Regional Risk Assessment of Salinity Impacts on Wellsites in Southeastern Alberta

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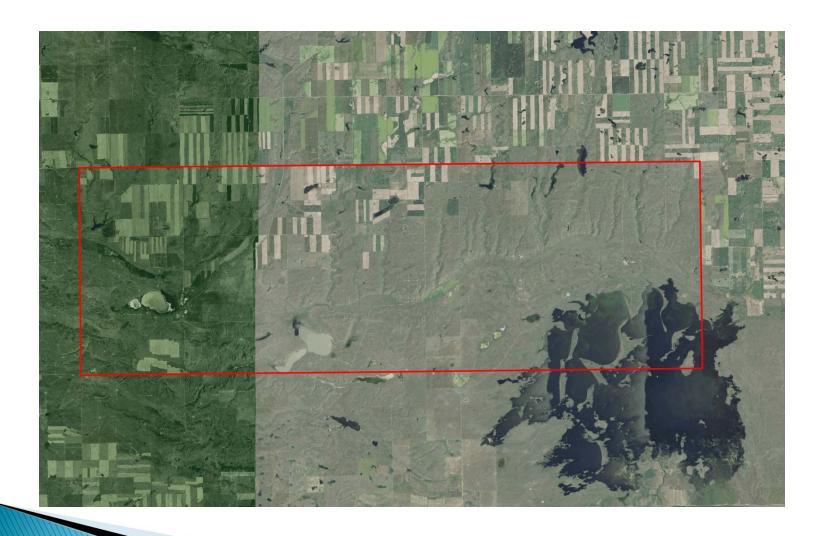
Acknowledgements

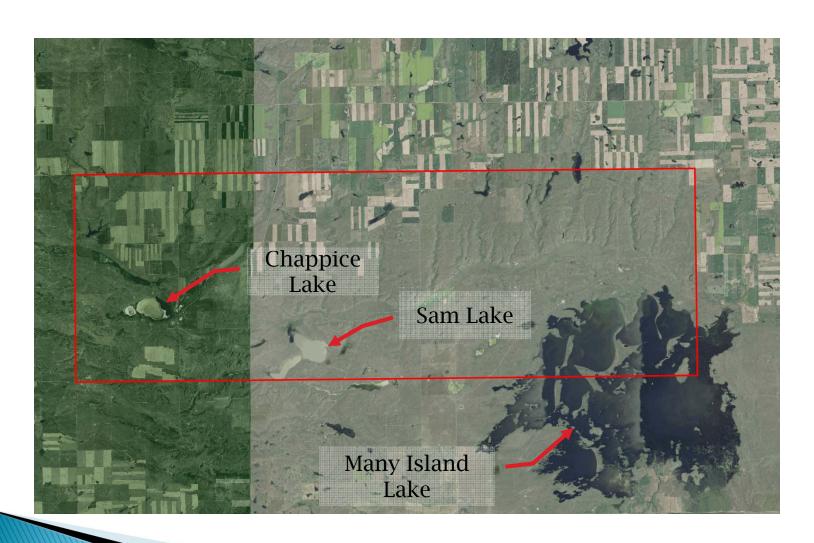
- Centrica Energy: Todd Lane and Jacqueline Vammen
- MEMS: Dan Stein
- RCGI personnel: assessment work, research
- AER: Dan Pollard, Kevin Ball
- ESRD: Gordon Dinwoodie

