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Managing Water in the West

Monitoring the Salton Sea: Documenting the Potential Loss of a Resource

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Introduction

- The Salton Sea is California's largest lake
- Salton Sea State Park had more annual visitors than Yosemite National Park in the 1960s
- In 1999, the Salton Sea was documented to be one of the most productive fisheries in the world
- The Sea is a very important resource for migratory birds

Postcard from the 1960s

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Key Characteristics

Parameter	Value at Surface Elevation	
	-228.0’	-232.0’
Surface Area mi^2 (ha)	374 (96,770)	354 (91,560)
Volume acre-ft (m^3)	7,413,997 (9.15×10^9)	6,482,138 (8.00×10^9)
Maximum Depth ft (m)	50.5 (15.4)	46.5 (14.2)
Watershed Area mi^2 (km^2)	7,851 (20,333)	
Mean Inflow acre-ft/yr (m^3/yr)	1,346,000 (1.66×10^9)	
Annual evaporation acre-ft/yr (m^3/yr)	1,360,000 (1.68×10^9)	

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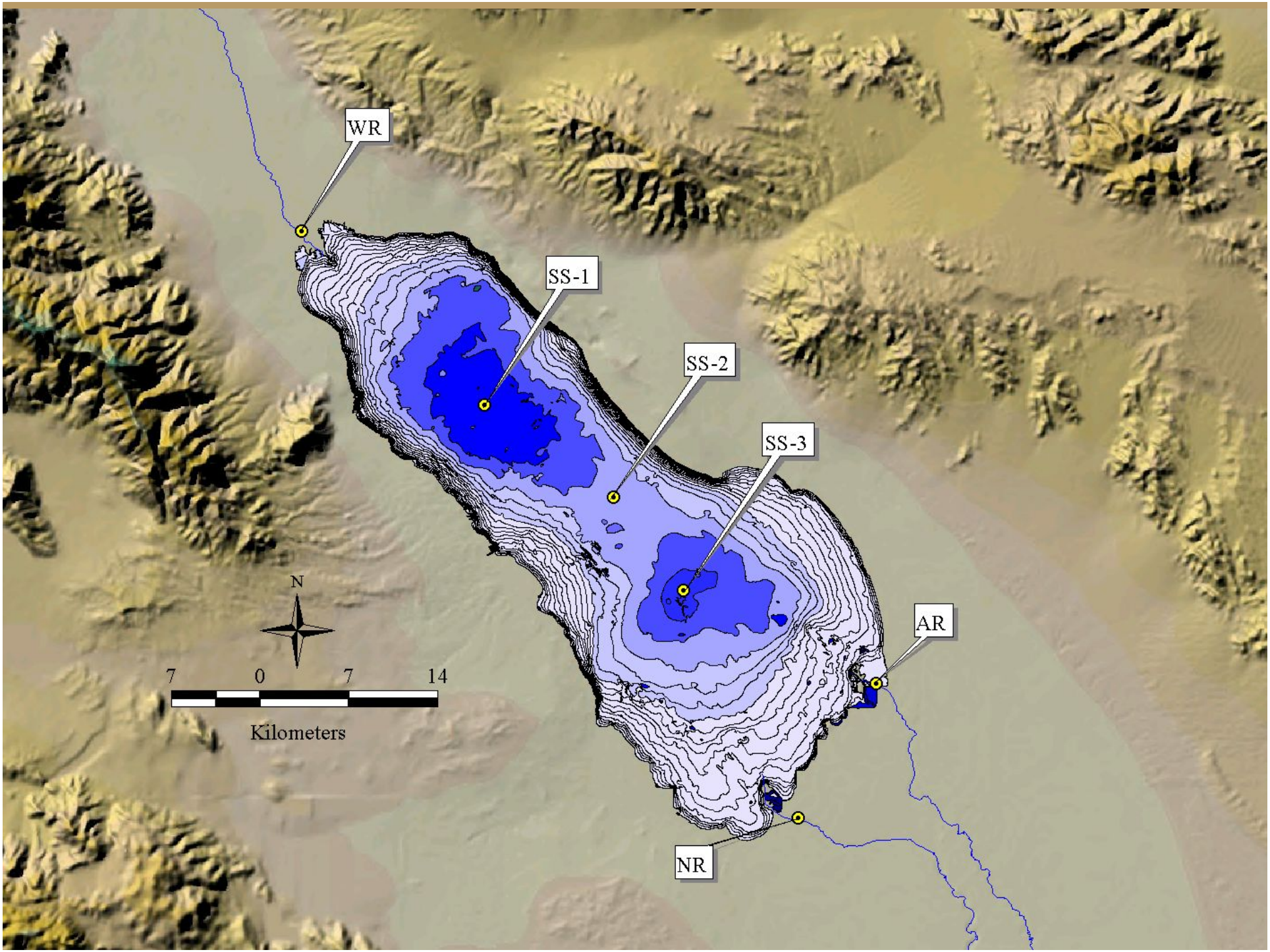
Salton Sea Restoration

- The Salton Sea Reclamation Act of 1998 (Public Law 105-372) directed the Secretary of the Interior, through Reclamation, to study options for managing the salinity and elevation of the Sea
- The overall goal of the act was to preserve fish and wildlife health and to enhance opportunities for recreational use and economic development while continuing the Sea's use as a receptacle for irrigation drainage

Monitoring Program

- **Reclamation conducted an extensive monitoring program in 1999 as part of a major scientific effort to develop a restoration project for the Salton Sea**
- **Monitoring resumed in 2004 and quarterly monitoring has continued since that time**
  - **Monitoring includes 3 sites in the Salton Sea and the three major river inflows**
  - **Monitoring includes temperature, DO, pH, and conductivity profiles, nutrients, solids, major ions, salinity, selenium, and chlorophyll *a***


