

Alberta Watershed Planning and Advisory Council Summit

“Source Water to Drinking Water”

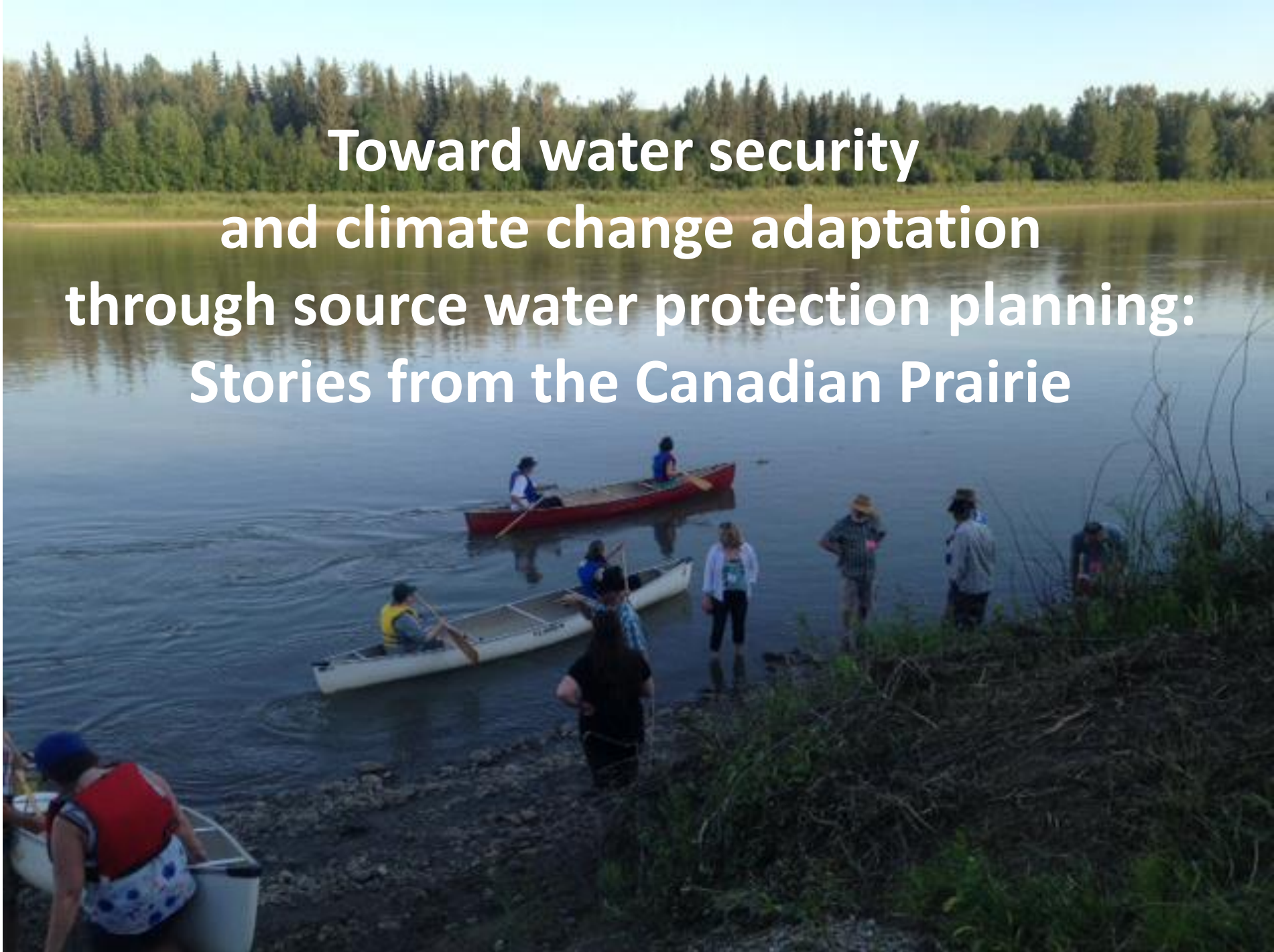
