

Determining Regional Water Quality Trends and Impacts of Organic Carbon, Geosmin, and Metals in Central Arizona



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BACKGROUND

REGIONAL APPROACH

Providing high quality drinking water to consumers is a top priority of water providers in Central Arizona. Among top water quality concerns are the presence of carcinogenic disinfection byproducts (DBPs), taste and odor (T&O) causing compounds, and metals. In collaboration with municipalities (Phoenix, Scottsdale, Mesa, Tempe, Chandler, Glendale, and Peoria), private water companies (Epcor), and water conveyors (SRP and CAP), we have monitored the water quality of the surface water supply entering the water treatment plants (WTPs). Sampling began in 1999 and continues today.

SIGNIFICANCE

The goals of this project are to (1) provide current source water quality data to water providers to aid them in treatment decisions; (2) establish a baseline for these parameters in order to identify trends and extreme events impacting water quality; and (3) to provide an avenue for knowledge transfer between ASU, municipalities, and water conveyors. Several patterns became apparent through examination of trends in the concentrations of these compounds over the past 10+ years. The concentration trends of these compounds show an increase in DOC during drought conditions, seasonal fluctuation of geosmin based on algal growth, and interesting variations in metals.

APPROACH

Monthly Sample Collection

- Central Arizona Project (CAP) system
- Salt and Verde River system
- Water treatment plants (raw & treated)

Sample Analysis for Water Quality Parameters

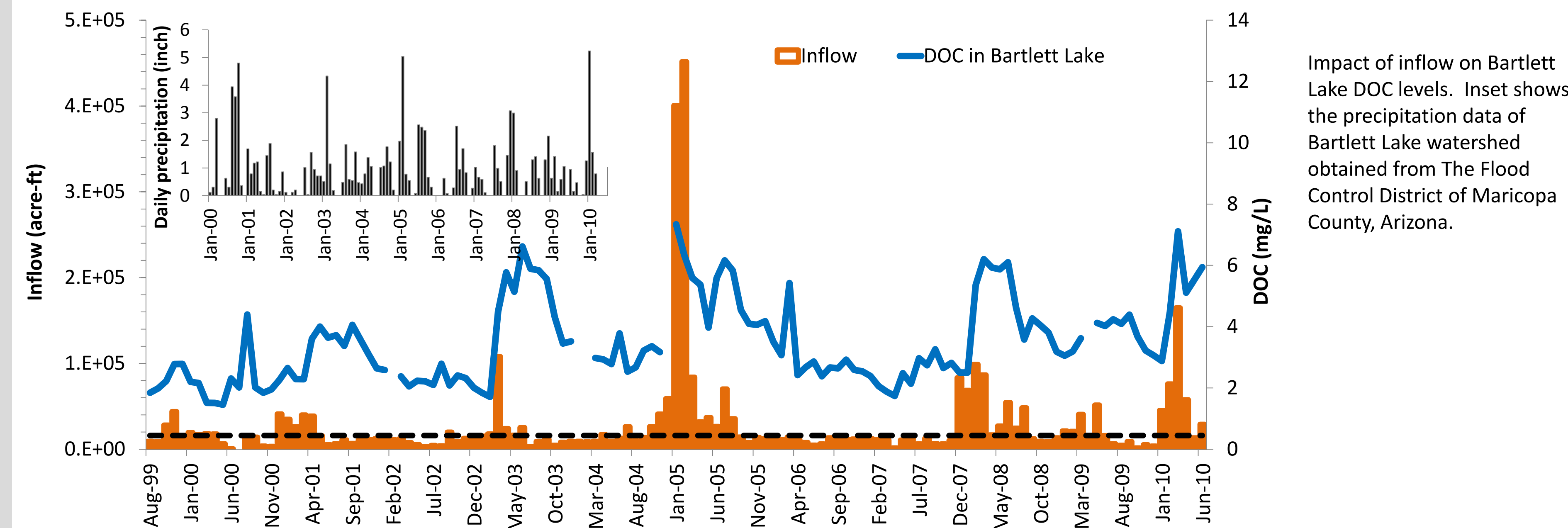
- Dissolved organic carbon (DOC)
- Taste & Odor (T&O) compounds (geosmin)
- Conductivity

