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Impact of Phragmites Autralis Control on Utah Lake Water Quality

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Extended Abstract

The introduction of the invasive perennial grass *Phragmites autralis* in the 1980s has dramatically impacted the ecosystem of Utah Lake. This invasive species has choked out native plants, reducing biodiversity and decreasing the aesthetic value of the lake. State legislators have thus allocated significant funding for its elimination. The current method of removal involves aerial application of glyphosate-based herbicides followed by mowing, leaving the roots in the sediment. However, studies have shown that *P. australis* plants sequester trace metals in their roots. Thus, management in this fashion only recycles the contaminants into the lake, even potentially worsening the water quality by introducing herbicides to the system. While it is important to control proliferation of *P. autralis* for ecosystem stability, its removal must be done holistically and thoughtfully. We hypothesize that trace metal concentration in sediments and water in locations where herbicide has been applied will be increasingly higher with time due to the slow decomposition of plant biomass relative to locations where Aqua Neat has not been applied, thereby reducing water quality.

P. australis, sediment and water samples will be collected from eight sites selected at random surrounding Utah Lake, including both treated and untreated areas for a period of 5 months. Sediment core samples (0-90cm) taken from each location will be divided into 15 cm increments and each increment composited for their respective location. Five replicate samples will be taken at each site. All samples will be prepped for acid microwave digestion, filtered and analyzed for trace metal content using the ICP-OES. Samples will be sent to the Utility Testing Lab in Salt Lake City for herbicide concentration determination. To understand the behavior of trace elements in each respective site, parameters such as temperature, pH, organic matter (OM), electrical conductivity, redox potential, dissolved oxygen, particle size distribution, total nitrogen, and total phosphate will be determined.

Rapid proliferation of the invasive *P. australis* is not only a local issue in Utah Lake, it is a continent-wide environmental concern as this species has invaded wetlands and most disturbed habitats across North America. Its aggressive distribution has been attributed to its ability to grow in soils with a wide range of pH, salinity, soil textures and in extreme environmental conditions. Although various approaches have been used to address the threats produced by this invasive plant, the manner in which the unintended consequences of *P. australis* control is addressed in Utah may also have implications for its management in other regions of North America. The proposed work will also advance the science of understanding geochemistry-ecological feedbacks in ecosystems, particularly involving exotic invasions. Many of these feedbacks are unknown and underappreciated. By demonstrating the potentially far-reaching consequences of invasive plant control efforts to geochemical cycling, this research will provide a template for other research efforts poised to address such relationships in other systems.