

# 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



# 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)

# BOW RIVER SIM



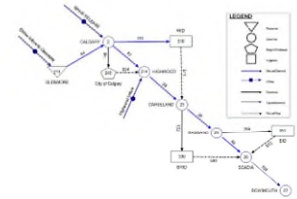
Contact:  
Khaled Akhtar, AEP  
[khaled.akhtar@gov.ab.ca](mailto:khaled.akhtar@gov.ab.ca)

# Goals

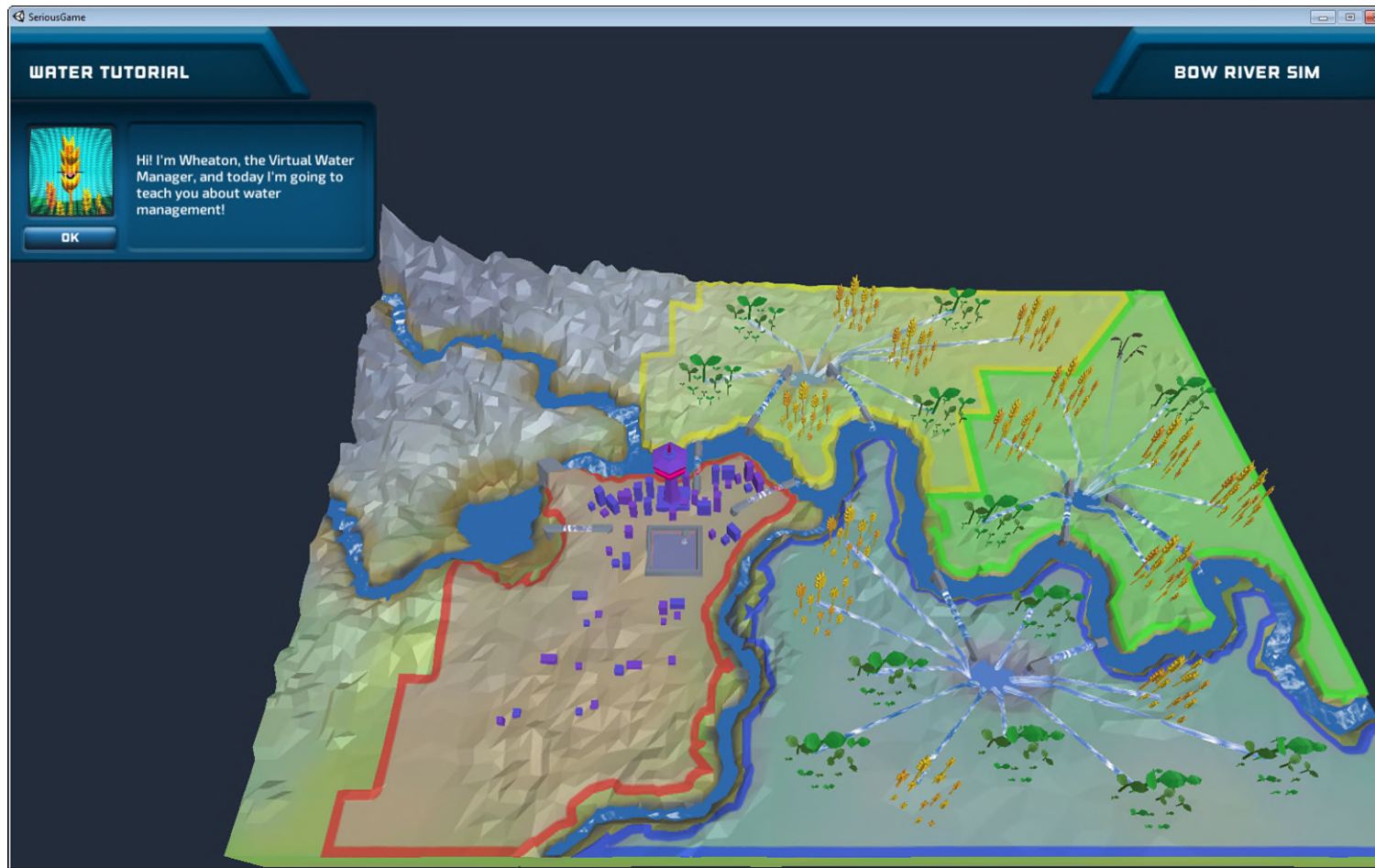
---

- 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

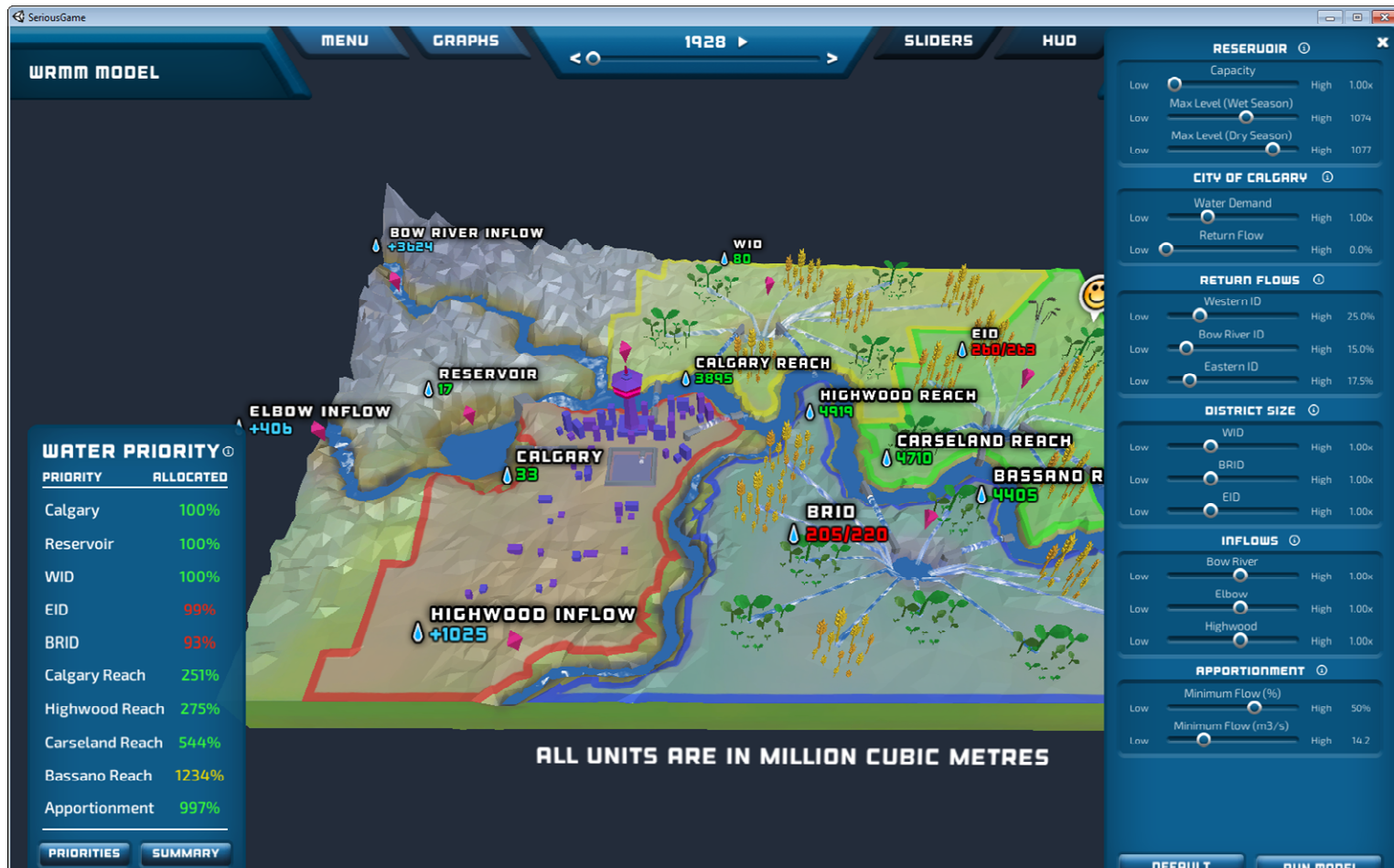
# Visual Transformation of WRMM



# Tutorial Mode



# Exploration Mode & Challenge Mode





# Flood Awareness Map Application (FAMA)

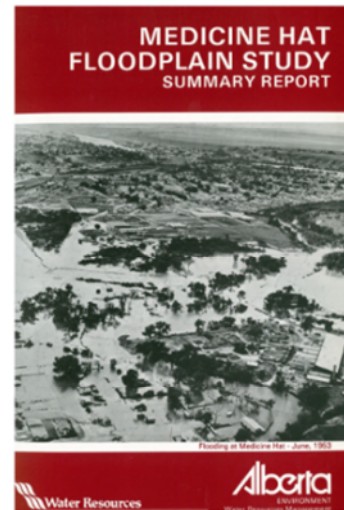
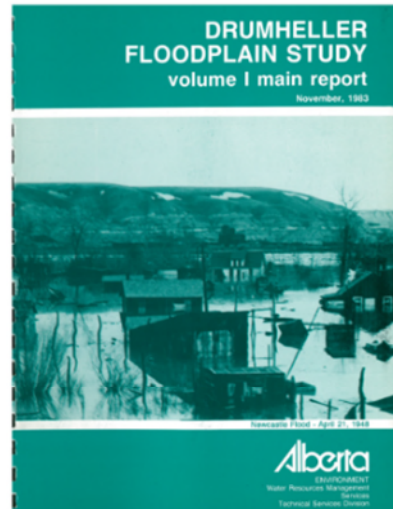


Contact:  
Peter Bezeau, AEP  
[peter.bezeau@gov.ab.ca](mailto:peter.bezeau@gov.ab.ca)

