rebates funded by the water agencies accelerated the process.

Based on a Grand Jury survey of water bills and responses to a questionnaire, there is one best management practice that has not been effectively implemented -- but one that could be a significant factor toward promoting water reduction. That practice is conservation pricing.

### **Conservation pricing or tiered pricing**

Conservation pricing, also referred to as tiered pricing, promotes conservation by establishing a base allocation, or water budget, with several levels of pricing for amounts used above that allotment. Each tier is priced at a more expensive rate than the one below, sometimes doubling in cost to encourage water conservation.

Tiered pricing has been implemented by 19 of the 30 Orange County retail water agencies. However, the practice varies widely from agency to agency. The effectiveness of this strategy may be undermined by the fact that the cost of water is relatively inexpensive. In Orange County, water costs consumers between \$0.0016 and \$0.0059 a gallon depending on the water agency and the amount of water consumed. The retail water agencies sell water in units of 100 cubic feet, equivalent to 748 gallons. Some agencies sell water on a flat-rate basis, charging from \$1.30 to \$2.85 per 100 cubic feet or \$0.0017 to \$0.0038 per gallon. Agencies using tiered pricing begin their base-level pricing from \$0.49 to \$2.27 per 100 cubic feet or \$0.0007 to \$0.0030 per gallon.

In most cases, the increases in each tier are relatively minor and may have little impact or effect on a consumer who happens to be more focused on the rising cost of gasoline and food. Besides the fact that water is inexpensive, another factor that could contribute to consumer indifference to tiered pricing is that the base-level allotments established by some agencies, as well as succeeding tiers, may have little relevance to actual need or usage.

Tiered pricing must be based on a fair and reasonable water budget or allotment and a fair and reasonable rate for that first tier. Higher tiers should then be priced at a sufficiently increased rate to get customer attention. There is precedent that supports the belief that this strategy has worked. Water bills issued by the Irvine Ranch Water District, which implemented tiered pricing in 1991, label each tier ranging from "low volume" to "conservation," "inefficient," "excessive" and "wasteful." Each tier essentially doubles in price, penalizing overuse. This projects a very clear picture to the consumer. For tiered pricing to have the intended impact, it appears that the tiers must be clearly defined on the water bill.

Restructuring rates is not a simple matter. But if the intent of this best management practice is to be met, an effective and equitable tiered-pricing structure must be implemented by all Orange County water agencies. It must be done in a manner that would preclude the necessity for raising rates to cover operating costs when consumers do reduce consumption. Rate increases resulting from reduced demand due to hard-won conservation efforts would only undermine public commitment to conservation.

## Establishing a budget/allocation

For residential customers, the process starts with water agencies establishing a base allocation for the average household within their boundaries. A determination must be made as to the adequate amount of water needed per person for indoor use for all customers and for outdoor use by single-family homes.

### *Indoor water use*

The average indoor water use in Orange County is unknown since it is not metered separately. However, the following table shows commonly-accepted estimates of average per person indoor water use in the United States, for both non-conserving and conserving households.

Type of Use	Daily Use per person in Gallons/day Non-Conserving	Daily Use per person in Gallons/day Conserving
Toilets	18.5	8.2
Washing Machines	15.0	10.0
Showers	11.6	8.8
Faucets	10.9	10.8
Leaks	9.5	4.0
Other	1.6	1.6
Bath	1.2	1.2
Dishwasher	1.0	0.7
Total	69.3	45.3

From the "Handbook of Water Use and Conservation" by Amy Vickers

Thus, 70 gallons per day per person appears to be an adequate allotment for average daily indoor use for meeting necessary health requirements. The Irvine Ranch Water District and the City of San Juan Capistrano both provide allotments to their customers using slightly different formulas to determine indoor water allowances. The Irvine Ranch Water District allows 75 gallons per day per person for four occupants per single family resident. The City of San Juan Capistrano allocates nine units per month (6,732 gallons) per single family resident, an amount that is equivalent to 70 gallons per day per person for 3.2 occupants.

### *Outdoor water use*

According to information derived from interviews and responses to its questionnaire, the Grand Jury learned that almost all water used outdoors is for landscaping. Half of that amount is wasted, with residents watering too much and too often.

Calculating the appropriate amount of watering (frequency and amount) for landscaping is a daunting task for most residents. By default, the burden of establishing a fair and reasonable allocation for outdoor landscape watering falls upon the water agencies -- if they are sincerely committed to improving water conservation. The calculation for appropriate watering is weather-based<sup>3</sup> as it takes into account weather conditions, plant species, the size of the landscape area and irrigation efficiencies. Soil texture is another important parameter that is necessary for determination of frequency of watering.

