In the practice of hydraulic fracturing, water and other chemicals are used to inject shale bedrock in order to obtain natural gas. However, after this process the water returns to the surface as “flowback water” with high TDS (total dissolved solids) levels and requires treatment for either reuse in the fracturing process or release back into the environment. The objective of this research is to determine how electrodialysis can be used to decrease the TDS levels of flowback water. Electrodialysis uses the combination of an applied electric field, an electrolyte solution, and ion-exchange membranes to create a dilute outflow and a concentrated outflow. This was tested using different configurations of applied current and duration of experiment, along with different electrolyte solutions and concentrations.

After a series of tests were run, it was found that the level of TDS removal was more dependent on the duration of the test and the electrolyte solution being used than the applied current or initial concentration of flowback water. This shows that with the right configuration, electrodialysis could be used as a treatment alternative for flowback water. However, more research still needs to be done to determine the best configuration.