

# Unpacking Landuse Decisions: Drivers and Resistors Part II Adventures in Co-Development



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# Photo of the team





# Objectives

To understand and couple farmers' viewpoints into water quality decision-making



**IMPORTANT**

Identify a set of Beneficial Management Practices (**BMPs**) that are coming from farmer's viewpoints





# 1-Understand viewpoints about agricultural drainage impact on water quality



Photo Credit: Stacey Lieslar, PAg

*Drainage ditch grassed on one side,  
farmed to edge on other.*



Photo Credit: Stacey Lieslar, PAg

*Un-grassed ditch sediment deposition.*



Photo Credit: USWA

*Grassed and properly sloped with 4 to 5 meters  
buffer from cropland.*



## 2-Understand viewpoints about impact of corrals near creek on water quality



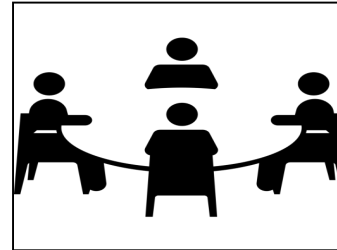


# March workshop to understand stakeholders' viewpoints

1. Statement sorting activity



2. Group discussions



3. Mapping activity







# Statement sorting activity

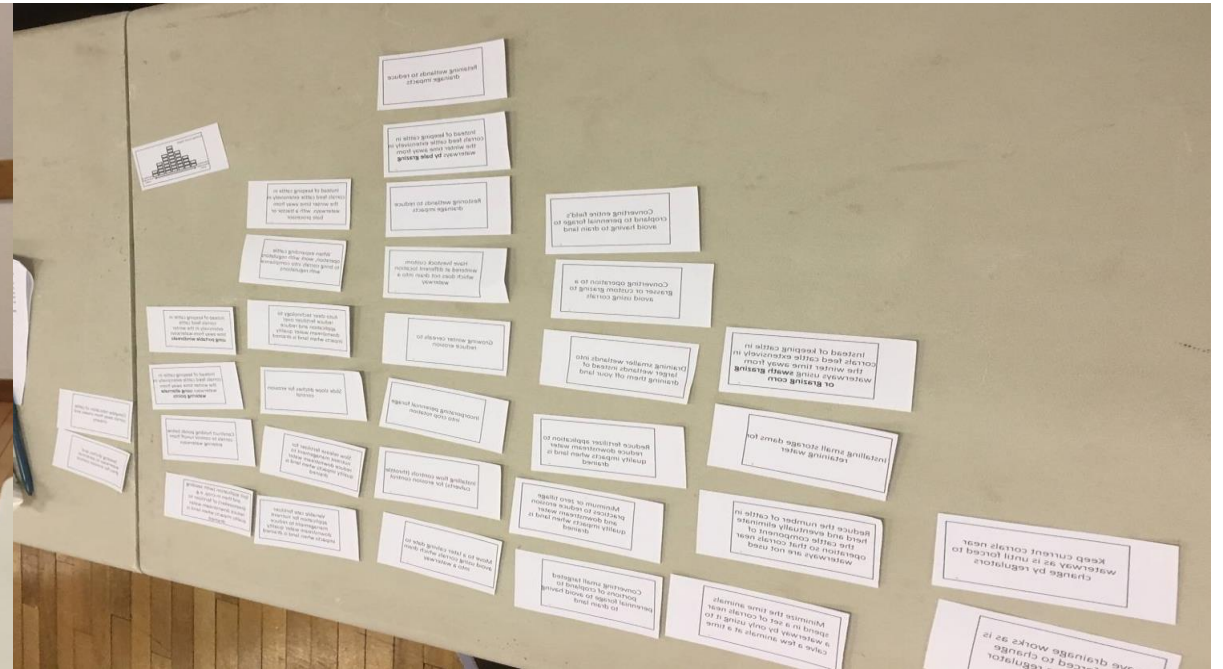
28 participants

Farmers

Resort village residents



Thank  
You!!!





# Results for sorted statements – Agricultural Producers

- Wetland restoration, flow and erosion control
- Relocation of corrals away from a creek
- Doing nothing!



Flow and erosion-control **over**  
fertilizer management



‘Hard’ and ‘soft’ management  
solutions





# Results for sorted statement- Lake Residents

- Wetland restoration/retaining , flow and erosion control
- Relocation of corrals away from a creeks
- Fertilizer management

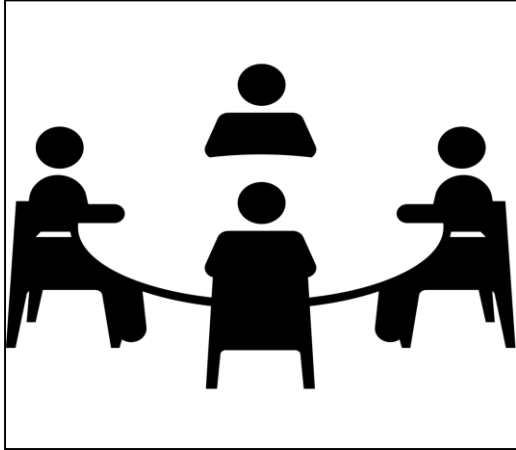


- Don't leave drainage as is until forced to change





# Group discussion and mapping activity



- Negative impact of draining wetlands
- Need for controlled drainage work
- Importance of relocating corrals away from creeks. capital cost



- A mixture of incentives and enforcement
- “Use the Tools and Enforce the Rules”: tools need to be provided and rules need to be enforced.



