

# Salinity Management: Status of Regional Water Basins

## The Wake-up Call

- Prior to 2002 there were no TDS related impairments on the 303(d) List
- In 2002 11 waterbodies were added to the 303(d) list for TDS related impairments

## San Diego Regional 303(d) Workgroup

- Formed in reaction to the 2002 303(d) listing process as a workgroup of Project Clean Water Science and Technology Technical Advisory Committee
- Prepared an Analysis of Total Dissolved Solids in San Diego County and submitted to SWRCB as part of the 2002 303(d) listing process

## Basin Planning Issues Workgroup

- Formed in 2003 to discuss the triennial review of the San Diego Basin Plan
- Total Dissolved Solids Management Plan and the Development of Water Quality Objectives for Nutrients identified as priority issues by stakeholders and submitted as part of the triennial review process

## More Recently

- In 2006, another 27 waterbodies were added to the 303(d) list for TDS related impairments
- How many more will be added in the 2008 update of the 303(d) list?

## Water Quality Standard for TDS in Surface Waters

- Established in 1975 when Basin Plan was adopted.
- WQS = 500 mg/L applied to most subbasins within the San Diego Region.
- Protective of Municipal Drinking Water and Agricultural Supply Beneficial Uses.

## Total Dissolved Solids include:

- Carbonates/bicarbonates
- Chlorides
- Sulfates
- Phosphates
- Nitrates
- Magnesium
- Sodium
- Iron and
- Manganese

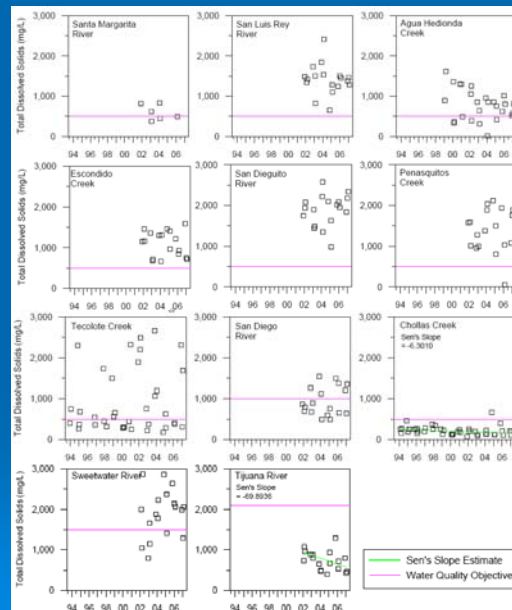
## Rationale for Surface Water WQS for TDS, Sulfate, Chloride, Manganese and Iron

- Prevent taste problems in potable water supplies
- Prevent leaf burn and salinity-related crop reductions

# Groundwater Water Quality Objectives

- In most cases exceed surface WQOs
- Not subject to the Federal Clean Water Act, therefore much easier to change

## TDS Concentrations in Stormwater



Data from the Regional Stormwater Monitoring Program Wet Weather Mass Loading Stations

## Estimated TDS Concentration in Dry Season Flows

Watershed	Observed Range (mg/L)	Average (mg/L)
Santa Margarita	795 - 1175	<b>965</b>
San Luis Rey	952 - 1945	<b>1395</b>
Carlsbad	905 - 6665	<b>2410</b>
San Dieguito	525 - 5020	<b>2380</b>
San Diego	665 - 1845	<b>1350</b>
Sweetwater	700 - 3775	<b>2175</b>
Tijuana	380 - 1040	<b>600</b>

2007 Data measured as conductivity and converted to TDS

## TDS in Groundwater

Watershed	Observed Concentrations (mg/L)
Santa Margarita	600 - 1500
San Luis Rey	500 - 3400
San Dieguito	1000 - 1500
San Diego	1000 - 3000
Sweetwater	300 - 3100
Tijuana	500 - 3000

Data from San Diego County Water Authority Groundwater Report , June 1997

## The Influence of Groundwater on Surface Waters

- Alluvial valleys contain unconfined groundwater
- Considerable interchange between surface flow and groundwater flow
- Incompatibility between ground and surface water quality objectives in Basin Plan

## Influence of Surface Water Hydrology

- Direct relationship between the magnitude of surface flow and mineral concentrations
- When flows are low, poor-quality surfacing groundwater dominates.

