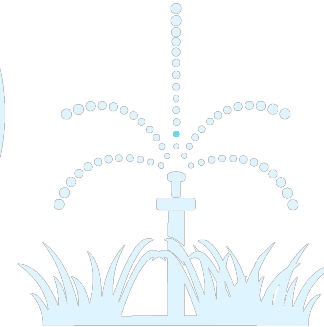
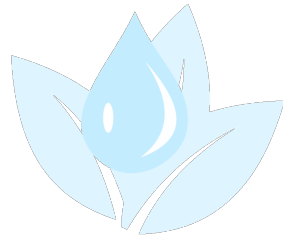


IRRIGATION AND DRAINAGE MODERNIZATION AND EXPANSION IN CANADA: A GLOBAL SUCCESS STORY

INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE (ICID)

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Indo-Global Irrigation Summit 2025
24-25 June 2025, New Delhi, India

Chandra Madramootoo
Distinguished Professor, McGill University
President Honoraire, ICID

Irrigation and Drainage Modernization and Expansion in Canada: A Global Success Story



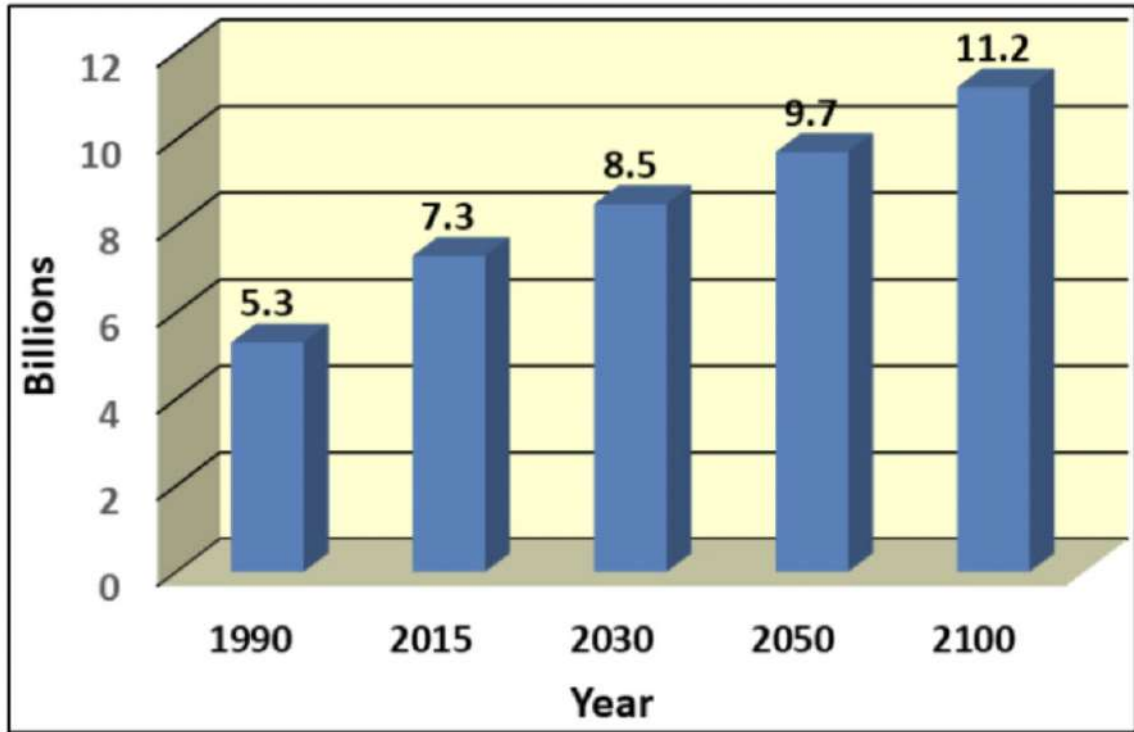
**Chandra Madramootoo
Distinguished Professor,
McGill University
President Honoraire, ICID**



McGill



ICID·CIID

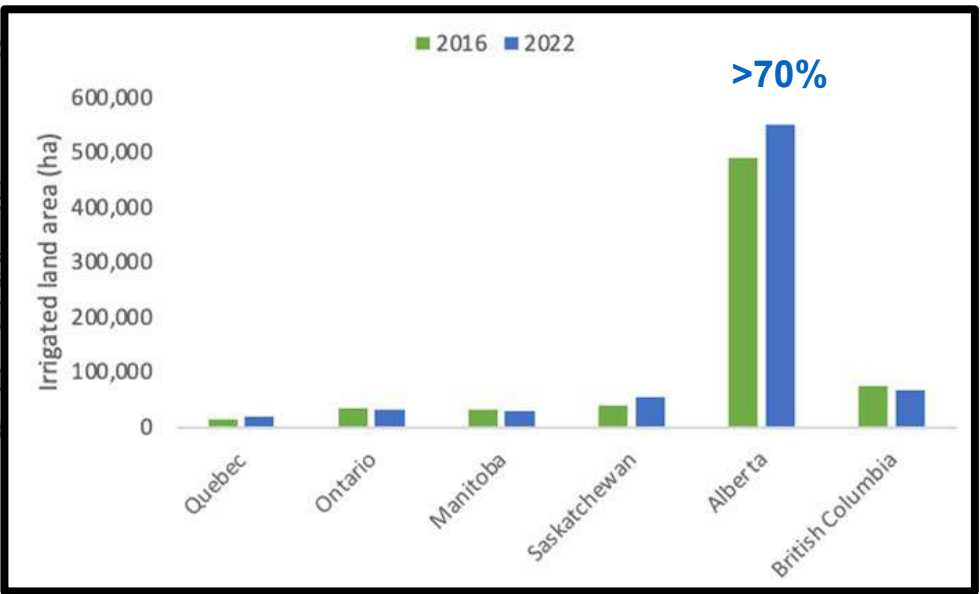
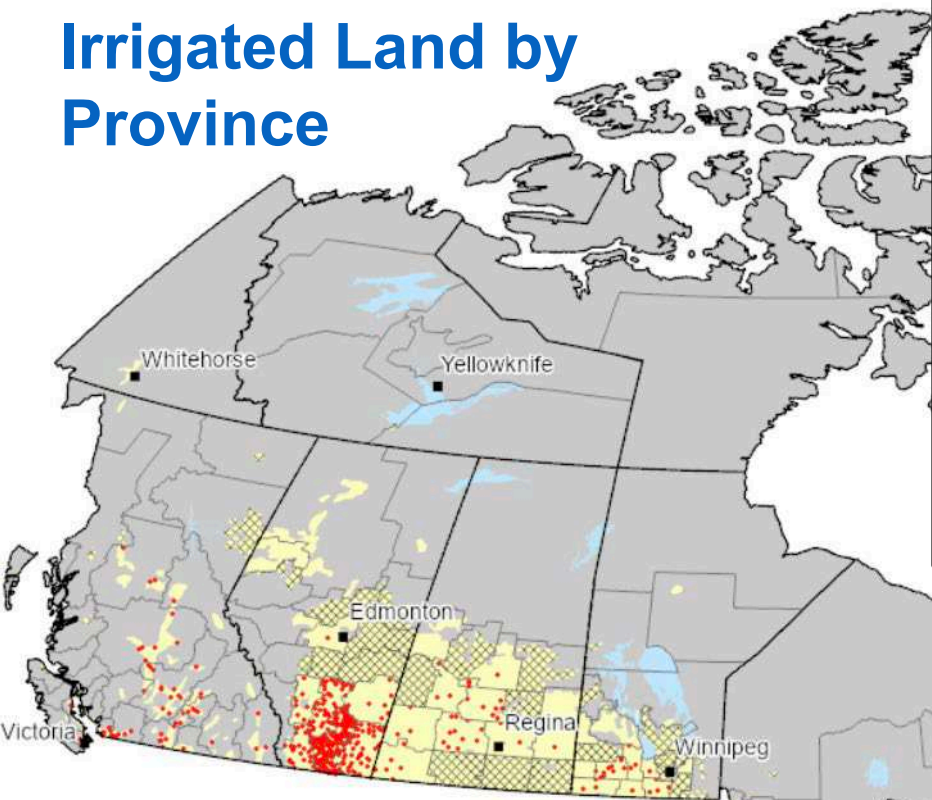


