ALBERTA
waterSMART
Water Management Solutions

Institute for Catastrophic Loss Reduction Workshop

Flood and drought: What's next for watershed management?

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October 16 2015



Presentation overview

ALBERTA WaterSMART Water Management Solutions

Today we'll cover

- Brief background on Alberta WaterSMART
- Water in Alberta – flood and drought
- The 2013 Flood
- Six high level recommendations for flood mitigation
- The value of collaboration
- Room for the River case study
- Looking ahead

About Alberta WaterSMART

OUR MISSION

We are committed to improving water management through better technologies and practices, for the social, economic and environmental benefit of current and future Albertans, and sharing our solutions with Canada and the World.

ACHIEVED THROUGH

Project development and execution
Identifying opportunities and innovative solutions to work toward a vision of improved water management

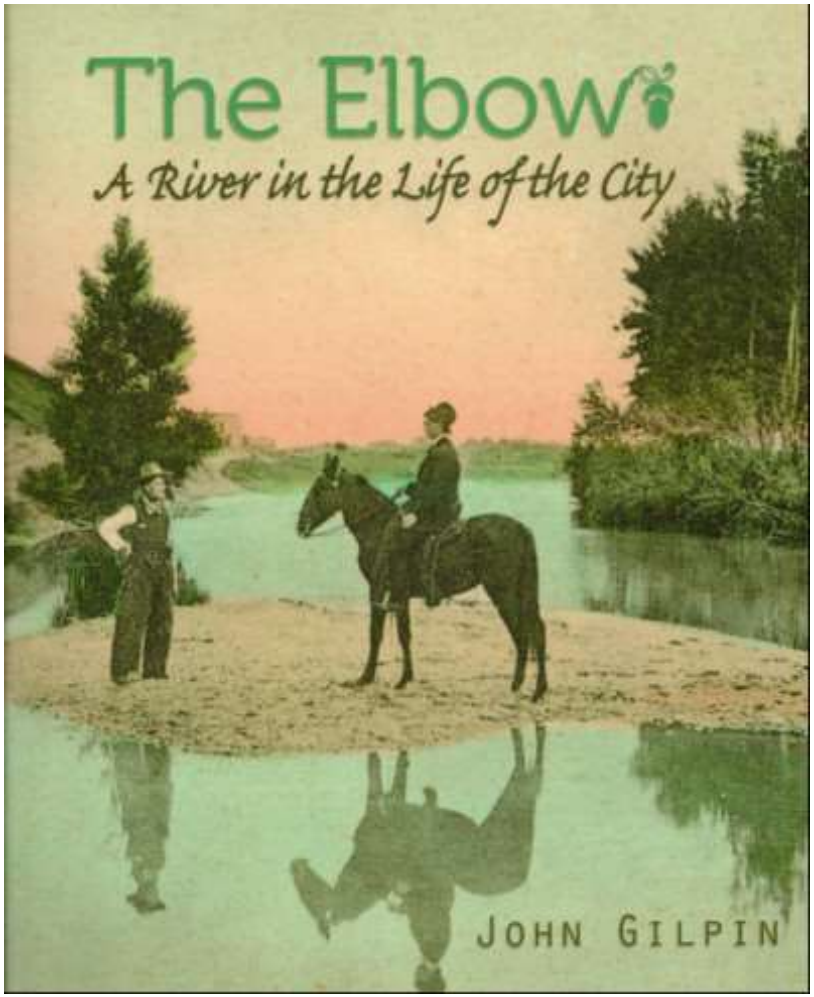
Collaboration and communication
Valuing collaboration and engagement by bringing diverse individuals and organizations together, to work toward common goals and accommodating multiple interests

Water strategy
Conducting effective projects on water strategy for corporations, consortiums and other organizations

Supported by people knowledgeable in all aspects of water management at local, regional, and global levels

Water in Alberta

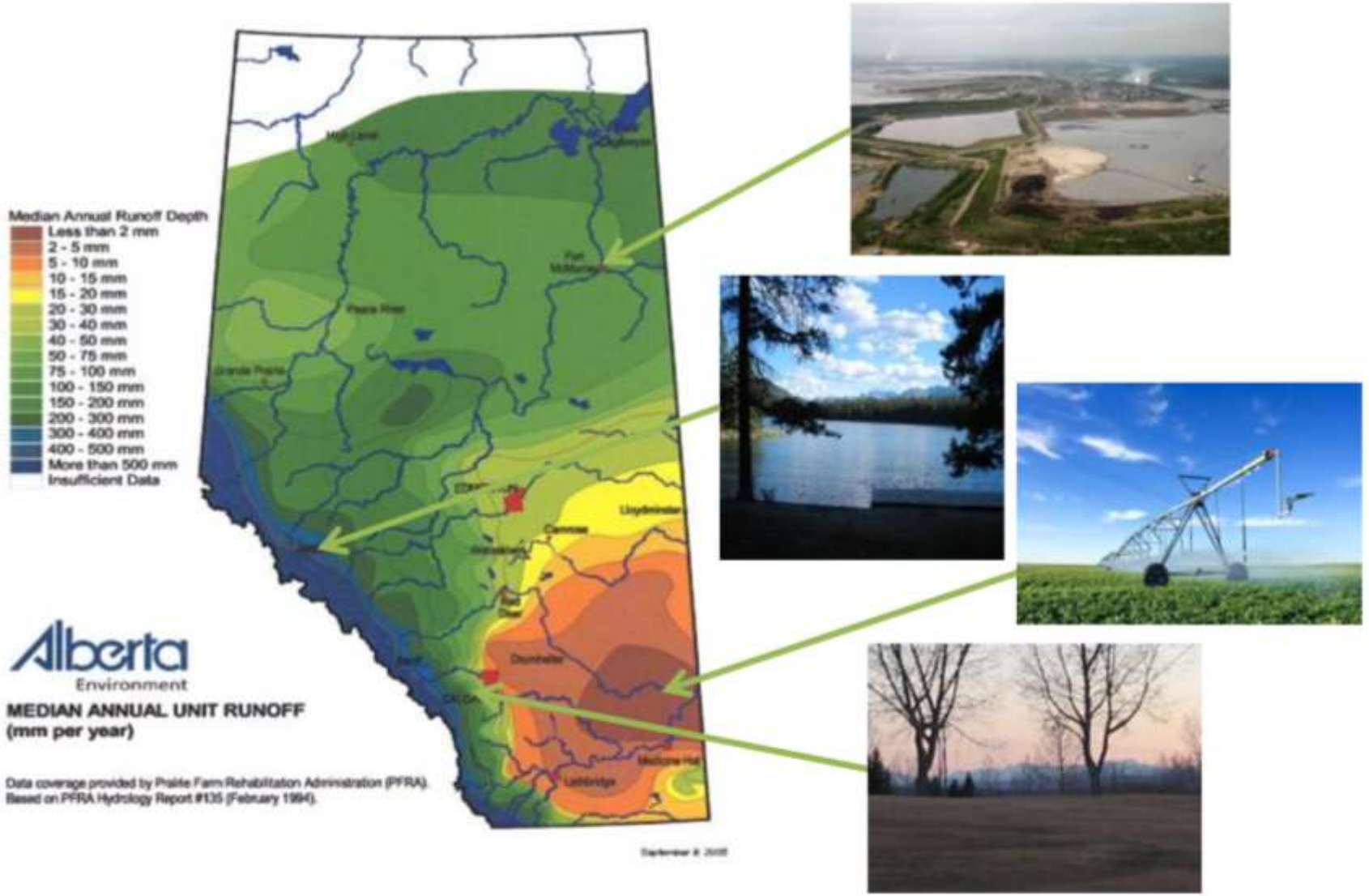
Everyone has their own water story



"economic and recreational benefits and periodic floods … The Elbow River has thus evoked fear, respect, indifference, pleasure, frustrations, appreciation and distaste, while being drank, swam in, skated upon, avoided, polluted and crossed."

