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Canada



Irrigation Demands in the Prairies and Potential Expansion

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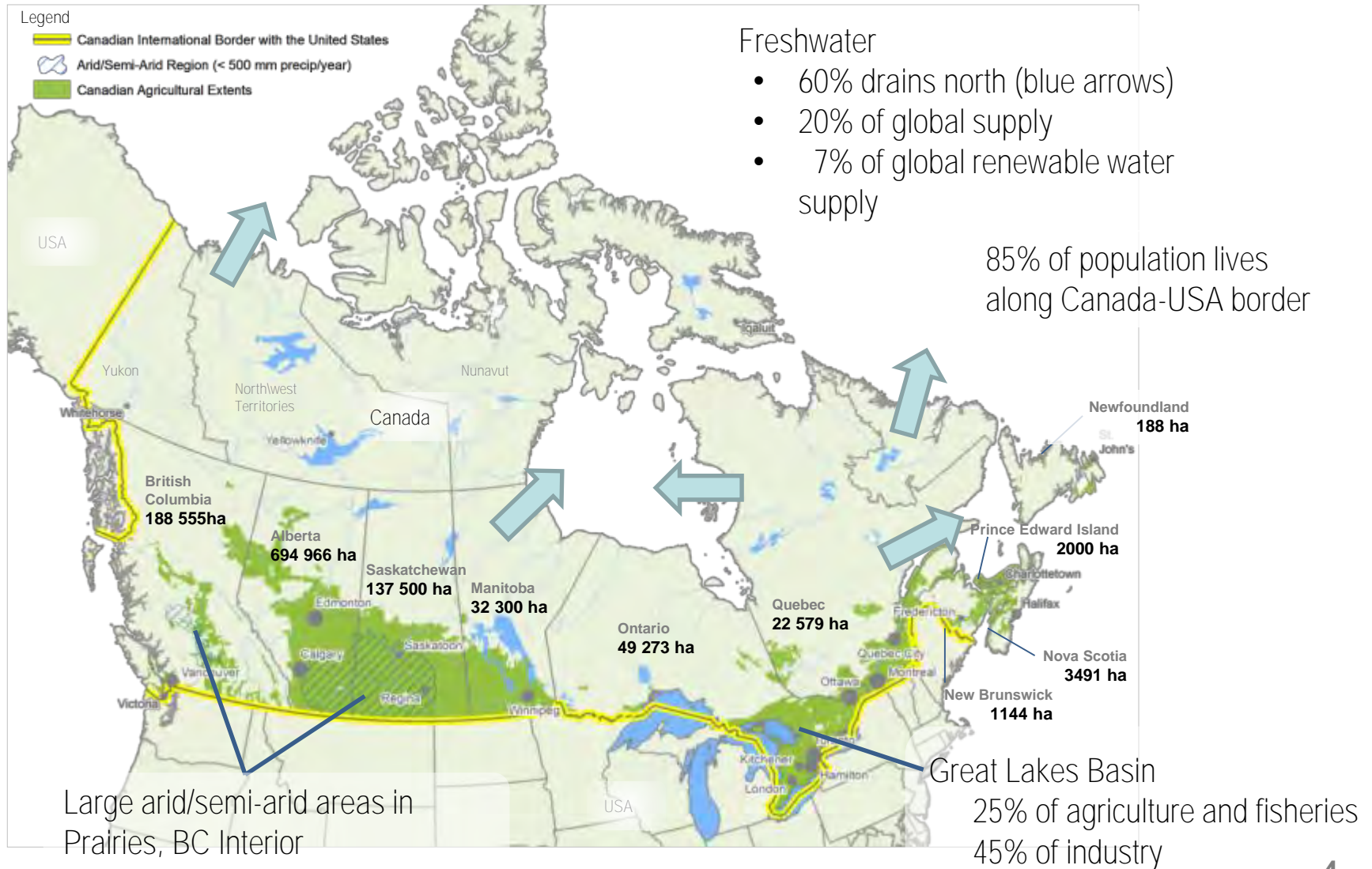
Irrigation in Canada

