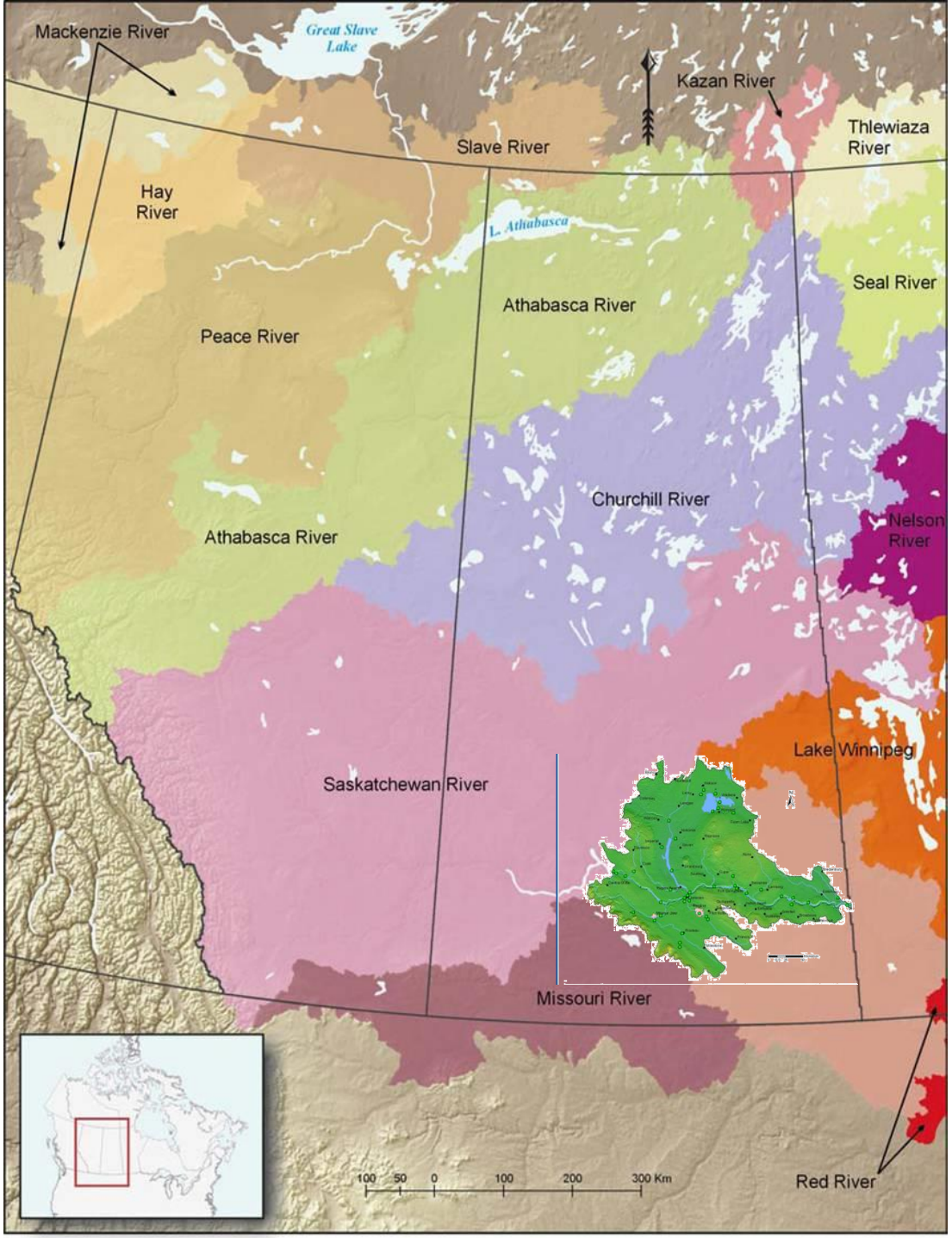
Water Security Agency

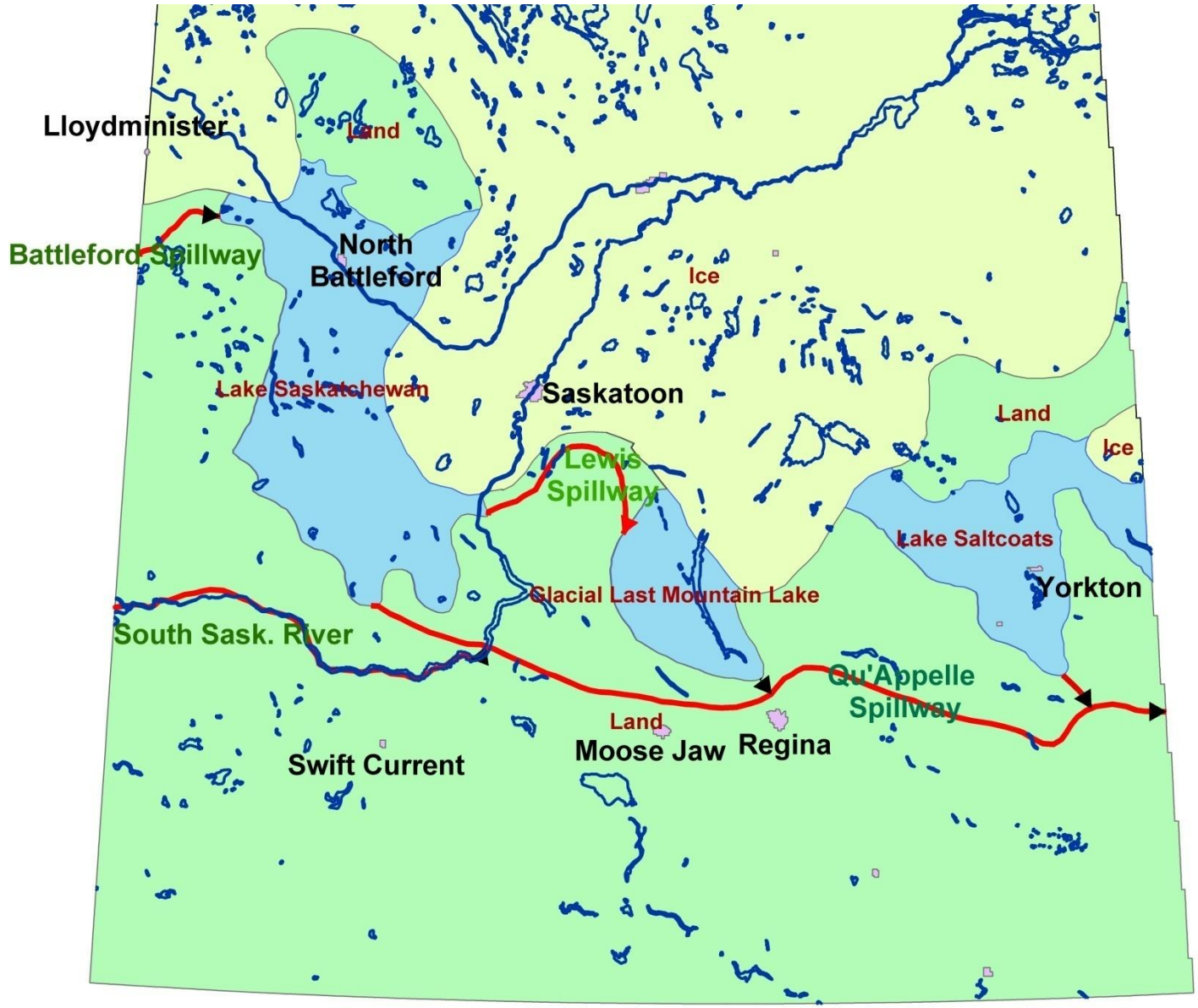
SASKATCHEWAN

Qu'Appelle River Basin

Outline

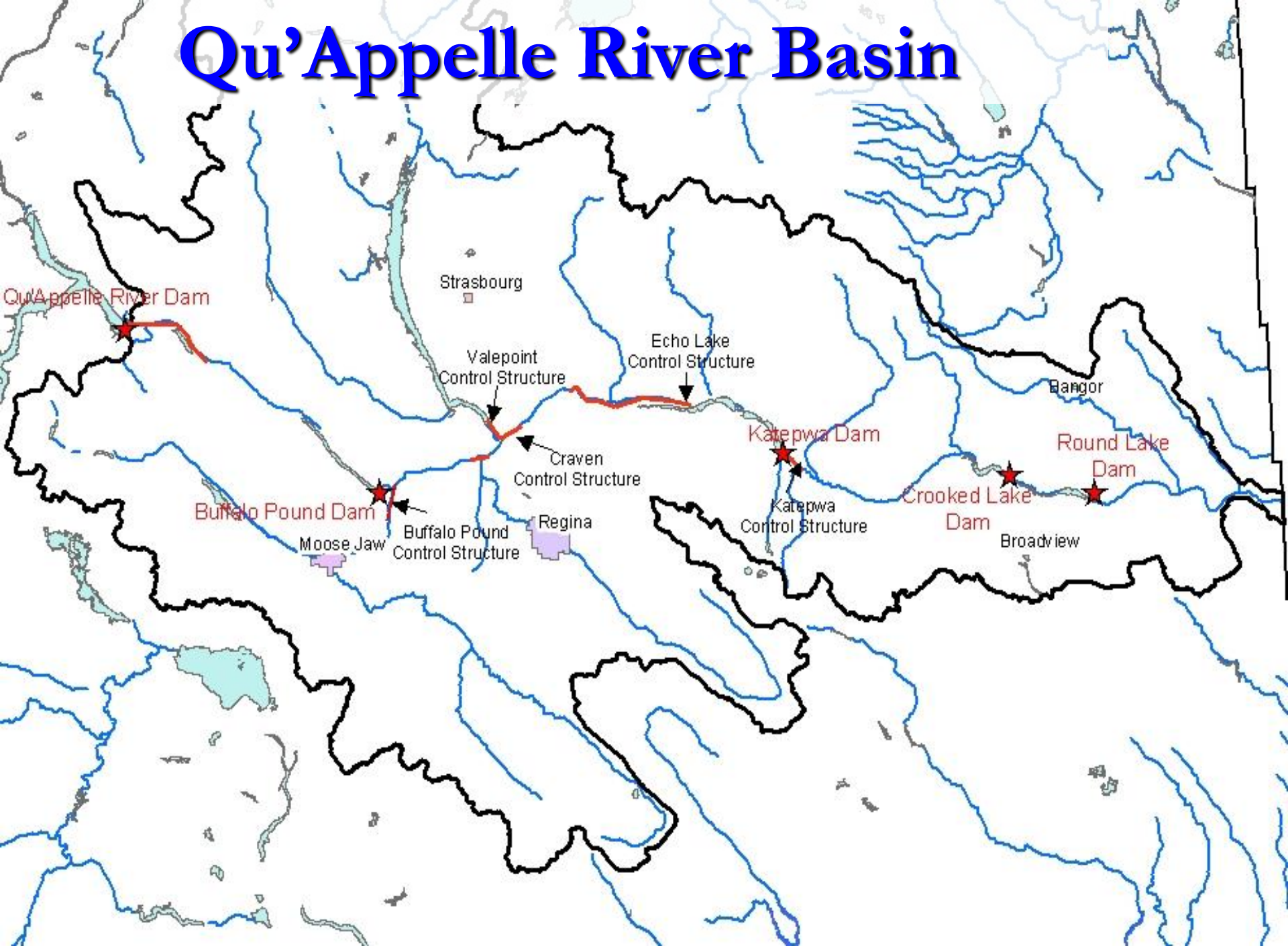
- Basin Layout
- Operations
- System Response to High Flows


