

# **Recent Flooding and Flood Mitigation in Manitoba**

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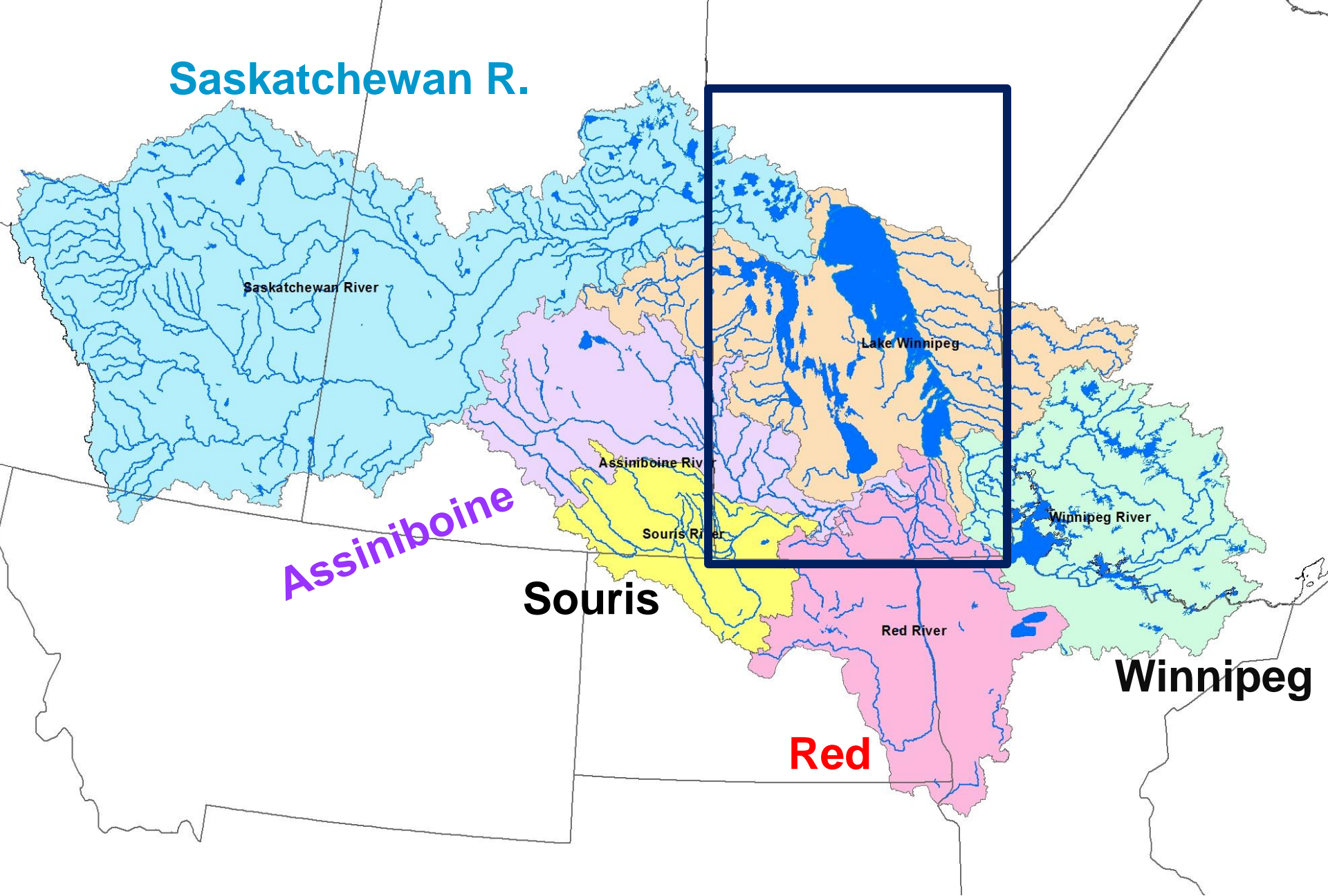
Eugene F. Kozera, P. Eng.

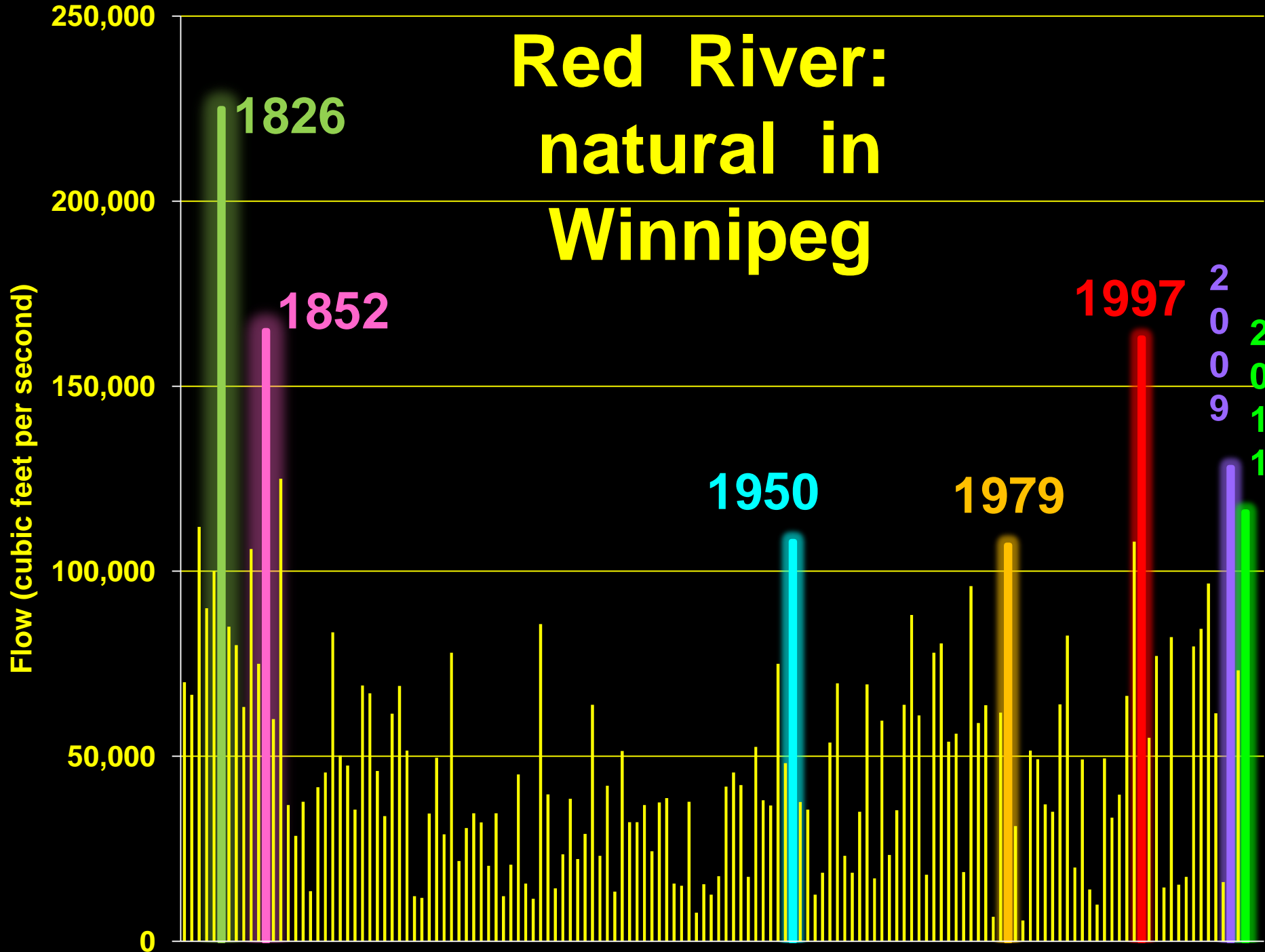
Director, Water Control System  
Management Branch  
Water Stewardship

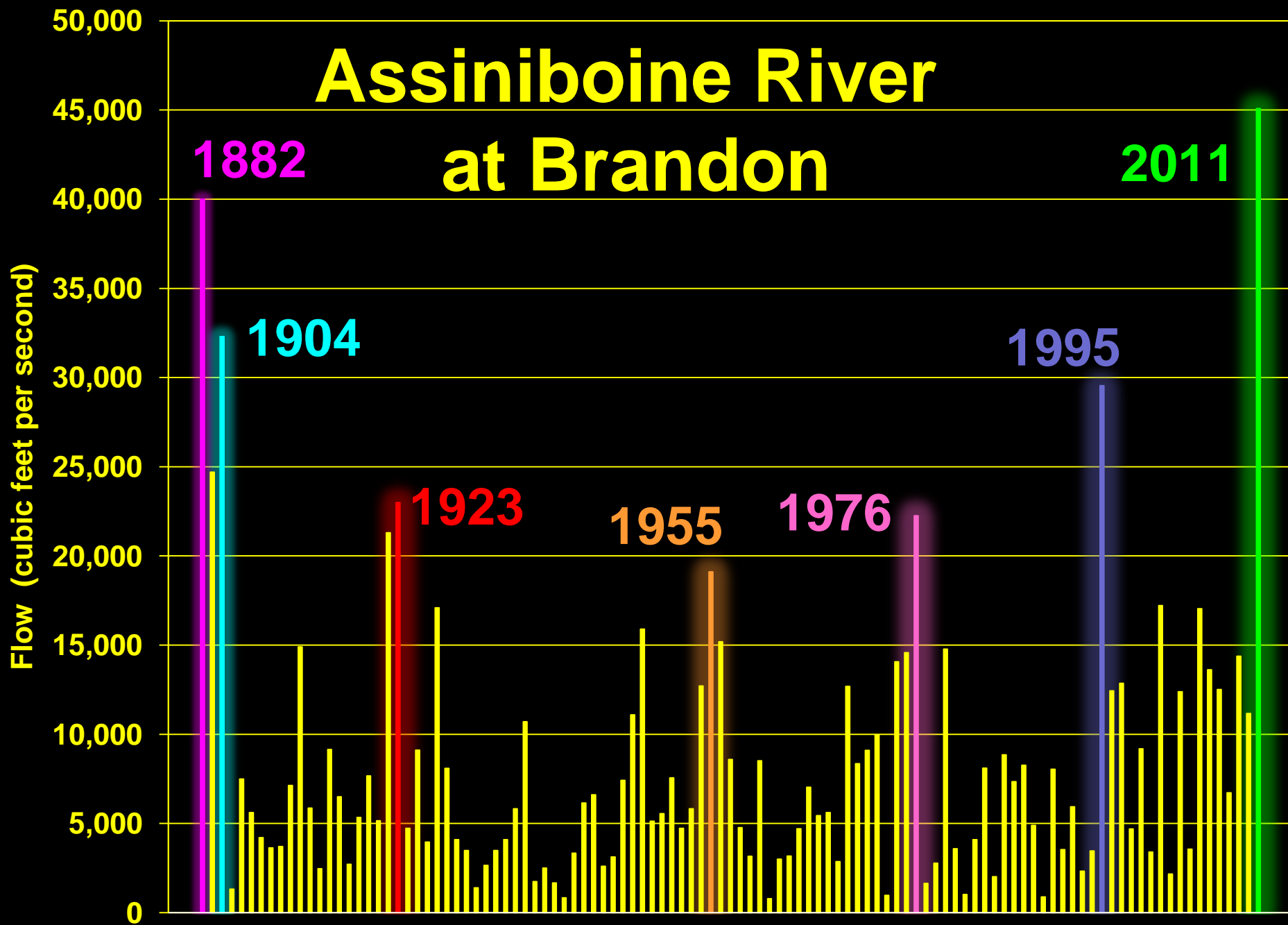
**Manitoba**



**Saskatchewan R.**









# Souris River at Westhope

Flow (cubic feet per second)