# Overall

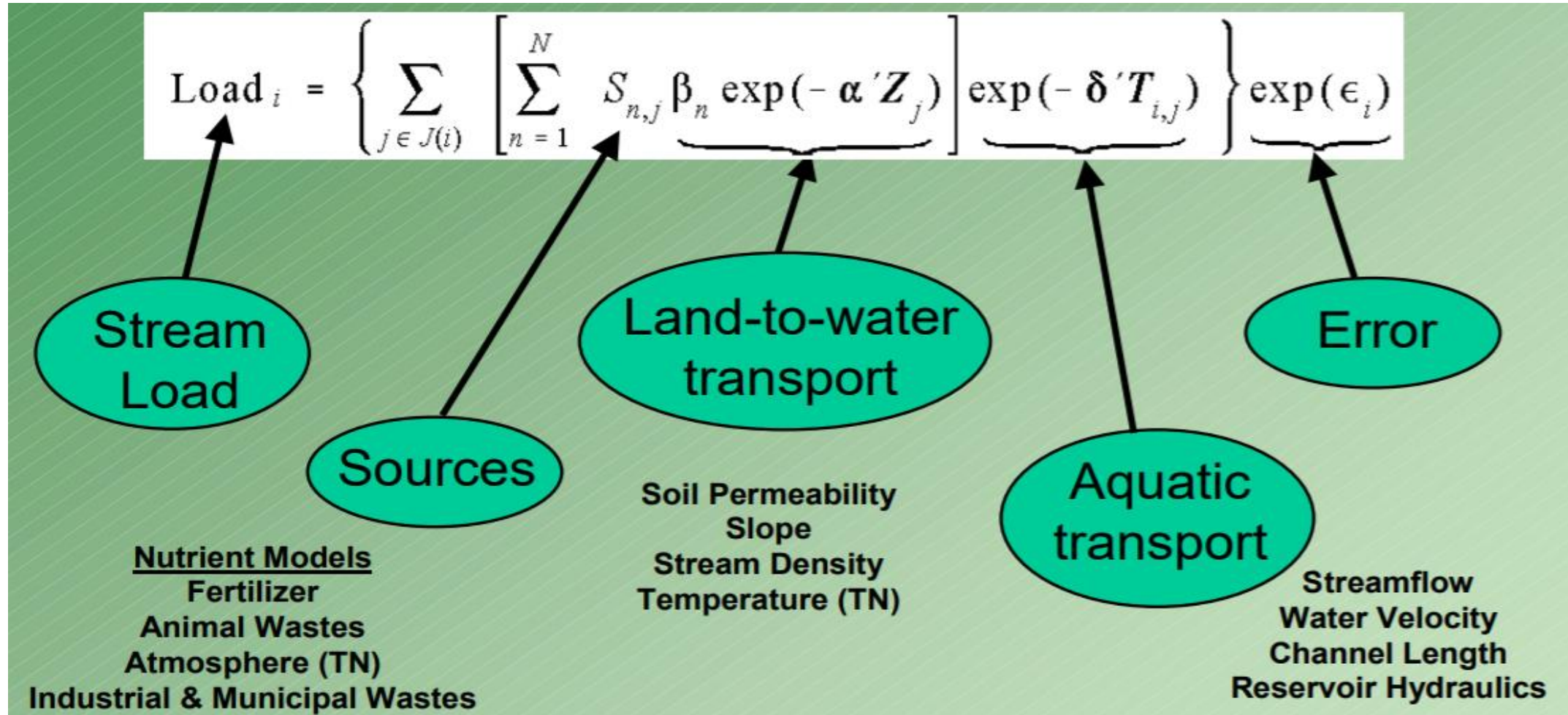
- There was an openness to our plan
- People express desire to comment on model development iteratively