Mackenzie River
Great Slave Lake
Kazan River
Thlewiaza River
Slave River
Hay River
L. Athabasca
Seal River
Athabasca River
Peace River
Churchill River
Nelson River
Athabasca River
Lake Winnipeg
Saskatchewan River
Missouri River
Red River
100 50 0 100 200 300 Km

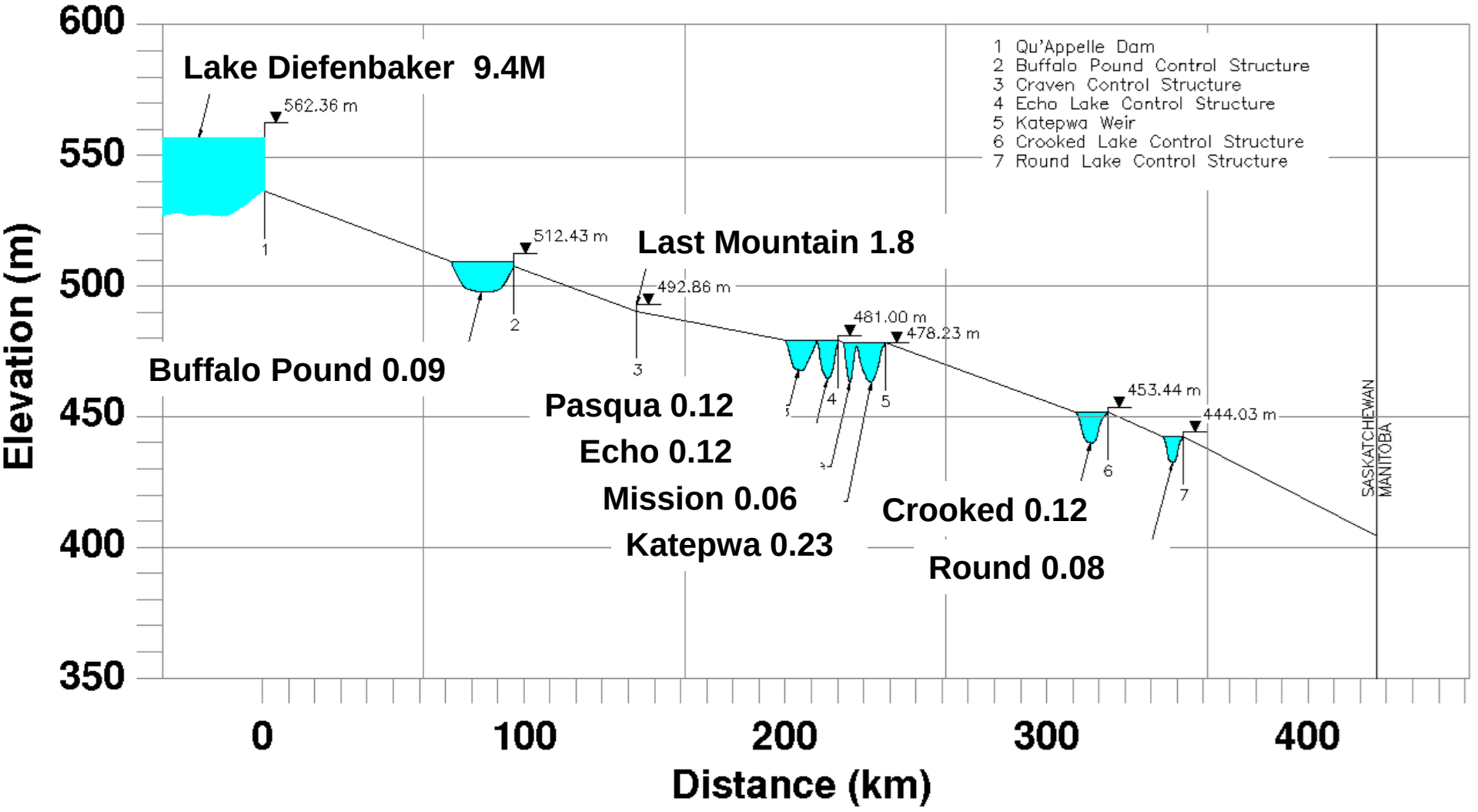

Lloydminister
Land
Battleford Spillway
North Battleford
Ice
Lake Saskatchewan
Saskatoon
Land
Ice
Lewis Spillway
Lake Saltcoats
Yorkton
Glacial Last Mountain Lake
South Sask. River
Qu'Appelle Spillway
Land
Moose Jaw
Regina
Swift Current


Moose Bay
Sunset Beach
Cowessess
Marieval
© 2014 Cnes/Spot Image
© 2014 Google
Image © 2014 DigitalGlobe
Image Landsat

Qu'Appelle River Basin



Profile Of Qu'Appelle River Valley



Qu'Appelle Operations

Purpose of Structures:

- Maintain water levels in normal years
- Mitigate effects of droughts

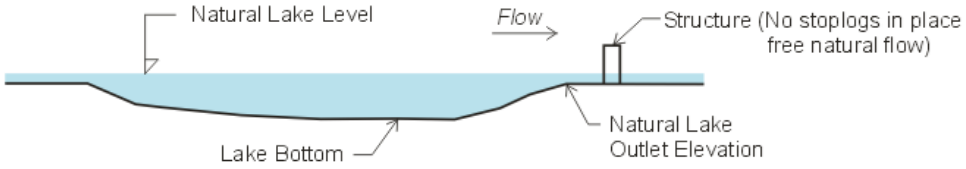
Qu’Appelle Dam Control Structure

- Located on the Qu’Appelle River Dam at Lake Diefenbaker.
- Used to supplement water Supply in Buffalo Pound Lake
- Used to reduce drought effects in Last Mountain Lake and beyond

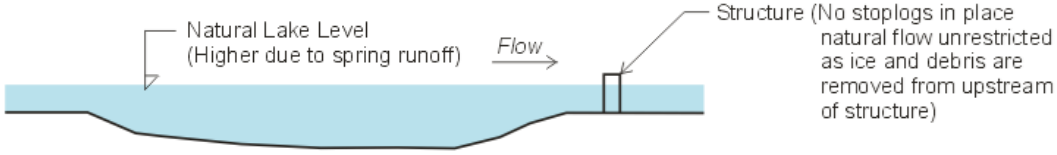
Craven Control Structure

- Used primarily in normal and dry years to supplement Last Mountain Lake Levels

1. Winter



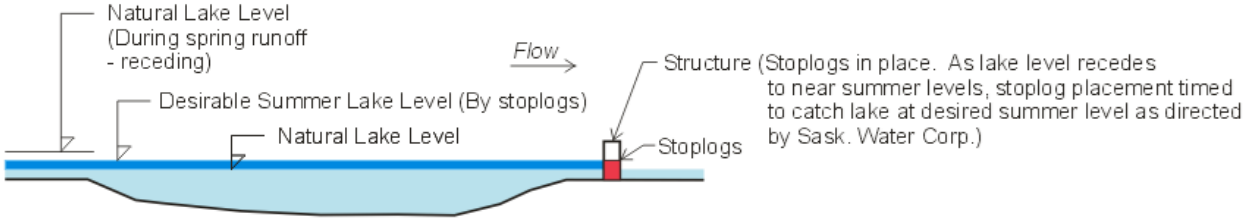
2. Spring



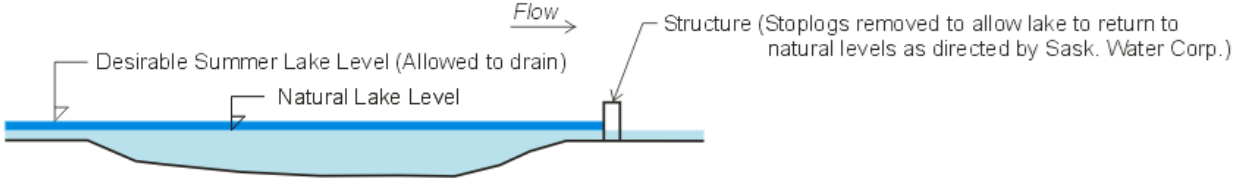
Lake	Maximum Increase in Water Level * from Stoplog Operations (metres)
Pasqua	.5
Echo	.5
Crooked	.9
Round	1.1

* Determined as top of stoplog elevation minus natural lake outlet elevation.