Lived beside and hiked!

Water issues vary widely across Alberta



Flood is no stranger to Alberta

THE WEATHER

THE CALGARY DAILY HERALD

5 O'CLOCK EDITION

FORTY-SIXTH YEAR, No. 5599. 22 CALGARY, ALBERTA, MONDAY, JUNE 3, 1929 22 PAGES

HUNDREDS OF CITY HOMES MENACED BY RIVERS

Baldwin Gov't Votes to Hand In Resignation

Cabinet Conference Monday Decides to Ask King for Official Release

MacDONALD TO AGAIN TRY MINORITY GOV'T

For Second Time in Five Years British Labor Will Try to Carry On

Ghost River Dam Menaced by Floods

Worst Floods Since '02 Ravage Calgary And South Districts

All Residential Areas Near Rivers Are Completely Covered Monday

Rivers Still Rising On Monday Afternoon

Bowness and St. George's Parks Wrecked—Animals At Zoo Drowned

Twenty-Fifth Avenue Bridge Is Washed Out

Two Streams Pouring Flood Waters Over Big Sections of the City

THE SITUATION AT A GLANCE

Swollen Highwood Flowing Through High River Streets

Business Places Isolated by Water and Many Homes Cut Off

Livestock Being Carried Down Stream

Townspeople Watching Big Emergency Dams With Deep Anxiety as Water Rises

SEVEN SEATS STILL IN DOUBT; LABOR HOLDS SAFE LEAD

KING'S BIRTHDAY OBSERVED QUIETLY

HEAVIEST RAIN IN YEARS STRIKES SOUTHERN ALBERTA

Bow and Elbow Rivers Continue to Rise Far Above Danger Levels

Dominion Water Power Officials Think Peak Has Been Reached

HEAVY RAIN REPORTED FROM JUMPING POUND CREEK TEARING BANKS

The Day in Parliament

Impacts of flood on homeowners

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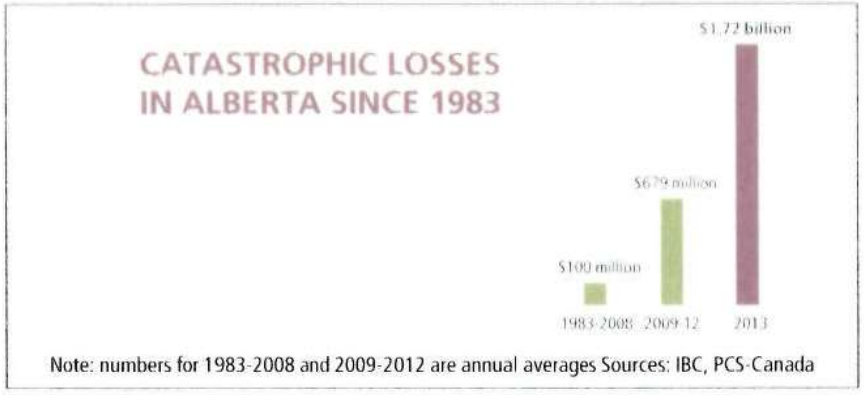
An example close to home -
excerpt from a letter form my insurer

Research for the Insurance Bureau of Canada shows that windstorms, hailstorms, flooding, drought and wildfires are expected to continue to impact Albertans in the years and decades to come.

The graph below illustrates the increase in catastrophic losses in Alberta over the last 20 years. Insurers have had to adjust coverage limits and products to ensure that coverage continues to be available and in order to meet the increasing demands of catastrophic claims.



Local community survey on insurance

$15,000 basement insurance

There is nothing of value in my basement

Drought is no stranger to Alberta

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19th Century Drought

1790s

- Drought impacted the ability of fur traders to move goods on the North Saskatchewan River

1791-1873

- Decimation of bison population, partly due to drought

1857

- Palliser Expedition
- Alberta declared "unsuitable for agriculture

20th Century Drought

1910 - 1920s

- Drought and settlement continued

1930

- Dirty Thirties

1980s

- 1984 driest year since 1916

21st Century Drought

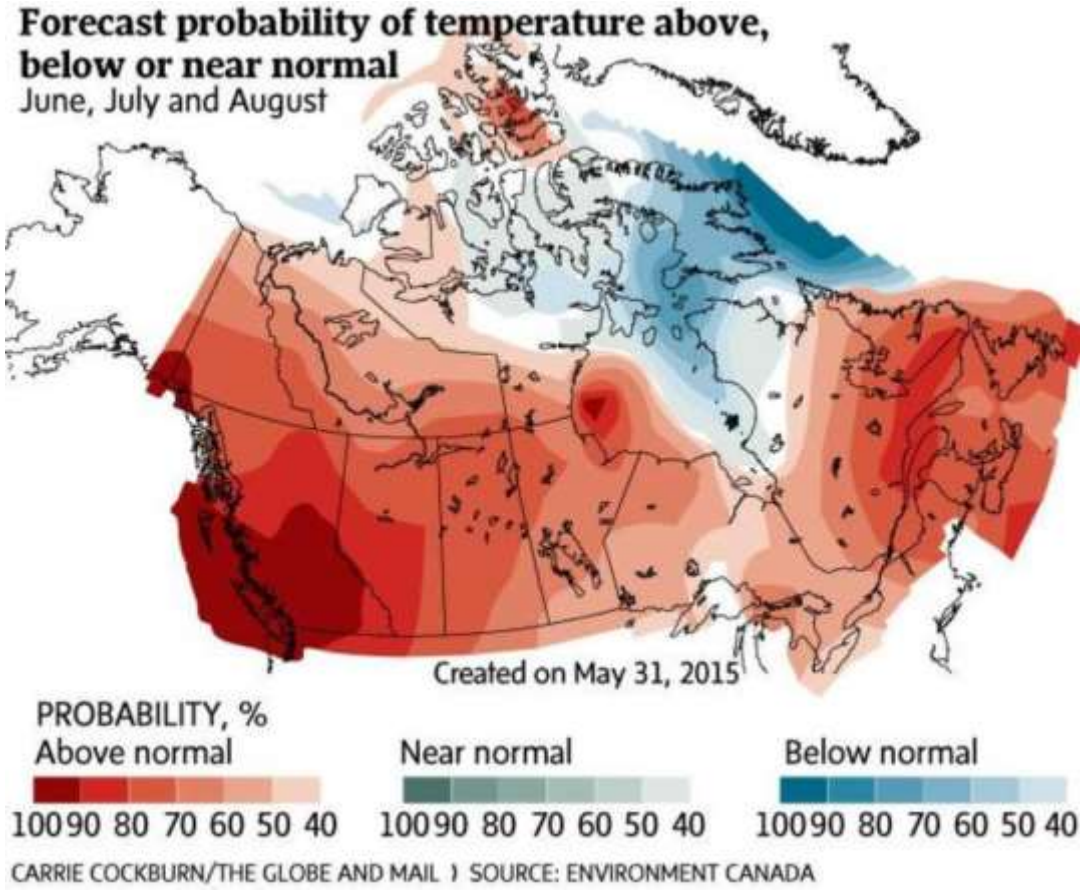
2002 - 2004

- Drought cost the Canadian economy $5.8 billion

2009 - 2010

- Drought caused communities in central and northern Alberta to declare states of emergency

- It is unknown when the next drought will occur



Impacts of drought on agriculture

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21 August 2015
Alberta declares a province-wide agricultural disaster

Insurance payouts to drought-hit farmers will likely near $1 billion

JODIE SINNEMA, EDMONTON JOURNAL 08.05.2015 |

Global NEWS
Edmonton
Change Location
TV News Programs
Newscasts & Videos

World Canada Local Politics Money Entertainment Health Lifestyle Tech Science Sports

CANADA

Alberta declares disaster after losses from drought

By Erika Tucker
Online Reporter Global News

Comments 3 Facebook 284 Twitter 21 Email Print ...

