

Calgary's Flood Resilience Plan

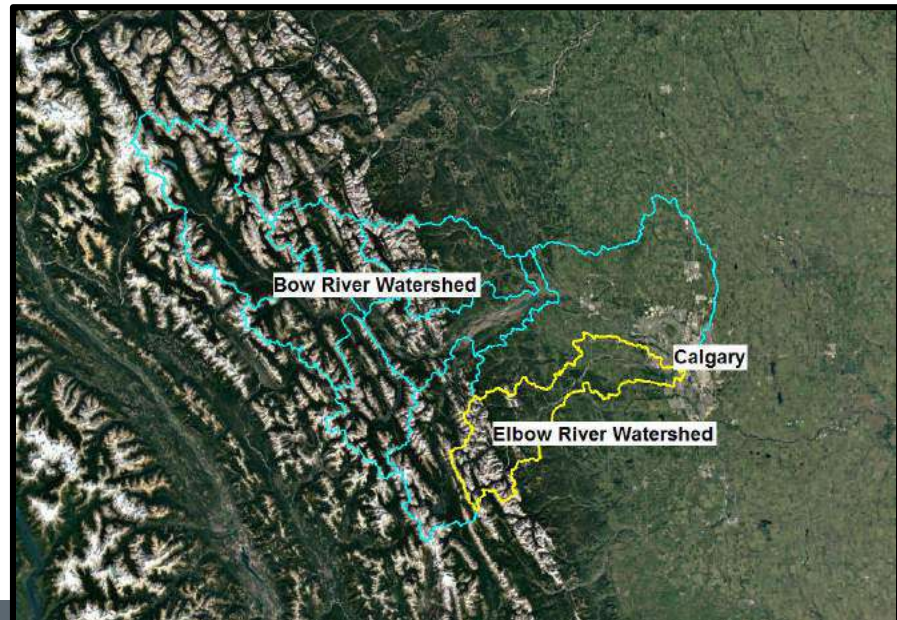
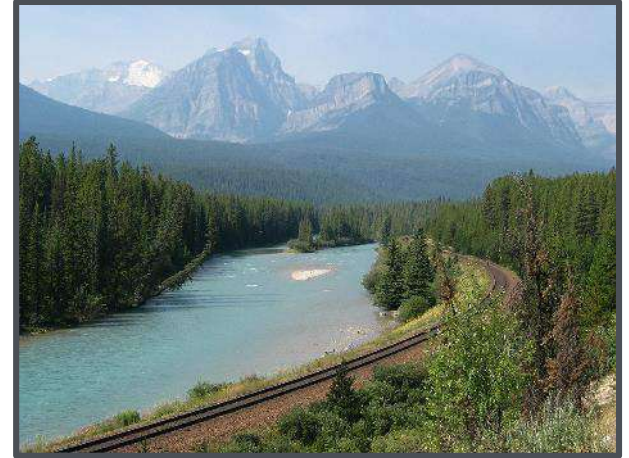
May 2019

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Flood Risk Awareness Program Manager
The City of Calgary
Water Services

ISC: Unrestricted

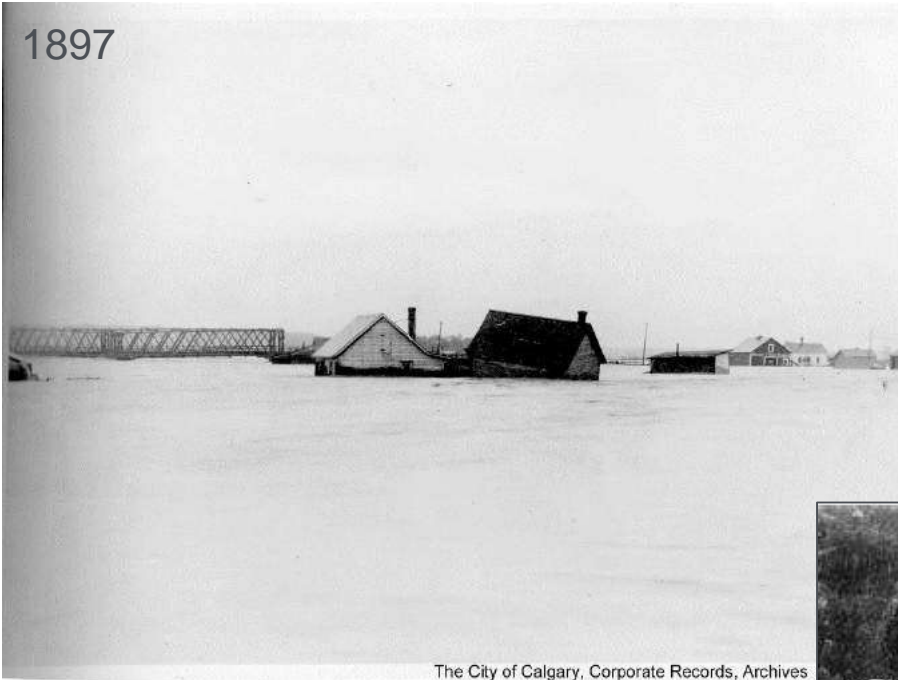
Understanding our River Flood Risk

- Risk factors:
 - Rainfall
 - Snowpack
 - Seasonal temperatures
- Highest flood risk May 15 to July 15
- 12 to 24 hour warning