WR
SS-1
SS-2
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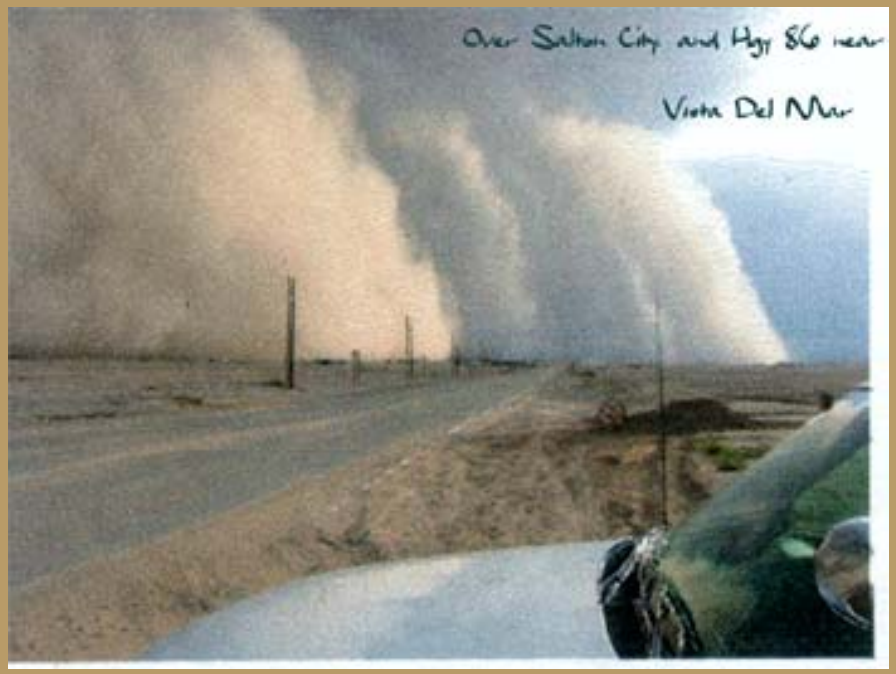
Kilometers

Identified Problems

- Rising salt levels eliminated most species of game fish by 2004
- Water transfers will accelerate the increase in salinity and the Sea will shrink
- Dust storms are a concern as the sea floor is exposed by falling water levels

Garst Road, 2010

Salton City, 2008



Photos by Norm Niver

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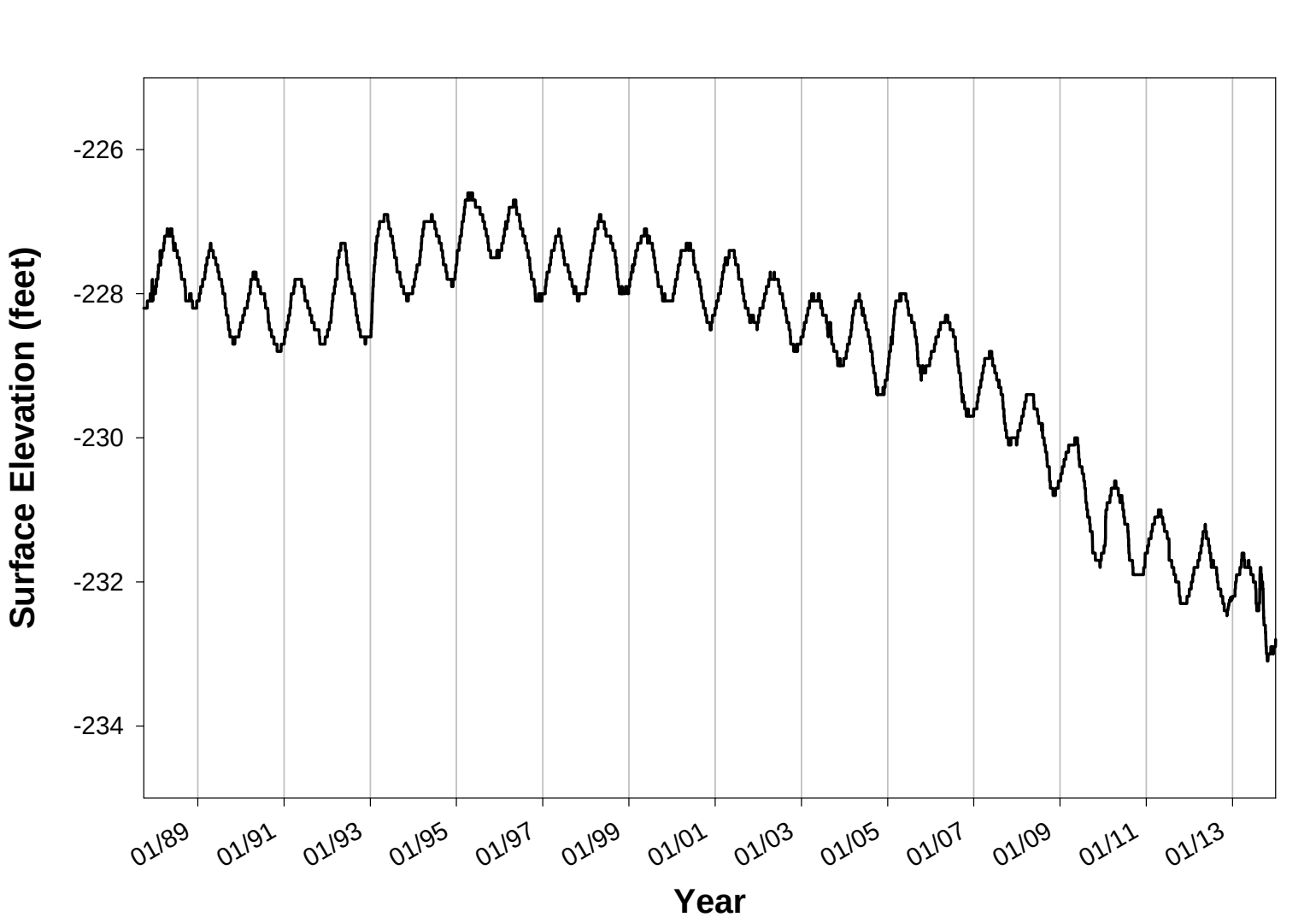
Daily Surface Elevation



