



Alberta Tools Update

by
Alberta Hydrology Community of Practice

2019 PPWB Committees on Flow Forecasting & Hydrology Workshop

Chiadih Chang
Modelling Integration Team (MIT) Lead
Alberta Environment and Parks

Edmonton, Alberta, November 27-28, 2019

Alberta 

Purposes of Presentation



- Keep you informed
- Share information and exchange ideas
- Explore collaboration opportunities

Alberta 

List of Some Alberta Tools



- Bow River Sim
- Flood Awareness Map Application (FAMA)
- Delta Water Assessment Tool (DWAT)
- Alberta Modelling Expert System (MES)
- Alberta Data Automation for Environmental Models (ADAEM)
- Alberta Flow Estimation Tool for Ungauged Watersheds (AFETUW)

Alberta



A serious game "is a game designed for a primary purpose other than pure entertainment. The "serious" adjective is generally prepended to refer to video games used by industries like defense, education, scientific exploration, health care, emergency management, city planning, engineering, and politics."

Goals

- Develop an educational tool to increase awareness
- Present AEP's WRMM in a communicative and interactive way
- Communicate the importance of integrated water management decision making
- Create an understanding of roles and responsibilities in water management
- Facilitate workshops to encourage discussion among stakeholders

Alberta ■

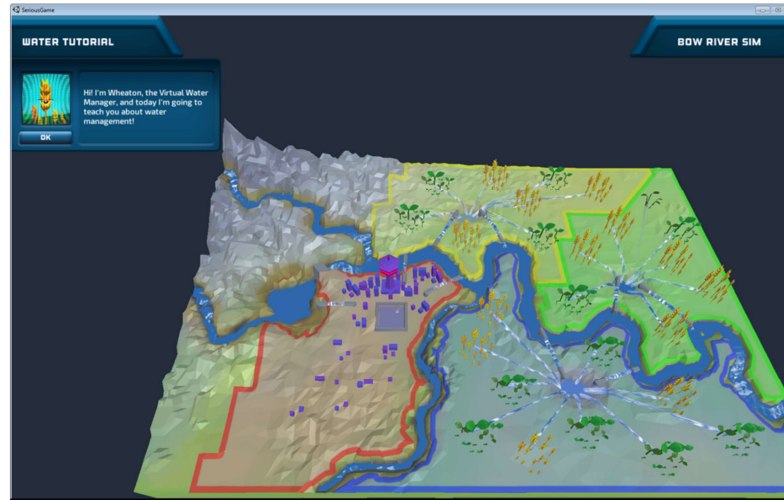
Visual Transformation of WRMM



Alberta

The three inflow channels provide natural water supply into the model. The three inflow channels are the Bow River just downstream of the Bearspaw Dam and the inflows from the Elbow and Highwood River tributaries. The downstream end of the model is the junction with the Oldman River which then forms the South Saskatchewan River. The model includes the Glenmore Reservoir located on the Elbow River, upstream of the junction with the Bow River.

Tutorial Mode



The Tutorial Mode consists of two interactive tutorials. The first tutorial introduces stakeholders to water management concepts and the second tutorial introduces the users to the Bow River Sim. The tutorials are guided by “Wheaton” an animated stalk of wheat who guides the users through the tutorials.

Exploration Mode & Challenge Mode



Alberta

- Exploration Mode lets people play freely with sliders, etc, and see what the results are.
- The Challenge Mode explores the concept of goal-oriented play which helps users further explore and learn about the WRMM model and water management. In Challenge Mode, the parameters that could be changed were limited, and the stakeholders are provided with specific learning objectives. Three challenges are introduced in this order: Reservoir Challenge, Calgary Challenge and Priority Challenge.

