Community Mitigation Elements
Forecasting
Flood Mapping

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Government of Alberta

Key Elements of Mitigation

- Overall Watershed Management
- Flood Modelling, Prediction, and Warning Systems
- Flood Risk Management Policies
- Upstream Water Management and Mitigation
- Erosion Control
- Local Mitigation Initiatives
- Individual Mitigation Measures for Homes

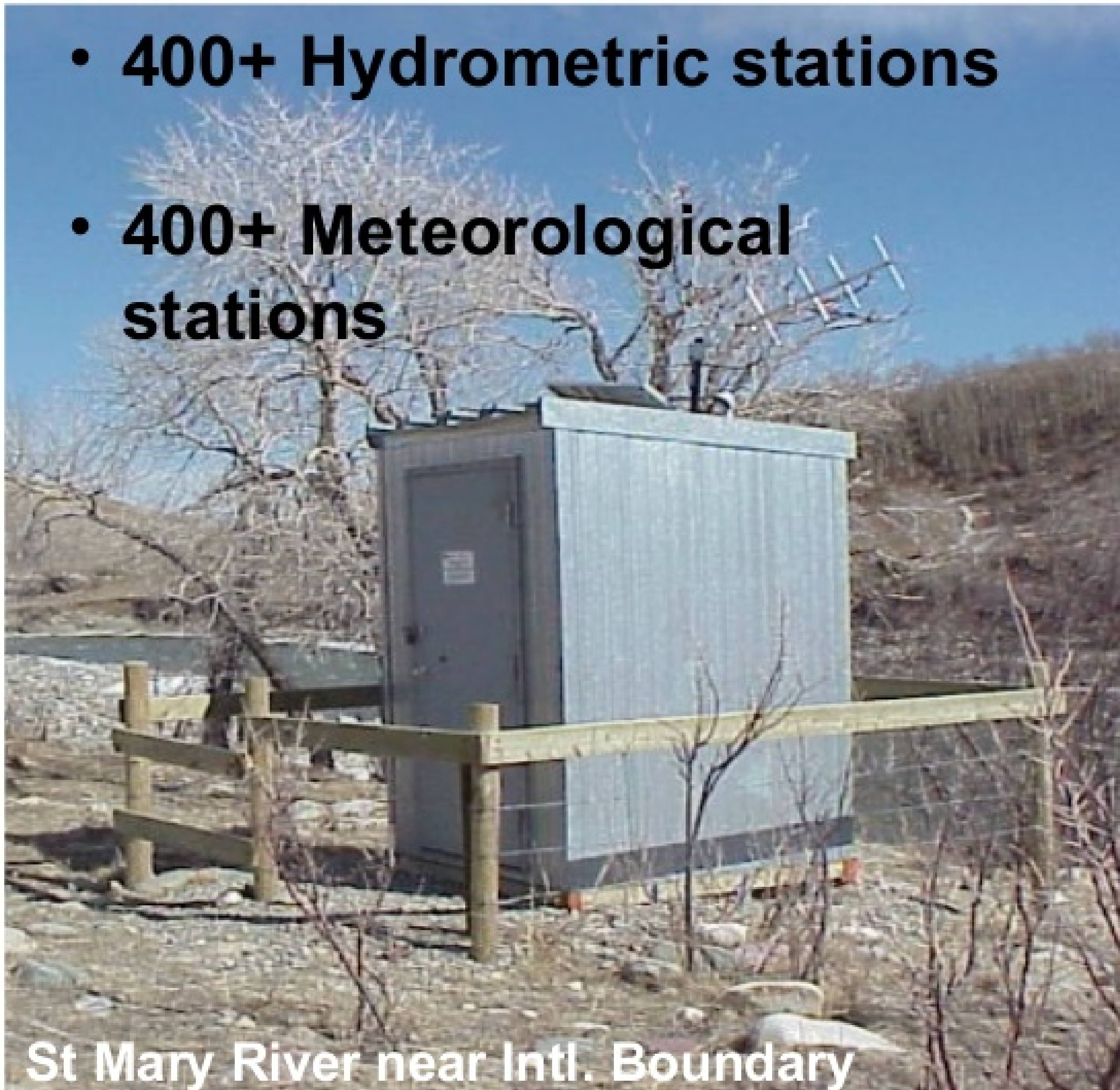
- What happened ?
- What did we learn ?
- What are our follow up actions ?

