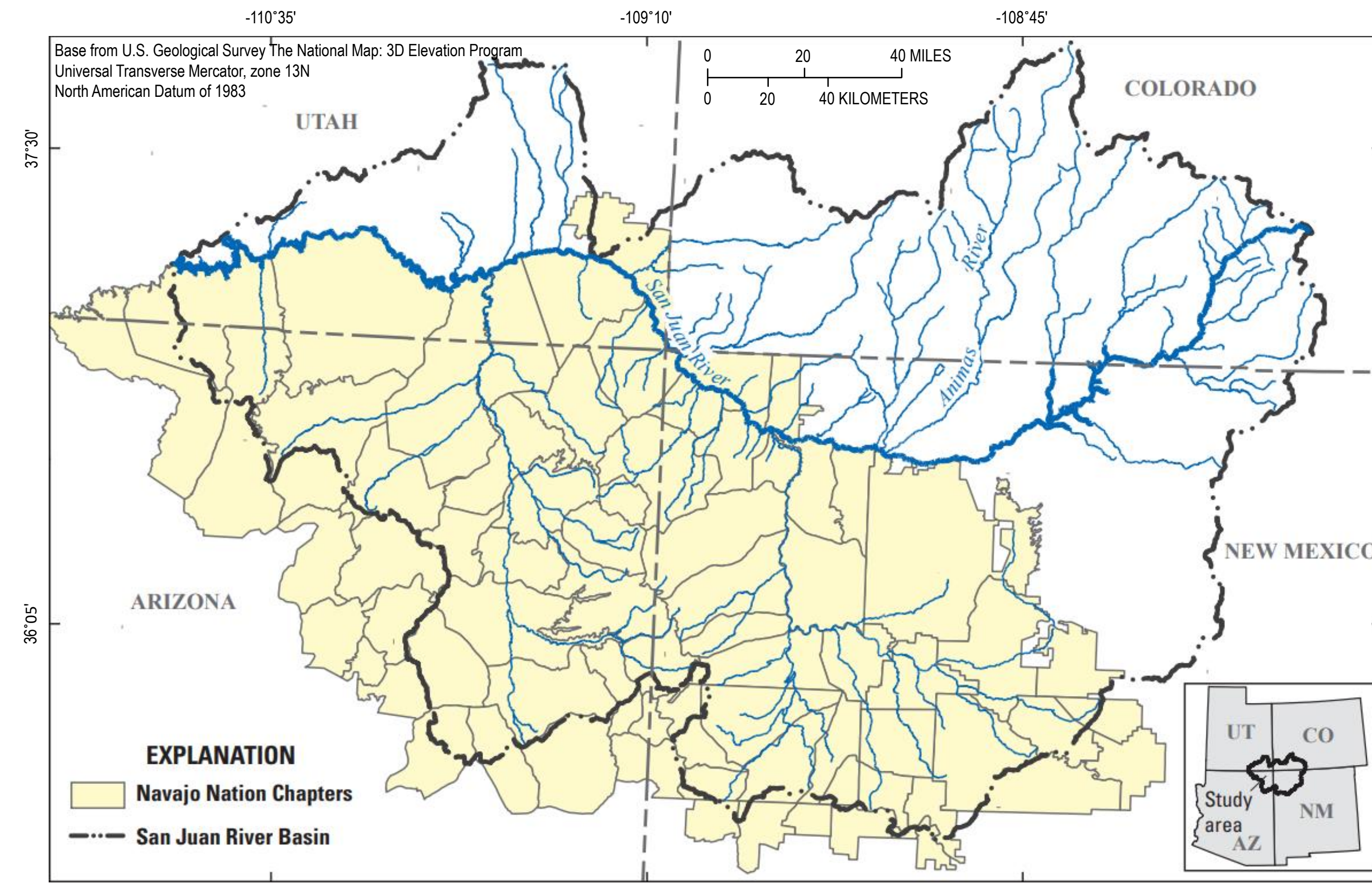


Introduction

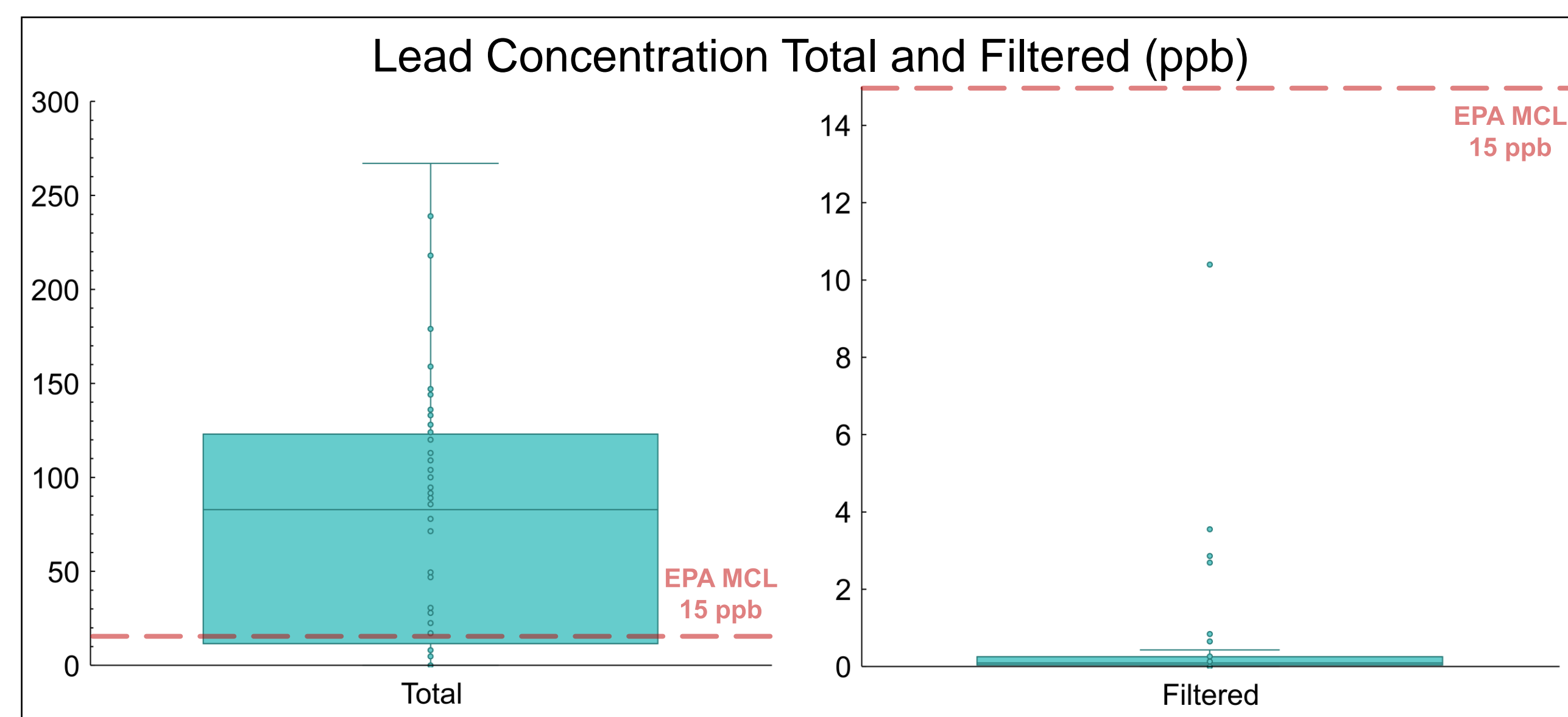
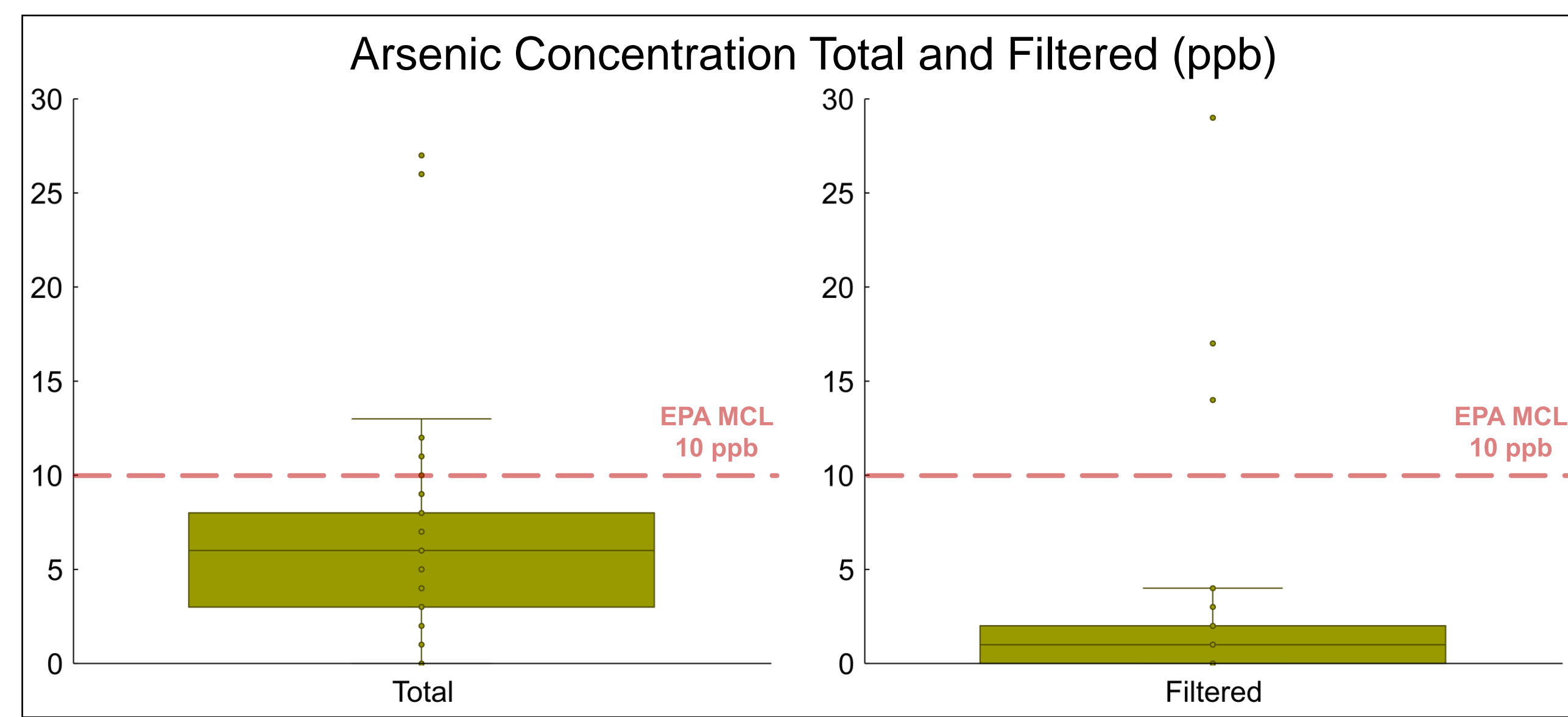
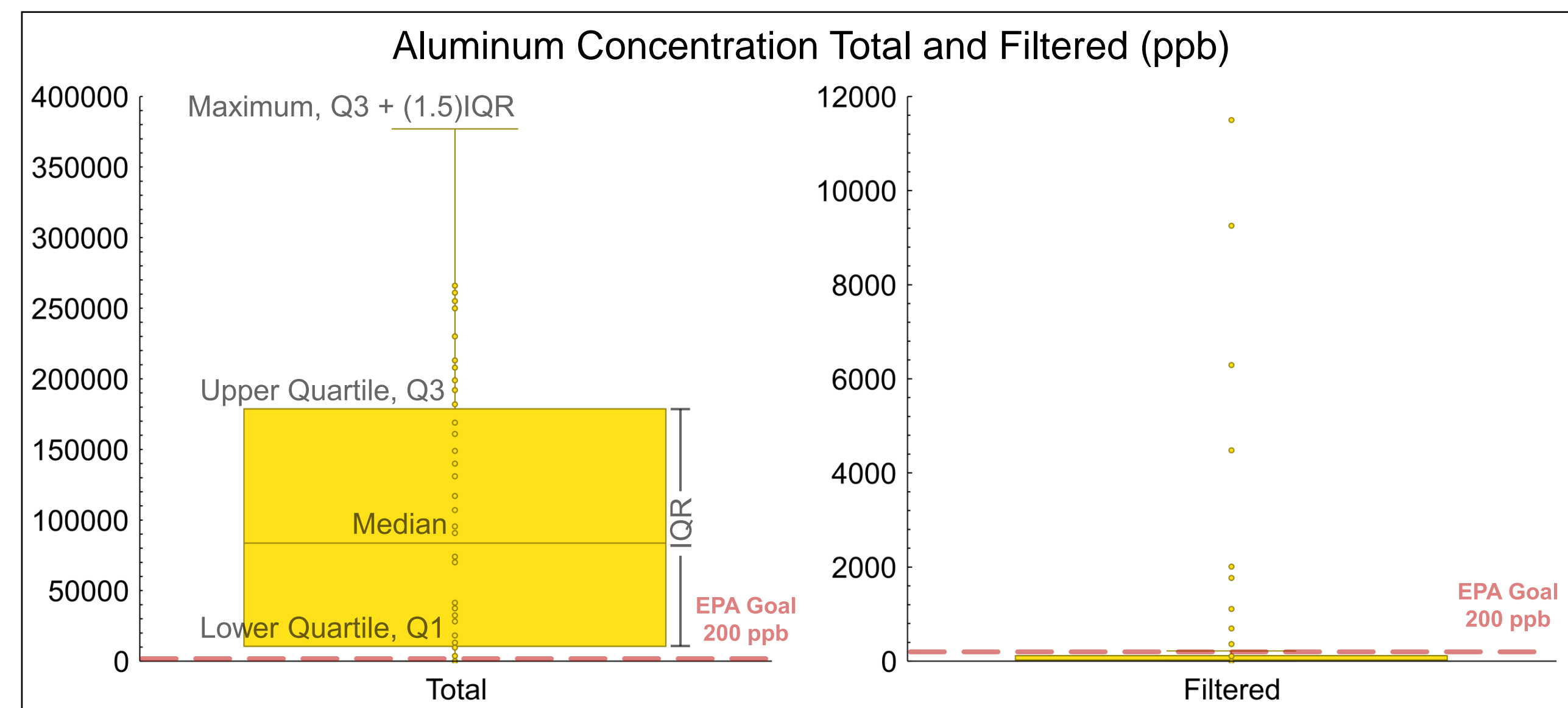
- The Navajo Nation Environmental Protection Agency (NNEPA) discovered elevated concentrations of aluminum (Al), arsenic (As), and lead (Pb) in surface water samples from routine monitoring of the San Juan River
- In cooperation with the NNEPA, the U.S. Geological Survey (USGS) is working to determine:
 - Which tributaries are contributing Al, As, and Pb
 - Relative contributions from anthropogenic and natural sources
- Potential anthropogenic sources:
 - Oil drilling operations, abandoned uranium mines and mills, agricultural land, natural gas power plants, illegal dumping
- Thirty-four tributaries and numerous sites on the San Juan River, from Navajo Dam, NM to Mexican Hat, UT are being sampled routinely for surface water and sediments
- Surface water samples are being analyzed for major ions and trace metals, and sediment mineralogy is being analyzed using a scanning electron microscope (SEM)
- Water chemistry and sediment mineralogy data analysis is ongoing