San Diego River Streamflow (CFS)	Mean Streamflow TDS Concentration (mg/L)
> 100	420
50 - 100	610
20 - 50	800
10 - 20	960
0 - 10	1300

## Influence of Imported Water on Dry Season Streamflow

When significant imported water deliveries began there was a measurable increase in dry season flows

San Luis Rey River at Oceanside

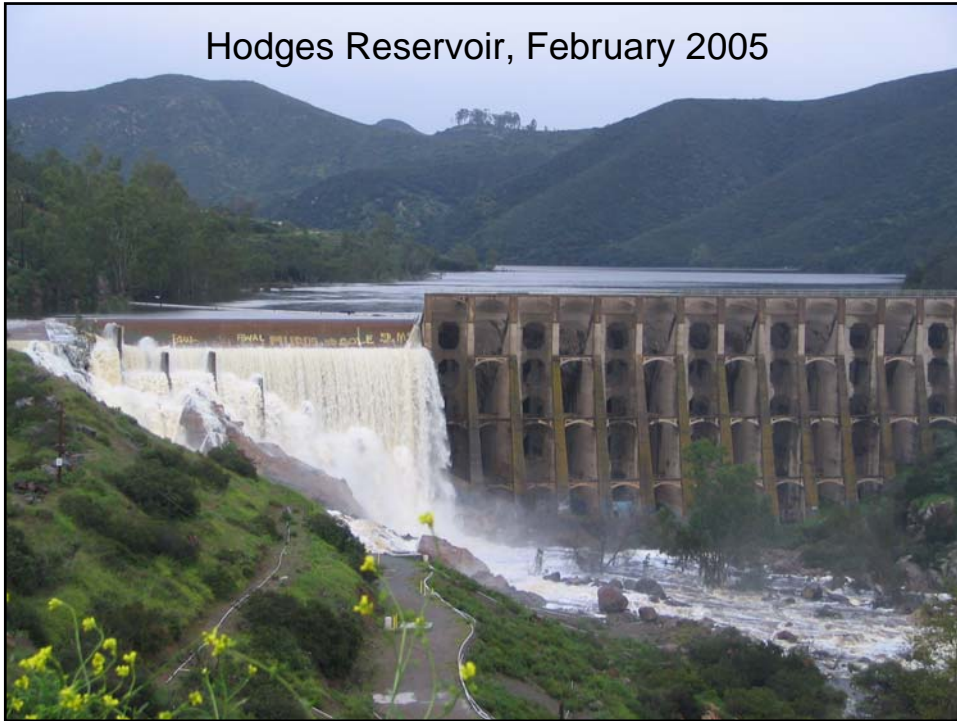
Parameter	Observed Flow (CFS)	
	1930 - 1967	1968 - 2000
Mean Annual Flow	15.7	56.5
Median Monthly Flow	0.0	10.2
Mean Flow: June –Oct.	0.3	14.2
Median Monthly Flow: June – Oct.	0.0	4.4

## Imported Water Impacts

- In 2005, 89.9% of water supply imported (573,048 acre-feet)
- Largest source of salt imported into San Diego Watershed
- Directly affects the salinity of recycled water

