

Salinity Management Study Economic Impact Assessment

Please fax your comments to Ray Mokhtari:

Metropolitan Water District

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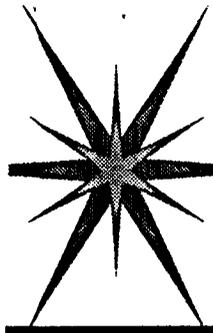
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Objectives

To quantify the economic impacts of imported water salinity changes in Metropolitan Service area:

- Colorado River Water
- State Project Water

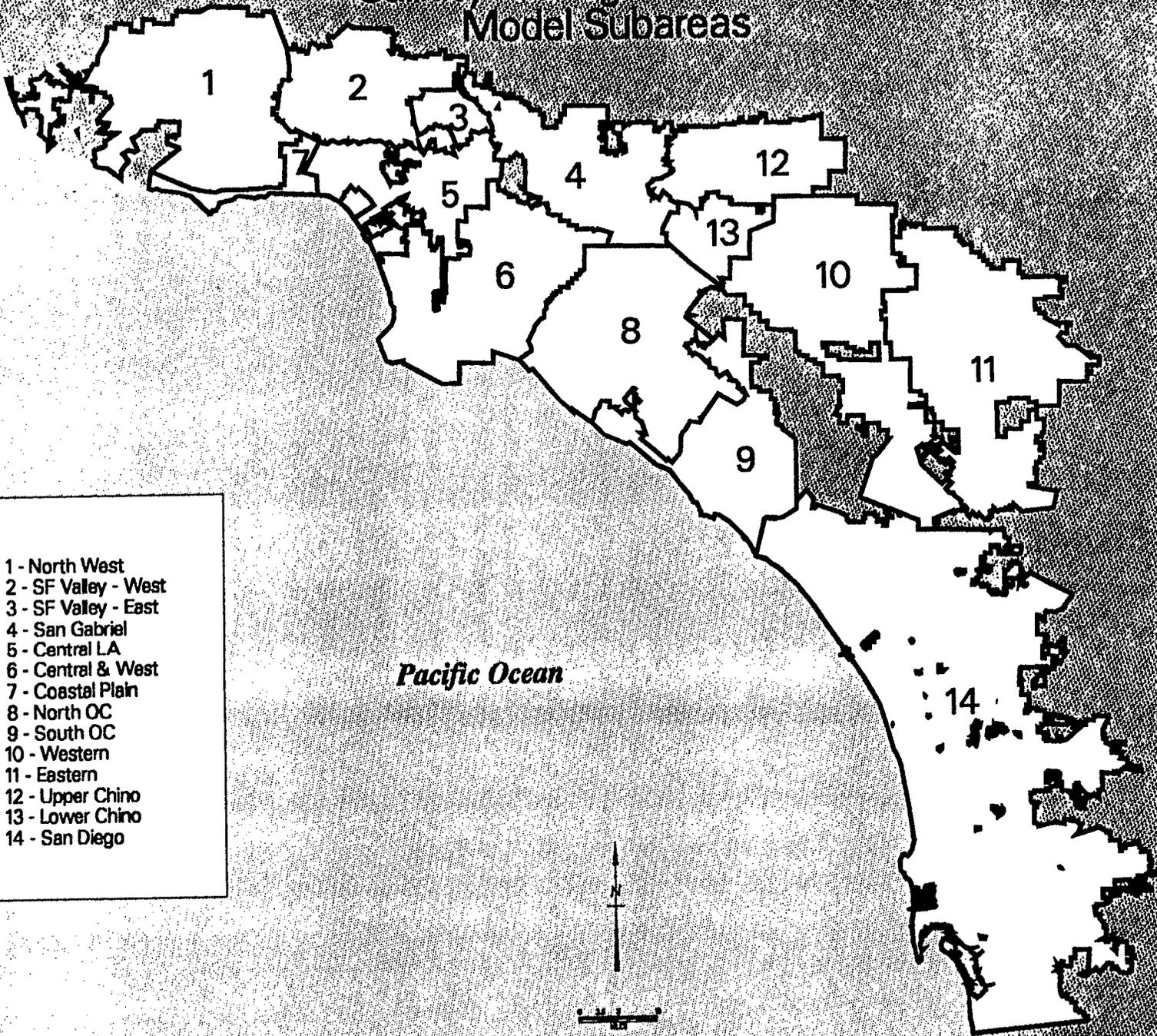


Background

1988 USBR Model

- Subdivided by Counties
- Excluded Ventura County
- Focused on Colorado River Water