Flood Modelling, Prediction, and Warning Systems

- Primary river flooding concerns are caused by:
  - Significant rainfall events
  - Significant rain on snow events
  - Significant ice jam events
- 24 x 7 operations to provide forecasting services as required
- Typical Critical Time Period for open water flooding: mid-May to mid-July

Monitoring System

- **400+ Hydrometric stations**
- **400+ Meteorological stations**



St Mary River near Intl. Boundary

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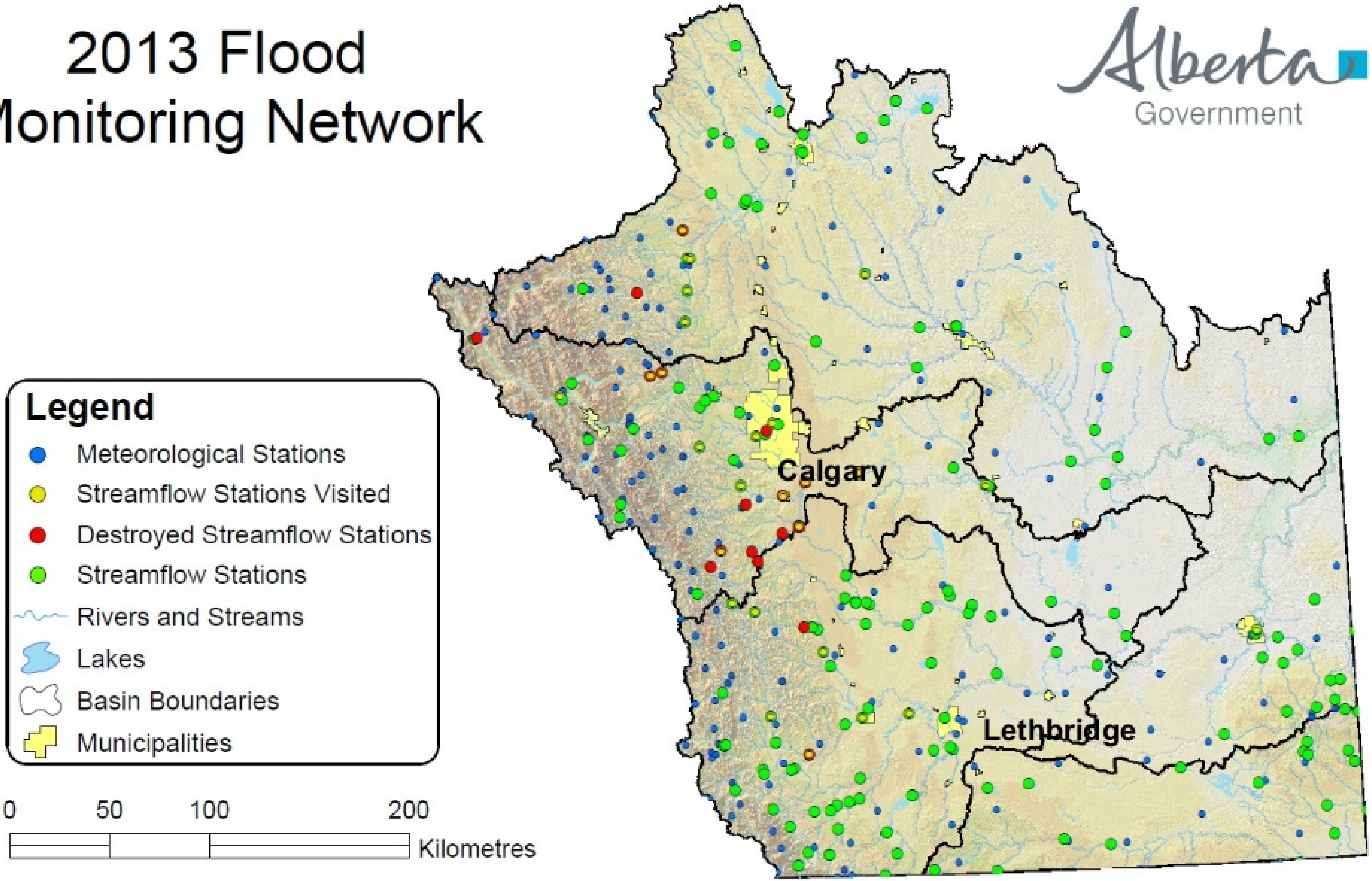
2013 Flood Monitoring Network