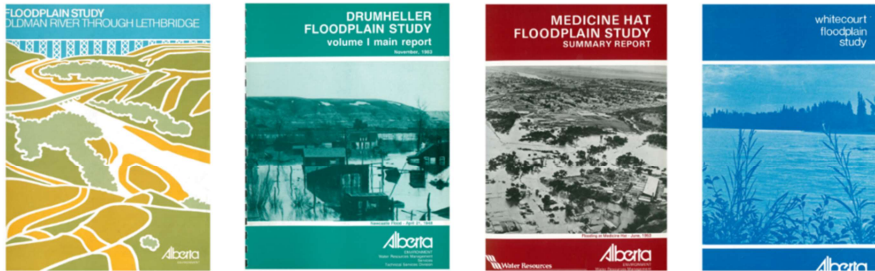
Flood Awareness Map Application (FAMA)

Contact:
Peter Bezeau, AEP
peter.bezeau@gov.ab.ca

Alberta 

Flood Hazard Identification Program

- Increase public safety and awareness of flood hazards
- Promote appropriate development of flood hazard areas
- Reduce future flood damages and related financial costs



Alberta

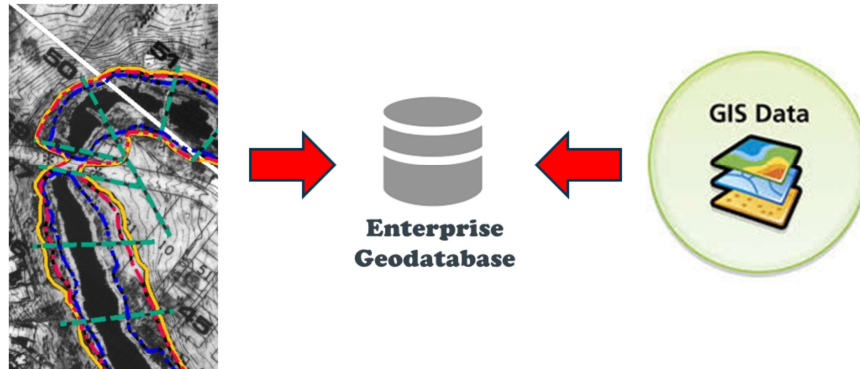
Flood Hazard Identification Program Objectives

Floods.Alberta.ca



Overview of our flood mapping web application – Multiple uses
Supports internal and external groups
Co-funded by Government of Alberta and Government of Canada through the National Disaster Mitigation program.
Effectively communicating flood information is critical to meet the Flood Hazard Identification Program Objectives

Flood Maps – Data Modernization



Alberta

A big part of this project is data modernization and standardization

Included:

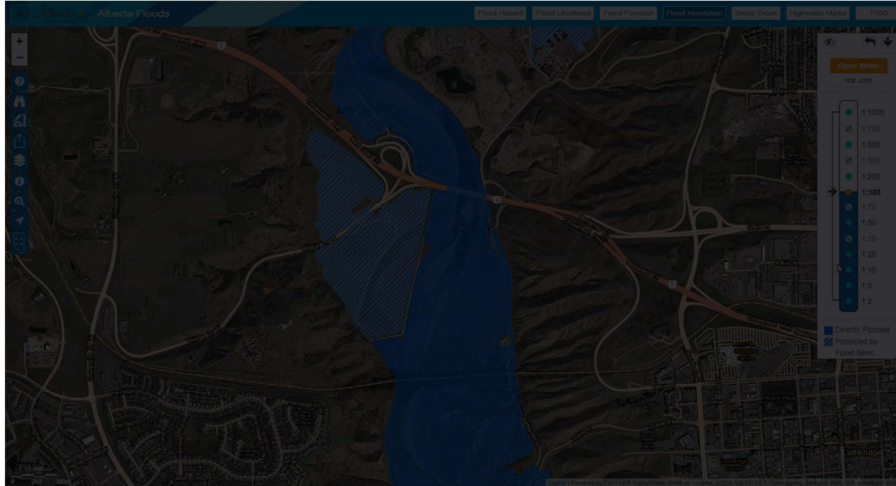
Digitizing old paper maps

Organizing and standardizing GIS data from a variety of formats.

