

# Alberta Watershed Planning and Advisory Council Summit

## “Source Water to Drinking Water”

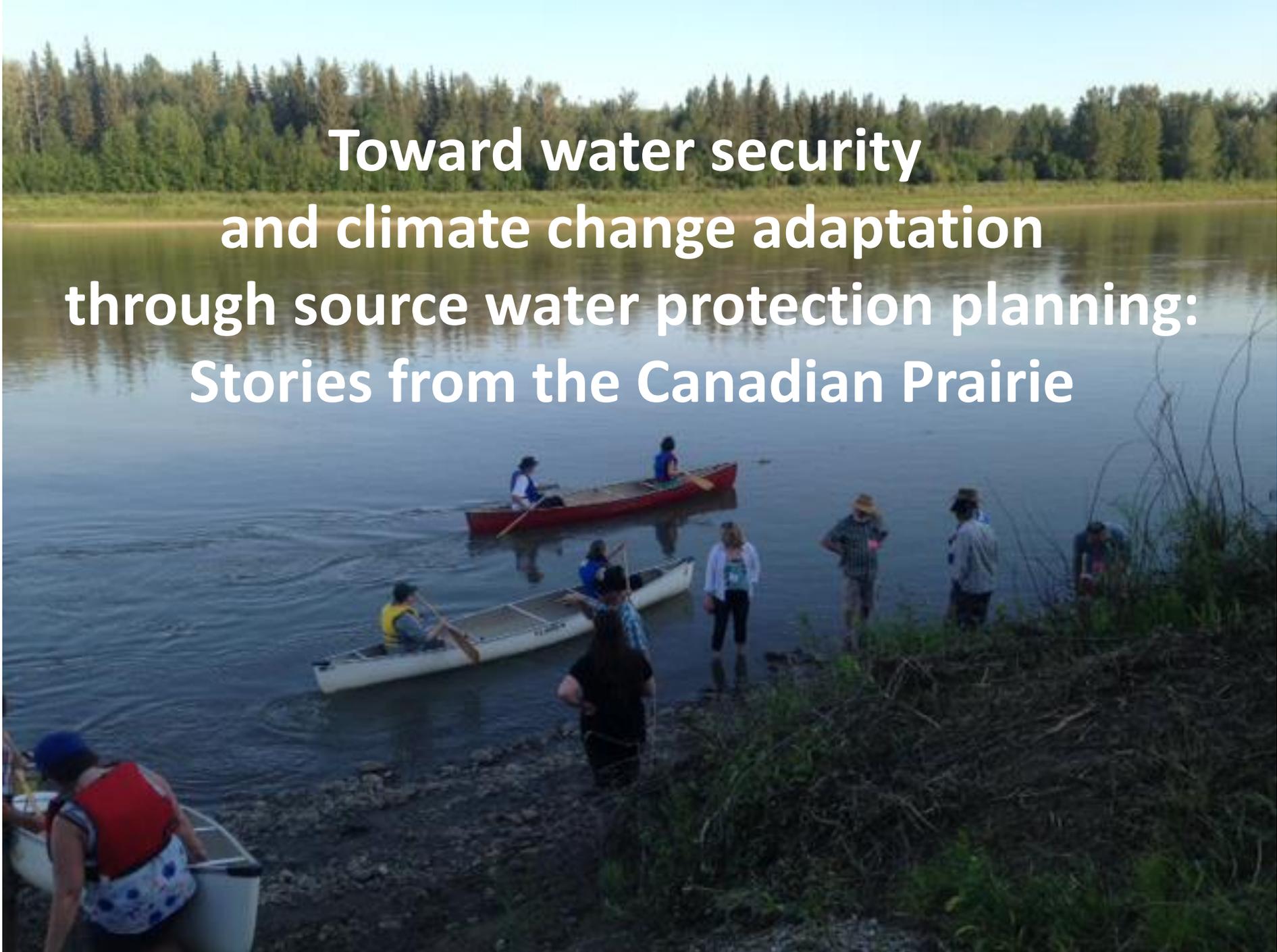
June 19-22, 2018

Peace River, Alberta

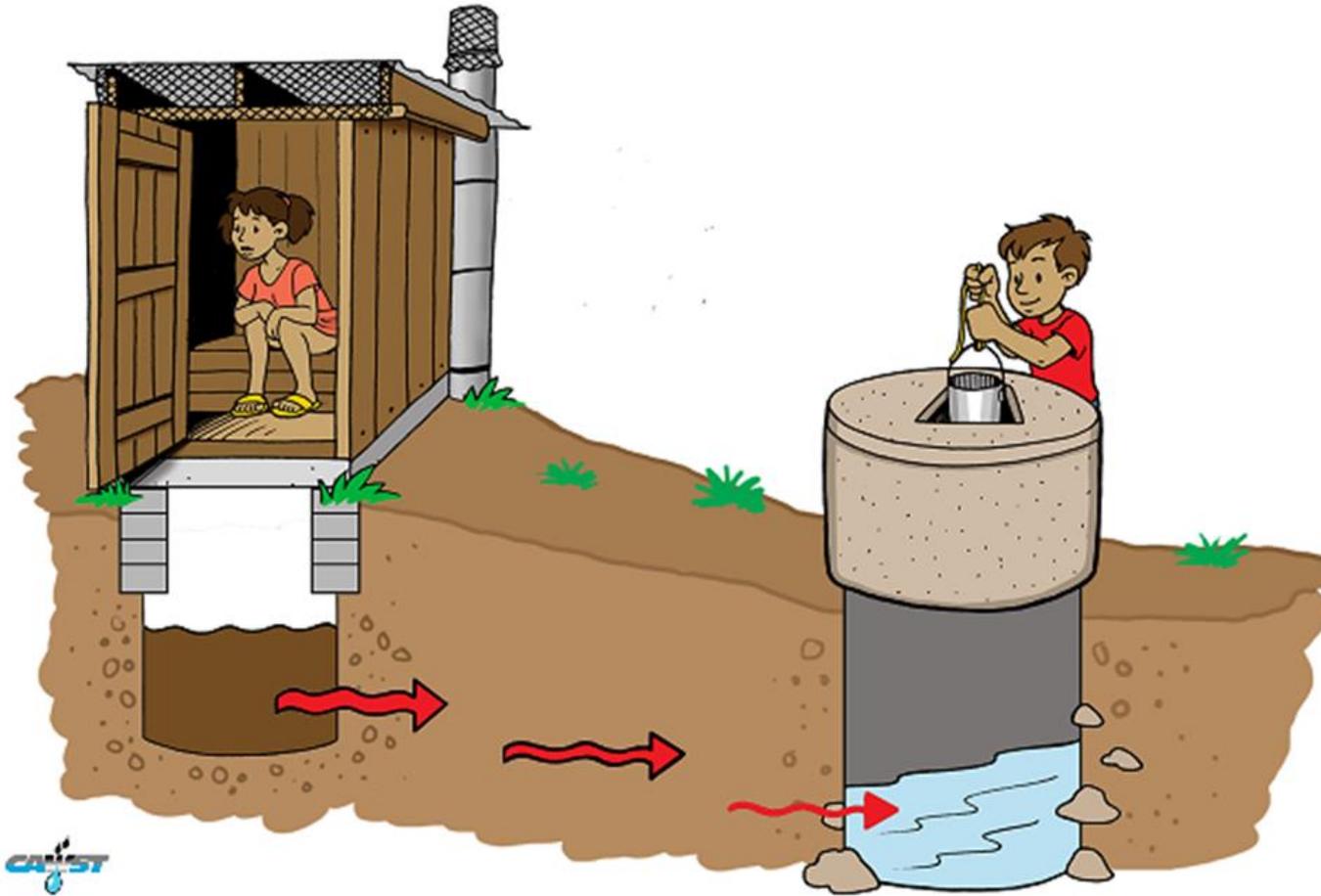
Robert (Bob) Patrick, MCIP; PhD  
University of Saskatchewan



