Statement of Dennis O'Connor,
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Presented To The
Senate Select Committee On CalFed Water Program
August 5, 1998

Chairman Johannessen, Members, for the record I am Dennis O'Connor, Assistant Director for Environment and Natural Resources for the California Research Bureau.

Mr. Chairman, on June 9, 1998, I testified before this committee on how DWR projected urban water demand through the year 2020. I described how DWR used a two-step process. That is, first they forecast urban per capita daily consumption. They then multiply that forecast by the Department of Finance's population forecast.

I then described how DWR forecasts per capita daily consumption. Briefly, DWR first establishes base year consumption, and then forecasts changes to per capita consumption based on expected socio-economic effects and conservation efforts.

Then I explained that DWR establishes base year consumption by examining the historical pattern of water use and adjusts for hydrologic conditions.

Finally, I showed the Committee a chart showing historic urban water demand and DWR's estimated base year consumption. I have attached a slightly reformatted version of that chart, labeled Chart 1, to my printed testimony.

This chart shows a gap of about 60 gallons per capita daily (gpcd) between historic water consumption and DWR's 1995 estimate of average year demand.

While DWR agreed with my description of its methodology, DWR strongly disagreed with the chart. In their view, the chart made an apples-to-oranges comparison that did not properly reflect the relationship between historic urban water demand and DWR's 1995 estimate.

Since June, DWR has been very accommodating in trying to resolve this issue. We have had numerous meetings, telephone calls, e-mails etc., and they have provided me with the necessary data sets. The result of my research is:

***There is still a gap between DWR's 1995 base year estimate and historic demand, although it is not as large as I originally thought it was.***

***There are three reasons why the chart shown on June 9, 1998 showed such a large gap between historic urban water use and the 1995 base year demand.***

1. ***DWR mis-labeled a key chart in both the current draft Bulletin 160-98*** AND ***the previous final version of Bulletin 160-93.***

In both the draft Bulletin 160-98 and the final Bulletin 160-93, DWR included a chart labeled "Urban per Capita Water Use." In draft Bulletin 160-93, DWR labeled the vertical axis "gallons per capita daily." However, in the final Bulletin 160-93, DWR labeled the vertical axis "Urban Applied

Water Use (gallons per capita daily)". Moreover, the text described the chart as urban applied water use. So naturally, I used the chart from the draft Bulletin 160-98 as the source for the historic urban applied water use shown in Chart 1.

However, discussions with DWR revealed that the chart in fact did not show urban applied water use. The chart actually showed urban municipal and industrial production (also known as urban M&I production).

Urban M&I production is one of two components of urban applied water. It represents the water urban water agencies put into their system for deliveries to their customers. The other component of urban applied water is self-supplied water. This is the urban water supplied by private wells. For some regions, like southern California, self-supplied water is a rather insignificant part urban applied water. However, in areas like the San Joaquin Valley where there are a number of canneries, etc., that get their water from their own private wells, self-supplied water is very important.

Consequently, Chart 1 understates historic urban water use by the amount of self-supplied water. Statewide, self-supplied water accounts for about eight gpcd. The consequence of DWR's mis-labeling of the chart in Bulletin 160, then, is that we can account for about eight of the 60 gpcd discrepancy shown on Chart 1.

2. ***DWR changed how it accounted for water in the draft Bulletin 160-98, and did not describe the change in the text.***

In the previous Bulletin 160-93, as with all prior editions of Bulletin 160, DWR used four categories of water use: Urban, Agriculture, Environment, and Other. Other included major conveyance facility losses, recreation uses, and energy production.

However, in the current draft Bulletin 160-98, DWR used three categories of water use: Urban, Agriculture, and Environment. DWR spread Other water use across the remaining three water use categories. This means that the table in draft Bulletin 160-98 labeled "Urban Applied Water" actually included urban applied water *plus* a portion of Other. However, nowhere in draft Bulletin 160-98 did DWR discuss this break with tradition.

Consequently, Chart 1 understates historic urban water use by the amount of attributed to Other water. Statewide, the Other water DWR attributed to urban water use is about 16 gpcd. So, the consequence of DWR's undocumented change in accounting is that we can account for another 16 of the 60-gpcd discrepancy shown on Chart 1.

Now, in all fairness to DWR, part of the reason for releasing a draft version of a report is to help identify these kinds of oversights. Moreover, correcting for these two errors puts us back to an apples-to-apples comparison. Chart 2 shows how these two corrections account for about 24 gpcd, or about 40 percent of the gap between historic urban M&I production and DWR's 1995 base.

### 3. *DWR's "normalization" process overstates baseline consumption*

The purpose of normalization is to remove the year to year fluctuations in demand due to annual changes in hydrologic patterns.

To do so, DWR divides the state first into major hydrologic regions. It then divides each hydrologic region into planning sub-areas and then further divides the planning sub-areas into detailed analysis units or DAUs. For illustrative purposes, I will focus on the South Coast Hydrologic Region and DAU 96 – Orange. (See Chart 3.)