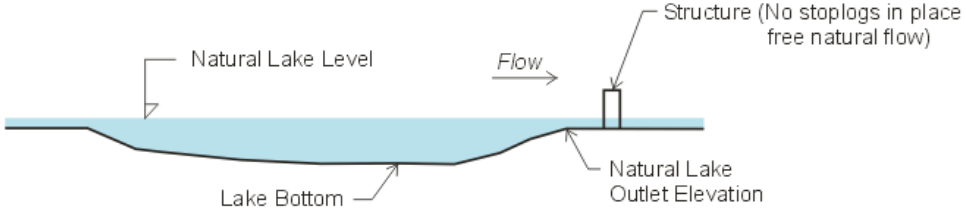
3. Early summer thru to fall



4. Fall



5. Winter



LEGEND

Natural Water Levels

Water Level Raised by Placing Stoplogs

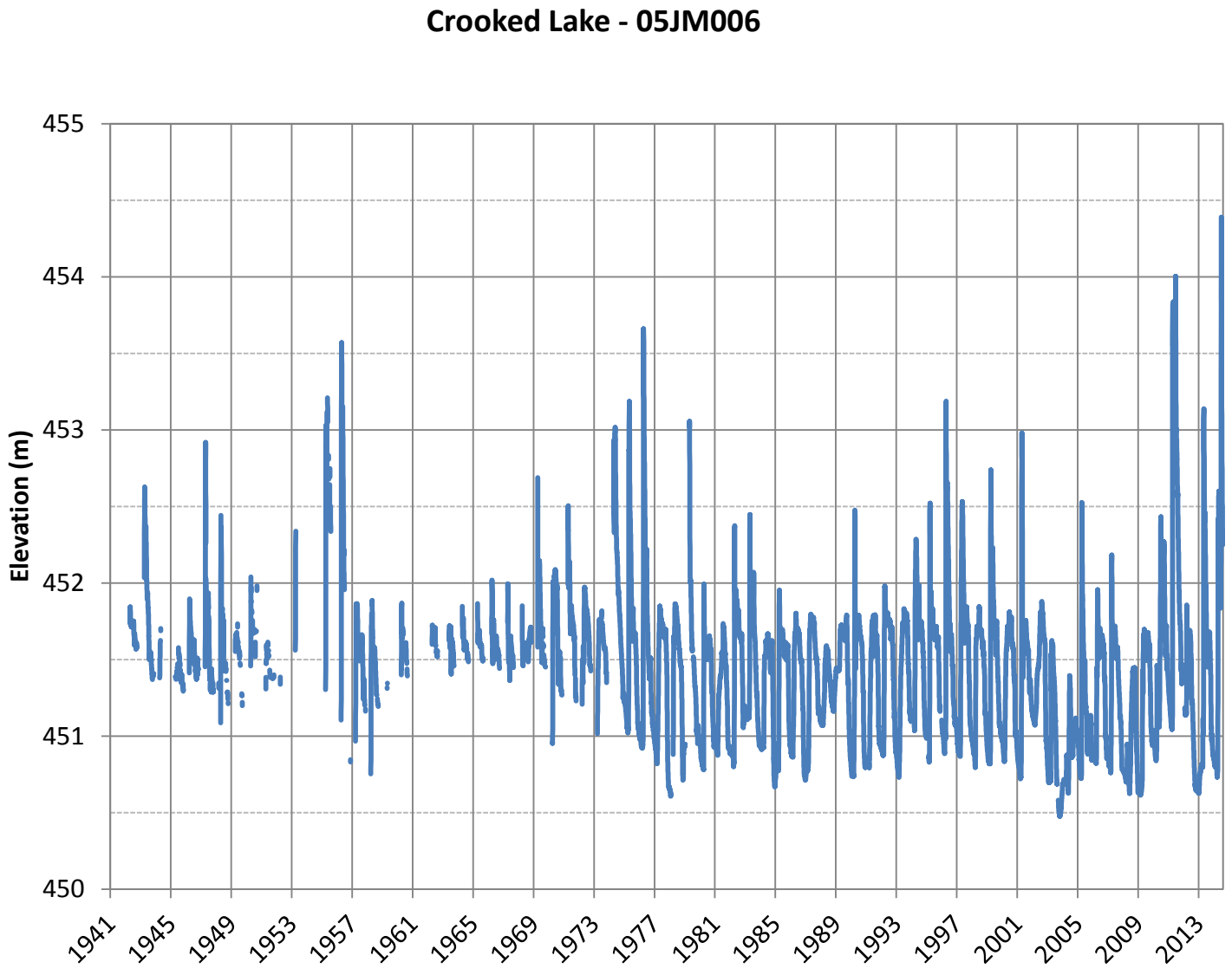
NOTES:

1. If very low runoff expected stoplogs are placed earlier in spring so lakes can try to attain desirable summer lake levels.

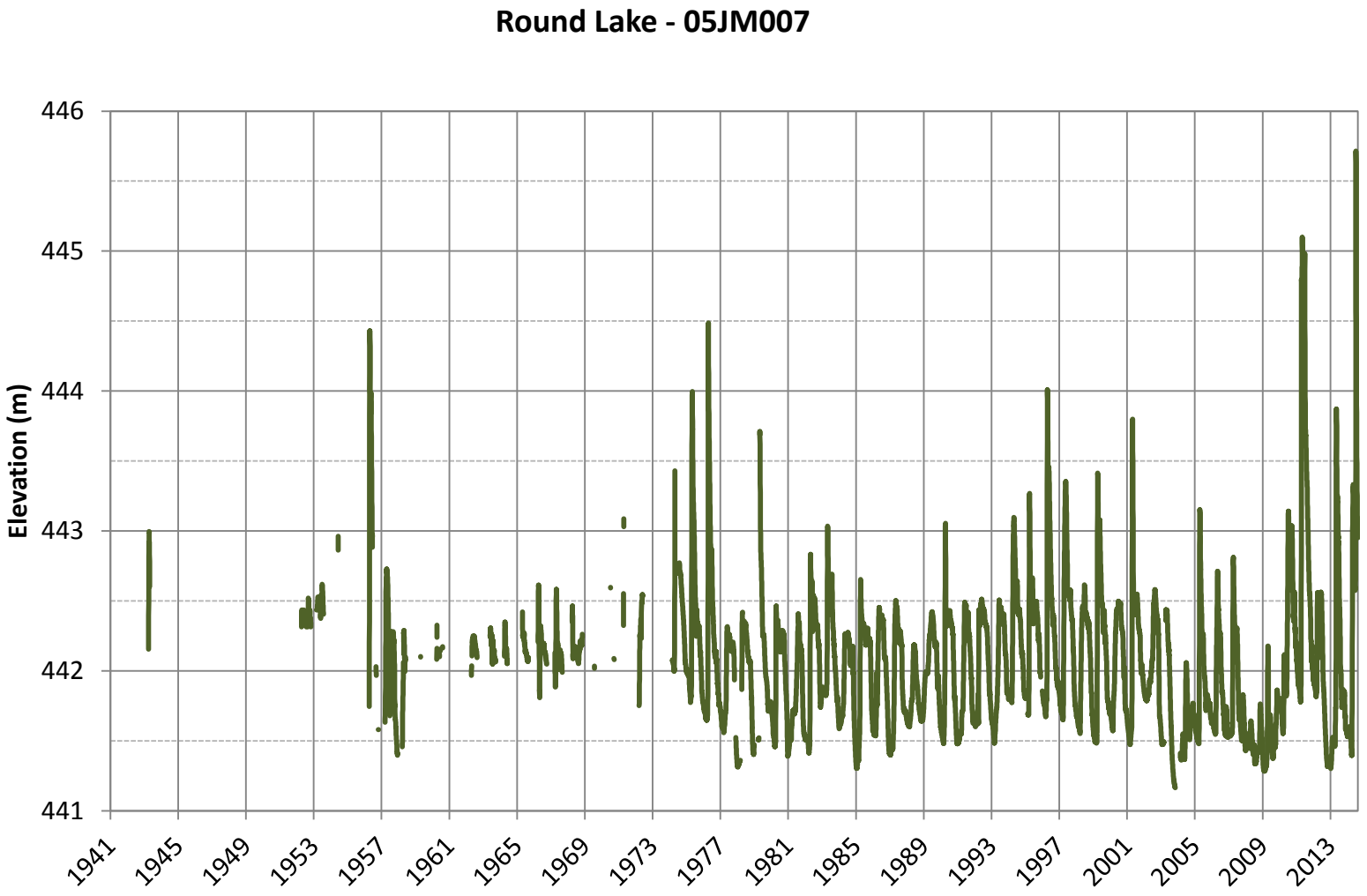
2. In the case of high spring runoff flows, stoplog placement is delayed as this higher volume of water requires more time to work its way through the system.