Population projections (1990-2100)

Food Security

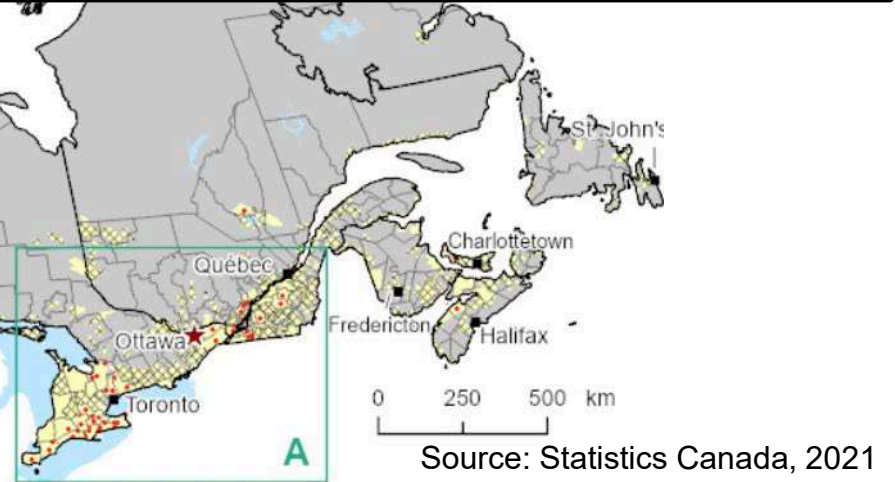
- Global food production will need to increase by 70%
- Top 5 future food producers:
 - Canada
 - United States
 - Brazil
 - Argentina
 - Russia

Irrigated Land by Province



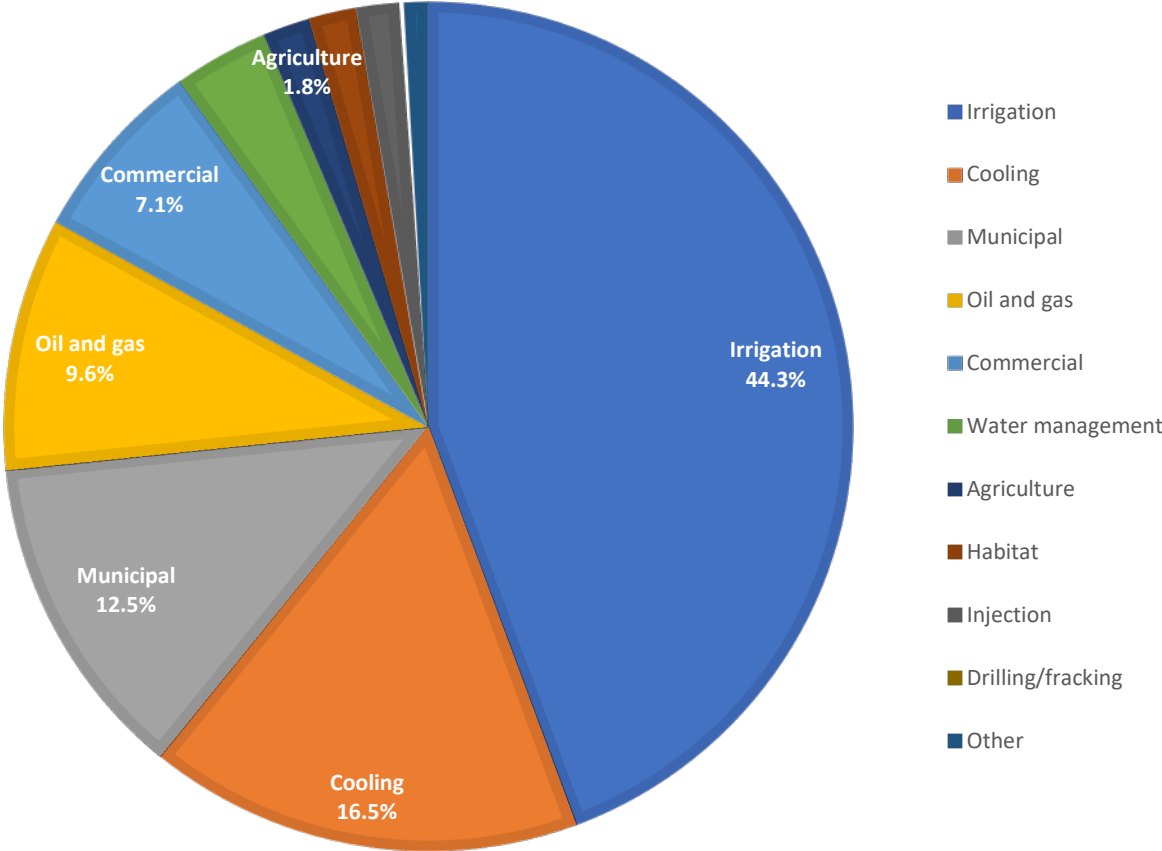
- 1 dot = 4,000 acres (1,619 hectares)
- Suppressed (confidential)
- Agricultural ecumene or null value
- Outside agricultural ecumene
- ★ National capital
- Provincial and territorial capital
- Census division boundary
- Provincial and territorial boundary