Past River Flood Events in Calgary

1897



The City of Calgary, Corporate Records, Archives

2013



1915

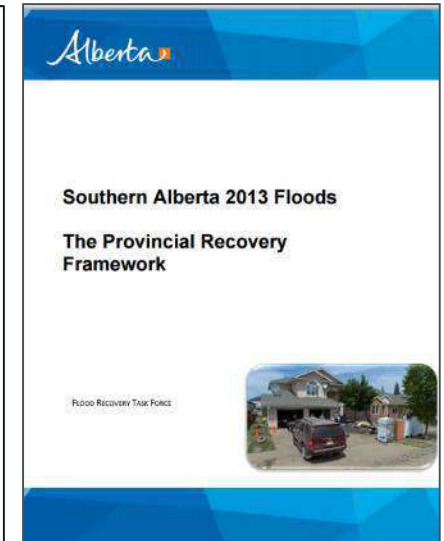
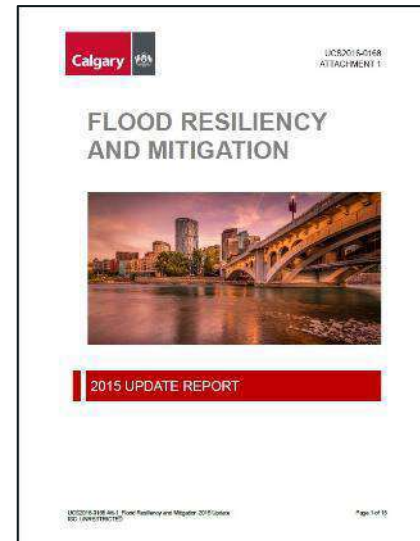
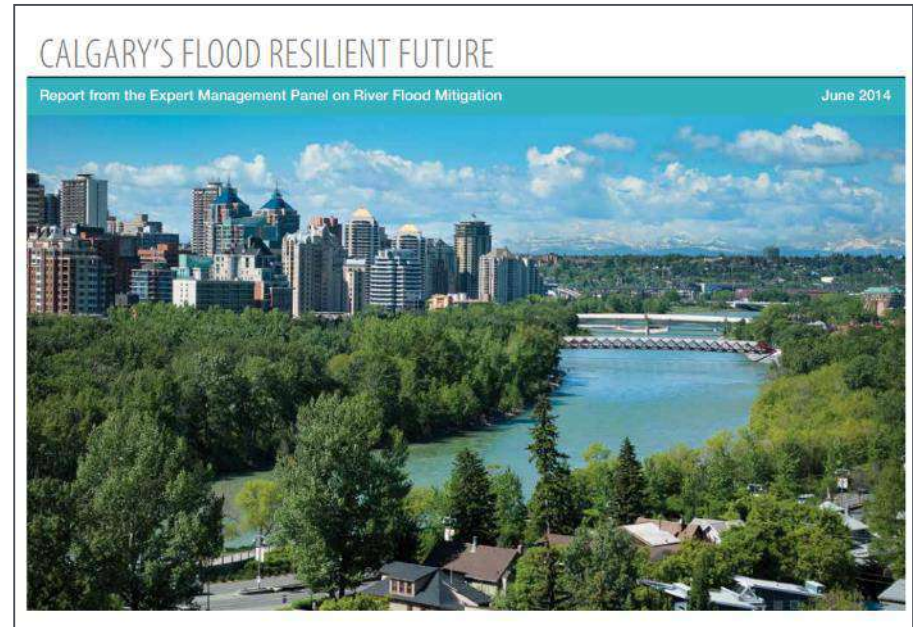


Expert Management Panel on River Flood Mitigation (2014)

Resilience is **complex**.

- Issue is bigger than Calgary
- City and Province coordinate
- Structural and non-structural
- Local and regional

In 2015-16 studied costs and benefits of the best combination of options.

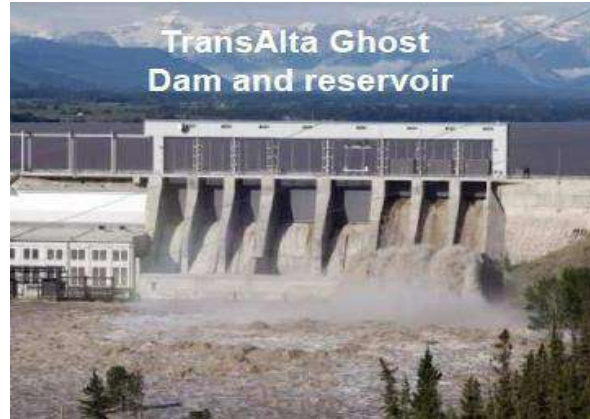


Key mitigation measures studied / combined

New reservoirs upstream



New operational efficiencies



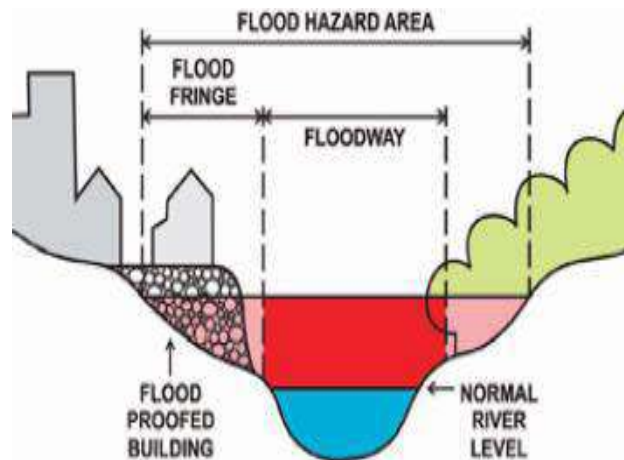
New community flood barriers & local improvements