# Structure of Water Quality Model

A water quality model that simulates the nutrient exports from a catchment

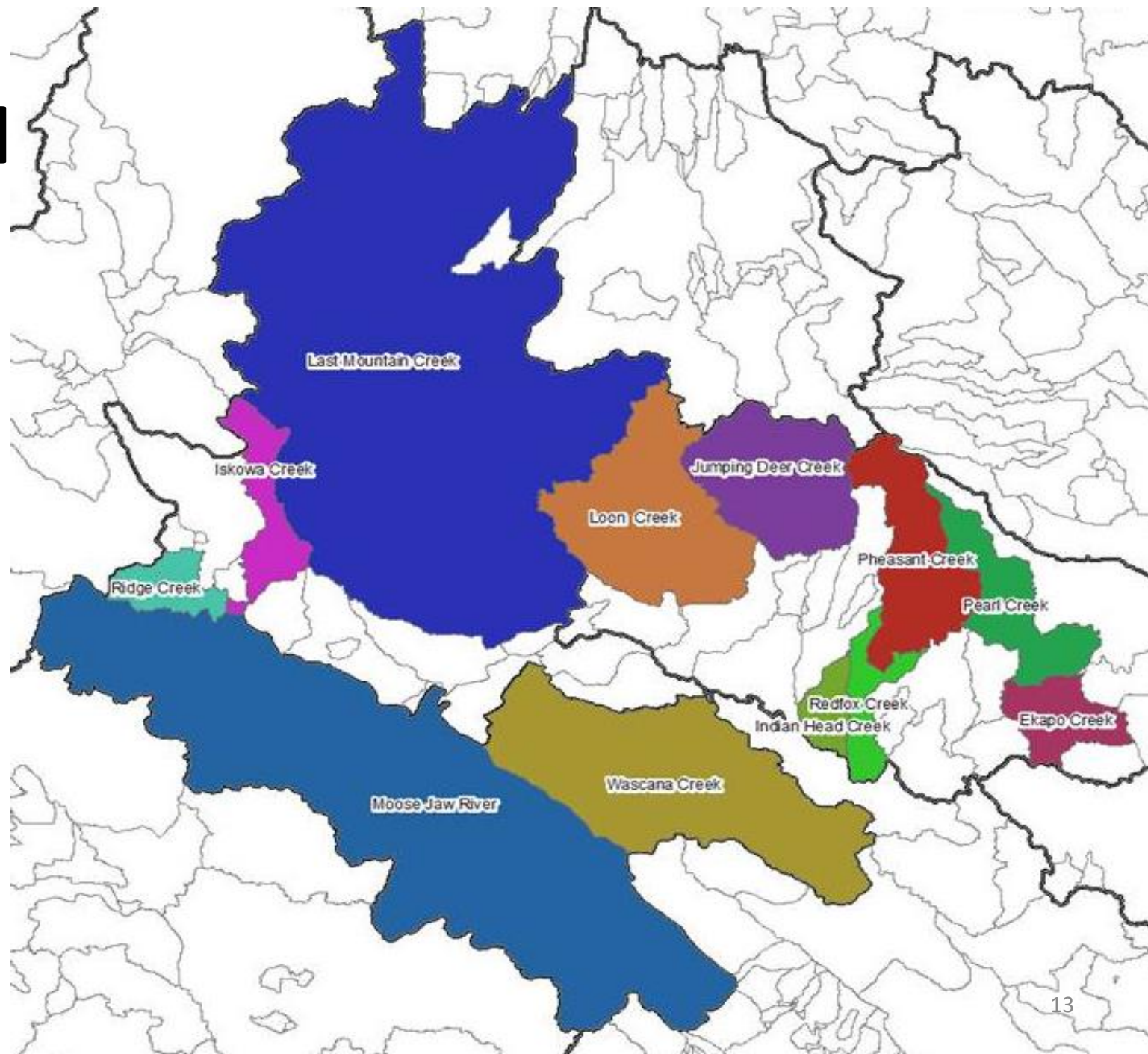


U.S. Geological Survey (SPARROW non-linear regression equations)



# Water quality model

SPARROW inputs and  
equations to estimate  
**nutrient loads from all  
tributaries**





# Assumptions for model development

## Data:

- Total number of corrals near creeks in each tributary (no spatial distribution)
- Wetland coverage area in each tributary (no spatial distribution; no spatial indication of drained wetlands)
- Averaged annual data (do not tell seasonal or year by year change)