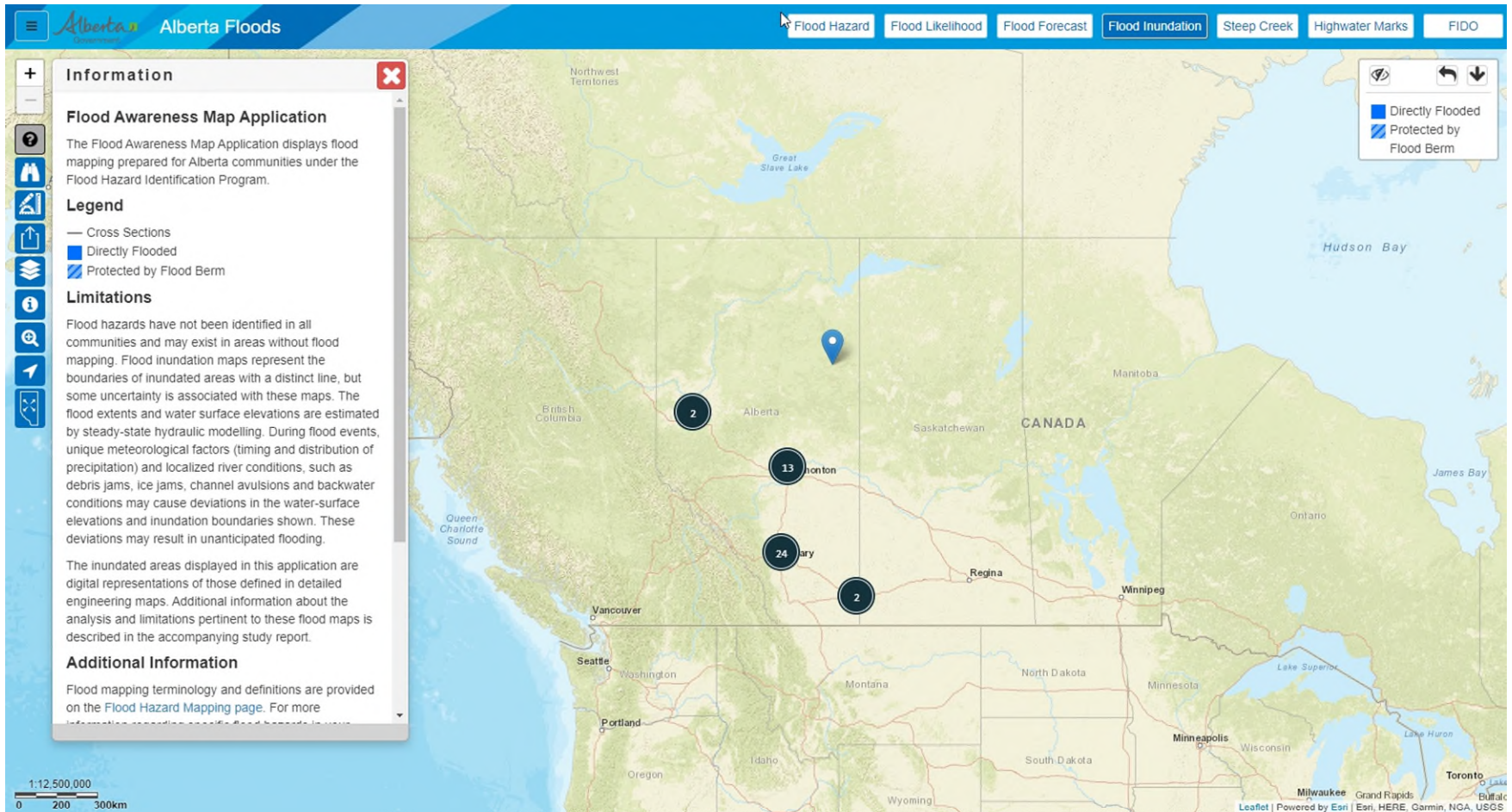
# Flood Hazard Identification Program

---

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

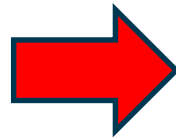
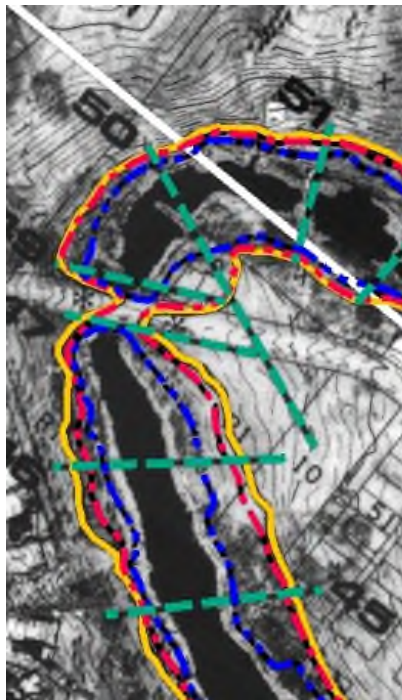