For each DAU, DWR uses production data from select "representative agencies" as the basis for its normalization. For DAU 96, the agencies are: Anaheim, Buena Park, Costa Mesa, Fullerton, Garden Grove, Huntington Beach, Orange, Laguna Beach, and Santa Ana.

To establish the normalized 1995 demand, DWR did not want to use production from the five-year drought nor the first couple of years after the drought. This is because after the 1976-77 drought, demand quickly rebounded to its pre-drought level. (See Chart 4.) So, to establish the 1995 normalized demand, DWR extrapolated the 1980 to 1988 trend in urban M&I production to 1995. They then adjusted the estimate down slightly to adjust for the beginning of the Urban BMPs (Best Management Practices) which were designed to increase the level of urban water conservation and thereby reduce demand.

The key assumption behind this approach is that trends in people's water use habits and practices that existed in 1980-1988 would continue on to 1995 as if the drought never occurred. That is, beyond some minor changes from toilet retrofits, etc., the five-year drought experience did not induce people to permanently change how they used water.

The data suggest otherwise. Chart 5 shows actual M&I production for the Orange DAU through 1995. The chart shows that actual production appears to have stabilized at a new lower level. The difference between the "Normalized" 1995 and actual production in 1995 is 30 gpcd, or about 47,000 acre-feet per year.

The Orange DAU is not unique. Virtually all south coast cities show similar water use patterns. DWR does not have complete data through 1995 on urban M&I production for all representative cities in the south coast hydrologic region. So, I combined the data for those cities for which DWR does have a full data set. The cities are: Anaheim, Banning, Downey, Fullerton, Inglewood, Los Angeles, Manhattan Beach, Orange, Pasadena, Redlands, Santa Ana, and Santa Monica. These cities have a combined population of just over 5 million, or about 1/3 of the south coast hydrologic region.

As shown in Chart 6, urban M&I production in the south coast does not appear to be returning its pre-drought trend. That is, the 1987-92 drought appears to have permanently changed how people in southern California use water.

More recent data further support this observation. The City of Los Angeles, in its *Urban Water Management Plan* for fiscal year 1996-97 observes, "Water use in Los Angeles increased by about 2 percent from the previous fiscal year.... The slight jump in sales can be attributed mainly to population growth, as citywide water conservation levels remain solid at 20 percent."*

Assuming the water use patterns shown in the previous charts apply statewide, the balance of the gap can be explained by DWR's normalization process. (See Chart 7.) DWR's normalized 1995 M&I production estimates appear to be overstated by about 15 percent. That works out to approximately 1.2 million acre-feet, or 20 percent more than the reservoir holding capacity of Folsom Dam.

***There are technical issues with DWR's normalization approach as well.***

Perhaps the most important has to do with how DWR selects the "representative" agencies for the DAUs. DWR tries to select agencies that best represent the water use of the DAU. Sometimes, like with the Orange DAU, it is easy – there are a number of agencies able and willing to provide the necessary data.

However, it is not always easy to find representative agencies for given DAUs. Take, for example, DAU 90 – San Fernando. The City of Los

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* City of Los Angeles, *Urban Water Management Plan: Annual Update Report*, Fiscal Year 1996-97, http://www.dwp.ci.la.ca.us/water/supply/uwmplan/

Angeles provides water to most of the DAU. However, DWR attributes all of Los Angeles's water use to DAU 89 – Coastal. That means two things. First, water use patterns in the Coastal DAU are skewed (probably upwards) by water use patterns in the San Fernando Valley. Second, it means that there are not any agencies well suited to represent water use in the San Fernando Valley.

DWR's solution is to use representative agencies from outside of the DAU. For the San Fernando Valley, DWR used San Gabriel Valley cities. For both the North Riverside and South Riverside DAUs (DAUs 100 & 104), DWR used the same four cities: Banning, Corona, Hemet, and Riverside. For the Temecula DAU (DAU 110), DWR used Corona, Hemet, and Escondido.

There is a potentially serious problem with this approach. While it is possible that water use in these areas show similar *patterns*, it seems unlikely that the absolute level of per capita water demand in these areas are the same. Riverside and Corona have different micro-climates than Banning and Hemet. Different cities have different mixes of businesses and industries. Family income and other socio-economic factors differ. And most important, different water agencies sell water at different prices and under different water conservation regulations.

These differences might or might not be important. What is important is that all interested parties agree that DWR has taken the best approach to estimating baseline demand – and on this point, there is no consensus.

*Why is this important?*

As I testified last June, DWR forecasts 2020 demand based on projected changes to this base. If the base is too high, the 2020 demand forecast is too high.

Moreover, CalFed is using these year 2020 forecasts for their alternative's analysis. If CalFed is trying to meet an overstated demand, they will exclude otherwise viable options because they cannot meet the overstated demand.

Finally, a small error can generate a lot of water. A difference of 10 gpcd is equal to 360,000 acre-feet per year, the capacity Hetch Hetchy. A difference of 1 million people (which is less than the amount DOF revised its year 2000 population forecast between its official 1993 and its 1997 interim forecast) is equivalent to 224,000 acre-feet a year, – a bit more than capacity of Pardee Reservoir.

*Conclusions*

In conclusion, I have two recommendations and a comment.