**Toward water security  
and climate change adaptation  
through source water protection planning:  
Stories from the Canadian Prairie**



# “Source Water to Drinking Water”



# First picture from NASA of water on Mars



....



[http://apod.nasa.gov/apod/image/0504/WaterOnMars2\\_gcc.jpg](http://apod.nasa.gov/apod/image/0504/WaterOnMars2_gcc.jpg)

# Personal background

- Land Use/Community Planner in BC 1988-2000
- Water Planner in BC 2000-2002
- PhD 2002-2007 (Univ Guelph)
- Univ. of Sask., Dept of Geography & Planning 2008-present
- Applied research, source water protection, planning process, barriers to implementation



Department of Geography  
& Planning

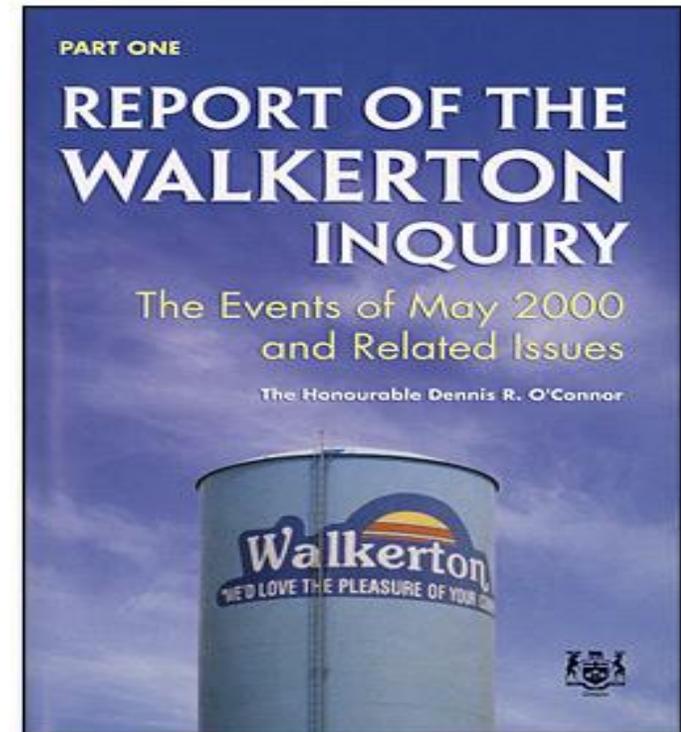
# Source Water Protection (SWP)

- Walkerton, ON. (date?)
- Walkerton Inquiry (Justice ???)



# Source Water Protection (SWP)

- Walkerton, ON. May 2000 (7 deaths, 2300 illnesses)
- Walkerton Inquiry (Justice D. O'Connor, 2002) – **how many recommendations?**



# Source Water Protection (SWP)

*"The first barrier to the contamination of drinking water involves protecting the sources of drinking water."*

(Justice Dennis O'Connor, 2002)

- 93 recommendations from the Walkerton Inquiry
- The first (how many?) all mention source water protection!!



