

Bow River Flood June 2013

Hillhurst Sunnyside Community Association, March 17, 2014

Roger Drury, TransAlta Hydro Operations

Presentation Outline

Part 1: TransAlta Bow Hydro System

Part 2: June 2013 Flood

Part 1: TransAlta Bow Hydro System

History

- TransAlta Is A Publicly Traded Corporation Owned By Shareholders
- Bow Facilities Built Between 1911 - 1955
- Built By Private Investment – No Public Funding Or Incentives
- Designed Specifically As Hydroelectric Facilities, Not Multiple Use Facilities

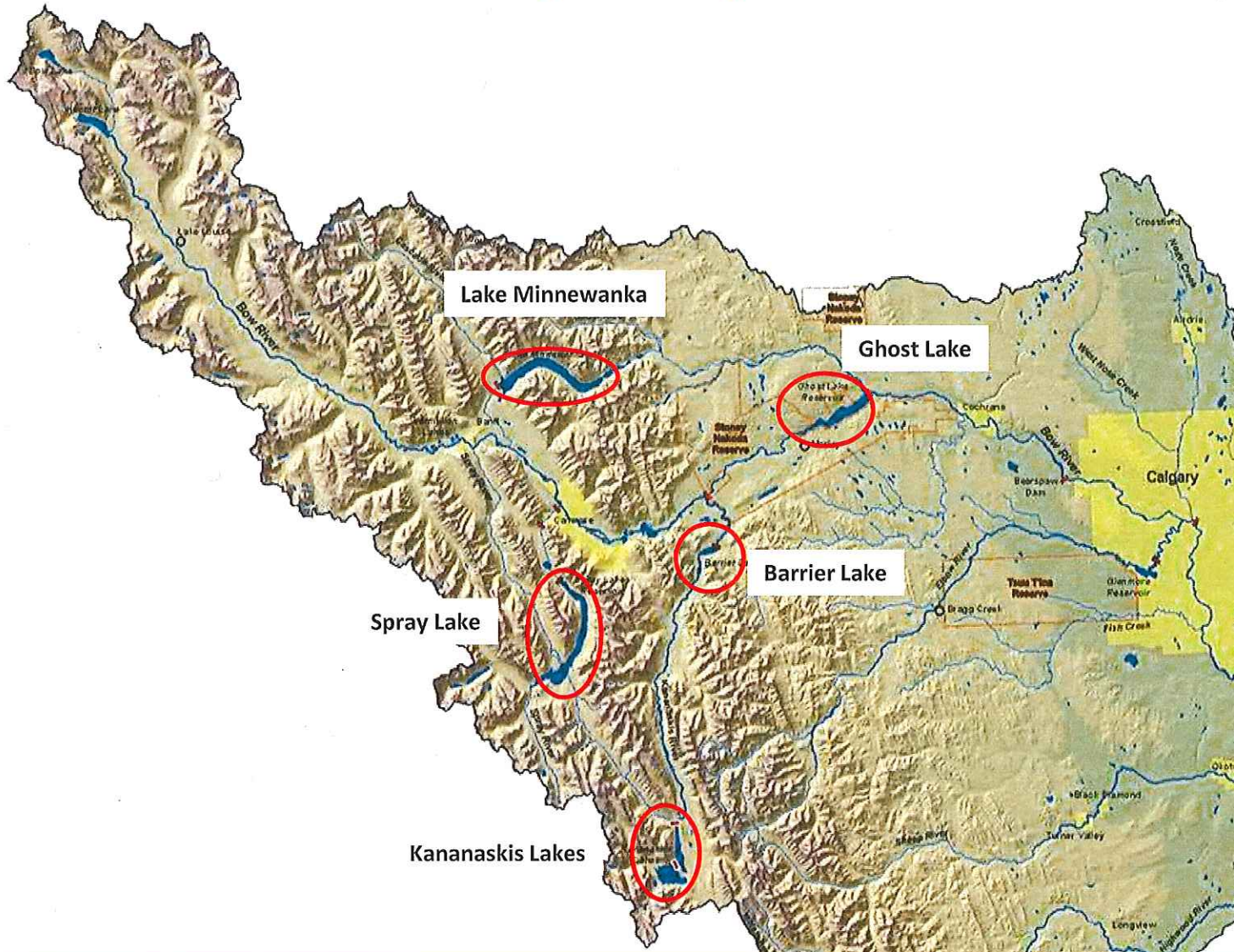
6 Storage Reservoirs

- Lake Minnewanka
- Spray Lake
- Upper Kananaskis Lake
- Lower Kananaskis Lake
- Barrier Lake
- Ghost Lake