1. ***DWR needs to describe much more explicitly the hows and whys of its urban demand estimates in Bulletin 160-98.***

To its credit, DWR recognizes that there is a problem with their draft Bulletin 160-98 and is working to correct and clarify both the text and the supporting tables and charts.

*2. DWR needs to revisit its normalization methodology.*

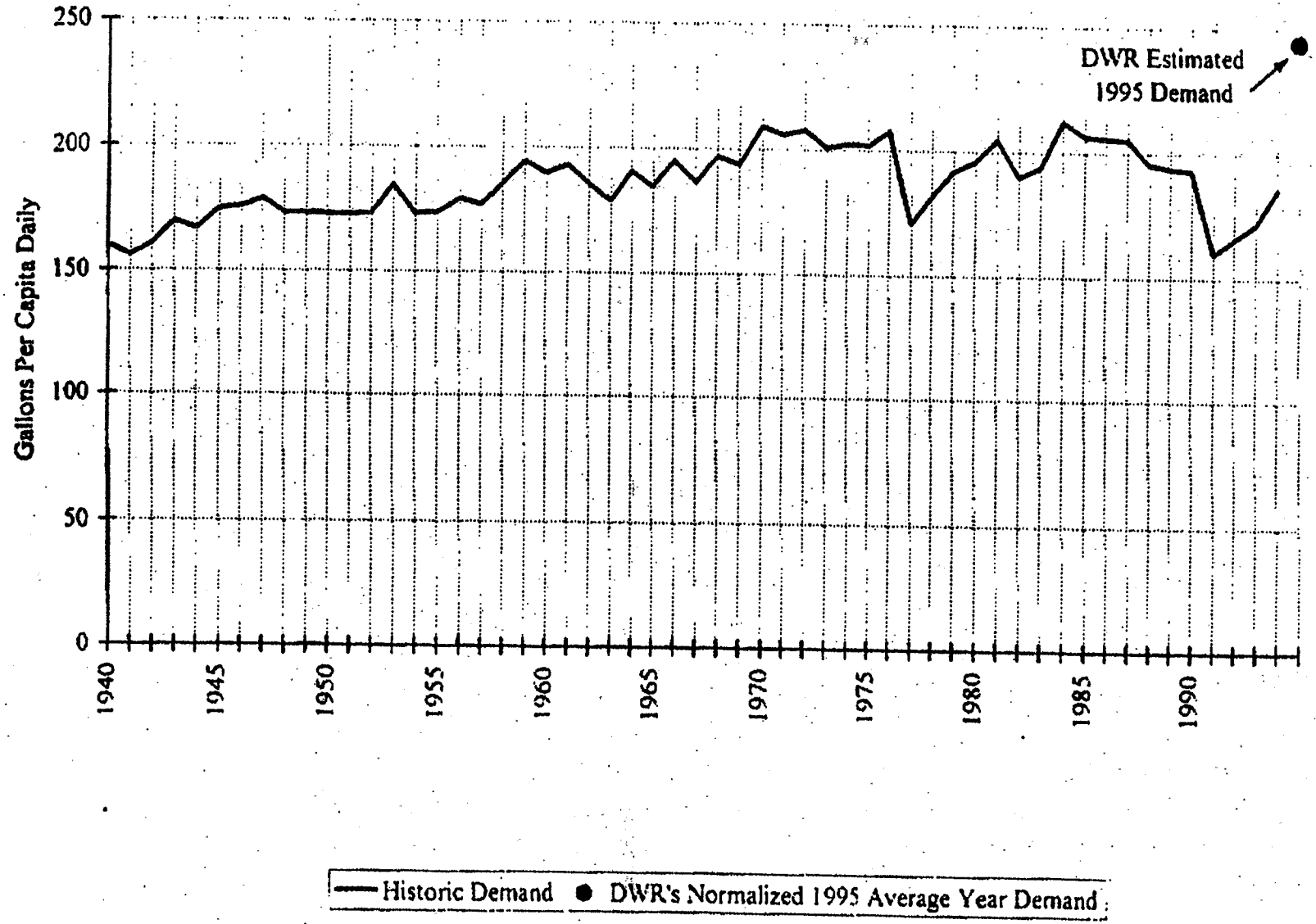
As you might imagine, my testimony last June generated a lot of interest within the water world. Hallway discussions suggest that people on all ends of the water spectrum are uncomfortable with using 1980-1988 trends to set 1995 base conditions. This is especially true since actual trends differ greatly from DWR's 1995 base.

***Comment***

As I noted in June, if the CalFed alternative is to meet the solution principles (implementable, affordable, durable, etc.) it is important that the underlying forecasts be as accurate as possible. What I neglected to mention, is that it is just as critical that all involved in the CalFed process feel comfortable with the forecasts' accuracy as well. This is a key assurance issue. Both accuracy and the perception of accuracy are equally important.