30,000

25,000

20,000

15,000

10,000

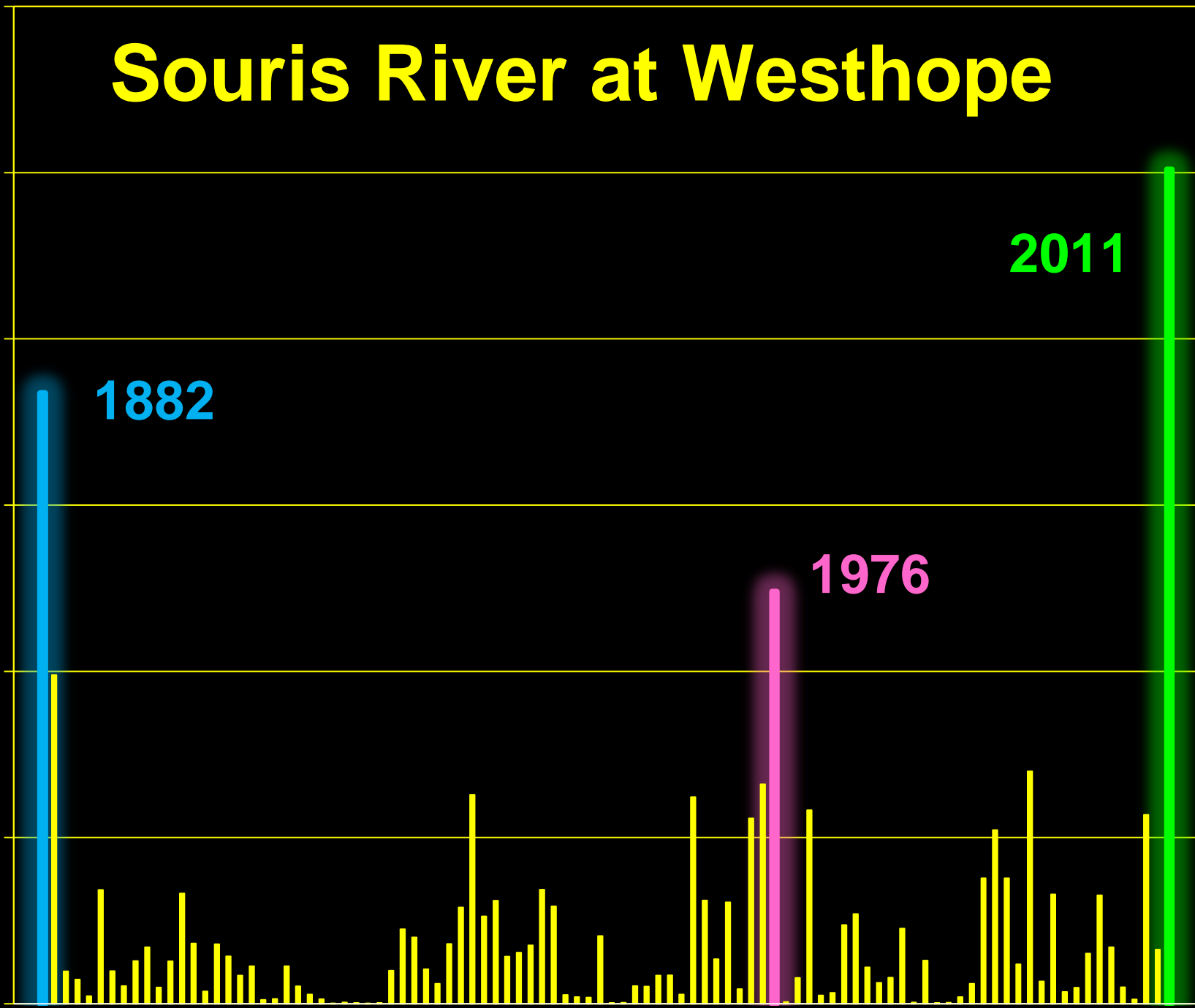
5,000

0

1882

1976

2011



# Assiniboine River dikes east of Portage





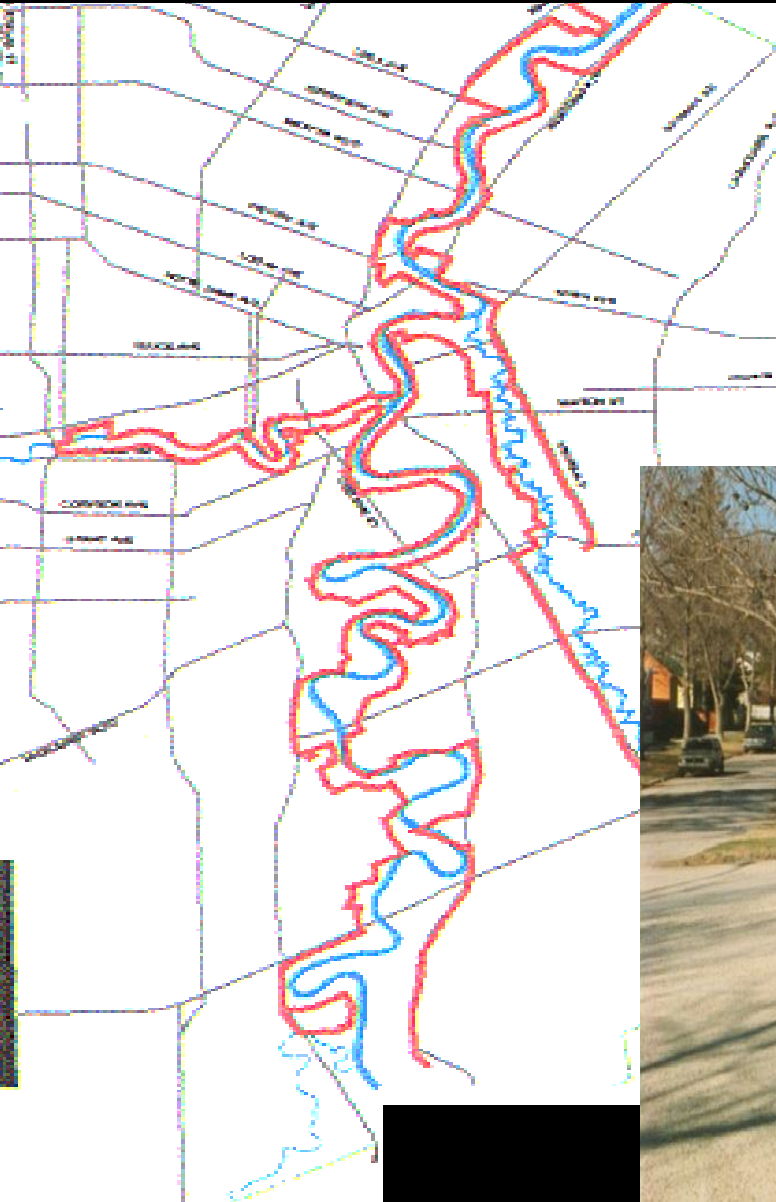
**1950 flood**



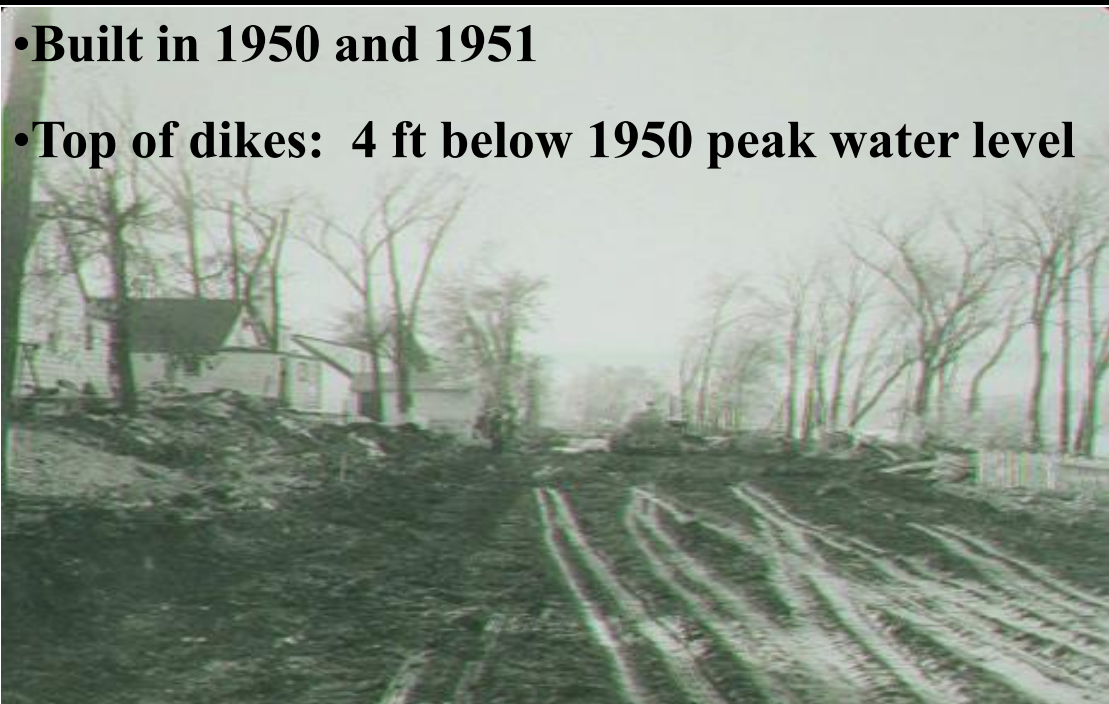
**Damages: over \$700 M**  
**100,000 people evacuated**  
**10,000 homes flooded**