Farmers east of Okotoks, Alberta are concerned about the dry season's effect on crops. July 2015.

Mia Sosiak / Global News

Disaster response and rising costs

The Insurance Bureau of Canada reported the 2011 Slave Lake wildfire was the second costliest natural disaster in Canadian history at more than $700 million, with $400 million in uninsurable losses.

Environment Canada

In 2012, 62% of all insurance losses from natural catastrophes were in Alberta

Insurance Bureau of Canada

From 2009 to 2014 insured losses from catastrophic events were close to or above $1 billion each year – most of this was due to water damage

Insurance Bureau of Canada

July and August 2015 saw flash flooding in the cities of Chestermere, the province informed residents its Disaster Recovery Program funds do not cover flooding from sewer or pump issues

The June 2013 flood

The 2013 flood is estimated to cost $6 billion

- The most damaging flood in our province's history.
- The combination of melted snowpack and days of torrential rain resulted in extremely high and swollen rivers in the Southern region of Alberta.
- Approximately one-hundred thousand people were evacuated, four people killed, and homes and businesses impacted.
- In the aftermath of the spring 2013 flooding, Albertans across the province were questioning flood mitigation methods, what they were, how they worked, and how our province could move forward to address future flooding...

Heroes: City of Calgary Water Services

City of Calgary
Glenmore Reservoir Water Treatment Plant

City of Calgary
Bearspaw Water Treatment Plant during 2013 Flood

"This disaster impacted 100,000 residents. If the water treatment plants had gone down, this disaster would have impacted a million residents."

Dan Limacher, City of Calgary Water Services

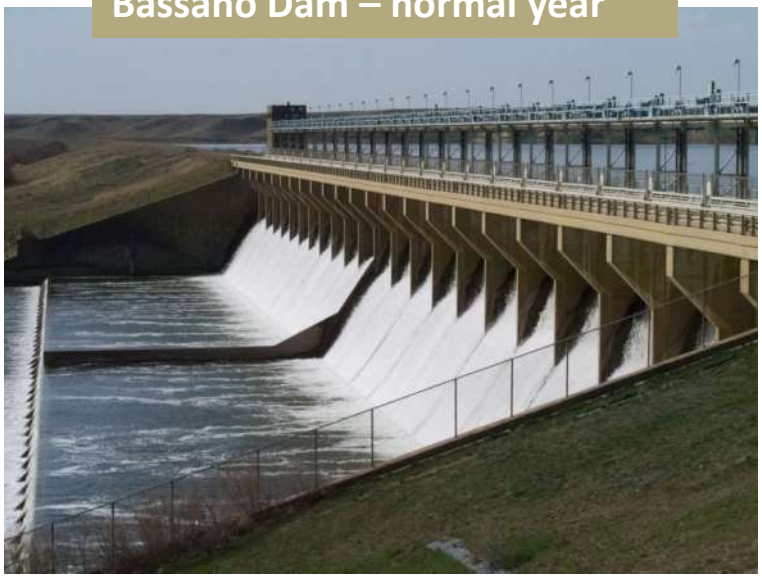
Heroes: Earl Wilson

"Hundreds of millions of dollars were at risk … I flipped a coin a million times trying to decide whether to pull the plug."

Earl Wilson, General Manager, Eastern Irrigation District

Calgary Herald, May 1, 2014

Bassano Dam – normal year



Bassano Dam – June 2013

Heroes: my WaterSMART team

Event was reported and responses managed primarily via social media.

@WaterPortal

FB.com/WaterPortal

How could we help?

June 20, 2013: Colpitts Ranch est. circa 1890

June 21, 2013: Stampede Park

The Canadian Water Summit was held in Calgary on June 27, 2013. We had the best water minds in the Basin, Canada and the World focused on flood mitigation solutions

The 2013 Great Alberta Flood:

Actions to Mitigate, Manage and Control Future Floods

Our condo

Our six high level recommendations

1. Anticipate and plan for more extreme weather events, including both flood and drought

2. Improve our operational capacity to deal with potential extreme weather scenarios through better modeling and data management

3. Investigate the cost/benefit balance of investing in physical infrastructure such as on and off-stream storage, diversions, and natural infrastructure such as wetlands

4. Consider flood risks in municipal planning and strengthen building codes for new developments in flood plains

5. Evaluate options for overland flood insurance

6. Manage our water resources collaboratively, and ensure WPACs across the province have proper authority and funding.

Recommendation 1.

Anticipate and plan for more extreme events

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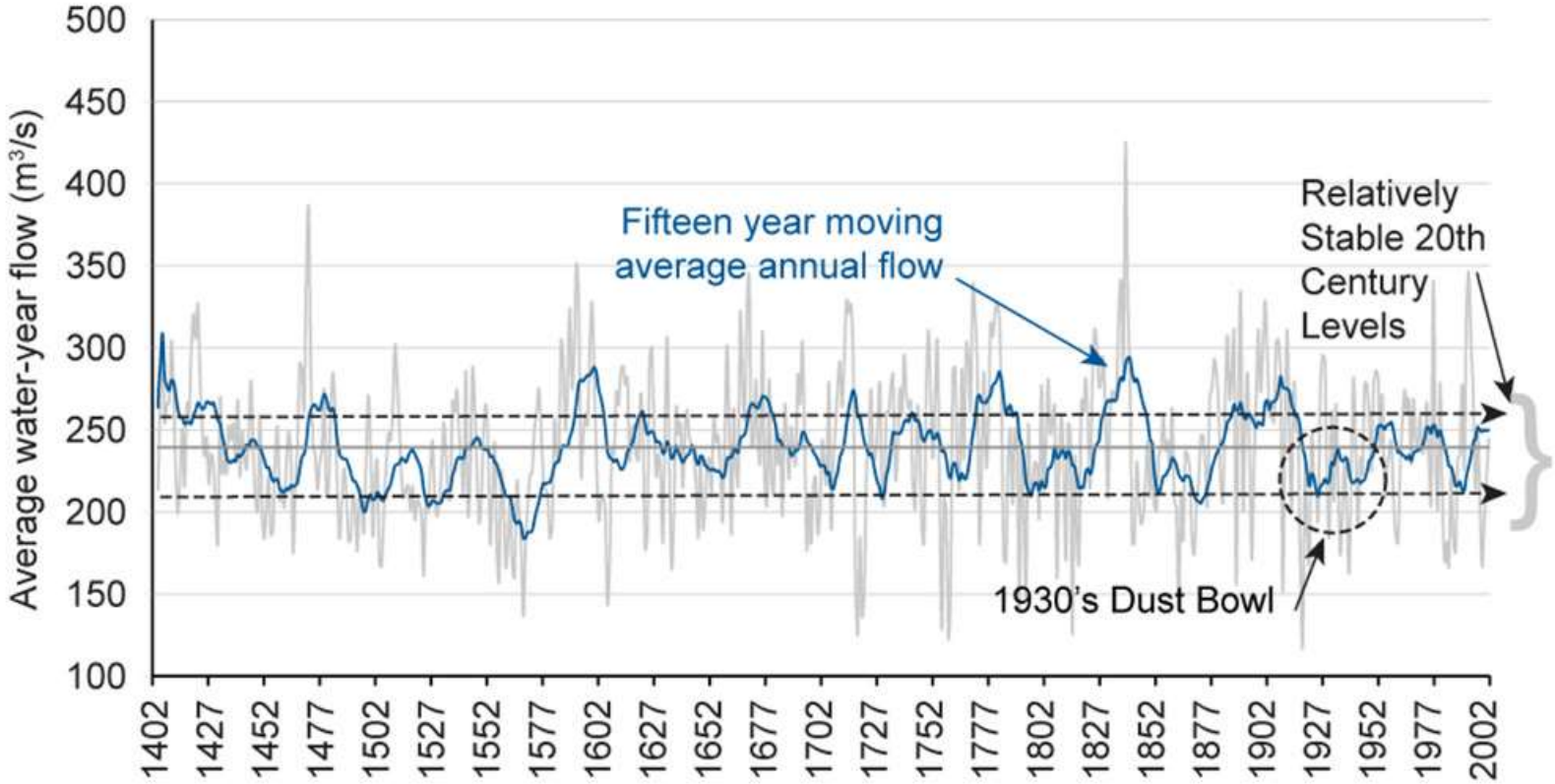
History demonstrates extreme climate variability