3 Run of River Facilities

- Kananaskis
- Horseshoe
- Bearspaw

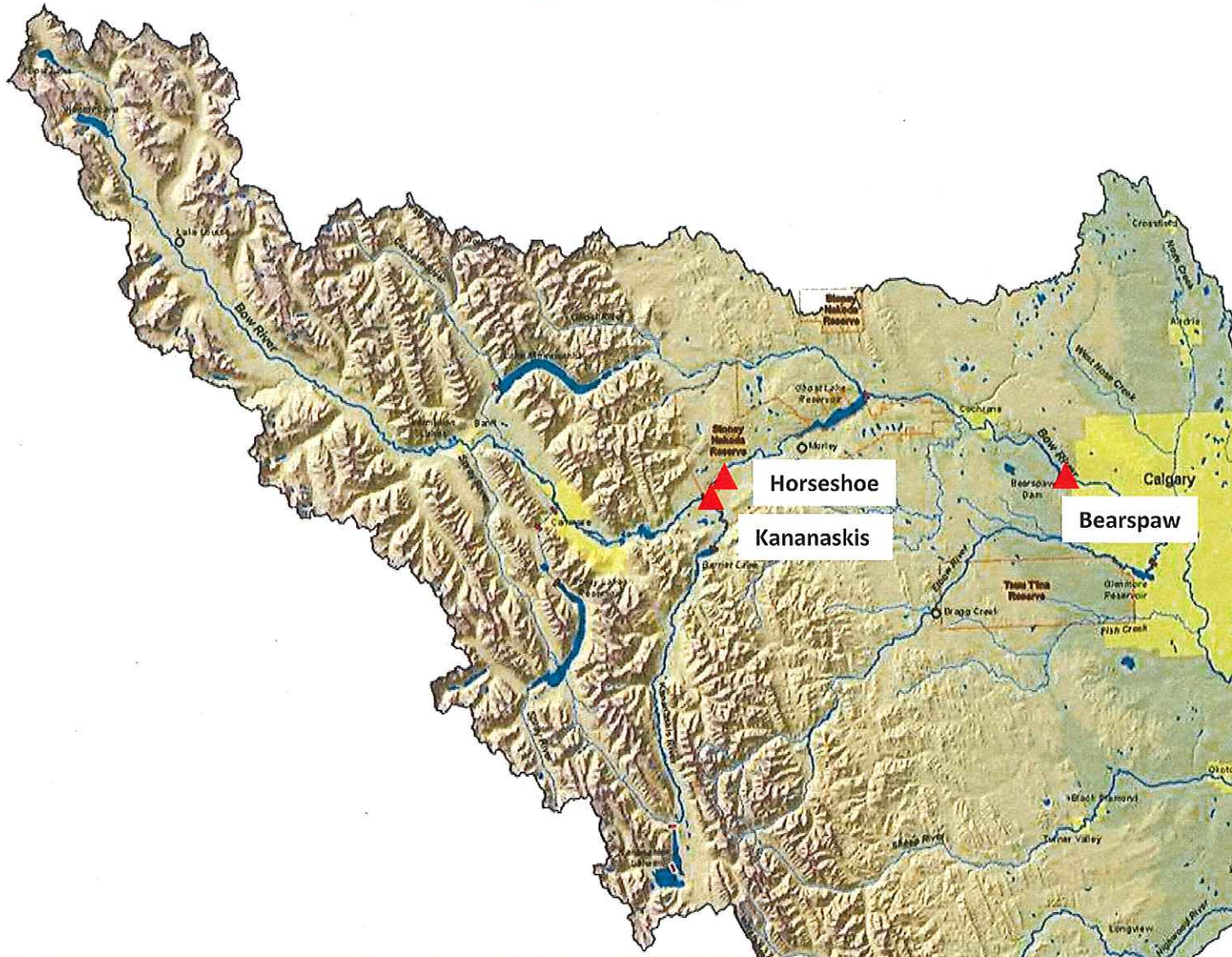
TransAlta Bow Hydro System - Reservoirs



Majority of Storage Located on Tributary Rivers & High in the Basin

Main Stem of Bow River Unregulated Upstream of Ghost

TransAlta Bow Hydro System – Run of River



**Minimal
Ability to
Regulate Flow**

**Whatever
Flow Comes In
Goes Out In
Same Day**

Reservoir Operations

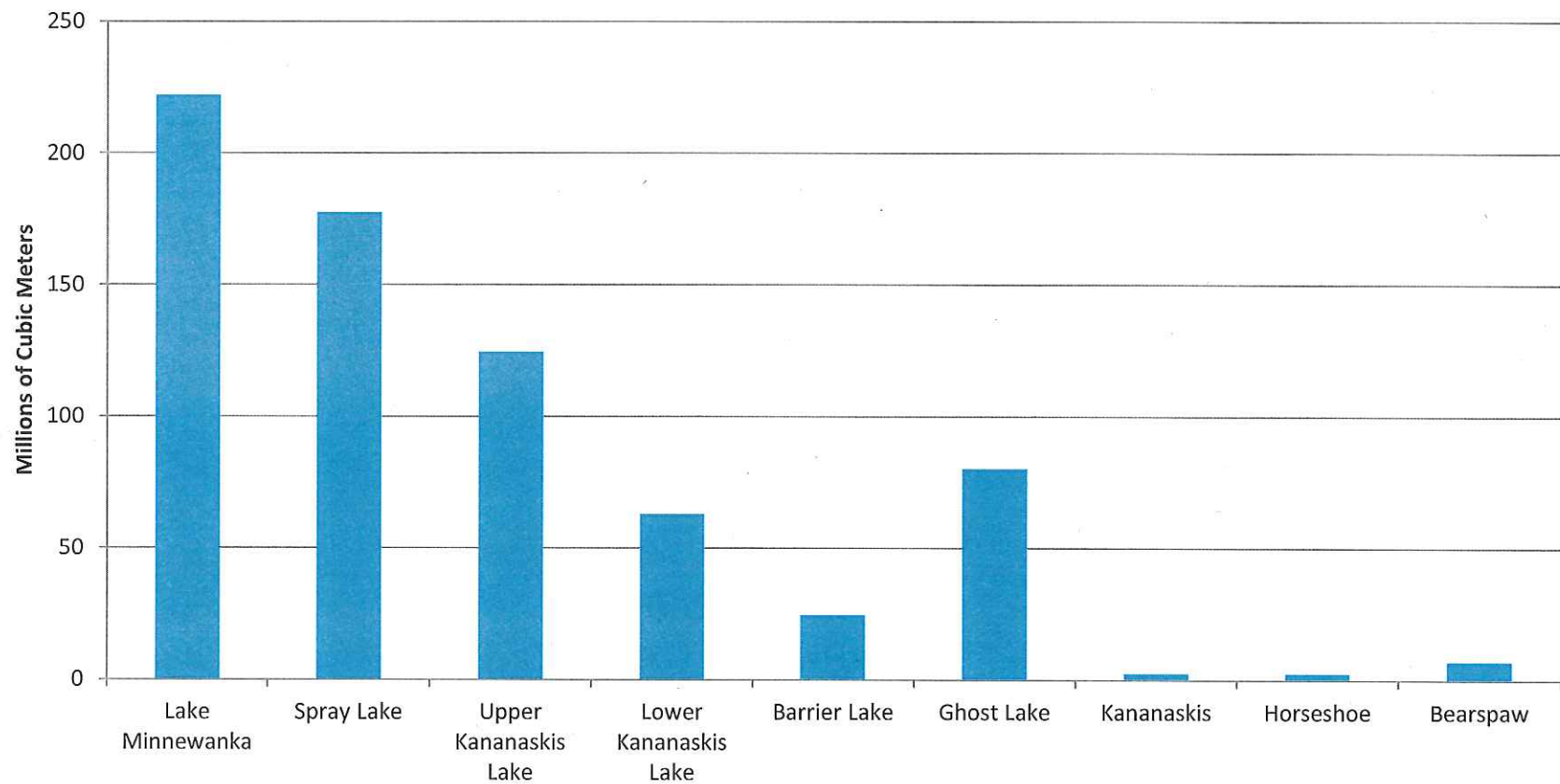
- Role of hydroelectric reservoirs:
 - Store water during high flow periods for release during low flow periods.
 - Equalize power production over the year.
 - Modifies river flow on a seasonal basis.
- Reservoirs are managed within pre-defined operating ranges:
 - Derived from analysis of historic inflows.
- Goals of reservoir management:
 - Ensure structural integrity of the dam is not compromised.
 - Optimize energy production over the yearly cycle.
 - Minimize the likelihood of having to use spillways.
 - Maximize the likelihood of filling the reservoir.

Run of River Operations

- Ensure structural integrity of the dam is not compromised.
- Dam creates a headpond for the hydro plant intakes.
- Storage is too small to regulate flow beyond a few hours.
- Primary operating goal is energy production.