Canada:
Total of
2,371,040 acres
959,526 hectares



Source: Statistics Canada, 2021

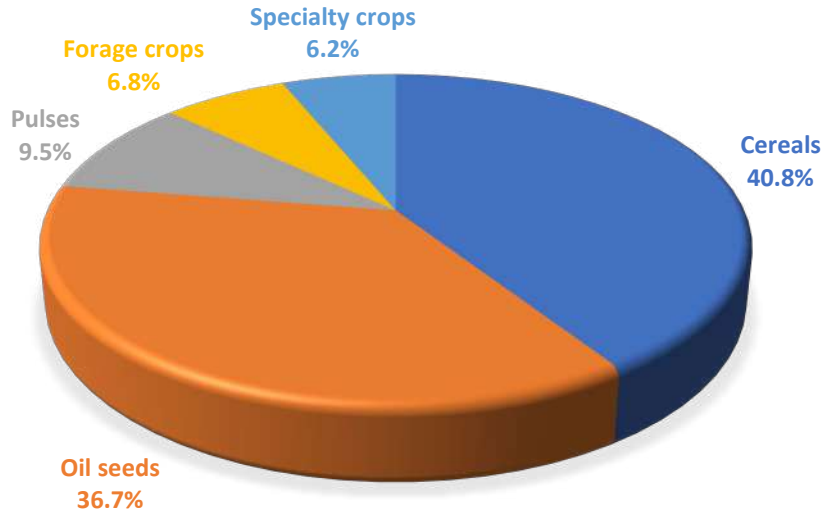
Alberta Water Allocations



Source: Alberta Ministry of Environment and Protected Areas, 2023

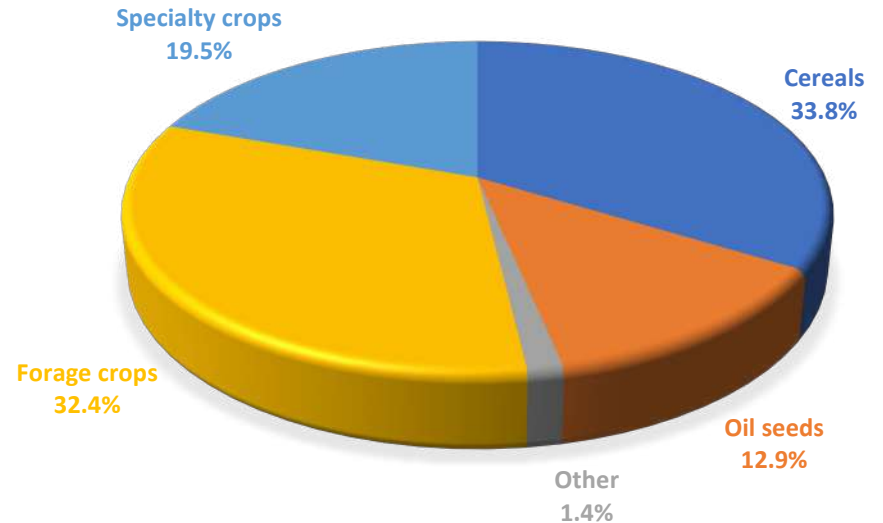
Irrigated Crops (2022)

Lake Diefenbaker Development Area



Source: ICDC, 2022

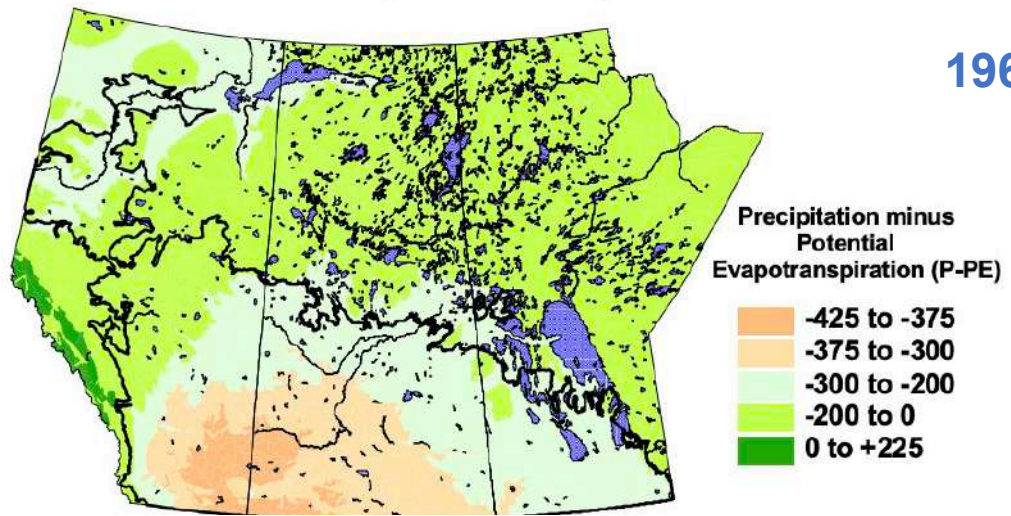
Alberta's 13 Irrigation Districts



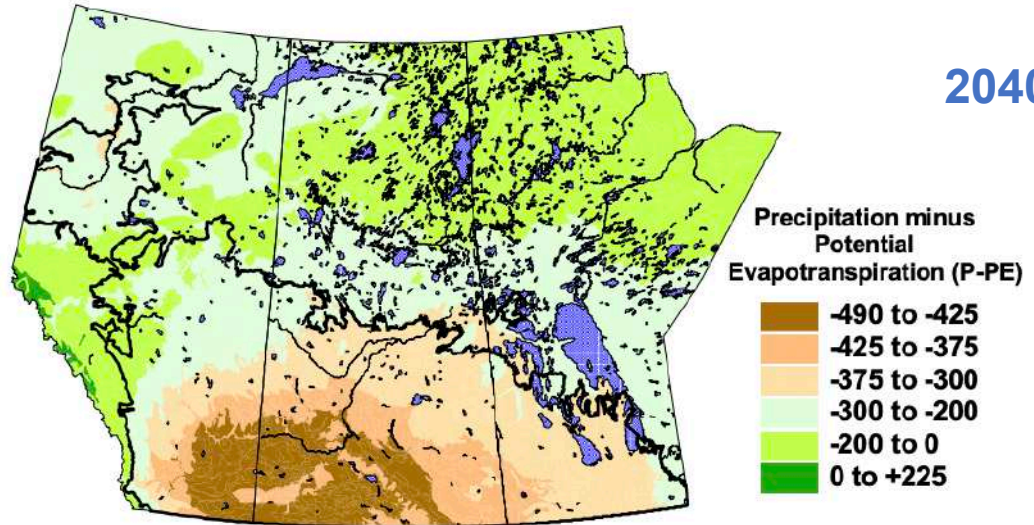
Source: Alberta Agriculture and Irrigation, 2023