- Practiced on 1.0 million ha; some in every province.
- **20% of world's arable land is irrigated** → 40% of food.
- A key mechanism for drought mitigation, crop diversification, economic development and value adding.
- Alberta Irrigation Projects Association (AIPA) study:
 - Irrigation adds \$3.6 billion to provincial GDP annually.
 - 4.7% of total farmland = 20% of agricultural GDP.
 - Every m³ of water delivered for irrigation creates a \$3 increase in GDP and \$2 additional labour income.

Canadian Irrigated Area by Province

Province	Estimated Irrigated Area (ha)
British Columbia	188,555
Alberta	639,887
Saskatchewan	137,500
Manitoba	32,300
Ontario	49,273
Quebec	22,579
New Brunswick	1,144
Nova Scotia	3,491
Prince Edward Island	2000
Newfoundland	188
Total	1,076,917

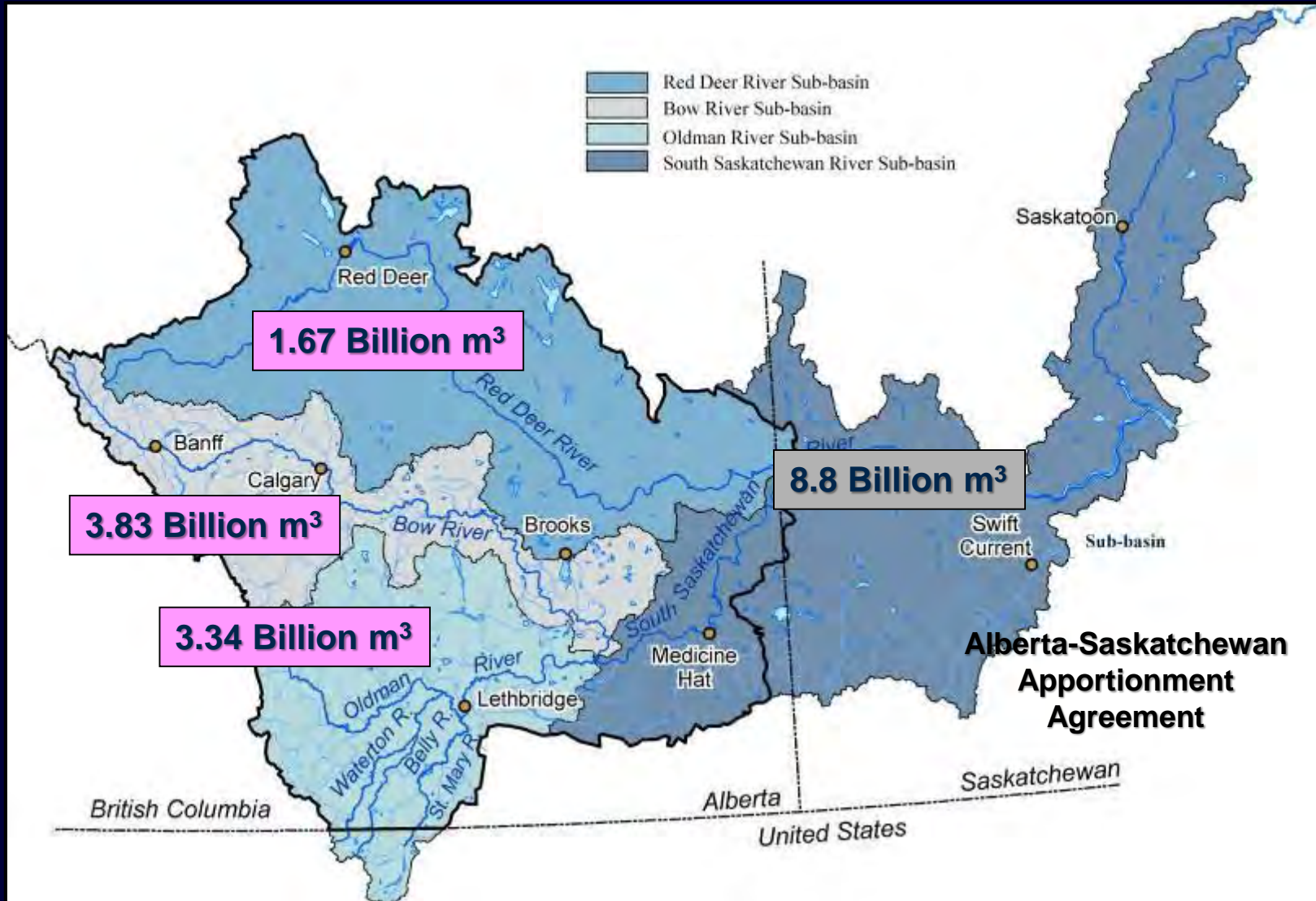
Freshwater and Agriculture in Canada



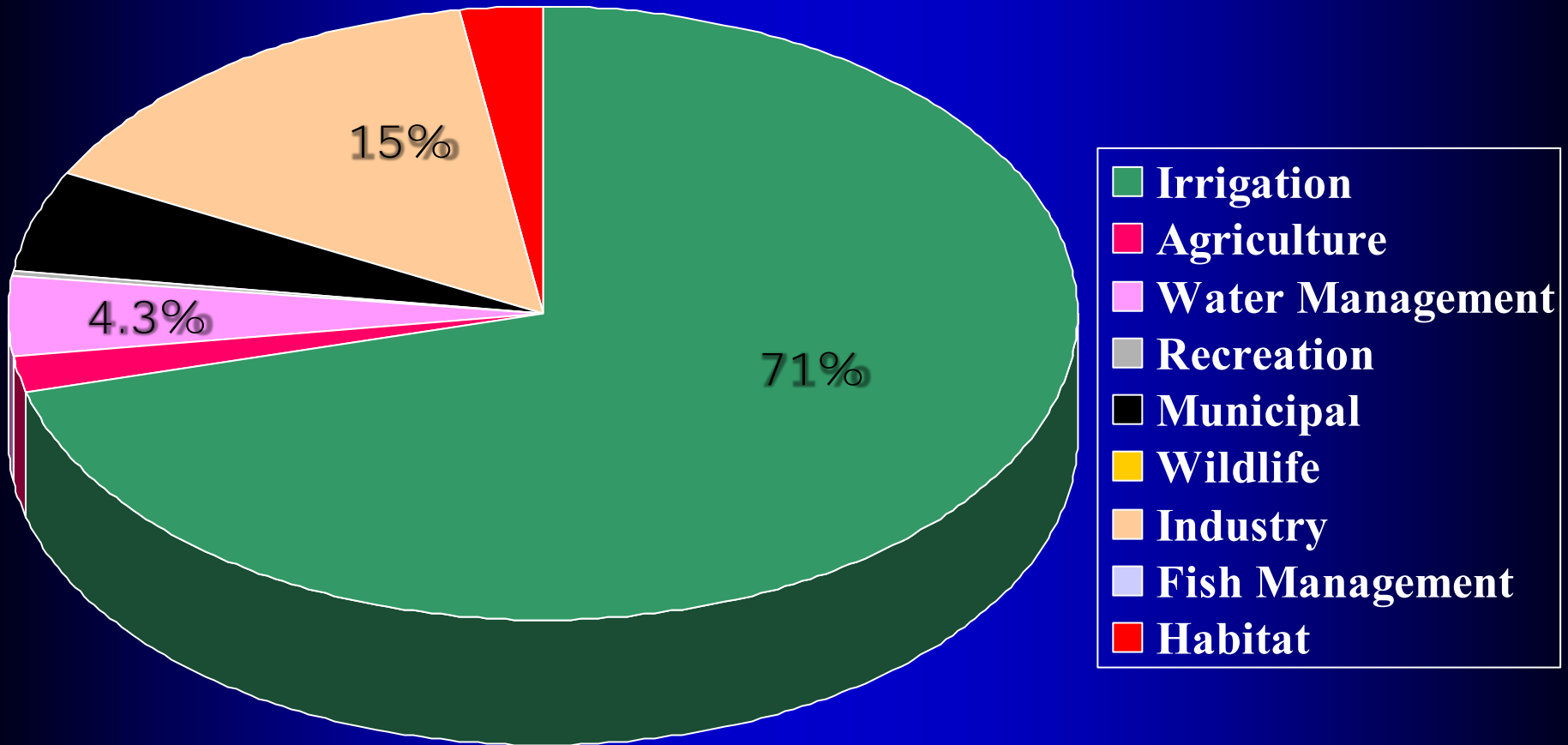
Mountain Watersheds Irrigation's Water Source