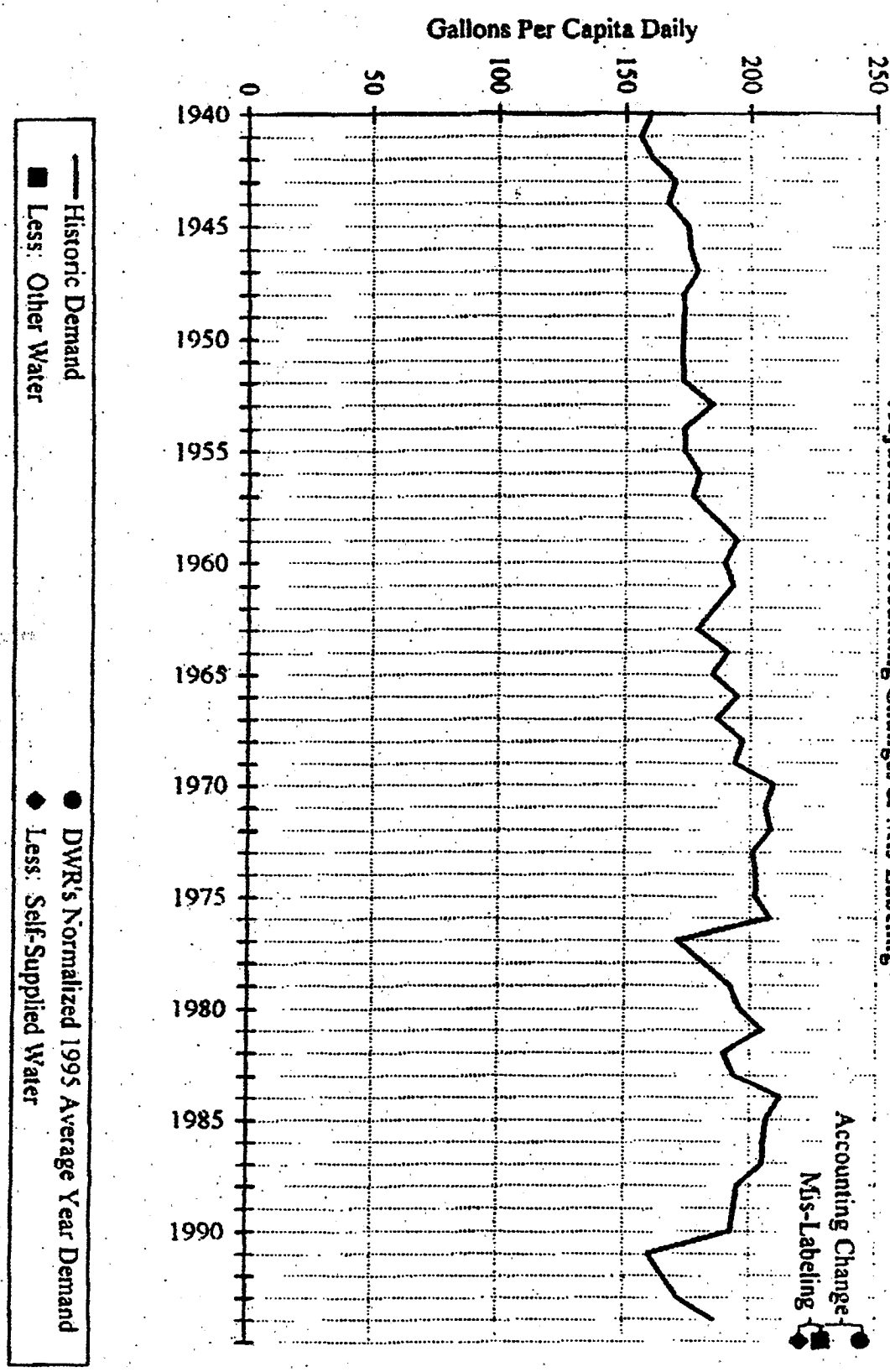
I will be happy to answer any question.