Study Area

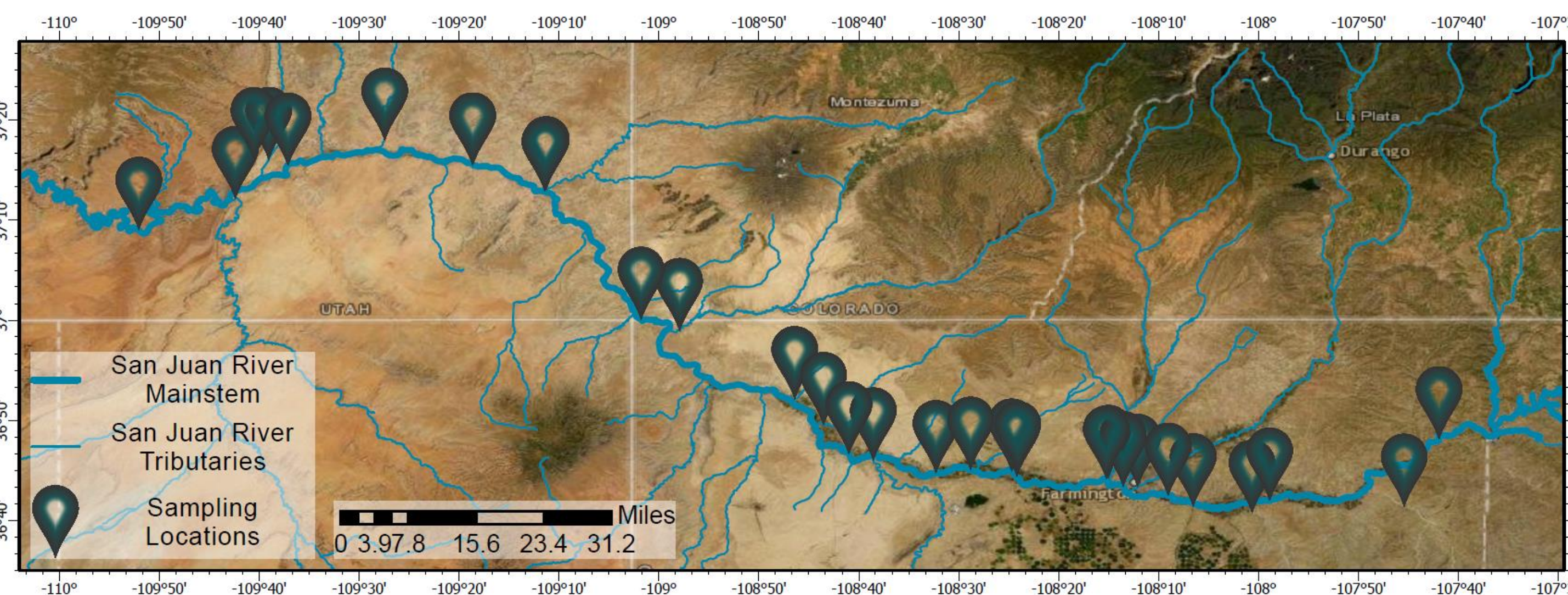


Water Chemistry

Concentrations of aluminum, arsenic and lead at each sampling site from a July 2021 sampling event. If multiple samples were collected for a site, the median value was used.



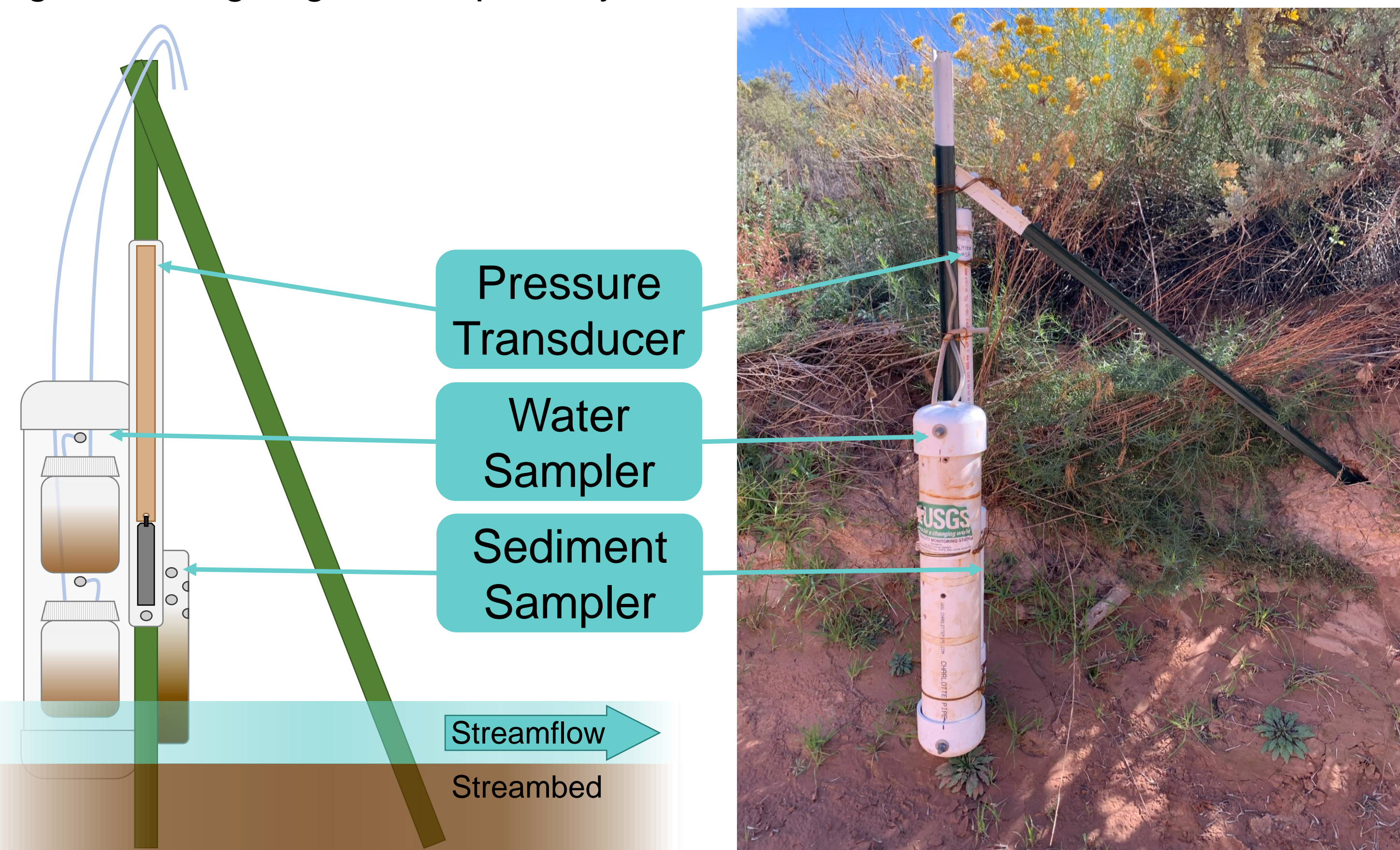
Methodology



“Sed-Chem” gages deployed on 34 tributaries and along the San Juan River. Data collected by Sed-Chem gages:

