Delivering Functional Flows in Southern Alberta

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Operations Infrastructure Branch

Alberta Environment and Parks

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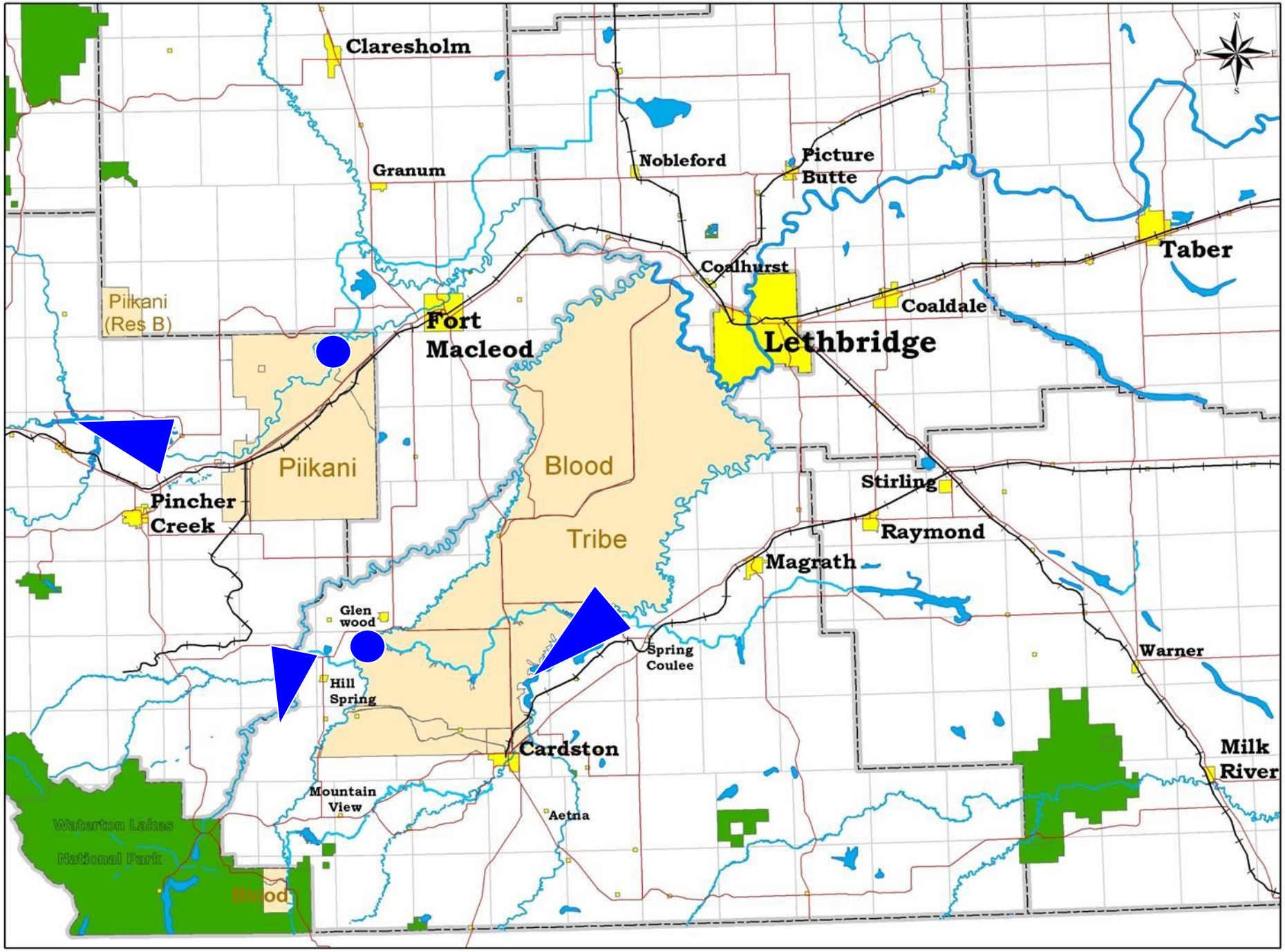
Operations Infrastructure Branch