## Model:

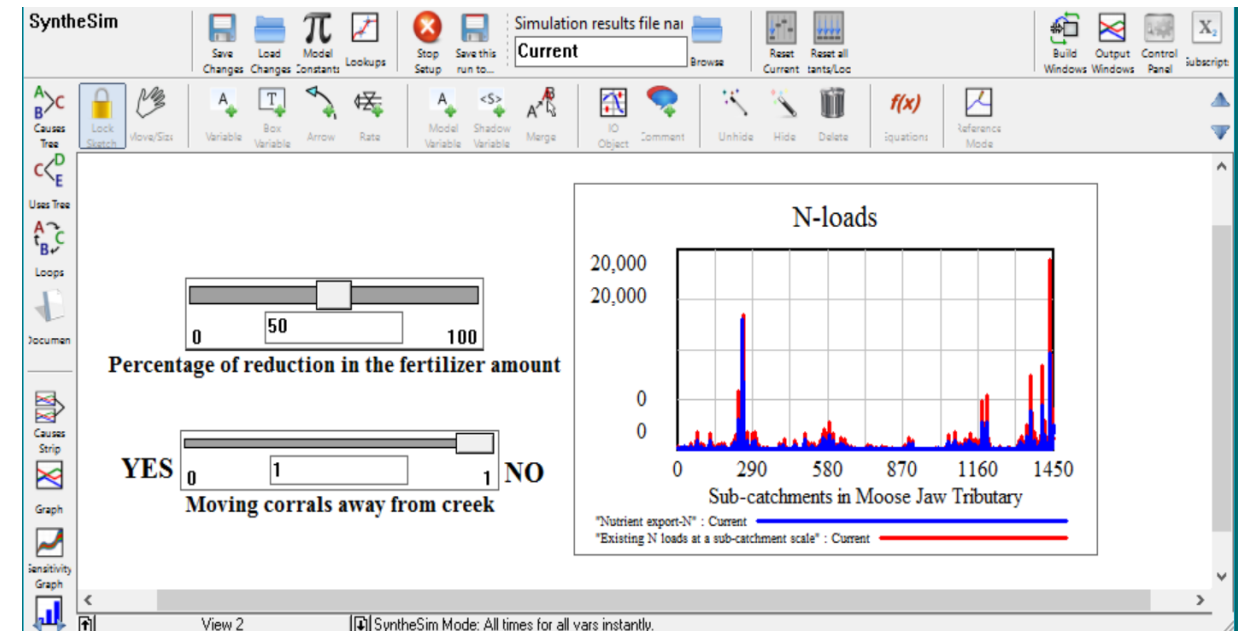
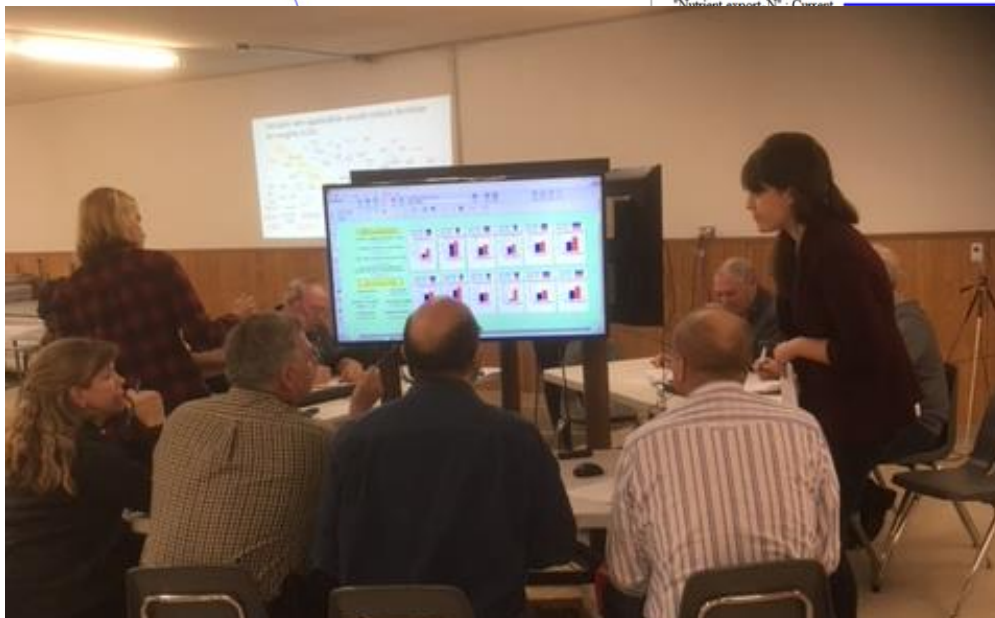
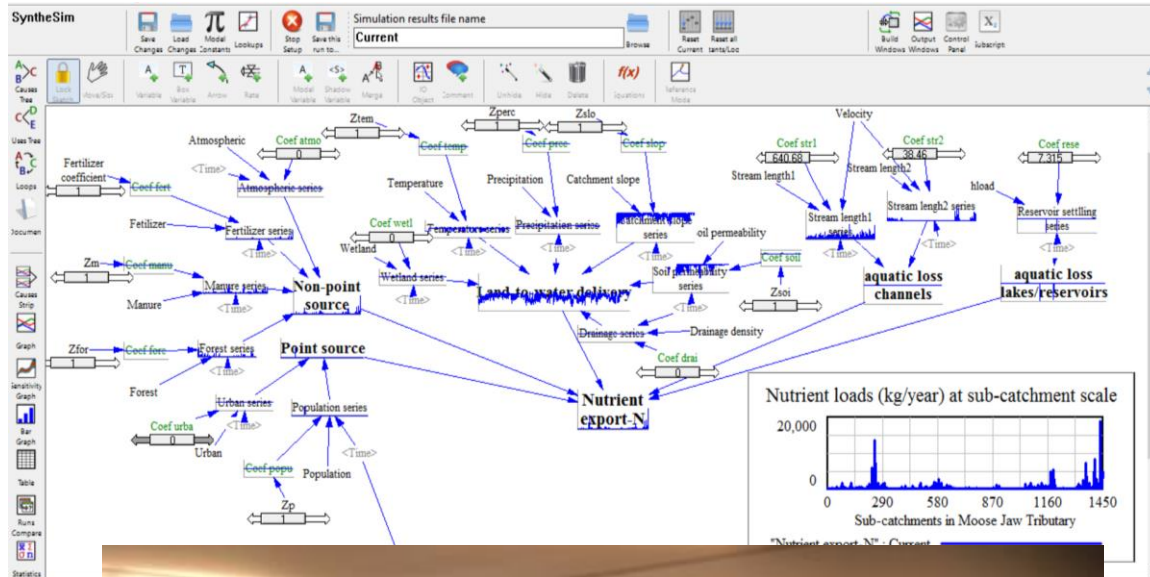
- Only nutrient exports (loads) from each tributary to Qu'Appelle (no calculation of loads/concentrations in the Qu'Appelle River at this stage)