June 19-22, 2018

Peace River, Alberta

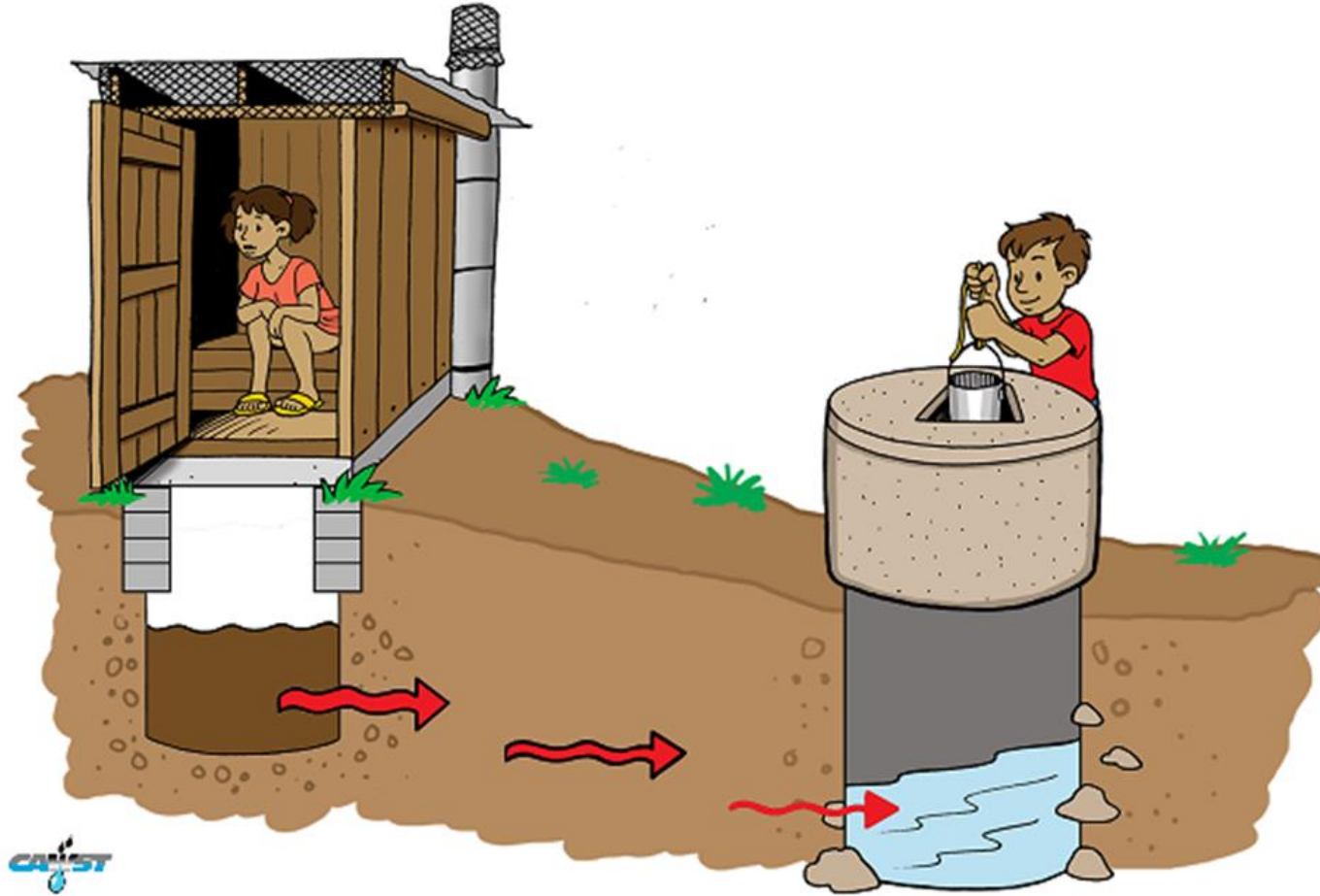
Robert (Bob) Patrick, MCIP; PhD
University of Saskatchewan