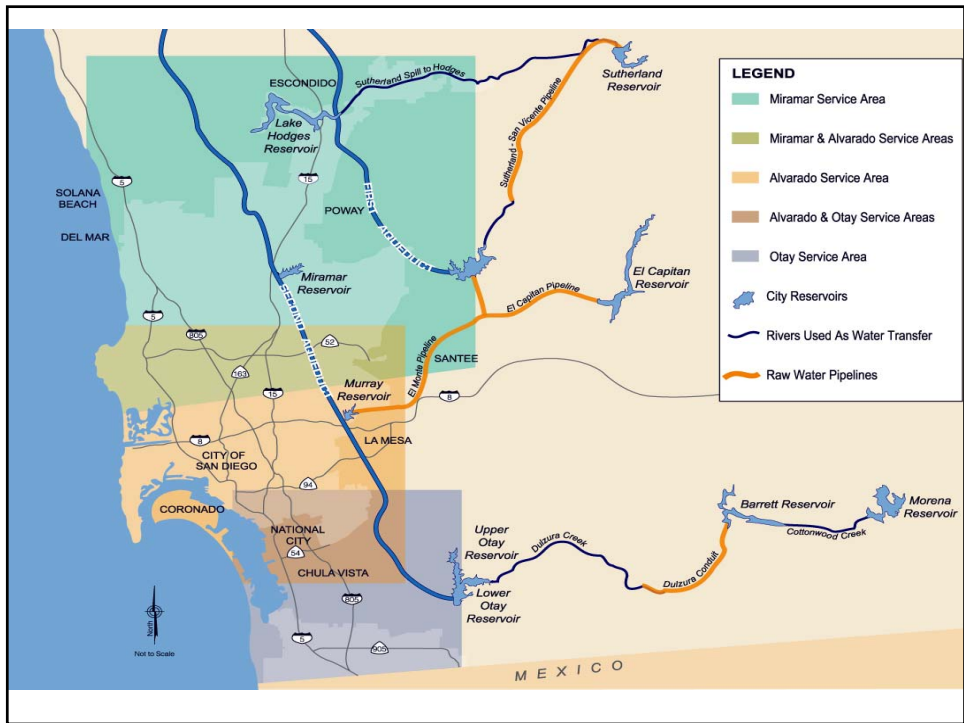
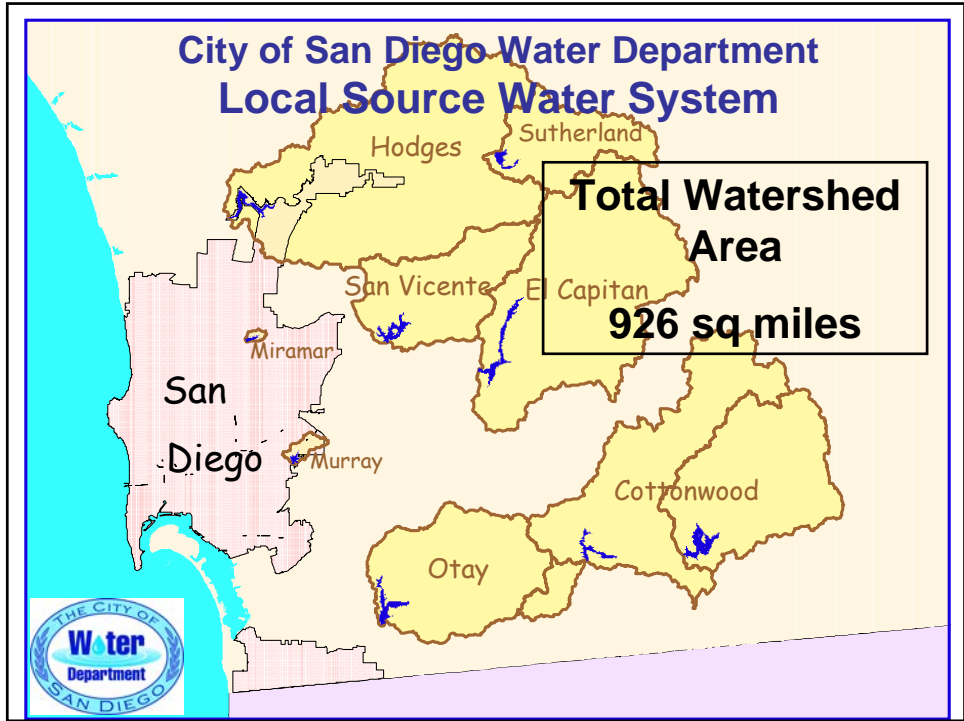