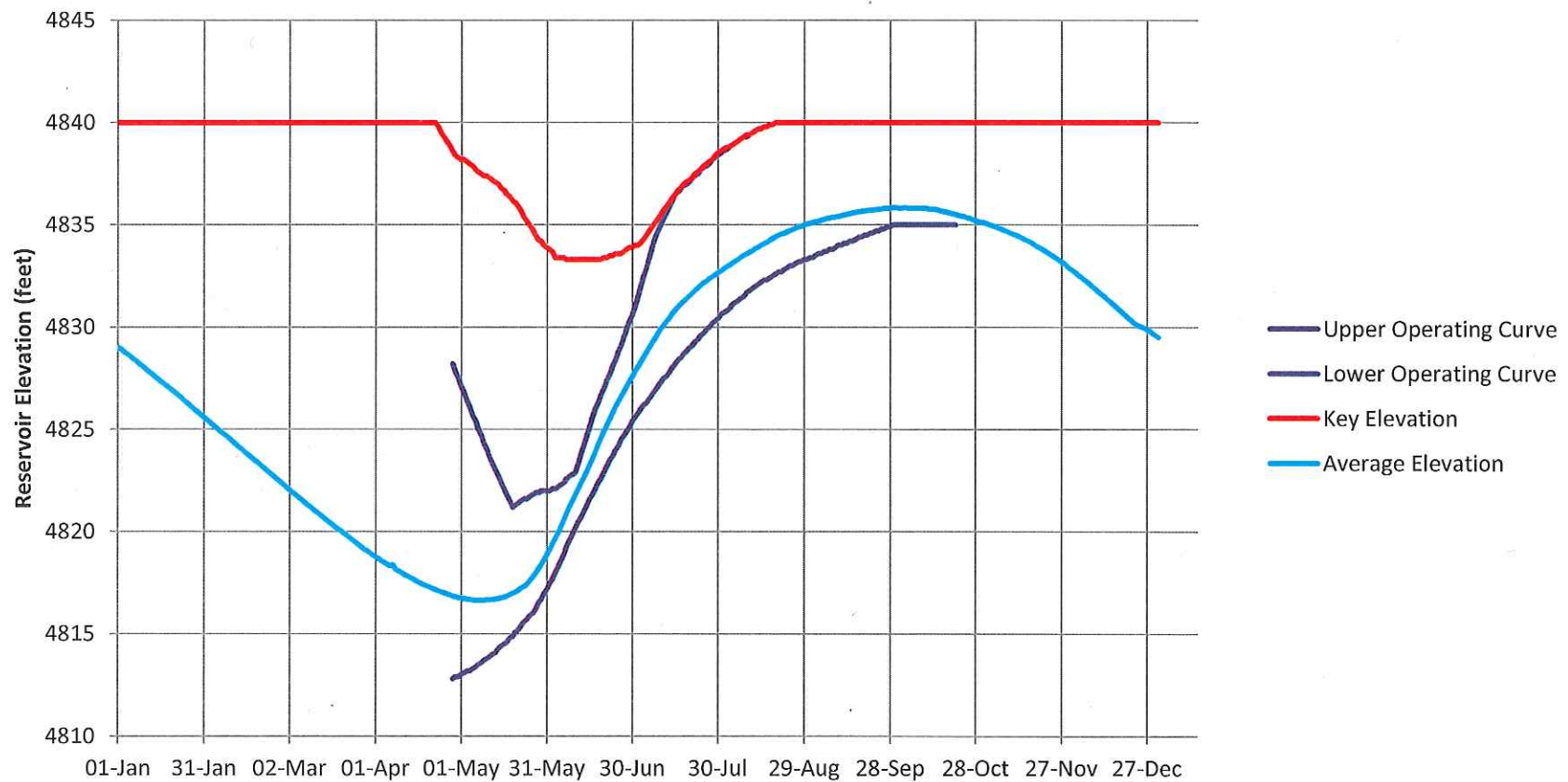
Storage Comparison

Reservoir Storage Volume



Reservoir Operating Rules - Example

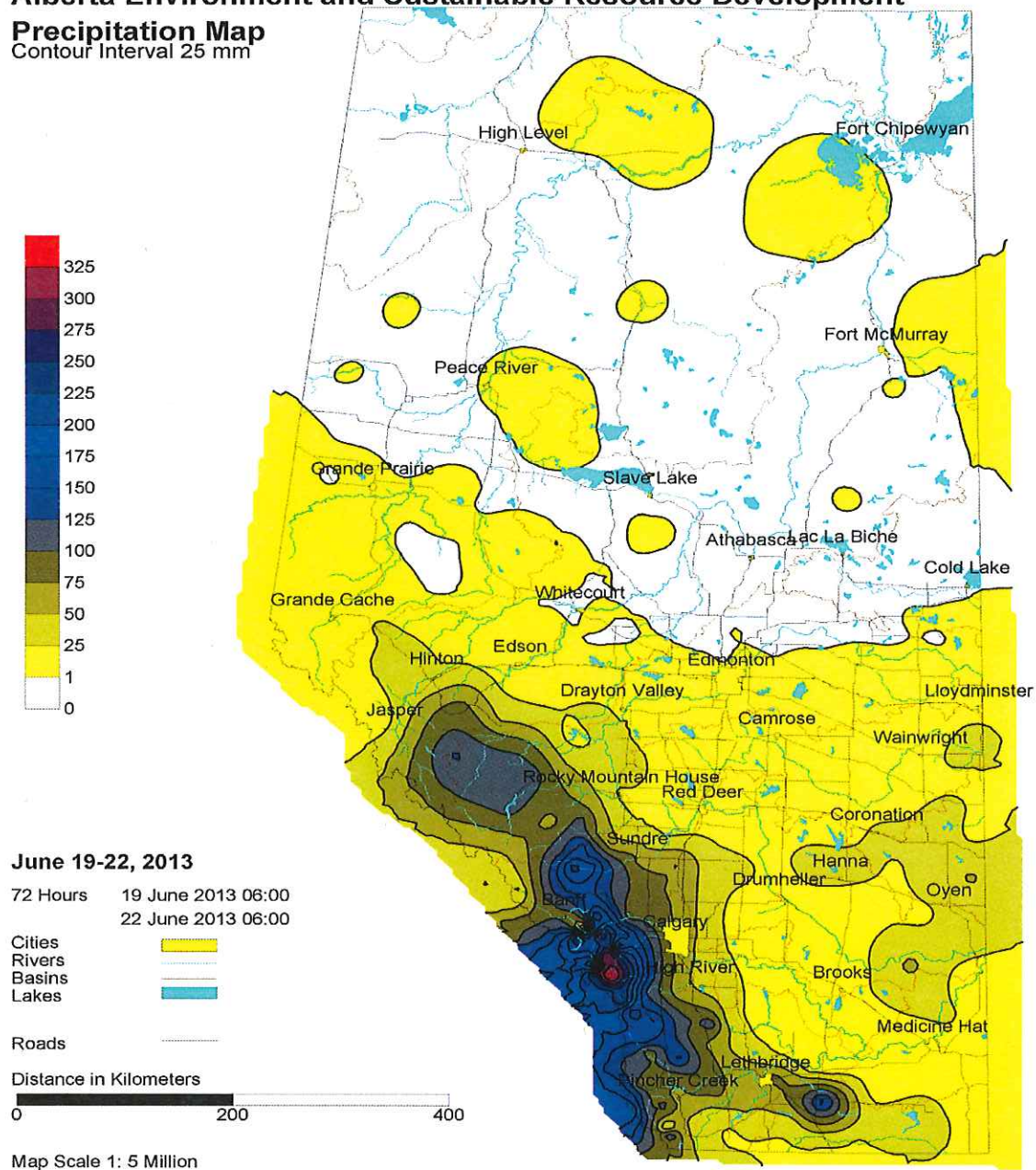
Lake Minnewanka