Moisture Deficit

1960-1990



2040-2069



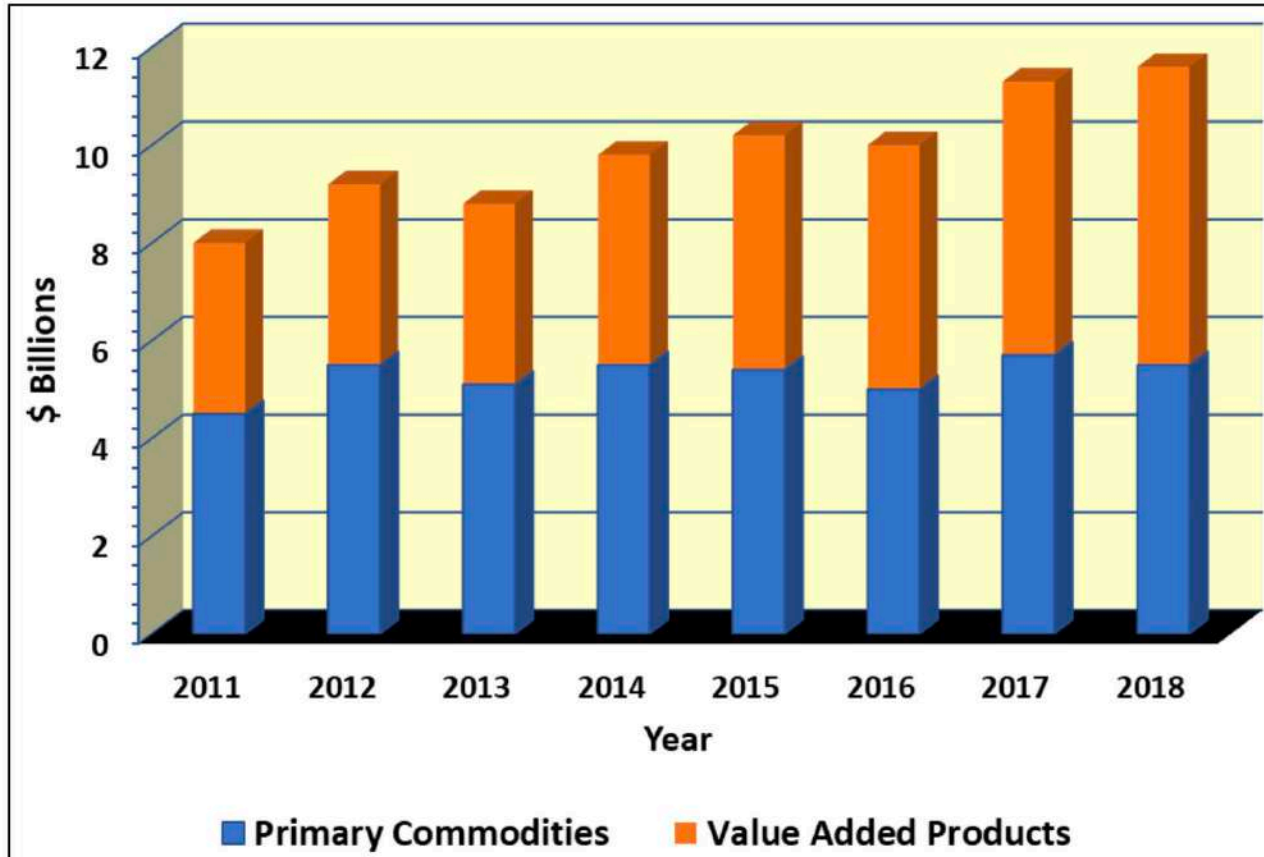
Benefits of Irrigation

In Alberta (2011-2018)

- \$5.4 billion contribution by irrigation-dependent industries to provincial GDP
- \$3.2 billion in employment income
- 46,000 job opportunities