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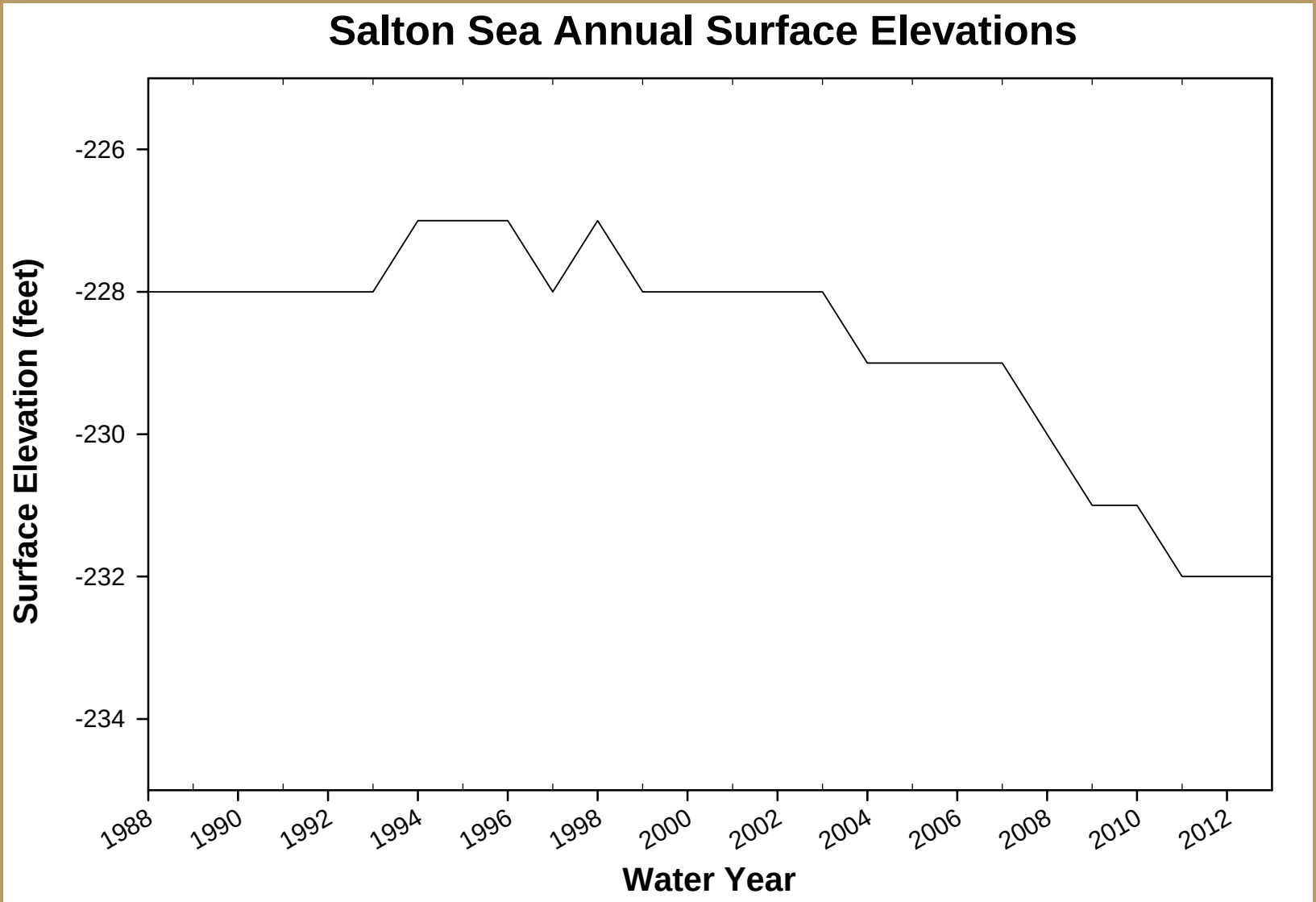
Annual Surface Elevation



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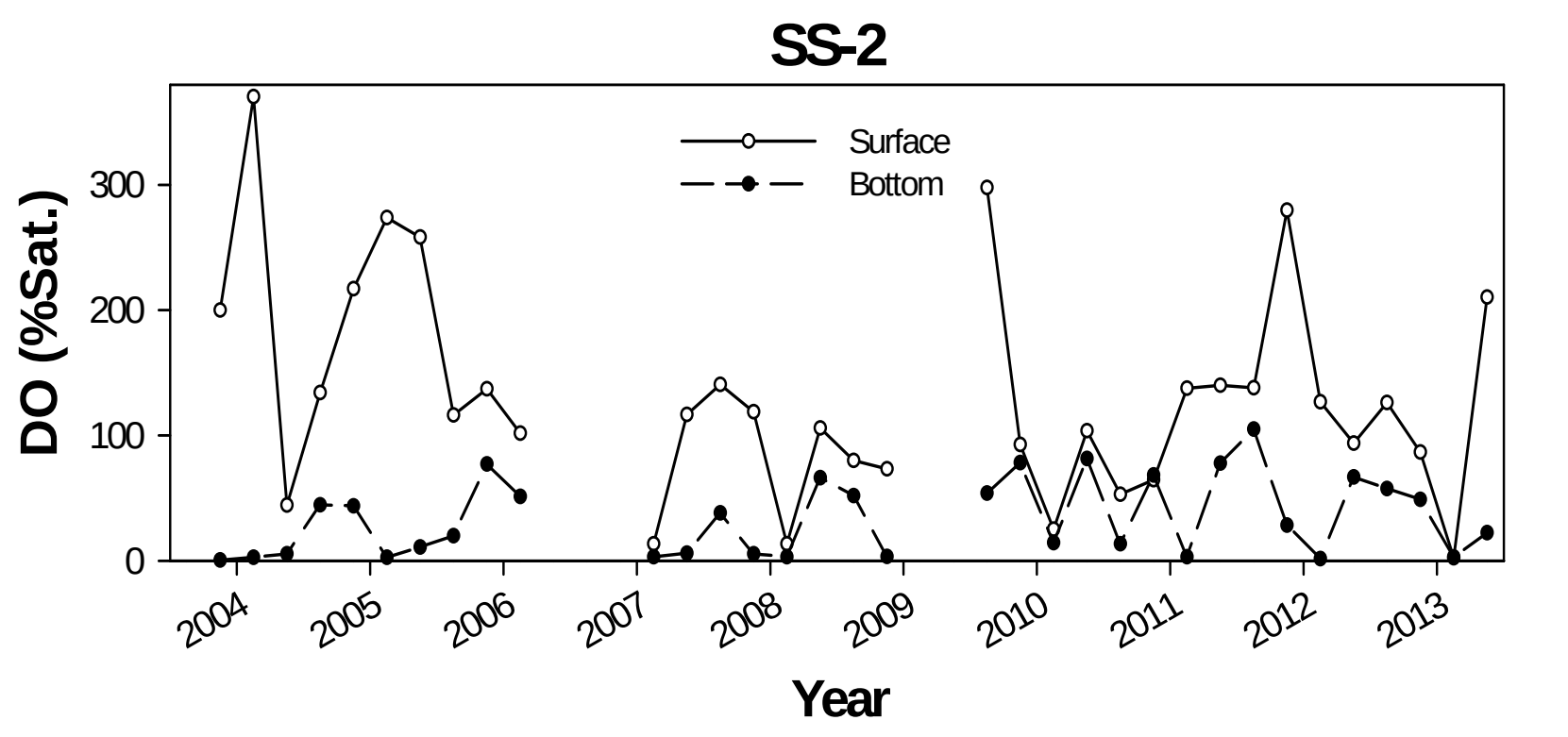
Dissolved Oxygen



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Reason for Extensive Low DO: Sulfide Irruptions/Gypsum Blooms