New dataset stored in our enterprise geodatabase (GENESIS)

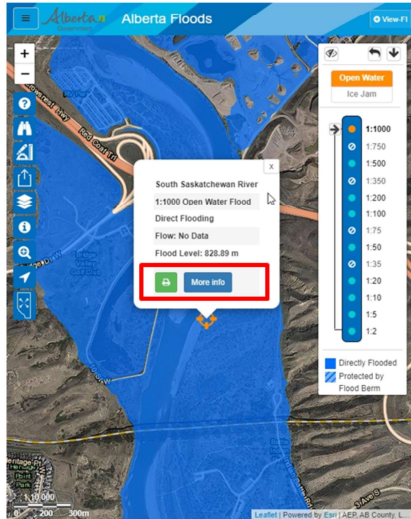
This data is then used to drive our flood mapping web application, the Flood Awareness Map Application.

Floods.Alberta.ca – Web Mapping



GIF of the basic flood inundation mapping functions
Change return periods to show a range of floods from the 1:2 year to the 1:1000 year.
Clicking on a flood areas will open a dialogue box that provides access to a variety of detailed information.

Floods.Alberta.ca – Information Shared



- Flood hydrology
- Open water and ice jam floods
- Customized flood maps
- Forecasted flood maps
- Emergency management tools
- Study reports (pdf)
- GIS data
- Metadata

Alberta

The app has the ability to provide a ranges of maps, data and tools.

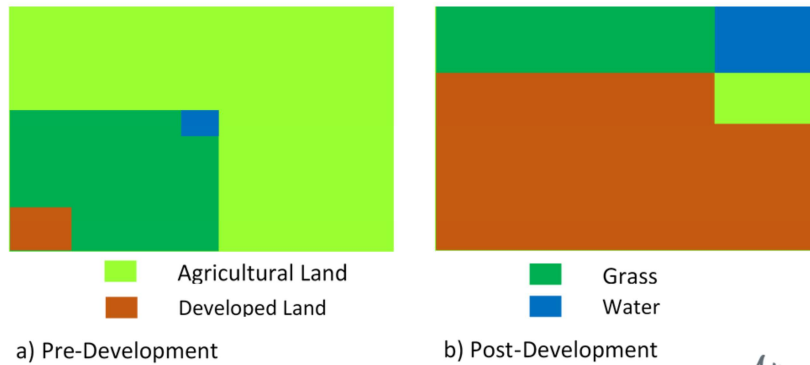
Delta Water Assessment Tool (DWAT)

Contact:
Zahidul Islam, AEP
zahidul.islam@gov.ab.ca

Alberta 

Delta Water Assessment Tool (DWAT)

Delta Water' is a terminology to describe the excess stormwater runoff generated from the increase in impervious surfaces associated with any landuse development.



Alberta

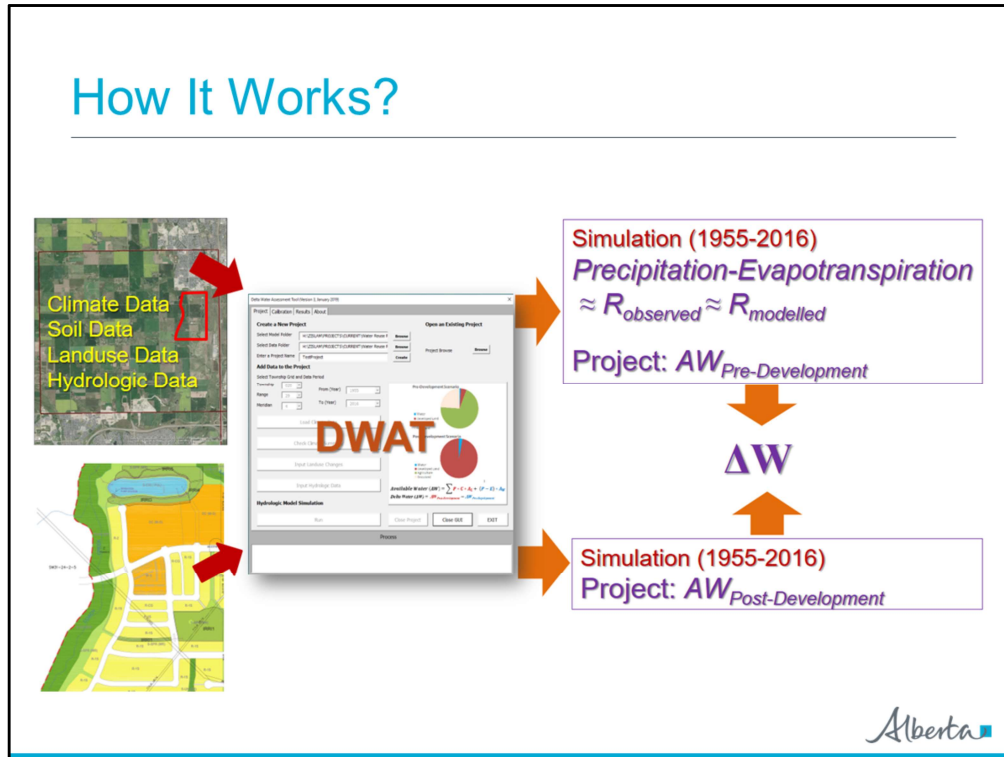
Purpose of the Tool:

- Understand the volumes of stormwater that can be made available for use that would otherwise be lost to evaporation.

Create the potential for Albertans to access and use a specific volume of a relatively high quality water source without impacting the existing water allocation system or ecological functions of the watershed.

- The long term vision is for regulators to utilize the DWAT to make decisions on stormwater allocation, and to enable equal access to the DWAT for all industries and municipalities across the province for planning purposes.

How It Works?



Conclusions:

- The tool can successfully estimate delta water and the results are comparable to the existing method of estimating stormwater drainage
- The tool could reasonably estimate delta water availability at different locations in Alberta.
- The tool can provide a consistent and scientifically defensible approach to support decision making under Alberta's regulatory framework for water management.

Alberta Modelling Expert System (MES)

Contact:
Chiadih Chang, AEP
Chiadih.chang@gov.ab.ca

Alberta 

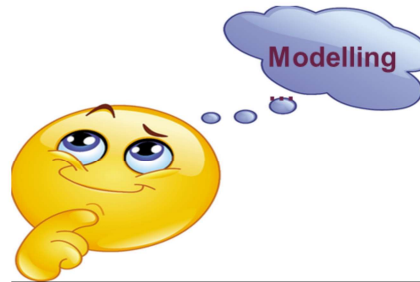
Three Commonly-Asked Modelling Questions

- What model should I use to meet my objectives?
- Do I have enough data to calibrate and validate the model I choose?
- Has anyone done any modelling work in a geographic area I am interested in?



Alberta

Vision of MES

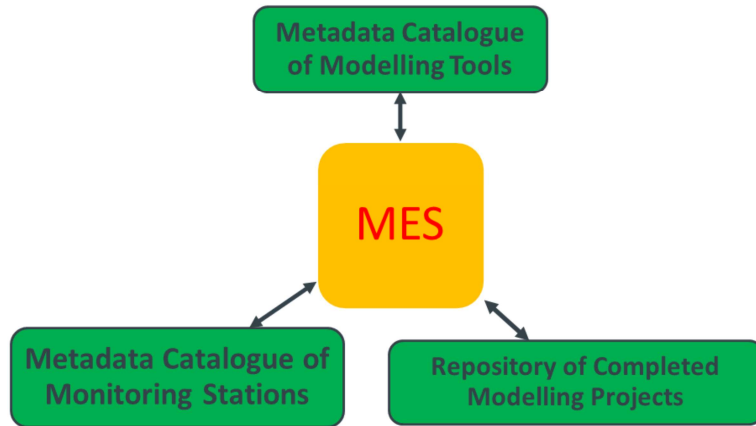


Let's MES it!

Alberta

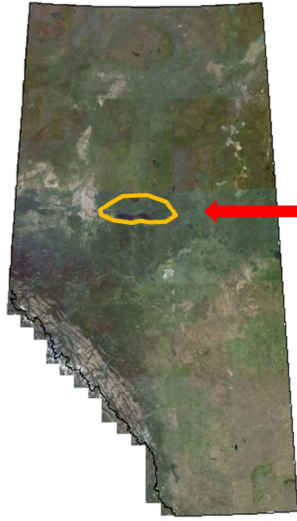
What is MES?

