

**SALT AFFECTED SOILS:
QUANTIFYING IMPACTS TO DEVELOP SCIENTIFICALLY BASED REMEDIATION
CRITERIA FOR ALBERTA**

Position: MSc student

Start Date: April 2018

Location: Department of Renewable Resources, University of Alberta, Edmonton, Alberta

Supervisor: Dr. M Anne Naeth, Professor, Land Reclamation and Restoration Ecology

Research Project:

Salt affected soils are those in which salts interfere with normal plant growth. While salt affected soils occur naturally, they can also be a result of human activities. Salt affected soils can result from spills of well site process water which is mainly sodium chloride, and soil contamination due to sodium sulfate can occur on sulfur storage sites following sour gas operations and in oil sands process water. Government regulations require industry to remediate salt affected soils, by reducing salt concentrations, before land reclamation can occur. Remediation is considered successful when soil meets the provincial guidelines for salinity and sodicity. Saline soils are those that have high electrical conductivities while sodic soils are those that have high sodium content; both can have detrimental effects on soil, water and plants. In Alberta, salinity is measured as electrical conductivity (EC) and sodicity as sodium adsorption ratio (SAR). Both are important for reestablishment of functioning soil and plant communities.

Current regulations require both soil electrical conductivity and sodium adsorption ratio to be below criteria even if a self sustaining desired vegetation cover exists. Achieving this on some sites is difficult, requiring excavation and disposal of soil off site and resulting in additional environmental damage. Natural attenuation and/or modifications to reclamation guidelines may be appropriate on some of these disturbed sites. In some of these cases electrical conductivity and/or sodium adsorption ratio may be below values found on naturally saline sites. Other measures such as specific ion concentrations, used in some provinces and jurisdictions, soil structural properties and/or plant abundances, may serve as appropriate indicators of detrimental salt contamination to better address soil remediation and reclamation.

The goal of this research project is to address whether electrical conductivity and sodium adsorption ratio are the most scientifically appropriate indicators of salt affected sites and potential negative impacts on soil and plants. The research will address what their relationship is to plant abundance, health and diversity across a range of salt affected sites and the relationship to alternative or complementary measures of salinity and sodicity, specifically total salt concentrations and specific ion concentrations. The graduate student will undertake field research at multiple salt affected sites in Alberta over two years. The project is funded by the Petroleum Technology Alliance Canada (PTAC) and the Future Energy Systems (FES) program.

Qualifications:

- A BSc degree in land reclamation, soil science, plant science or equivalent field of study
- Be familiar with Alberta and land reclamation policy and guidelines
- Soil chemistry background an asset
- Be resourceful and able to effectively problem solve
- Enjoys working in a dynamic environment

- Adapts to changing priorities and schedules
- Works independently, particularly in the field
- Be willing to travel extensively and live and work in remote locations during the field season
- Have a Class 5 non graduated driver's license and be comfortable driving 4x4 trucks
- Interest in being part of a supportive research team including assisting on other graduate student projects

Stipend: MSc stipend of approximately \$2000/month as per University of Alberta guidelines.

Apply: Send a statement of interest, current CV and copies of your academic transcripts to sarah.wilkinson@ualberta.ca