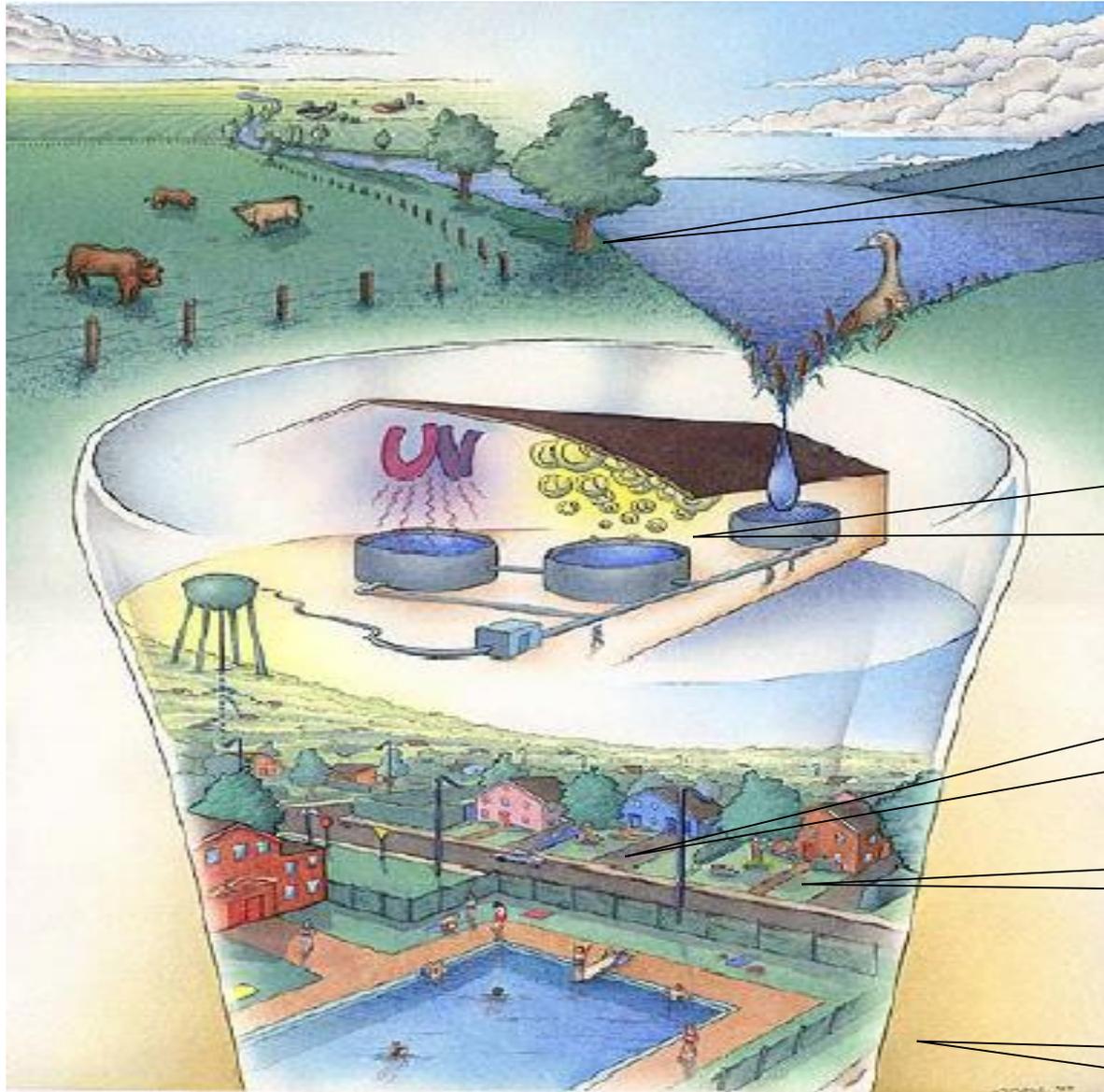
# Source Water Protection (SWP)

*"The first barrier to the contamination of drinking water involves protecting the sources of drinking water."* (Justice Dennis O'Connor, 2002)

- 93 recommendations from the Walkerton Inquiry
- The first **13** all mention source water protection!!
- Canada late to the game
- US Safe Drinking Water Act (1996)
- “Poster Child” city for source water protection in North America?