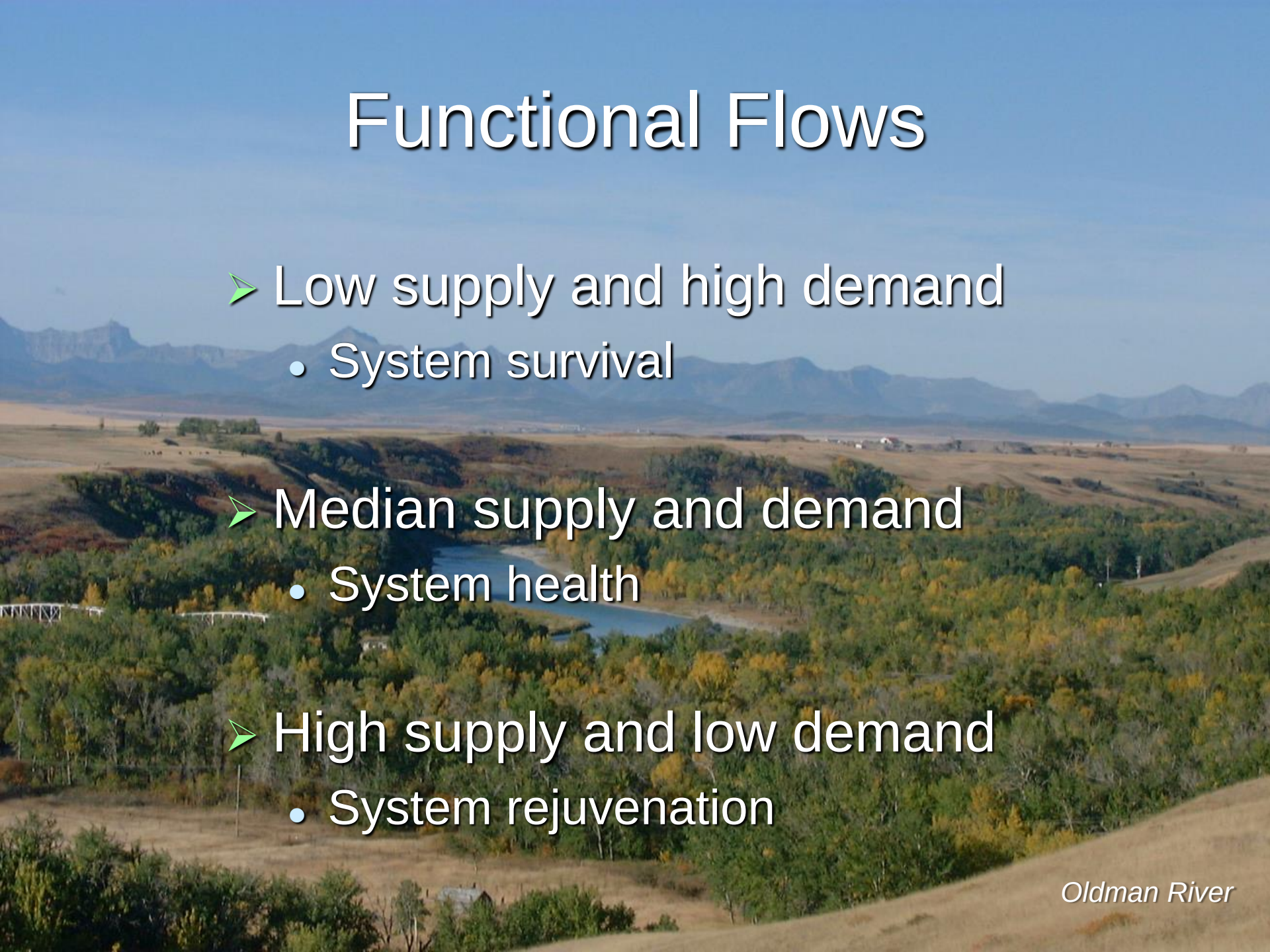
- Own and operate the major water supply structures in southern Alberta
- Primarily to provide a secure water supply

Waterton Reservoir


Claresholm
Granum
Nobleford
Picture Butte
Taber
Coalhurst
Coaldale
Lethbridge
Piikani (Res B)
Fort Macleod
Piikani
Blood Tribe
Pincher Creek
Stirling
Raymond
Magrath
Glen wood
Spring Coulee
Warner
Hill Spring
Cardston
Milk River
Mountain View
Aetna
Waterton Lakes National Park
Blood

Functional Flows

- Low supply and high demand
  - System survival
- Median supply and demand
  - System health
- High supply and low demand
  - System rejuvenation