**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

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

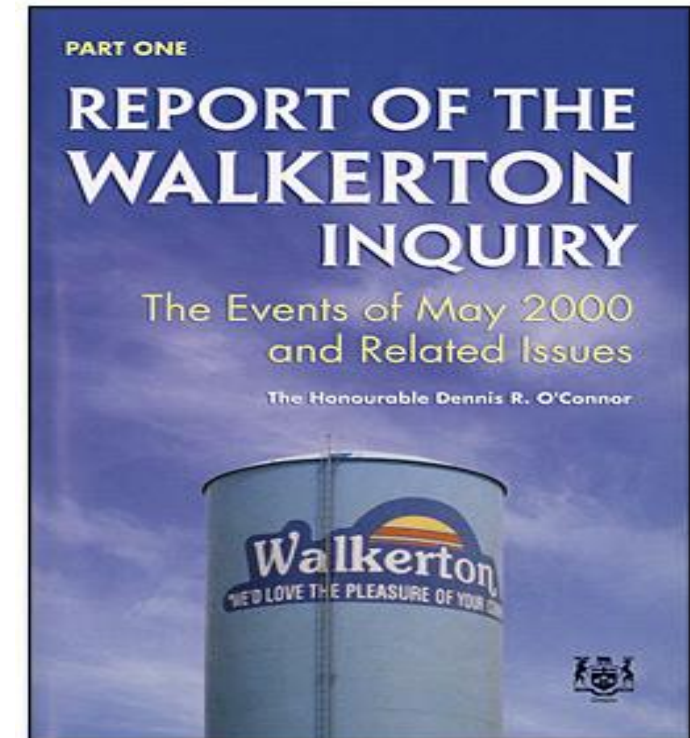
Source Water Protection (SWP)

- 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!!



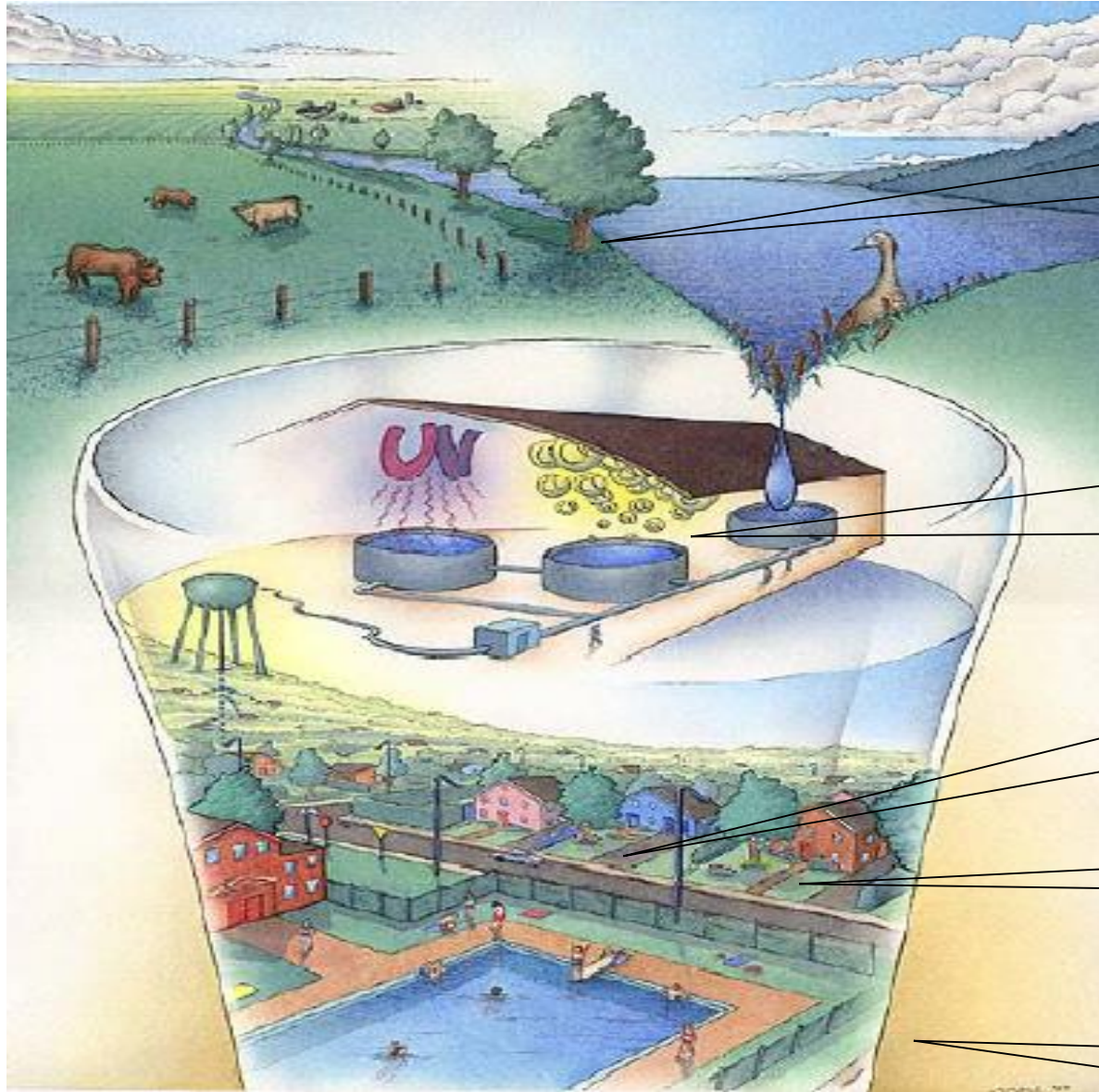
Source Water Protection (SWP)