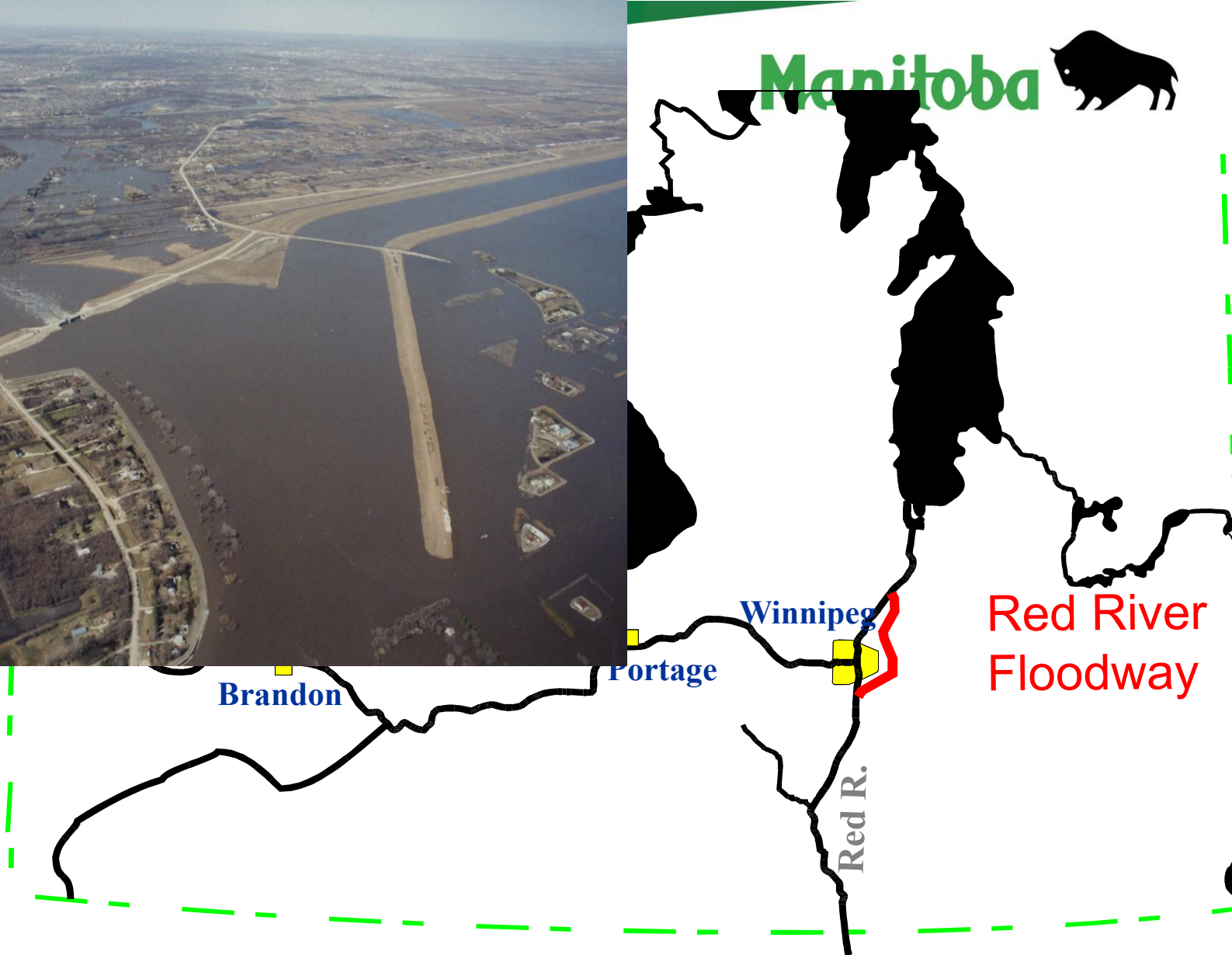
# Winnipeg's Primary Dikes



- Built in 1950 and 1951
- Top of dikes: 4 ft below 1950 peak water level



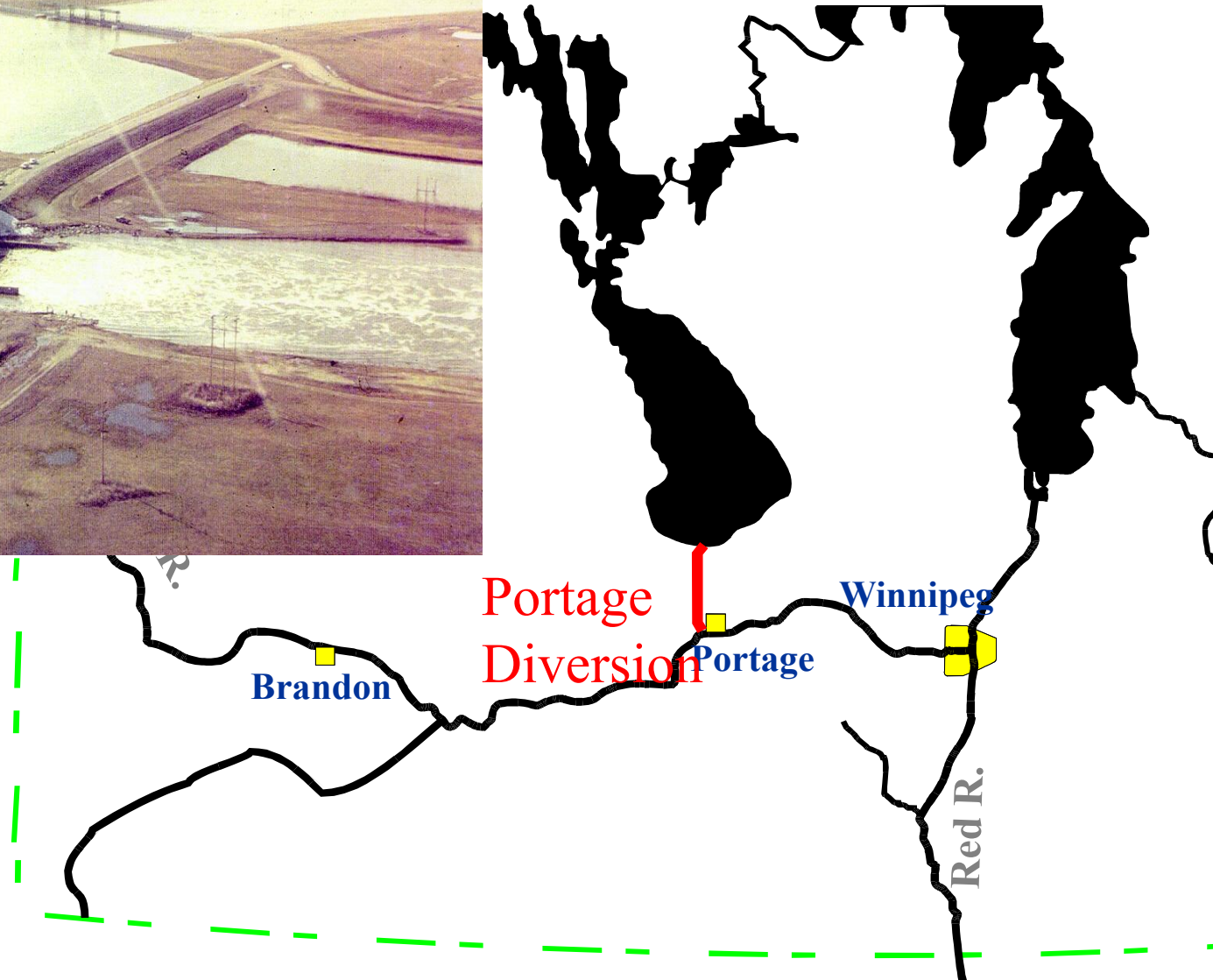
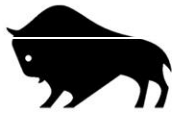
**Cost: \$4.6 million**  
**(Canada, Manitoba, City of Winnipeg)**







Manitoba



Shellmouth  
Dam and  
Reservoir

Assiniboine R.

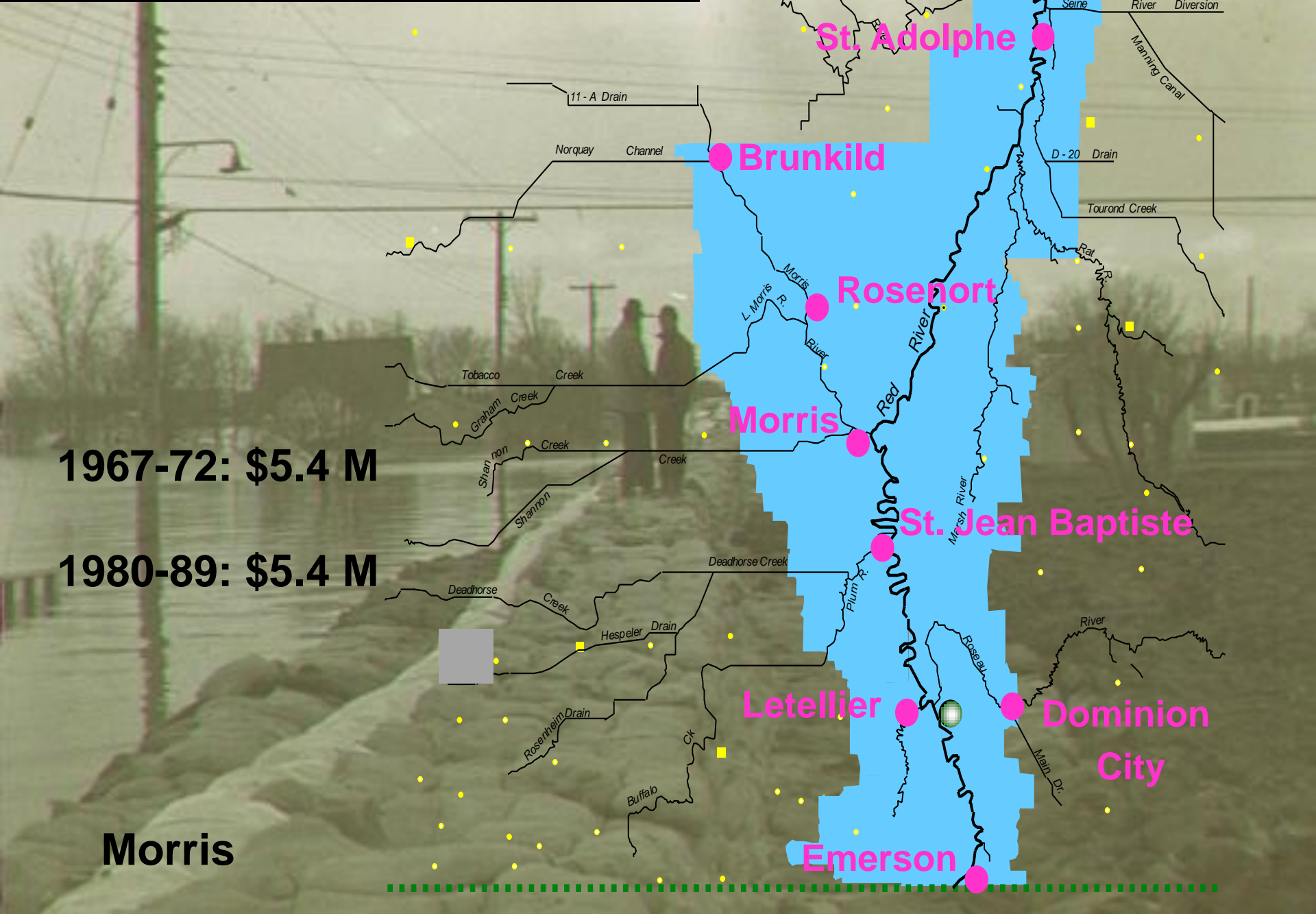
Brandon

Red R.