MODIS Imagery, Oct. 26, 2003

See Tiffany et al., 2007

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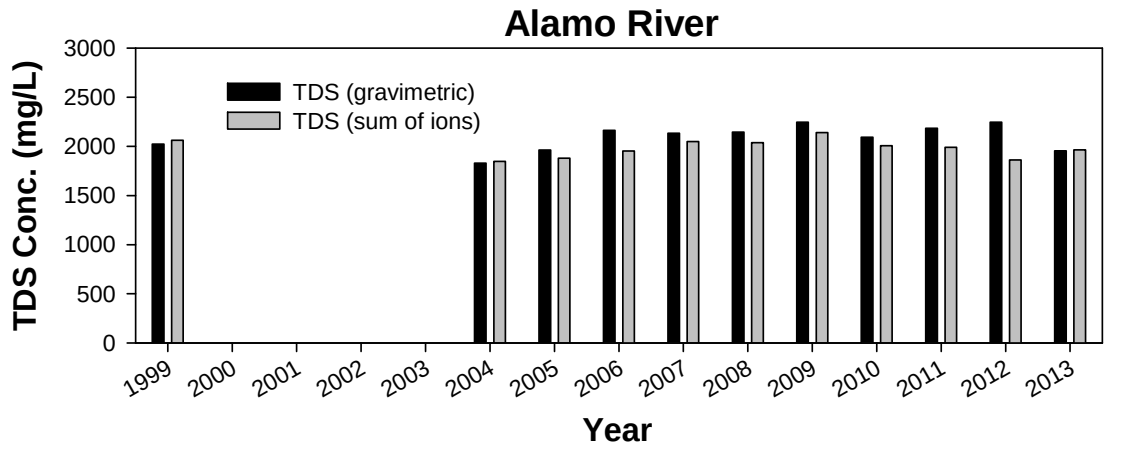
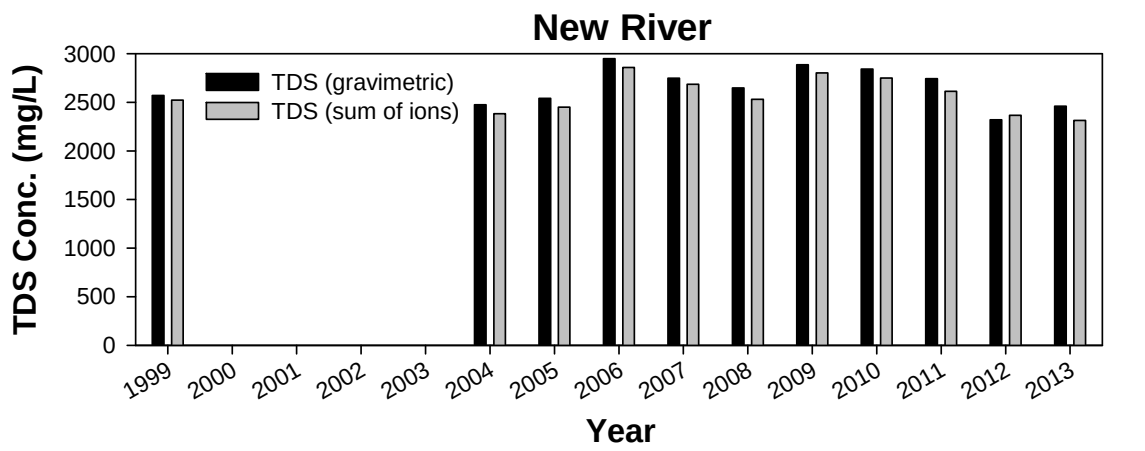
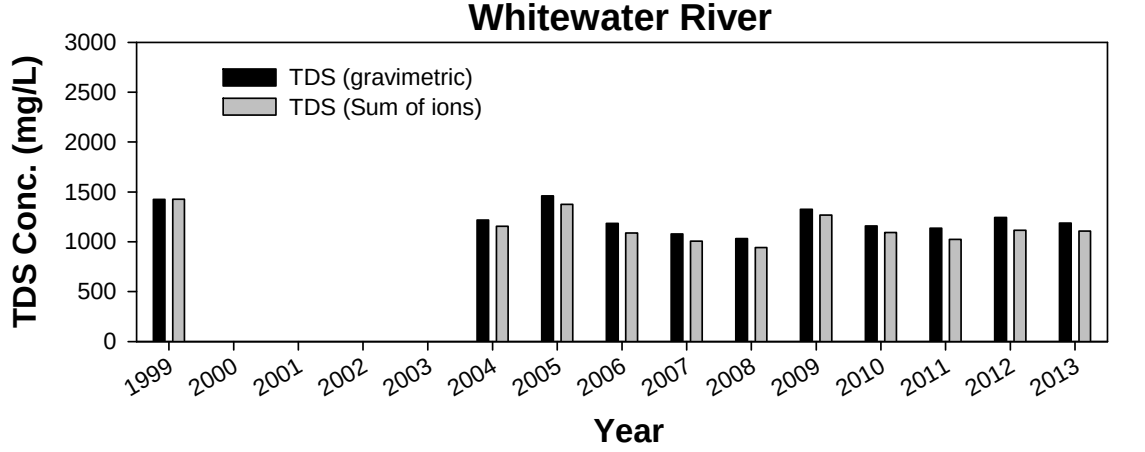
River TDS Conc.