"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

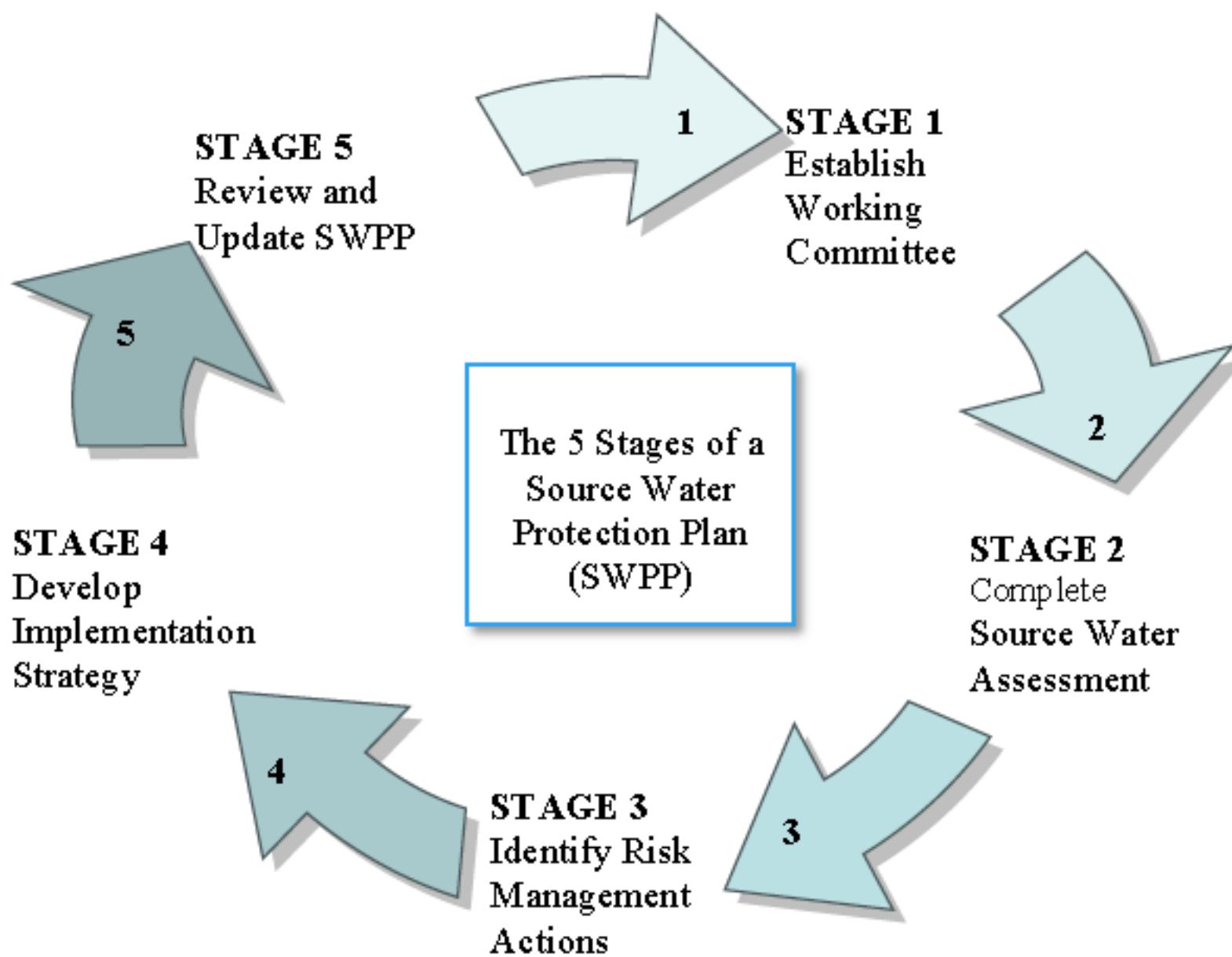
5. Response Plan

What is Source Water Protection Planning?