# 1966 Red River Valley flood



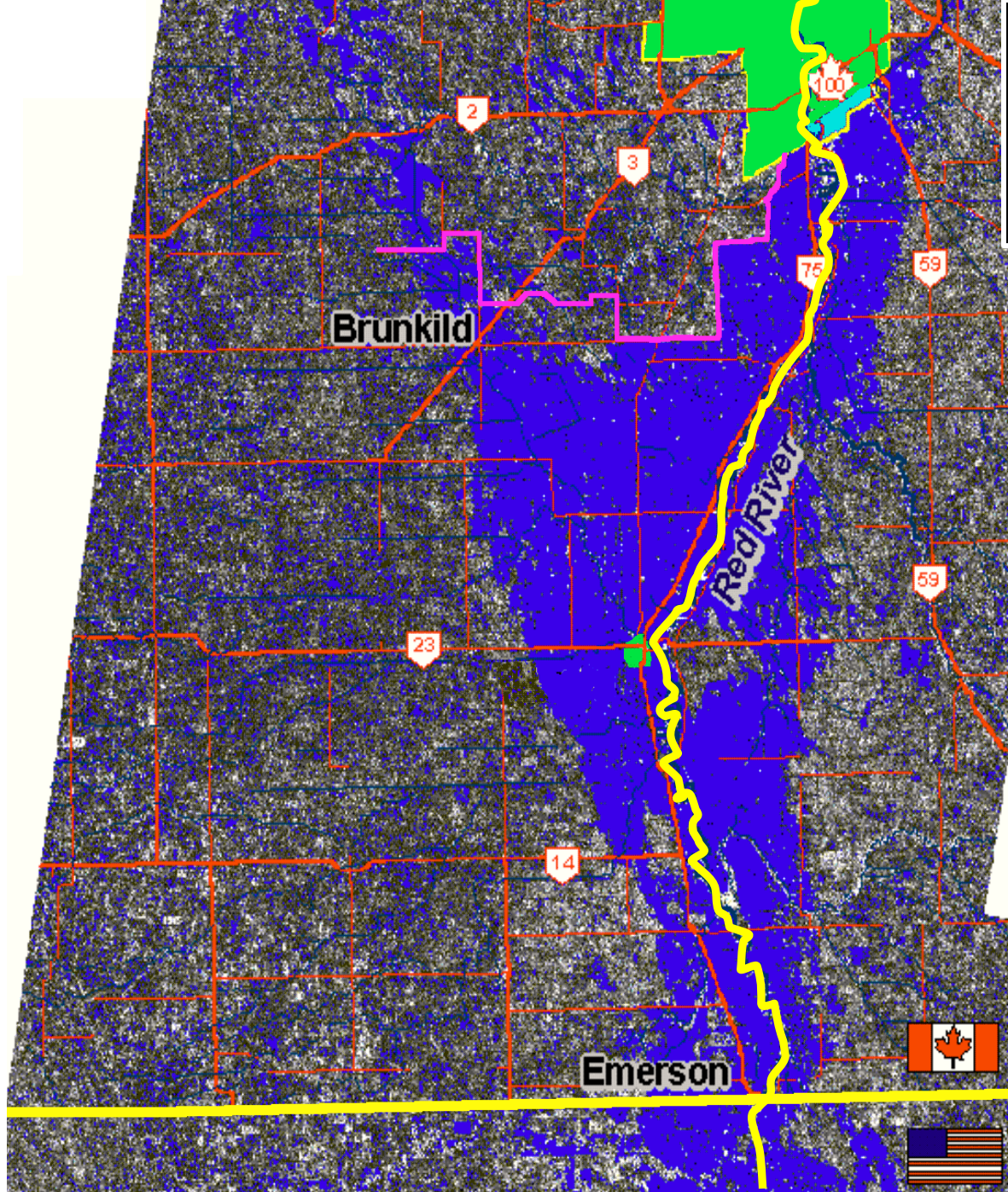
1967-72: \$5.4 M

1980-89: \$5.4 M

Morris



# 1997 Red River Valley flood







**Morris**







**Flood preparation, fighting,  
damages: \$500 M**

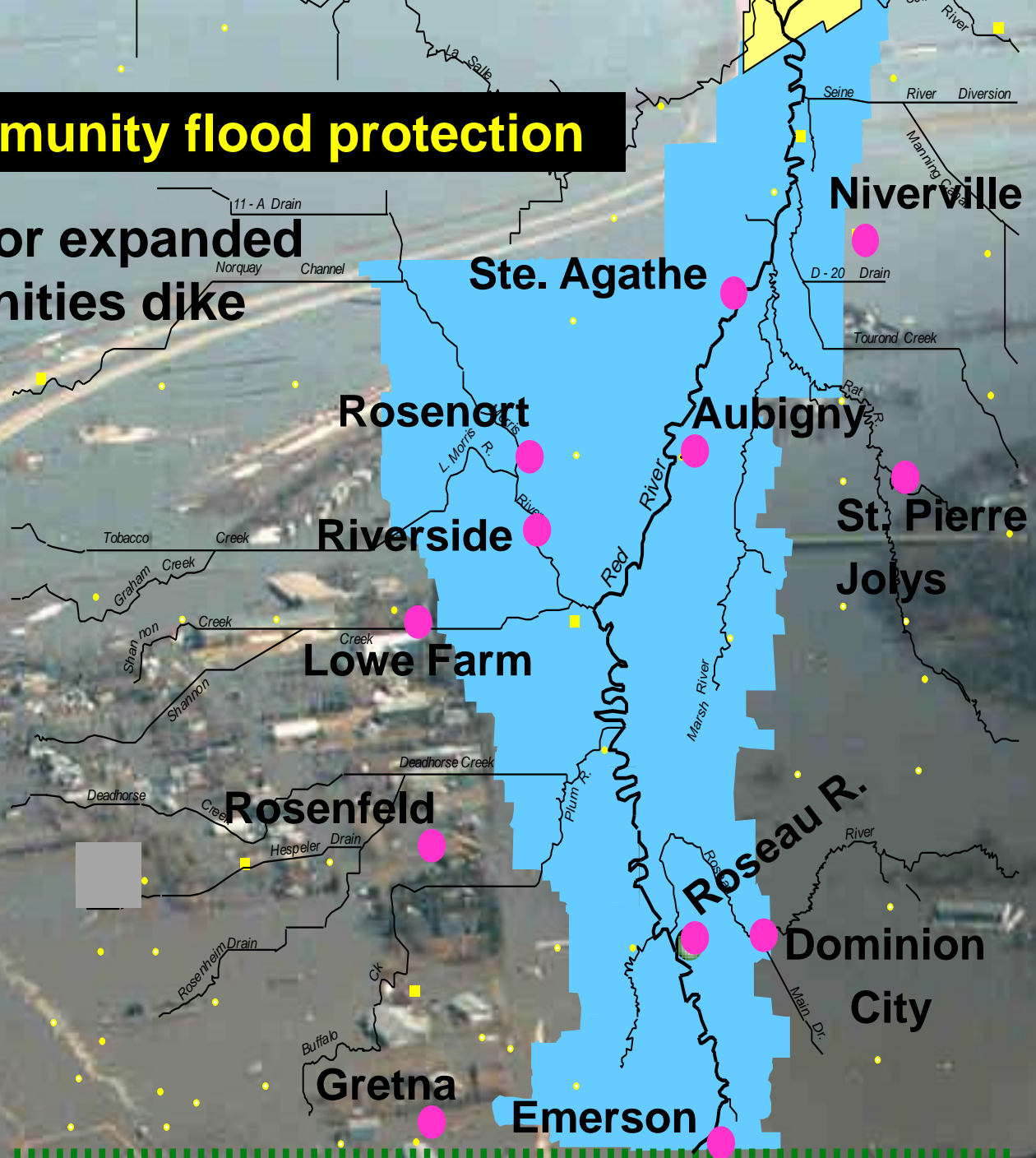
**Ste. Agathe**

**Evacuations: 28,000 people**

# Community flood protection

14 new or expanded  
communities dike

\$35.5 M





**Raising**



**Diking**



**Individual flood protection:  
1,750 structures; \$59 M**

**Retaining wall**



**Structural dike**



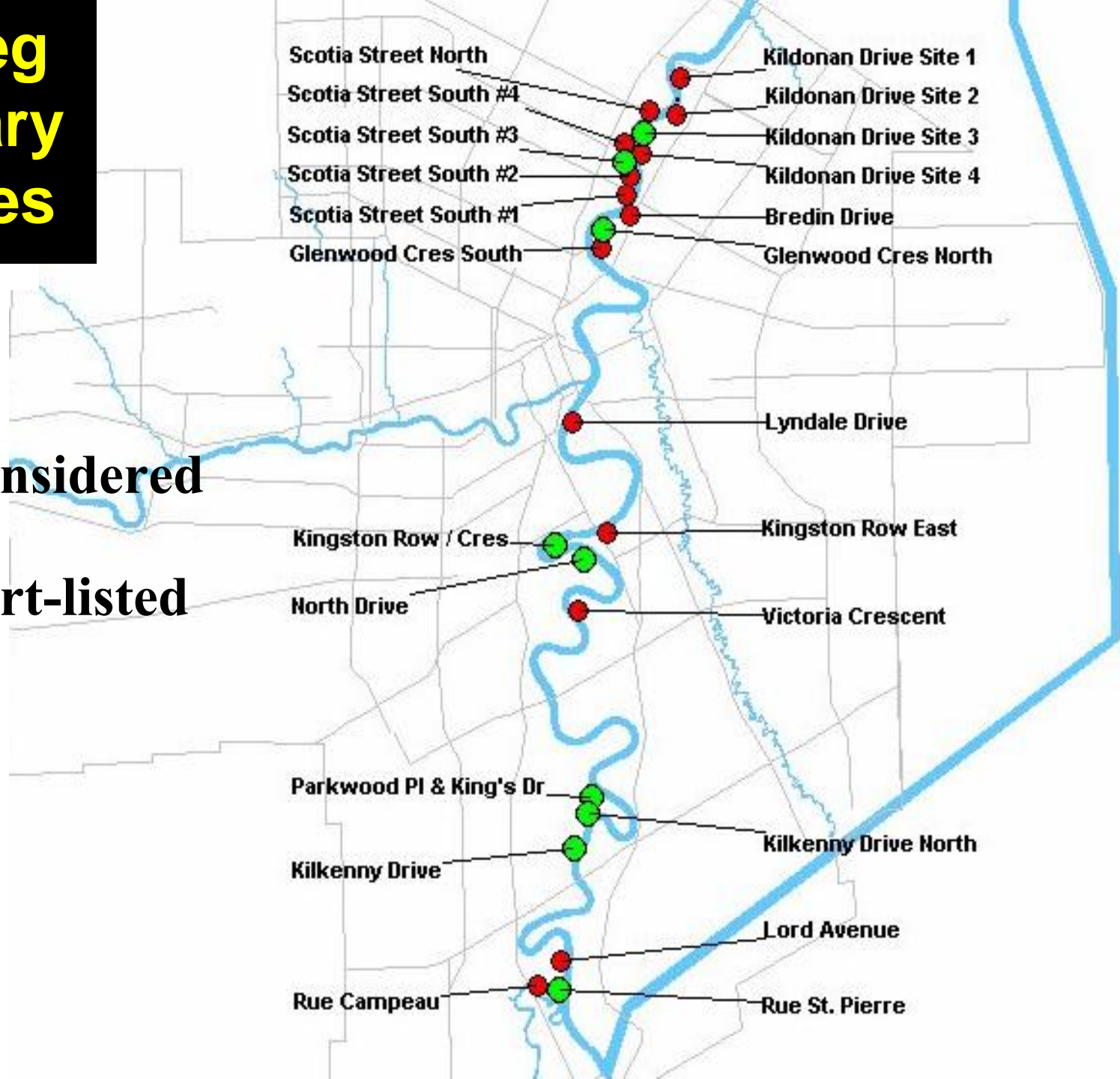