Average annual natural flow volumes



Consumptive Water Use in Alberta

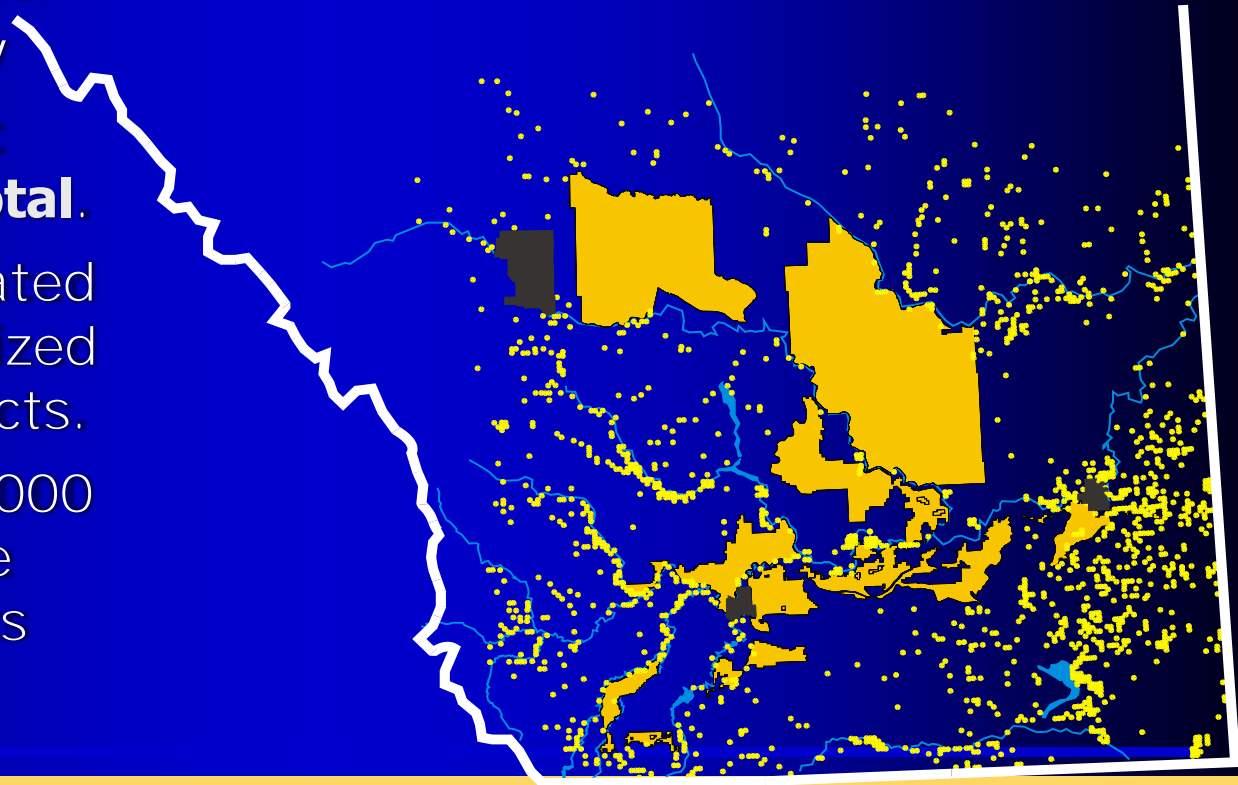


- ❑ 97.5% of consumptive use is from surface water.
- ❑ 2.5% of consumptive use is from groundwater.