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Forecasting System

Input Data and Modelling

- **Weather forecasts from:**
  - **Provincial Fire Weather Office**
  - **Environment Canada**
  - ***National Oceanic and Atmospheric Administration* (NOAA)**
  - **Weather Network**
  - **Unisys**
  - **Intellicast**
- **Streamflow Synthesis and Reservoir Regulation Model (SSARR) Modeling platform – output assessment**

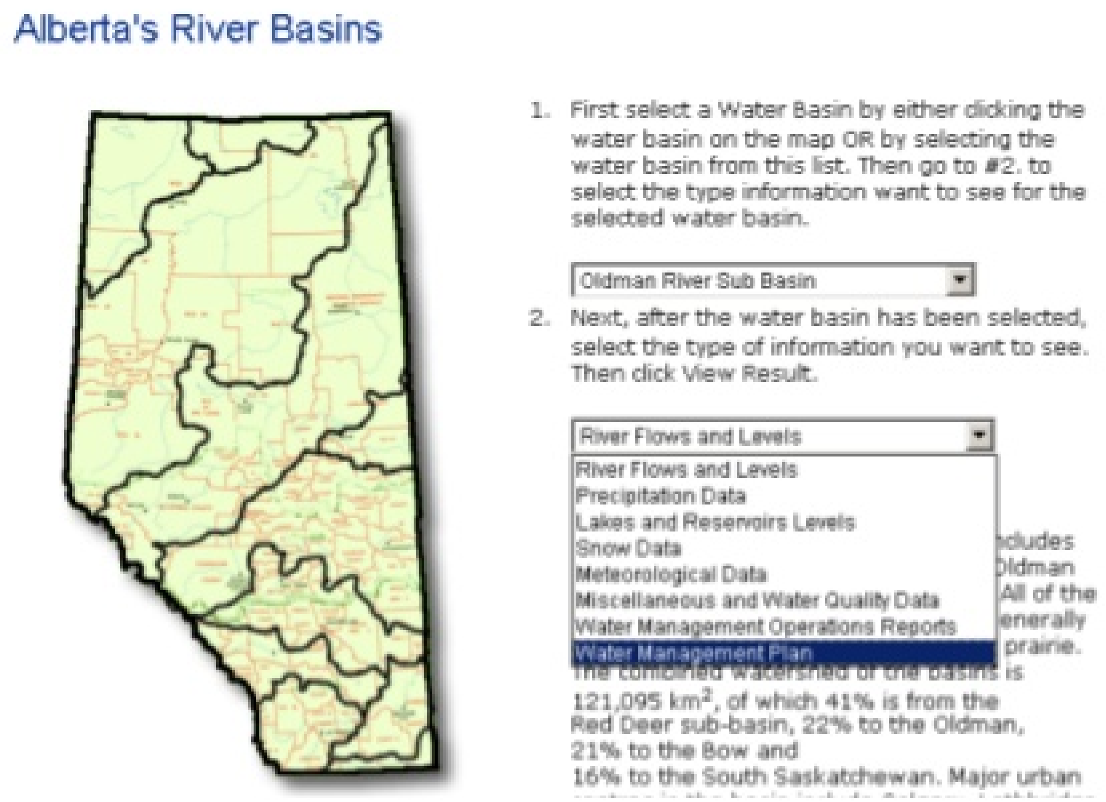
Ghost River above Waiparous Creek

Community Engagement
- River Forecasting