South Saskatchewan River Basin Flows (Bow + Oldman)

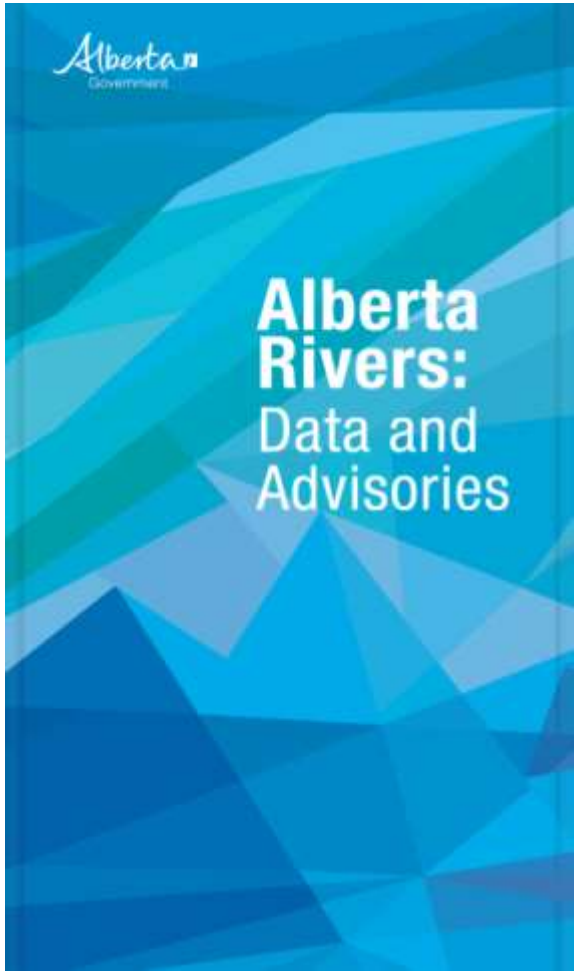


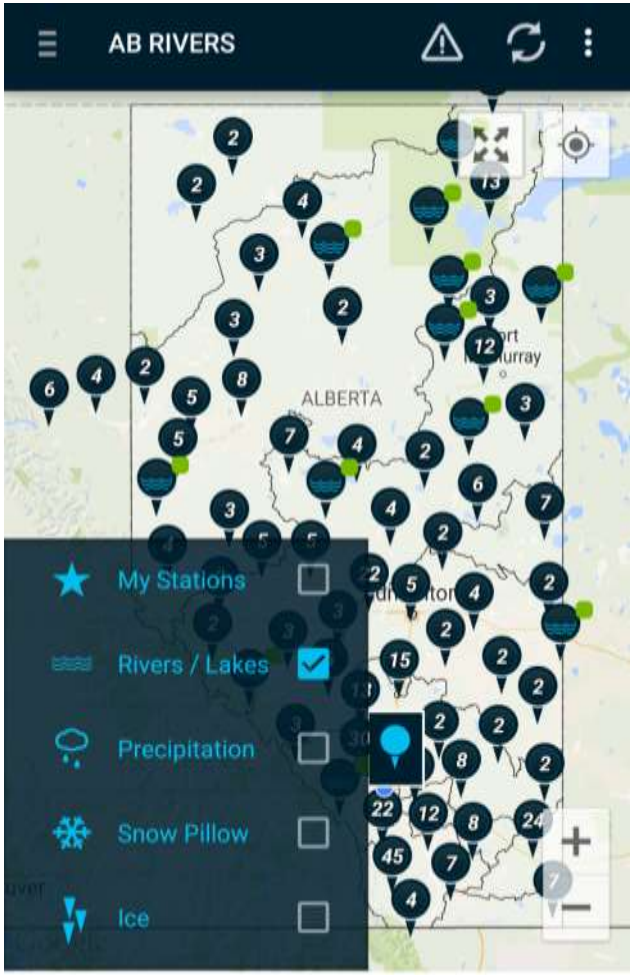
Source: David Sauchyn, University of Regina

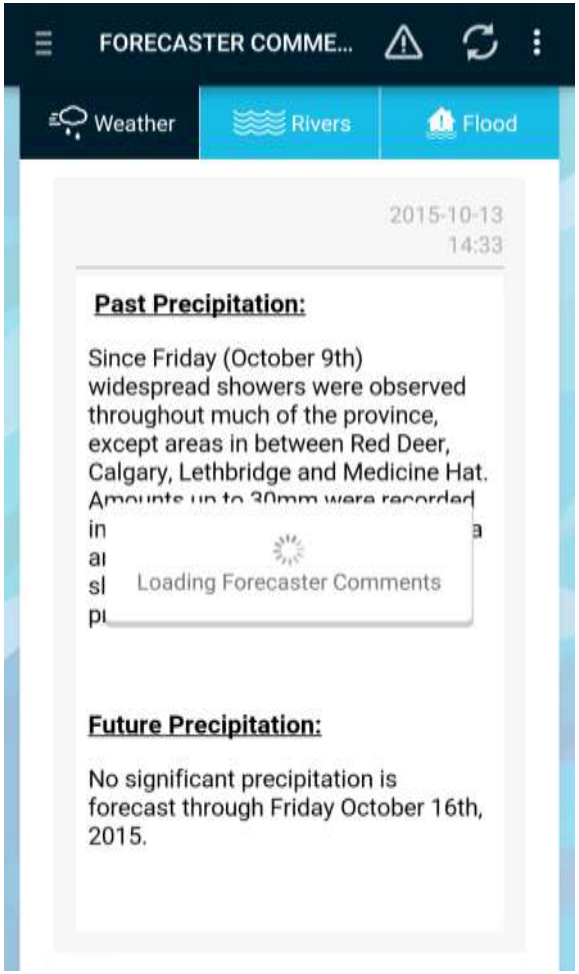
Historic and tree ring data indicate future flood/drought events could be far more severe than recent record

Recommendation 2.