## Chart 1
## Urban Water Consumption -- Historical Demand and DWR's Estimated Base Year




Sources. DWR
Bulletin 160 Figure 4-5 and Table 4-10

California Research Bureau, California State Library




ces: DWR data, CRB analysis



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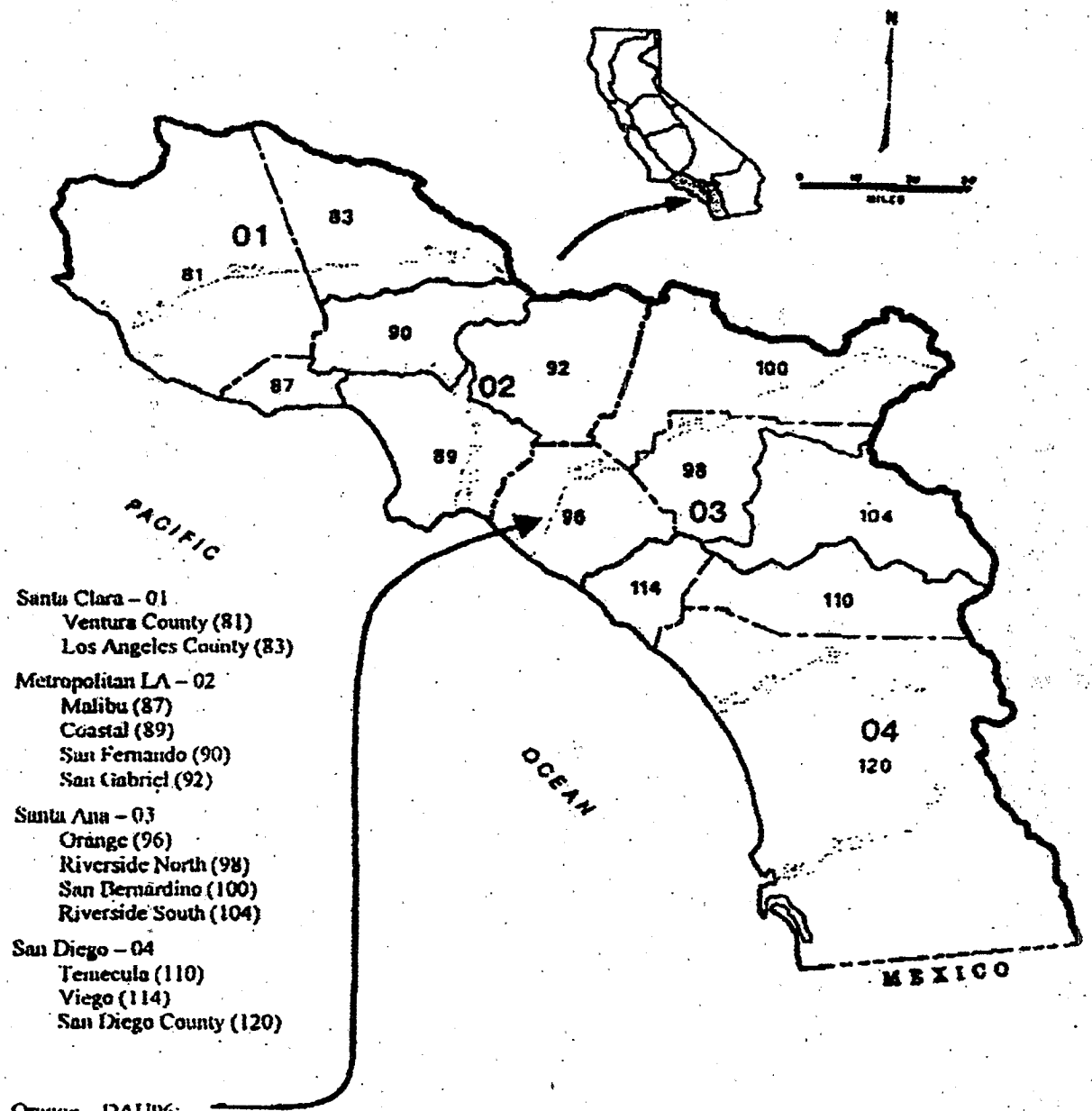
## Chart 3
## South Coast Hydrologic Region
### *Planning Sub-Areas and Detailed Analysis Units*




Santa Clara – 01
- Ventura County (81)
- Los Angeles County (83)

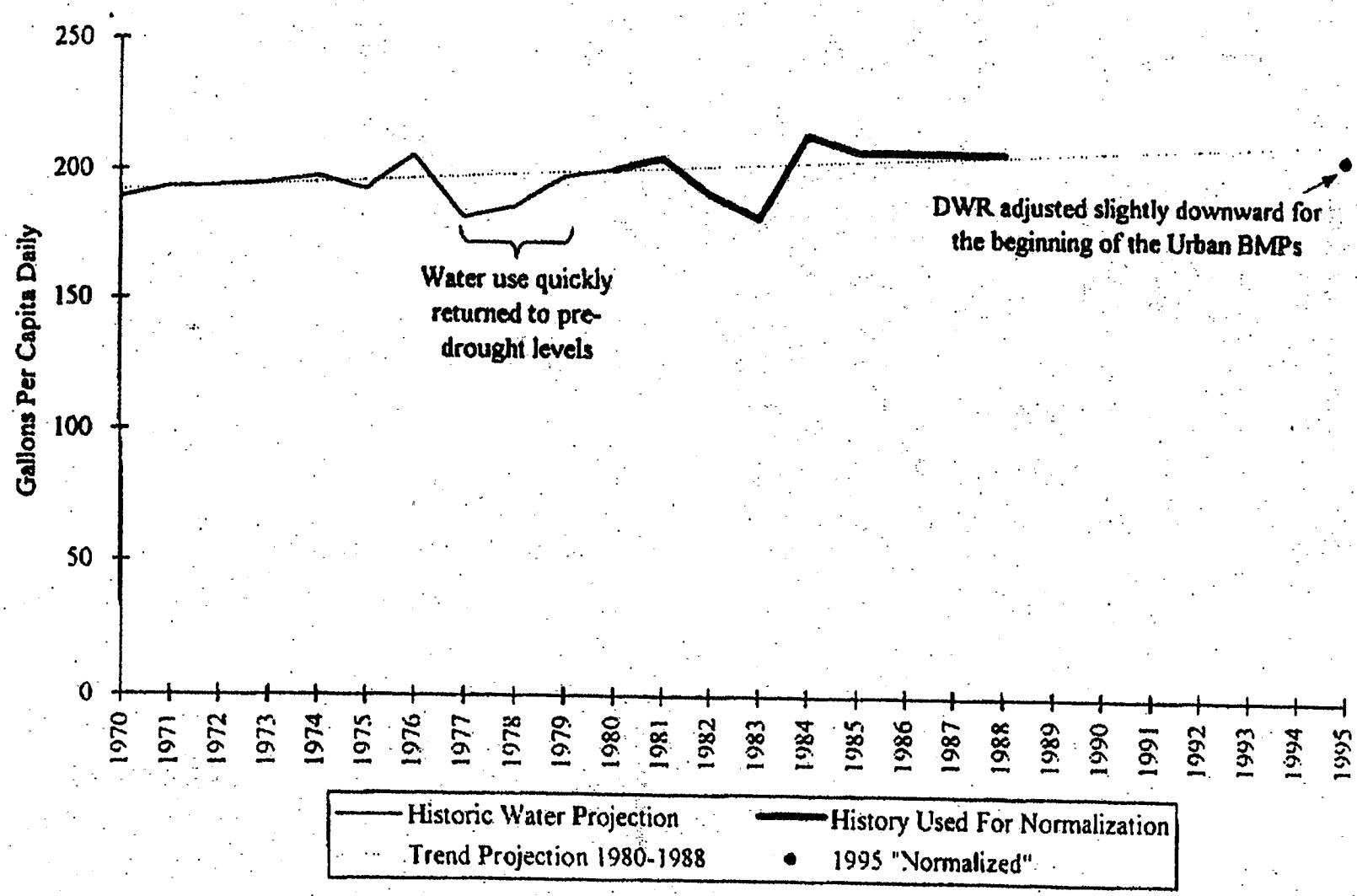
Metropolitan LA – 02
- Malibu (87)
- Coastal (89)
- San Fernando (90)
- San Gabriel (92)

