# How will climate change impact agriculture in Canada?



### PROJECT SUMMARY

Project summary: Agricultural Water Futures (AWF) examines how climate change will affect Canada's agricultural systems and the people and ecosystems that depend on them. Our integrated research approach explores agricultural challenges from multiple perspectives: climate, hydrology, soils, land use practices, economic incentives, and human behaviours. Our goal is to help specialists across Canada's agricultural community – producers, managers, extension specialists, businesses, conservation authorities, researchers, and policy experts – make informed decisions that will help Canadian agricultural practices adapt to a changing climate, both now and in the future.

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PROJECT NAME: Agricultural Water Futures in Canada: Stressors & Solutions

### Progress

Water Availability and Use For

Crops

• Improved measurement and modelling



### Results

Water Availability and Use For

#### Crops

 Creation of unique datasets of water use, biophysical characteristics and ET from crops in both SK and ON

- capabilities for crop water use
- New approaches to better understand evapotranspiration and crop productivity

#### Water Quality & BMPs

- Understanding interactions between
   climate, landscape and management
   drivers on nutrient loss within and
   between the Prairies and Great Lakes
- Integrating water quality into models
   Behavior Change & Economics
- Understanding producer motivation and exploring incentives and water quality trading schemes
- Including human behaviour in hydrological models
- Quantifying cost-effectiveness of BMPs



## **User Engagement**

AWF engages with stakeholders to cocreate knowledge and develop costeffective solutions for farmers and managers. This is being done through various media:

- Stakeholder workshops in both
   Waterloo (2018) and Saskatoon (2019)
   for co-creation of knowledge
- Field tours and educational workshops for industry specialists and conservation authorities/districts (London, 2019; Waterloo, 2019; Virtual/Saskatoon 2021)
- Webinars, podcasts and op-eds in popular media, and Twitter (ongoing)

• Improvement of existing crop models and simulation of agroclimatic indices

#### Water Quality & BMPs

- Demonstrated improvement of Prairie water quality through soil P drawdown
- Determination of spatial drivers of water quality and development of recommendations for targeting BMPs across and within regions
- Integrated water quality into CRHM and development of tile drainage module

#### **Behavior Change & Economics**

- Development of economic optimization tool for watershed BMP implementation
- Analysis of water quality trading schemes



• Blog on Agricultural Nutrients and Water Quality:

https://sites.usask.ca/agwaterquality/

- Special issue in J. Environmental
- Quality on BMPs in Cold Regions (2019)



### Outcomes and application uptake

- Integration of AWF Great Lakes results into Ontario Ministry of Agriculture, Food and Rural Affairs Ontario P Index tool (PLATO)
- Training of Certified Crop Advisors in BMP recommendations for farmers
- Recommendations for soil P thresholds in the Prairies needed to improve water quality
- Suggestions for the Great Lakes Water Quality Agreement Science Priorities used
- Ongoing dialogue and research about opportunities for place-based P management to help bridge agronomic and environmental needs for soil P
- Engagement from provincial governments of SK, MB and ON in our results