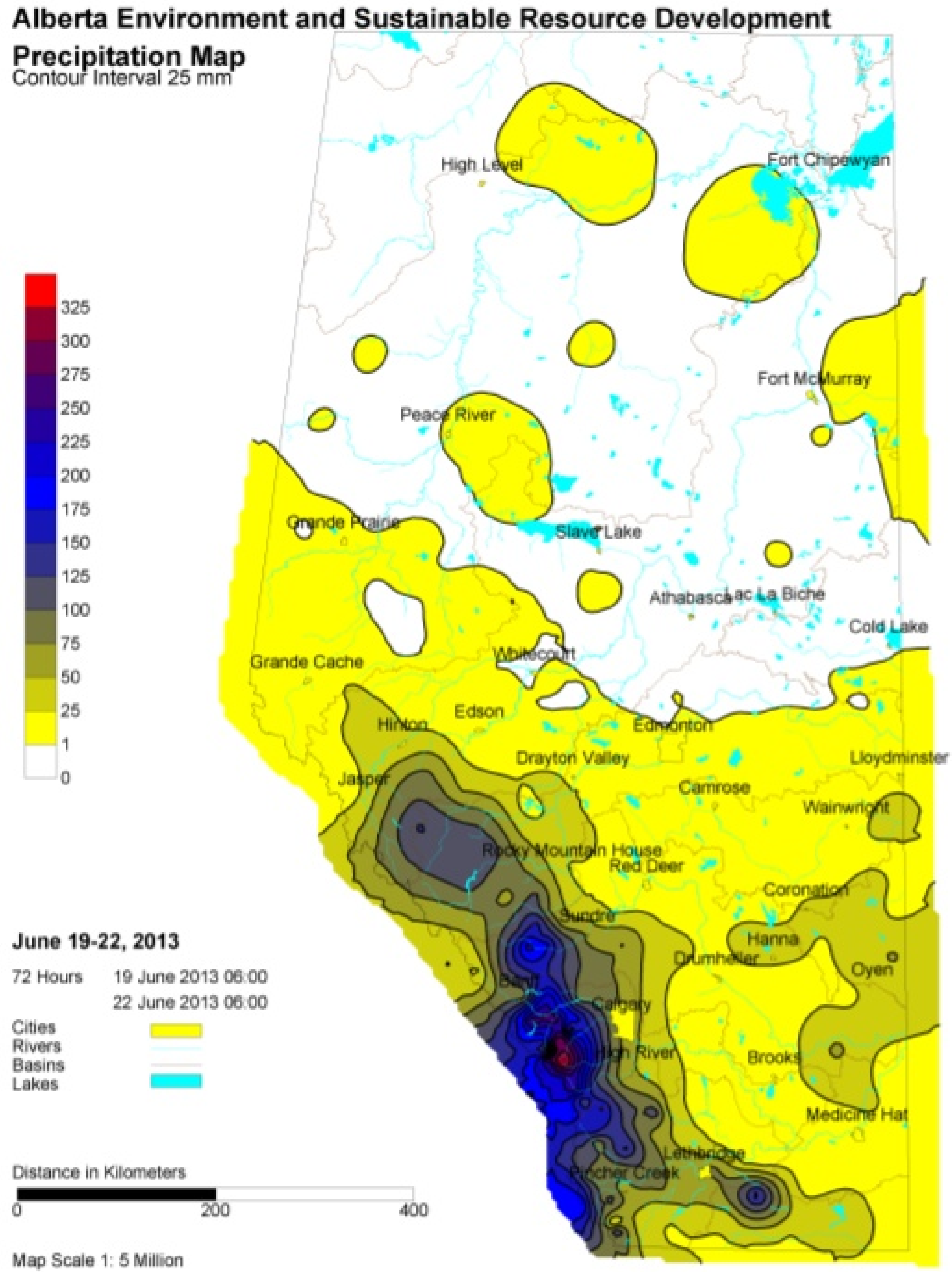
Communications

- Initial contact with potentially affected municipalities Monday (June 17).

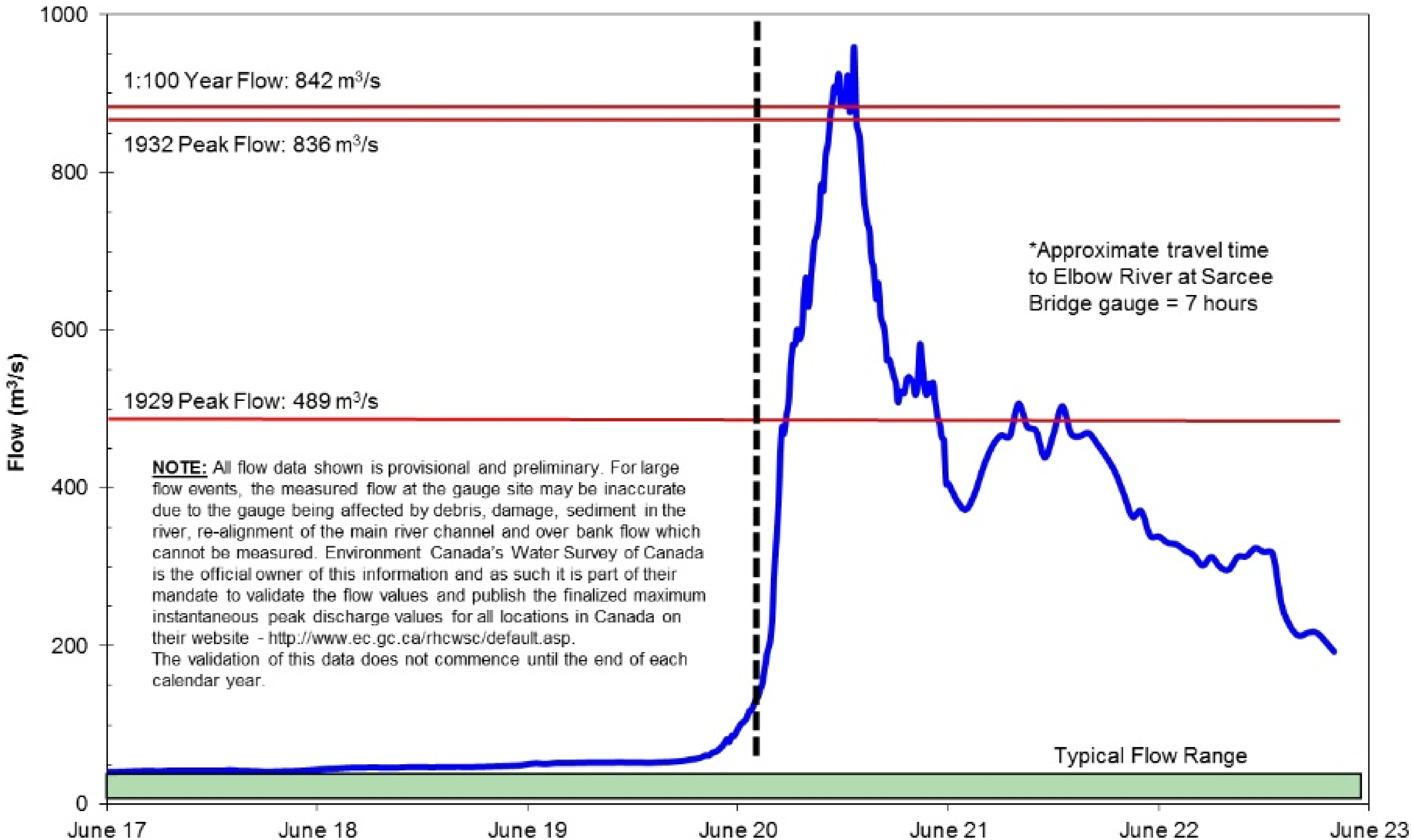
- Model scenarios run (continuous) and results discussed with municipalities (risk and potential impact)