# Winnipeg secondary ring dikes

— 23 sites considered

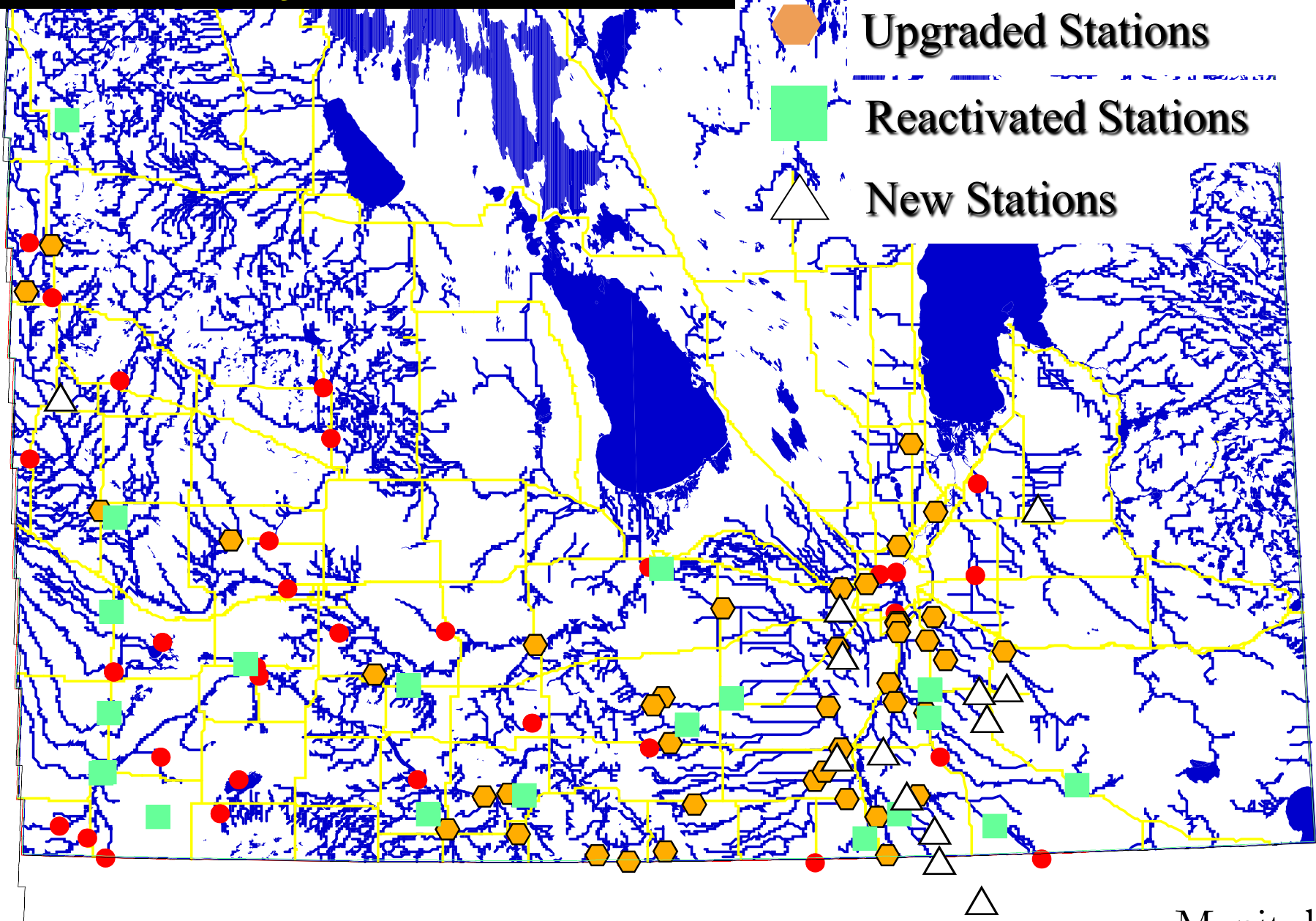
— 9 sites short-listed

— \$10.4 M



# Enhanced hydrometric network

- Existing Stations
- Upgraded Stations
- Reactivated Stations
- New Stations





# Floodway Expansion - Channel



**\$665 M**



# - bridges





# - Inlet control structure



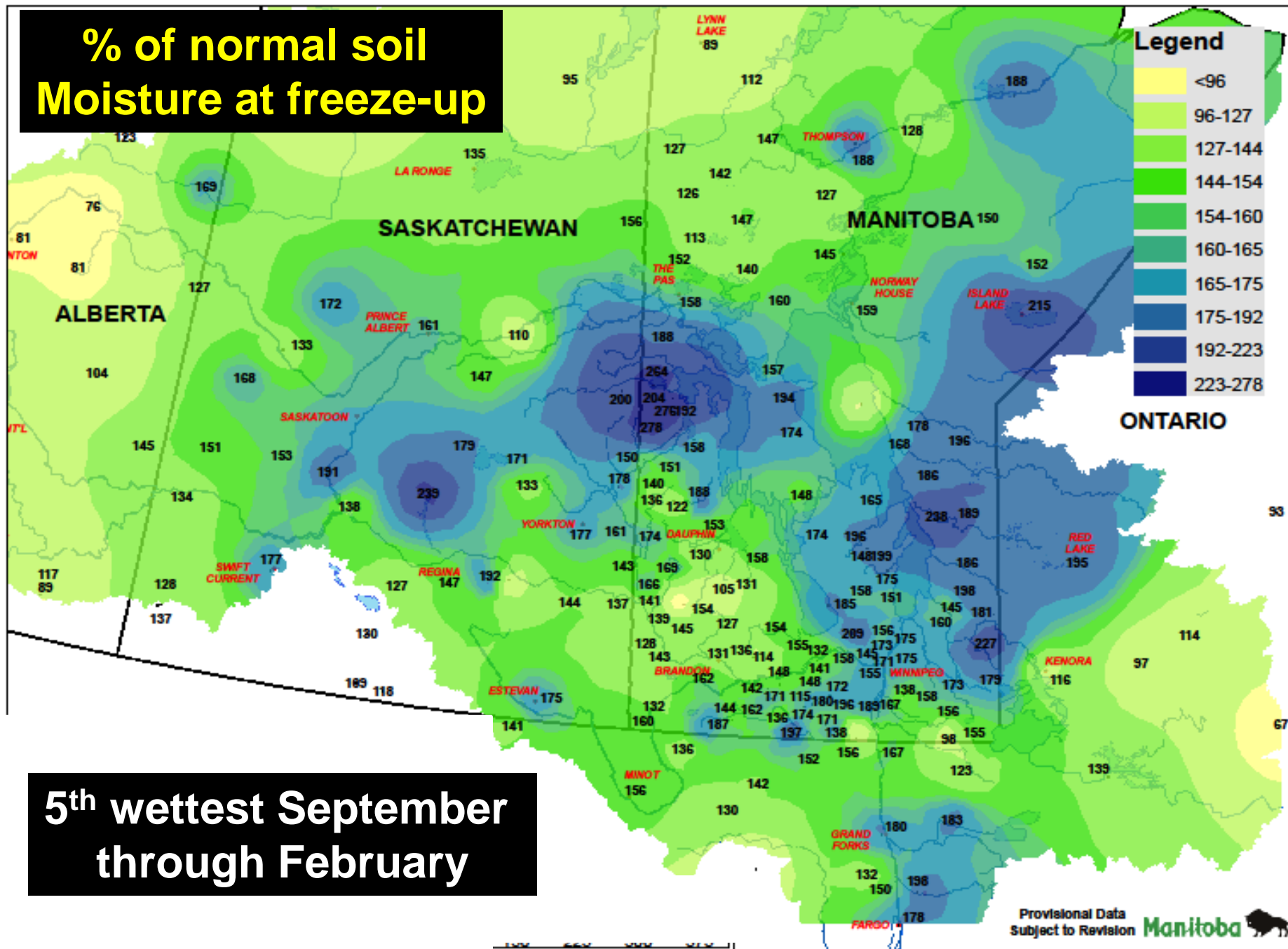


**- west dike**

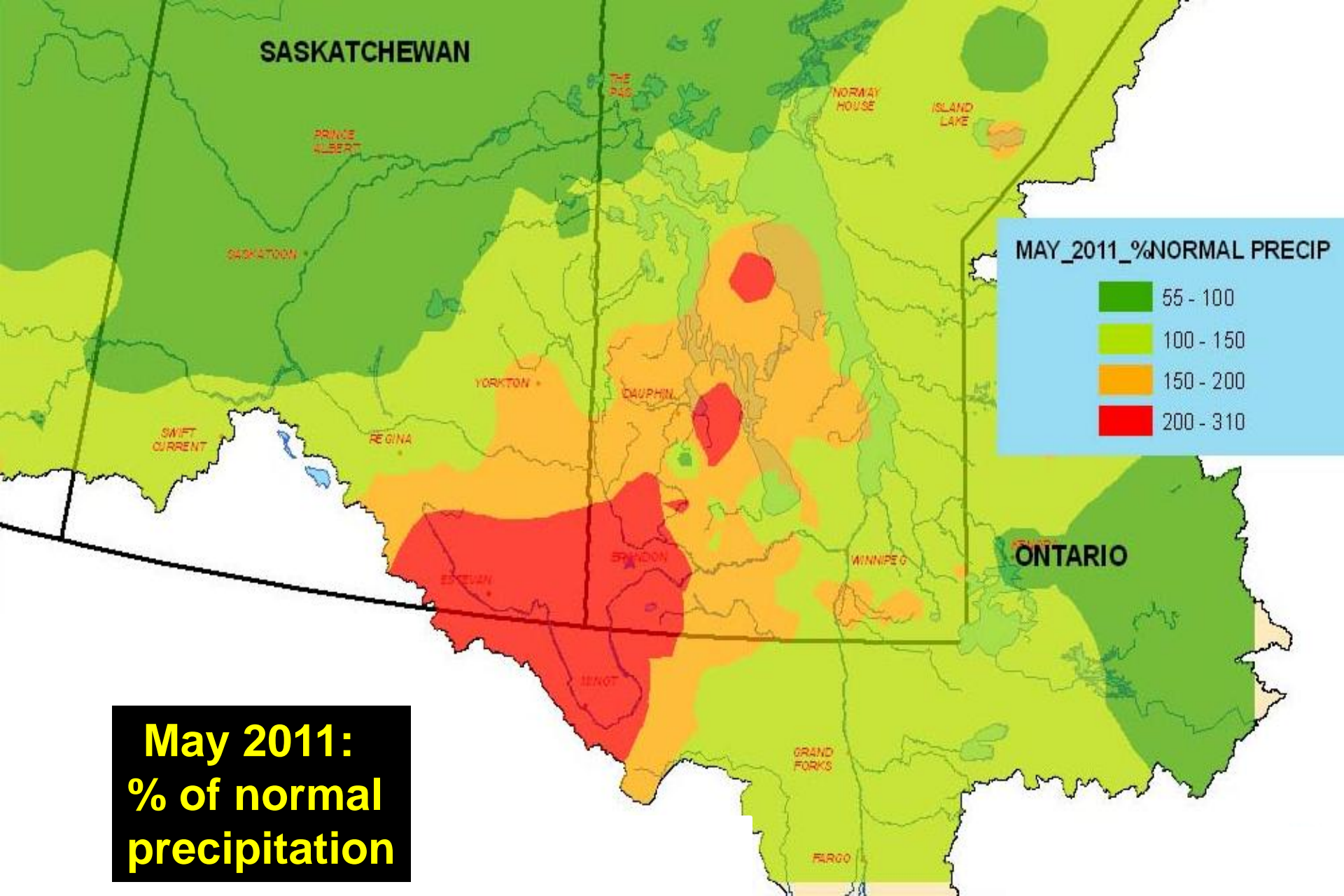




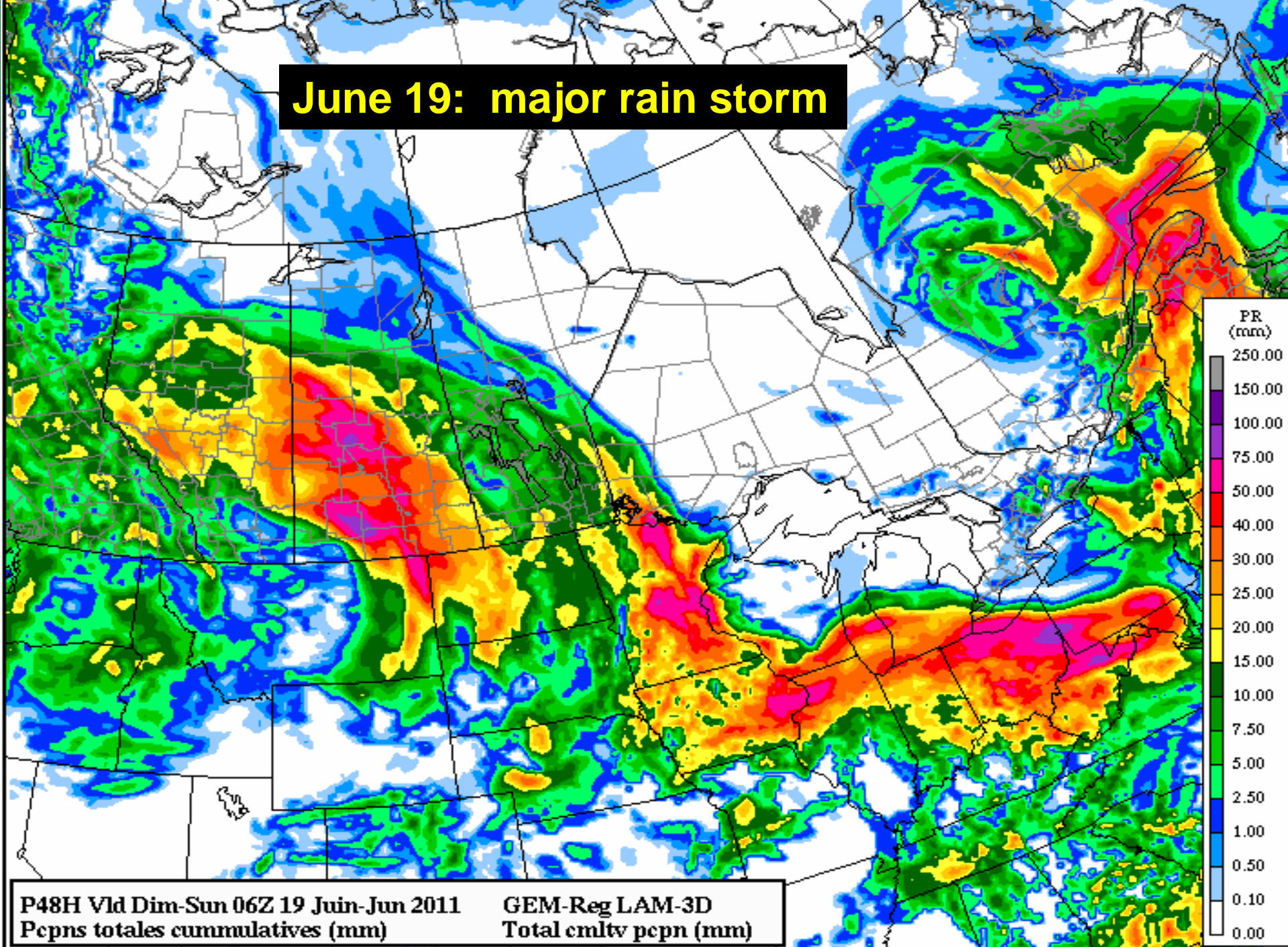
# **% of normal soil Moisture at freeze-up**