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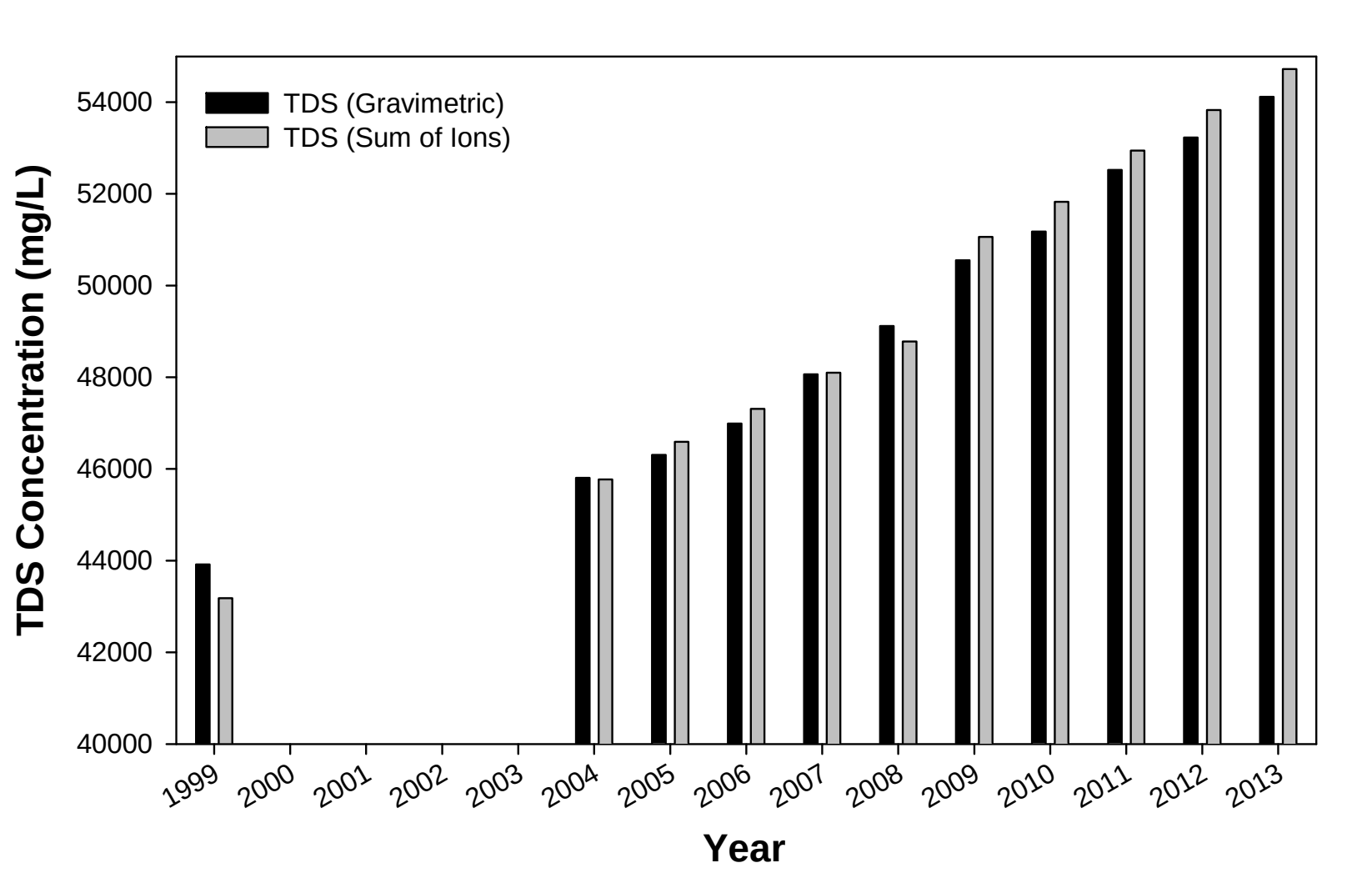
Salton Sea TDS Concentrations



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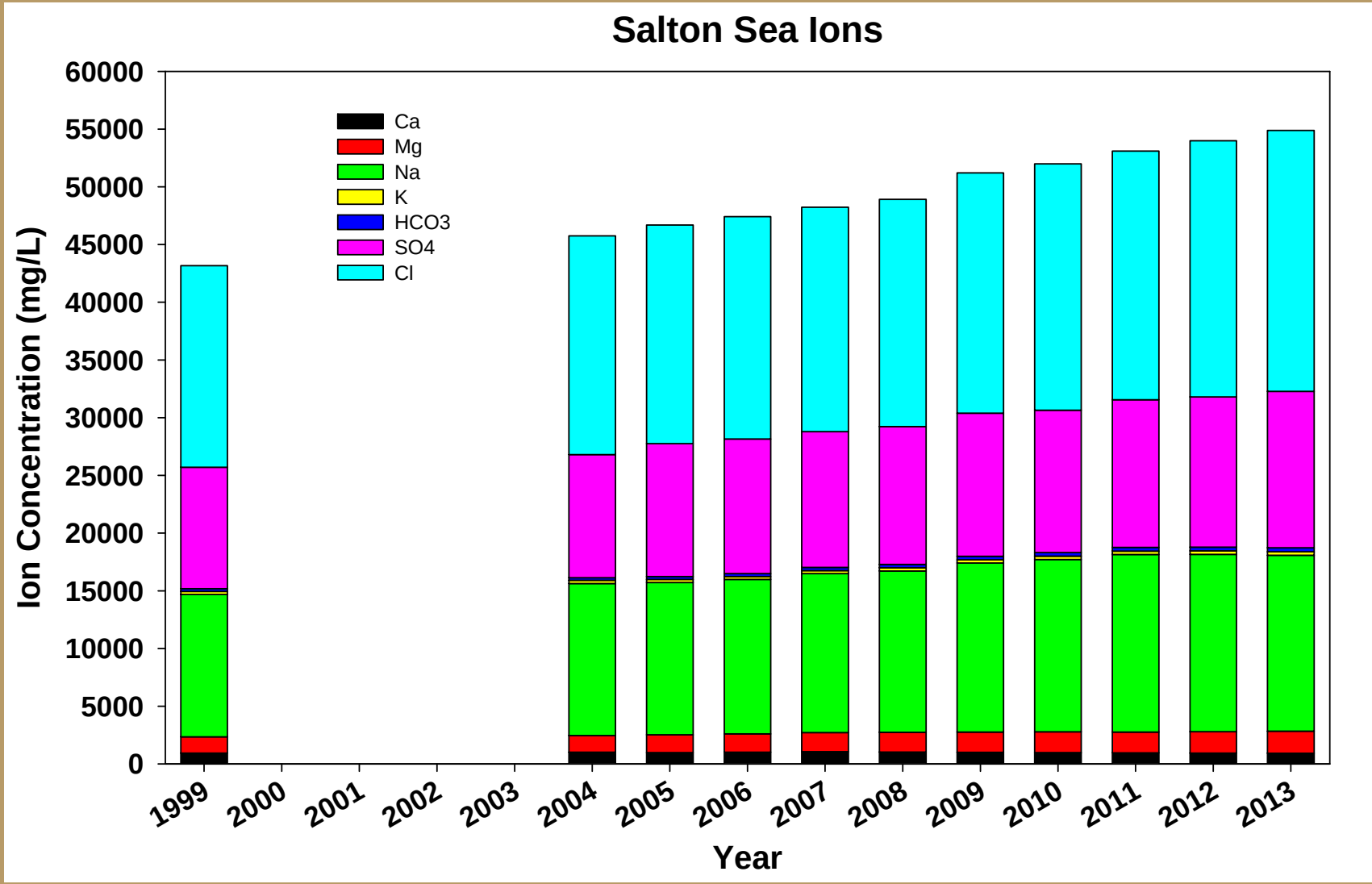
Ion Composition



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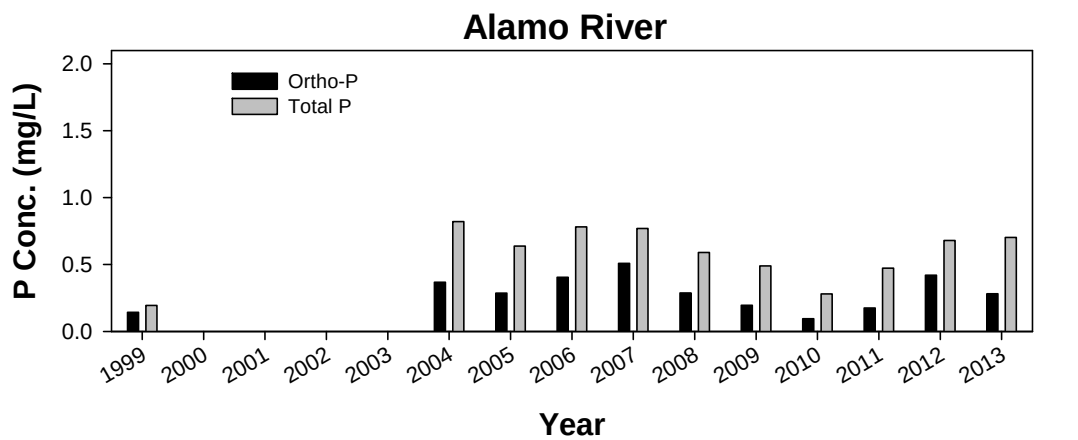