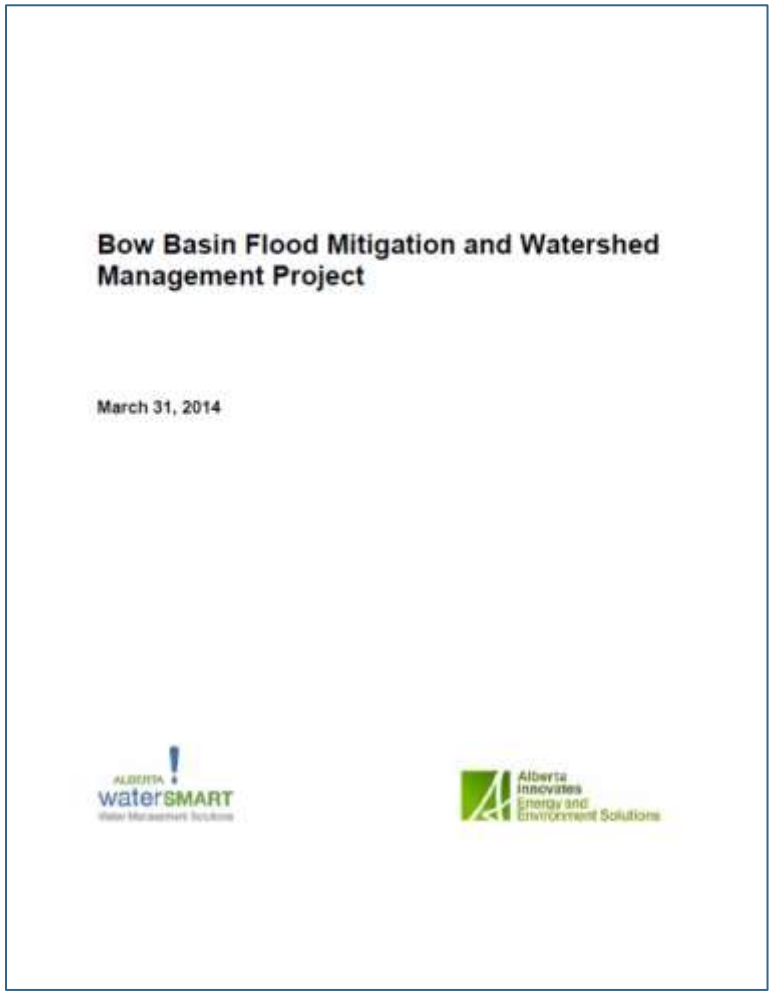
Improve operational capacity and response

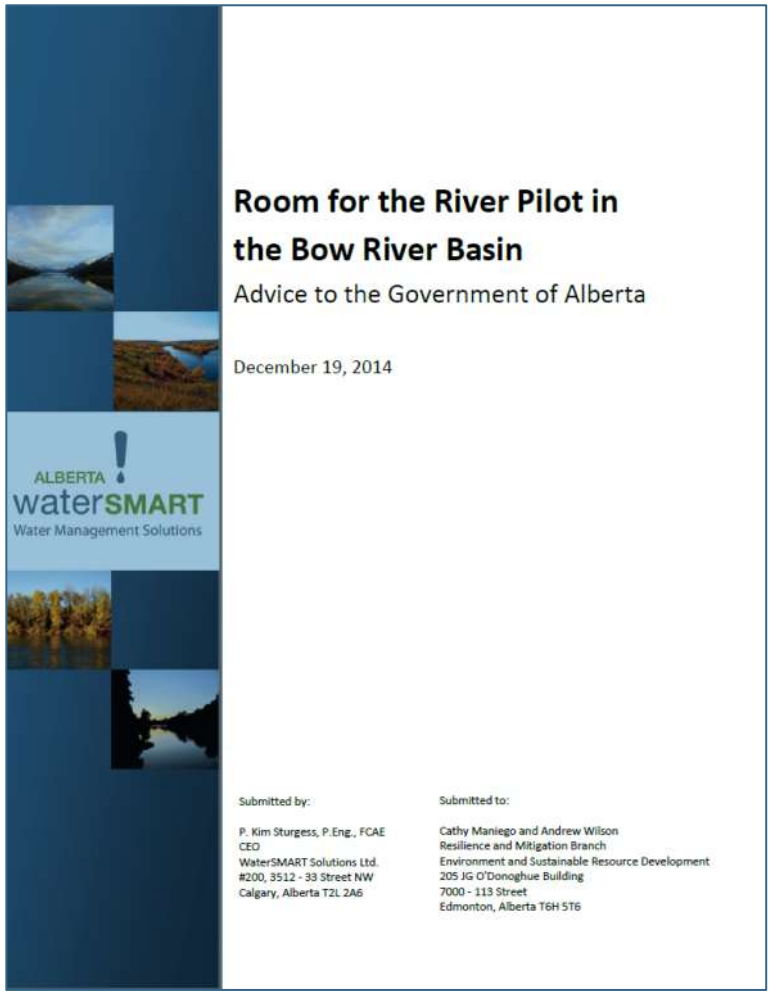






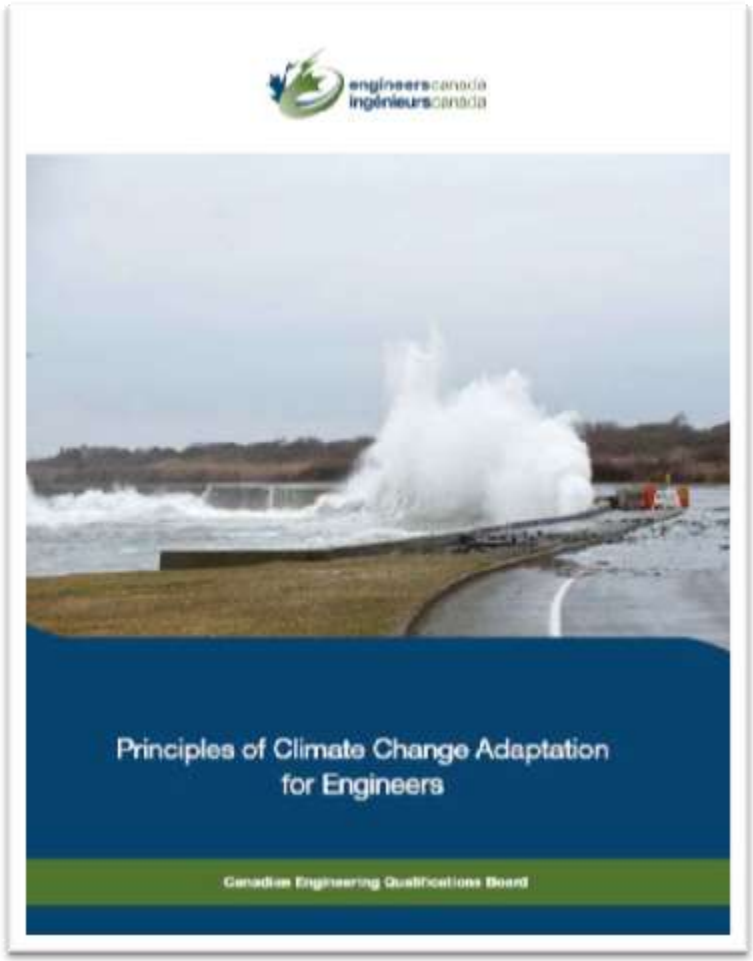
Recommendation 3. Investigate cost/benefits balance of physical infrastructure and natural infrastructure





These reports and more available free on www.albertawater.com

Recommendation 4. Consider flood risks in municipal planning and strengthen building codes



Professional Judgment

Guideline Element # 1: Integrate Adaptation into Practice
Guideline Element # 2: Review Adequacy of Current Standards
Guideline Element # 3: Exercise Professional Judgement

Integrating Climate Information

Guideline Element # 4: Interpret Climate Information
Guideline Element # 5: Work with Specialists and Stakeholders
Guideline Element # 6: Use Effective Language

Practice Guidance

Guideline Element # 7: Plan for Service Life
Guideline Element # 8: Use Risk Assessment for Uncertainty
Guideline Element # 9: Monitor Legal Liabilities

Recommendation 5.
Evaluate options for overland flood insurance

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Albertans who live in floodplains can now get overland flood insurance

MATT MCCLURE, CALGARY HERALD

More from Matt McClure, Calgary Herald

Published on: June 2, 2015 | Last Updated: June 2, 2015 7:13 PM MDT

Homeowners in Alberta who live in floodplains can now insure their losses from overland waters with one of the province's largest property insurers … Using new software that maps the risk of inundation down to the individual property level, the Co-operators said this week it is now able to price a comprehensive water damage product…

Aviva Canada also began offering an overland water endorsement this month that covers losses from the accumulation or runoff of surface waters to customers in Alberta and Ontario who already have sewer backup coverage.