Oldman River

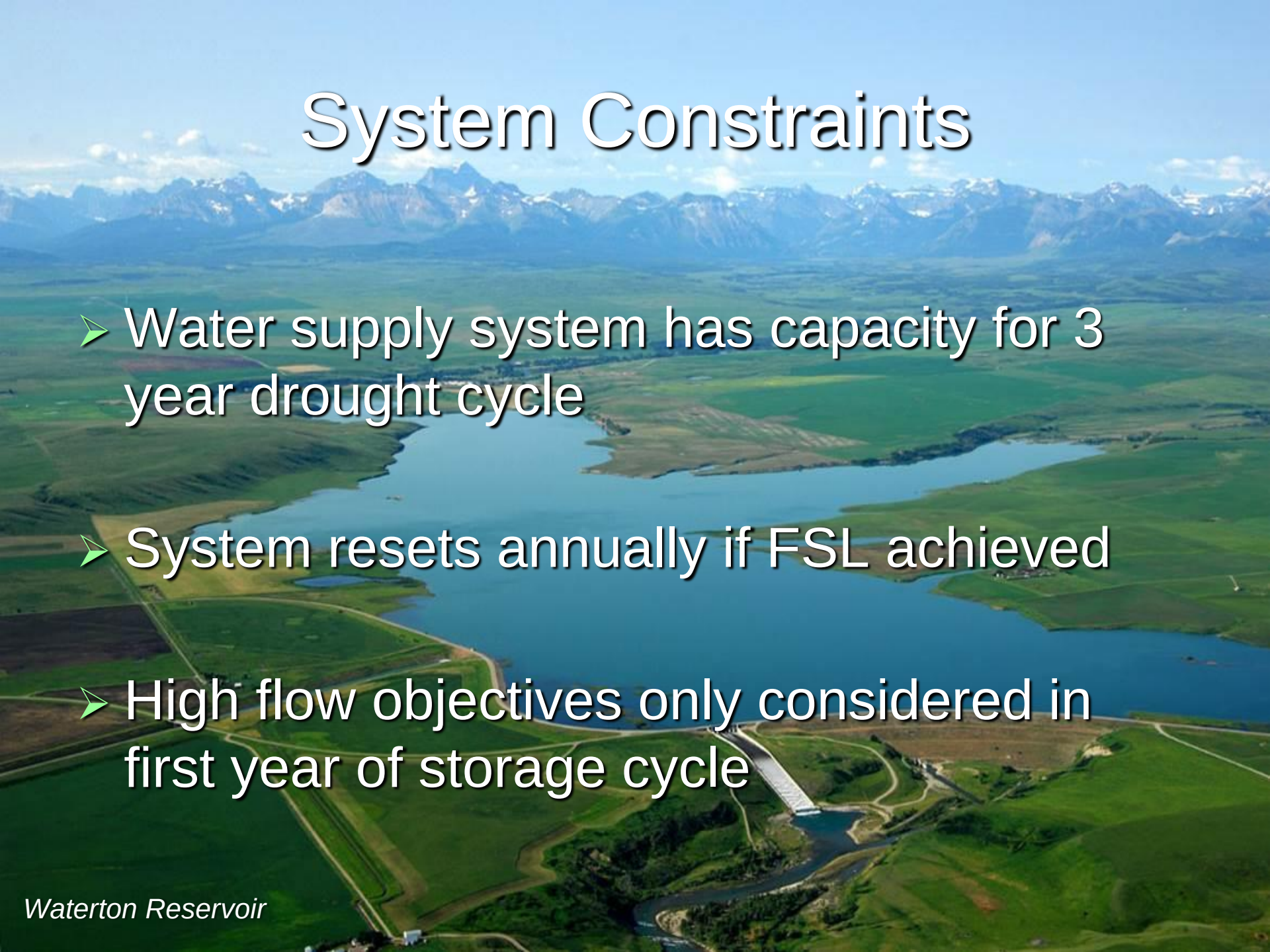
Functional Flows

- System Survival
  - Enhance minimum flows
- System Health
  - Enhance minimum flows
  - Target fish spawning requirements
- System Rejuvenation
  - Riparian forest recruitment

Oldman River

System Constraints

- Water supply system has capacity for 3 year drought cycle
- System resets annually if FSL achieved
- High flow objectives only considered in first year of storage cycle