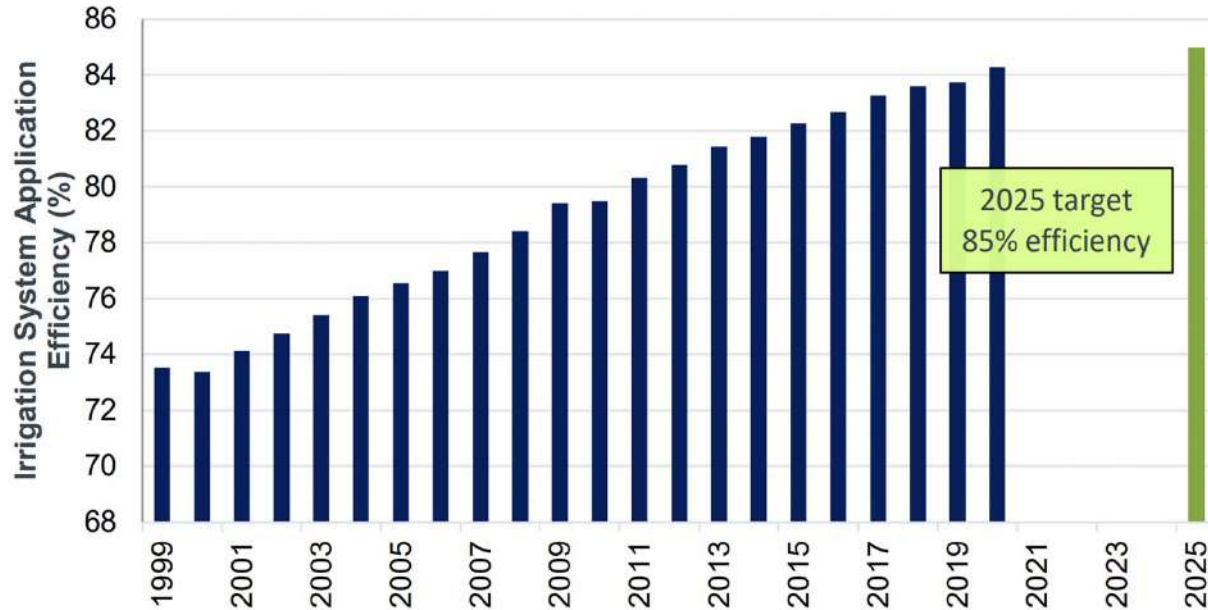


Alberta's Agri-food Exports



Source: Acera Consult Inc., 2021

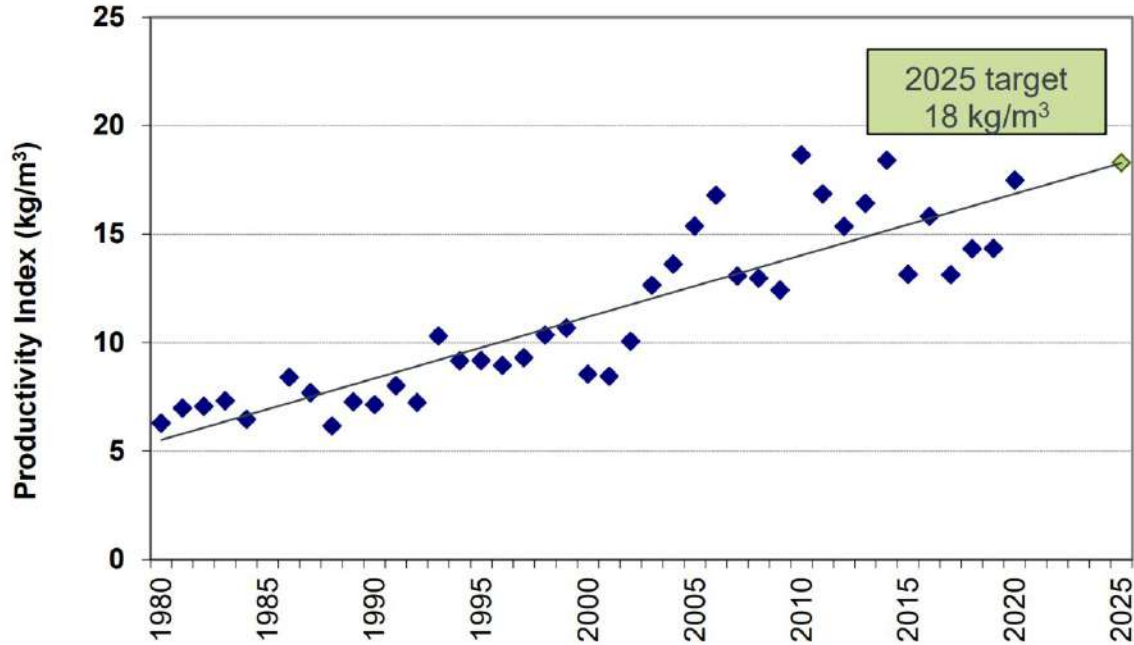
Shifting to Low-Pressure Centre Pivot Systems



**Every \$1.00
invested
returns \$3.56
in revenue to
Alberta**

Source: Alberta Agriculture and Irrigation, 2023

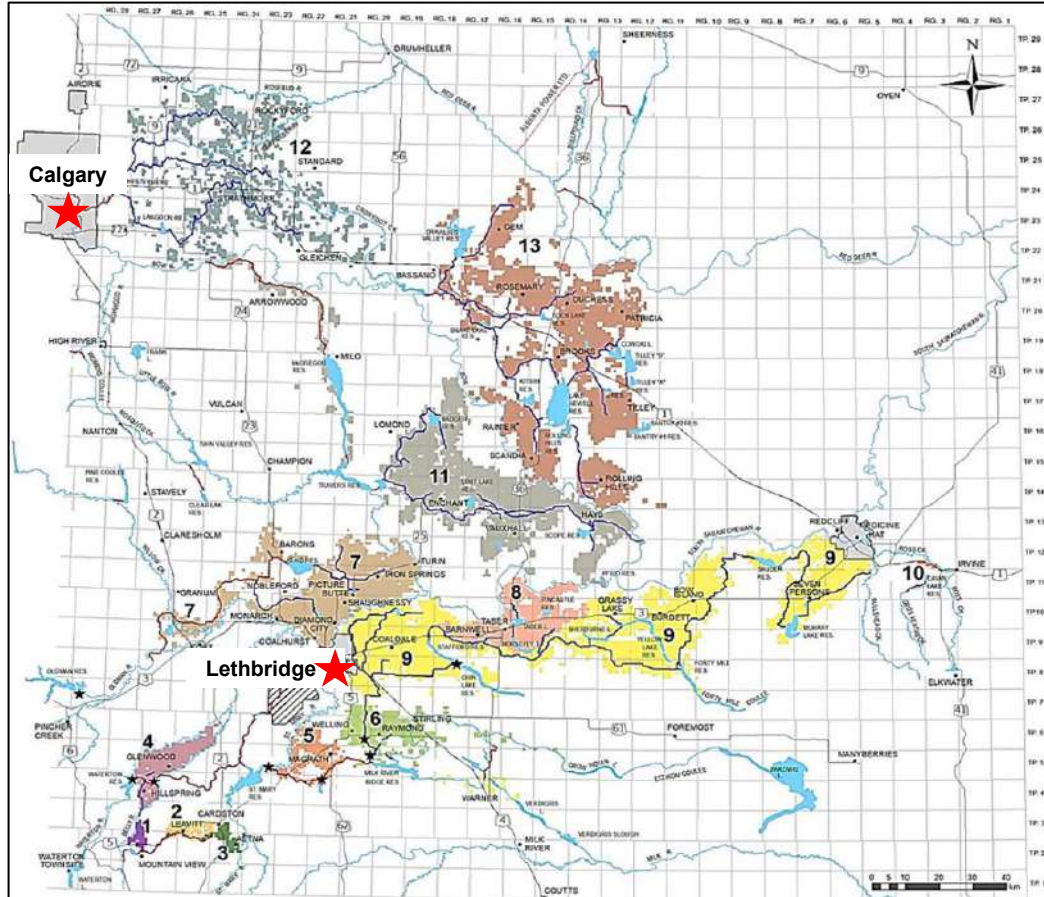
Investing in Irrigation: Water Productivity



**Irrigate more
land with the
same
volume of
water!**

Source: Alberta Agriculture and Irrigation, 2021

Irrigation Expansion in Alberta



Source: Acera Consult Inc., 2021

**Proposed expansion of 81,000 ha
between 2018-2038
(\$933 million investment)**

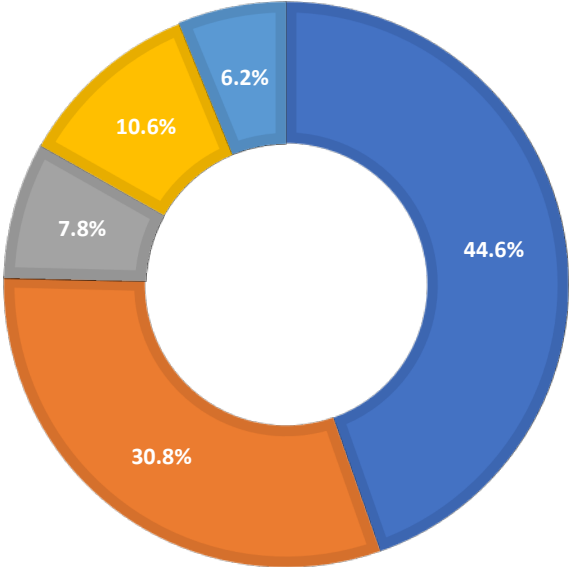
- Increase in crop and livestock sales by 76% and 30%, respectively
- Annual contribution of \$477 million to provincial GDP
- 7300 permanent jobs and 1400 construction jobs