# June 19: major rain storm

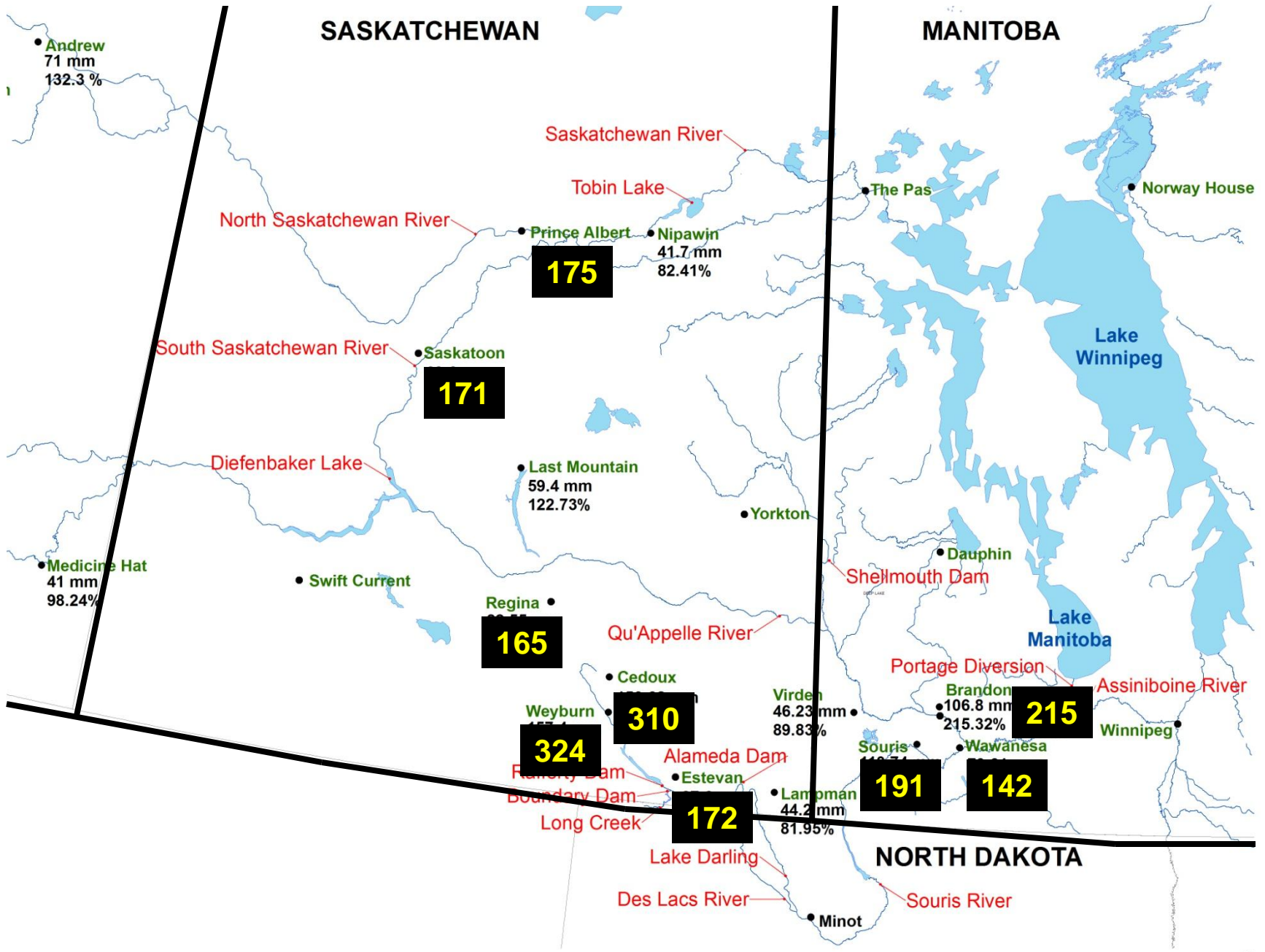


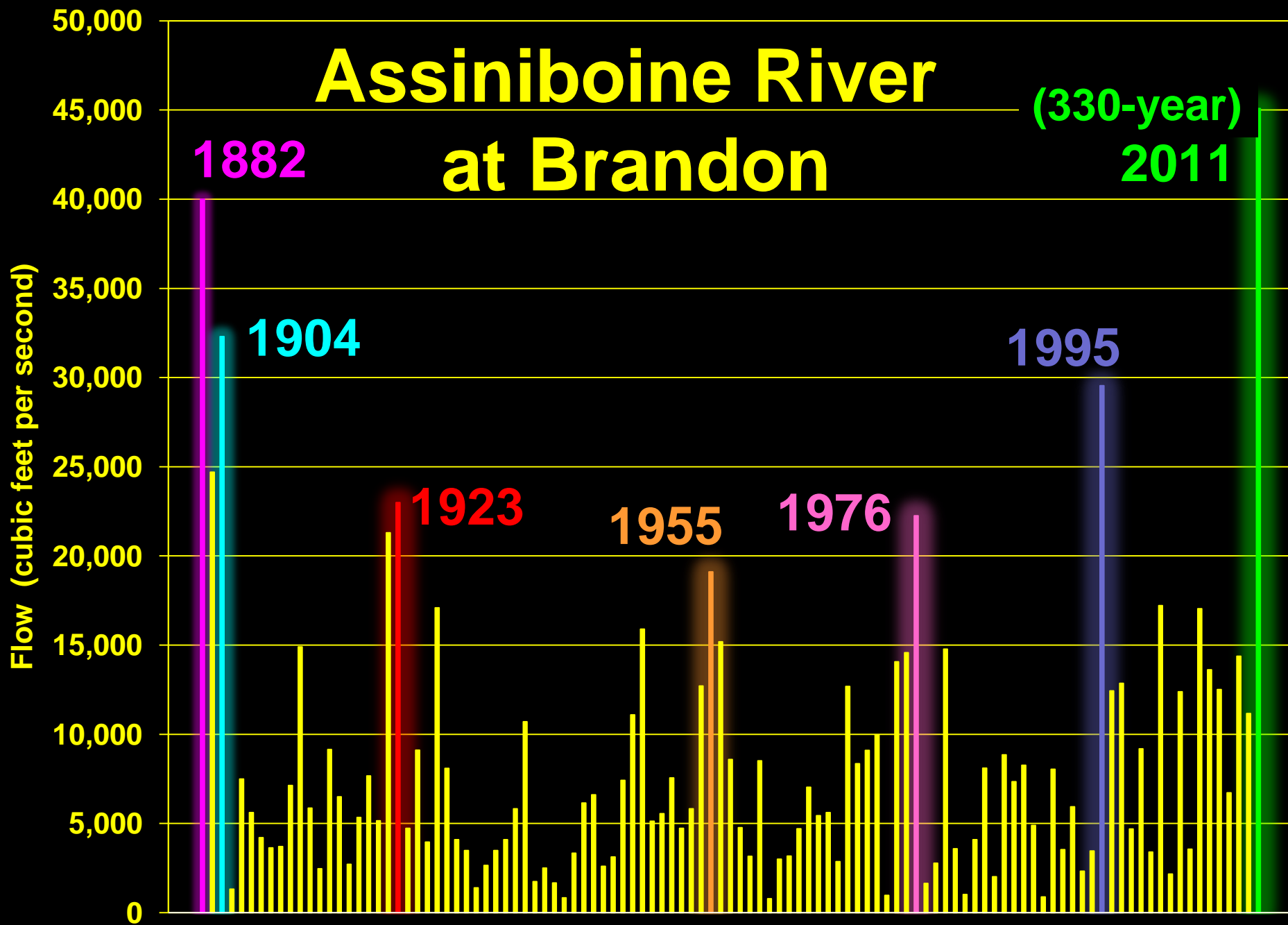
P48H Vld Dim-Sun 06Z 19 Juin-Jun 2011  
Pcpns totales cummulatives (mm)

GEM-Reg LAM-3D  
Total cmltv pcprn (mm)

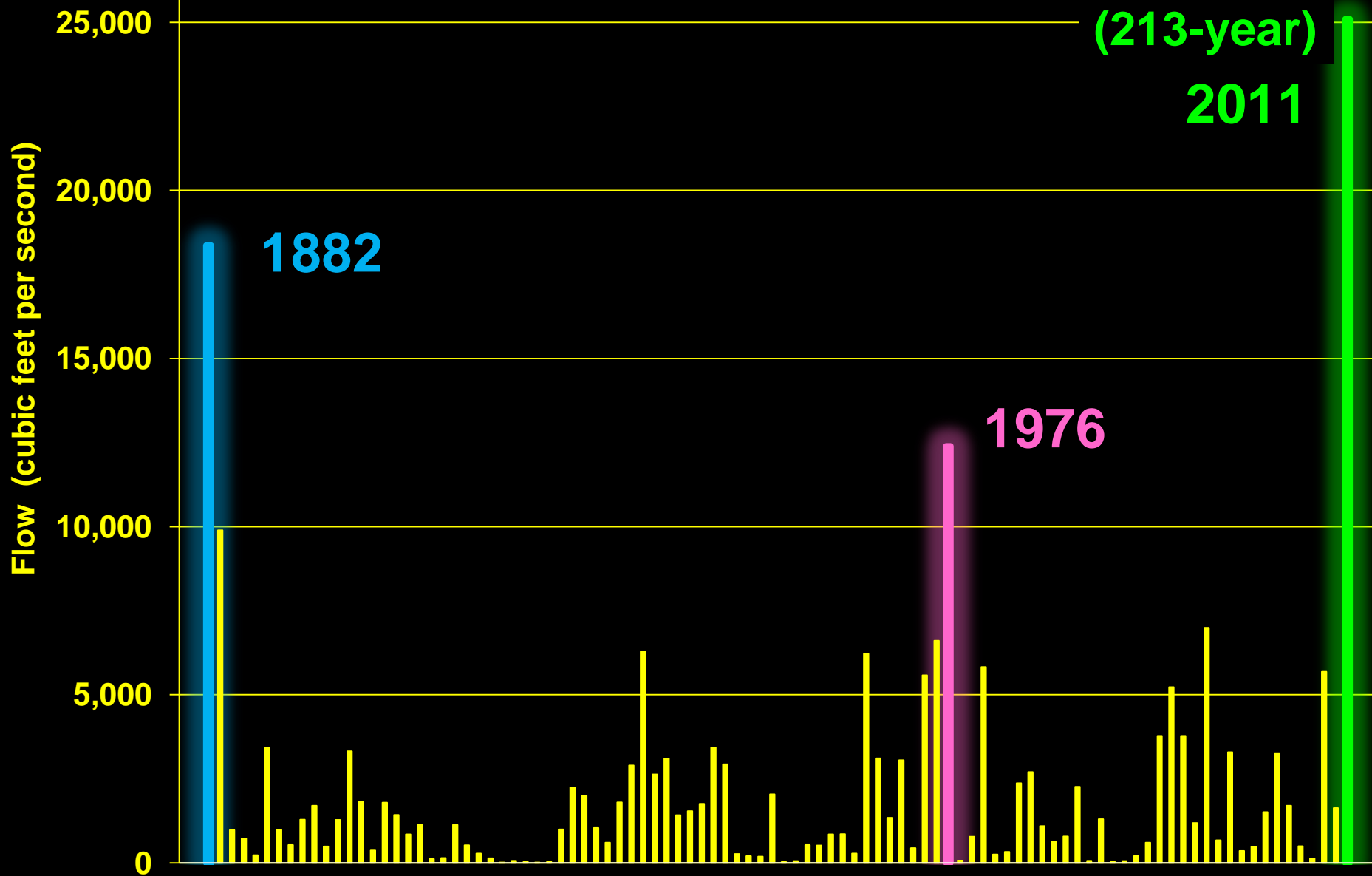


# June 2011 Precipitation: % of normal

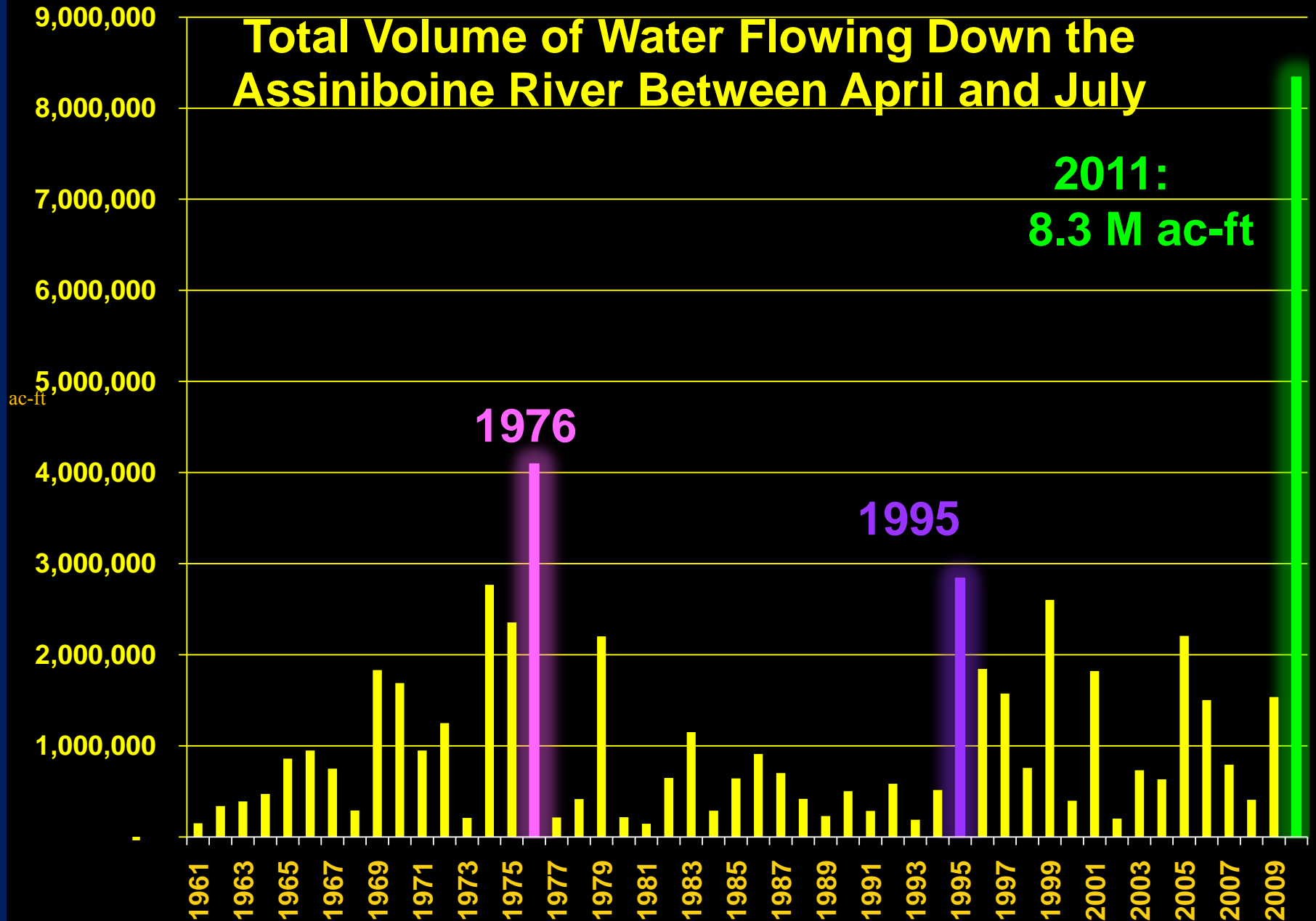




# Souris River at Westhope



# Total Volume of Water Flowing Down the Assiniboine River Between April and July



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# New flood threat in southern Saskatchewan

CBC News Posted: Jun 18, 2011 2:31 PM CST | Last Updated: Jun 18, 2011 8:08 PM CST 34



The town of Yellow Grass was hit with a flash flood on Friday night. (CBC)

The release of rising waters from reservoirs along the Souris River is threatening to flood homes near Estevan, Sask., residents say.