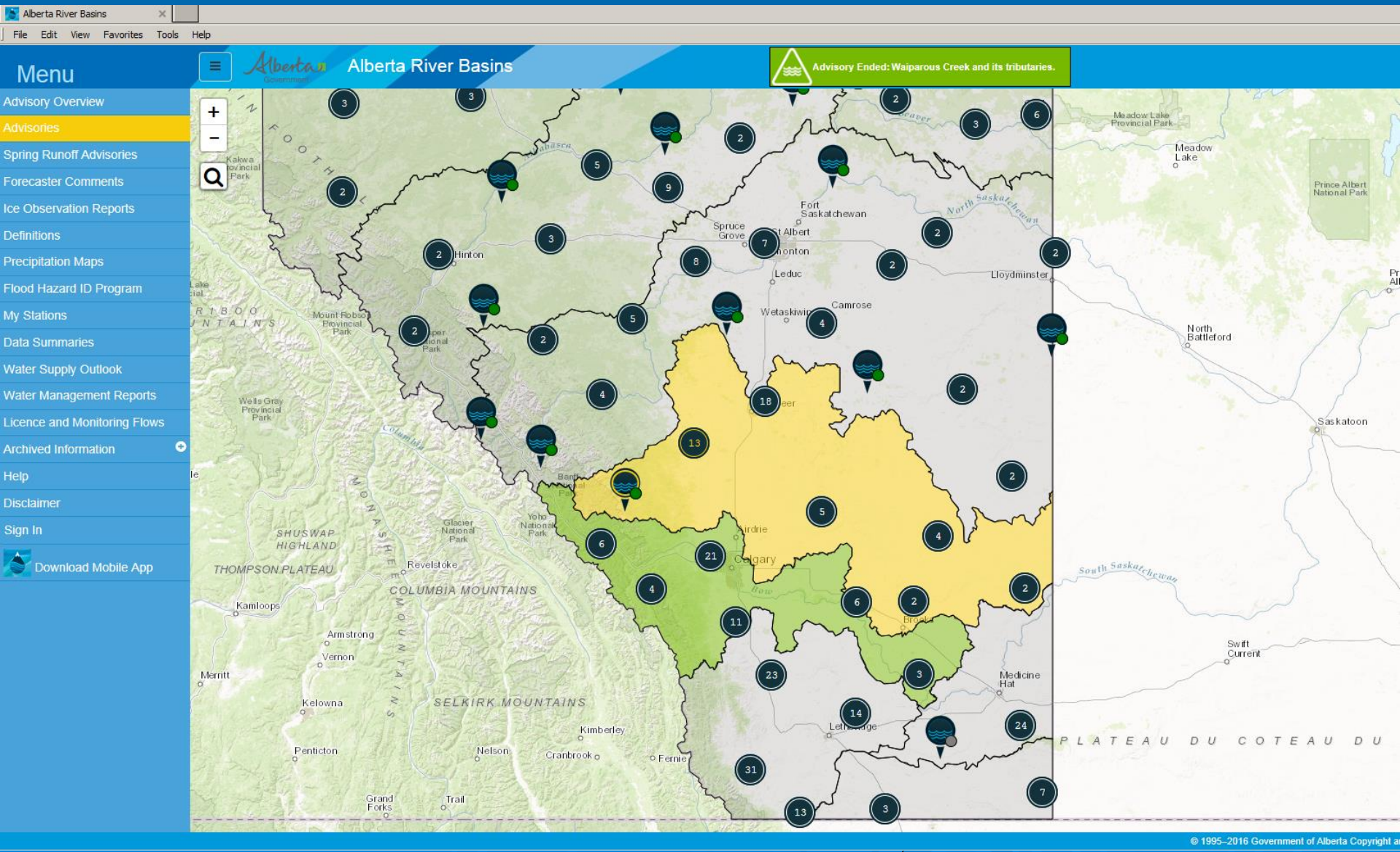
Waterton Reservoir

Legal and Social Constraints

- Apportionment Agreement with Saskatchewan
  - Manageable in high supply years
- Licensed Withdrawals
  - Manageable in low demand years

Legal and Social Constraints

- Secure Water Supply vs Flood Protection
  - Public debate that varies with recent streamflow history
- Environmental Protection
  - Public expectation that river flows are adequate to support the aquatic and riparian ecosystems
  - Knowledgeable public interest groups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Menu
Advisory Overview
Advisories
Spring Runoff Advisories
Forecaster Comments
Ice Observation Reports
Definitions
Precipitation Maps
Flood Hazard ID Program