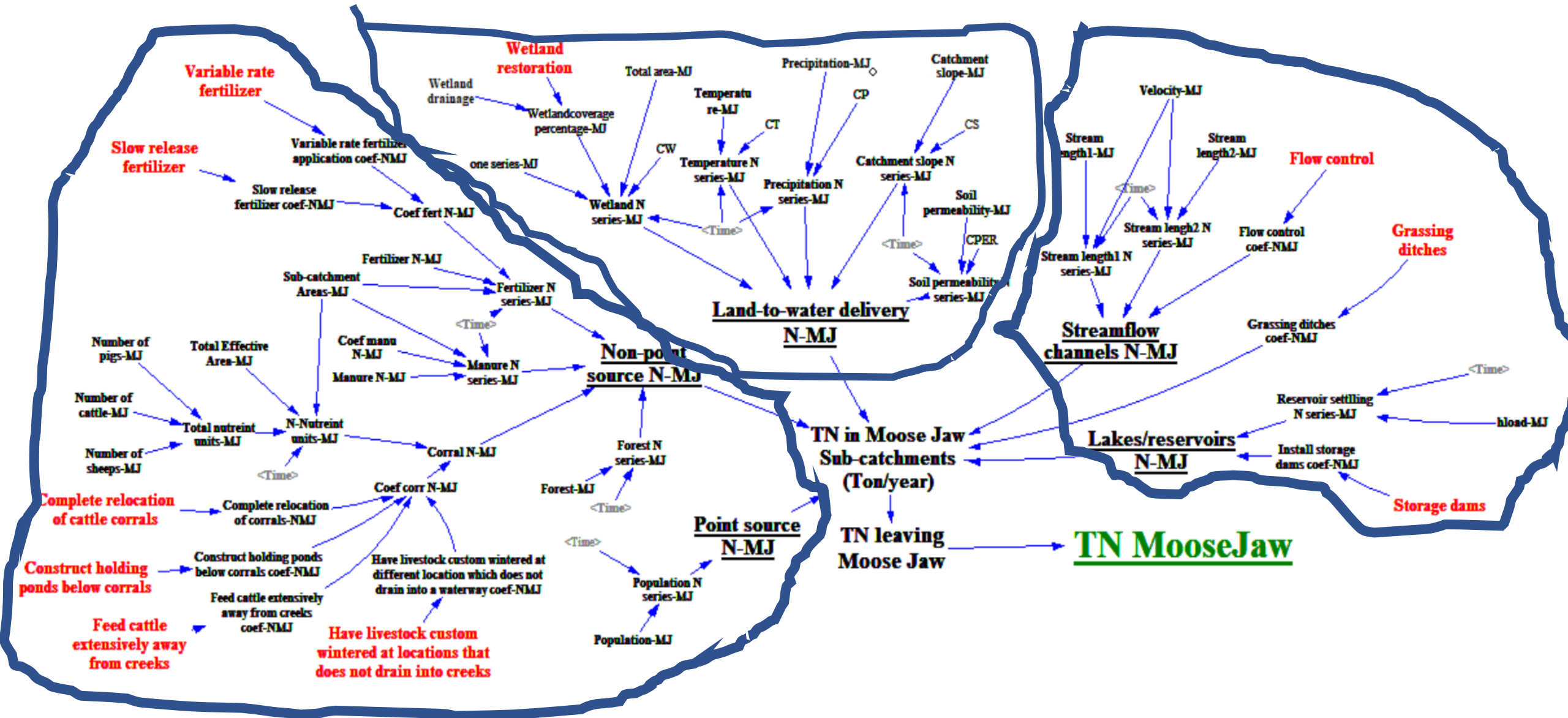
# Participatory Water Quality Modeling Experimental Decision Lab 2.0

4 distinguishing viewpoints on BMPs with the most positive impact on water quality:

- Flow and erosion control in grain farms (11 participants)
- Cattle farm and wetland management (7 participants)
- Cattle feeding management in cattle farms (5 participants)
- Fertilizer management in grain farms (2 participants)