Part 2: June 2013 Storm Event

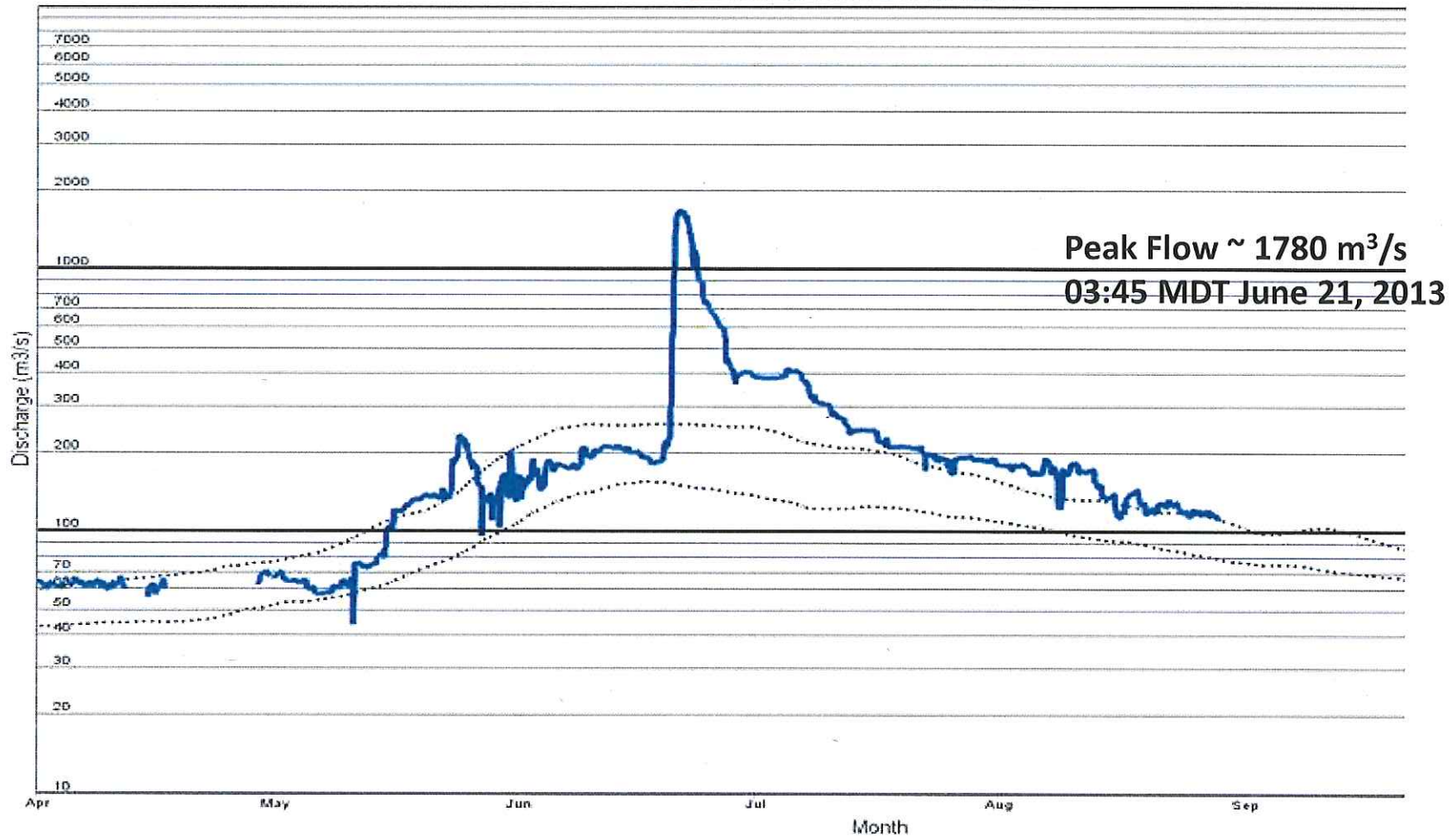
- Extended from US Border to Hinton
- Heaviest Rainfall in Highwood & Sheep Basins
- 150 to 250 mm in much of upper Bow Basin