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Alberta River Basins
Advisory Ended: Waiparous Creek and its tributaries.
Hinton
Fort Saskatchewan
Spruce Grove
Leduc
Lloydminster
Camrose
Wetaskiwin
Meadow Lake Provincial Park
Meadow Lake
Prince Albert National Park
North Battleford
Saskatoon
Swift Current
Medicine Hat
Lethbridge
Calgary
Mount Robson Provincial Park
Wells Gray Provincial Park
Glacier National Park
Yoho National Park
Revelstoke
Kamloops
Armstrong
Vernon
Merritt
Kelowna
Penticton
Nelson
Cranbrook
Kimberley
Fernie
Grand Forks
Trail
SHUSWAP HIGHLAND
THOMPSON PLATEAU
COLUMBIA MOUNTAINS
SELKIRK MOUNTAINS
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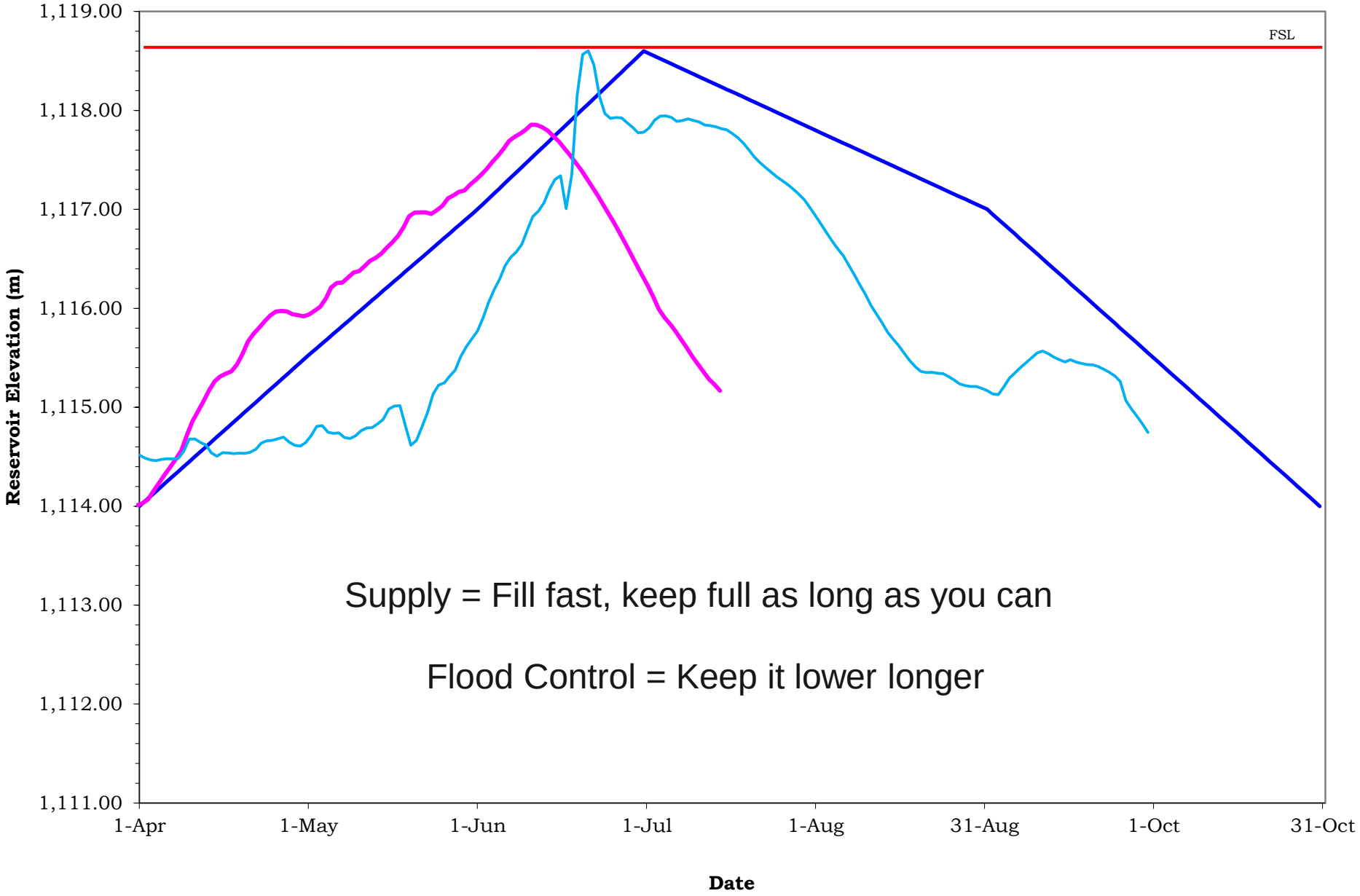
Operational Constraints