MES is a user-friendly, web-based, GIS-enabled system to support and enhance modelling activities for all media to support integrated natural resource management in Alberta.



Alberta

Are there any completed modelling projects available in an area of my interest?



Alberta

Alberta Data Automation for Environmental Models (ADAEM)

Contact:
Chiadih Chang, AEP
Chiadih.chang@gov.ab.ca

Alberta 

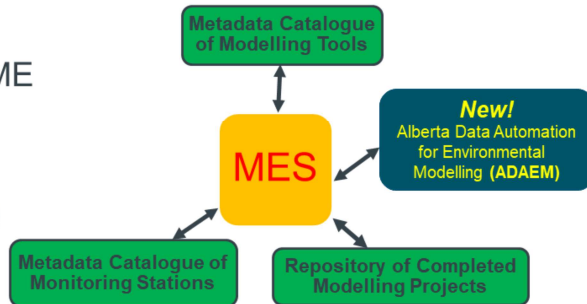
Challenges in Data Preparation for Modelling

- Compiling different datasets (including spatial and temporal data) from various data sources in different formats.
- Pre-processing of data into various formats to input into environmental models.
- Post-processing of output data from a model into various formats to input into other models.
- Time-consuming, labor-intensive, repetitive, and error-prone if done manually.

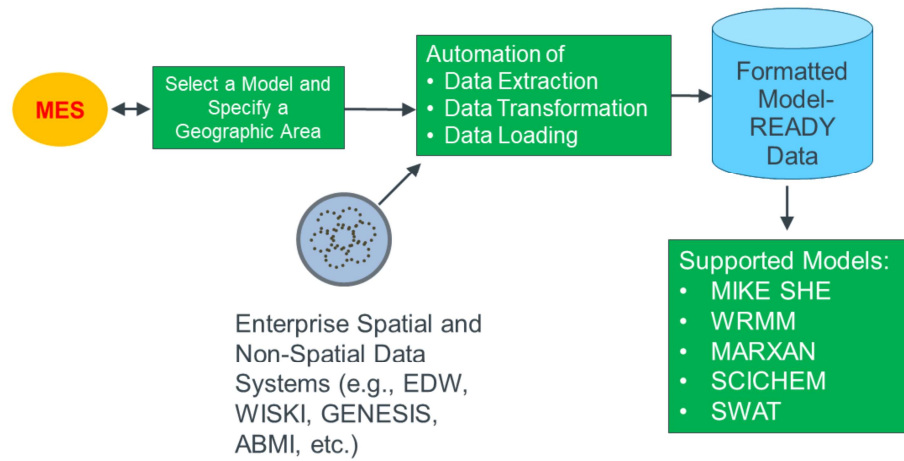
Alberta ■

What is ADAEM?

- A GIS-enabled, web-based portal.
- Integrating various FME workspaces with the Alberta Modelling Expert System (MES) of AEP.
- Supporting data needs for environmental modelling.



Main Processes of ADAEM



Alberta

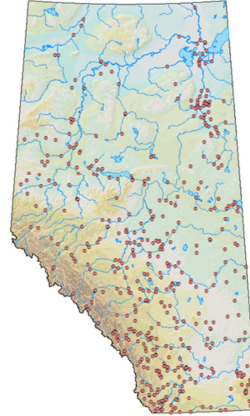
Alberta Flow Estimation Tool for Ungauged Watersheds (AFETUW)

Contact:
Chiadih Chang, AEP
Chiadih.chang@gov.ab.ca

Alberta 

Needs for AFETUW

- GoA's responsibility to manage and protect all streams in Alberta, including **ungauged streams**
 - Water Act
 - EPEA
 - Water for Life Strategy
 - Surface Water Allocation Directive
- Lack of hydrometric monitoring stations
- Need for flow statistics, real-time and historical flow information at ungauged watersheds
- Need for water licence information at ungauged watersheds



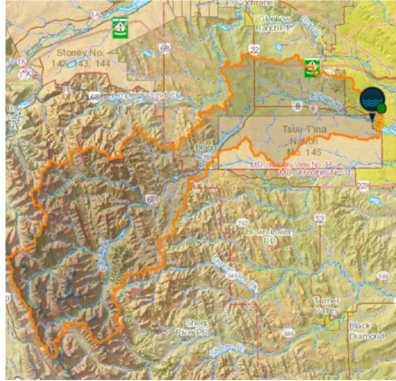
What is AFETUW?