- Early forecast : 80 to 160 mm over 48 hours – Red Deer and Bow River Basins
- Contact with potentially affected municipalities
- No significant change in forecast until rain started Wednesday night (June19)
- As rain fell, flood advisories / watches / warnings issued Wednesday night and early Thursday morning.
- Up to 300 mm in 24 hours in some locations.



Elbow River at Bragg Creek



What did we learn?

- Forecasting system is not undersized, but did operate to capacity.
- Utilization of field monitoring staff was critical during the event, as many stations were washed out.
- Ongoing and pre-communications with partners and municipalities assisted information transfer greatly during the event.

- How do we reduce the uncertainty of the metrological forecast as it directly relates to stream flow forecast ?
- How do we accommodate climate variability in the metrological / stream flow forecasts ?
- Consideration of "Flash Flood" warning systems

Follow up Actions

- Full assessment of partner group and clients evaluation of notification system and tools.
- Full review of modeling accuracy and how a forecast is evaluated after an event.
- Full review of ongoing modeling capabilities for “Alberta”.
- Review of national and international performance measures.
- Full review of adequacy of field monitoring stations and system :
    - **Snow**
    - **Rain**
    - **Soil moisture**
    - **Water quantity**
    - **Location and Resiliency**

Provincial Flood Hazard Identification Program

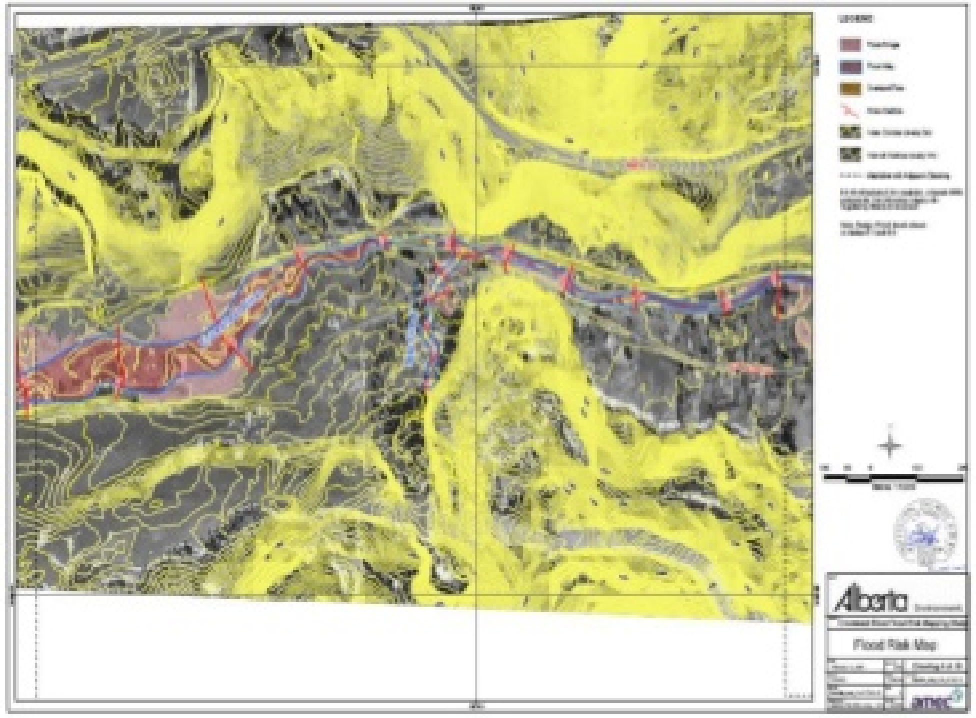
Provincial Flood Hazard Identification Program