# Floods.Alberta.ca

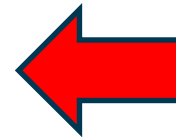


# Flood Maps – Data Modernization

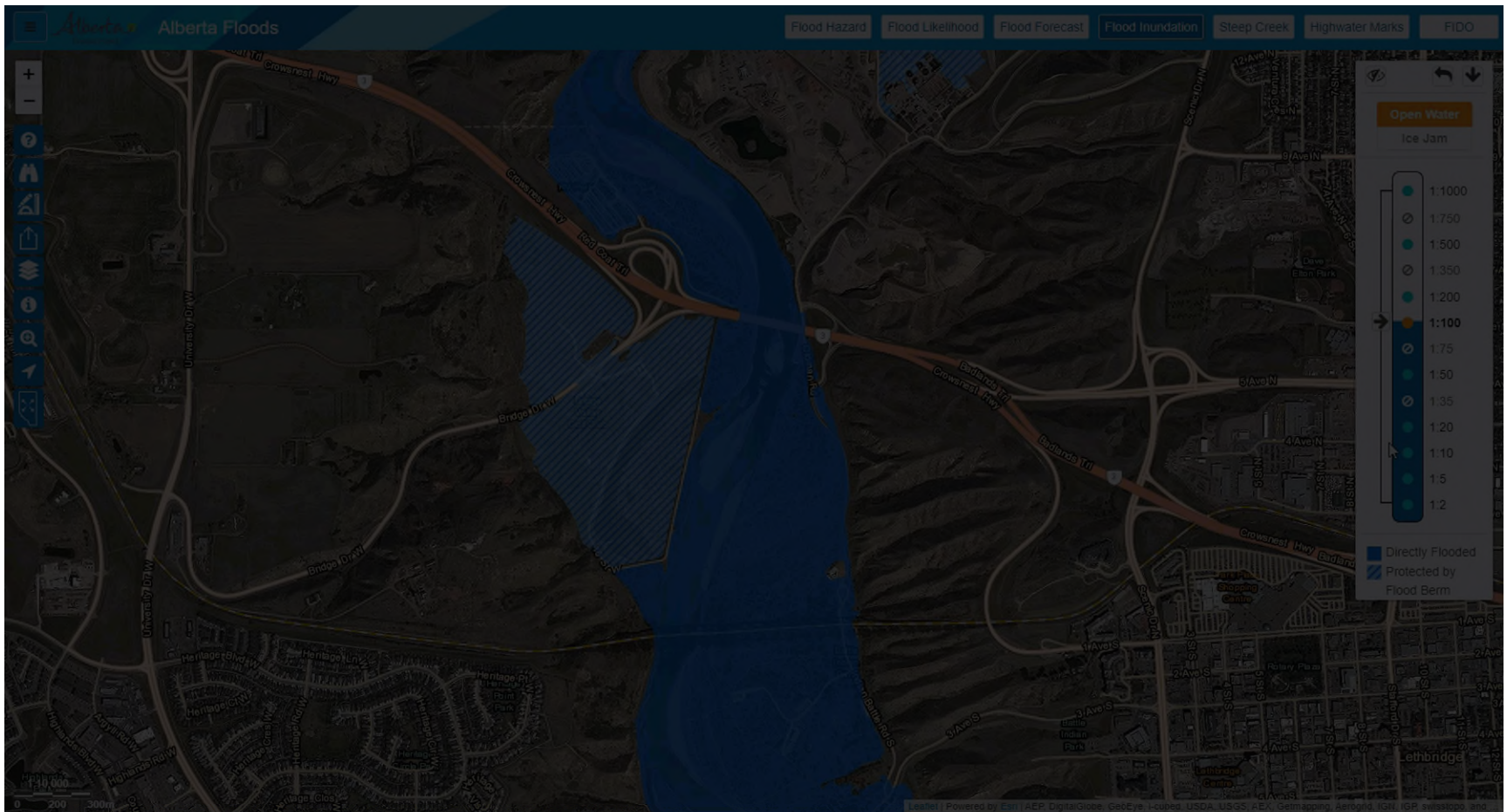
---



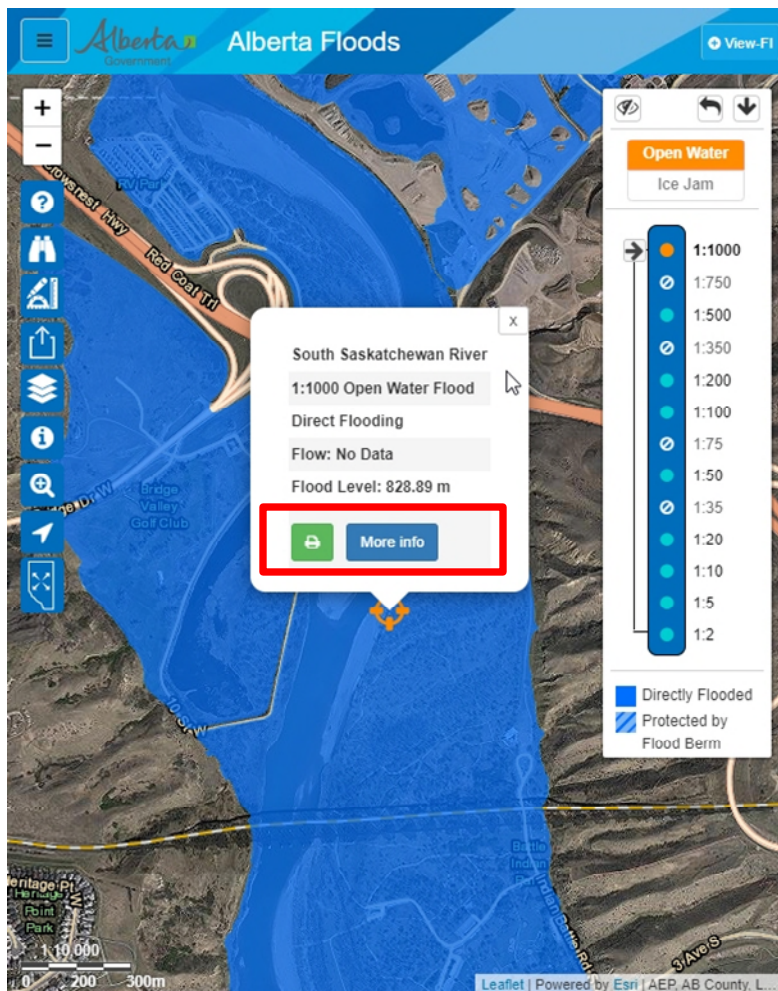
**Enterprise  
Geodatabase**



# Floods.Alberta.ca – Web Mapping



# 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

# Delta Water Assessment Tool (DWAT)

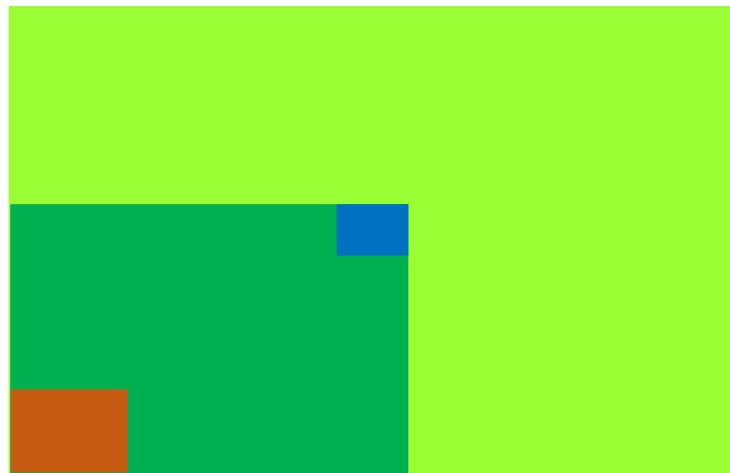
---



Contact:  
Zahidul Islam, AEP  
[zahidul.islam@gov.ab.ca](mailto:zahidul.islam@gov.ab.ca)

# 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.



 Agricultural Land  
 Developed Land

a) Pre-Development