Quarterly Sample Collection & Analysis

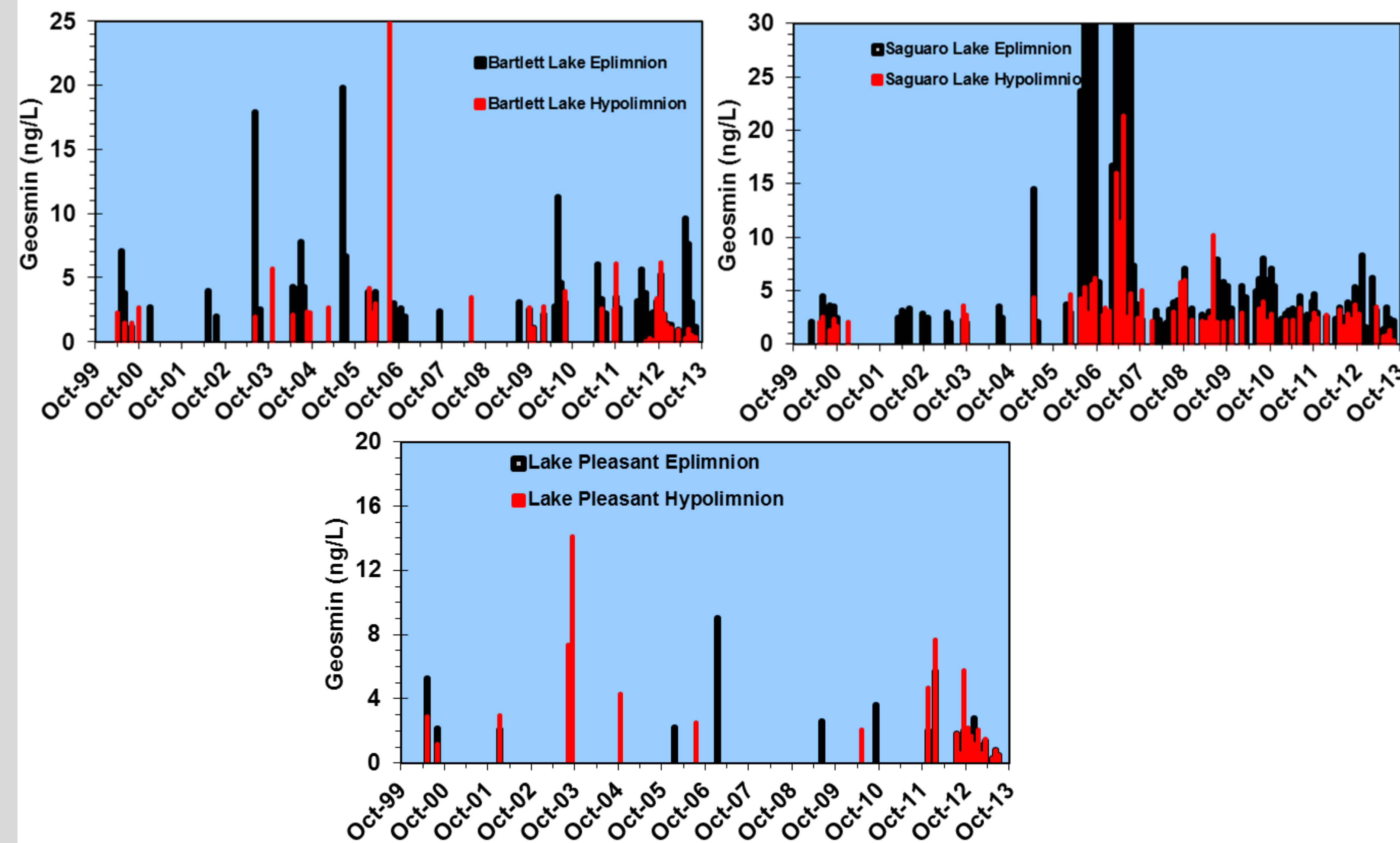
- Upper Salt River reservoirs (Roosevelt, Apache, Canyon)
- DOC, geosmin, phosphorus, conductivity, metals

