UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
WATER QUALITY

LAKE POWELL CORING STUDY

BACKGROUND

Sediment deposits accumulated in the San Juan River and Colorado River deltas of Lake Powell since completion of Glen Canyon Dam are known to contain mining-related sediment from the Upper Colorado River basin. In light of the 2015 release from the Gold King Mine in Colorado, of particular interest are heavy metals from historic mining in the Upper Animas River watershed deposited in the San Juan River delta. Understanding the distribution, mass, and biological availability of these metals to living organisms is critical for understanding the possible risks they pose to water quality in Lake Powell and what mitigation measures, if any, are necessary and feasible.

The makeup of Lake Powell's major river deltas are currently unknown, but they continue to accumulate sediment and metals, including arsenic, cadmium, copper, mercury, lead, selenium, and zinc. Mobilization of these metals into Lake Powell in the future could threaten water quality, human health, and aquatic life.

PURPOSE

This project will improve scientific understanding of the concentration, mass loading, distribution, and bioavailability of metals through the total depth of sediment deposits in Lake Powell to help determine potential impacts to water quality and associated beneficial uses including human health and aquatic life. The project will also help understand the extent to which these impacts can be linked to human activities, such as mining, in the watershed.

Study questions

1. How much metal (mass) has been deposited in the San Juan River delta?
2. How are metals distributed in the delta?
3. How stable/biologically available are metals in the delta?
4. What longer term trends in metal deposition can be revealed from pre-Lake Powell deposits?
5. How do data from the San Juan River delta compare to the Colorado River delta in Lake Powell?
6. What are the management options within Lake Powell, the San Juan River basin, and the Upper Colorado River basin to minimize the environmental effects of metals?

OBJECTIVES

1. Characterize the sediments accumulated over time in the San Juan River and Colorado River deltas
2. Determine the character and chronology of sediment and metal deposition.
3. Assess potential water quality impacts to Lake Powell
4. Develop management options to resolve any water quality impacts

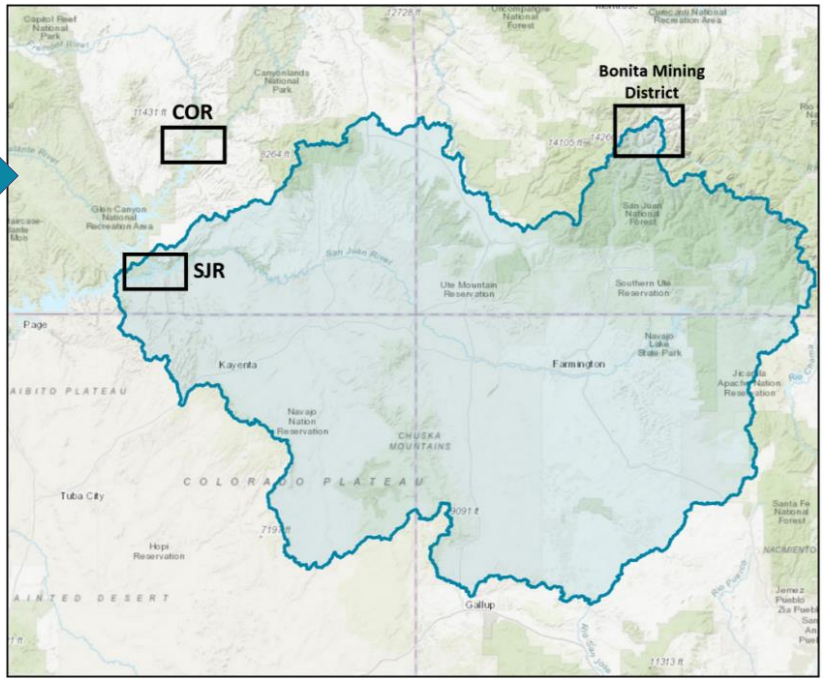
FUNDING

- Water Infrastructure for Improvements to the Nation (WINN) Act Funding: $900,000
- DEQ Division of Water Quality Section 106 Grant Funding: $48,796
- U.S. Geological Survey (USGS) Funding (in-kind): $316,265

Total: $1,265,061

SAMPLING SCHEME

Coring will occur at approximately four to six sites in the San Juan River (SJR) delta and four to six sites in the Colorado River (COR) delta of Lake Powell.



PROJECT PHASES

Phase 1: Retrieve sediment cores (Fall 2018)

Extract 2.5-in diameter cores from lakebed deposits with focus on the thickest deltaic accumulations (150–200 feet sediment thickness) from water depths between 5–350 feet.

Phase 2: Conduct preliminary analysis (Winter 2018 – Early 2020)

Scan cores (<1 centimeter increments) prior to splitting, imaging, and sampling to measure:

- Physical parameters of the cores
- Sediment characteristics and porosity of core samples using acoustic wave velocity logging
- Sediment porosity and permeability of core samples using electrical resistivity logging
- Magnetic mineral content in core samples using magnetic susceptibility logging

Additional analysis includes full geochemical analysis of bulk sediment and radionuclides to develop a chronology of sedimentation.

Phase 3: Conduct comprehensive analysis (Late 2020 – 2021)

Use data analysis and reporting to focus on rates of deposition as well as changes in the rate and character of metal deposition.

PROJECT OUTCOMES

- Determine background rates of metal deposition from San Juan River and Colorado River sediment before, during, and after filling of Lake Powell
- Identify timing and nature of sediment deposits from background rates, with characterization of specific events (e.g., the signature from the Gold King Mine spill)
- Evaluate whether there is evidence of the remobilization of deltaic sediment during historically low lake levels
- Assess potential risks associated with future sediment remobilization during low lake levels
- Develop management options to reduce impacts or risks identified during the project

CONTACT

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