# Multi-Barrier Approach



**1. Source Protection**

**2. Water treatment**

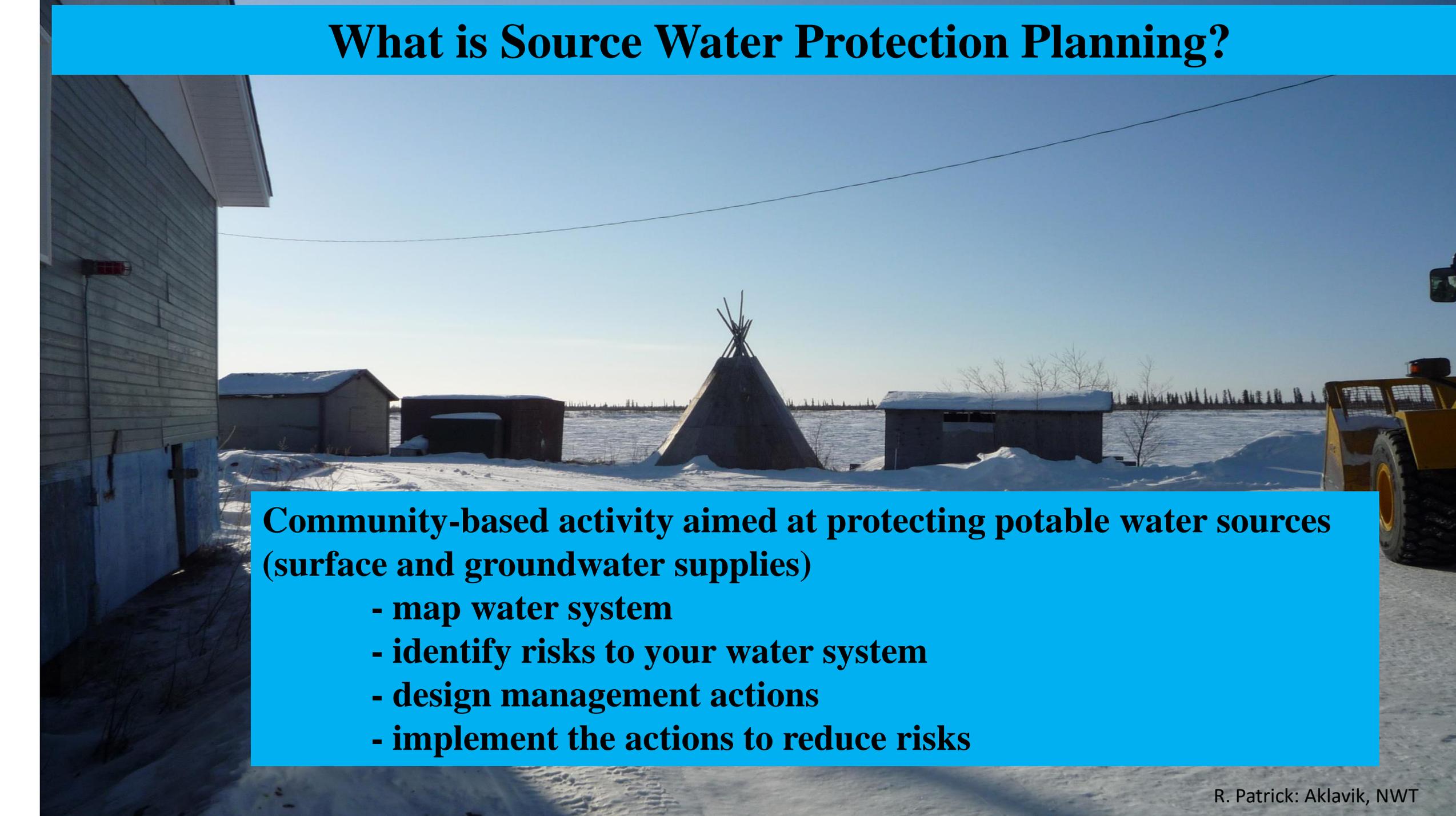
- filtration
- disinfection
- UV

**3. Distribution**

**4. Monitoring**

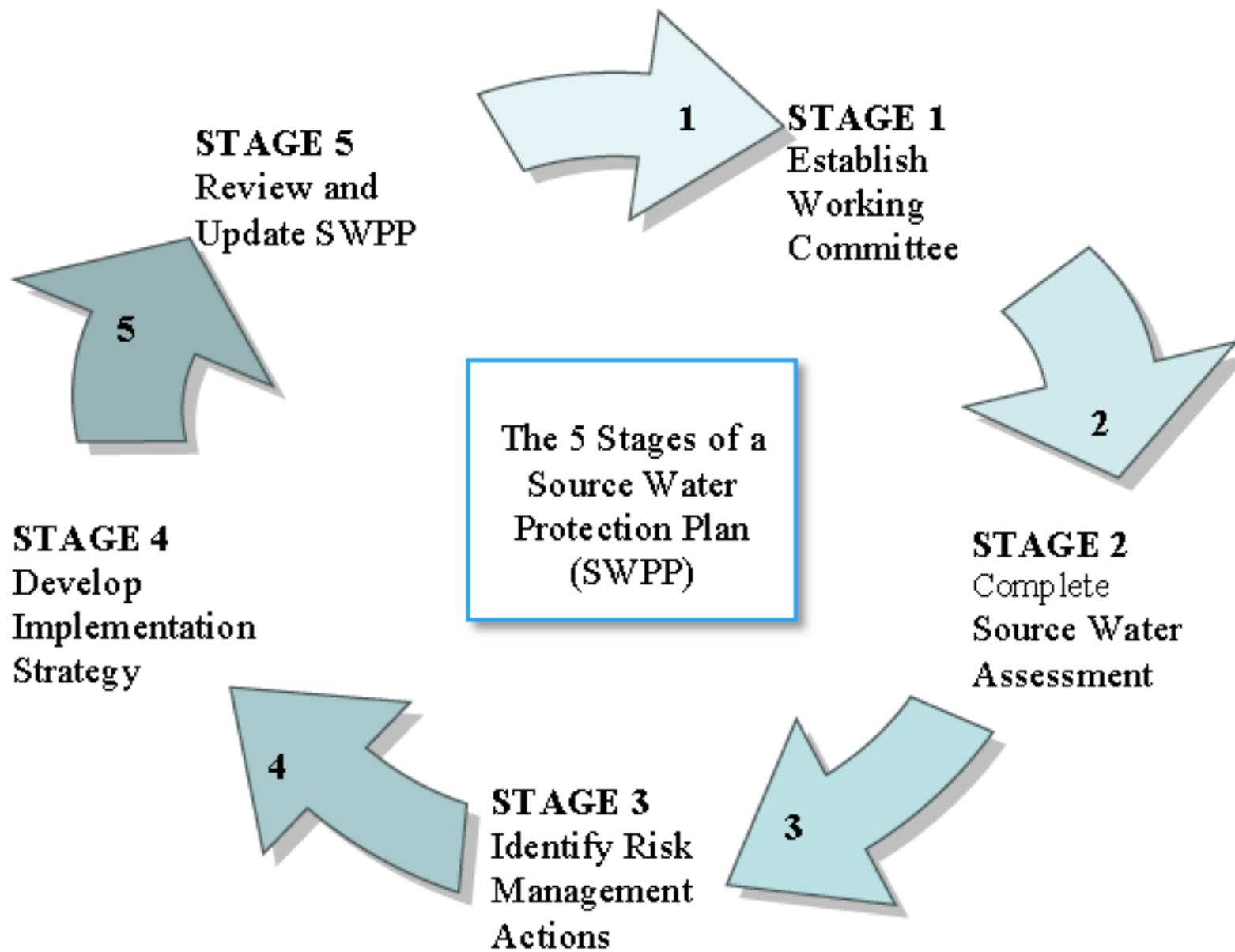
**5. Response Plan**

# What is Source Water Protection Planning?



**Community-based activity aimed at protecting potable water sources (surface and groundwater supplies)**

- map water system**
- identify risks to your water system**
- design management actions**
- implement the actions to reduce risks**





- Located 270 km southeast of Saskatoon
- Within the Lower Qu'Appelle River West
- Touchwood Hills, on Highway 15
- Touchwood Agency Tribal Council , Treaty 4.



# Muskowekwan Working Committee

NAME	POSITION
Julius	Band Councillor/WTP Operator
Bradley	Band Councillor
Elaine	Band Manager
Frank	Water Treatment Plant Operator
Ernie	Water Treatment Plant Operator
Ken	Muskowekwan School
Nick	Elder
Marina	Community Health Representative

# Planning Schedule

- Six meetings (Oct 2013 – June 2014), Band Office, open meetings
- 2 site tours in the community
- Presentation to Council (2 June 2014)
- Open House (22 October 2014) at Muskowekwan School, Grades 5-8



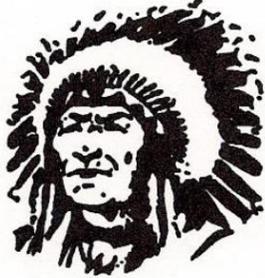
# Likelihood X Impact = RISK

Likelihood of Occurrence	Impact of Occurrence				
	Insignificant 1	Minor 2	Moderate 3	Severe 4	Catastrophic 5
Most Unlikely 1 (in next 4-5 years)	1	2	3	4	5
Unlikely 2 (in next 4-5 years)	2	4	6	8	10
Likely 3 (in next 4-5 years)	3	6	9	12	15
Probable 4 (in next 4-5 years)	4	8	12	16	20
Almost Certain 5 (in next 4-5 years)	5	10	15	20	25