Alberta Environment and Sustainable Resource Development
Precipitation Map
Contour Interval 25 mm



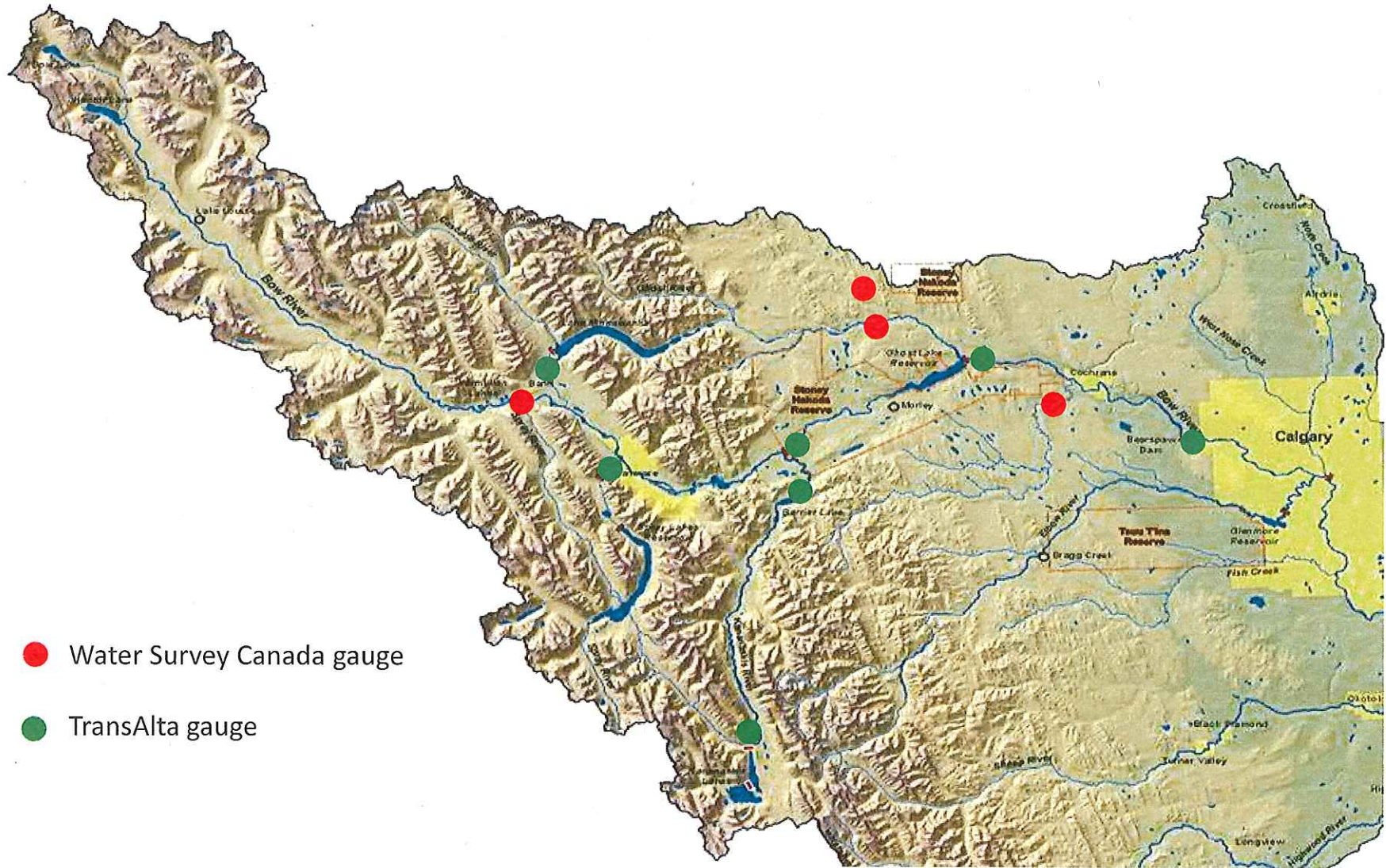
Bow River at Calgary (05BH004)
River Data* - Apr. 01, 2013 - Nov. 01, 2013

■ Current Year ▲ Normal Range (Quartiles)