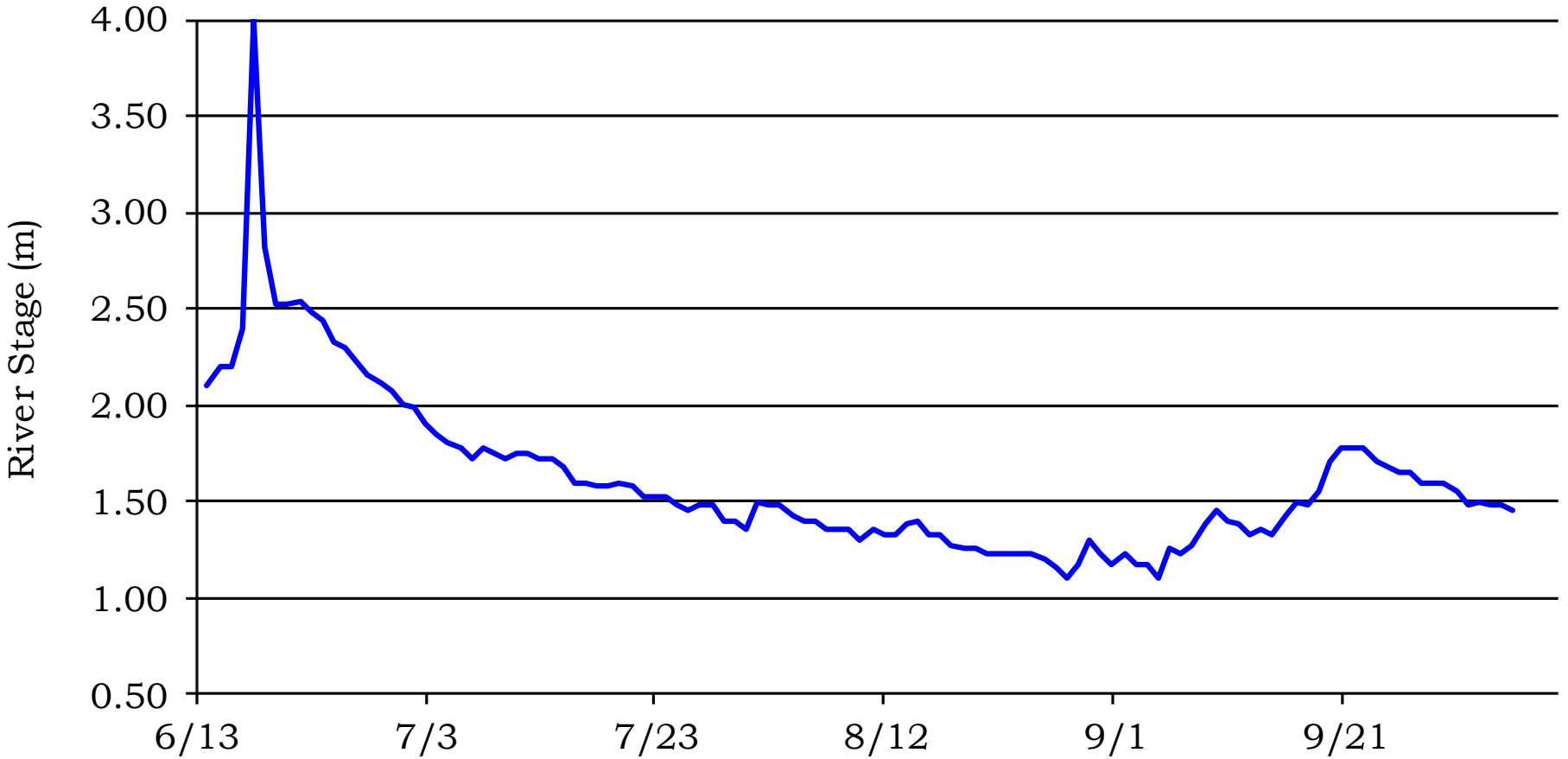
- Reservoir Fill Curves

Oldman River Dam



Operational Constraints

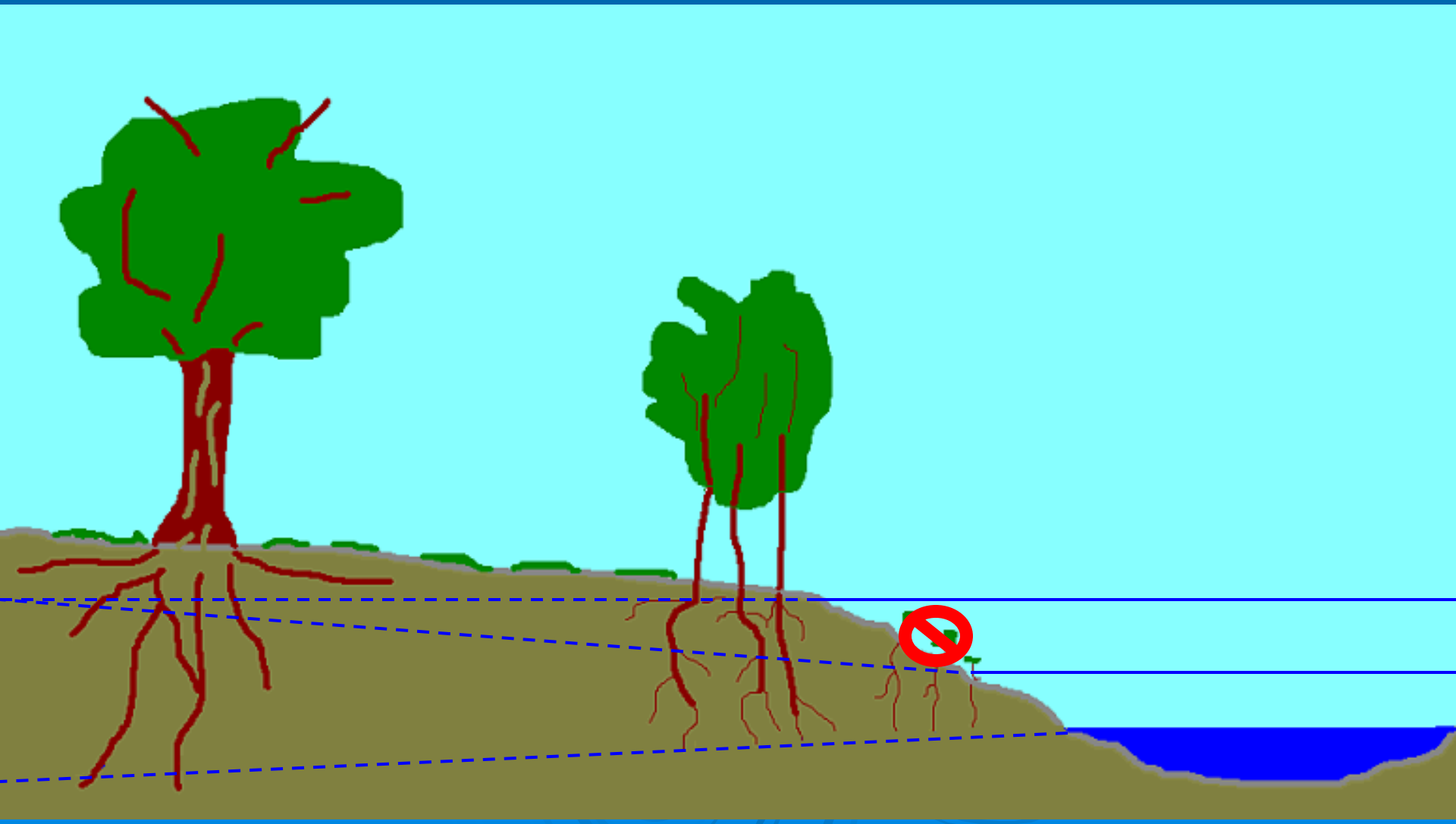
- Reservoir Fill Curves
- End of Season Reservoir Level


River Stage (m)
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
6/13
7/3
7/23
8/12
9/1
9/21