# First Nation Source Water Protection Plans

MUSKOWEKWAN FIRST NATION  
SOURCE WATER PROTECTION PLAN

JUNE 2, 2014




Frog Lake First Nation  
ALBERTA, CANADA

## Source Water Protection Plan

Frog Lake First Nations 121 & 122  
General Delivery  
Frog Lake, Alberta  
T0A 1M0



## Lac La Ronge Multi-Community Source Water Protection Plan

Draft: December 2016

The Town of La Ronge  
Northern Village of Air Ronge  
Lac La Ronge Indian Band  
The Northern Municipal District






## Source Water Protection Plan

Mistawasis Nēhiyawak  
P.O. Box 250  
Leask, SK  
S0J 1M0



Photo obtained from www.mistawasis.ca



## Siksika Nation

### On-Reserve Source Water Protection Plan

DRAFT - December 21, 2012



P.O. Box 1580  
Siksika, Alberta  
T0J 3W0

ed June 24, 2015



## Source Water Protection Plan

Cumberland House Cree Nation  
P.O. Box 220  
Cumberland House, SK S0E 0S0



DRAFT: January 17, 2017



## Source Water Protection Plan

Beardys & Okemasis First Nation  
In cooperation and partnership with  
Town of Duck Lake  
RM of Duck Lake

PO Box 340 Duck Lake  
Saskatchewan, Canada  
S0K 1J0

Phone: 306.467.4523

DRAFT: August 2016

# Identify the risk to drinking water source ....



# Reported highest risks to source water, n=7

Sewage lagoons

Illegal dump sites

Uncapped private wells (abandoned)

Agriculture pesticides, fertilizer

Household septic 'shoot-outs'

Cattle/livestock encroaching

Contaminated industrial land, fuel & material wastes

Solid waste landfills

Well-head exposure

Hazardous goods transport

Potable water cisterns



# SWP management actions as CC mitigation



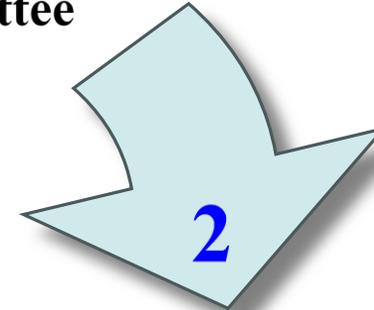
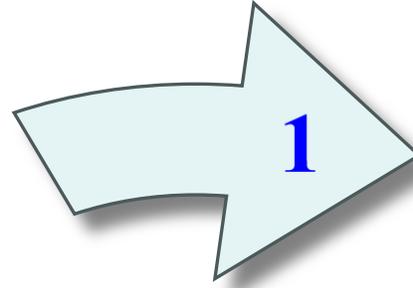
Muskeg Lake Cree Nation



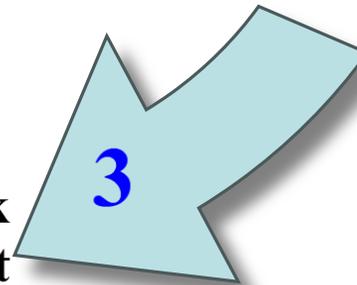
**STAGE 5**  
Review and  
Update  
SWPP



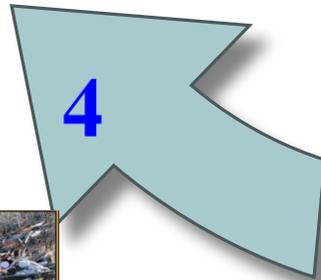
**STAGE 1**  
Establish  
Working  
Committee