Santa Ana – 03
- Orange (96)
- Riverside North (98)
- San Bernardino (100)
- Riverside South (104)

San Diego – 04
- Temecula (110)
- Viego (114)
- San Diego County (120)

Orange – DAU96:
- Anaheim
- Buena Park
- Costa Mesa
- Fullerton
- Garden Grove
- Huntington Beach
- Orange
- Laguna Beach
- Santa Ana

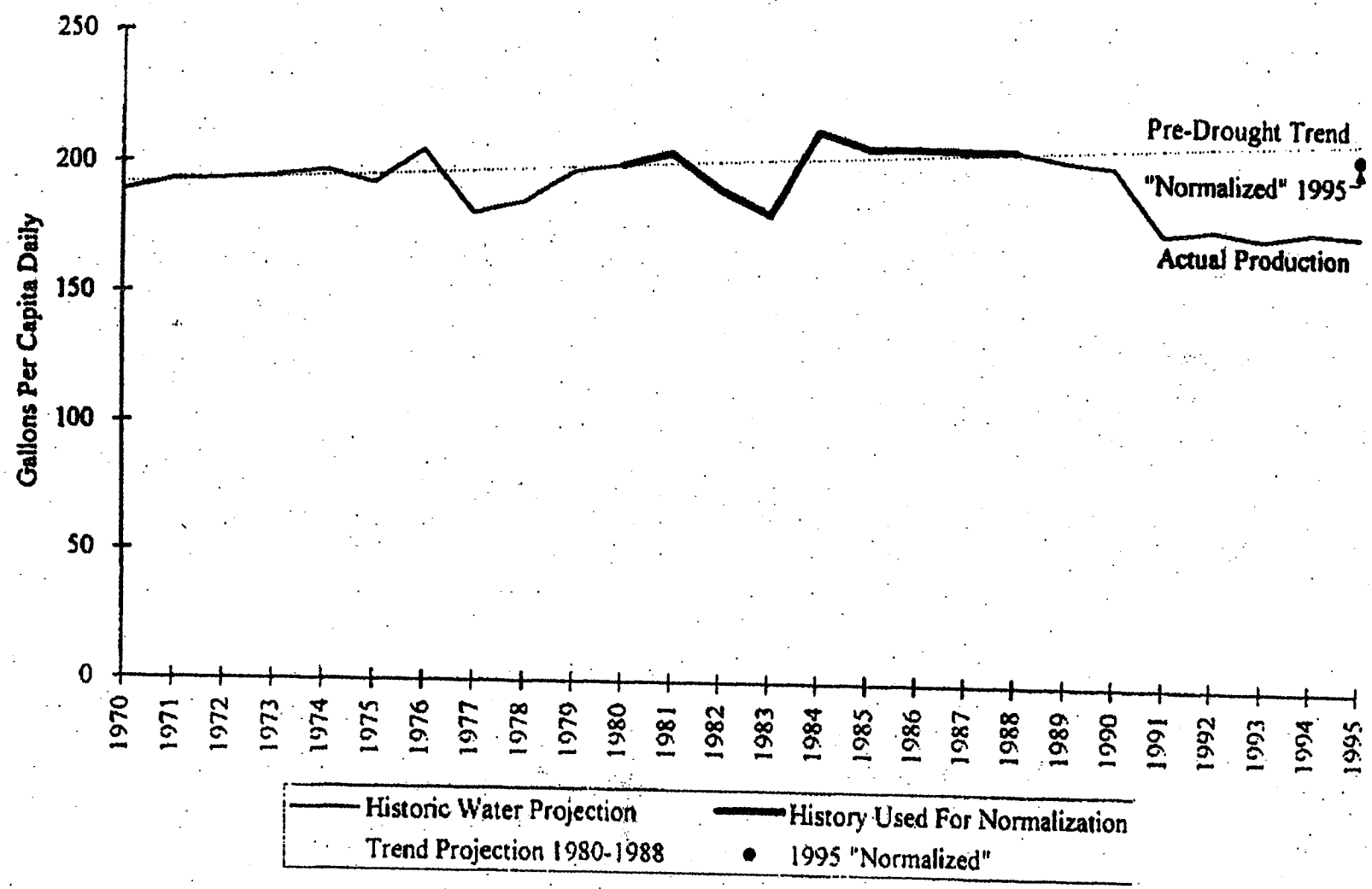
**Chart 4**
**DWR "Normalized" 1995 Urban Water Production**
**Based On 1980 - 1988 Trend**