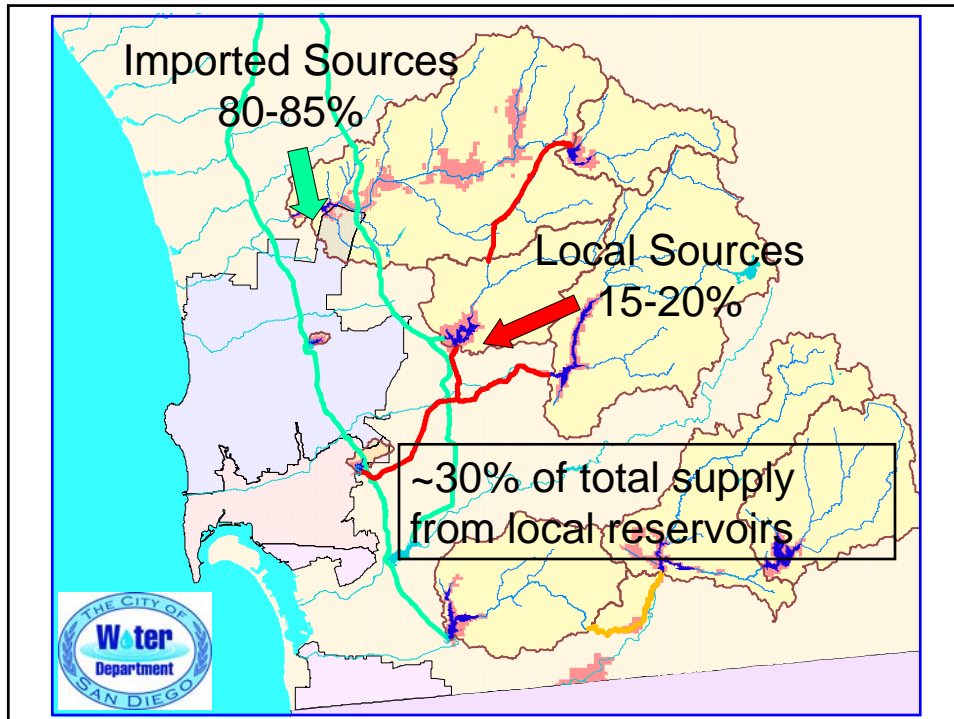
Hodges Reservoir, February 2005



## Reservoirs in the San Diego Region

- 24 reservoirs, total storage capacity 571,000 acre feet
- Most located in rural east County areas, but, increasingly at risk from residential and commercial development
- San Diego's reservoirs are part of the state-wide water supply system
- watershed management = source water protection





## Salinity in Drinking Water

TDS, chloride, sulfate are secondary standards in drinking water

- affects taste, odor, appearance
- not a health effect at regulated levels

constituent	recommended (mg/L)	upper (mg/L)
TDS	500	1000
chloride	250	500
sulfate	250	500

Taste, odor, appearance are the #1 complaint / inquiry from water customers



## Salinity in San Diego's Drinking Water Sources

- Imported sources
  - Colorado River ~ 700 mg/L
  - State Project ~ 300 mg/L
  - MWDSC blends sources to deliver water at <500 mg/L to San Diego
- Local surface runoff impounded in reservoirs ~150 to 400 mg/L



## Basin Plan Standards and "Impairment" of Reservoirs

- TDS Water Quality Objective at reservoirs
  - most reservoirs 500 mg/L
  - San Vicente & El Capitan 300 mg/L
- 303(d) listing of reservoirs
  - 2002 Hodges
  - 2006 San Vicente, El Capitan, Murray, Miramar
- "If you monitor, they will be listed."



## Basin Plan Standards and “Impairment” of Reservoirs

- TDS listing of reservoirs dropped from final 2006 list (State Board overrode staff recommendations)



## Management of Salinity vs San Diego’s drinking water sources: a Paradox

- local water agencies strive to deliver water of <math><500\text{ mg/L}</math>
- imported water +/- 500 mg/L
- local reservoirs store imported water, but are influenced by local runoff
- Where to focus efforts to manage salinity in drinking water reservoirs?