

The Big Picture

This study will:

- Provide science-based information on the potential risks of livestock manure management activities on groundwater quality in Alberta.
- Provide a better understanding of the processes affecting the fate and transport of manure constituents in the groundwater, under Alberta conditions.
- Recommend solutions to mitigate potential risks.



Point velocity probe used to measure groundwater velocity and direction at the centimetre scale.

Alberta Groundwater Facts

- 3 % of allocated water is from groundwater.
- 23 % of the population relies on groundwater.
- Groundwater use is dominated by agriculture and municipalities in southern Alberta, and by the oil and gas industry in the northern part of the province.

(Fennell 2011)

Partners:

Producers in the study areas
Alberta Agriculture and Rural Development
Natural Resources Conservation Board
University of Saskatchewan
Alberta Irrigation Projects Association

Additional contributions have been provided by Alberta Environment and Sustainable Resource Development, Universities of Alberta and Kansas, Canadian Water Network, and Agriculture and Agri-Food Canada.

For more information:

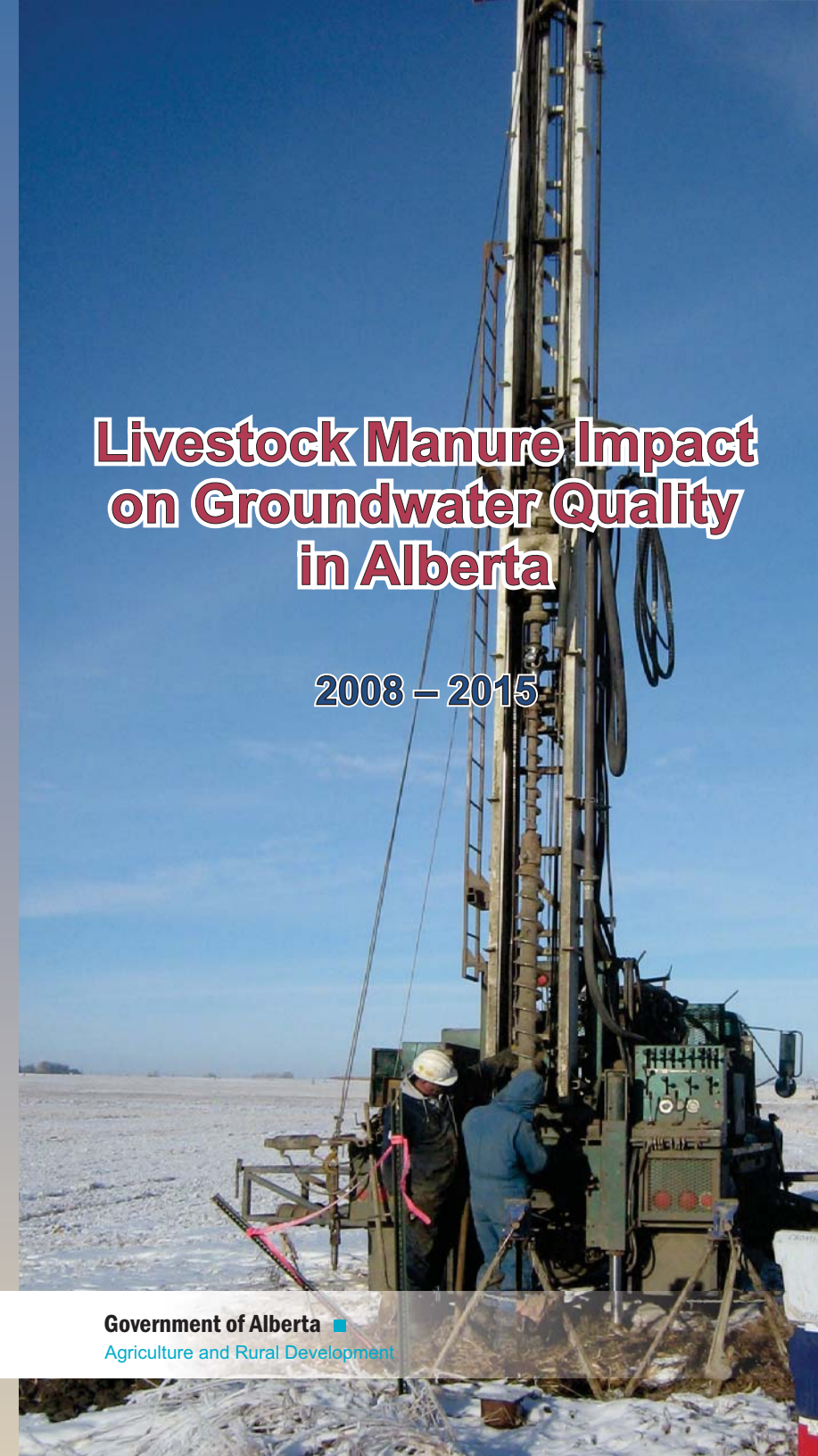
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Sustainable Agriculture – Our Common Goal

Sustainable agriculture refers to the ability of farms to produce crops and livestock economically and indefinitely within acceptable environmental stewardship objectives.