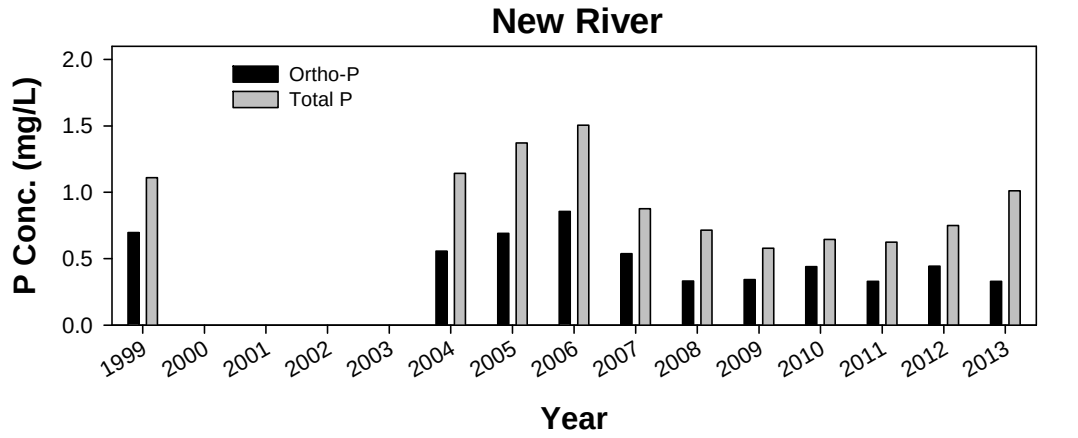

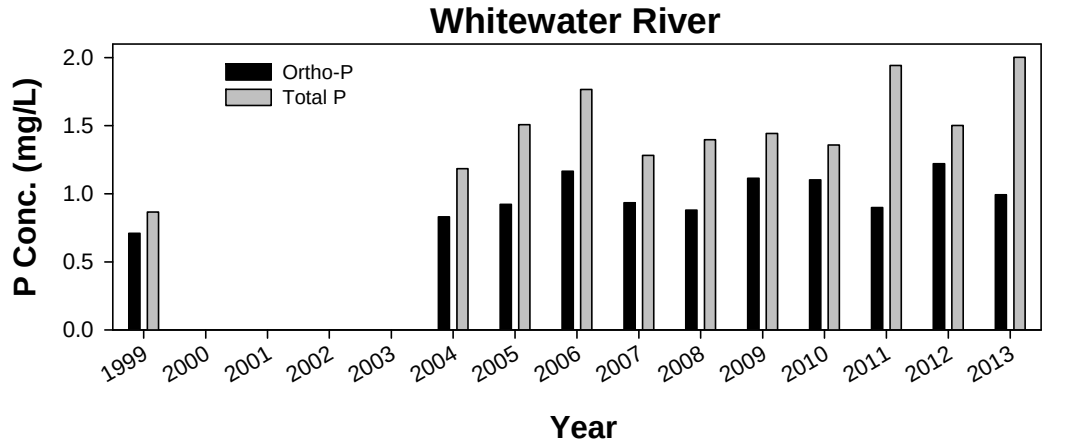

River P Conc.

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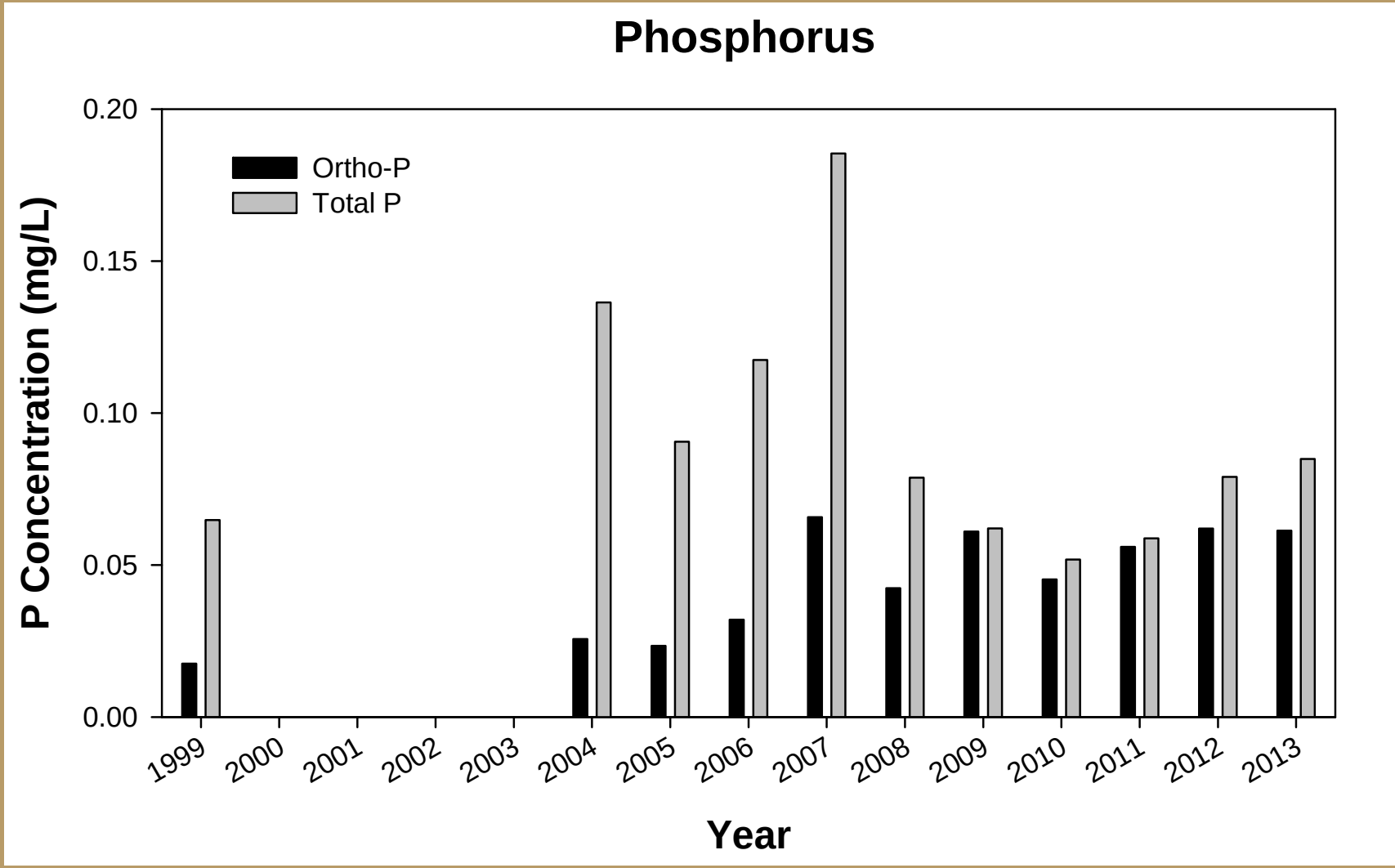
Salton Sea P Concentrations