- Currently 500,000 domestic wells in Alberta.
- About 7,000 new wells are added each year.

Irrigation in Alberta

- About 660,000 ha of land currently irrigated – almost **70% of Canada's total**.
 - 555,000 ha located in the 13 organized irrigation districts.
 - Additional 105,000 ha as private developments




SASKATCHEWAN

- Land of opportunity
- 142,000 irrigated ha



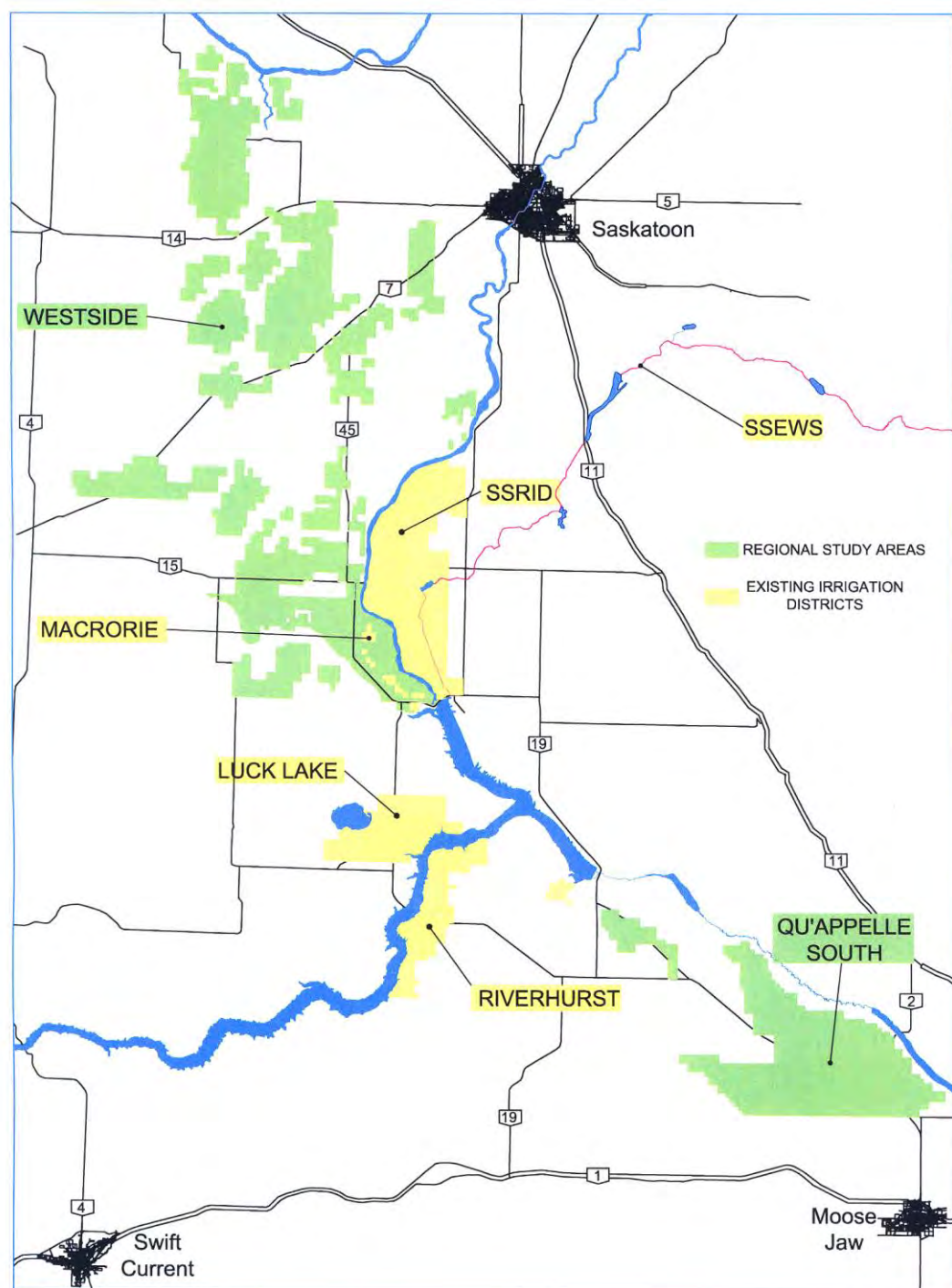
Lake Diefenbaker Gardiner Dam

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- An aerial photograph showing the vast expanse of Lake Diefenbaker, a large reservoir in Saskatchewan, Canada. The lake's surface is a deep blue, contrasting with the surrounding green and brown landscape. In the foreground, the Gardiner Dam is visible as a long, low structure with several spillways. A road or railway line runs parallel to the dam. The sky is a pale blue with some light clouds.
- 9.4 million dam³ total storage
 - 64m high dam x 5,000m wide
 - 225km long lake with 800km shoreline
 - 45% of SK population's drinking water source

- PFRA completed the Gardiner Dam and Lake Diefenbaker in 1966 for some 500,000 acres of irrigation to drought-proof Saskatchewan and provide the “critical mass” to support value-added processing.
- The total irrigated area in the province is roughly 350,000 acres, with approximately 110,000 of those acres supplied from Lake Diefenbaker.