# Water quality model

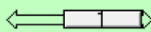


### BMPs for corrals near creek

<Construct holding ponds below corrals>



<Complete relocation of cattle corrals>



<Feed cattle extensively away from creeks>

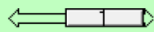


<Have livestock custom wintered at locations that does not drain into creeks>

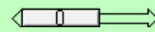


### BMPs when land is drained

<Grassing ditches>



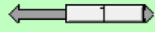
<Flow control>



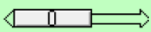
Variable rate fertilizer>



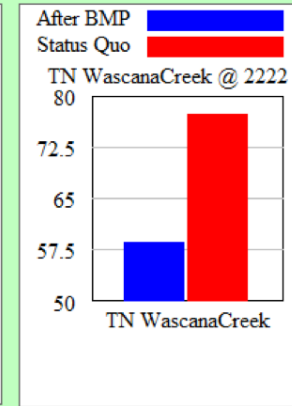
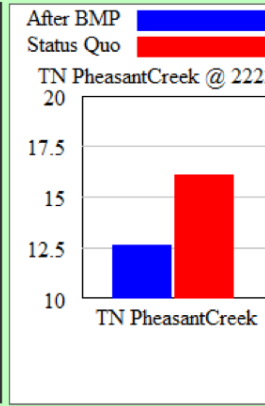
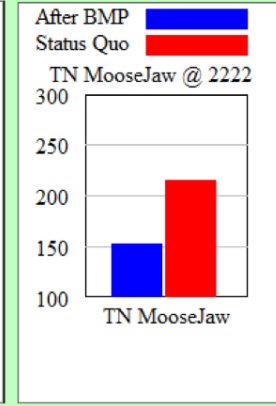
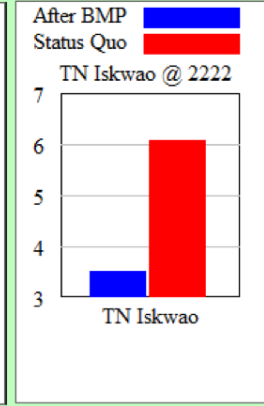
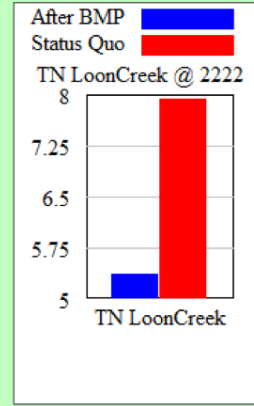
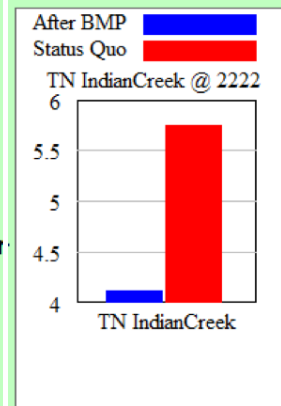
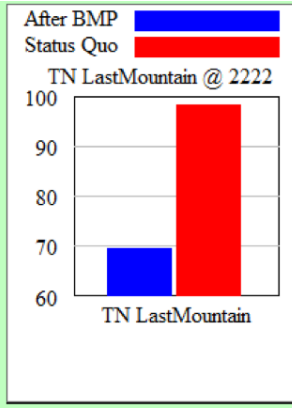
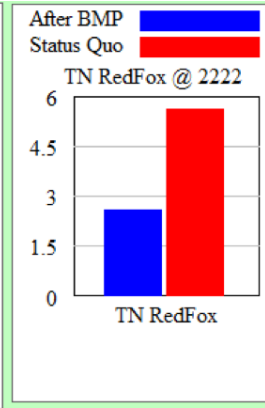
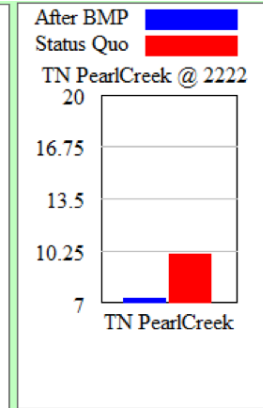
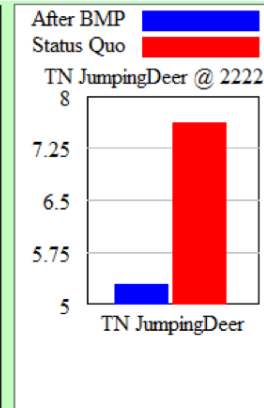
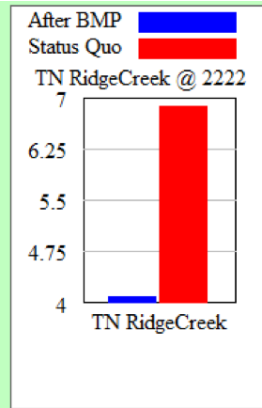
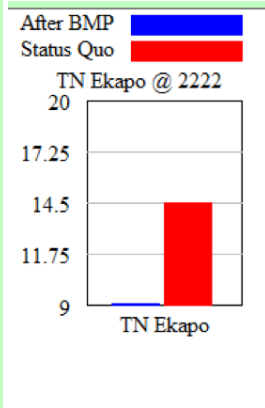
<Slow release fertilizer>



<Storage dams>



<Wetland restoration>





# Key learnings from workshop

- Cumulative effects of BMPS needs more consideration
- Gradients of BMPs not on or off
- Wetland restoration was not seen as realistic – retention was
- Fix numbers of livestock not necessarily representative of
- More place-based approach at the farm scale is needed
- Economics is primary driver of decisions model should reflect this
- Nutrients don't drive decisions, but we'd like to know the decrease load from investment in BMPS.



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# Potential Next Steps

- Water Quality App &



# Crowdsourcing Water Science



Who do users want to share data with and under what circumstances?