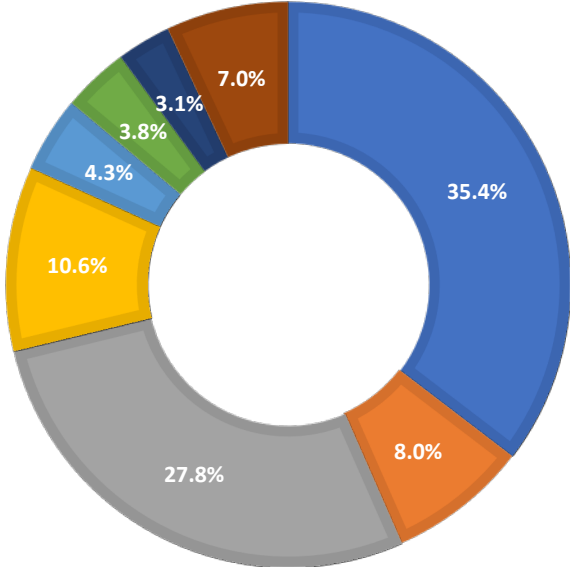
Saskatchewan - Irrigation development and expansion



Irrigated Crops in Lake Diefenbaker Development Area (2023)



- Cereals
- Oil seeds
- Pulses
- Forage crops
- Specialty crops



- Wheat
- Barley/oats
- Canola
- Alfalfa
- Potato
- Field peas
- Dry bean
- Other

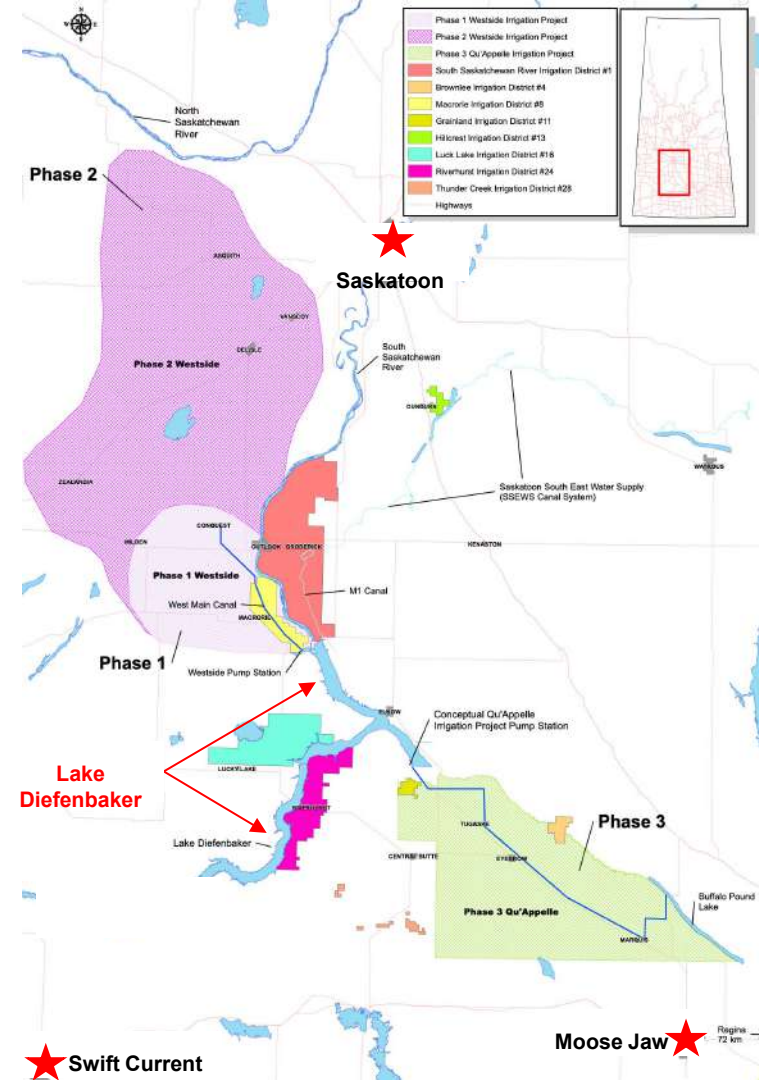
Source: ICDC, 2023

Irrigation Development Projects in Saskatchewan

Westside Irrigation Project (\$4 billion investment)

- About 40,500 ha irrigated by Lake Diefenbaker in 2020
- The project goal is to increase irrigated land area by 202,400 ha:
 - Phase I: Restoration and expansion of the West Main Canal (32,400 ha)
 - Phase II: Expansion to central Saskatchewan (105,200 ha)
 - Phase III: Expansion of the Qu'Appelle South Canal (56,700 ha)

Source: Government of Saskatchewan, 2020

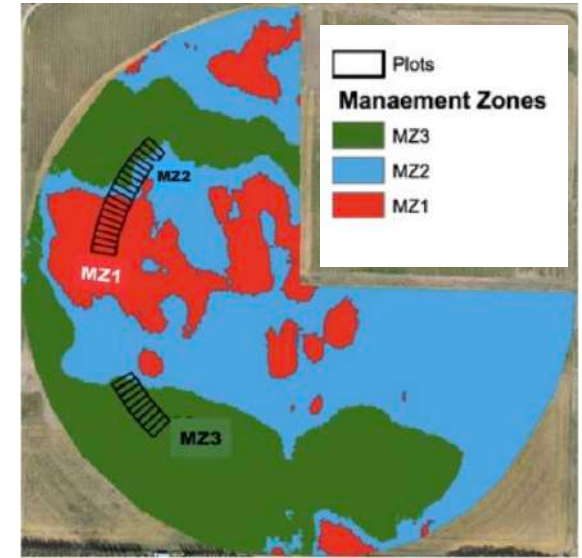
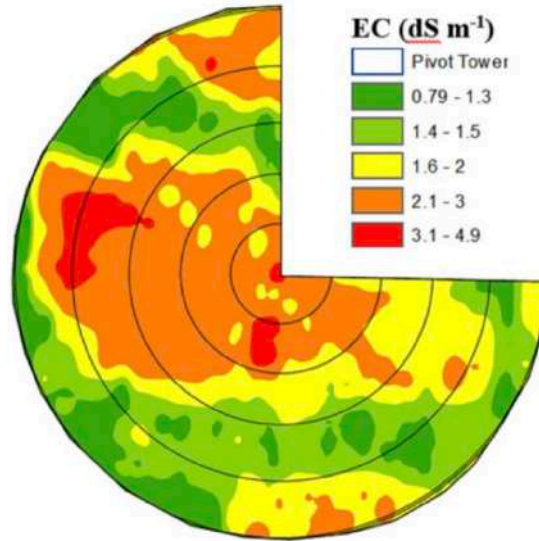
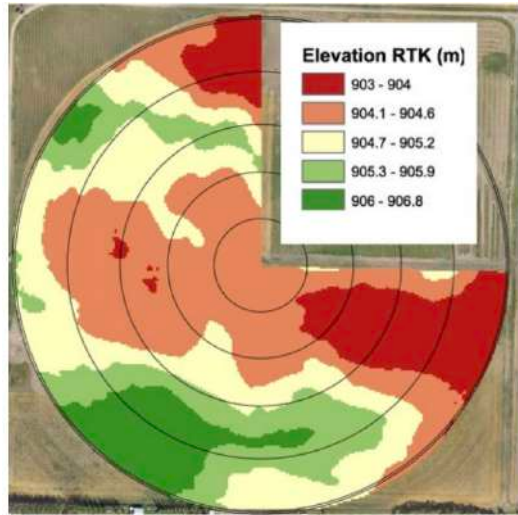