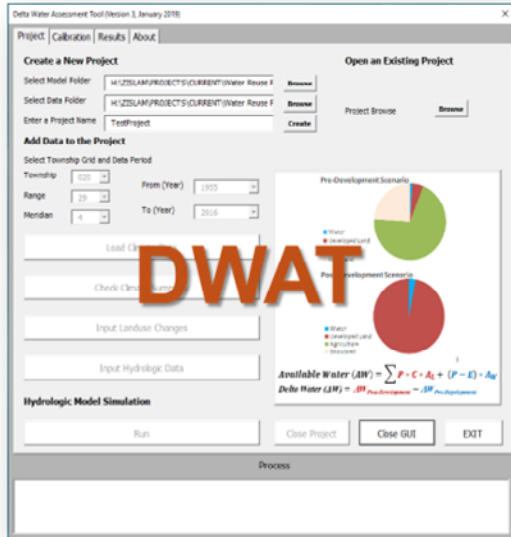
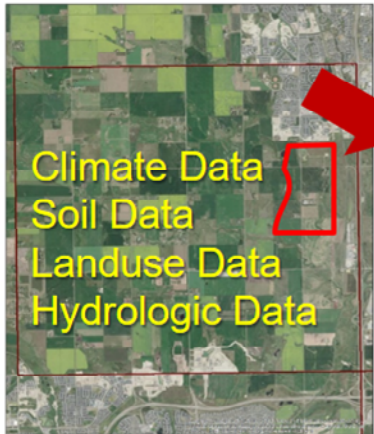


 Grass  
 Water

b) Post-Development



# How It Works?



Simulation (1955-2016)  
Precipitation-Evapotranspiration  
 $\approx R_{observed} \approx R_{modelled}$

Project:  $AW_{Pre-Development}$



$\Delta W$



Simulation (1955-2016)  
Project:  $AW_{Post-Development}$

# Alberta Modelling Expert System (MES)

---

Contact:  
Chiadih Chang, AEP  
[Chiadih.chang@gov.ab.ca](mailto:Chiadih.chang@gov.ab.ca)

# Three Commonly-Asked Modelling Questions

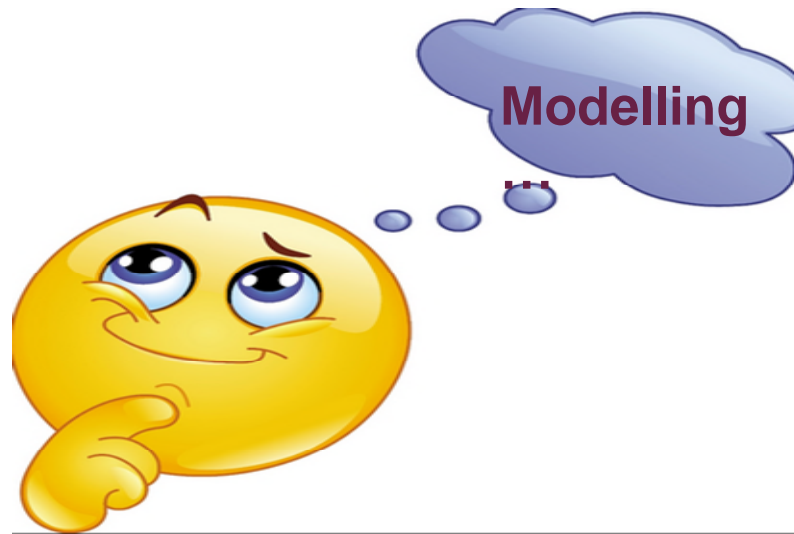
---

- 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?