**Minot, North Dakota**





**Brandon**



# **Brandon: major dike raising (earth and super sand bags)**



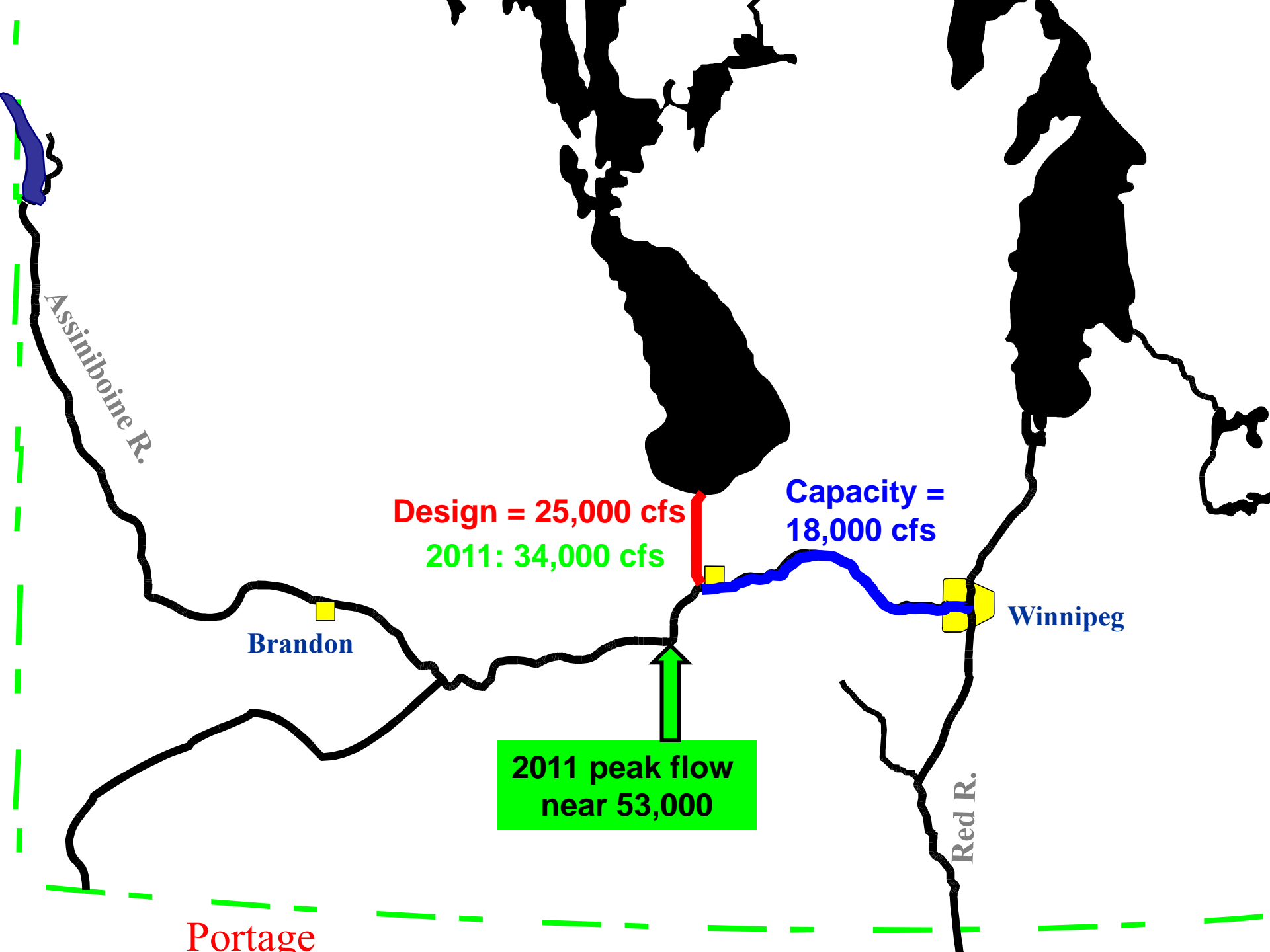


**Souris**





**Melita**





# Assiniboine River Dikes – Massive Effort to Reinforce









# Portage Diversion: reinforcing drop structures

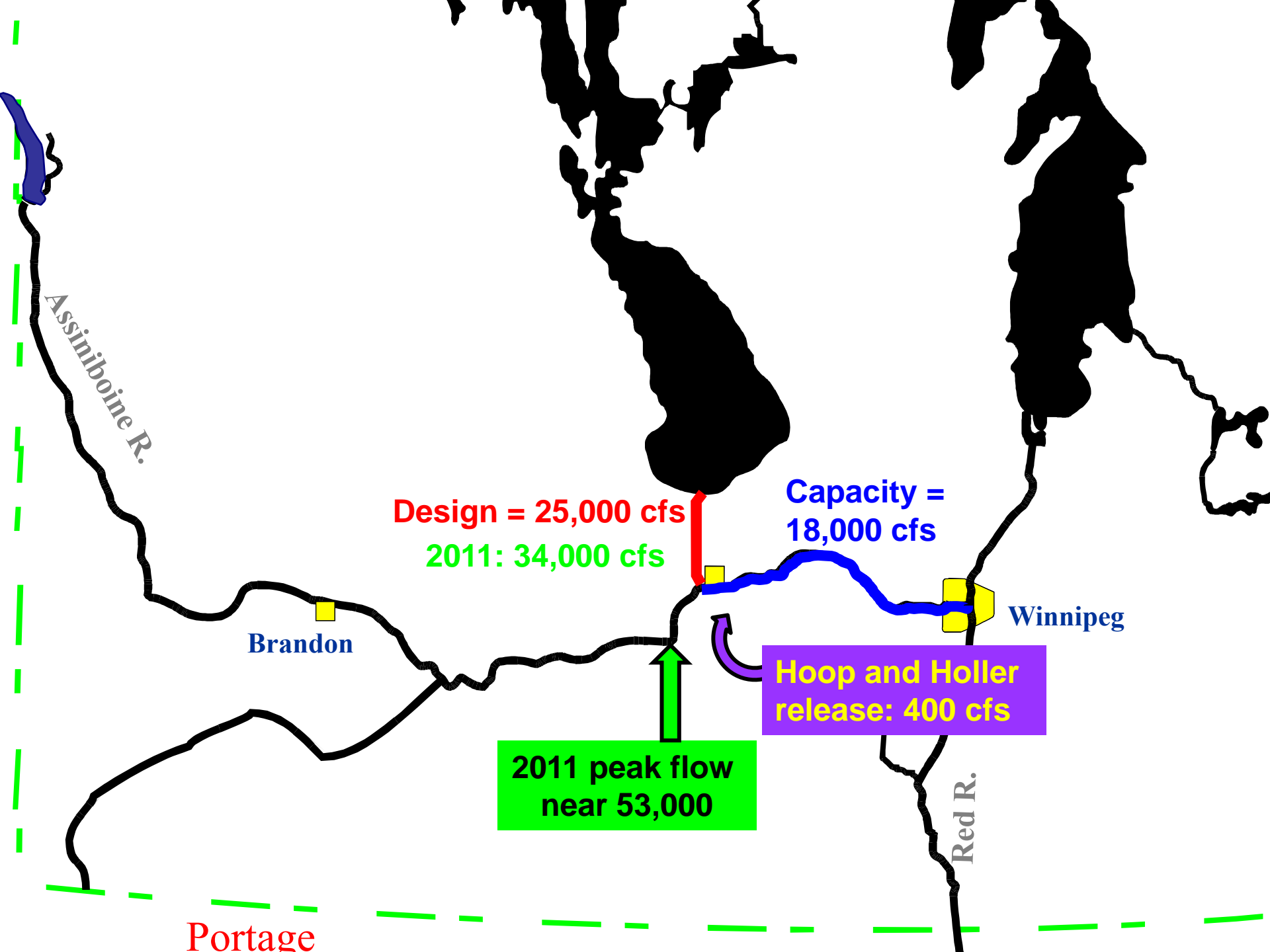






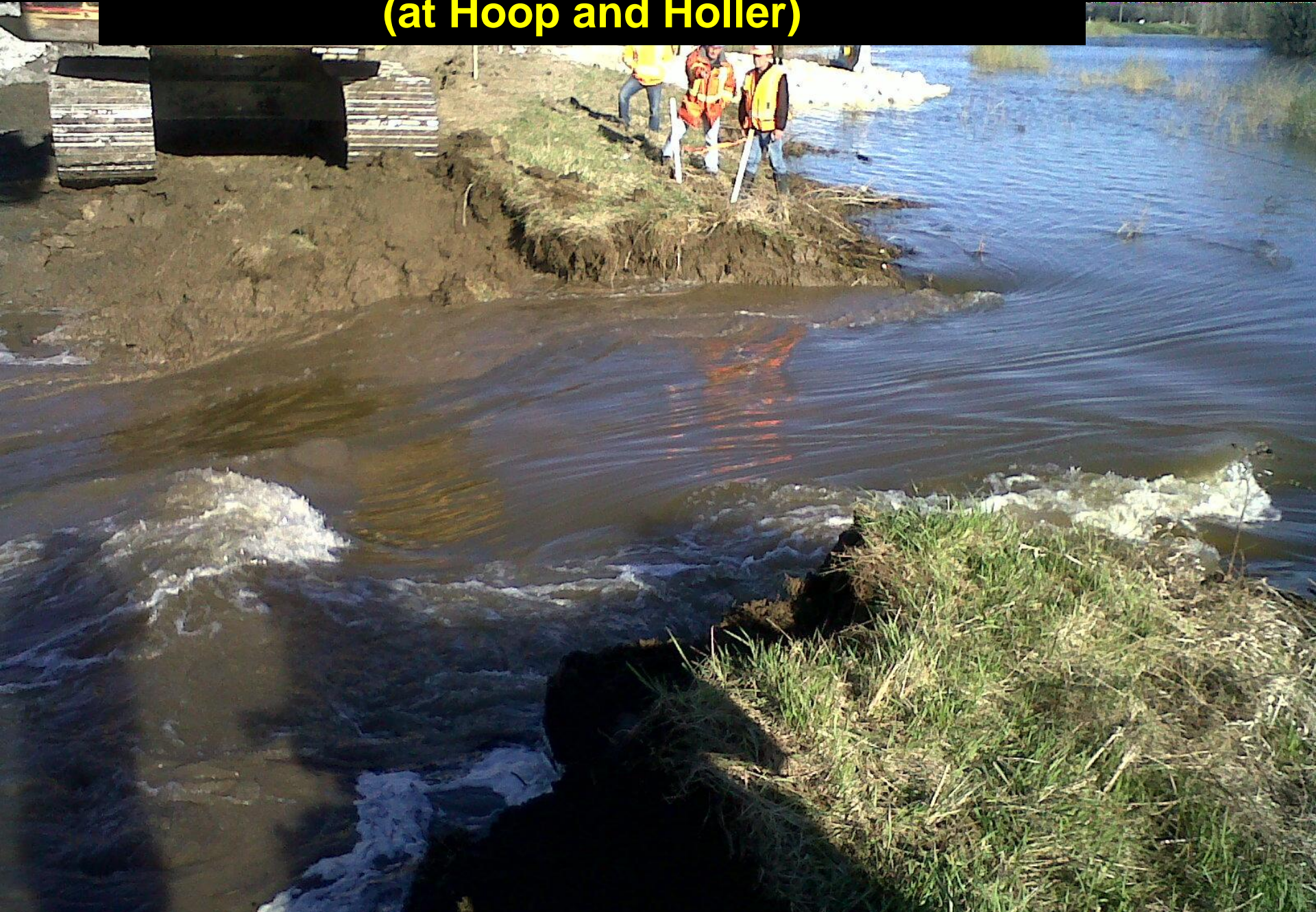
## **Portage Diversion: raising dikes along channel**