AFETUW (*a-fet-to*) is a provincial GIS-enabled web tool for **ungauged watersheds** in Alberta which automates:

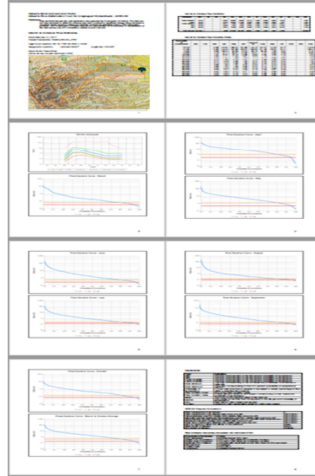
- Watershed delineation
- Flow statistics and estimations
 - Flow Duration Curve (FDC)
 - Real-Time Flows
 - Historic Daily Flows
- Implementation of provincial Surface Water Allocation Directive (SWAD) and Instream Objective (IO)
- Water licence queries

AFETUW Sample Output

Automate **watershed delineation** anywhere in Alberta by point & click on the map.

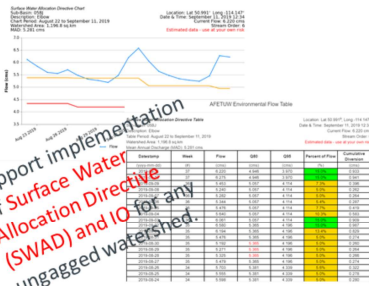


Derive **Flow statistics** for an ungauged watershed.



AFETUW Sample Output (cont'd)

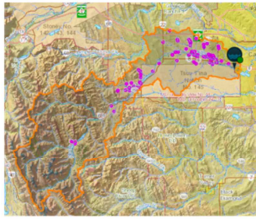
AFETUW Environmental Flow



Date	Flow (m³/s)	Flow (cfs)	Flow (MGD)
2010-01-01	1.0	35.3	0.0001
2010-01-02	1.0	35.3	0.0001
2010-01-03	1.0	35.3	0.0001
2010-01-04	1.0	35.3	0.0001
2010-01-05	1.0	35.3	0.0001
2010-01-06	1.0	35.3	0.0001
2010-01-07	1.0	35.3	0.0001
2010-01-08	1.0	35.3	0.0001
2010-01-09	1.0	35.3	0.0001
2010-01-10	1.0	35.3	0.0001
2010-01-11	1.0	35.3	0.0001
2010-01-12	1.0	35.3	0.0001
2010-01-13	1.0	35.3	0.0001
2010-01-14	1.0	35.3	0.0001
2010-01-15	1.0	35.3	0.0001
2010-01-16	1.0	35.3	0.0001
2010-01-17	1.0	35.3	0.0001
2010-01-18	1.0	35.3	0.0001
2010-01-19	1.0	35.3	0.0001
2010-01-20	1.0	35.3	0.0001
2010-01-21	1.0	35.3	0.0001
2010-01-22	1.0	35.3	0.0001
2010-01-23	1.0	35.3	0.0001
2010-01-24	1.0	35.3	0.0001
2010-01-25	1.0	35.3	0.0001
2010-01-26	1.0	35.3	0.0001
2010-01-27	1.0	35.3	0.0001
2010-01-28	1.0	35.3	0.0001
2010-01-29	1.0	35.3	0.0001
2010-01-30	1.0	35.3	0.0001
2010-01-31	1.0	35.3	0.0001

Support implementation of Surface Water Allocation Directive (SWAD) and IO for any ungagged watershed.