Salinity Management Study Model Subareas



- 1 - North West
- 2 - SF Valley - West
- 3 - SF Valley - East
- 4 - San Gabriel
- 5 - Central LA
- 6 - Central & West
- 7 - Coastal Plain
- 8 - North OC
- 9 - South OC
- 10 - Western
- 11 - Eastern
- 12 - Upper Chino
- 13 - Lower Chino
- 14 - San Diego

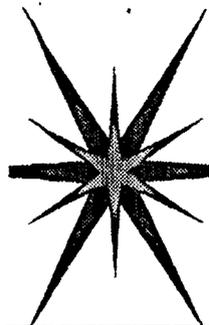
Pacific Ocean



MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
Planning & Resources Division

D-043692

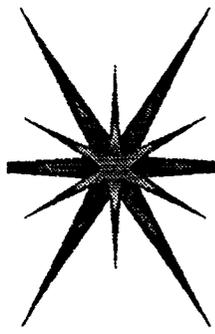
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TDS Assumptions

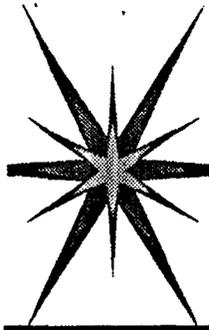
1997 SUB-AREA	LOCAL SUPPLIES						IMPORTED SUPPLIES						TOTAL			
	Groundwater Recovery		Groundwater Production		Surface Water		LA Aqueduct		SPW East Branch		SPW West Branch		Colorado River		Supply	Salinity
	AFY	mg/L	AFY	mg/L	AFY	mg/L	AFY	mg/L	AFY	mg/L	AFY	mg/L	AFY	mg/L	AFY	mg/L*
North West	0	550	25,630	550	0	0	0	0	200	112,853	300	0	0	138,483	346	
San Fernando Valley - West	0	420	59,221	420	0	0	265,919	230	0	55,966	300	0	0	381,105	270	
San Fernando Valley - East	2,561	460	5,000	460	0	0	0	0	0	5,345	300	30,291	700	43,197	608	
San Gabriel Valley	982	350	207,190	350	17,309	180	0	0	10,082	200	0	57,130	700	292,692	403	
Central Los Angeles -	0	420	44,886	420	0	0	98,353	230	10,422	200	45,978	300	41,687	700	241,326	359
Central and West Basins	1,534	375	249,114	375	0	0	0	0	0	44,656	300	253,050	700	548,353	519	
Coastal Plain	1,800	650	12,525	650	0	0	0	0	0	3,866	300	21,910	700	40,101	644	
North West Orange County	3,500	450	280,338	480	0	0	0	0	33,664	200	0	190,763	700	508,265	544	
South East Orange County	1,500	600	26,858	600	0	0	0	0	16,455	200	0	93,245	700	138,058	620	
Western MWD	1,164	500	182,998	400	0	0	0	0	8,621	200	0	63,222	700	256,004	468	
Eastern MWD	0	650	65,143	425	7,849	200	0	0	44,052	200	0	11,887	700	128,931	360	
Upper Chino	3,600	280	89,178	260	17,151	180	0	0	76,663	200	0	25,554	700	212,146	285	
Lower Chino	0	500	65,143	500	0	0	0	0	2,725	200	0	2,725	700	70,592	496	
San Diego	2,203	700	13,000	700	60,000	300	0	0	67,203	200	0	380,817	700	523,223	590	

* Flow weighted average TDS for each subarea.



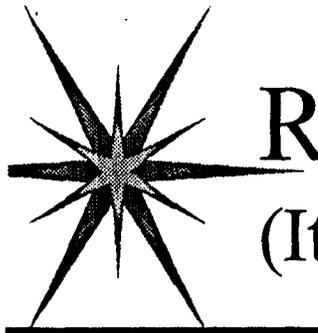
Summary of Impacts

- Residential and Commercial
 - Reduced life of plumbing system and appliances
 - Increased use of bottle water / home water treatment
 - Increased use of soap, detergents, etc.
- Industrial
 - Increased cost of water treatment
 - Increased water usage
 - Increased sewer fees
- Agricultural
 - Reduced crop yield
 - Increased water usage for leaching purposes
- Utilities
 - Reduced life of treatment facilities and pipelines
- Regulatory Compliance
 - Wastewater discharge requirements
 - Desalination
 - Brine lines and ocean outfalls
- Groundwater and Recycled Water
 - Increased use of imported water
 - Desalination



Impact Categories

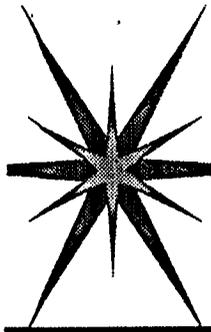
- Residential
- Commercial
- Industrial
- Agricultural
- Utilities
- Regulatory Compliance
- Groundwater
- Recycled Water