**Location:** Latitude and Longitude

**Date:** September 8<sup>th</sup>, 2017

**Wetlands**

**Classification:** Numbers 1 - 8

**Complex Type:** Numbers 1 – 5

**Production Value/**Cost**:** \$\$\$\$\$

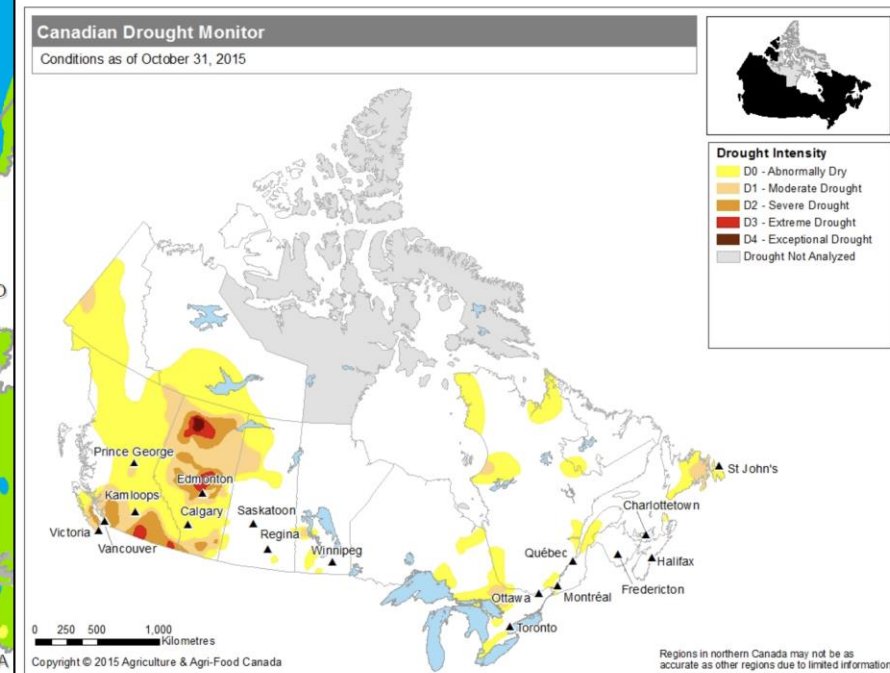
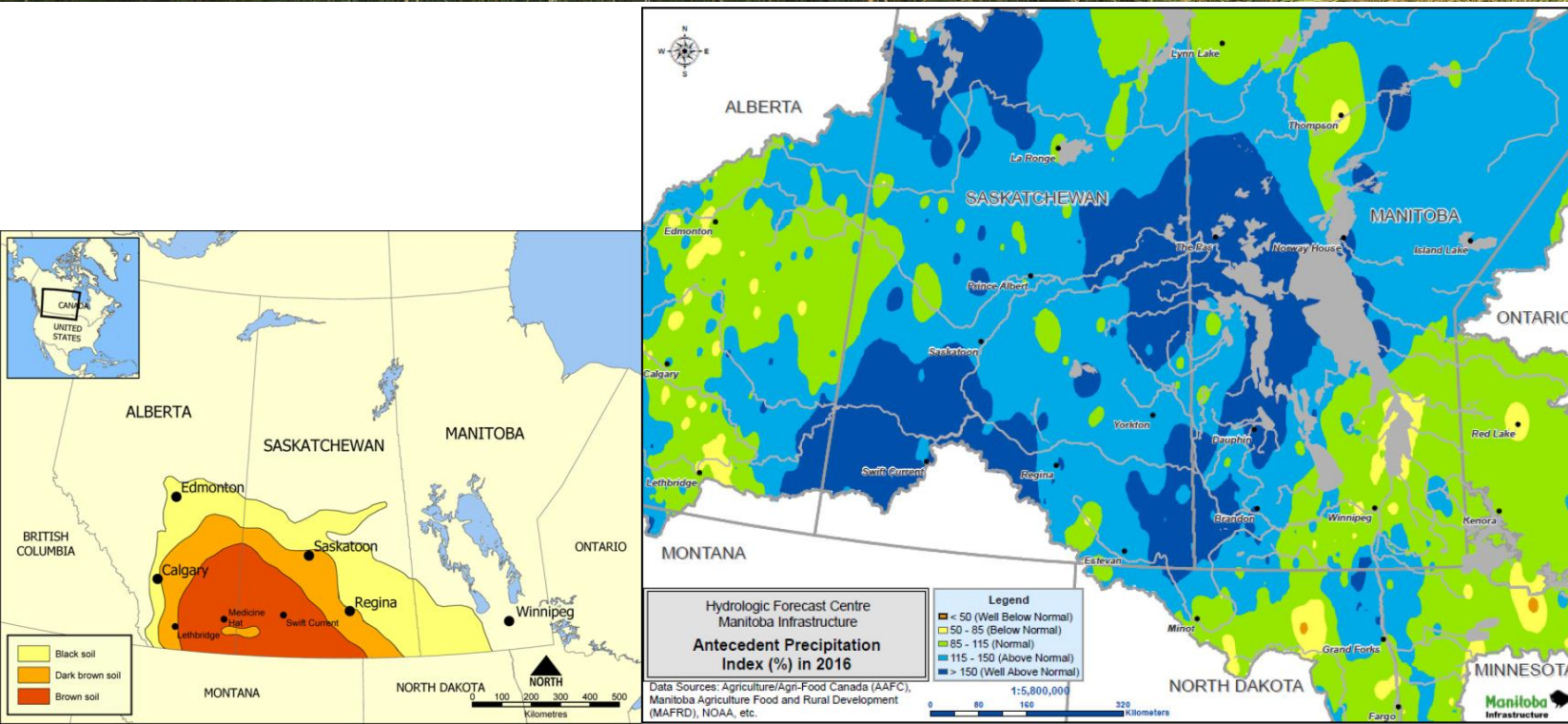
**Surrounding Crops**