New property –level programs



Update land use policy & development

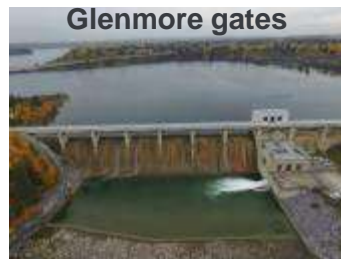
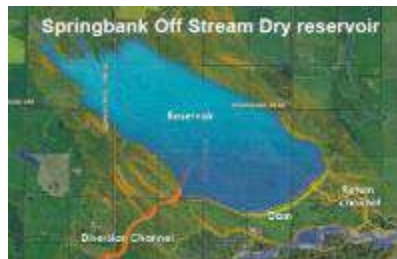


Improved forecasting/emergency response



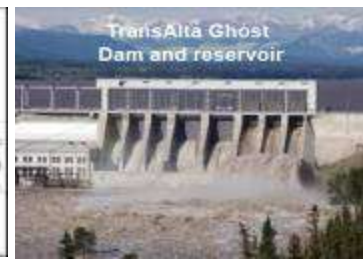
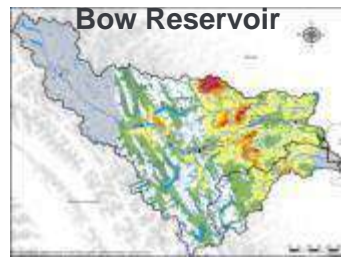
Elbow River

**Springbank Reservoir
+ new Glenmore gates**



Bow River

**New upstream reservoir (BRWG)
+ TransAlta agreement
+ Local barriers**

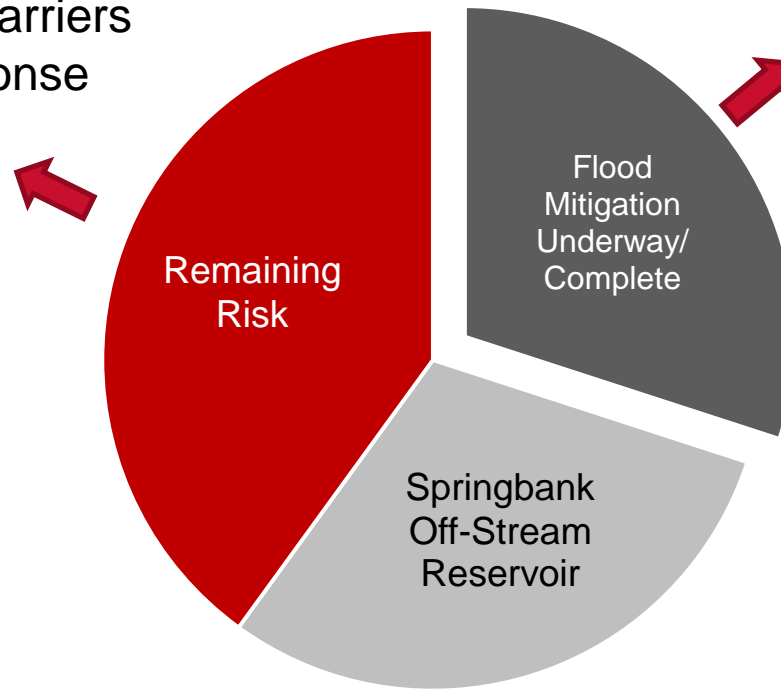


- + Gravel bars
- + Land use policy and building regulations
- + Education and awareness
- + Emergency preparedness, response, forecasting

What We Have Done Since 2013

Calgary River Flood Risk

- Bow upstream reservoir
- Enhanced Operations with TransAlta
- Complementary barriers
- Emergency Response



- Glenmore Dam gates
- Flood barriers
- River bank strengthening
- Stormwater gates
- Lift stations
- Bridge replacements
- Riparian restoration

Glenmore Reservoir Construction

- Glenmore Dam currently under construction
- Improvements will better enable The City to manage river flows, for drinking water supply and flood mitigation, as well as extend the life of the dam.
- Will double the volume of flood water Glenmore Reservoir can hold.
 - This is about 20% of the volume required to hold back a 2013-sized flood.
- Complete by Spring 2020



Springbank Off-Stream Reservoir

- About 5 times more storage than Glenmore
- Temporary water storage only when required
- Location can capture runoff from a large area upstream
- Off-stream (requires diversion channel from river) – limited impact on normal streamflow, habitat and function
- 80% of mitigation needed for Elbow to hold a 2013-sized flood
- **With Glenmore gates** provides 2013 flood level protection on Elbow
- **Cannot reasonably be replaced by local barriers** on lower Elbow
- Alberta Transportation project – currently in Environmental Assessment