A photograph of a winter scene in a northern community. In the center, a traditional wooden teepee stands on a snow-covered ground. To its left and right are several small, dark-colored buildings with snow on their roofs. In the background, a frozen body of water stretches to a line of trees under a clear blue sky. A yellow snow machine is visible on the right side of the frame. A blue text box is overlaid on the bottom half of the image.

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



Source Water Protection Plan

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



ed June 24, 2015

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 Nêhiyawak
P.O. Box 250
Leask, SK
S0J 1M0



Siksika Nation On-Reserve Source Water Protection Plan

DRAFT - December 21, 2012



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



Source Water Protection Plan

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



DRAFT: January 17, 2017



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

Source Water Protection Plan

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



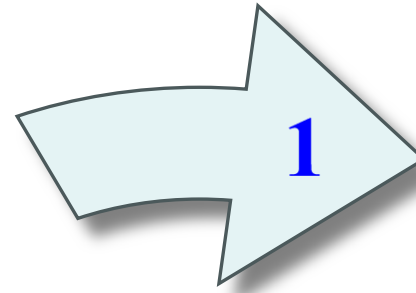
SWP management actions as CC mitigation



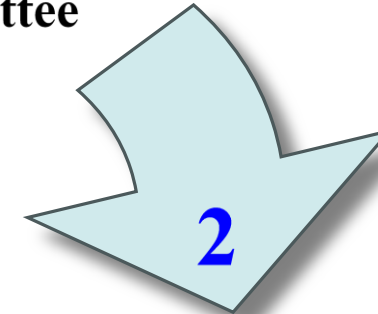
Muskeg Lake Cree Nation



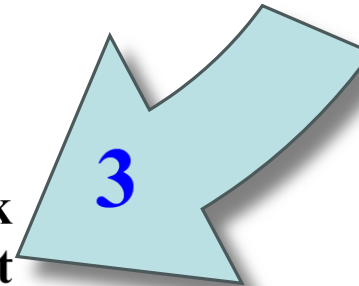
STAGE 5
Review and
Update
SWPP



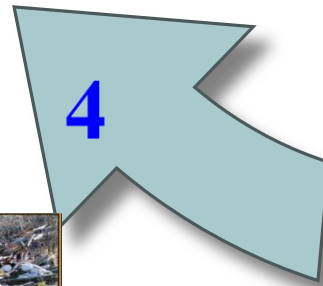
STAGE 1
Establish
Working
Committee



STAGE 2
Complete
Source Water
Assessment



STAGE 3
Identify Risk
Management
Actions

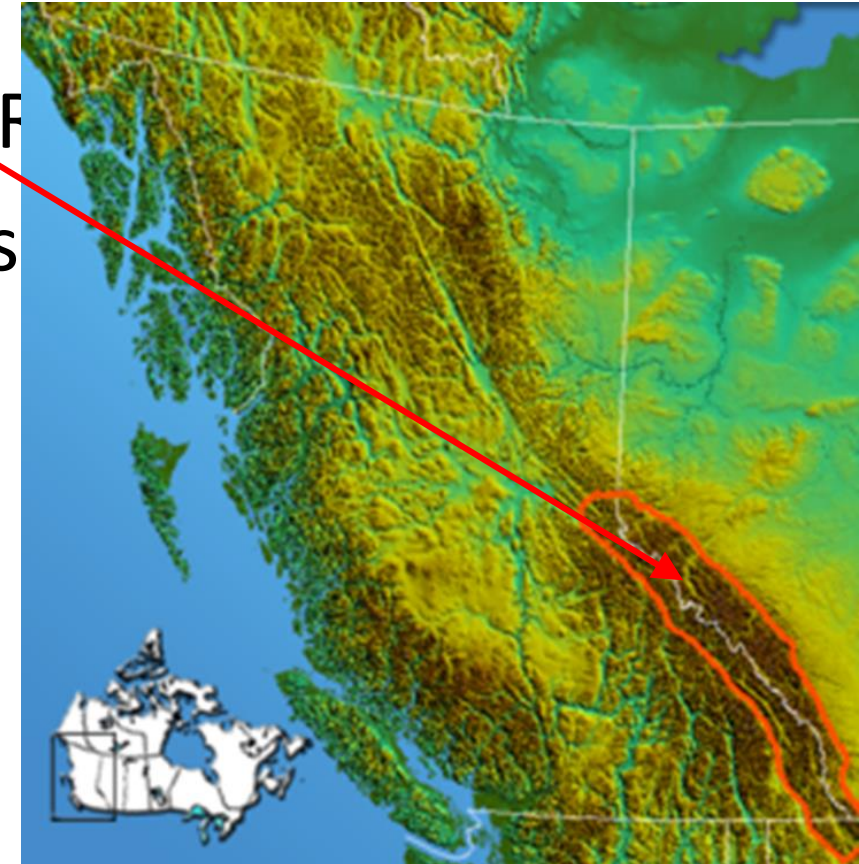


STAGE 4
Develop
Implementation
Strategy

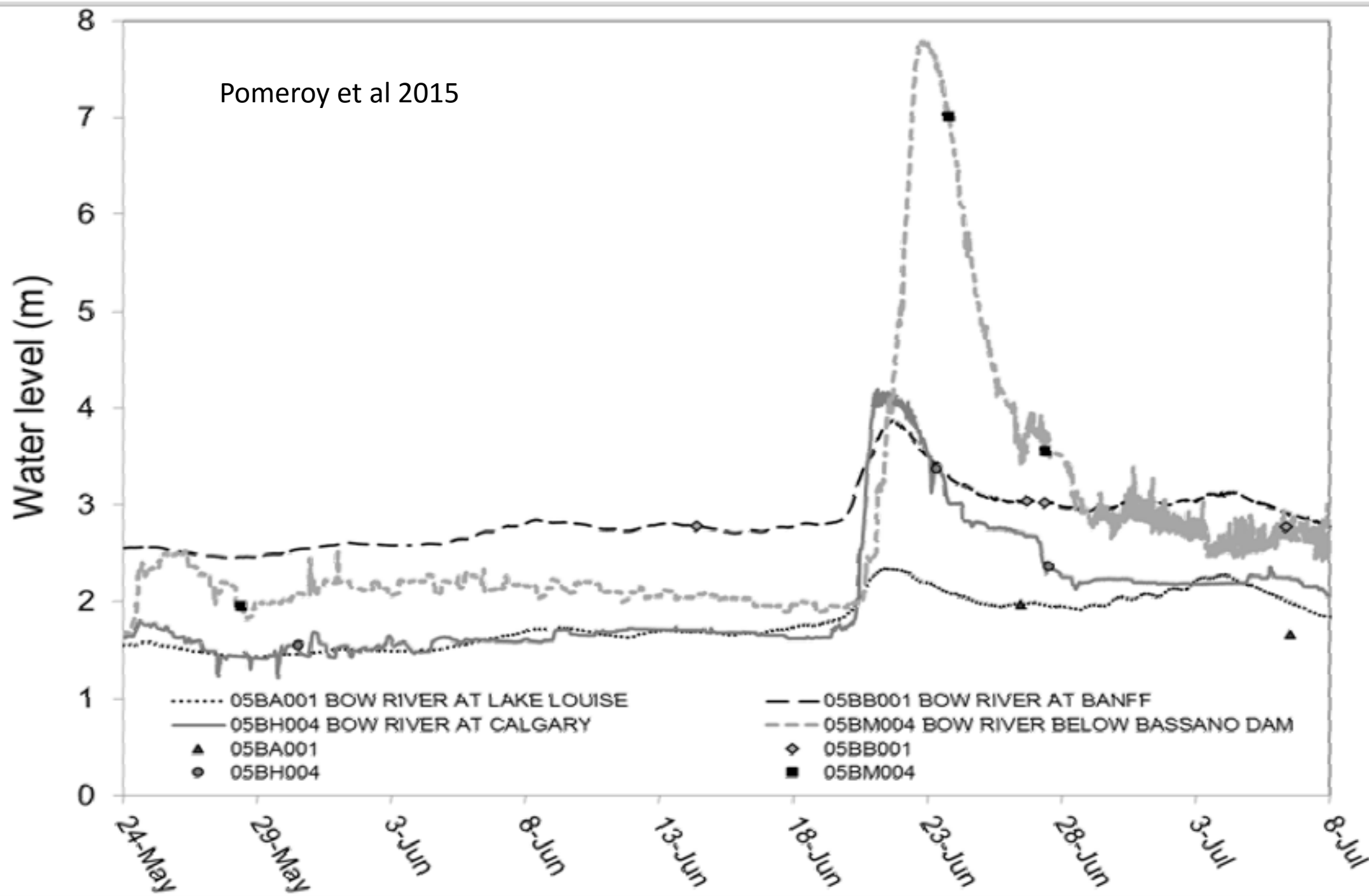


First the flood

- 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



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



Bow River



Hidden Valley



South Camp, Siksika

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

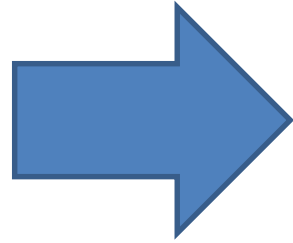


Siksika Response to flood ...