**STAGE 2**  
Complete  
Source Water  
Assessment



**STAGE 3**  
Identify Risk  
Management  
Actions

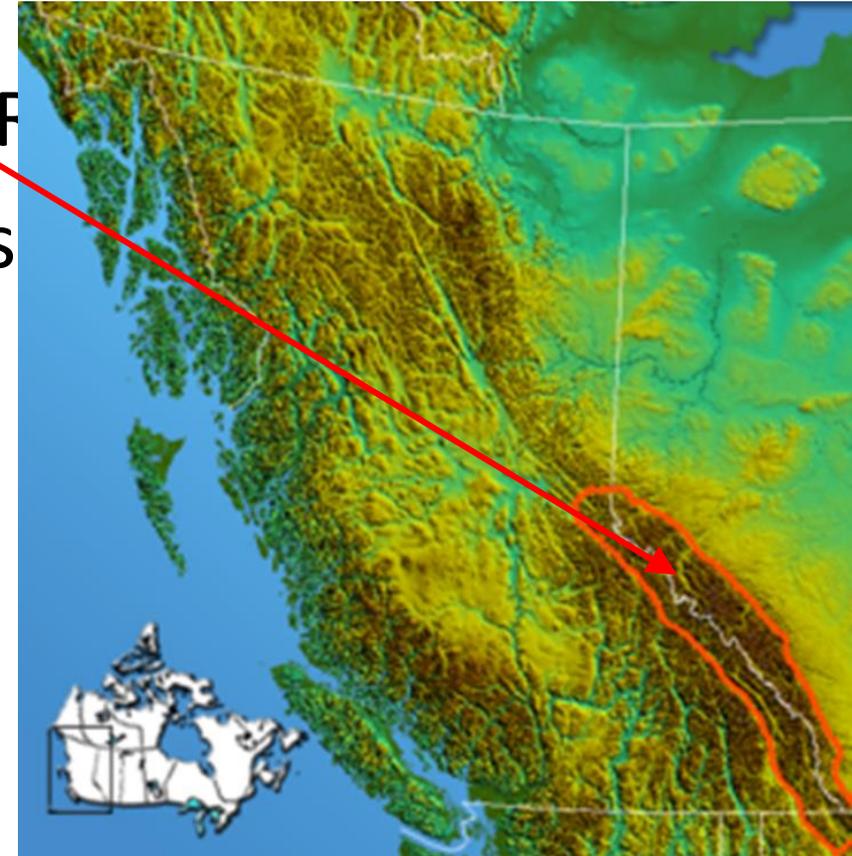


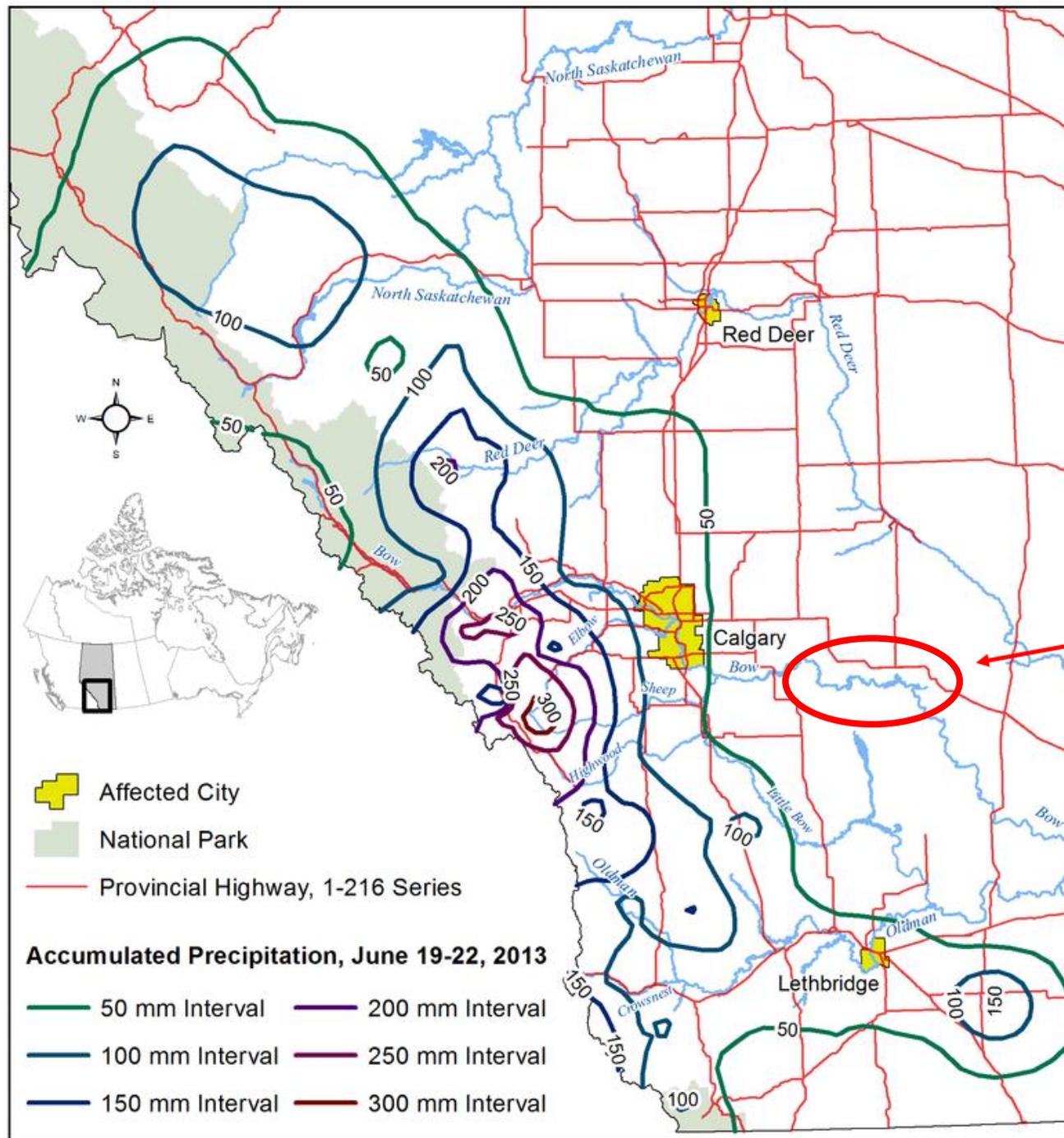
**STAGE 4**  
Develop  
Implementation  
Strategy



# First the flood ....

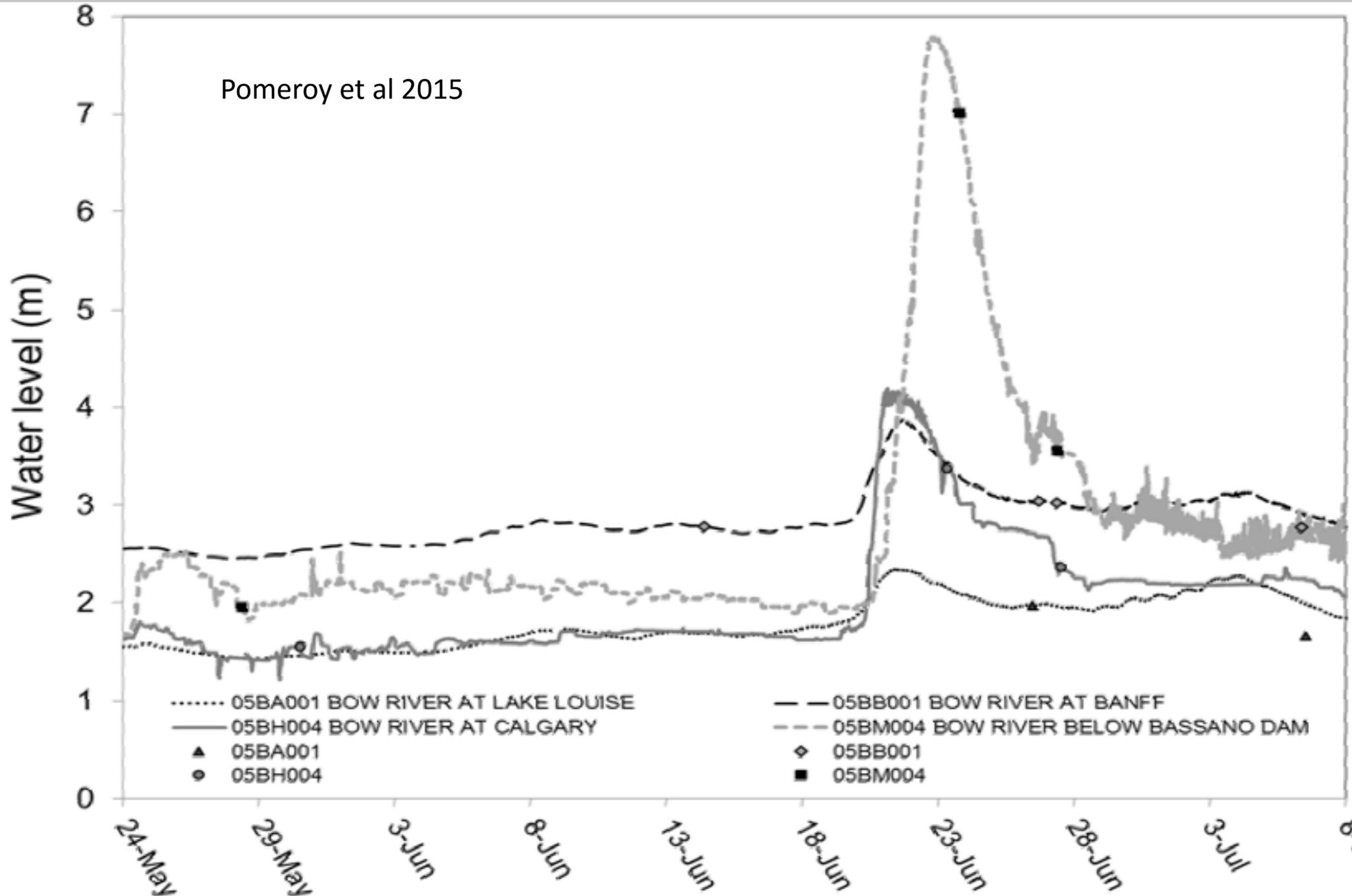
- June 19, 2013; 3 days heavy rain
- Large spatial extent, Red Deer (north) to Oldman River Basin (south), and into BC (Elk River)
- As much as 350mm fell over Front Ranges of F
- Tributaries of the Bow all reached flood levels
- At peak, water levels at 60 year high