McLean Creek Dam

- Major environmental & habitat impact
- 30% smaller catchment area – less effective
- Construction & operation complexity / risk

Tri-Rivers Proposal

- Cost & engineering feasibility unclear
- Smaller catchment area – less effective
- Water licensing impacts
- Major environmental & habitat impact

Local Barriers/Floodwalls

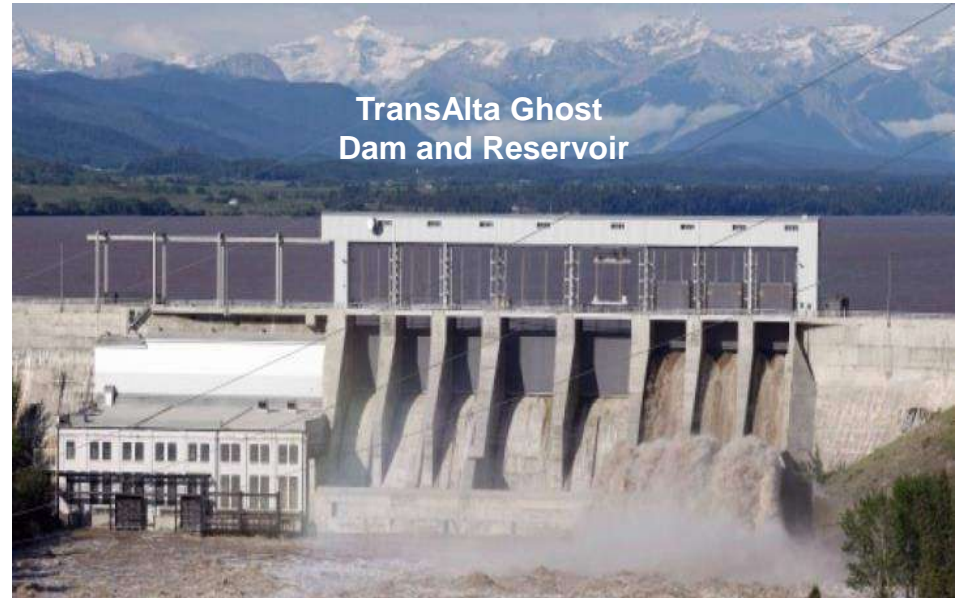
- Conceptual design costs greater than benefits for Elbow River communities
- Environmental & social impacts unacceptable

Other Concepts Studied and Turned Aside:

- Dredging Glenmore Reservoir
- Diversion of Elbow to Fish Creek
- Community/Property buy-out
- Concepts not sufficient on own without structural flood mitigation:
 - Land Use Regulation
 - Insurance
 - Emergency flood response



- Agreement put in place in 2016 for five years
- Sets reservoir levels and operations during flood season, to maximize potential flood mitigation
- Ghost Reservoir target elevation in 2018 is 1 m lower than last year due to current conditions. Reservoir will be kept low until July.



West Eau Claire Park / Eau Claire Public Realm

calgary.ca/eauclaire



Centre Street Lower Deck Barrier

- Stop-log barrier that can be deployed in advance of a flood event
- Increases resiliency from ~1:75 to 1:200 year
- Protects the community of Chinatown and Riverfront Ave.
- Completed 2018



New Upstream Reservoir on the Bow River

- The City continues to advocate that a new Bow River reservoir is necessary to manage flooding in Calgary
- The Province is doing a feasibility study (2018-2019) for a new reservoir on the Bow River upstream of Calgary.
- With Provincial funding, TransAlta is investigating how quickly Ghost Reservoir can be lowered, to improve potential flood mitigation





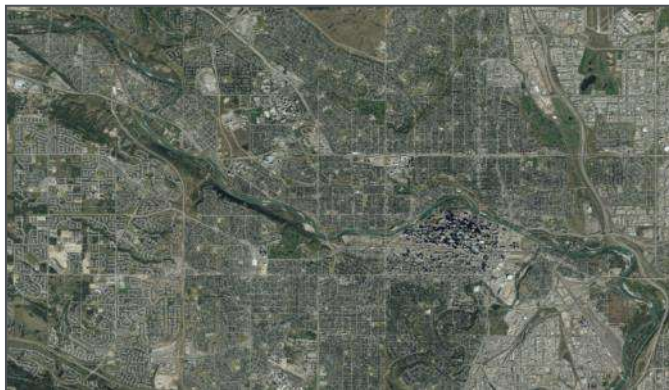
2013 flood unmitigated

(what would have happened if no action was taken)



2013 FLOOD ACTUAL

(City and TransAlta operations, emergency response)