Source: DWR
Urban Water Production: Orange DAU

Anaheim, Buena Park, Costa Mesa, Fullerton, Garden Grove, Huntington Beach, Laguna Beach, Orange, Santa Ana

## Chart 5
## Urban Water Use In Orange DAU
## Has Not Returned To Pre-Drought Levels

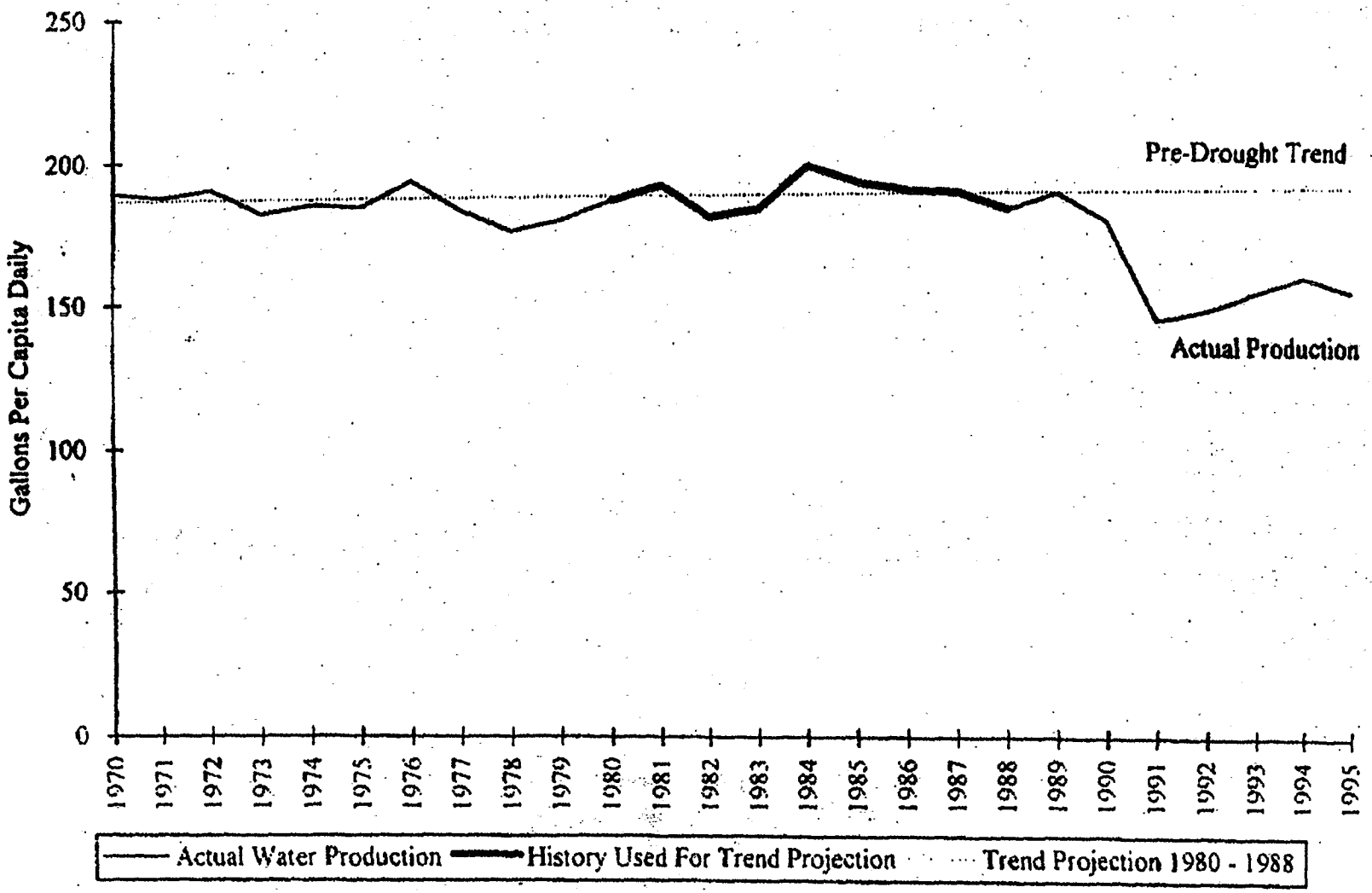



Source: DWR
Urban Water production: Orange DAU

Anaheim, Buena Park, Costa Mesa, Fullerton, Garden Grove, Huntington Beach, Laguna Beach, Orange, Santa Ana