History

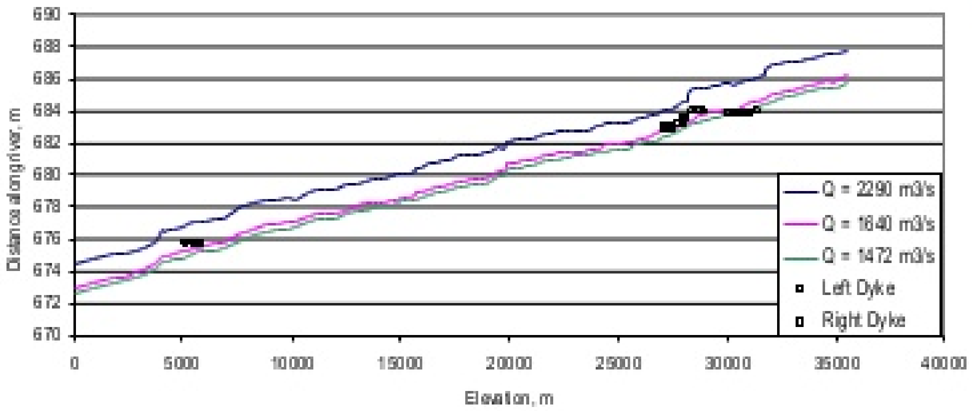
- Flood hazard mapping has been produced by the Government of Alberta for communities throughout the province since the 1970s
- Canada-Alberta Flood Damage Reduction Program (FDRP) was initiated in 1989 with the Government of Canada to standardize and cost-share flood hazard mapping studies
- The Government of Alberta has continued to create flood hazard mapping for communities since 1999 with the Flood Hazard Identification Program (FHIP)

Provincial Flood Hazard Identification Program

Map Production



Water surface elevation profiles for various discharges for the Red Deer River at Drumheller



- Part of a comprehensive flood hazard study
- A computer hydraulic model representing the river is created using survey data and historic highwater marks
- Model calculates water levels for a design flood event
- Design flood levels transferred to base mapping to delineate a flood hazard area