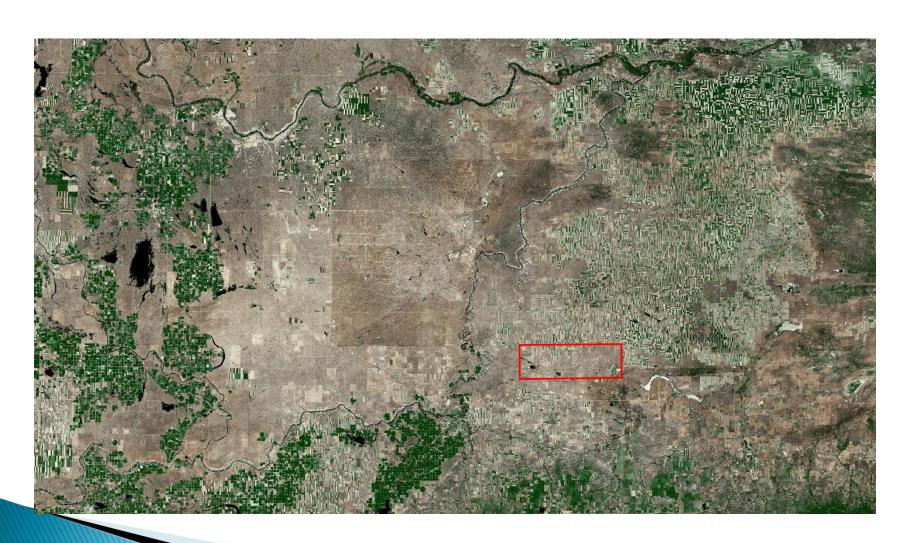
- Brown Soil Zone
- Dry Mixed Grass Ecoregion
- Primarily native prairie, some cultivated
- Rare species
- Natural sulphates, natural chlorides, presence of hypersaline lakes
- Low groundwater table

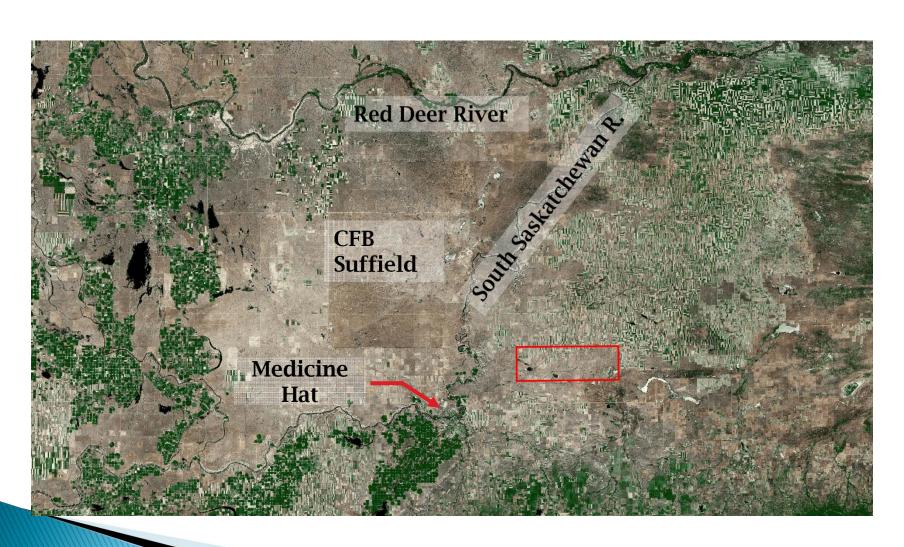
Beautiful...





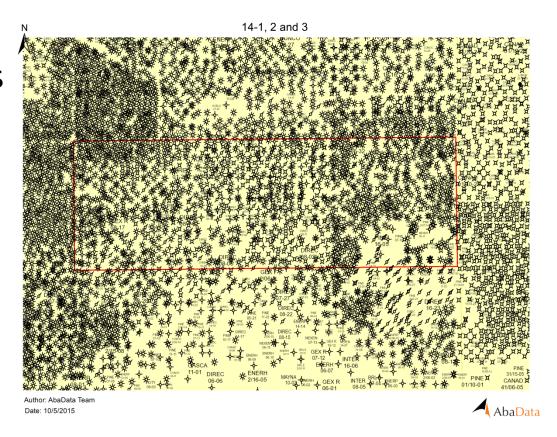






Rationale for the Project

- Sites: high density; shallow gas wellsites
- Impacts: salinity related, low to moderate, but prevalent
- High degree of similarity: region, sites, impact type, assessment type



Project Goals

- Use a consistent approach, acceptable to AER
- Minimize assessment and remediation costs
- Remain protective of the environment, but reduce unnecessary remediation