Residential/Commercial Impacts

(Items Considered)

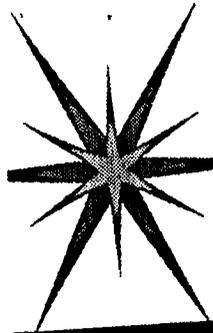
- Water Pipes
- Water Heaters
- Faucets
- Garbage Disposals
- Cloth Washers
- Dish Washers
- Bottle Water Purchase
- Home Water Softeners
- Other Home Water Treatment
- Soap/Detergent
- Others



Industrial

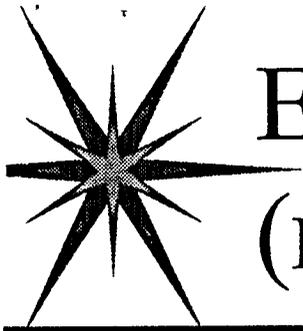
(Items Considered)

- Cooling Tower
- Boiler
- Process
- Pipes, Faucets, Landscaping, Etc.



Agricultural (Crops)

- Strawberry
- Nursery
- Truck Crop
- Citrus
- Avocado
- Vineyards
- Pasture/Grain
- Deciduous
- Field



Example

(Household Water Heaters)

Input to model:

- No. of Households (Number)
- Units per House (Unit)
- Cost of Water Heater (Cost)
- Baseline TDS (TDS1)
- Test TDS (TDS2)
- Useful life of Water Heater (Life) -
(calculated based on TDS from this table)

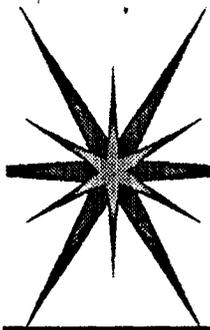
TDS (mg/L)	Useful Life (Years)
100	13.4
200	12.3
300	11.3
400	10.5
500	9.7
600	9.1
700	8.5
800	8.1
900	7.7
1000	7.4
1100	7.2
1200	7.1

Formula:

$$\text{Annual Impact} = [(\text{Number}) * (\text{Unit})] * [(\text{Cost}) / (\text{Life})_{\text{TDS2}} - (\text{Cost}) / (\text{Life})_{\text{TDS1}}]$$

If TDS1 = 500 mg/L, TDS2 = 600 mg/L, Cost = \$200, Unit = 0.97, Number = 5,328,236

$$\text{Annual Impact} = (5,328,236 * 0.97) * (200 / 9.1 - 200 / 9.7) = \$7,026,245$$



Example

(Bottle Water Purchase)

Input to model:

- Number of Household (number)
- Average cost per gallon (cost)
- Baseline TDS (TDS1)
- Test TDS (TDS2)
- Annual household consumption (use) -
(calculated based on TDS from this table)

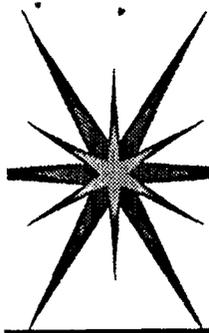
TDS (mg/L)	Gallons Per Year
100	15.3
200	24.2
300	33.0
400	41.9
500	50.8
600	59.6
700	68.5
800	77.4
900	86.3
1000	95.1
1100	104.0
1200	112.9

Formula:

$$\text{Annual Impact} = [(\text{number}) * (\text{cost})] * [(\text{use})_{\text{TDS2}} - (\text{use})_{\text{TDS1}}]$$

If TDS1 = 500 mg/L, TDS2 = 600 mg/L, cost = \$0.80, number = 5,328,236

$$\text{Annual Impact} = (5,328,236 * 0.80) * (59.6 - 50.8) = \$37,510,781$$



Example

(Agriculture - Avocados)

Input to model:

- Acreage (acre)
- Average crop value per acre (value)
- Baseline TDS (TDS1)
- Test TDS (TDS2)
- Percentage of full yield (percent) -
(calculated based on TDS from this table)

TDS (mg/L)	% of Full Yield
100	100
200	100
300	100
400	100
500	94
600	87
700	81
800	75
900	68
1000	62
1100	56
1200	49

Formula:

$$\text{Annual Impact} = [(\text{acre}) * (\text{value})] * [(\text{percent})_{\text{TDS1}} - (\text{percent})_{\text{TDS2}}]$$

If TDS1 = 500 mg/L, TDS2 = 600 mg/L, acre = 35,745, value = \$4,600

$$\text{Annual Impact} = (35,745 * 4,600) * (0.94 - 0.87) = \$11,509,890$$