Operational Constraints

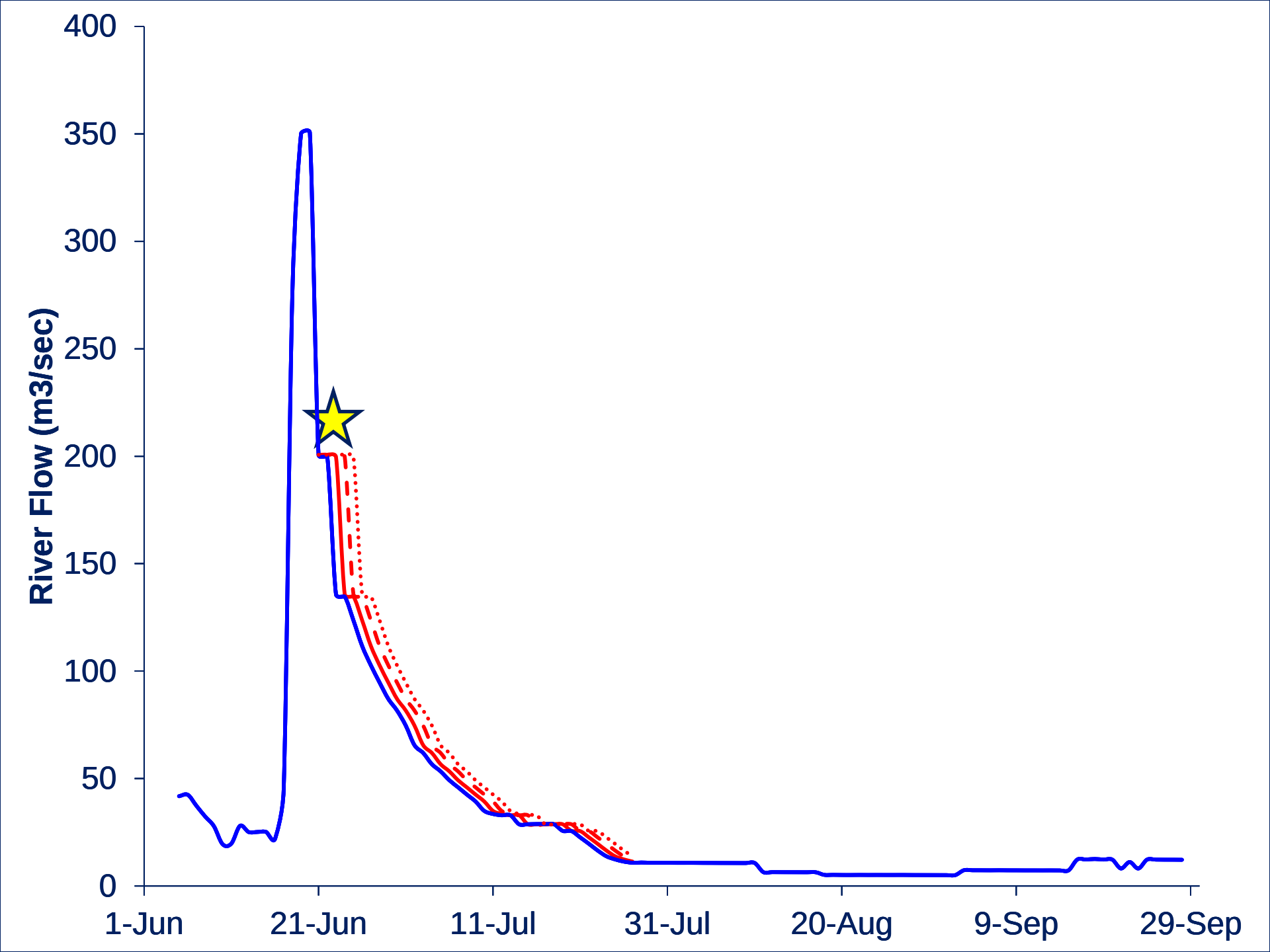
- Reservoir Fill Curves
- End of Season Reservoir Level
- Standardized Flow Patterns

Don’t Do Loops



Operational Constraints

- Reservoir Fill Curves
- End of Season Reservoir Level
- Standardized Flow Patterns
- Timely Implementation