TYPICAL ANNUAL OPERATION SCENARIO
STOPLOG WATER CONTROL STRUCTURE - QU'APPELLE LAKES SYSTEM

Lakes- Historical

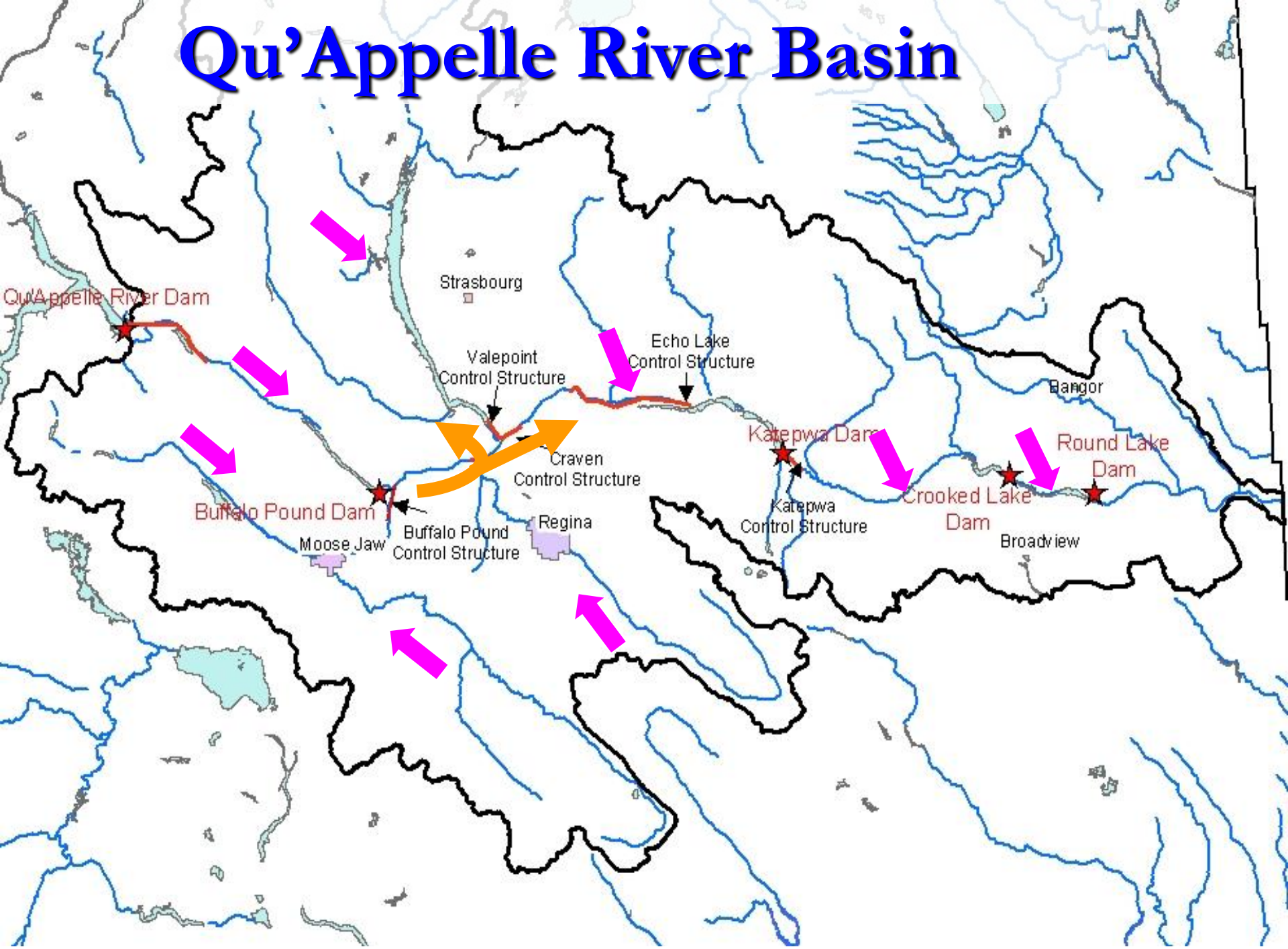


Lakes- Historical

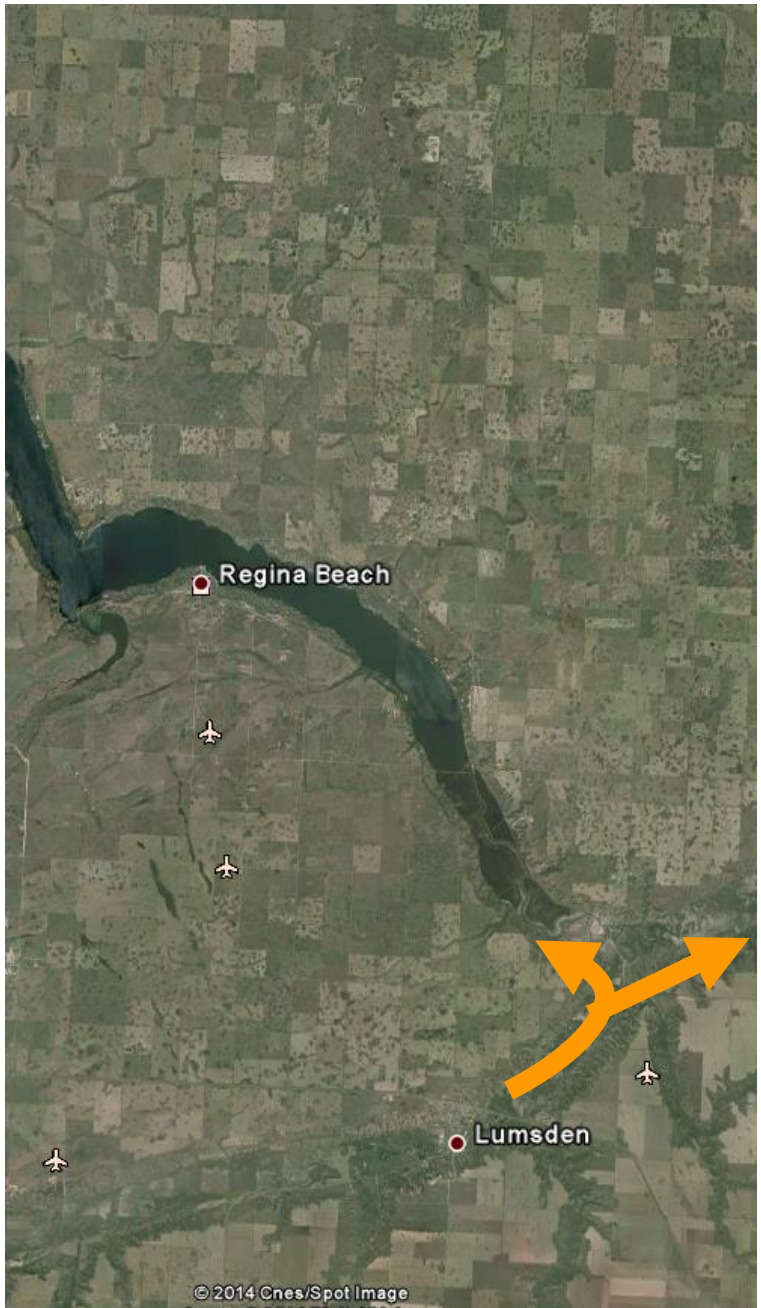


Qu’Appelle System Response (High Flow)

Qu'Appelle River Basin



Last Mountain Lake - Flood Peak Mitigation

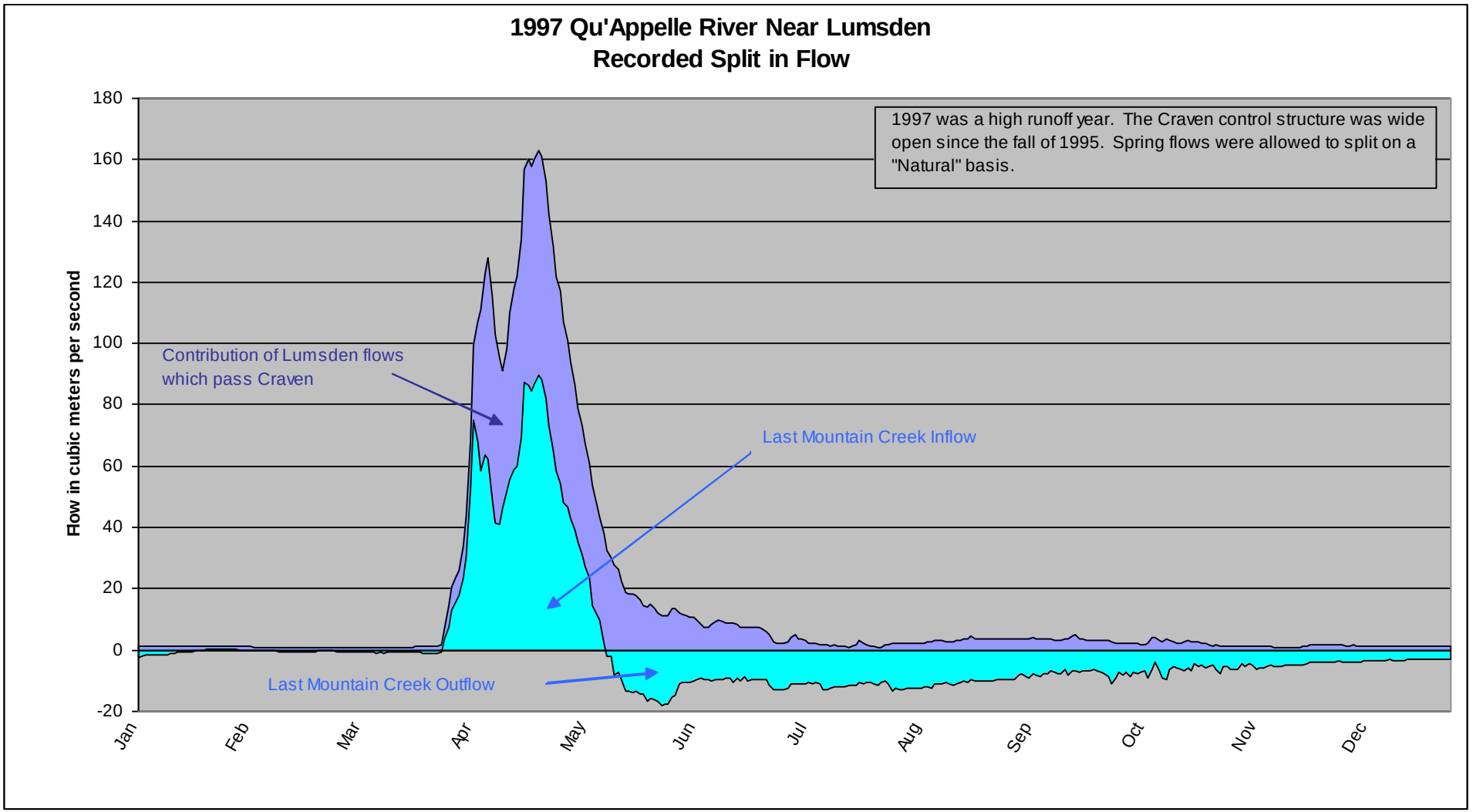


When River > Lake:

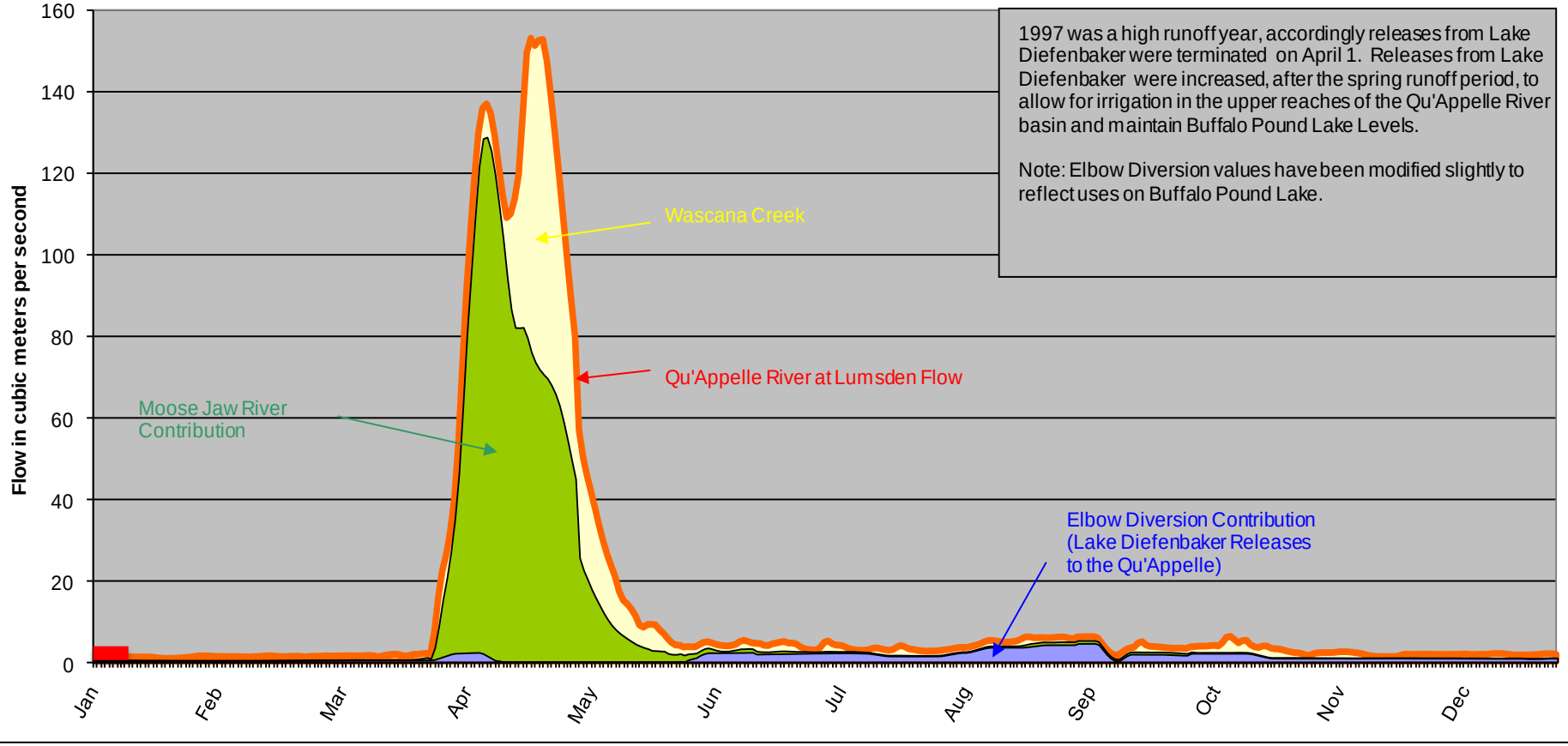
- River flow splits into lake
- Reduction peak D/S of Craven
- Can store > ½ of volume from U/S Lumsden
- Stored volume comes out over summer and fall