The Grand Jury was impressed with the separate approaches taken by two Orange County water agencies for determining the landscaped area. The City of San Juan Capistrano estimates a landscaped area of 3,636 square feet for lot sizes less than 7,000 square feet. For those over 7,000 square feet, the square footage of the house is doubled and subtracted from the lot size. The Irvine Ranch Water District estimates a landscaped area of 1,300 square feet for every single-family home but allows variances for those who show that their landscape area is larger. A calculation (based on actual weather data and plant needs) is then made for how much water that average landscaped area requires.

Regardless of the method used to determine an outdoor allotment for landscaping, the water agencies must be able to demonstrate that their method is fair and equitable.

### **Resources currently available for conservation**

The objective in assigning allocations and implementing tiered pricing with significantly increased rates is not to punish customers, nor to earn additional revenue, but to encourage those who are wasteful to conserve. Water agencies should all be assisting customers with detecting and correcting the reasons for excessive use of water. Personnel at the Irvine Ranch Water District indicated that they respond personally to customer requests for help and will assist them in correcting the problem and will often refund the cost of the penalty after the problem is corrected.

The following devices and resources can assist or inform motivated gardeners about new irrigation techniques:

- *Smart timers* - automatically adjust watering times for different weather, soil and landscape conditions
- *Watering index* - provides an index for those having timers equipped with a “water budget adjustment”<sup>4</sup>
- *Water calculators* – calculates the frequency and duration for watering based on the type of soil, plants, watering system and its flow rate<sup>5</sup> for residents in Southern California.
- *Innovations in irrigation systems* - including rotating nozzles for pop-up spray heads and a new system for watering turf grass using plastic pipes with drip emitters, are proving to be much more efficient than conventional sprinklers
- *Xeriscape landscaping* - drought-tolerant vegetation

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<sup>3</sup> Water budgeting using evapotranspiration data from CIMIS (California Irrigation Management Information System) and crop coefficients from WUCOLS (Water Use Classification of Landscape Species).

<sup>4</sup> [Bewaterwise.com](http://Bewaterwise.com), sponsored by water agencies including those in Orange County

<sup>5</sup> *ibid*



- *Synthetic turf* – replaces water-guzzling turf with “realistic” manufactured grass

Although these devices are helpful, some knowledge and skill are required to take full advantage of them. Smart timers and water calculators also require knowledge of the types of soil and plants involved. To maximize use of the aforementioned resources, additional information and support must be provided.

### **Selling conservation**

Unfortunately, water agencies cannot stand by passively until residents motivate themselves to conserve water. Just as those agencies must offer a stick in the form of tiered pricing, they must offer a carrot to motivate residents to pay more attention to their outdoor watering practices.

Water agencies certainly promote conservation. The question is, is this enough? The Grand Jury concluded that they could do more through:

- *Public education.* While some local water districts provide classes on landscape watering principles and practices, they indicate that some of these classes are poorly attended. The classes might draw additional interest if they offer workshops on determining soil types, using water calculators and demonstrating new devices like smart timers.
- *Promotion.* Some water agencies send out mailers with water bills to promote classes or encourage efficient watering techniques. Press releases may generate brief announcements of the classes. But effective promotion may require teaming up with other agencies as well as vendors to provide the resources to attract greater attendance at classes or garden demonstrations.
- *Rebates.* Water agencies should continue to offer more rebates for water-saving devices, such as more efficient landscape sprinklers and controllers outdoors as well as more efficient indoor appliances and plumbing fixtures.
- *Personal assistance.* Water agencies should establish a telephone help line staffed by a person (not a computer) to answer their customers’ water-related questions. They should also make available a countywide soils map that would allow the customers to approximate soil textures.

### **CONCLUSION**

There is still room for more water conservation, especially in outdoor landscape irrigation. Water agencies need to help the public better understand the principles and new technologies to make improvements in landscape irrigation. Customers need encouragement and assistance. Water agencies must provide clear targets for the customer and implement tiered pricing in support of the targets.

## **FINDINGS**

In accordance with California Penal Code sections 933 and 933.05, each finding will be responded to by the government entity to which it is addressed. The responses are to be submitted to the Presiding Judge of the Superior Court. The 2007-2008 Orange County Grand Jury has arrived at the following findings:

- F-1 Opportunities for further water conservation exist especially with regard to landscape watering.**
- F-2 Conservation pricing, or tiered pricing, with a fair and reasonable base allotment, followed by tiers of higher rates, can be an effective tool to motivate further conservation.**

**Response to finding F-1 is required from MWDOC**

**Responses to findings F-1 and F-2 are required from the following Water Districts and City Water Departments:**

East Orange County Water District	City of Buena Park
El Toro Water District	City of Fountain Valley
Emerald Bay Service District	City of Fullerton
Irvine Ranch Water District	City of Garden Grove
Laguna Beach County Water District	City of Huntington Beach
Mesa Consolidated Water District	City of La Habra
Moulton Niguel Water District	City of La Palma
Santa Margarita Water District	City of Newport Beach
Serrano Water District	City of Orange
South Coast Water District	City of San Clemente
Trabuco Canyon Water District	City of San Juan Capistrano
Yorba Linda Water District	City of Santa Ana
City of Anaheim	City of Seal Beach
City of Brea	City of Tustin
	City of Westminster