- Currently, less than 2% of the average inflow to Lake Diefenbaker is used for irrigation. Roughly 4% of the average inflow is lost to evaporation.
- Potential irrigation expansion from Lake Diefenbaker is over 500,000 acres.



Potential for expansion areas based on suitable soils and economic feasibility.
Qu'appelle South and West side projects



Qu'Appelle South Irrigation Project

- Total Development of 45,000 hectares
- Combination of open canal and reservoirs supplying modules of pressurized pipeline delivery systems
- Potential to supply Buffalo Pound Lake with high quality water for Regina & Moose Jaw plus recreational lakes downstream

Westside Irrigation Project

- Total Development of 152,000 hectares
 - Lake Diefenbaker = 135,000 ha
 - South Sask. River = 10,300 ha
 - North Sask. River = 7,200 ha
- Combination of open canal and reservoirs supplying modules of pressurized pipeline delivery systems in 2000 to 4050 ha blocks

Climate Change, Water, and Canadian Agriculture

- Evidence for global warming is unequivocal. (IPCC 2014)
- Climate change and water are closely linked.
 - Water availability affected: periods of scarcity and excess.
- Extreme weather events expected to be more frequent and **severe (the “new normal”)**.
 - Heat waves, excess precipitation, drought.
- Irrigation and drainage are key components to climate change adaptation.