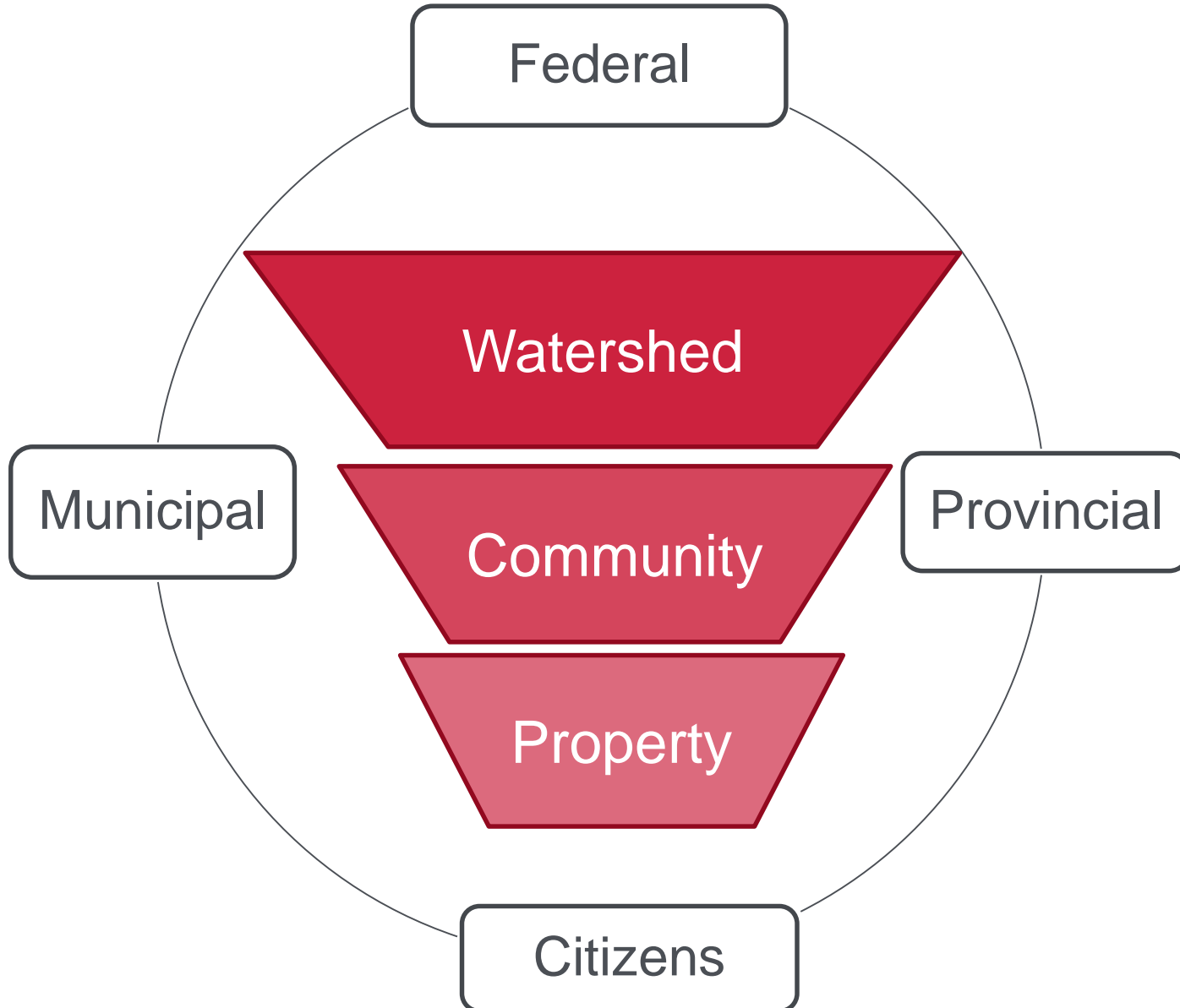


2013 flood with full flood management plan in place

(New upstream reservoirs, enhanced operations, community barriers, emergency response)



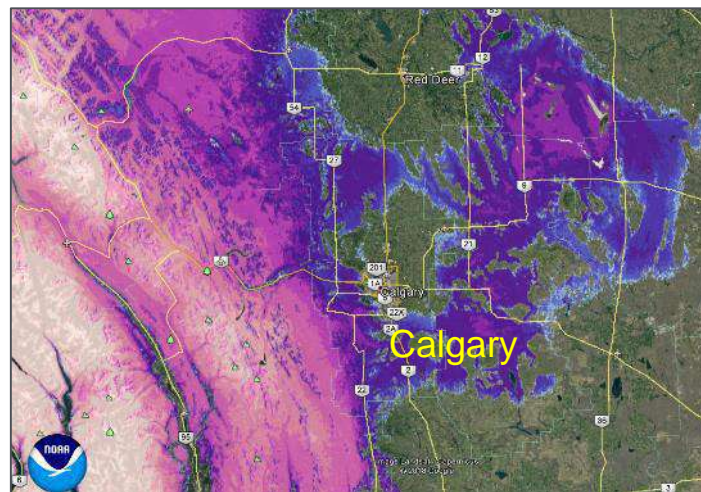
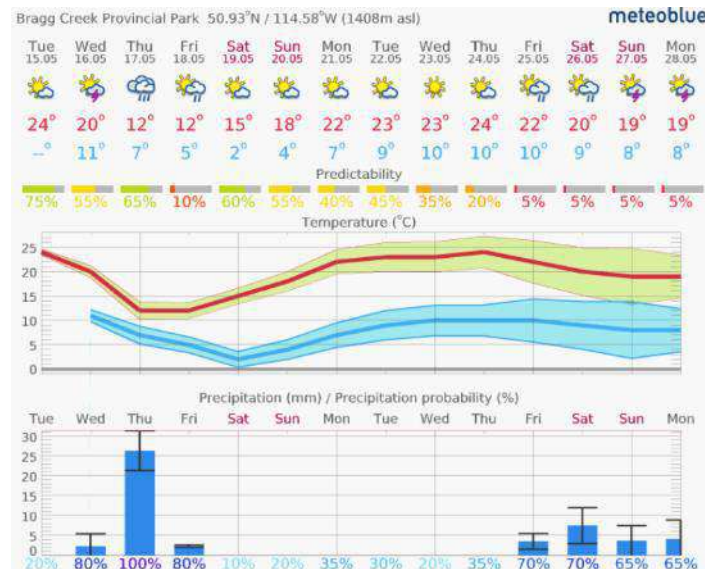
Resiliency by integrated levels of flood mitigation