For Reference: 2005 Peak Flow = 791 m³/s

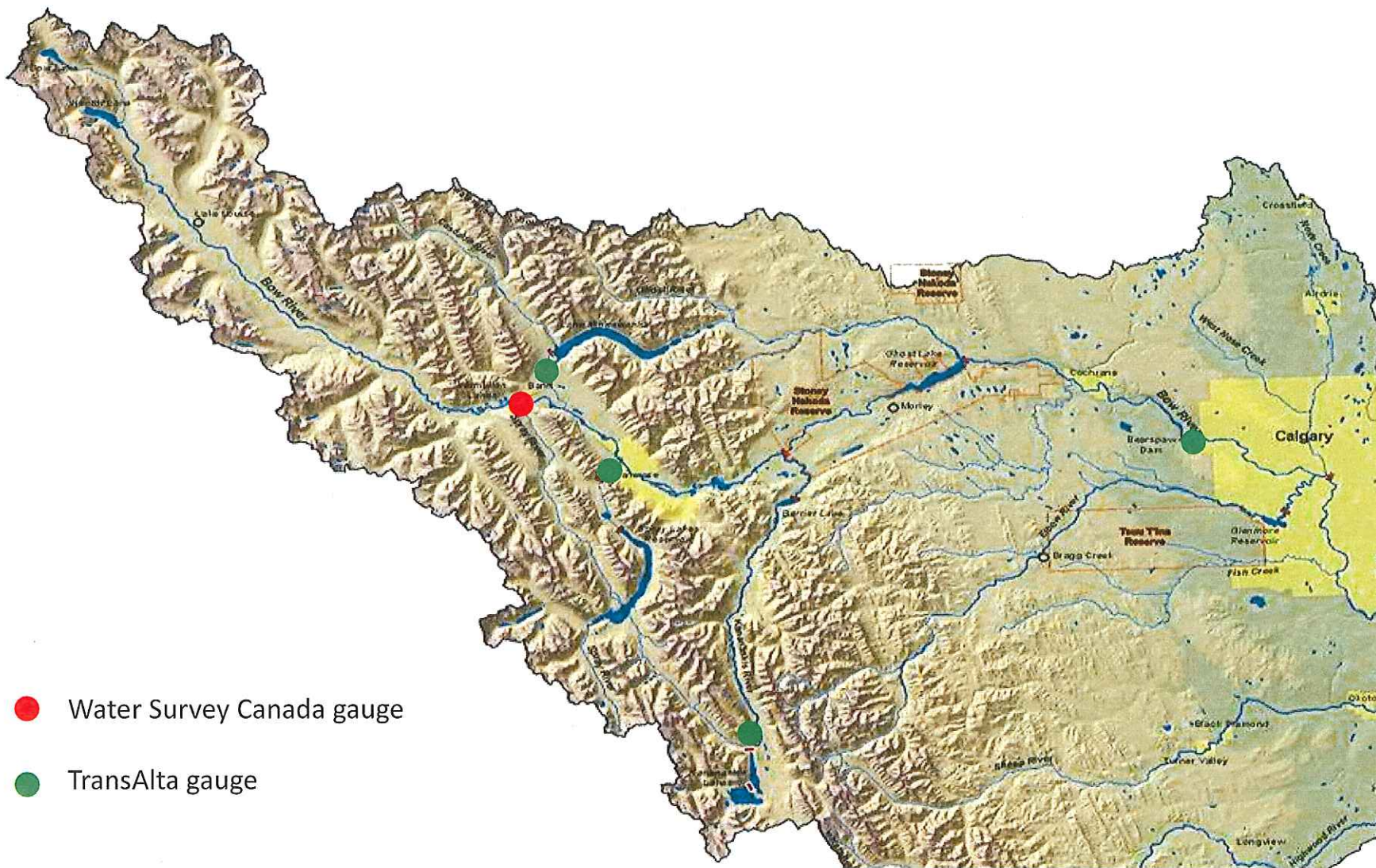
Stream Gauge Locations with Telemetry



● Water Survey Canada gauge

● TransAlta gauge

Stream Gauges Operating June 20, 2013



● Water Survey Canada gauge

● TransAlta gauge

TransAlta Reservoir Operation

Facility	Max Inflow on June 20 (m ³ /s)	Max Release in the 24 hours preceding Peak Flow at Calgary (m ³ /s)	Reservoir Level before Flood on June 19 (m)	Reservoir Level at end of day June 21 (m)	Reservoir Elevation Rise (m)	Floodwater Stored (cubic meters)
Lake Minnewanka	442	11	1470.94	1473.31	2.37	50,676,300
Spray Lake	365	27	1692.18	1695.13	2.94	44,856,540
Upper Kananaskis Lake	99	0	1692.61	1694.33	1.73	13,143,780
Lower Kananaskis Lake	117	0	1659.76	1662.52	2.76	13,895,910
Barrier Lake	402	356	1371.62	1373.71	2.09	5,338,890
Ghost Lake	~1600	~1600	1191.08	1192.00	0.91	10,344,870
					Total	138,256,290

Notes

Reservoir levels on June 19 were in normal range for this time of year

All inflow values are preliminary only

Maximum inflows occurred at different times and cannot be added directly to flow at Calgary

Barrier & Ghost were in Spillway Operation

Maximum reservoir elevation at Ghost occurred on June 20, 2013

Tracking The Water

<u>Location</u>	<u>Max Flow (m³/s) *</u>	
Bow River at Banff	200	04:00 MDT June 20 *
Bow River Inflow - Banff to Kananaskis River	?	
Kananaskis River Spill at Barrier	356	17:45 MDT June 20
Ghost River at Mouth (includes Waiparous Cr.)	670	afternoon June 20
Jumpingpound Creek	202	20:45 MDT June 20