Precision Irrigation



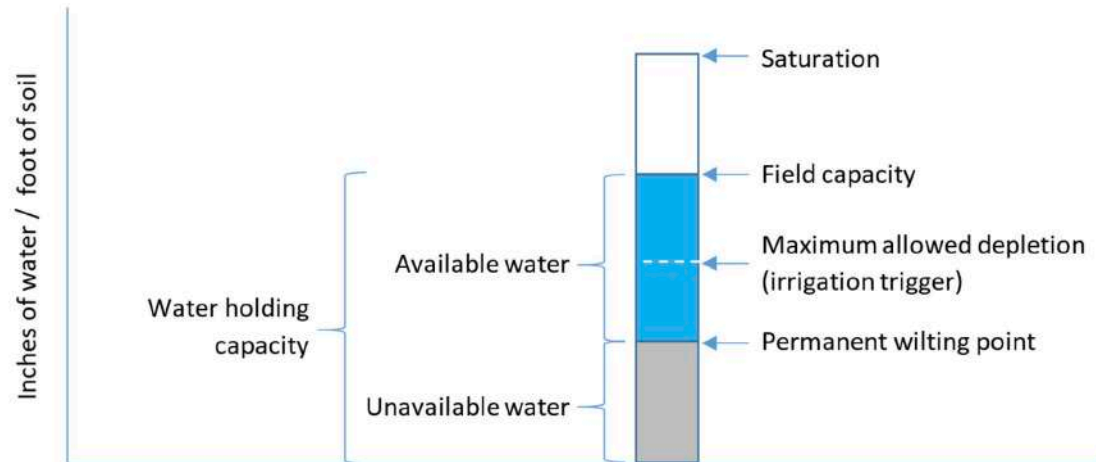
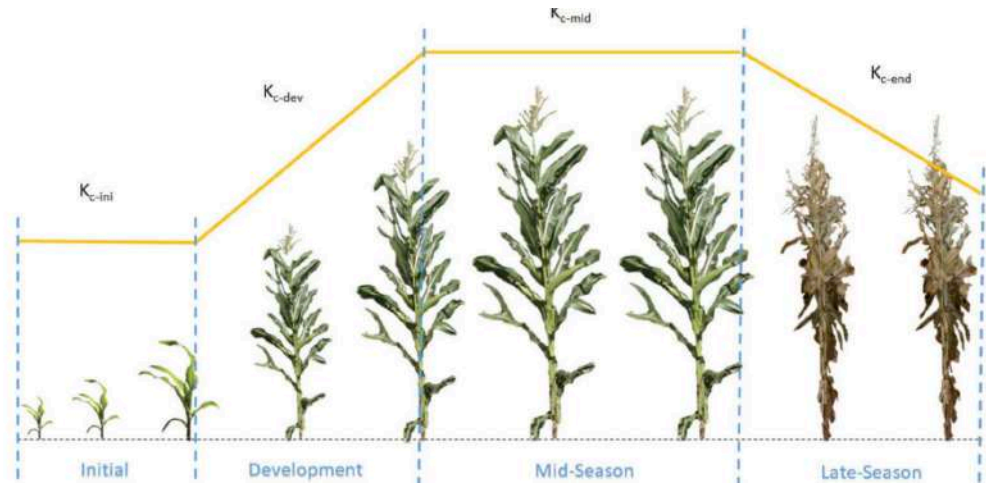
Variable Rate Irrigation (VRI)

Right Time | Right Amount | Right Place



Source: A. Yari, C.A. Madramootoo, S.A. Woods, V.I. Adamchuk (2021)

Irrigation Scheduling

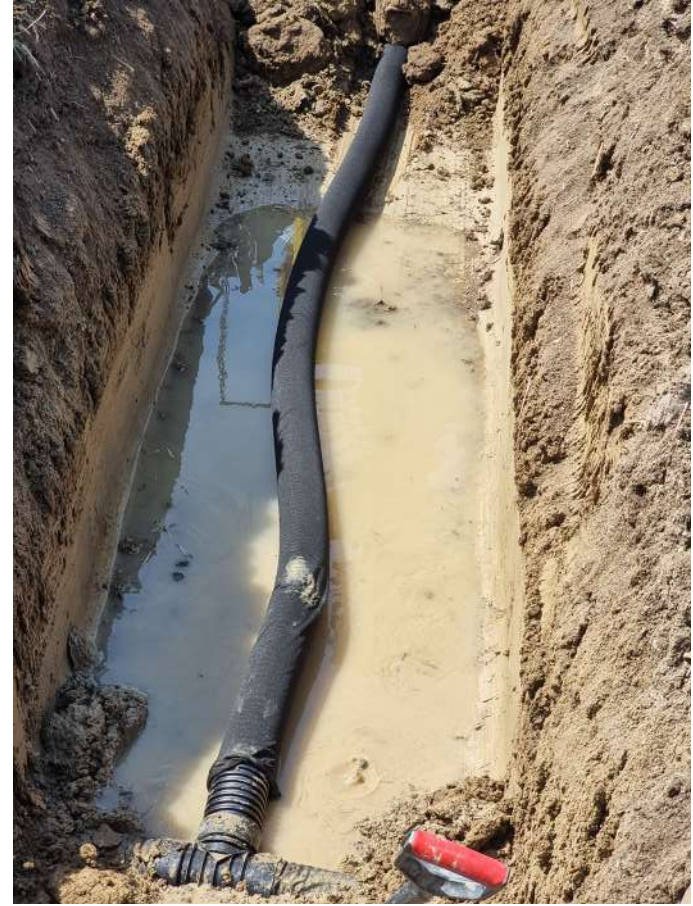


Sensor Technology

Source: Derdall & Svendsen (2022)