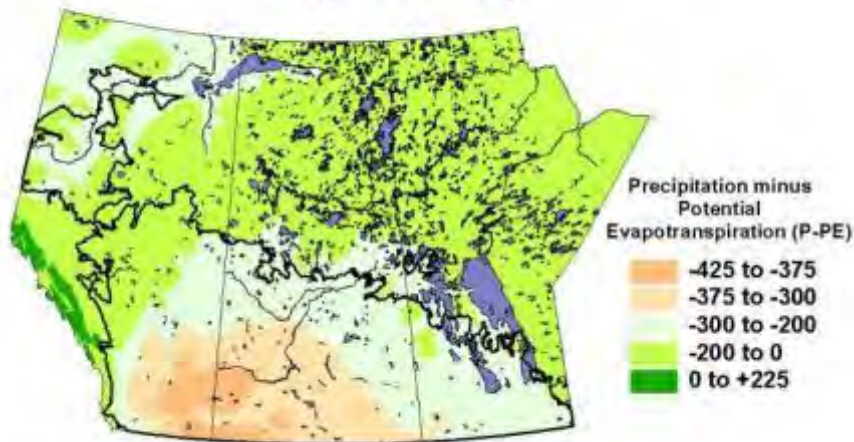
Peterborough ON



Red River Valley MB

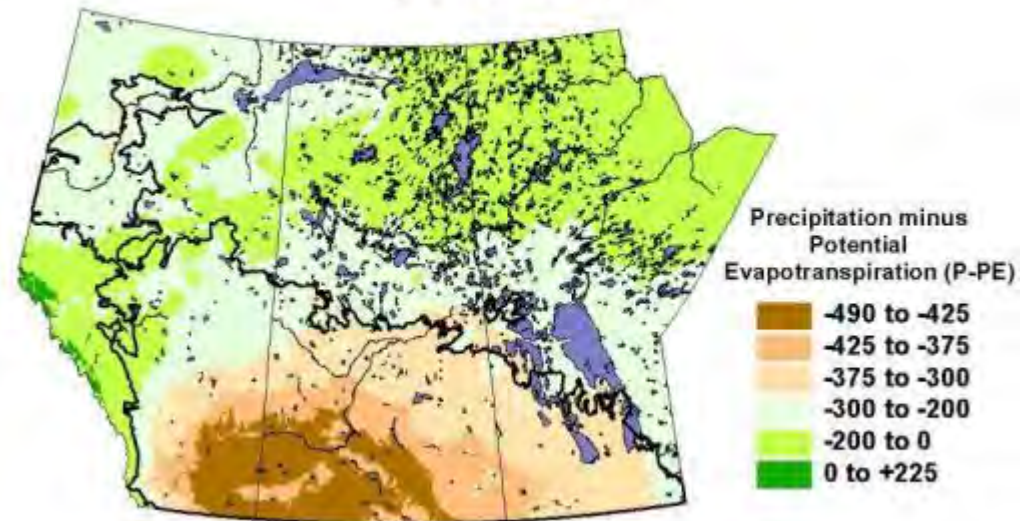
Climate Models Predict a Warmer, Drier Growing Season

**Moisture Deficit (P-PE)
(1961-90)**



Models vary, but most indicate a 2.5 - 4⁰C increase in temperature and a 2-10 per cent increase in precipitation → greater moisture deficit.