**Soils**

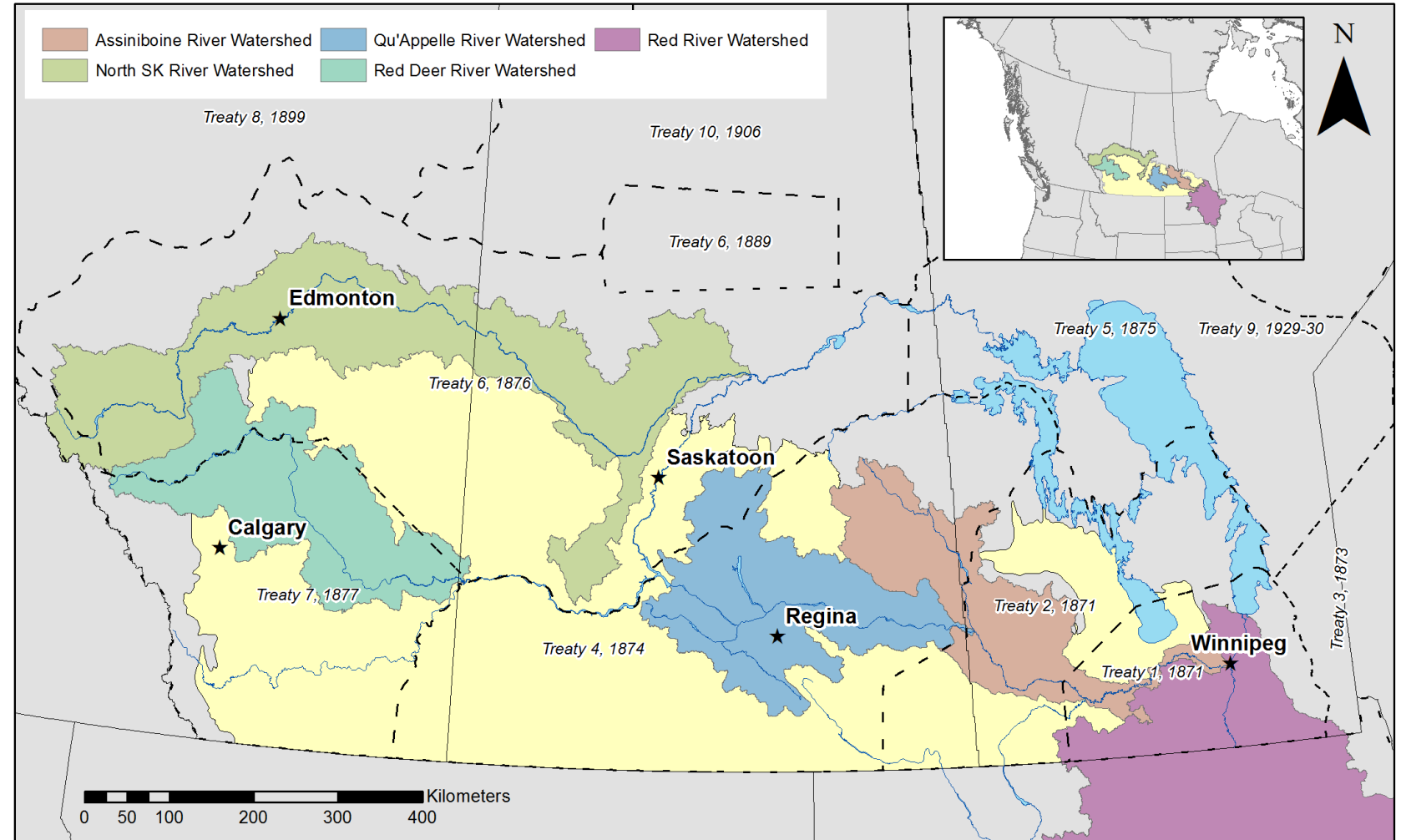
**Moisture Content:**

**Temperature:**

**Nutrients:** N, P and C







Enhancing the resilience of Prairie communities through sustainable water management



# PRAIRIE WATER

## GLOBAL WATER FUTURES

### Hydrology

John Pomeroy  
Kevin Shook  
Chris Spence



### Groundwater

Grant Ferguson  
Masaki Hayashi



### Wetlands

Nandita Basu  
Helen Baulch  
Angela Bedard-Haughn  
Ken Belcher  
Bob Clark  
Karsten Liber  
Christy Morrissey  
Colin Whitfield



### Governance

Lalita Bharadwaj  
Lori Bradford  
Maureen Reed  
Graham Strickert



Usable knowledge to build **resilient** communities by ensuring **sustainable watershed management** and **governance** on the Canadian Prairies.