# Vision of MES

---

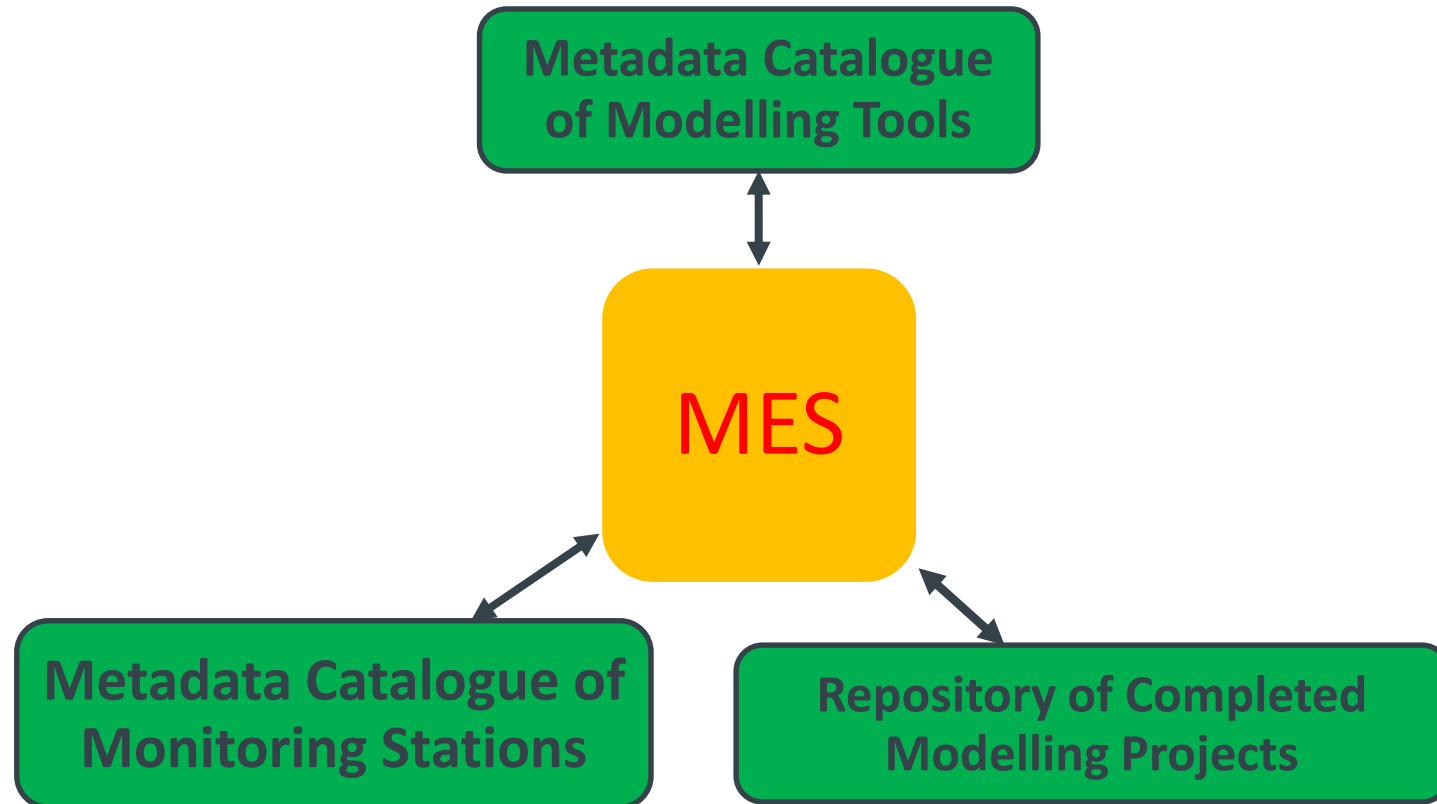


**Let's MES it!**

# 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.



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



# Alberta Data Automation for Environmental Models (ADAEM)

---

Contact:  
Chiadih Chang, AEP  
[Chiadih.chang@gov.ab.ca](mailto:Chiadih.chang@gov.ab.ca)

# Challenges in Data Preparation for Modelling

---

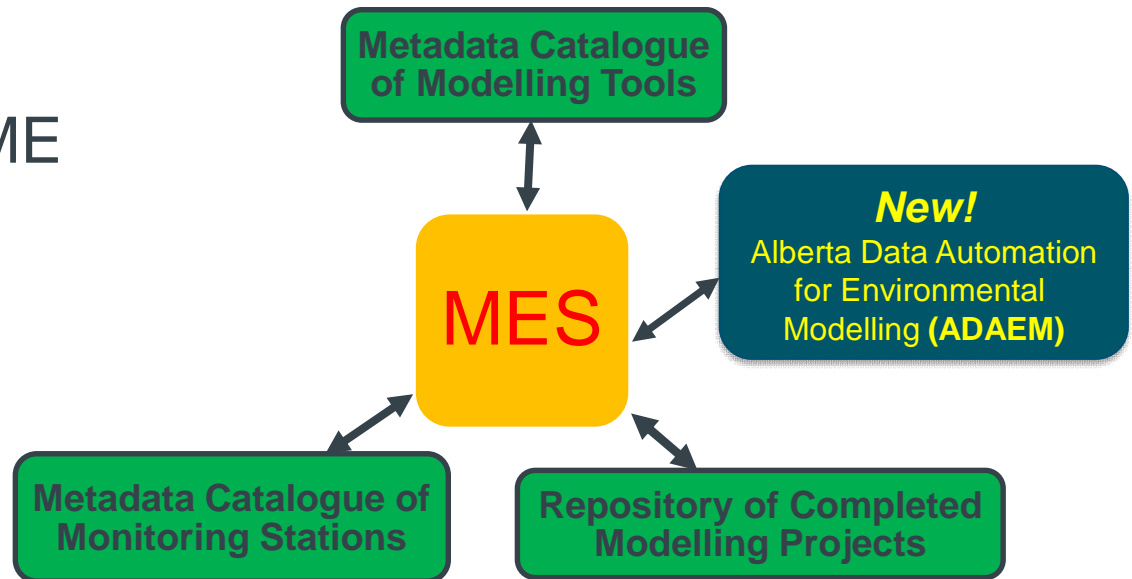
- Compiling different datasets (including spatial and temporal data) from various data sources in different formats.
- Pre-processing of data into various formats to input into environmental models.
- Post-processing of output data from a model into various formats to input into other models.
- Time-consuming,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