Recommendation 6.
Manage our water sources collaboratively

Collaboration between federal, provincial and municipal governments, WPACs, irrigation districts, hydropower companies, NGOs is required, and can be improved by:

- Supporting WPACs to work with their membership to assess flood and drought risk, consequences, and mitigation strategies, and to provide advice to GoA
- Considering the creation of a Provincial Water Authority for coordinated watershed management across the WPACs
- Supporting and providing increased capacity to smaller communities to respond to natural disasters.

The value of collaboration

Stakeholder participation is essential

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A collaborative process of involvement is essential for

Common knowledge base

Defined objectives

Society-wide issues

Adaptation, not prevention

Shared costs

Public support

Credibility

Project participants typically include

WPACs

Municipal governments

NGOs with water interests

Irrigation districts

Alberta Government

Academia

Technical experts

Industry

The interested public

Collaborative modelling process builds knowledge and enables exploration

Computer aided negotiation,
computer aided dispute resolution,
computer modelling for decision support…
...many names, similar approaches

Six steps

1. Determine participants, interested parties, and project team
2. Prepare and agree on Project Terms of Reference
3. Develop Performance Measures
4. Build the model
5. Test the model and explore alternatives “what if…”
6. Reach consensus and assess practical implementation

Collaboration case study

Room for the River

Dutch Room for the River Program

Dutch National Water Authority responsible for administering *Room for the River* program.

Program objectives for the Rhine branches are:

- Safely cope with a 1:1250 years discharge of 16,000 cms without flooding
- Enhance the overall spatial quality of the river landscape

Their process has been

1. Joint problem definition
2. Inventory of project proposals
3. Hydraulic modelling and assessment of cost-effectiveness of all proposals (Planning Kit)
4. Joint (participatory) selection of a set of projects that together 'do the job'
5. Local implementation (transparency and extensive engagement throughout) under national supervision

Source: http://www.ruimtevoordewaal.nl/en/room-for-the-river-waal/

Recognize the differences between Southern Alberta and Netherlands river systems

River Ijssel in the Netherlands

Wide, flat and slow

Channelized

Ends in the Atlantic Ocean

At least a week's notice of flood

Bow River in Alberta

Narrow, steep and fast

Development only in City and towns

Ends in agricultural region

Maybe eight hours notice of flood

Room for the River Pilot in the Bow Basin

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Objective

Learn from the Dutch Room for the River experience to identify and consider potential flood mitigation options in the Red Deer River Basin and Bow River Basin to reduce vulnerability of people and infrastructure along with improving the overall environmental quality of the river.

Approach

- WaterSMART was engaged by Alberta Environment to facilitate this pilot
- Built on work already identified, studied and implemented in the basin
- Worked with water managers, watershed managers, regulators and experts that know the river
- Applied a systematic, informed framework and process that could be replicated in other basins

Room for the River Pilot contributors

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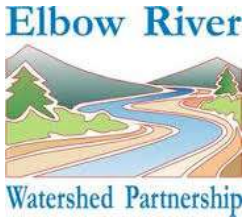
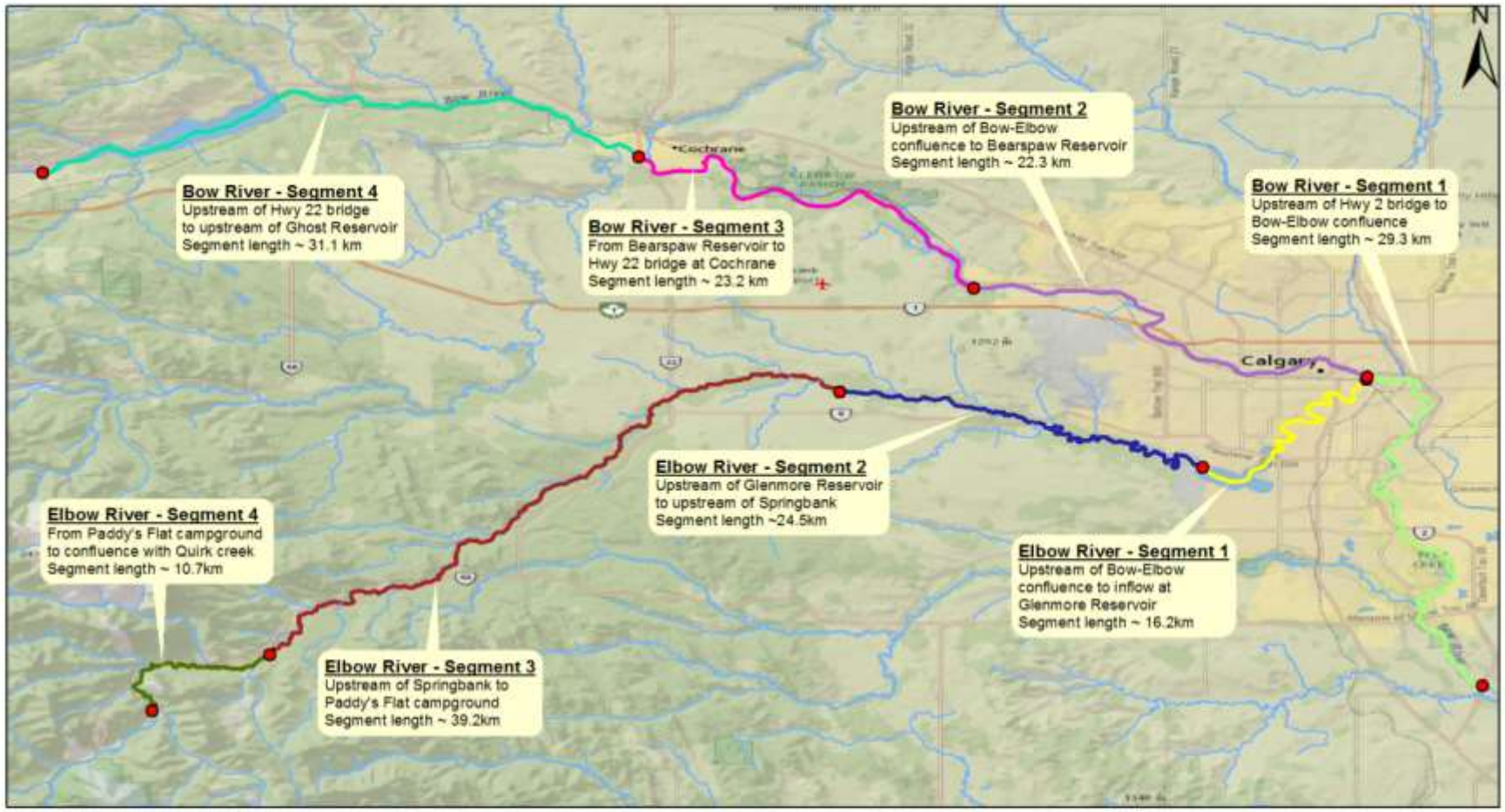


Fisheries and Canada

TransAlta

Apply framework to the Bow Basin



Tables organized by river segment to generate all possible mitigation ideas

All ideas captured, organized and reported.
Nothing was deleted or removed.
No politics!