- Surface water samples
- Sediment samples
- Flow height via a data logger

Two surface water samples can be collected passively. When flowing during gage servicing, a grab sample may be taken.

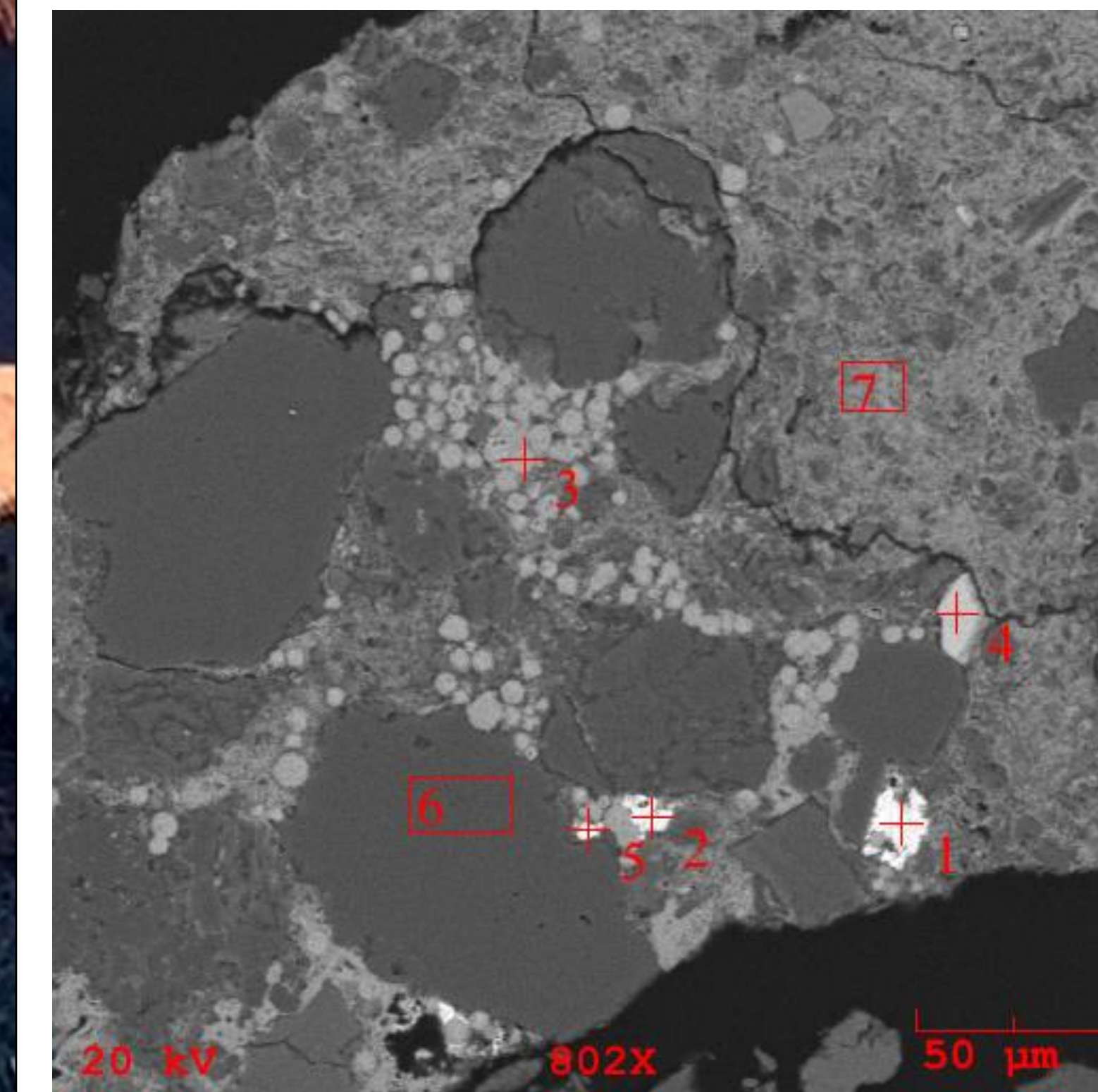


SEM Analysis

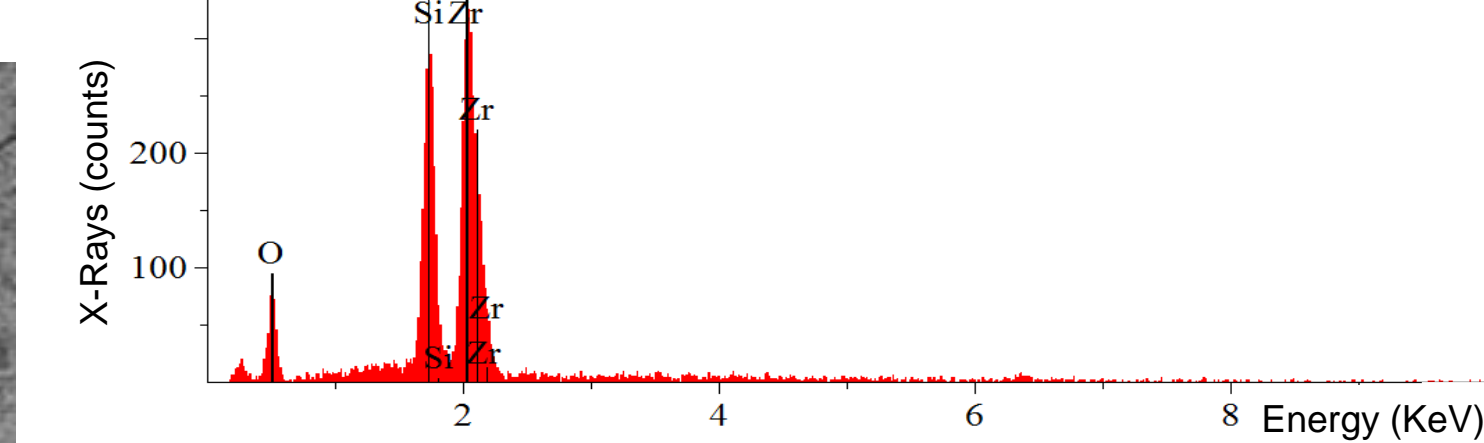
Tributary sediments collected in August 2021 prepped for SEM analysis. Placed in downstream order from right to left.