# What is ADAEM?

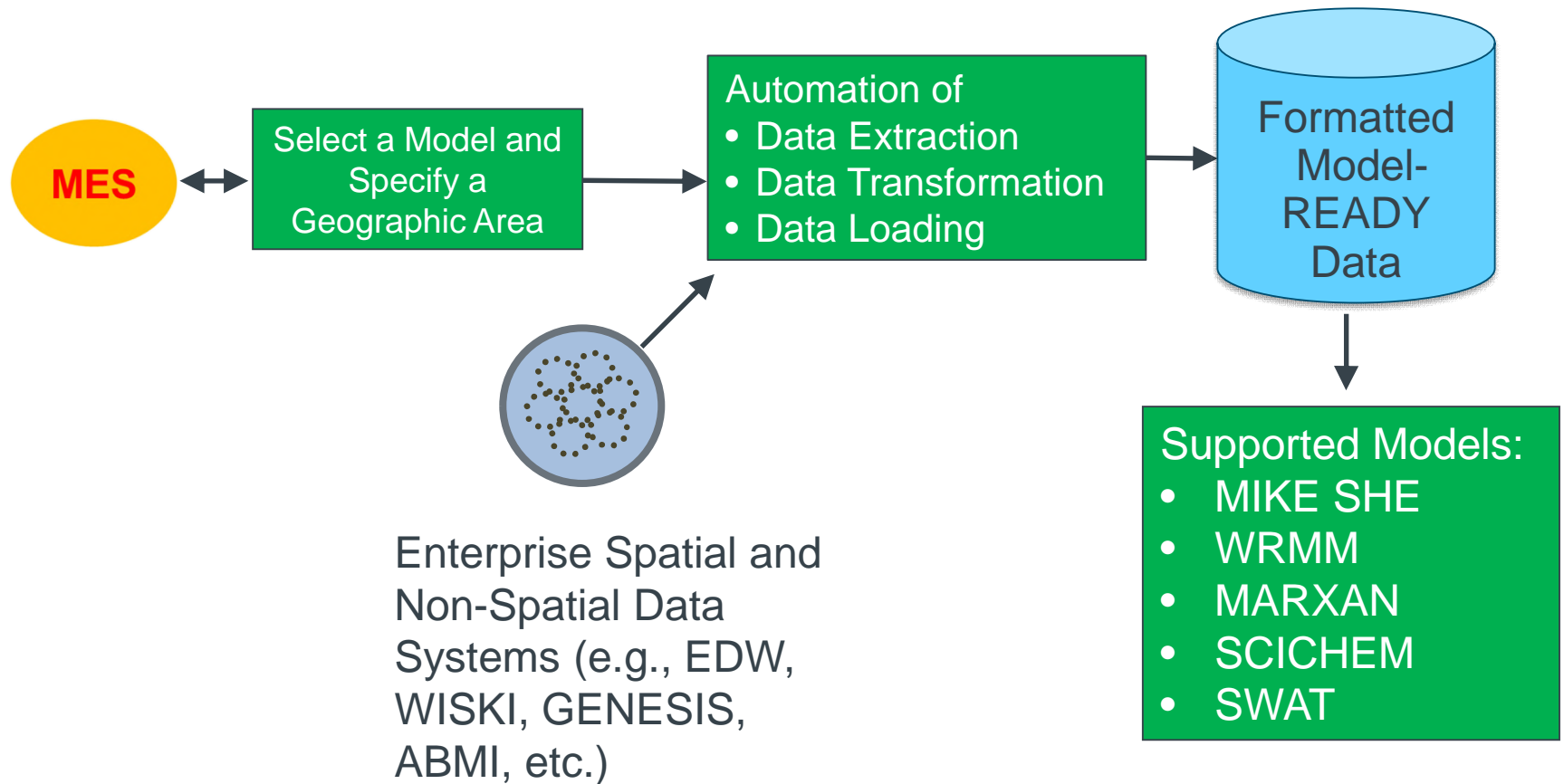
---

- 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 Flow Estimation Tool for Ungauged Watersheds (AFETUW)

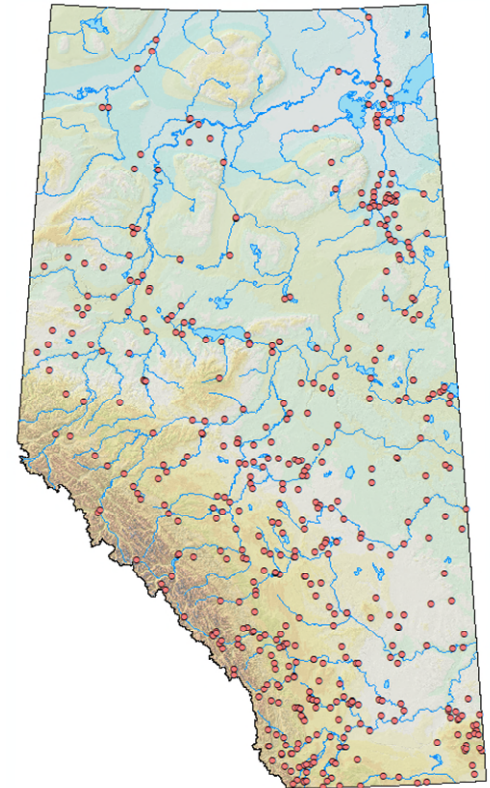
---

Contact:  
Chiadih Chang, AEP  
[Chiadih.chang@gov.ab.ca](mailto:Chiadih.chang@gov.ab.ca)