When Lake > River:

- Flow from U/S of Lumsden not reduced
- Outflow from Lake back into River
- Fishing Lakes - small flood storage
- Round and Crooked Lakes - even less

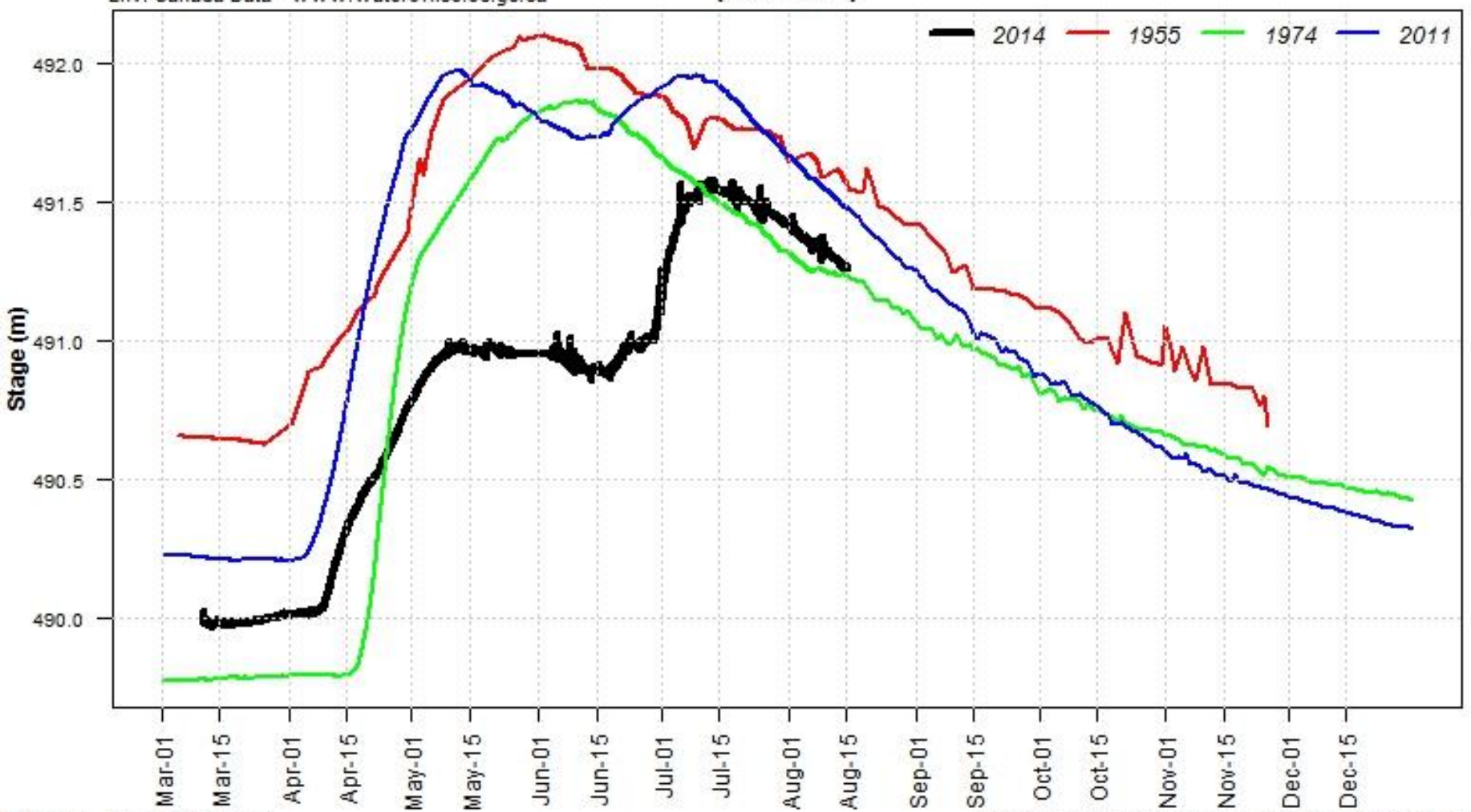

1997 Qu'Appelle River Near Lumsden
Recorded Split in Flow
1997 was a high runoff year. The Craven control structure was wide open since the fall of 1995. Spring flows were allowed to split on a "Natural" basis.
Flow in cubic meters per second
180
160
140
120
100
80
60
40
20
0
-20
Contribution of Lumsden flows which pass Craven
Last Mountain Creek Inflow
Last Mountain Creek Outflow
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

1997 Modelled Qu'Appelle River Near Lumsden
Accumulated Flow Contributions



LAST MOUNTAIN LAKE
(05JH004)

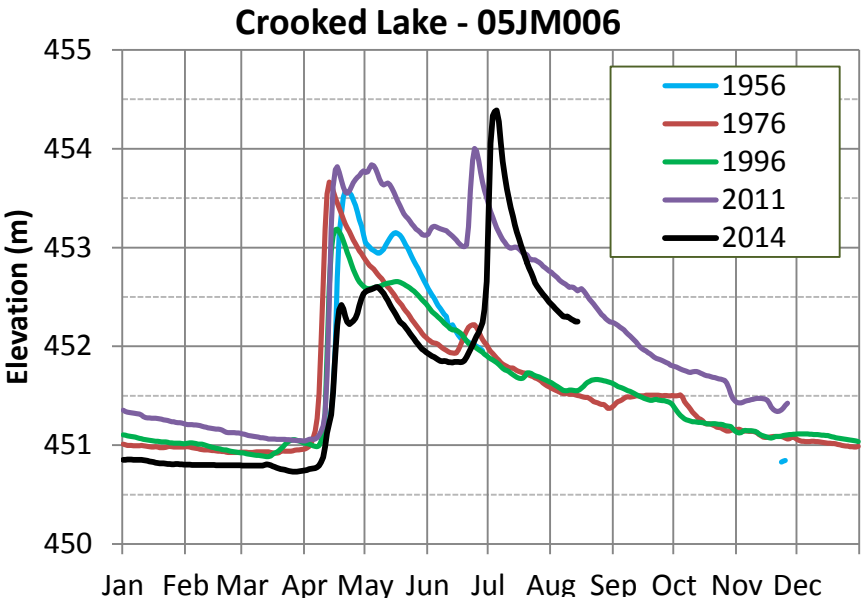
Env. Canada Data - www.wateroffice.ec.gc.ca