Project Initiation

- Group of 17 sites; chosen from a much larger pool
- Applied following approach
 - Pool background data
 - Assess each site for closure
 - Create decision tree to assess applicability and appropriateness
 - Use generic Tier 2 assessments to categorize sites

Background Soil Data

- Collected regionally
- Eventually compared to and combined with site-specific
- Baseline of data
 - Background chloride
 - Background EC and SAR with depth (SCARG guidelines)

Site Assessments

- Conducted to generic SST standards, except:
 - Use of modified background chloride
 - Less background
 - Select sites chosen for baseline groundwater assessment

Decision Tree

- Stepwise approach to assess and categorize sites
- Assesses appropriateness (cost, applicability)
- Assess pertinent / sensitive site characteristics
 - Distance to FAL
 - Plume dimensions
 - Separation between impacts and groundwater

End Result

- A scheme to assess appropriateness and applicability
- Regional SCARG guidelines
- Regional SST classification scheme

Benefits

- Reduction in Tier 2 assessment costs
- Reduction in reporting costs
- Reduction in unnecessary landfill disposal
- Protection of the environment (native prairie)



Challenges

- Background chloride
- Use of statistics
- Validation / definition of the regional concept
- Regulatory

Challenges: Background Chloride

Origin:

- Surficial deposits of marine origin
- Slowly being leached downwards significant change at 1 mbgs

Issues:

- Delineation
- Modelling parameters
- Calculation of appropriate regional background value

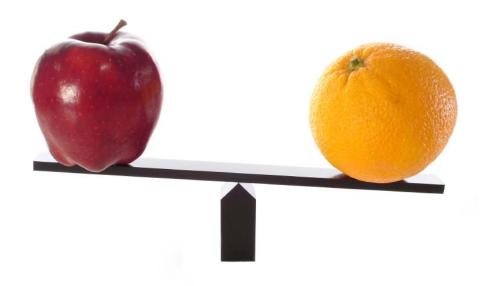
Challenges: Use of Statistics

- Initially: primary means of validating assumptions
- Going forward: a single line of evidence supporting natural science arguments
- Improvements: plain language communication, documentation and transparency
- Not going away: still required for various comparisons, calculations and tests

Challenges: Regional Concept

- Defining of a region
 - Climate
 - Soils
 - Geology
 - Physical geography
- Discerning 'domains'; subsets of the region which may correlate / predict background

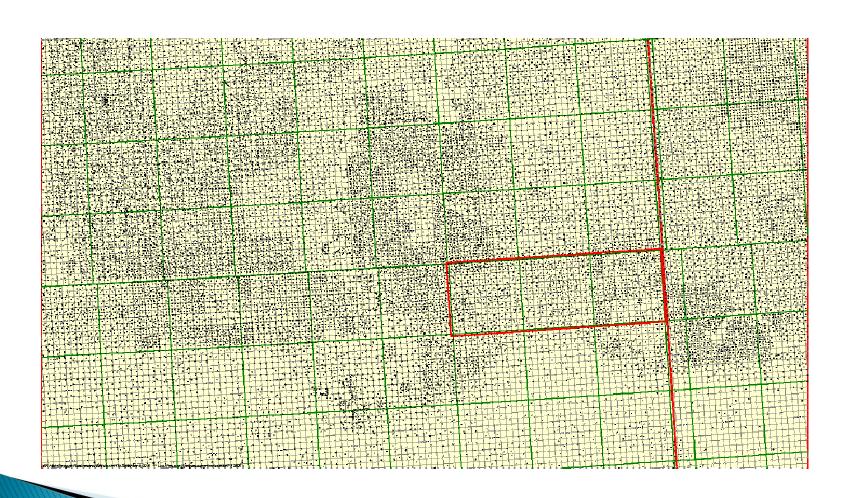
Regulatory Concerns



Project Status

- Feedback: third iteration
- Revised methodology: end of year
- ▶ Feedback: ongoing, Q1–2016
- Client: still supportive, encouraged, looking for opportunities to expand and cost share

Replication and Cost Sharing



Questions?