# 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?

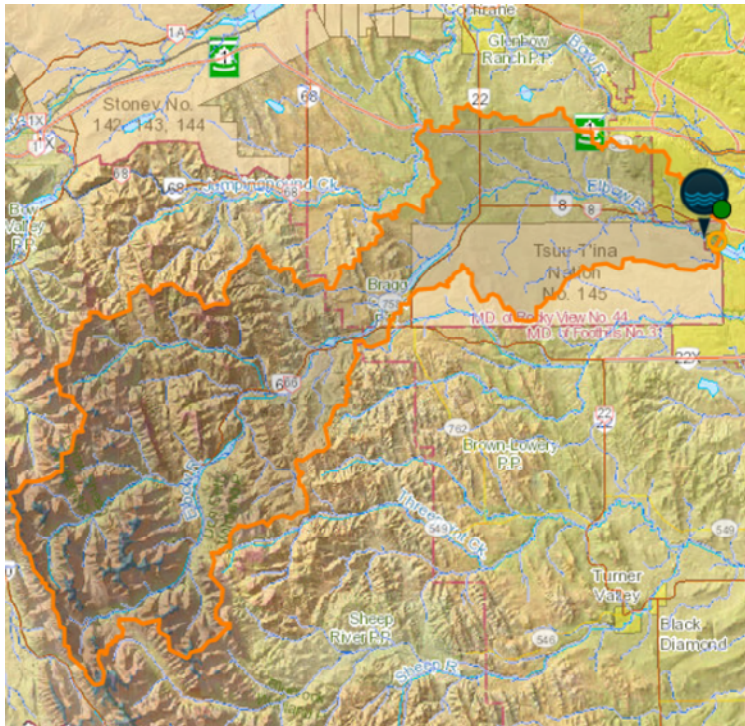
---

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

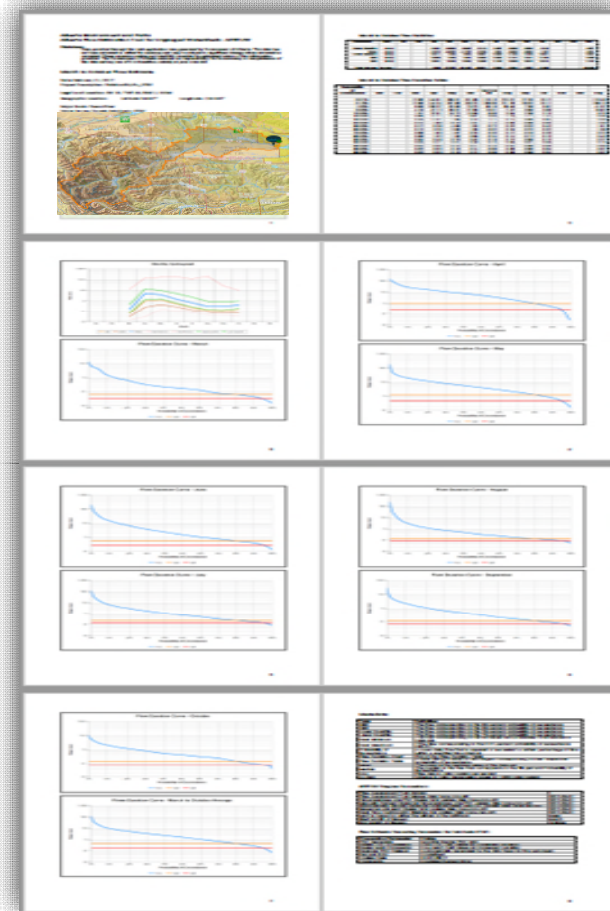
- Watershed delineation
- Flow statistics and estimations
  - Flow Duration Curve (FDC)
  - Real-Time Flows
  - Historic Daily Flows
- Implementation of provincial Surface Water Allocation Directive (SWAD) and Instream Objective (IO)
- Water licence queries

# AFETUW Sample Output

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

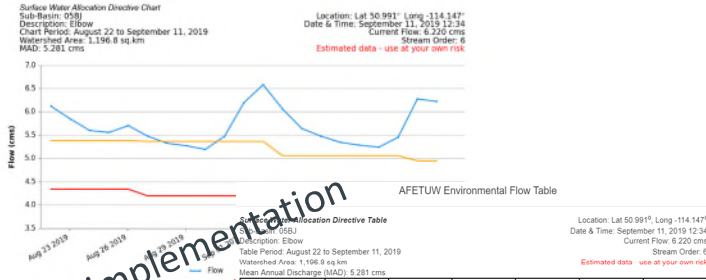


Derive **Flow statistics** for an ungauged watershed.



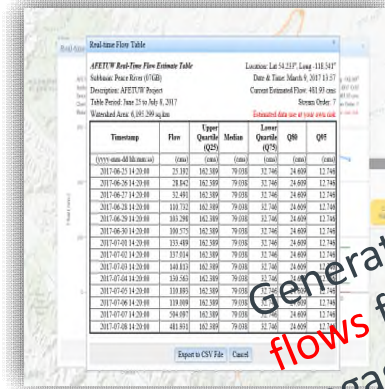
# AFETUW Sample Output (cont'd)

AFETUW Environmental Flow

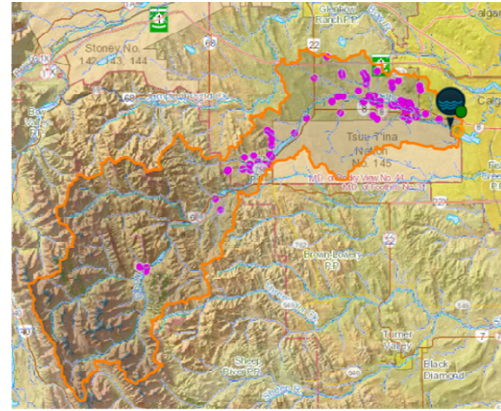


Support implementation of Surface Water Allocation Directive (SWAD) and IO for any untagged watershed.