Siksika Nation

Pomeroy et al 2015



## ... then the disaster

- Damage to infrastructure
- TransCanada closed for days
- >12 municipalities declared local state of emergency
- 100,000 people evacuated
- 5 deaths
- Costliest natural disaster in CDN history, \$6 billion



# Siksika Nation – June 2013 flood

- 1000 of 4000 residents evacuated
- 134 homes lost; 771 people homeless (1 in 4 people vs 1 in 10 in Calgary)
- North Camp, Little Washington, Little Chicago, and South Camp totally under water
- Nation covered with loss of 2 Bow River bridge crossings



# Flood facts: mid-June 2013

- 134 – Siksika Nation homes damaged or destroyed.
- 771 – Siksika members in temporary housing, some homeless.
- 3 – ATCO trailer camps housing the homeless.
- 5 – The number of years it could take to rebuild or repair flood damaged homes and infrastructure (2018).
- 300 – The number of homes damaged or destroyed on the Hidden Valley Golf Resort on land leased from the Siksika Nation.



# SWP management actions as CC mitigation

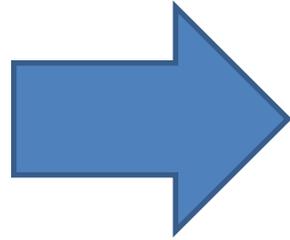


Siksika Response to flood ...

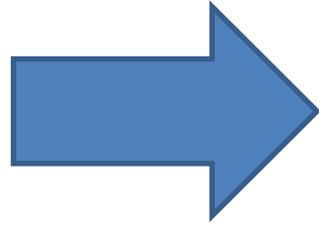
- Post-flood SWP Coordinator
- Calgary Foundation Funding



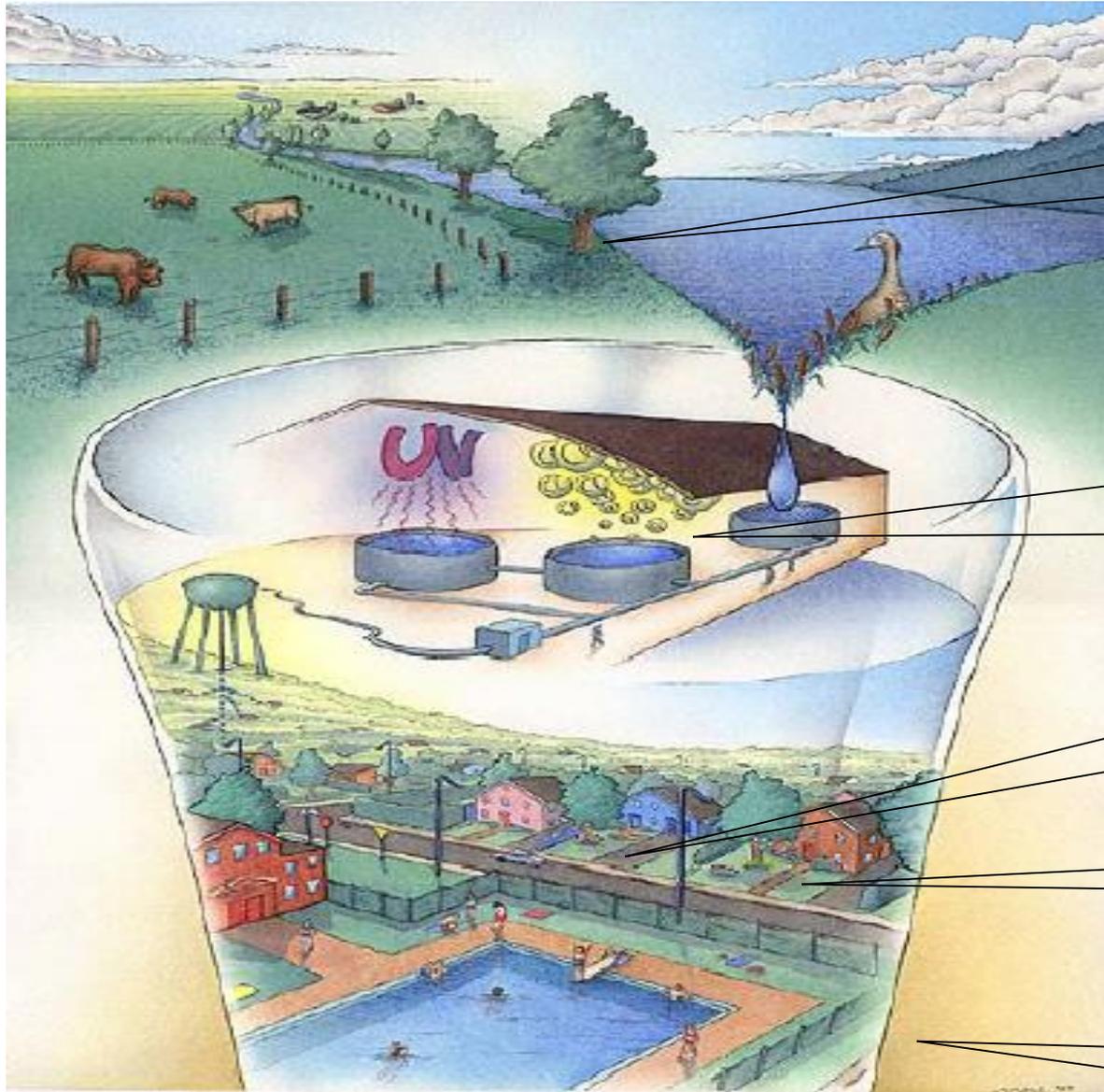
# SWP management actions as CC mitigation