How Does The City Prepare?

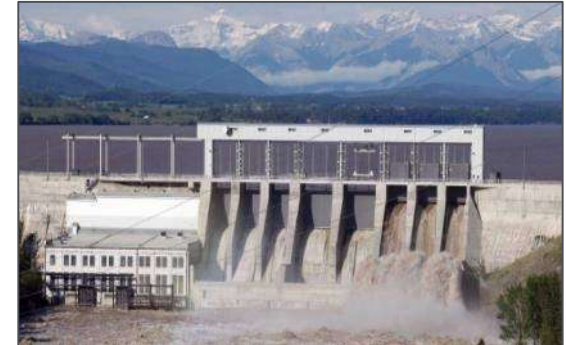
Flood Preparedness: Forecasting

- Year-round forecasting and monitoring
- 24/7 monitoring May to July (weather and river flows) – already underway for 2019
- Increased team capacity and training
- Share modelling and forecast information with CEMA and Government of Alberta



Flood Preparedness: Infrastructure and Response

- Reservoirs are lowered
- Field Readiness – test valves, pre-position pumps and other emergency supplies
- Training and Exercises – Water maintains a team of 140 members trained in ICS
- Annual updates to Flood Emergency Reference Manual
- In 2018 expanded response plan to include resources and staff from other departments



How Can Citizens Prepare?







**Know Your Risk.
Be Prepared.
Stay Informed.**

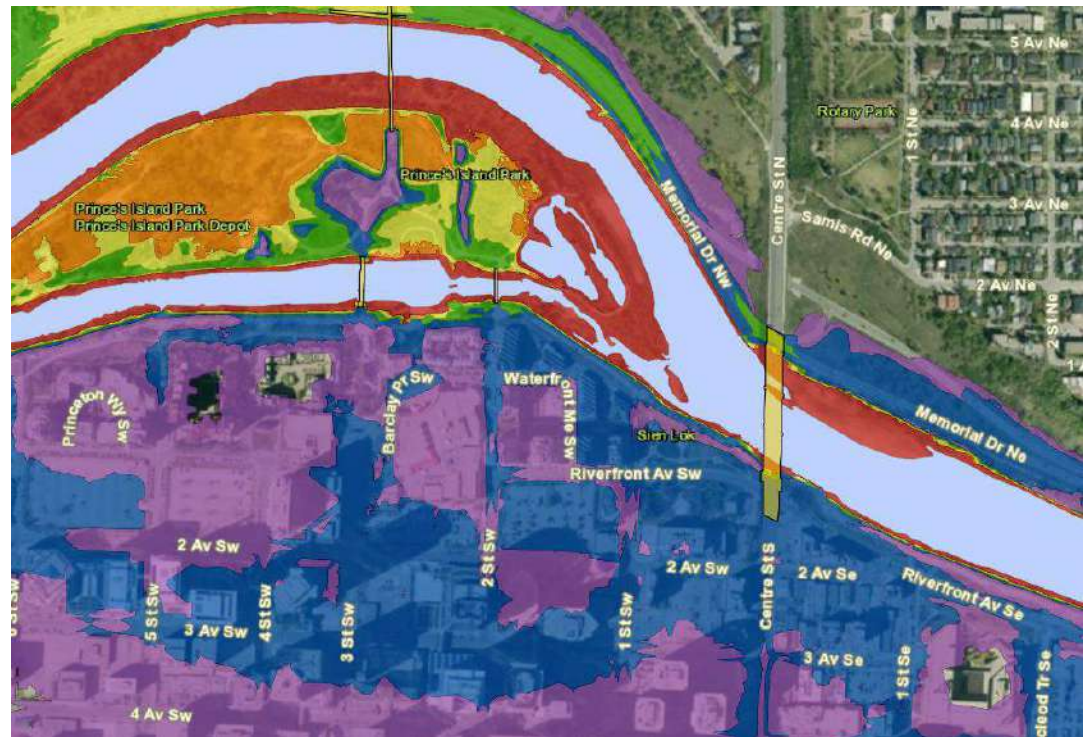
Know Your Risk.

- River flooding impacts all Calgarians** – whether you live, work, commute or recreate in the city centre, or along the Bow or Elbow Rivers.