## **RECOMMENDATIONS**

In accordance with California Penal Code sections 933 and 933.05, each recommendation will be responded to by the government entity to which it is addressed. The responses are to be submitted to the Presiding Judge of the Superior Court. Based on the findings of this report, the 2007-2008 Orange County Grand Jury makes the following recommendations:

- R-1 Continue to emphasize methods and availability of tools that assist the customers in understanding weather-based irrigation practices by:**

- **Providing a hotline for assisting the public with landscape irrigation information**
- **Providing a countywide soil texture map on the MWDOC website**
- **Developing an Orange County specific water calculator on the MWDOC website**

**R-2a Develop monthly water allocations for each customer based on both of the following:**

- **A per person indoor water allotment that satisfies basic needs**
- **An outdoor water allotment that applies the weather-based method over the customers' landscaped area**

**R-2b Develop a tiered-pricing structure with the first tier based on individual customer water allocation priced at a commodity rate, and subsequent tiers priced significantly higher to encourage conservation. The pricing shall be structured in a manner that will preclude the necessity of price increases as a result of reduced water use.**

**R-2c Modify water bills to clearly explain customer monthly allotment and monthly water usage.**

**Response to recommendation R-1 is required from the Municipal Water District of Orange County.**

**Responses to recommendations R-1, R-2a, R-2b, and R-2c are required from following Water Districts and City Water Departments:**

- |                                    |                             |
|------------------------------------|-----------------------------|
| East Orange County Water District  | City of Buena Park          |
| El Toro Water District             | City of Fountain Valley     |
| Emerald Bay Service District       | City of Fullerton           |
| Irvine Ranch Water District        | City of Garden Grove        |
| Laguna Beach County Water District | City of Huntington Beach    |
| Mesa Consolidated Water District   | City of La Habra            |
| Moulton Niguel Water District      | City of La Palma            |
| Santa Margarita Water District     | City of Newport Beach       |
| Serrano Water District             | City of Orange              |
| South Coast Water District         | City of San Clemente        |
| Trabuco Canyon Water District      | City of San Juan Capistrano |
| Yorba Linda Water District         | City of Santa Ana           |
| City of Anaheim                    | City of Seal Beach          |
| City of Brea                       | City of Tustin              |
|                                    | City of Westminster         |

## **REQUIRED RESPONSES:**

The California Penal Code specifies the required permissible responses to the findings and recommendations contained in this report. The specific sections are quoted below:

§933.05

- (a) For purposes of subdivision (b) of Section 933, as to each grand jury finding, the responding person or entity shall indicate one of the following:
- (1) The respondent agrees with the finding.
  - (2) The respondent disagrees wholly or partially with the finding, in which case the response shall specify the portion of the finding that is disputed and shall include an explanation of the reasons therefore.
- (b) For purposes of subdivision (b) of Section 933, as to each grand jury recommendation, the responding person or entity shall report one of the following actions:
- (1) The recommendation has been implemented, with a summary regarding the implemented action.
  - (2) The recommendation has not yet been implemented, but will be implemented in the future, with a timeframe for implementation.
  - (3) The recommendation requires further analysis, with an explanation and the scope and parameters of an analysis or study, and a timeframe for the matter to be prepared for discussion by the officer or head of the agency or department being investigated or reviewed, including the governing body of the public agency when applicable. This timeframe shall not exceed six months from the date of publication of the grand jury report.
  - (4) The recommendation will not be implemented because it is not warranted or is not reasonable, with an explanation therefore.

## DOCUMENTATION

“Orange County Water Agencies Water Rate\$: Water System Operations and Financial Information”, Orange County Water Association and Municipal Water District of Orange County, 2006

“The Residential Runoff Reduction Study”, Municipal Water District of Orange County and Irvine Ranch Water District, July 2006

“2005 Urban Water Management Plan”, Municipal Water District of Orange County, 2005

“A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California: The Landscape Coefficient Method”, University of California Cooperative Extension, California Department of Water Resources, 2000

“Landscape Management for Water Savings: How to Profit from a Water Efficient Future”, Municipal Water District of Orange County, 1998

Stan Sprague, “Orange County’s Water Story: Regional Water Issues and the Import Supply”, March 2003

Tom Ash, “Landscape Management for Water Savings”, 1998

“Smart Water: A Comparative Study of Urban Water Use Efficiency Across the Southwest”, Western Resource Advocates

“Reclamation: Managing Water in the West - Weather Based Technologies for Residential Irrigation Scheduling”, Technical Review Report, Water District of Orange County, 2004

“Landscape Water Management Principles”, The Irrigation Training and Research Center, 1997

“Residential Weather-Based Irrigation Scheduling: Evidence from the Irvine ‘ET Controller’ Study”, June 2006