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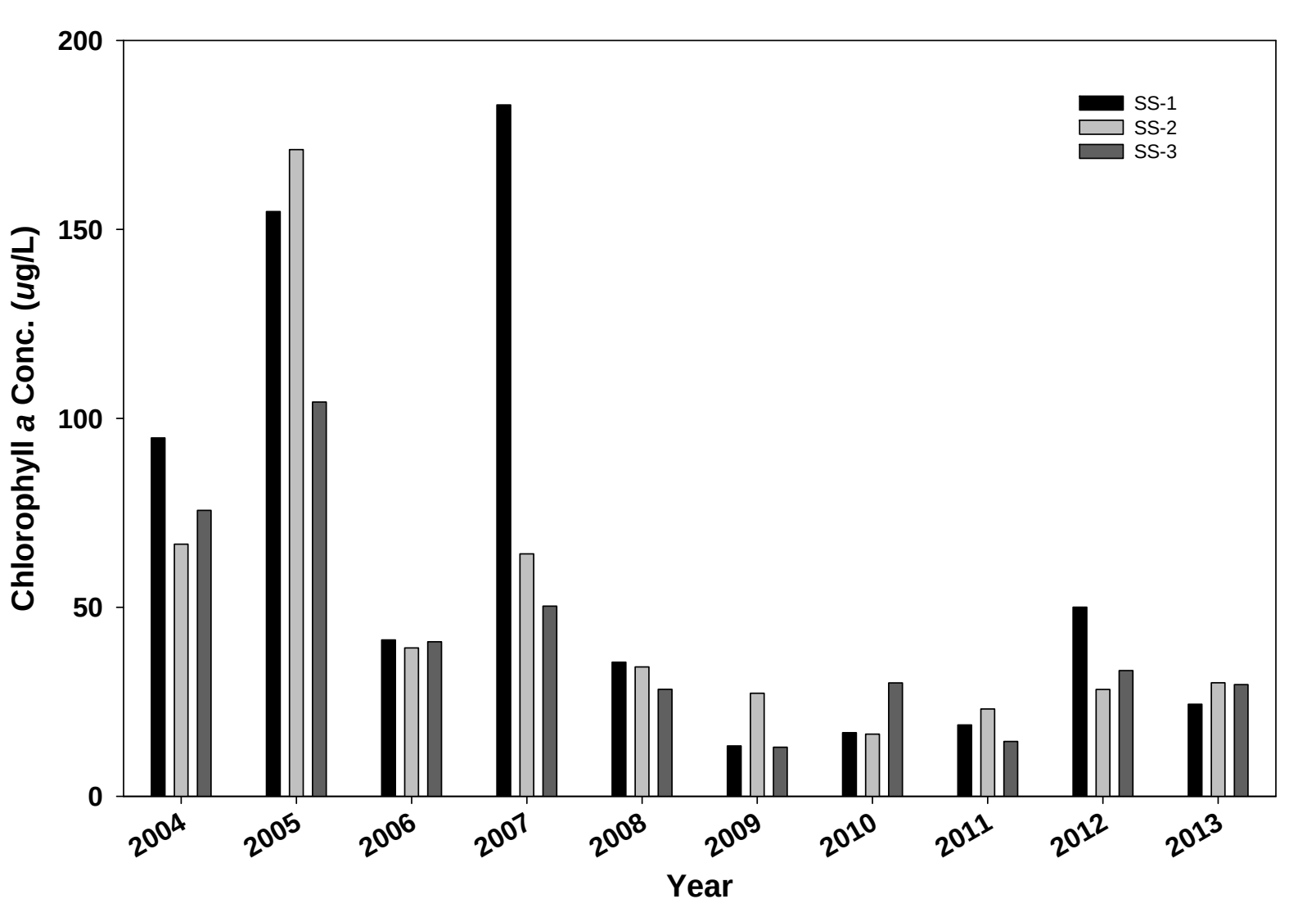
Salton Sea Chlorophyll *a* Conc.