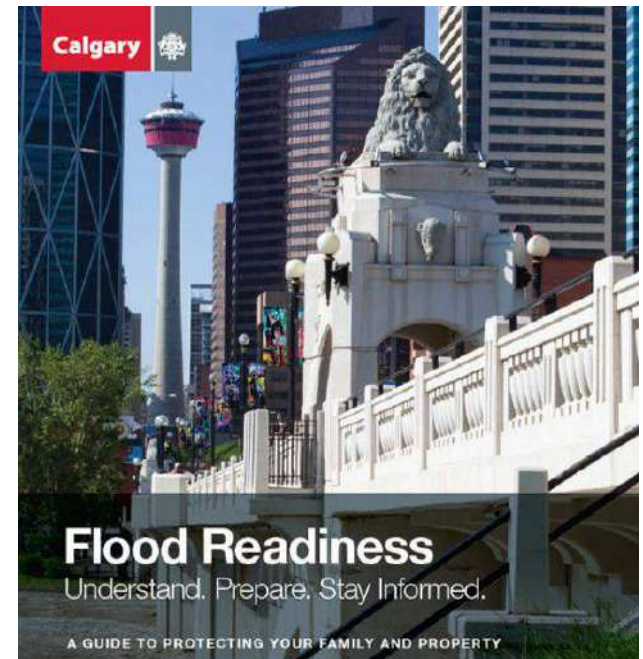
Staff – if you have a **project near the river or in a flood zone**

- Know Your Risk: check maps at calgary.ca/floodinfo**

| LEGEND | Flowrate that could flood this area – Bow River upstream of the Elbow River | Natural chance of a property within this area flooding in any given year without mitigation – given as “% chance” of this flood occurring in any year, and as “1:X” probability flood | Natural chance of a property within this area flooding in 25 years without mitigation – given as “% chance” of this flood occurring at least once over 25 years (e.g., a typical mortgage life) |
|--|---|---|---|
|  | up to 839 m ³ /s | 12.5% (1:8) | 97% |
|  | 840-927 m ³ /s | 10% to 12.5% (1:8 to 1:10) | 93% to 97% |
|  | 928-1230 m ³ /s | 5% to 10% (1:10 to 1:20) | 72% to 93% |
|  | 1231-1660 m ³ /s | 2% to 5% (1:20 to 1:50) | 40% to 72% |
|  | 1661-2020 m ³ /s | 1% to 5% (1:50 to 1:100) | 22% to 40% |
|  | 2021-3340 m ³ /s | 0.1% to 1% (1:100 to 1:1000) | 2.5% to 22% |



- Prepare your home or business
 - move valuables, electronics and documents to a safe place (not in basement)
 - Finish basements with easy-clean materials
- Have an evacuation plan:
 - Know what to take with you (medication, documents)
 - Know where you will go
 - Have a plan to communicate with your loved ones
- Follow directions during a flood
 - Not following directions could put you, your loved ones, and emergency responders at risk
- Read the Flood Readiness Guide for more tips
 - calgary.ca/floodinfo



Flooding occurs quickly and with little warning.
Stay up to date on conditions and be prepared to act.

Flooding in Calgary

Flooding can occur at any time with little to no warning. May 15 to July 15 is when we receive our largest rainfalls and are most likely to experience flooding.

Understand, prepare and stay informed by knowing your flood risk and how to prepare for flood conditions.

For a history of the 2013 flood, see [Calgary 2013 flood](#).



- Types of flooding
- Flow rates
- Monitoring Calgary's rivers



- Prepare ahead
- What to do during a flood
- Flood Readiness Guide



- Understand emergency alerts
- Check current river flows



- Check your flood risk
- Are you building or renovating? Check your regulatory flood zone.



- The City's Flood Mitigation Strategy
- Flood protection: what we've done and what we're doing



- Returning home after a flood
- Cleaning up after a flood
- Health-related information

Join us in person:

Flood Preparedness Open House for Bow River Communities
Tuesday, May 15, 2018
Start time: 7:00 p.m.
[Foothills Academy](#)
745 37th Street N.W.

Councillor Farkas's Flood Readiness
Town Hall for Elbow River Communities
Thursday, May 17, 2018
Start time: 7:00 p.m.
[Elbow Park Community Centre](#)
800 34 Avenue S.W.

Stay connected

[Sign up for email updates](#) to receive news and notices related to flood.

Current river status

[Learn about river flow rates](#) and how they may impact you.

Check [Alberta's River Monitoring Centre](#) for Bow and Elbow River flow information.



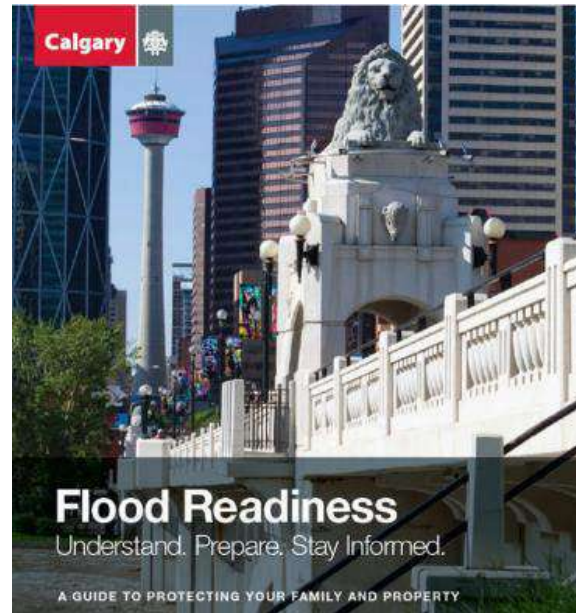
Alberta Rivers: Data and Advisories

Monitor flood advisories, and obtain up-to-date station information for Alberta's rivers and lakes.