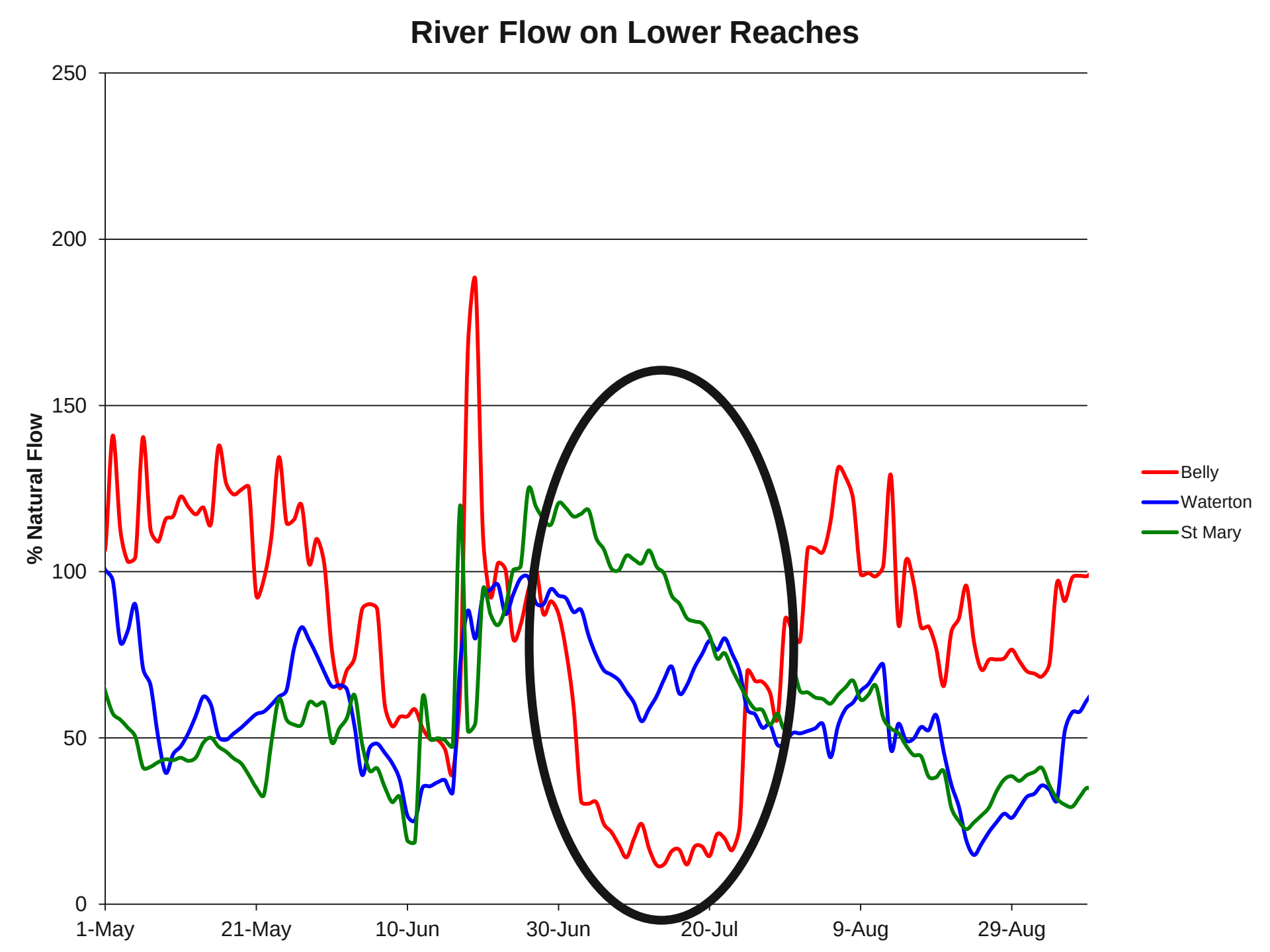

400
350
300
250
200
150
100
50
0
River Flow (m3/sec)
1-Jun
21-Jun
11-Jul
31-Jul
20-Aug
9-Sep
29-Sep

Do It Now

- Delay operations by 1 day, delivery over 21 days
- Total volume used = 16,400 dam^3
- 10% (approx) of storage in Waterton reservoir
- Normal end of season drawdown is ~6m
- Added drawdown of ~2.2m
- 2 day delay requires 32,800 dam^3
- 3 day delay requires 49,000 dam^3

Operational Constraints

- Reservoir Fill Curves
- End of Season Reservoir Level
- Standardized Flow Patterns
- Timely Implementation
- Balancing Impacts Across Rivers


River Flow on Lower Reaches
% Natural Flow
250
200
150
100
50
0
1-May
21-May
10-Jun
30-Jun
20-Jul
9-Aug
29-Aug
Belly
Waterton
St Mary

Year	Demand	Oldman River Dam				St Mary River Dam			
		Start Pop Ops	Annual Peak	Total stage decline	Comments	Start Pop Ops	Annual Peak	Total stage decline	Comments
2000	High	No Start				No Start			
2001	Very High	No Start				No Start			
2002	Normal	July 11 – too late	550 June 18	1.4 m	Abandoned on July 2	July 9 – too late	200 June 29	1.4 m	Abandoned on July 3
2003	High	No Start				No Start			
2004	Normal		82				11		
2005	Low	July 9 – too late	480 June 9	< 0.5 m – too low			274 June 8	0.4m after seed release – too small	Annual Peak too early
2006	High	No Start				No Start			
2007	High	No Start				No Start			
2008	Normal		178				152	0.4 m – too small	
2009	Normal		146				130	0.3 m - too small	
2010	Low	June 21	470 June 18	1.1 m	Could have been 1.6 m decline	June 25	300 June 19	0.6m - minimal	Could have been 1.2 m decline

Future Directions

- Coordination of flows across multiple years
- Coordination of all rivers to generate supporting flows at Lethbridge and further downstream


Delivering Functional Flows is a Challenge
We are working at it.
St Mary River Dam