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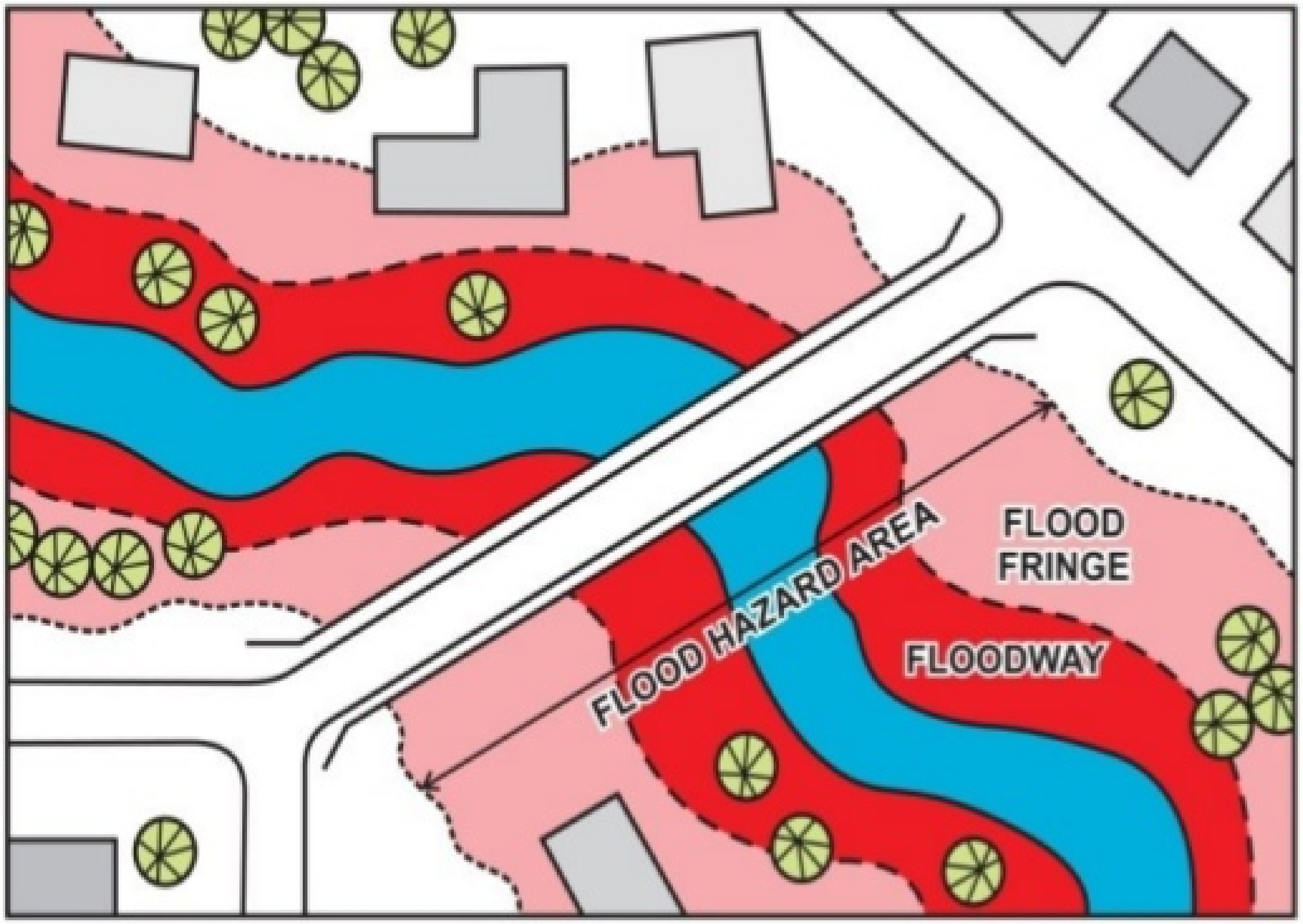
Provincial Flood Hazard Identification Program

Terminology



Design Flood

- A flood that has a 1% chance of occurring each year
- Referred to as the 100-year flood, but this does not mean that it will only occur once every 100 years

- Flood hazard mapping identifies areas at risk from flooding caused by excessive overbank river flow, and does not consider:
  - groundwater problems
  - storm water drainage issues
  - dam or levee failures
  - debris jams at bridges

What did we learn?

- Policy decision has increased the focus on all aspect of the Provincial Flood Hazard Maps.

- Intense focus on the location of the floodway and flood fringe lines this information is of critical importance to Disaster Recovery Program (DRP) decisions.

- Flood Hazard Mapping vs. Flood Risk Mapping
  – **Hazard identification**
  - Hazard + Lilkelihood x Consequence

- Consideration of erosion, local storm water, sewer backup, groundwater, debris accumulation

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Follow up Actions

- Comprehensive implementation plan for both post event assessment reviews and unmapped communities maps is being developed.
- Results of the post assessments will be shared with the community and need for a full mapping review / analysis discussed with local governments.
- Engagement and consultation with Academic and Professional Technical Experts regarding overall "risk based assessment and management" approach.
- Review of long term program objective and tools:
  - **Federal Study underway**
  - **Provincial objectives**
  - **Others ?**


Little Red Deer River near Water Valley
2005