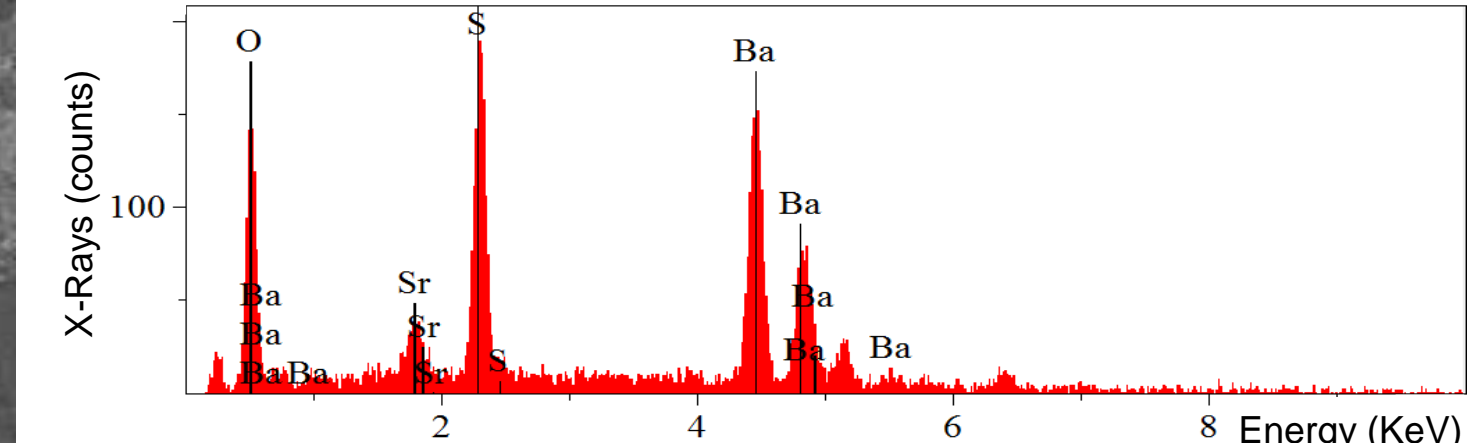
Salt Creek SEM results



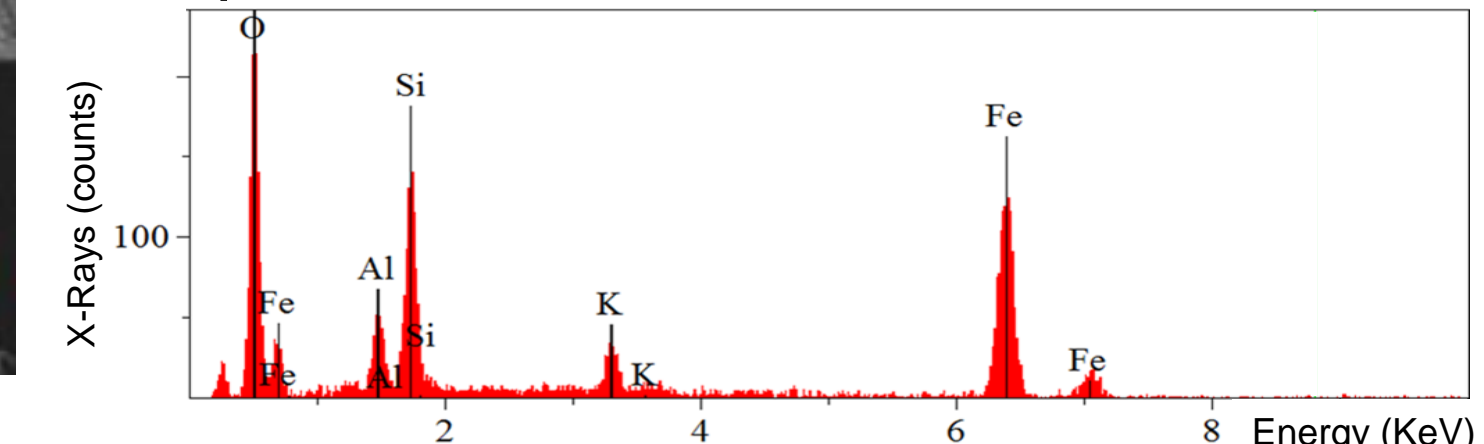
Point 4: Zircon and silica