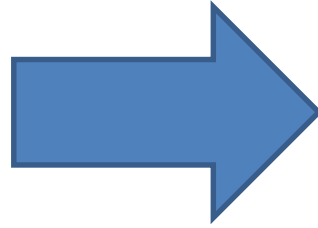
- Post-flood SWP Coordinator
- Calgary Foundation Funding



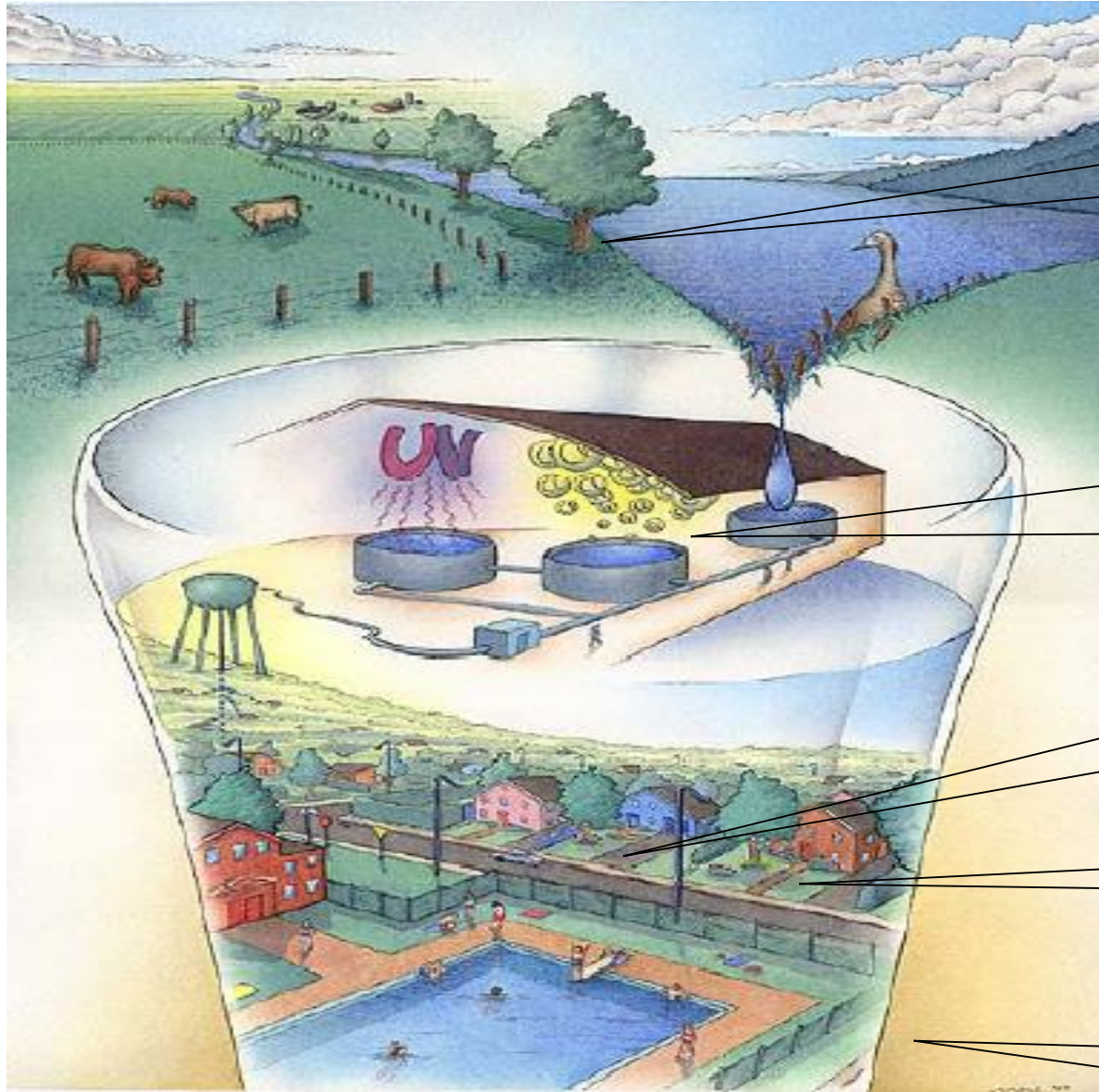
SWP management actions as CC mitigation



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



Truck Fill Hose

Threats:

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



Water Truck

Threats:

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



Water cistern

... to tap, almost!