Drainage in Eastern Canada

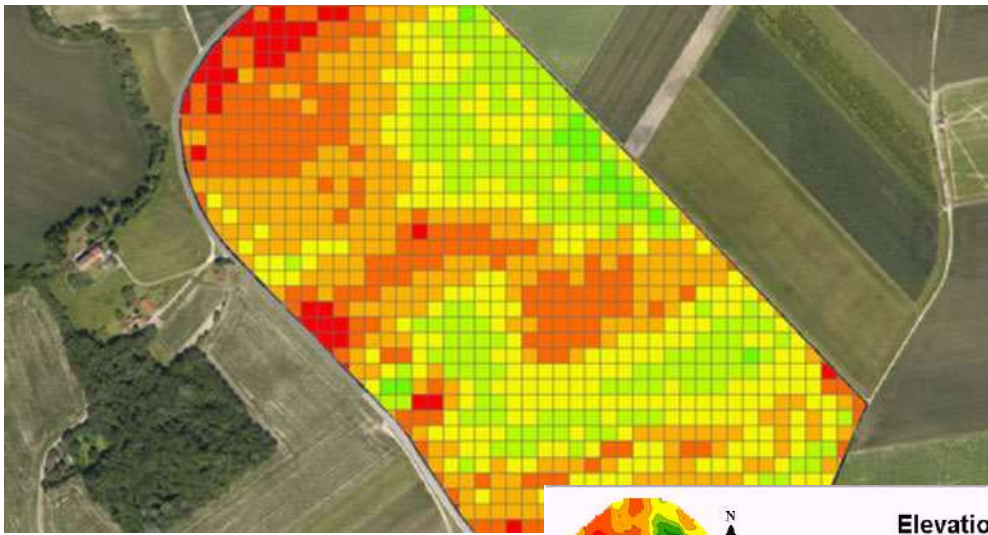




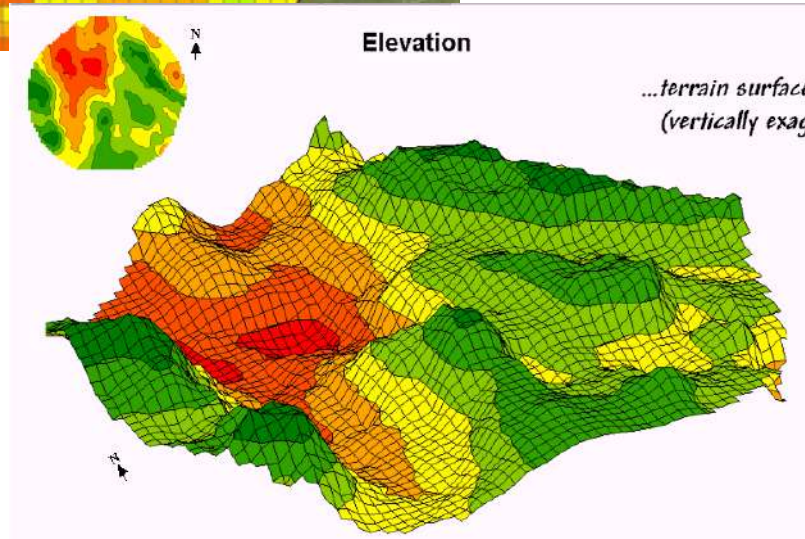
- Warmer and drier Spring soil conditions for seedbed preparation and seed germination
- Improved field machine trafficability
- Longer growing season

Trenchless plows





Use of crop yield maps and digital elevation maps to identify low spots and wet spots in fields



Field Drainage and Water Table Control



Water Table Control Structures



Managing irrigation and drainage water to protect biodiversity and maintain ecosystem functions and ecological services



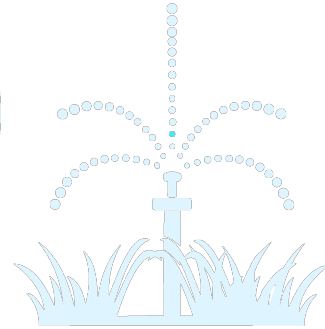
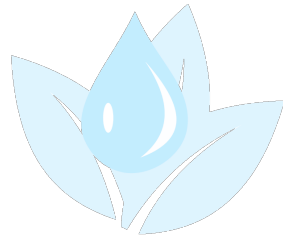
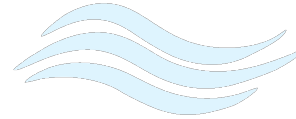
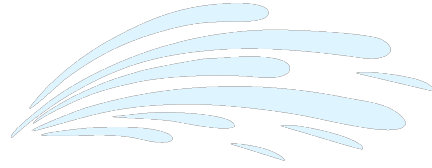


Thank You



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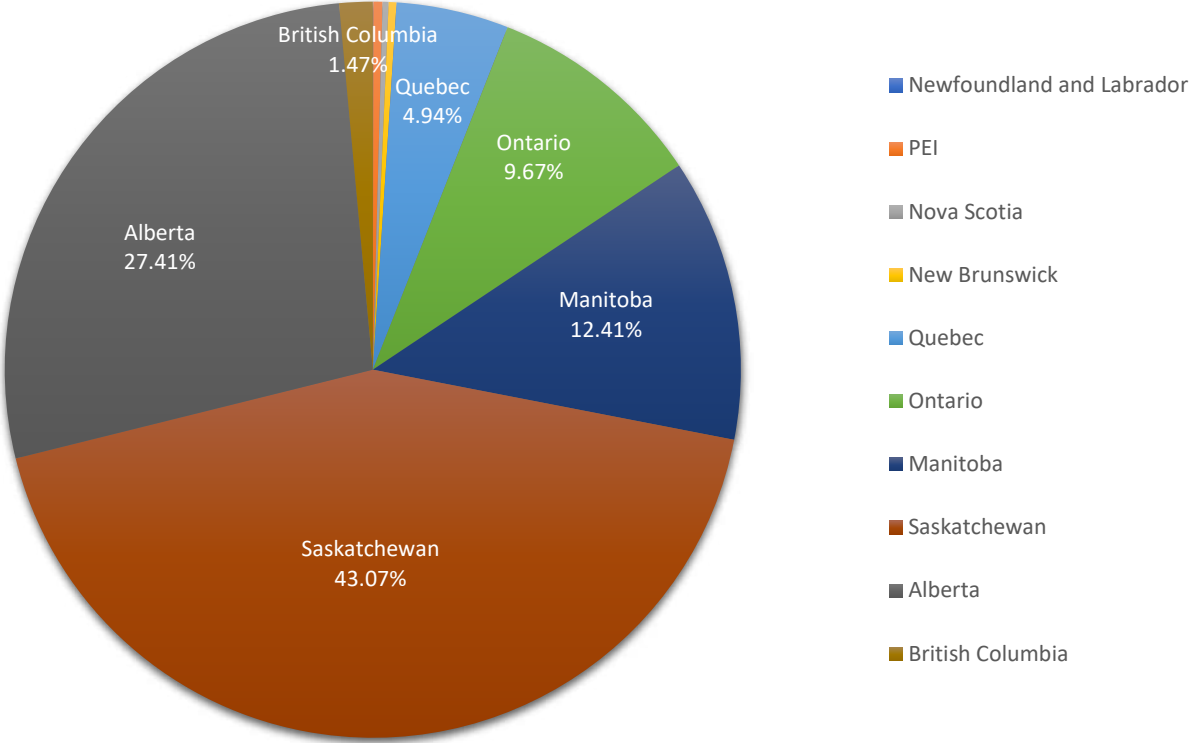


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Cropland (ha) by Province



Source: Statistics Canada, Census of Agriculture 2021