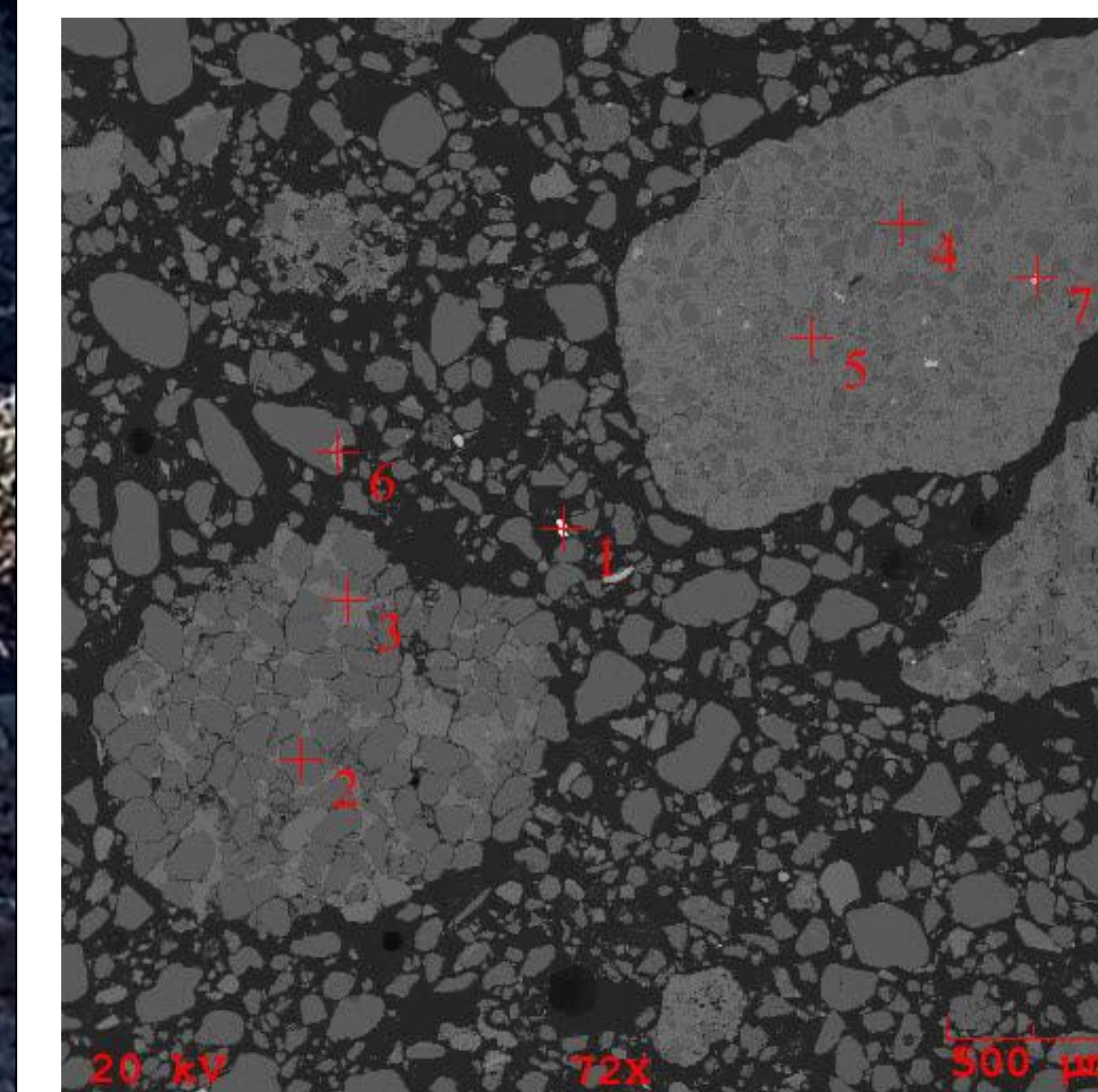
Point 5: Barite with strontium substitution



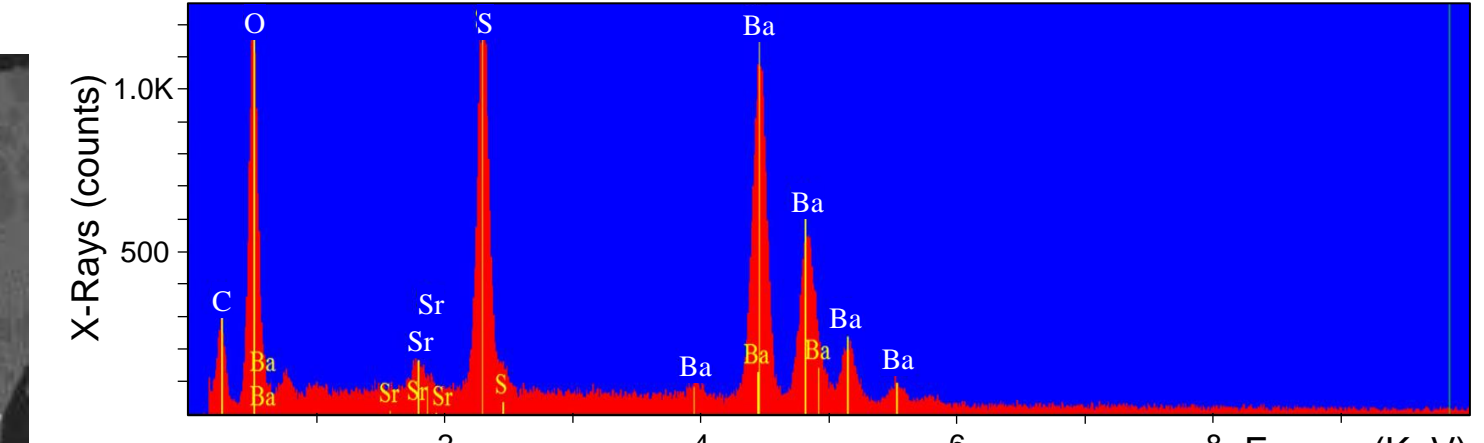
Rectangle 7: Iron oxide and potassium feldspar