**Moisture Deficit (P-PE)
(2040-69)**



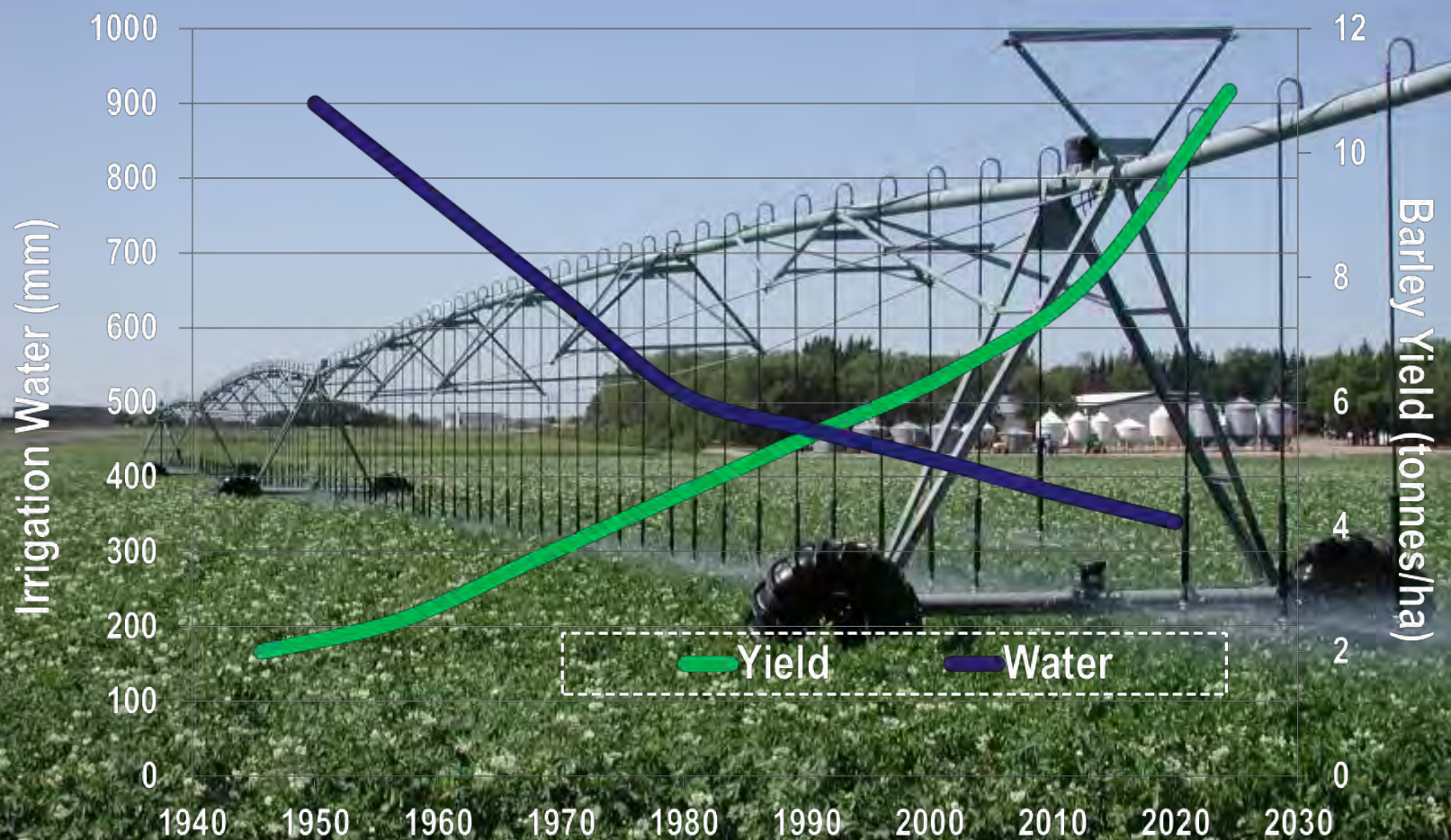
Current RDT Activity

- 1) Evaluation of new and existing crops and varieties under irrigated conditions in a changing environment.
 - collaboration with AAFC, University, private plant breeders.
- 2) **Development of BMP's for sustainable irrigated crop production.**
 - season extension technology, greenhouse gas mitigation, agronomy
- 3) Evaluation of irrigation management practices for improved water and energy use efficiency and resource protection.
 - precision irrigation, irrigation scheduling, surface and sub-surface drainage, etc.

On-farm application efficiency has increased from 50 to 90%



Increasing the Productivity of Irrigation Water



The Challenge

- Increased water scarcity is predicted in regions of western Canada due to climate change and increased demand from other sectors
- Availability and distribution (where and when) of water resources will be altered
- Climate change effects on future hydrology will strain irrigation, drainage and flood control systems.
- Improving irrigation water use efficiency
- Improving climate forecasting and monitoring
- Equip producers and industry with tools for decision making. What happens if we expand irrigated areas.
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ICID 69th IEC and Regional Conference Saskatoon, Canada, August 12-17, 2018



Conference Theme:
**Innovative and sustainable agri-water
management: Adapting to a variable
and changing climate**

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