☐ **Talk** ☒ **Poster**

The impacts polished desalinated treated produced water on soil nutrient availability at field scale

Emma Hart[1], Matthew Siebecker[2]

[1]Texas Tech University
Author Email: emma.schmidt@ttu.edu

Texas is the main producer of oil and gas in the United States, with a large portion produced through hydraulic fracking operations that are largely centered in the Permian Basin. A byproduct of the fracking process is "produced water", which is a mixture of brine water and hydrocarbons. Produced water can be treated through series of desalination processes coupled with polishing that decreases the concentration of total dissolved solids to below 500 mg L^{-1}, thereby creating the possibility for alternative uses for the treated water in a variety of settings, for example potential watershed regeneration. This water has the potential to become an important resource, particularly in the western United States, where water insecurity is becoming more common. As aquifer water is depleted and groundwater is degraded by contaminants and high salinity, new water sources are continually sought to ensure that Americans have clean drinking and irrigation water. This field study is the first of its kind in an attempt to illustrate the effects that polished desalinated treated produced water have on soil nutrient availability and chemistry during native grassland restoration and crop production. This site is a 0.5 acre plot with three water, two tilling, and five plant treatments, with a total of 240 1m2 plots organized via random block design. Triplicate soil samples were obtained from all plots for baseline characterization to determine changes in soil chemistry over treatment time. Wet chemical extractions, microwave digestions, and microfocused X-ray fluorescence spectroscopy are being performed to assess chemical composition and elemental distribution within surface soil samples. Future research will focus on analysis of phosphorus and sulfur in the bulk soil to assess changes in chemical speciation with treatments. Tender energy spectroscopy will therefore play a key role in assessing these changes and to the success of these experimental objectives..