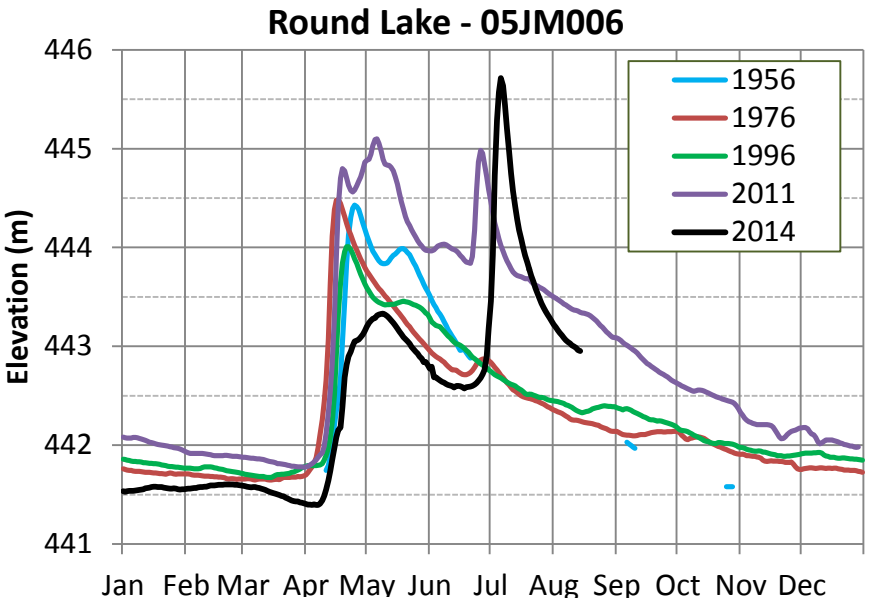


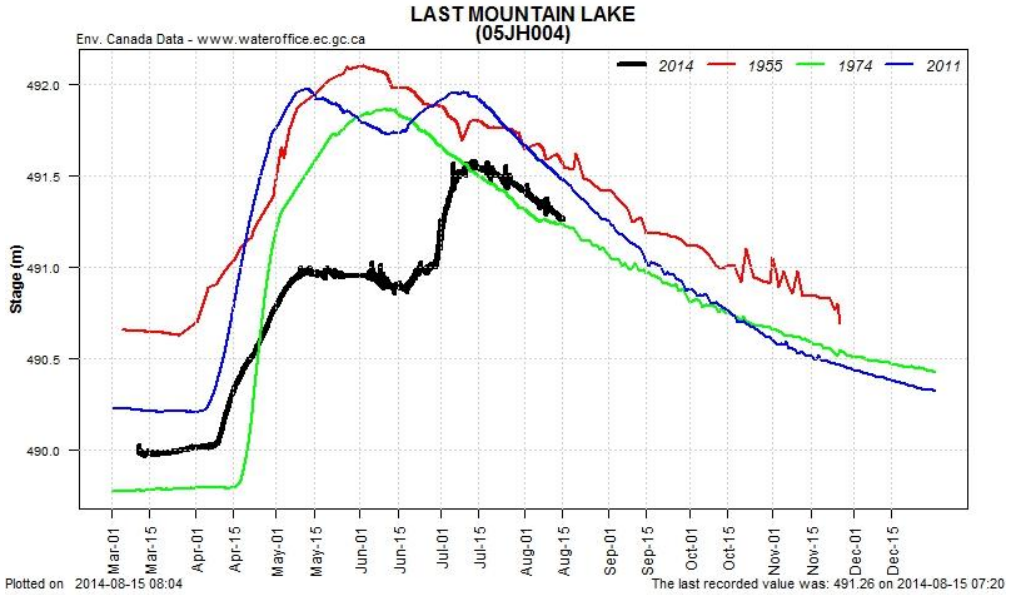
Plotted on 2014-08-15 08:04

The last recorded value was: 491.26 on 2014-08-15 07:20

Lakes- Maximums

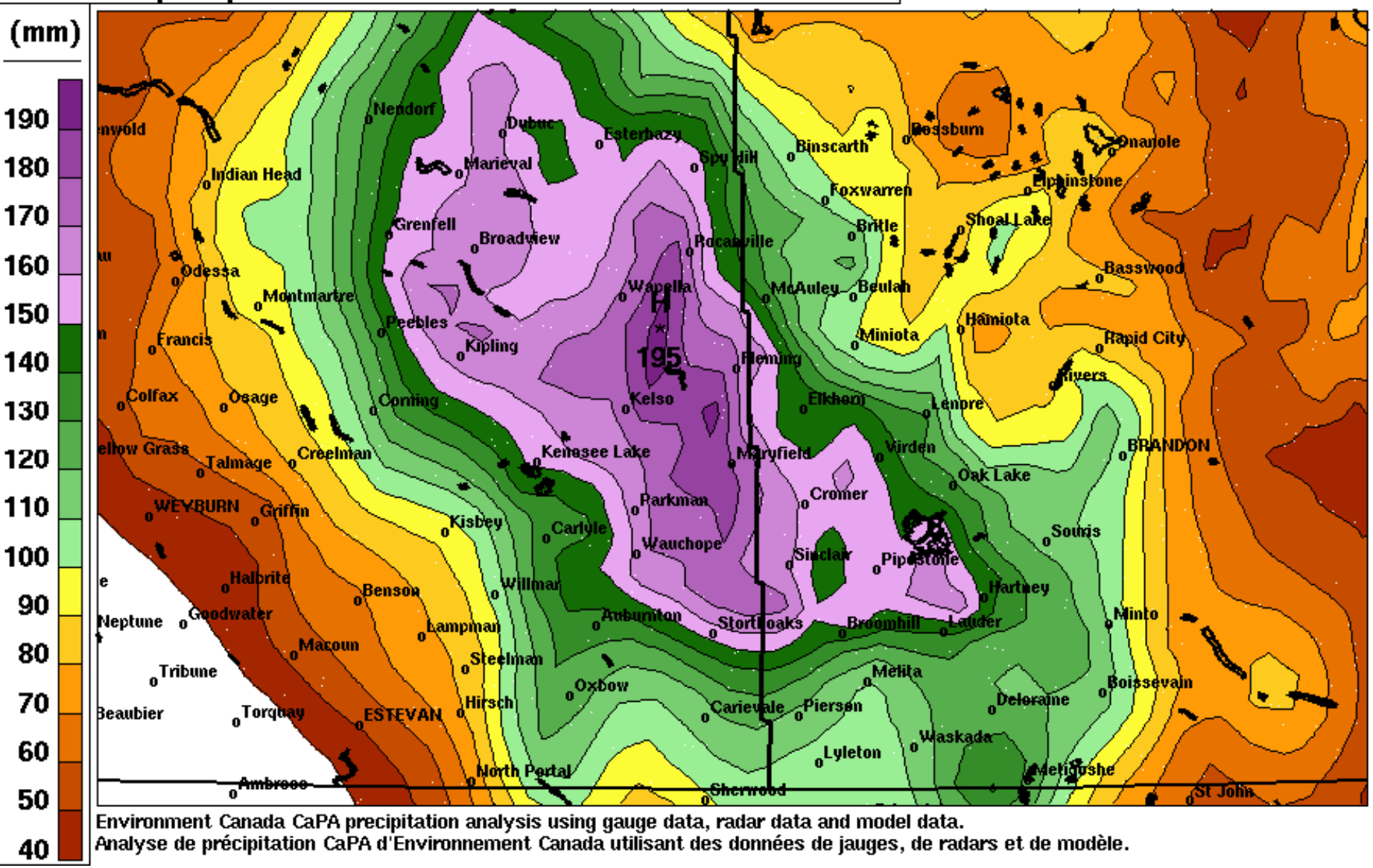






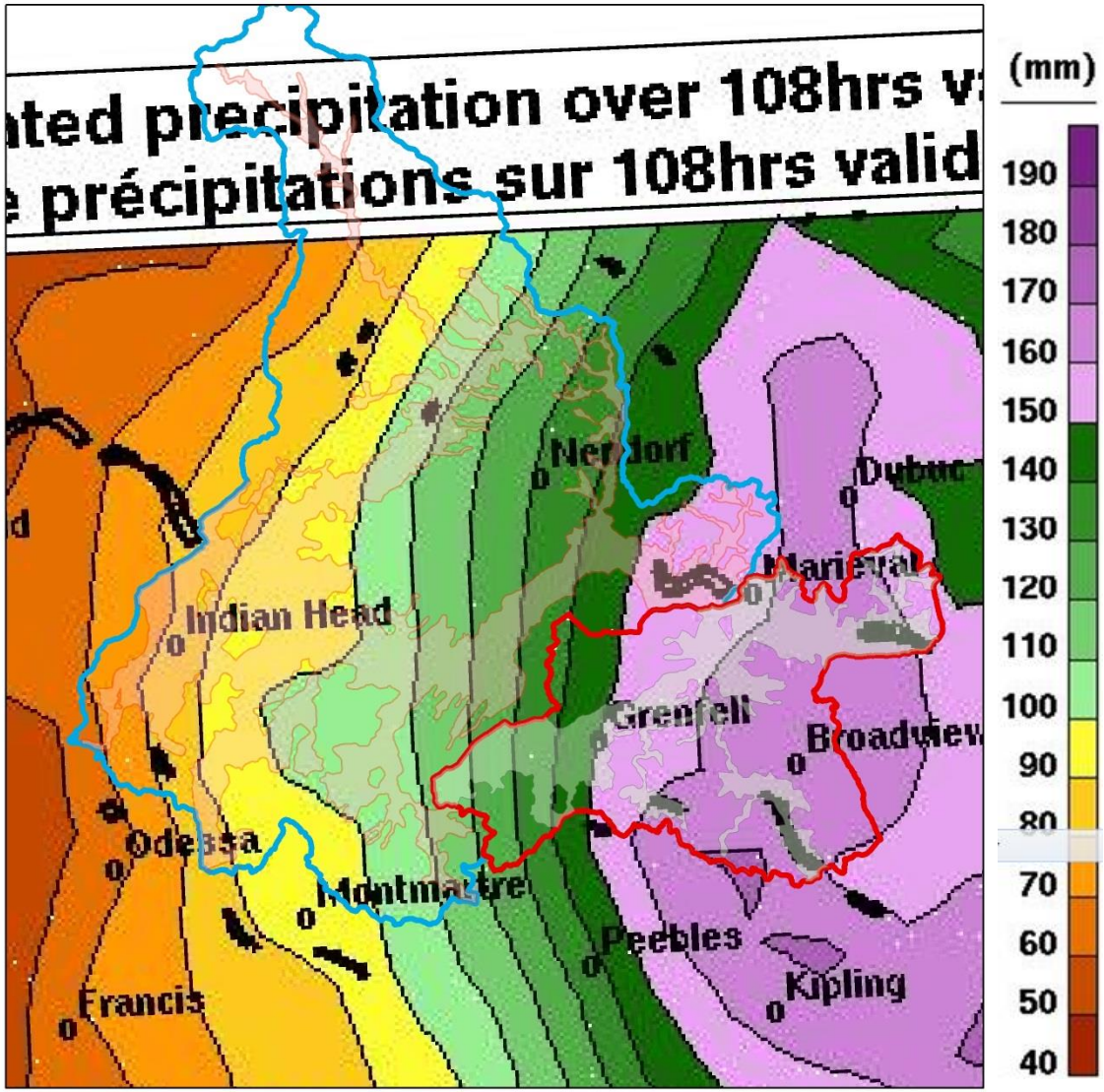
Accumulated precipitation over 108hrs valid at 2014-07-01 12UT
Cumul de précipitations sur 108hrs valide à 2014-07-01 12TU

Environnement Canada | Environment Canada



Environment Canada CaPA precipitation analysis using gauge data, radar data and model data.
Analyse de précipitation CaPA d'Environnement Canada utilisant des données de jauges, de radars et de modèle.