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



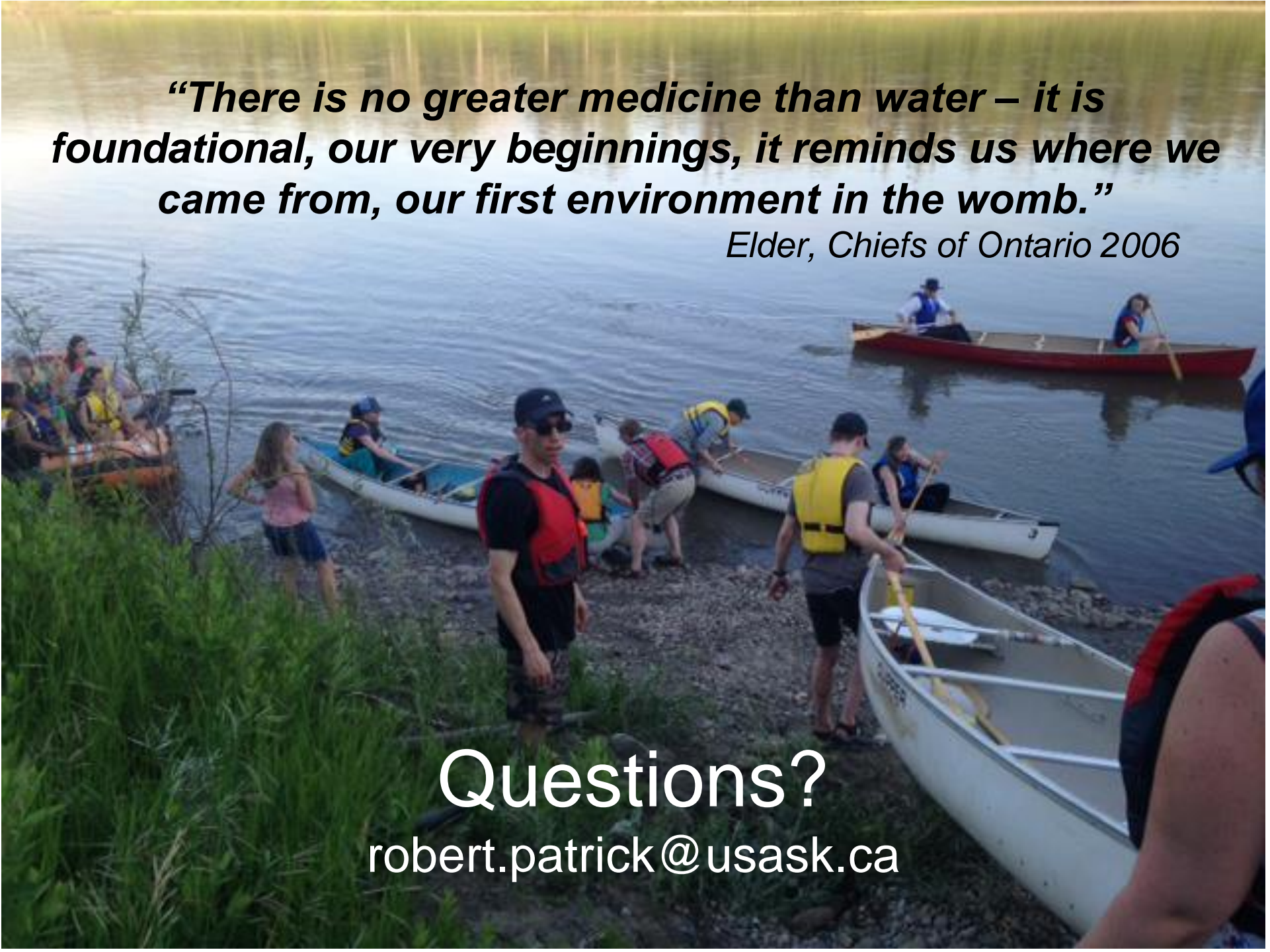
Funding, time, political will, ...



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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