RESULTS

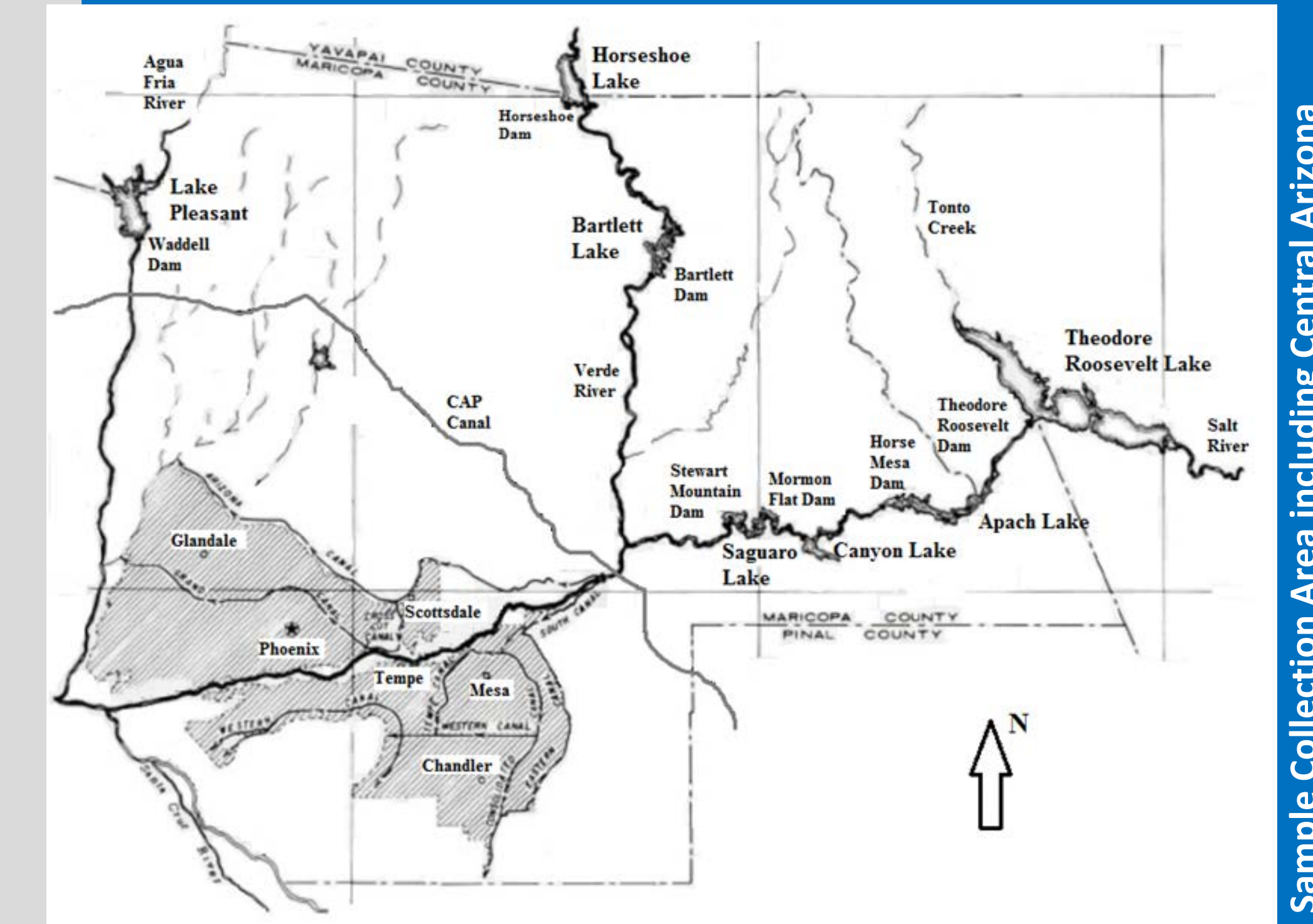
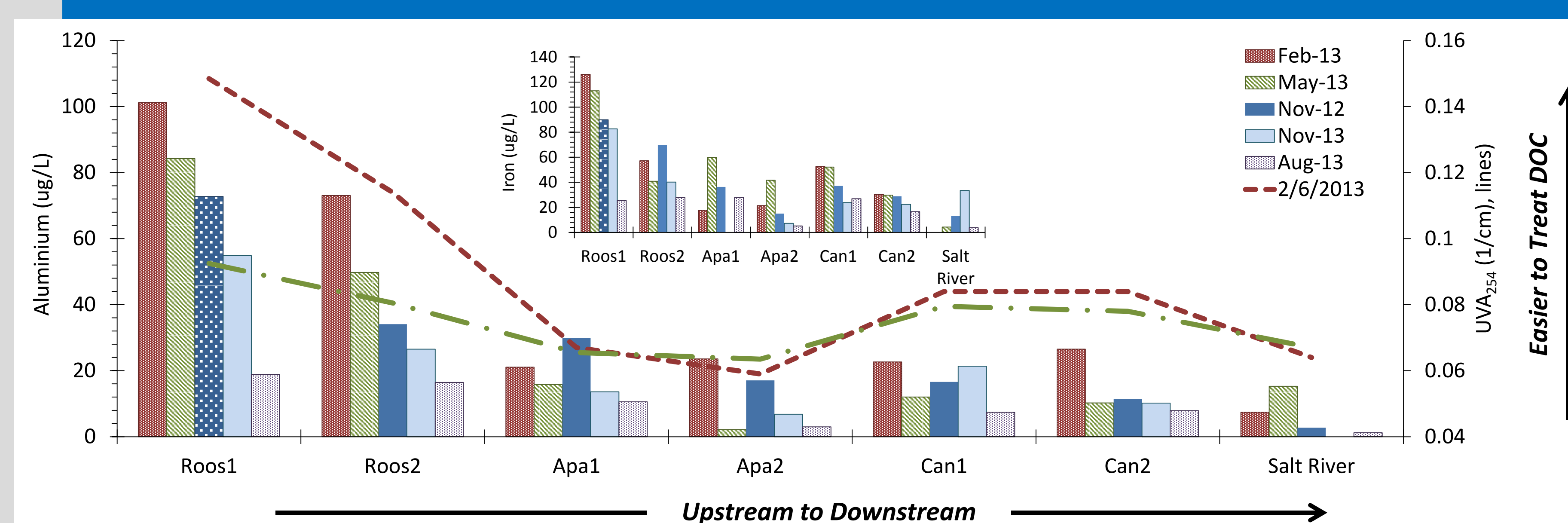
DISSOLVED ORGANIC CARBON



TASTE & ODOR CAUSING COMPOUND (GEOSMIN)



TRENDS IN CONCENTRATION OF METALS IN UPPER SALT RIVER RESERVOIRS



OUTCOMES

WATER TREATMENT IMPLICATIONS

DISSOLVED ORGANIC CARBON

Increased over long term. Higher concentrations during drought and "first flush" of spring runoff

TASTE & ODOR COMPOUNDS

Seasonal fluctuations in response to algal growth/die off. Concentrations also impacted by periods of drought.

METALS

Varies by metal. Higher levels of aluminum and iron in upper reservoirs may be providing some coagulation/flocculation, resulting in only the more difficult-to-remove material in the water

KNOWLEDGE TRANSFER

A monthly newsletter is provided to project stakeholders with the most recent water quality data and relevant research articles. A workshop is also held each year for ASU, participating cities and private water companies, and whole water conveyors (CAP/SRP), where water quality trends are presented, ideas/issues/concerns are discussed and current research is shared.

ACKNOWLEDGEMENTS

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