Room for the River pilot

Policy opportunities identified through collaboration and engagement

1. **Map inundation and/or hazard across the whole basin** to provide a base of knowledge for development, mitigation and recovery decisions, and enforcement

2. **Document damage to infrastructure** to retain institutional memory on flood impacts to inform future building and mitigation

3. Strengthen and enforce policy and regulation to **halt or minimize new development in floodplains**

4. **Ensure projects are rebuilding more robustly** than before; e.g., new Glenmore Dam gates higher than original stop logs

5. Revisit standards and incentives to promote **building roads and bridges to leave more room for the river**

6. Establish **more stringent guidelines for new pipeline and utility** construction in or across floodplains

7. Establish basin wide guidelines for **"as needed" flooding of light infrastructure areas**

8. **Stop the removal of log jams in the headwaters** (where it is not close to flood risk) to maintain natural retention

9. **Strengthen and enforce land use BMPs** to maintain the flow regulation and retention in the catchment

10. **Improve monitoring of precipitation and river flow** measurements as well as the methods and timelines of public communications related to possible flood warnings

Room for the River pilot outcomes

Advice to Government of Alberta

1. Scan of specific, actionable opportunities to further implement *Room for the River* measures along the Bow and Elbow main stems above and including Calgary.
2. Recognition of what has already been done along the Bow and Elbow rivers to create room for the river.
3. Possible practical and implementable “no regrets” opportunities
4. Suggestions on potential broader program, process and engagement

An elevated understanding amongst the water community in the Bow Basin of the *Room for the River* program, measures and associated opportunities in Alberta.

A tested framework and process for applying *Room for the River* measures to all watersheds in Alberta.

Looking ahead

What's next for Alberta?

Announcements expected in the upcoming Budget

- Provincial support to continue one large infrastructure project for mitigation on the Elbow River
- Some discussion of utilizing existing dam infrastructure on the Bow River for flood and drought mitigation
- Continued funding for more local berming projects, as well natural infrastructure projects, such as wetlands.

What is needed and hopefully being discussed

- What level of risk protection is the Province willing to access for properties downstream of the Glenmore Reservoir?
- What are the economic trade-offs between major infrastructure projects and other options, such as relocation?

Why environment and climatic changes matters to everyone

- Water is already a barrier to population growth, economic development, and recreational demand
- Home to over one third of Alberta's population; southern Alberta's population expected to grow 60% by 2041
- Loss of glacier storage (lower reserve and natural summer flow on the Bow River)
- Climate and weather patterns can change rapidly
- Growing world demand for irrigated agriculture production
- Environmental concerns throughout the river systems
- Reach-dependent impacts on high value fisheries and other recreation
- Risk of periodic floods and drought without coordinated and systematic approach to manage or mitigate

Learnings: climate variability will play out differently in each sub basin

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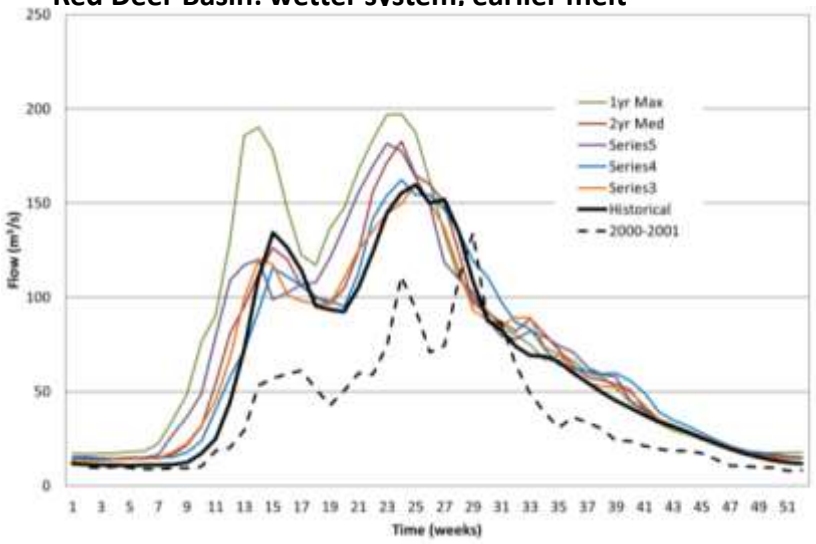
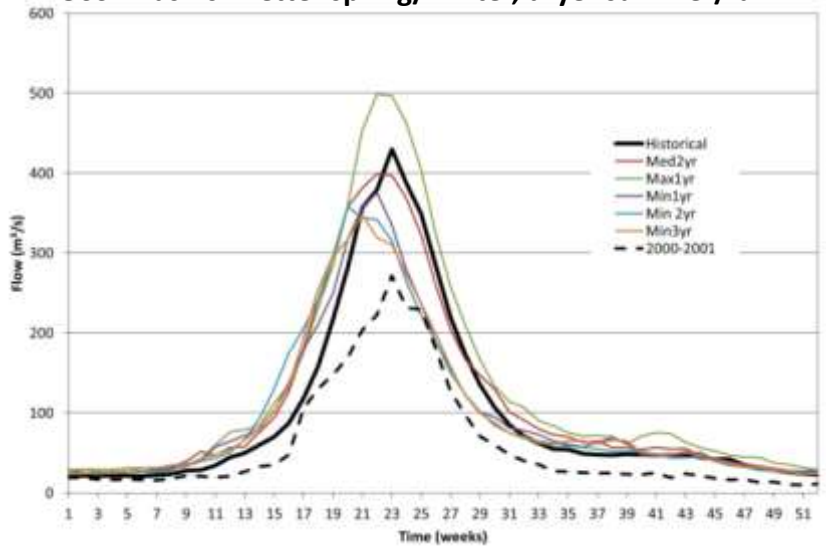
Red Deer Basin: wetter system, earlier melt

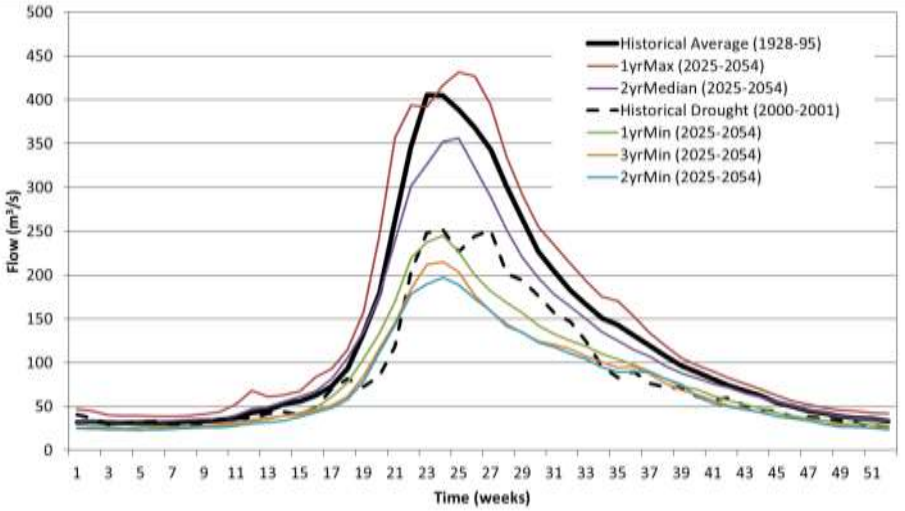


OSSK Basins: wetter spring/winter, dryer summer/fall



Climate Variability Scenarios Compared to 2000-2001 in each Basin

Bow Basin: dryer system overall



Building an integrated operating model to develop and test basin-wide resilience strategies