Generate real-time flows for any ungagged watershed.



Select Water Licences

Water Licence Area:

- AFETUW Designated Watershed
- Watershed Layer
- Drain Polygon
- Import Polygon
- Use Gross Drainage Area (Default)

Water Source:

- Surface Water
- Ground Water

Category:

- Permanent Licences
- Include Registrations
- Include Preliminary Certificates
- Temporary Diversion Licence (TDL)
- Licence Application

Display:

- Show Water Licences on Map View

Run Result Close

Query for water licence information for any watershed of interest in Alberta.

Licence Report: Surface Water, Permanent Licence including Preliminary Certificates

Watershed ID	Watershed Name	Area (km²)	Flow (m³/s)	Flow (cfs)	Flow (MGD)
1001	10010001	100.0	1.0	35.3	0.0001
1002	10010002	100.0	1.0	35.3	0.0001
1003	10010003	100.0	1.0	35.3	0.0001
1004	10010004	100.0	1.0	35.3	0.0001
1005	10010005	100.0	1.0	35.3	0.0001
1006	10010006	100.0	1.0	35.3	0.0001
1007	10010007	100.0	1.0	35.3	0.0001
1008	10010008	100.0	1.0	35.3	0.0001
1009	10010009	100.0	1.0	35.3	0.0001
1010	10010010	100.0	1.0	35.3	0.0001

31



Summary

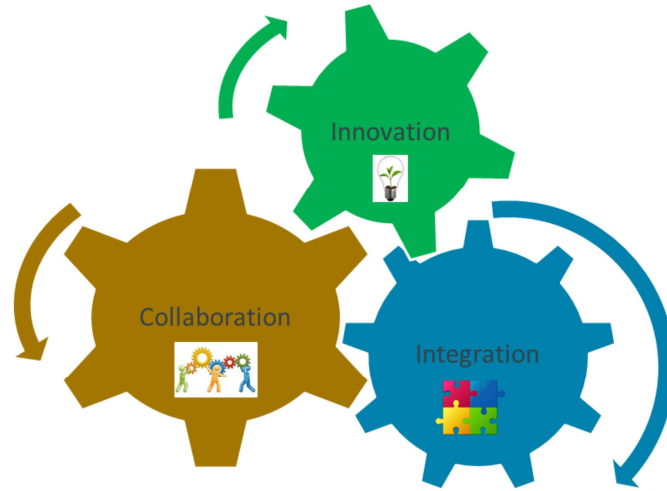
Alberta

Lessons Learned



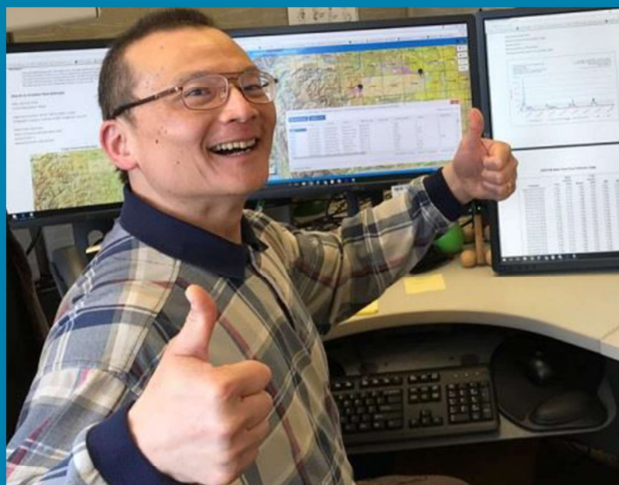
- Building **in-house capacity** is essential for long-term tools sustainability.
- **Engaging, communicating,** and **building good working relationships** with Sector-based IM/T is important.
- Involving **multidisciplinary teams** is critical.
- Forming **collaborative partnerships** is a big gain.

More Innovation, Integration & Collaboration



Alberta

Alberta Tools Matter and Make a Difference!



Happy and productive staff who are making more meaningful contributions to support informed environmental management decisions in Alberta.

35

Alberta

THANK
YOU!

Questions?



Alberta