Drainage Area to Crooked and Round Lake

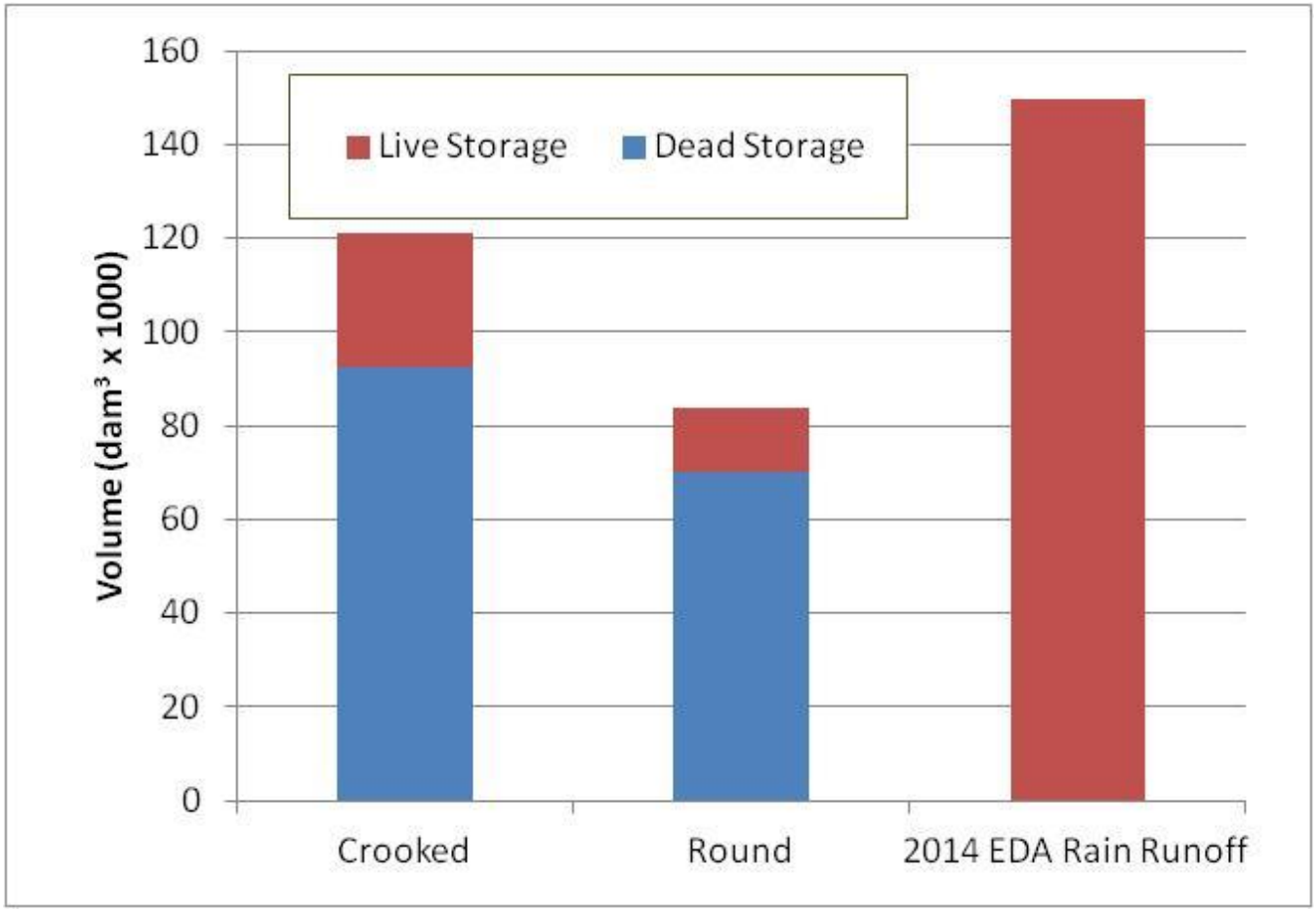


Crooked Lake
Gross Drainage Area = 4571 km^2
Effective Drainage Area= 1578 km^2

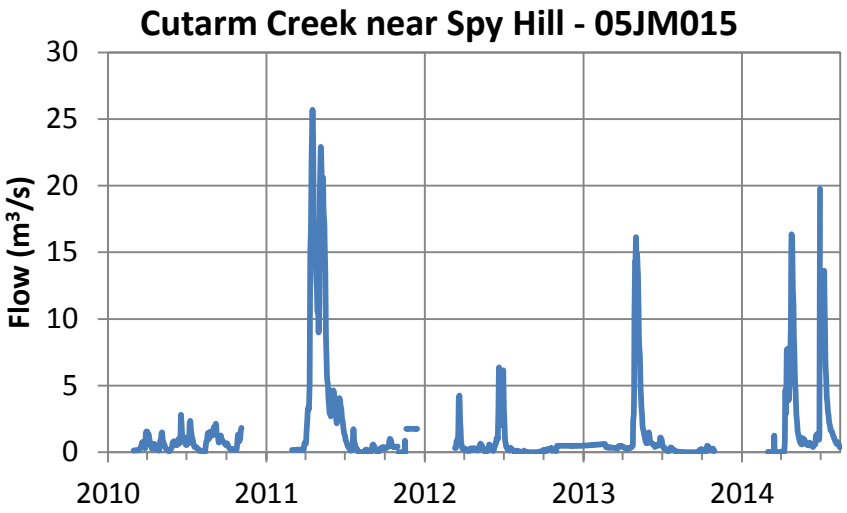
Round Lake
Gross Drainage Area= 1461 km^2
Effective Drainage Area= 593 km^2

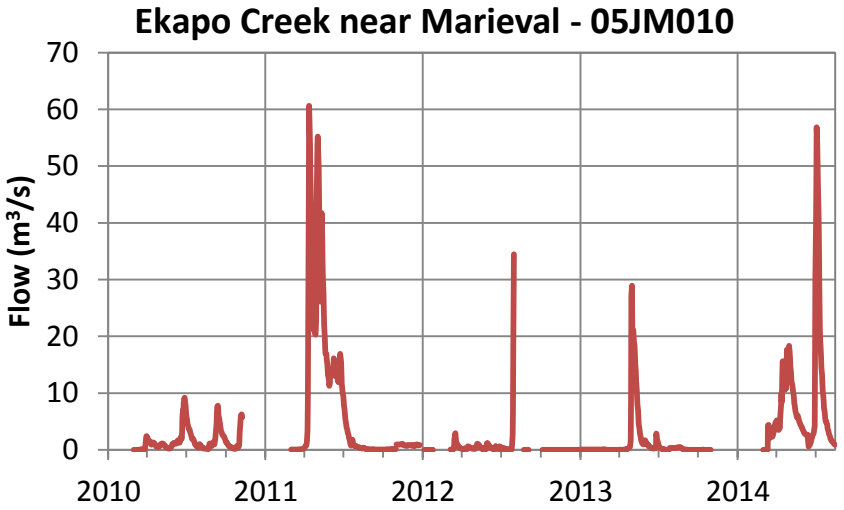
Legend

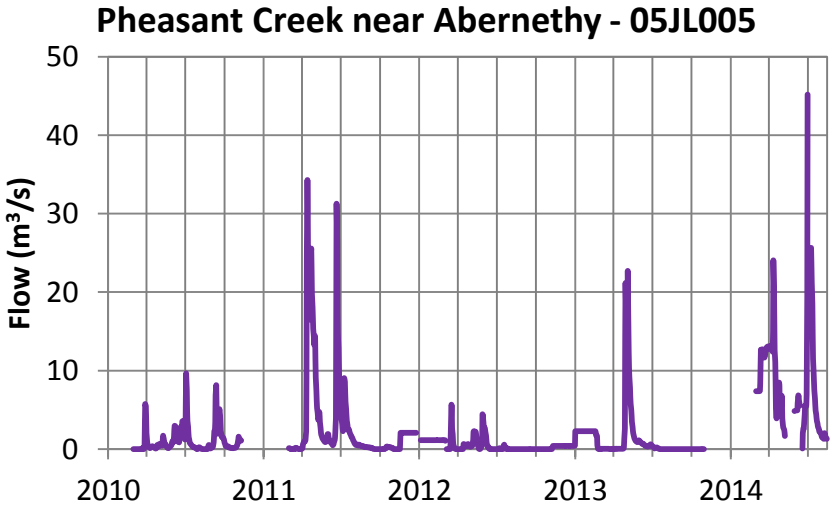
- Crooked Lake-Effective Drainage Area
- Crooked Lake-Gross Drainage Area
- Round Lake-Gross Drainage Area
- Round Lake-Effective Drainage Area

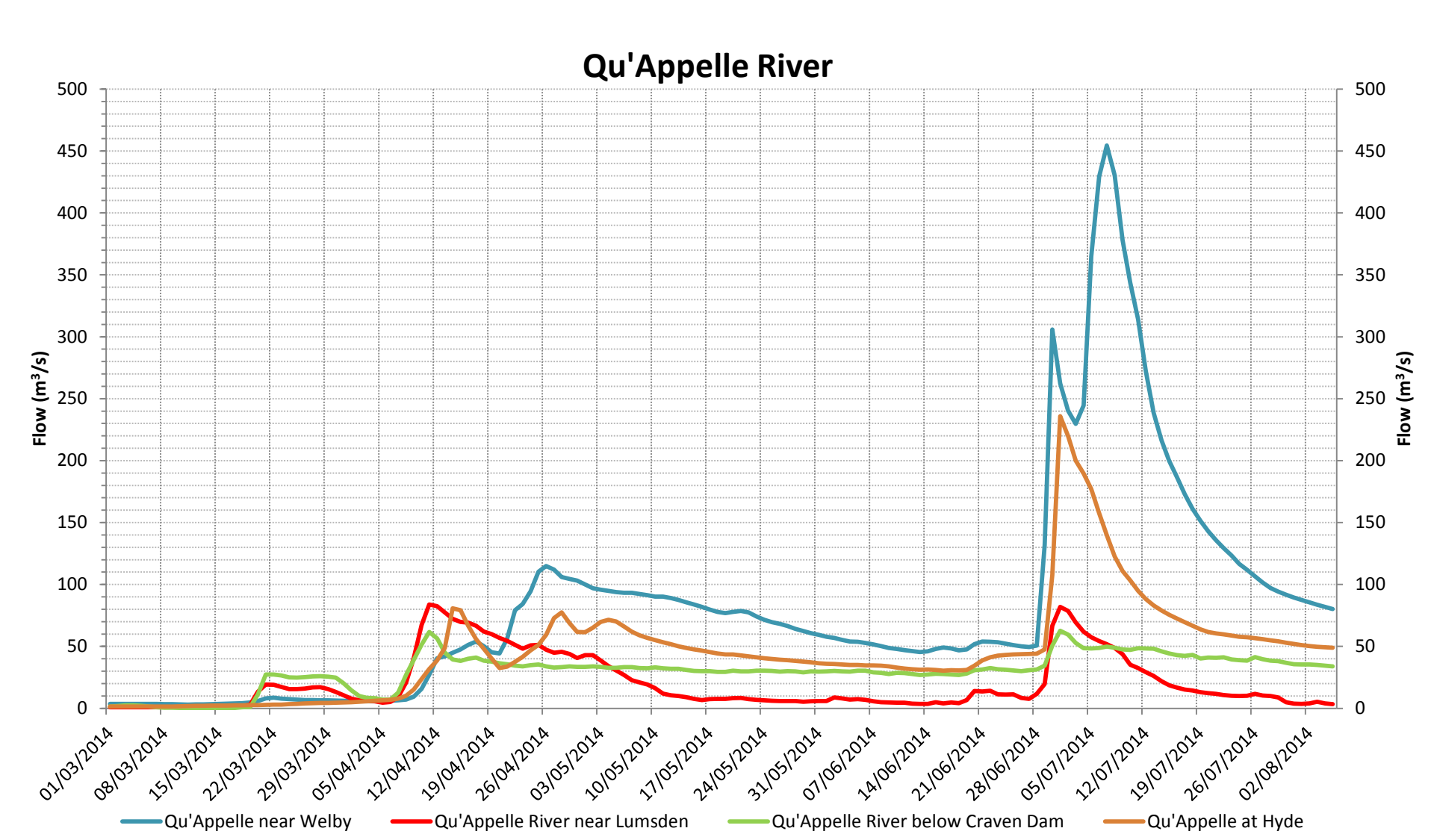

160
140
120
100
80
60
40
20
0
Volume (dam³ x 1000)
Live Storage
Dead Storage
Crooked
Round
2014 EDA Rain Runoff