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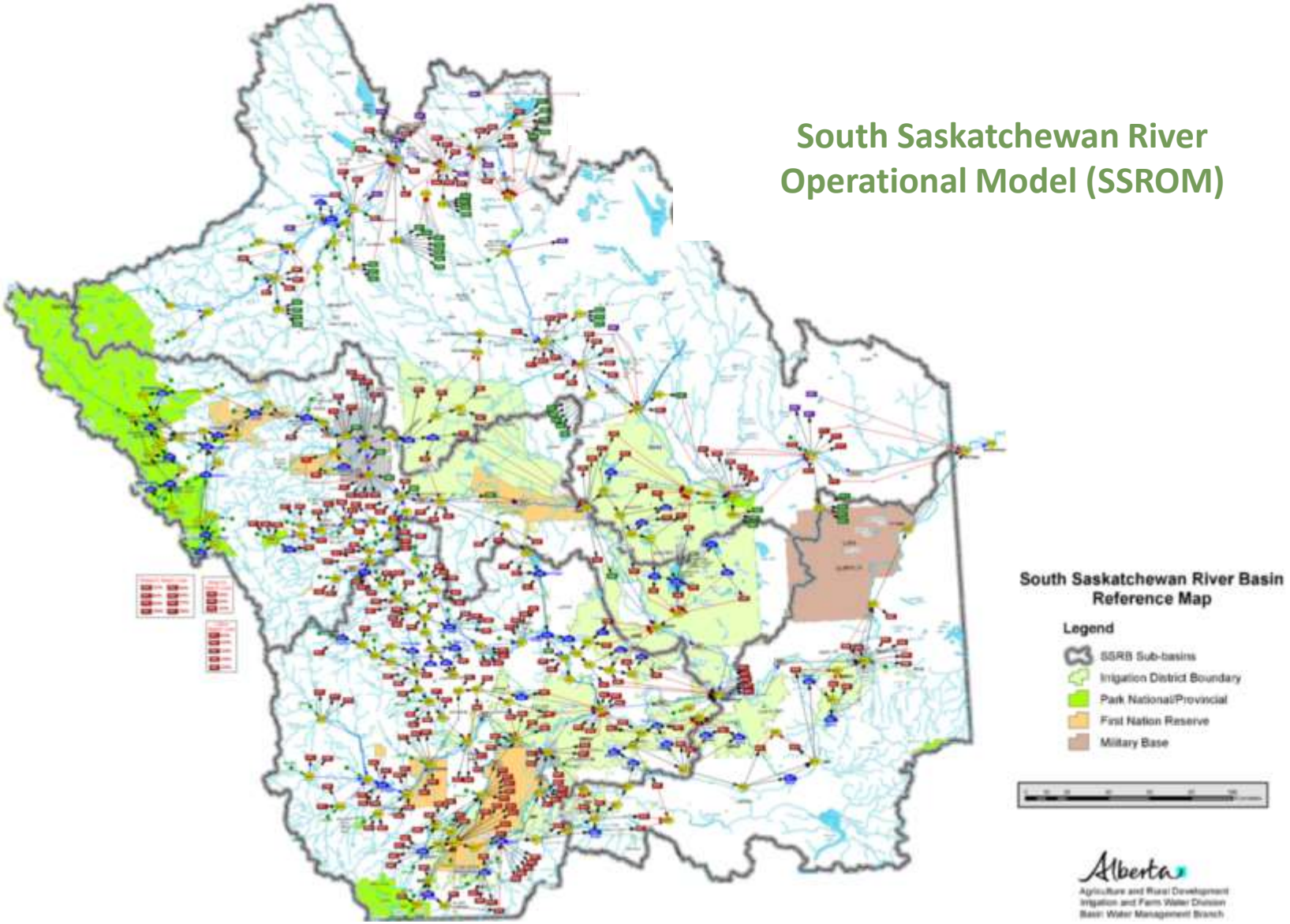
South Saskatchewan River Operational Model (SSROM)

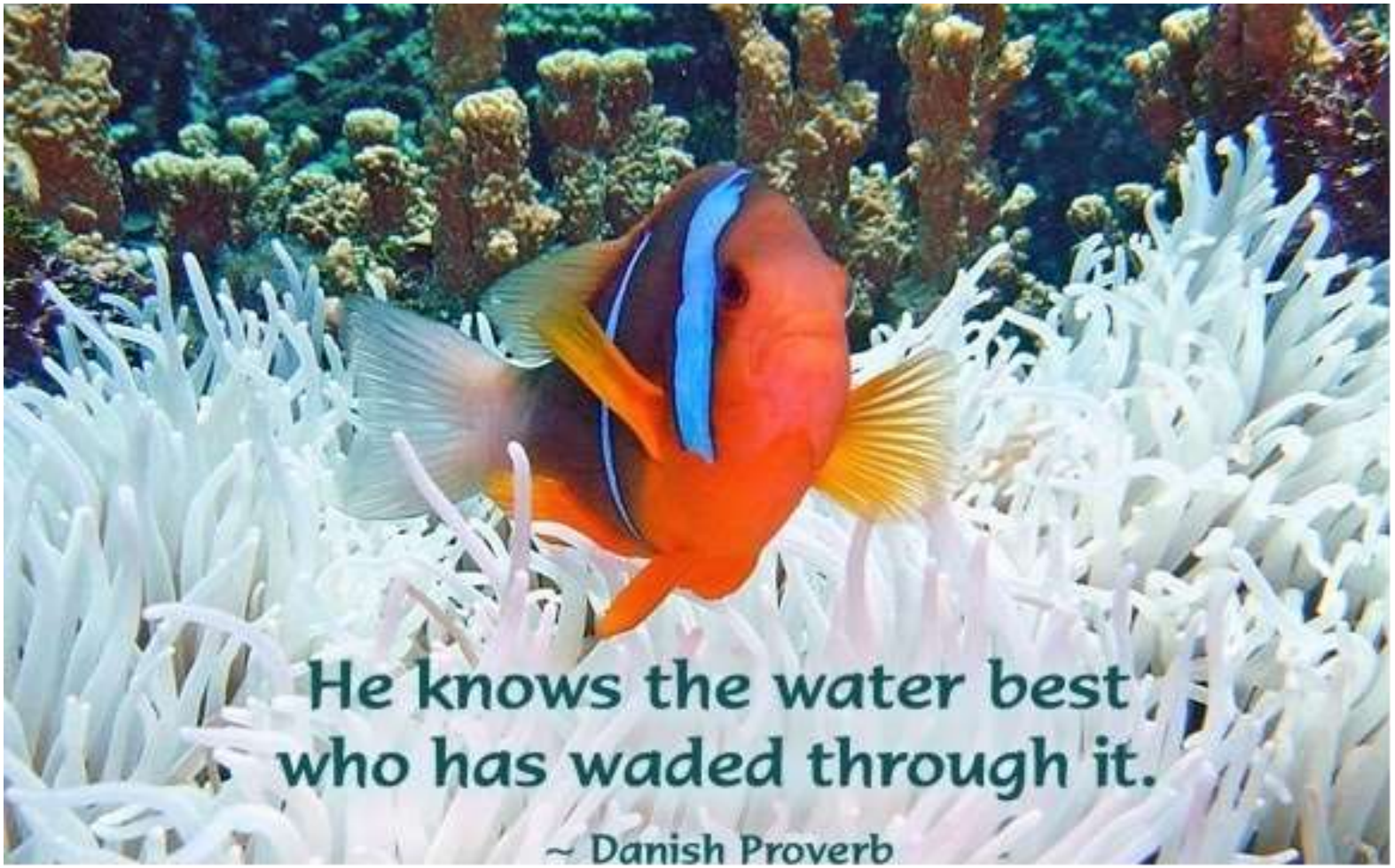


A collaborative approach and adaptive water management is critical

- Natural climate variability and climate change pose a huge challenge to Alberta, as headwater for major east and north flowing rivers
- Land use changes significantly impact river systems and flows
- Water supply, timing and nature of precipitation matched with growing water demands likely the most significant environmental and climatic impacts
- Adaptive water management is essential for Alberta's continued prosperity.

No single entity or initiative can address this challenge alone

Manage our water resources collaboratively



Water: the key to our sustainable future

More information

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www.albertawatersmart.com

ALBERTA WaterPortal SOCIETY

www.albertawater.com