Livestock Manure Impact on Groundwater Quality in Alberta

2008 – 2015



September 2013

Government of Alberta ■
Agriculture and Rural Development

Livestock Manure Impact on Groundwater Quality in Alberta

The Study

Alberta Agriculture and Rural Development and partners implemented a 7-yr study to determine the potential risks of intensive livestock production to groundwater quality in Alberta.

Why Groundwater?

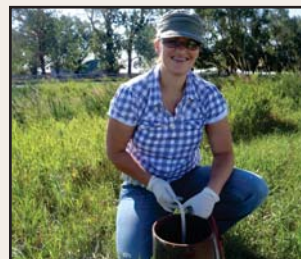
Agricultural manure management activities can contribute nitrogen, phosphorus, organic carbon, salts, and pathogens to groundwater. Recent reviews suggest that manure field application and storage facilities may pose a risk to groundwater quality in Alberta. However, little Alberta specific information exists.

Study Objectives

- 1) Determine groundwater quality changes with time in the Battersea; an irrigated area, which has the highest density of confined feeding operations (CFOs) in Alberta.
- 2) Determine the risks to groundwater quality from manure field application and storage facilities.
- 3) Compare relative impacts between manure field application and storage facilities on groundwater quality.

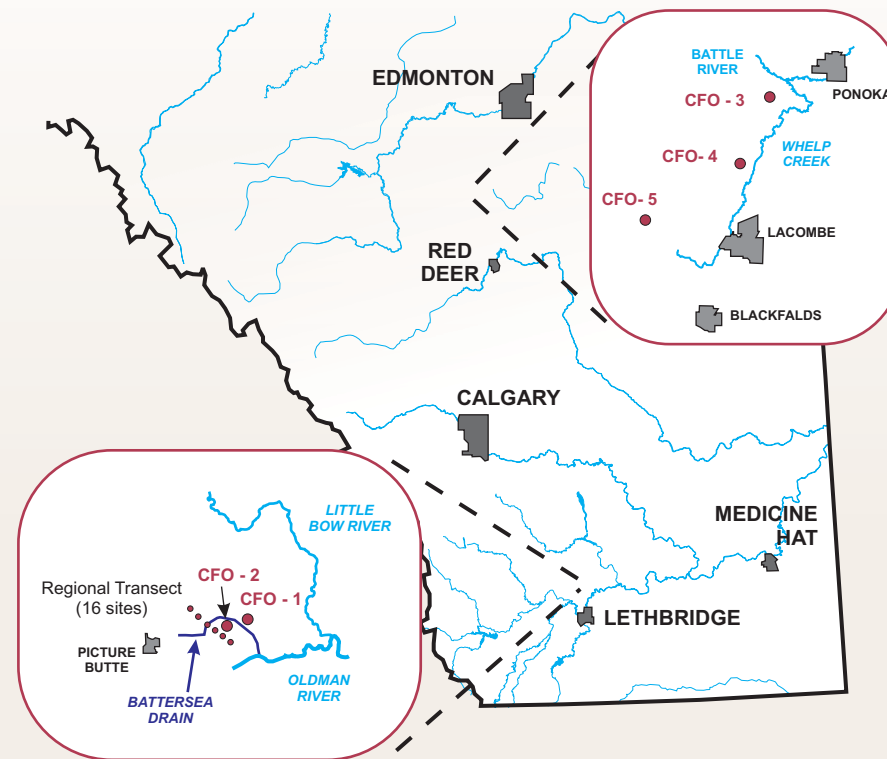


Monitoring well purging



Groundwater sampling

Study Areas



Study Design

A total of 170 groundwater monitoring wells (78 water table wells, 82 piezometer wells) have been implemented in study areas in central and southern Alberta. The manure management activities of interest are:

- 1) Manure field application
 - Regional transect: A series of monitoring wells are being used to determine water quality changes in the Battersea area compared to previous work carried out about 10 yr ago.
 - Field scale: Four field sites, with a history of beef manure application, are being studied to assess the potential groundwater contamination from manure spreading in southern Alberta.
- 2) CFOs
 - Beef feedlot sites: Two feedlots were instrumented with monitoring wells in the Battersea area (CFO-1 and -2).
 - Dairy EMS sites: Four dairy earthen manure storages (EMS) are being monitored: one in southern Alberta (CFO-1) and three in central Alberta (CFO-3, -4, and -5).

Data collection includes groundwater elevation, vertical and horizontal flow, chemistry, and isotopes, as well as manure and soil characteristics.



Hollow stem and split spoon



Auger drilling