Local Inflows - Recent

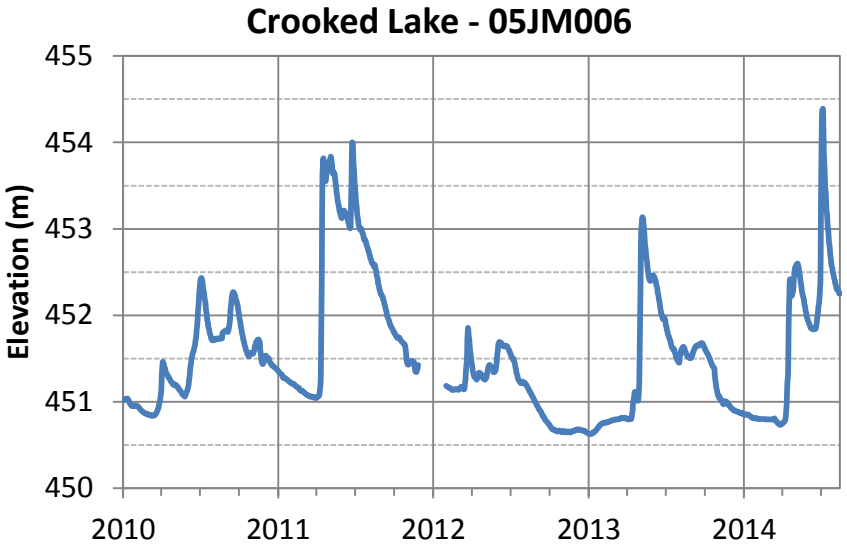


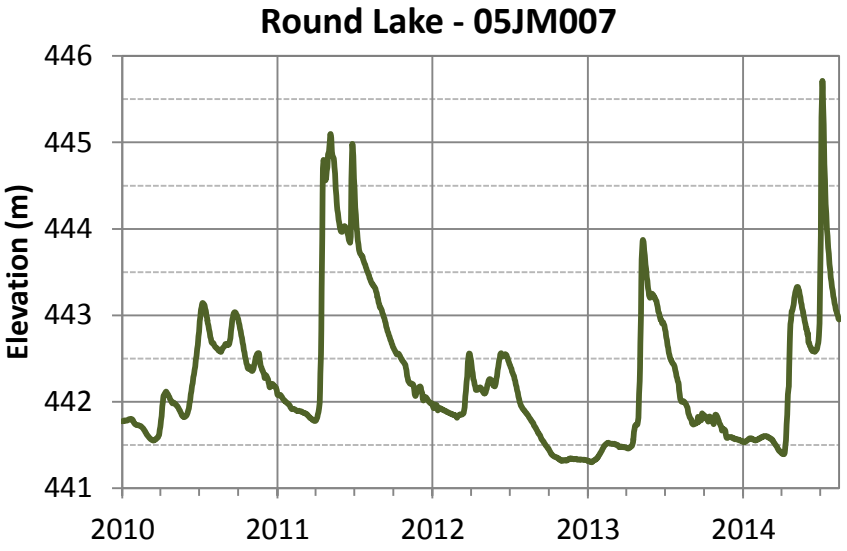


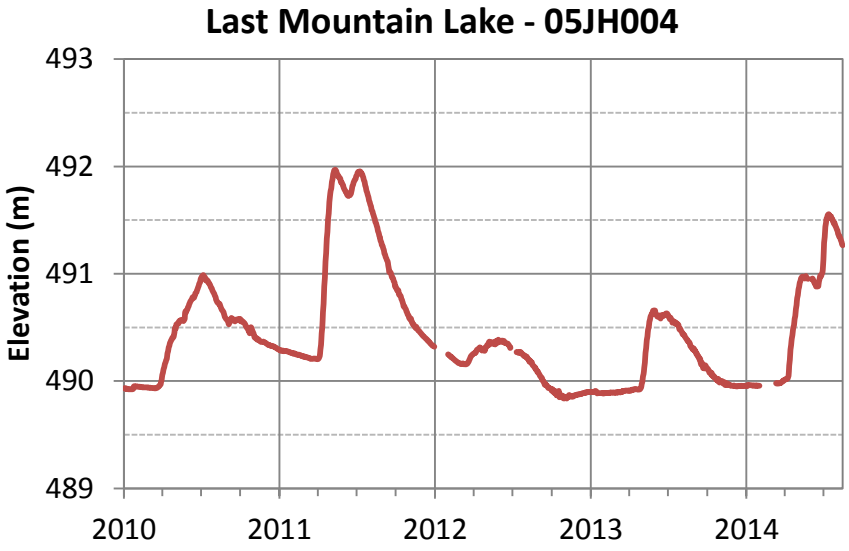


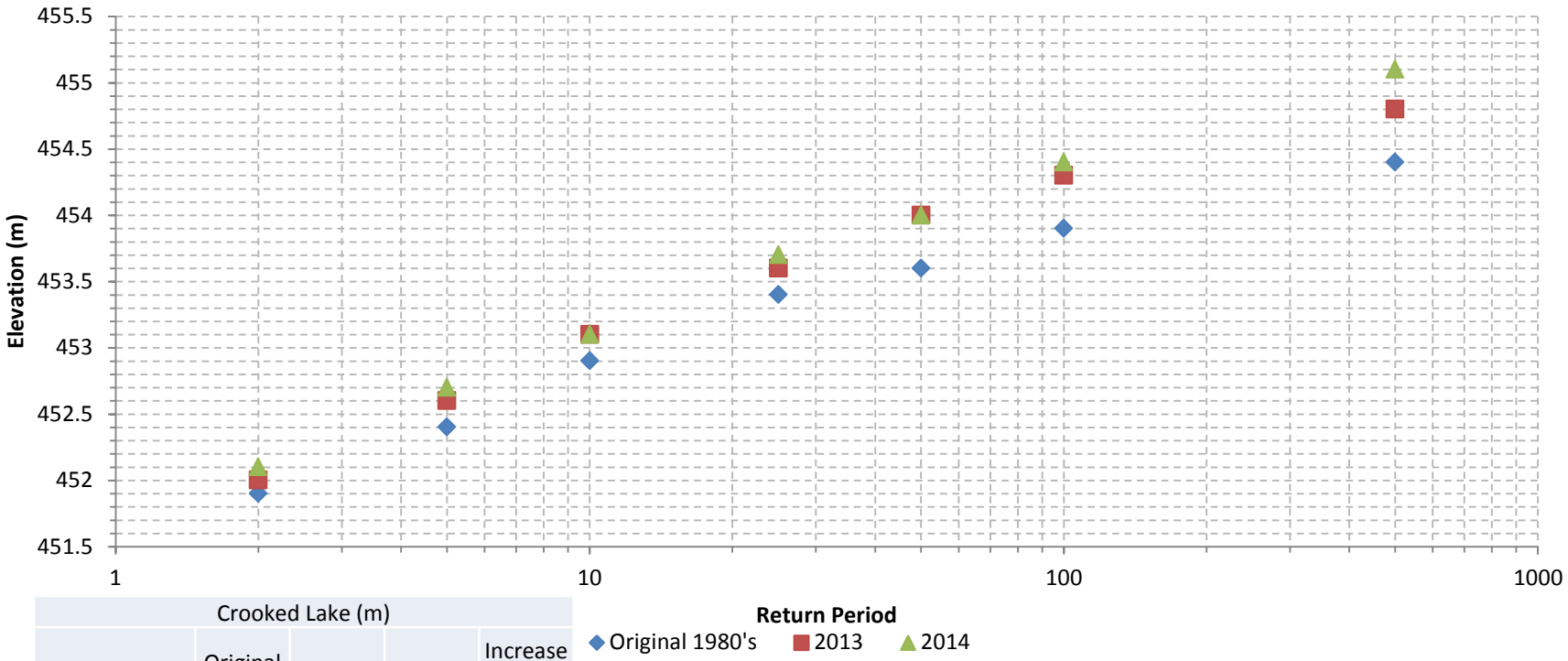

Qu'Appelle River
Flow (m³/s)
500
450
400
350
300
250
200
150
100
50
0
01/03/2014
08/03/2014
15/03/2014
22/03/2014
29/03/2014
05/04/2014
12/04/2014
19/04/2014
26/04/2014
03/05/2014
10/05/2014
17/05/2014
24/05/2014
31/05/2014
07/06/2014
14/06/2014
21/06/2014
28/06/2014
05/07/2014
12/07/2014
19/07/2014
26/07/2014
02/08/2014
Qu'Appelle near Welby
Qu'Appelle River near Lumsden
Qu'Appelle River below Craven Dam
Qu'Appelle at Hyde

Lakes- Recent









Crooked Lake (m)				
Return Period	Original 1980's	2013	2014	Increase from original
F2	451.9	452	452.1	0.2
F5	452.4	452.6	452.7	0.3
F10	452.9	453.1	453.1	0.2
F25	453.4	453.6	453.7	0.3
F50	453.6	454	454	0.4
F100	**453.9**	**454.3**	**454.4**	**0.5**
F500	**454.4**	**454.8**	**455.1**	**0.7**

Peak Water Levels	
Year	Crooked Lake (m)
2014	454.4
1955	454.4
2011	454
1976	453.7

Round Lake Control Structure

May 17, 1956