# SWP management actions as CC mitigation



# Multi-Barrier Approach



**1. Source Protection**

**2. Water treatment**

- filtration
- disinfection
- UV

**3. Distribution**

**4. Monitoring**

**5. Response Plan**

# Multi-Barrier Approach (First Nation)

From source ...



Well-head

## Threats:

- unprotected well heads
- no back-up source
- “Indian lawnmowers”
- agriculture, land uses



Infrastructure

## Threats:

- open access to fill hose
- pipe contamination
- Truck tank disinfection



Truck Fill Hose

## Threats:

- truck hose disinfection
- unsecure cistern cap
- cisterns cracked, contaminated



Water Truck

... to tap, almost!



Water cistern

# Barriers of source water protection



## Human capacity on reserve

- Who will be the plan champion?
- Who will be the implementation champion?



## Limited control outside reserve boundaries

- Agriculture; Rail and road transportation; Airborne contaminants



## Climate change uncertainty



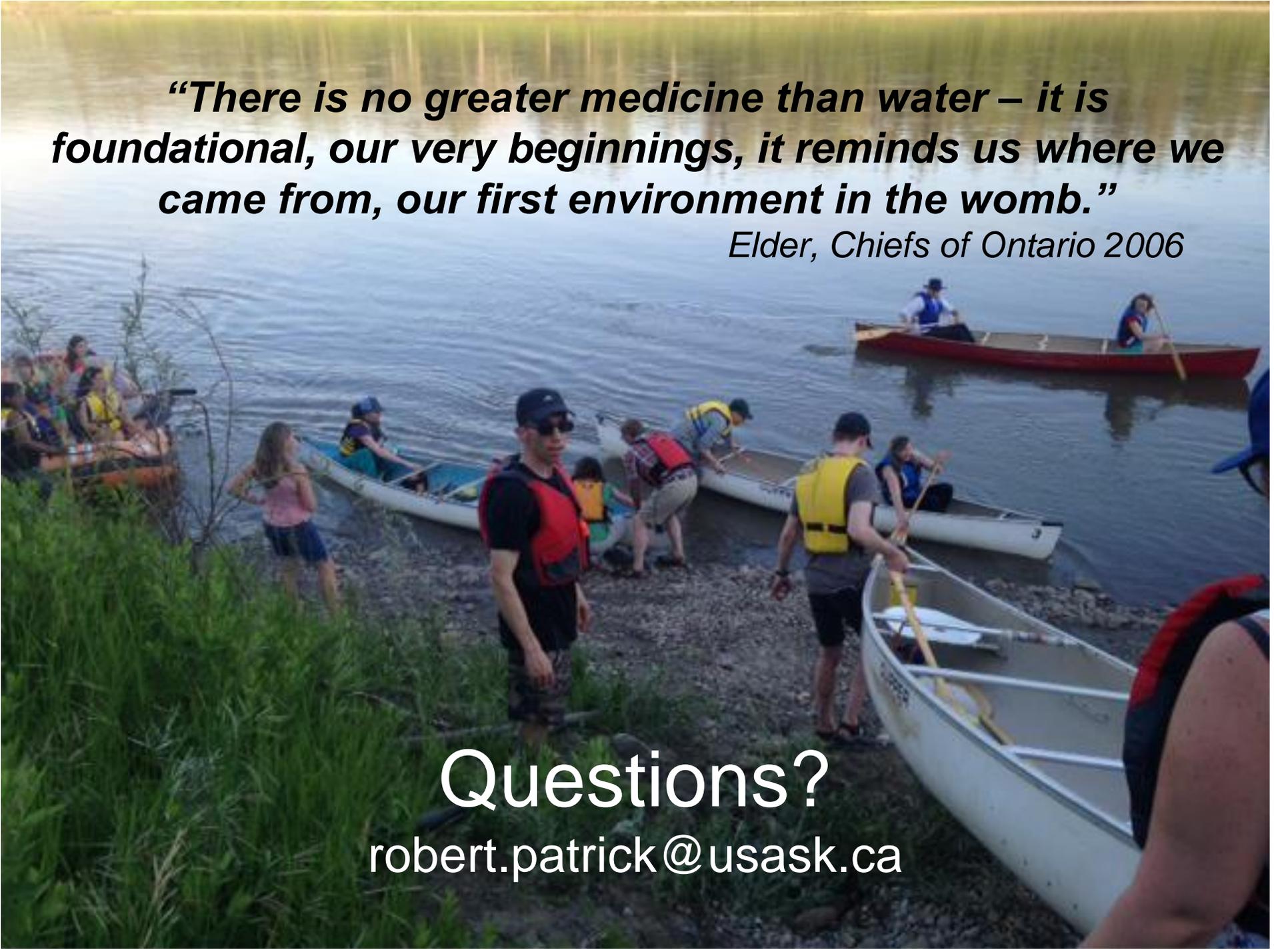
## Funding, time, political will, ...



Gerald Enns, NWT

***“There is no greater medicine than water – it is foundational, our very beginnings, it reminds us where we came from, our first environment in the womb.”***

*Elder, Chiefs of Ontario 2006*



**Questions?**

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