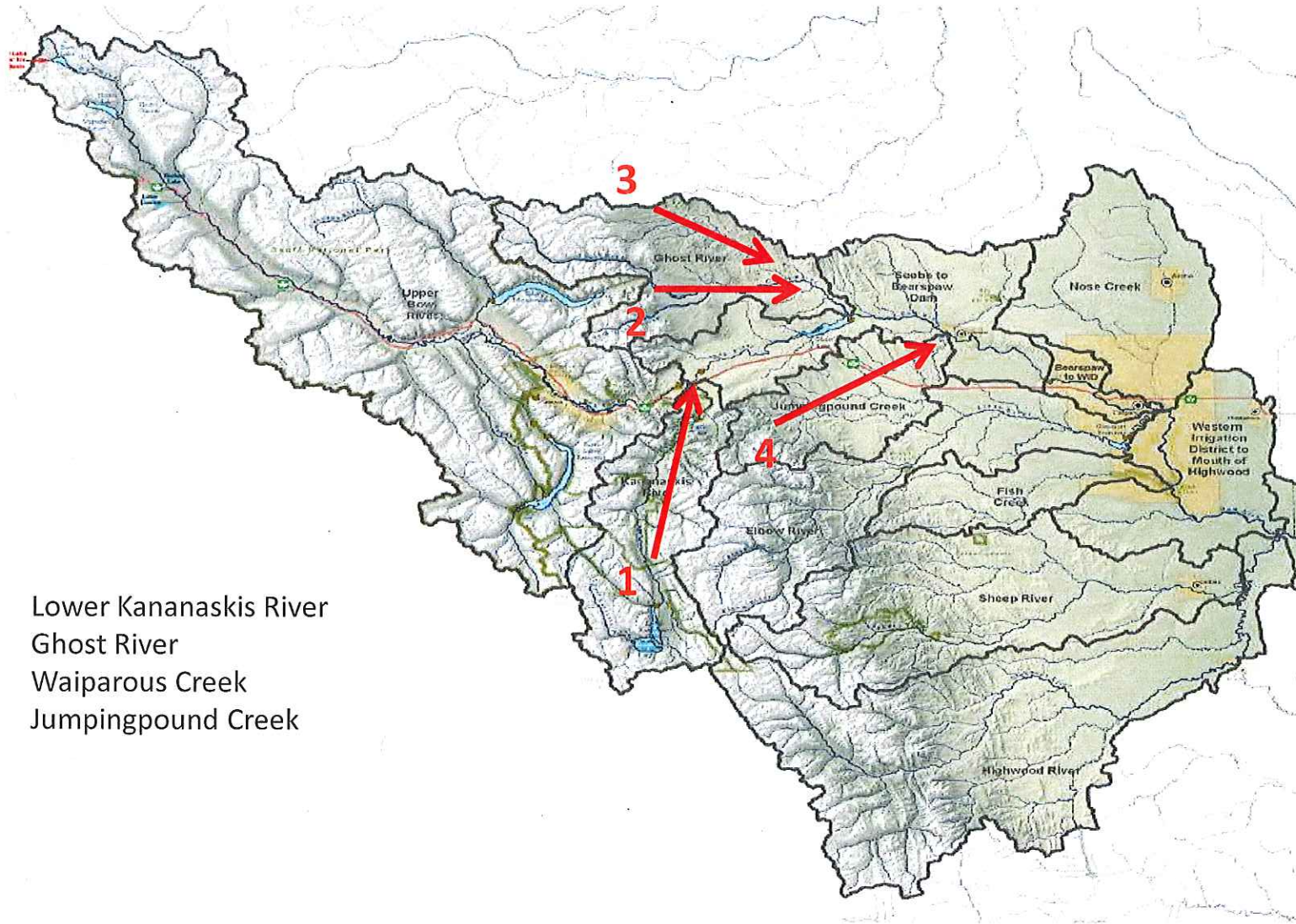
Notes

All flow values are preliminary

Bow River at Banff is the flow rate 24 hours prior to peak flow at Calgary. Peak flow at Banff occurred on the afternoon of June 21

Downstream Tributaries Drove the Peak at Calgary

Location Plan of Lower Tributaries



- 1 Lower Kananaskis River
- 2 Ghost River
- 3 Waiparous Creek
- 4 Jumpingpound Creek

Modified Reservoir Operations

- TransAlta completed preliminary assessment of options
- Opportunities in upstream reservoirs are minimal (Minnewanka, Spray, Upper & Lower Kananaskis)
- Opportunities exist at Barrier and Ghost
 - TransAlta modeling results are not as optimistic as WaterSmart
 - Reliable stream gauge information critical to achieving benefits
- Initial discussions with GOA / City of Calgary took place in January 2014
- TransAlta is currently waiting for feedback and direction
- Implementation will require a commercial agreement and well defined procedures