Datestamp	Week	Flow	Q80	Q85	Percent of Flow	Cumulative Diversion
(yyyy-mm-dd)	(#)	(cms)	(cms)	(cms)	(%)	(cms)
2019-08-28	37	6.222	4.840	3.970	77.9%	0.822
2019-09-04	38	6.222	4.840	3.970	63.0%	0.941
2019-09-11	39	6.453	5.057	4.114	7.3%	0.396
2019-09-18	40	5.240	5.057	4.114	5.0%	0.262
2019-09-25	41	5.292	5.057	4.114	5.0%	0.256
2019-10-02	42	5.344	5.057	4.114	5.4%	0.287
2019-10-09	43	6.478	5.057	4.114	7.7%	0.419
2019-10-16	44	6.840	5.047	4.114	10.3%	0.686
2019-10-23	45	6.951	5.057	4.114	10.0%	0.929
2019-10-30	46	6.580	5.365	4.198	18.0%	0.987
2019-11-06	47	6.194	5.365	4.198	13.4%	0.829
2019-11-13	48	5.478	5.365	4.198	5.0%	0.274
2019-11-20	49	5.192	5.365	4.198	5.0%	0.260
2019-11-27	50	5.271	5.365	4.198	5.0%	0.254
2019-12-04	35	6.258	5.365	4.198	5.0%	0.298
2019-12-11	36	5.470	5.365	4.198	5.0%	0.274
2019-12-18	34	5.703	5.381	4.339	5.0%	0.322
2019-12-25	34	5.555	5.381	4.339	5.0%	0.278
2019-08-24	34	5.588	5.381	4.339	5.0%	0.280



Generate real-time flows for any untagged watershed.



Select Water Licences

**Water Licence Area:**

- AFETUW Delineated Watershed
- Watershed Layer
- Draw 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

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

Licence Report: Surface Water: Permanent Licences including (Preliminary Certificates)

Approval Id	Priority <sup>1</sup>	License	Source <sup>2</sup>	Effective Date	Expire Date	Licence Volume <sup>3</sup>	Losses	Return Flow
2253	1996015001	COLPITTS RA	Elbow River	1997-07-22		2,450	0	0
2252	1996015002	COLPITTS RA	Tributary to Eb.	1997-07-22		9,890	0	0
2251	1996015003	COLPITTS RA	Elbow River	1997-07-22		1,220	0	0
2443	20000817002	ELKANA RES.	Elbow River	1985-10-25		0	0	0
3425	19780315001	SARCOE DEVE	Elbow River	1985-01-07		148,020	0	0
255373	19741024001	ROCKY VIEW	Elbow River	2010-10-29	2035-10-28	277,533	0	277,533
35772	19810430002	CALALTA INAT	Elbow River	1983-09-09		154,850	0	0
24581	19831026009	SPRINGBANK	Elbow River	1985-09-28		7,450	0	0
49789	19970714001	ALBERTA ENV.	Elbow River	1998-08-14		12,324.82	12,324.82	0
						25,177,304.77 (m <sup>3</sup> /ye.	827,101.75 (m <sup>3</sup> /year)	11,825,696.40

Run Reset Close

# Summary

---





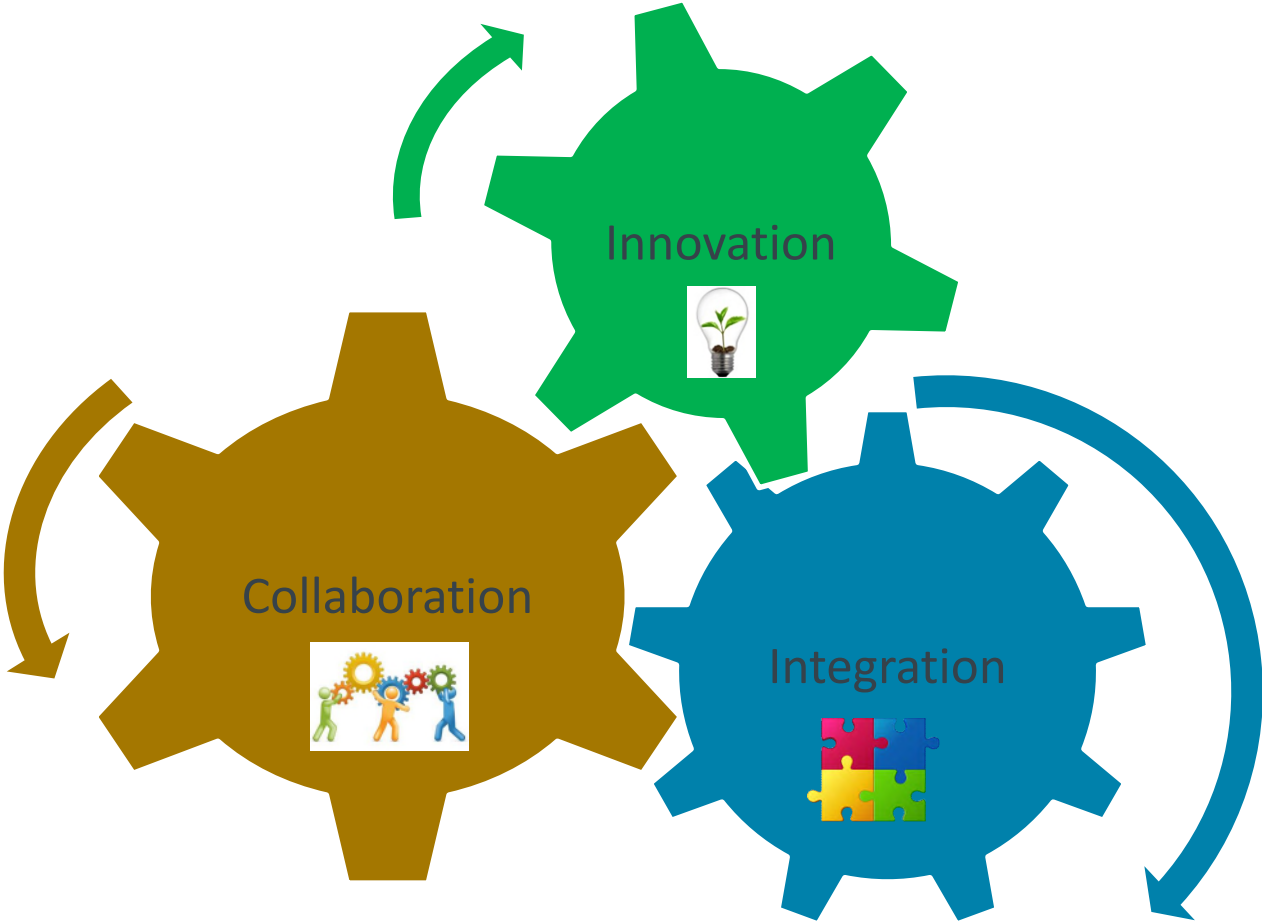
# Lessons Learned

---

- 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 Tools Matter and Make a Difference!



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

THANK  
YOU!

# Questions?

---