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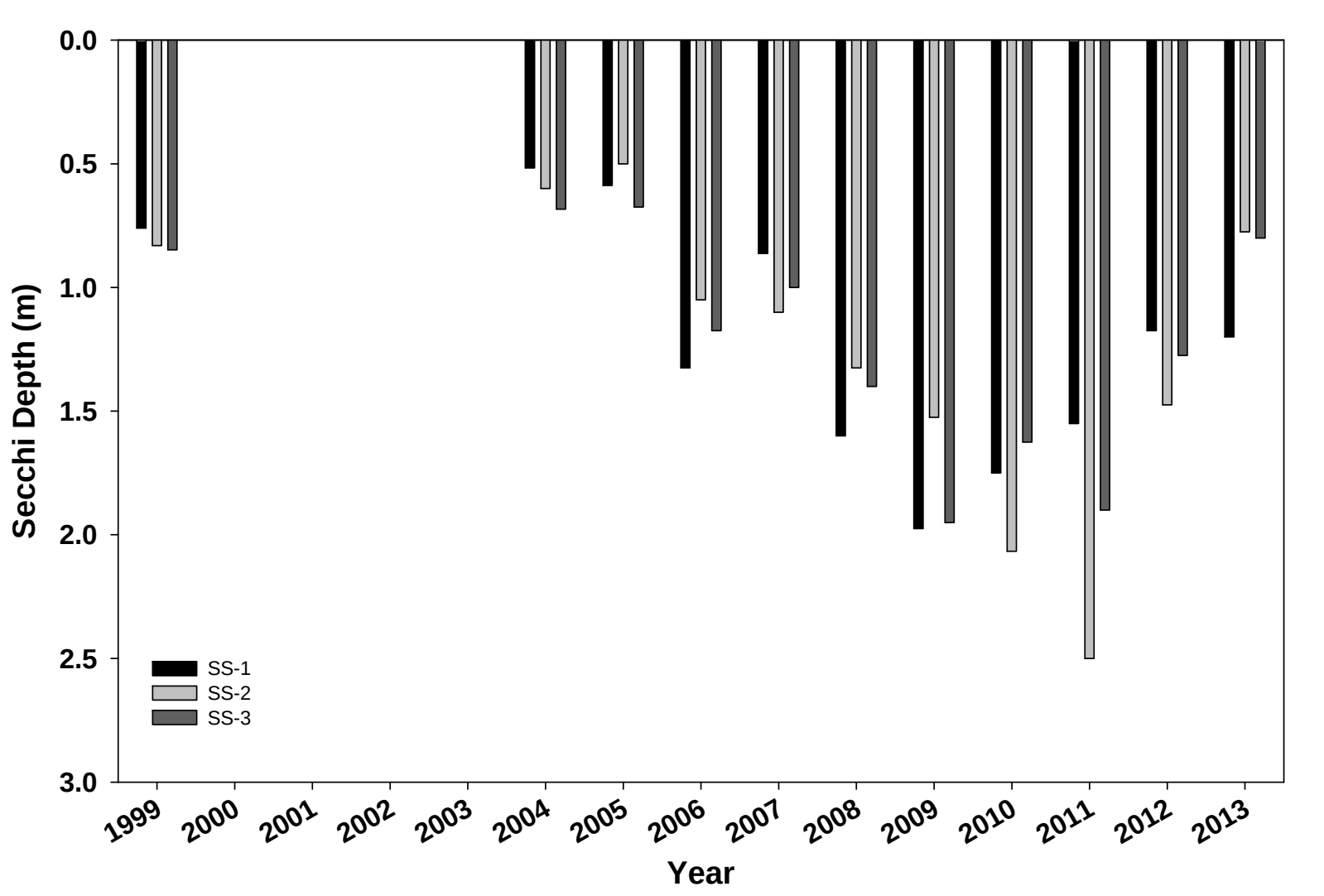
Salton Sea Secchi Depths



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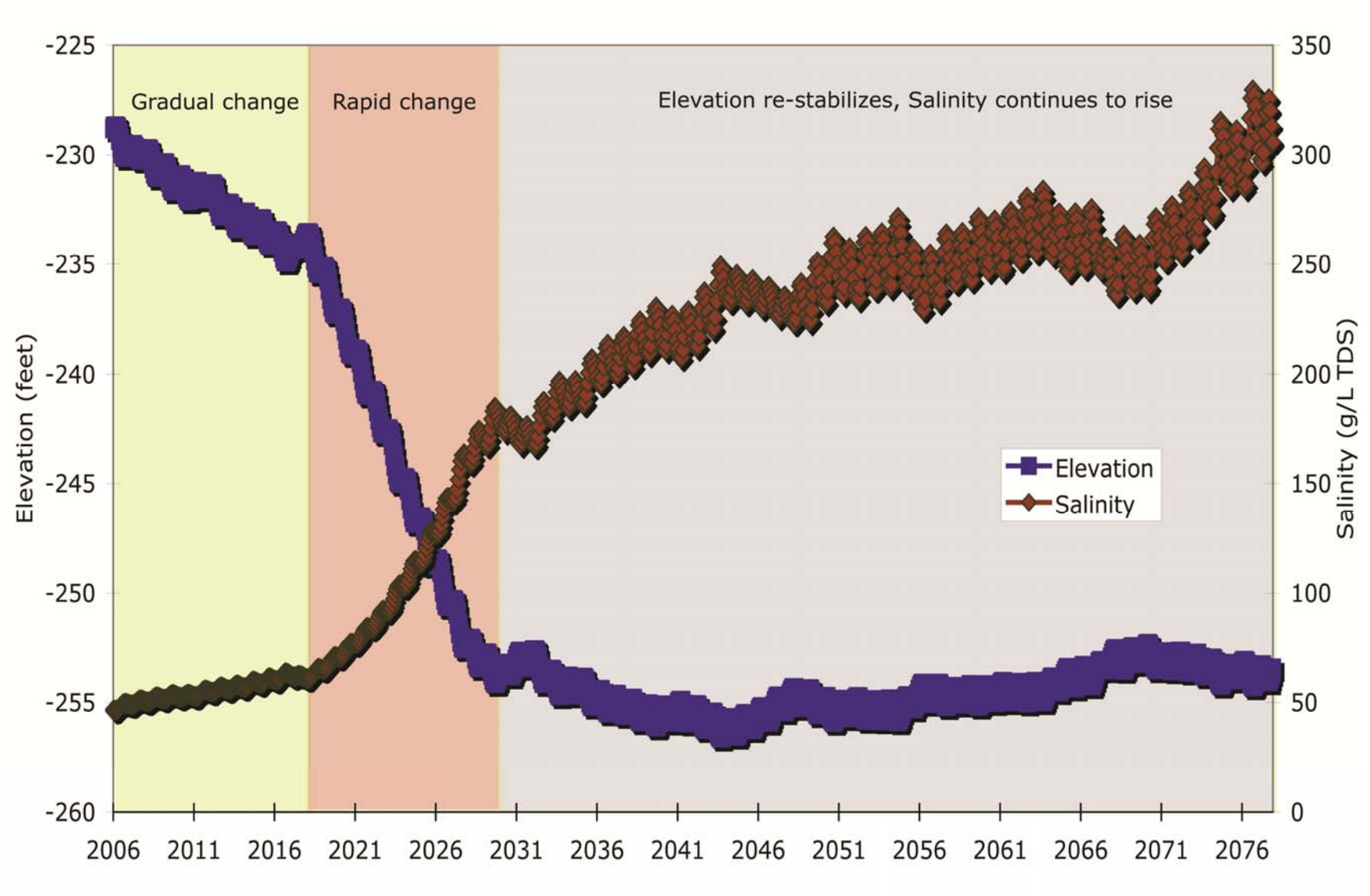
The Future



Cohen and Hyun, 2006

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Where Do We Go From Here?

- Several TMDL projects were implemented to reduce sediment loads and pathogens in rivers and drains entering the Sea
- The construction of habitat ponds around the edge of the Sea to provide habitat for birds and cover the exposed playa is California's preferred restoration alternative
- It is unlikely that restoration alternatives that would have maintained water levels in the Sea and controlled salinity will be implemented due to high costs

Expected Outcomes

- More water will be diverted from the Sea to supply the growing population along the California coast
- Water levels will continue to drop and salinity will increase
- The remnant Sea will eventually become too saline to support anything other than brine flies
- Air quality in the region will deteriorate
- Earthquake frequency may increase

Bioluminescent Foam – See Tiffany et al, 2007
Photo by Kevin Marty, Imperial Valley Press