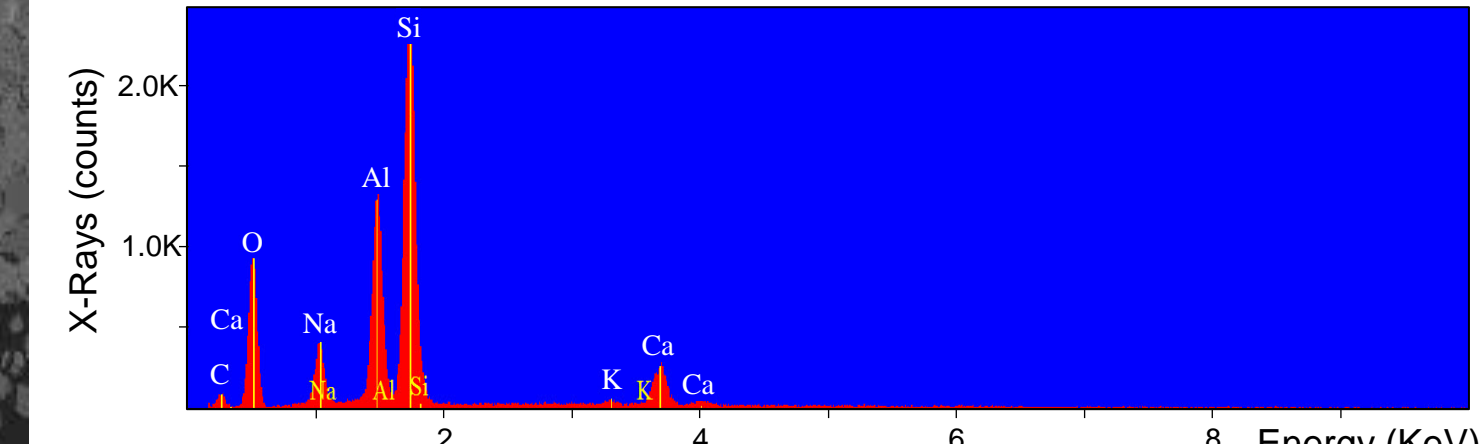
Lime Creek SEM results



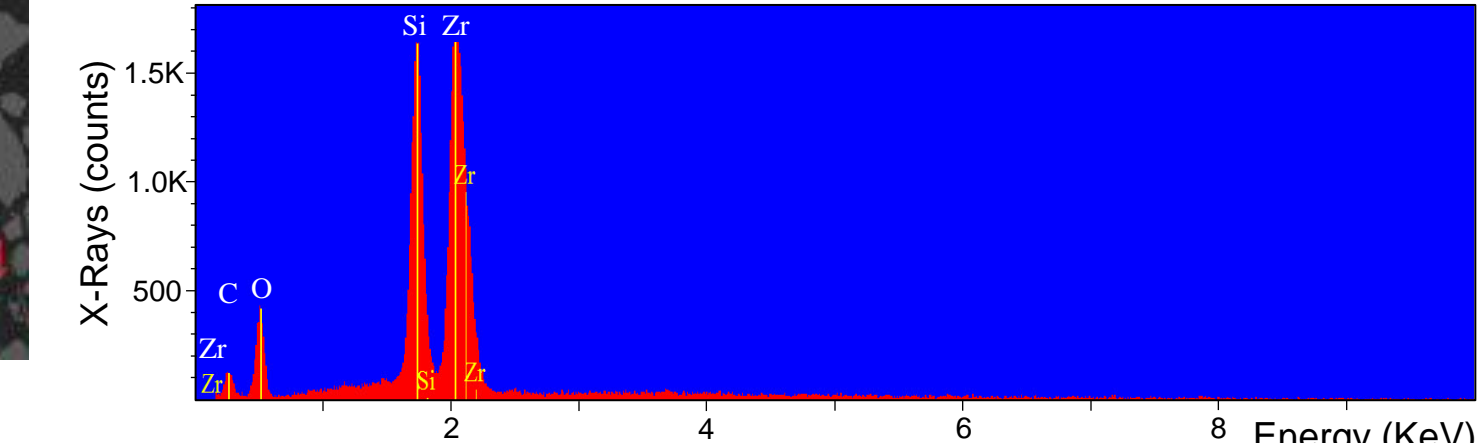
Point 1: Barite with strontium substitution



Point 4: Sodium feldspar and calcium carbonate



Point 7: Zircon and silica



Ongoing Work

- Continue to sample tributaries and the San Juan River through September 2022
- Finish SEM analysis of selected sediment samples
- Create digital elevation models of tributaries using unmanned aircraft systems and photogrammetry
- Begin data interpretation and reporting