**Chart 6**

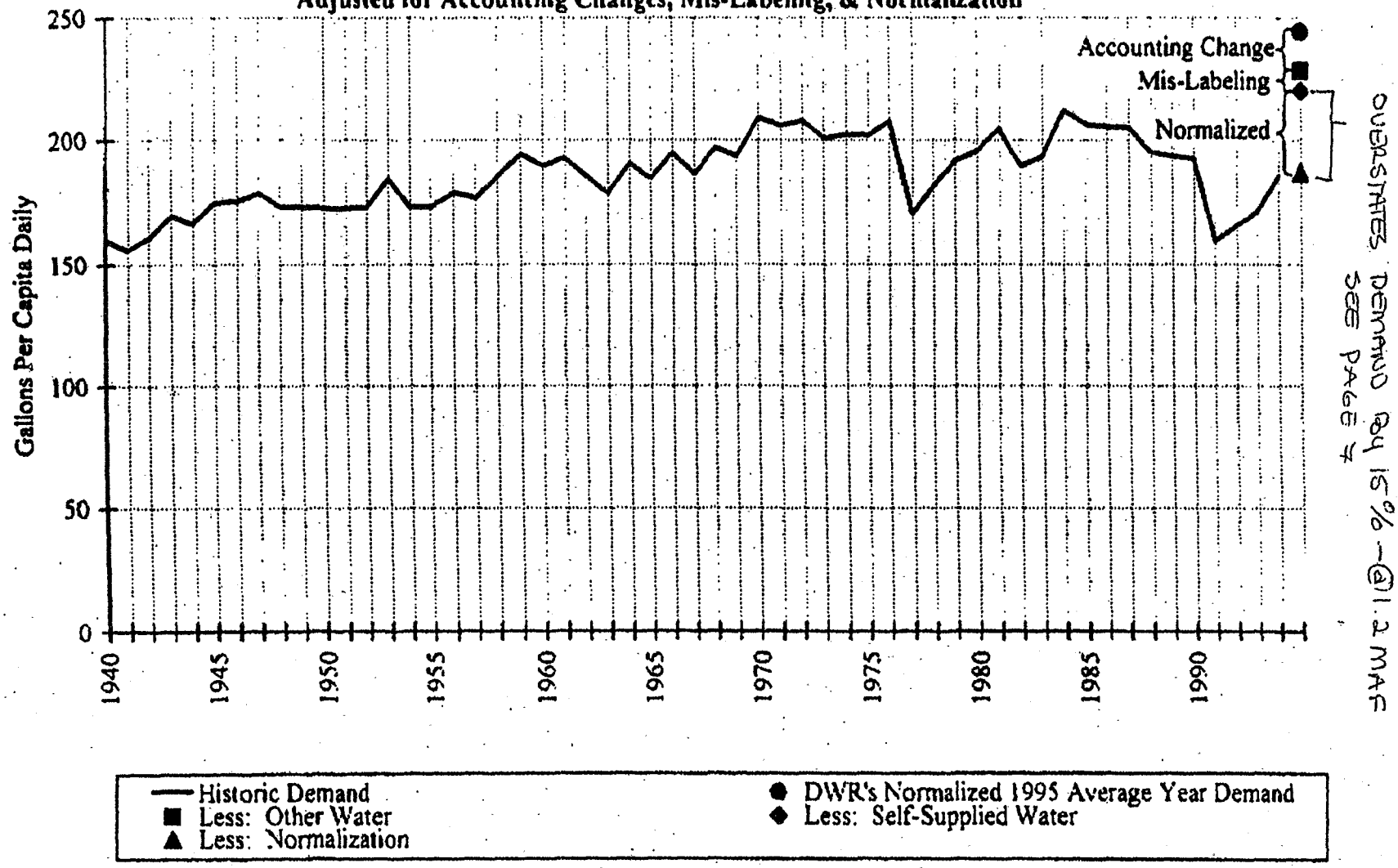
**There Is No Evidence That Urban Water Production In the South Coast Hydrologic Region Is Returning to Pre-Drought Levels**




Urban Water Production, South Coast Hydrologic Region,
Cities for which DWR has complete data, 1970 - 1995

Anaheim, Banning, Downey, Fullerton, Inglewood, Los Angeles, Manhattan Beach, Orange, Pasadena, Redlands, Santa Ana, Santa Monica

## Chart 7
## DWR's Normalized 1995 Average Year Demand
## Adjusted for Accounting Changes, Mis-Labeling, & Normalization




OVERSTATES DEMAND BY 15% - @ 1.2 MAF
SEE PAGE 4

Sources: DWR data, CRB analysis