Links and information at
calgary.ca/floodinfo

2019 Flood Readiness Campaign: Keeping Citizens Informed

- Flood E-Newsletter
- Disaster Alley booth
- **Walking tours (Eau Claire)**
- ENMAX insert (June)
- Report to Calgarians (May)
- Social Media posts & ads
- Community presentations
- Media coverage



Information and Sign-up at
calgary.ca/floodinfo

A photograph of the Peace Bridge in Calgary, showing its distinctive red arches and concrete walkway. The bridge spans a river, and the sky is blue with scattered clouds.

Be Prepared. Stay Informed.

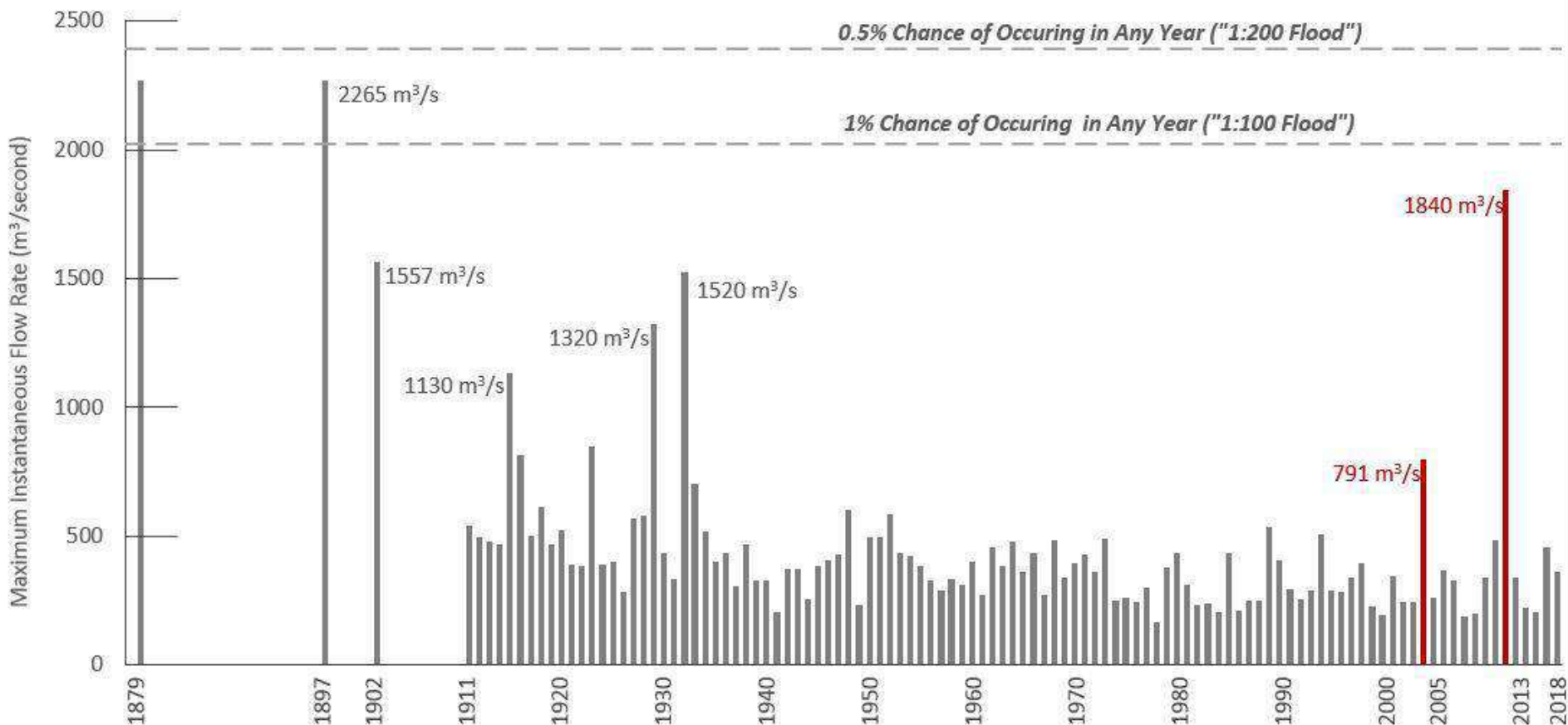
Sign up for our e-newsletter

www.calgary.ca/floodinfo

Sandra.Davis@Calgary.ca

Past River Flood Events in Calgary

Maximum Flow in the Bow River at Calgary (Above the Elbow River)



* Estimated based on historical high water marks.

** Return period flow estimates are from Bow and Elbow River Basin-Wide Hydrology Assessment and 2013 Flood Documentation Report prepared for The City of Calgary and The Province of Alberta, Sept. 2014.