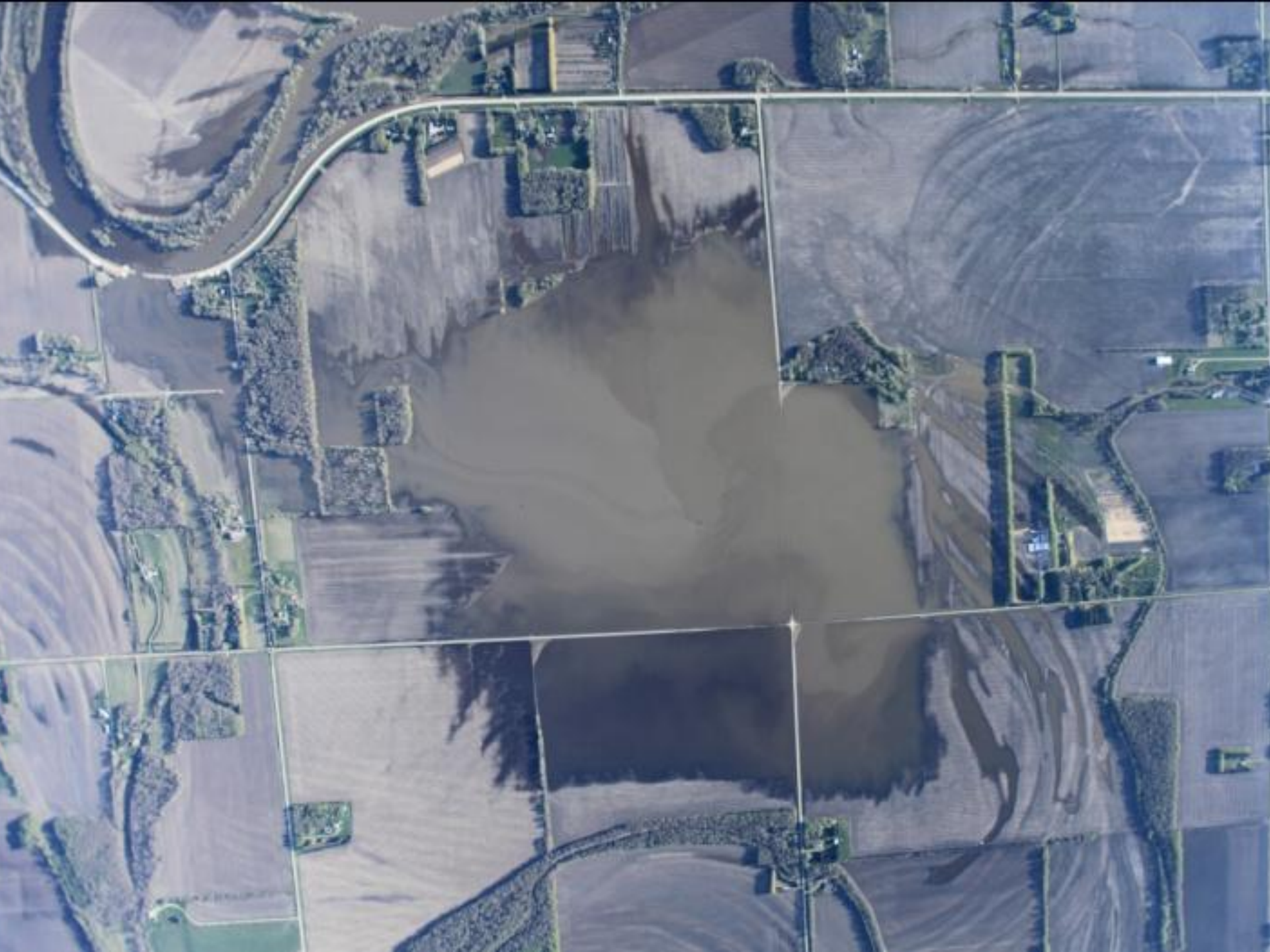




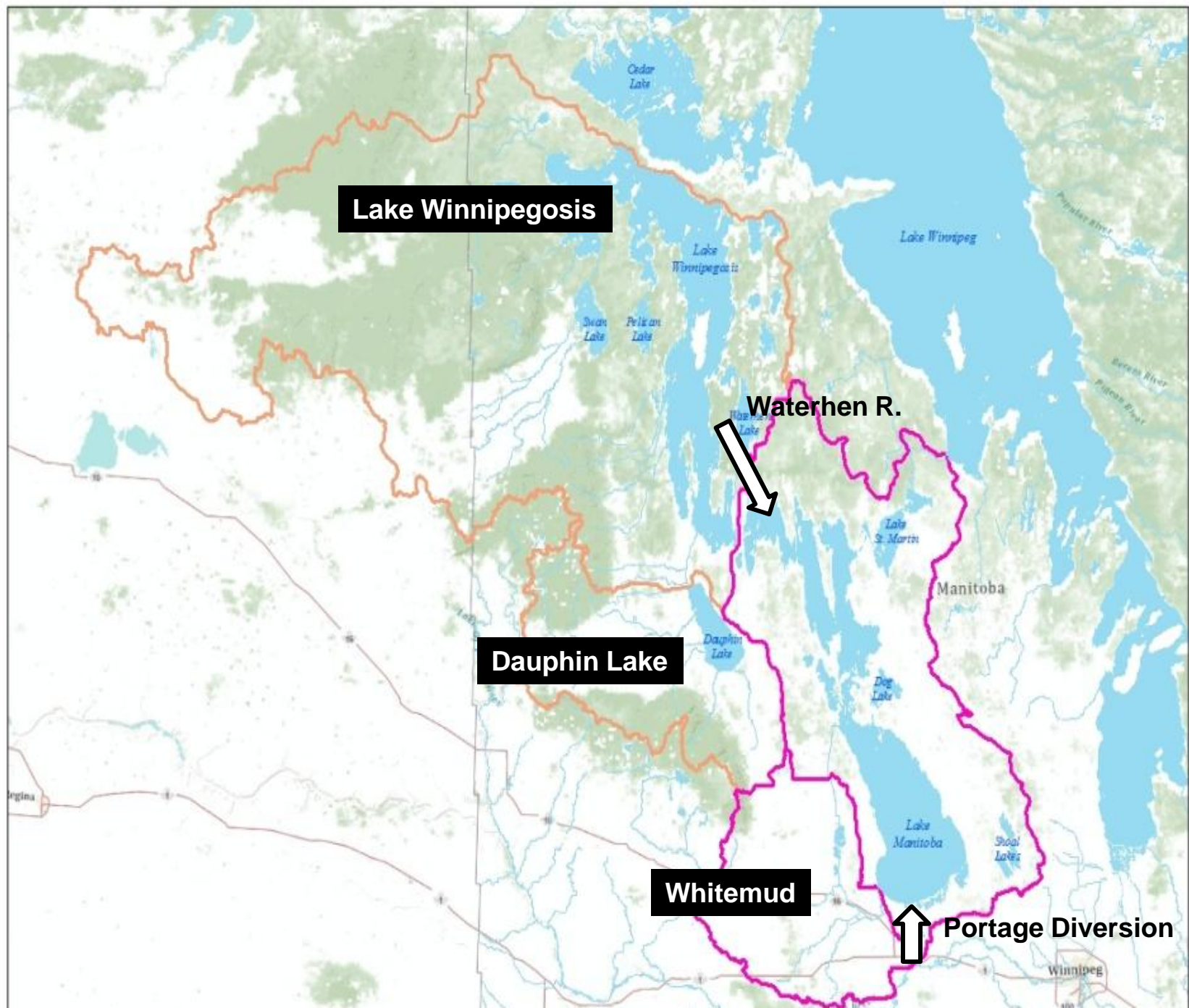
# Controlled release at Assiniboine River dikes (at Hoop and Holler)













**May 31<sup>st</sup>: Lake Manitoba at 815.3 ft, and major wind storm**





60,000

Lake Manitoba peaked at 817.15 ft btwn July 12 - 25 (*wind eliminated*)

50,000

40,000

30,000

20,000

10,000

0

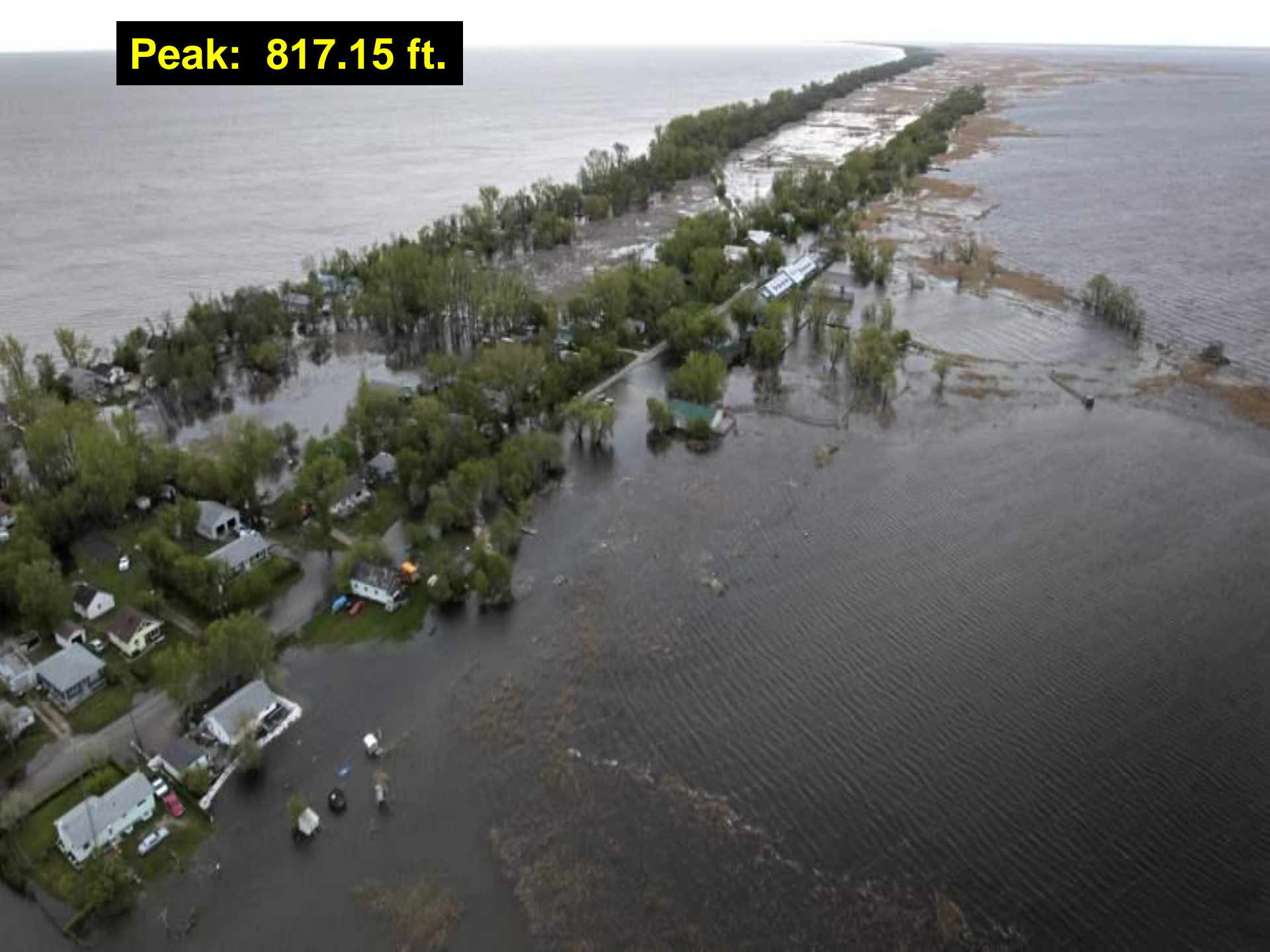
cfs

06-Apr





**Peak: 817.15 ft.**













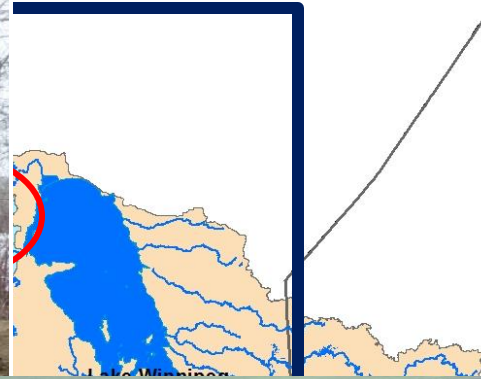
## Lake St. Martin

Picture 25: PR 513  
flooding on May 6'11

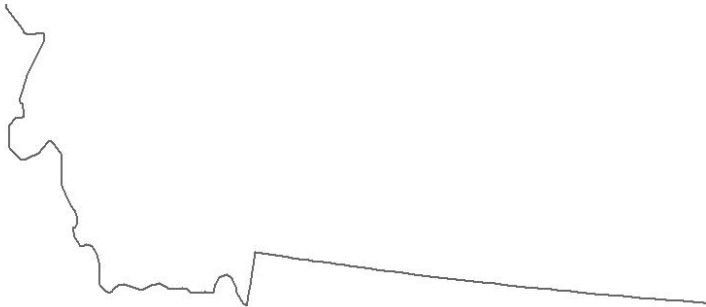




# Ralls Island diking



# Carrot River temp dikes



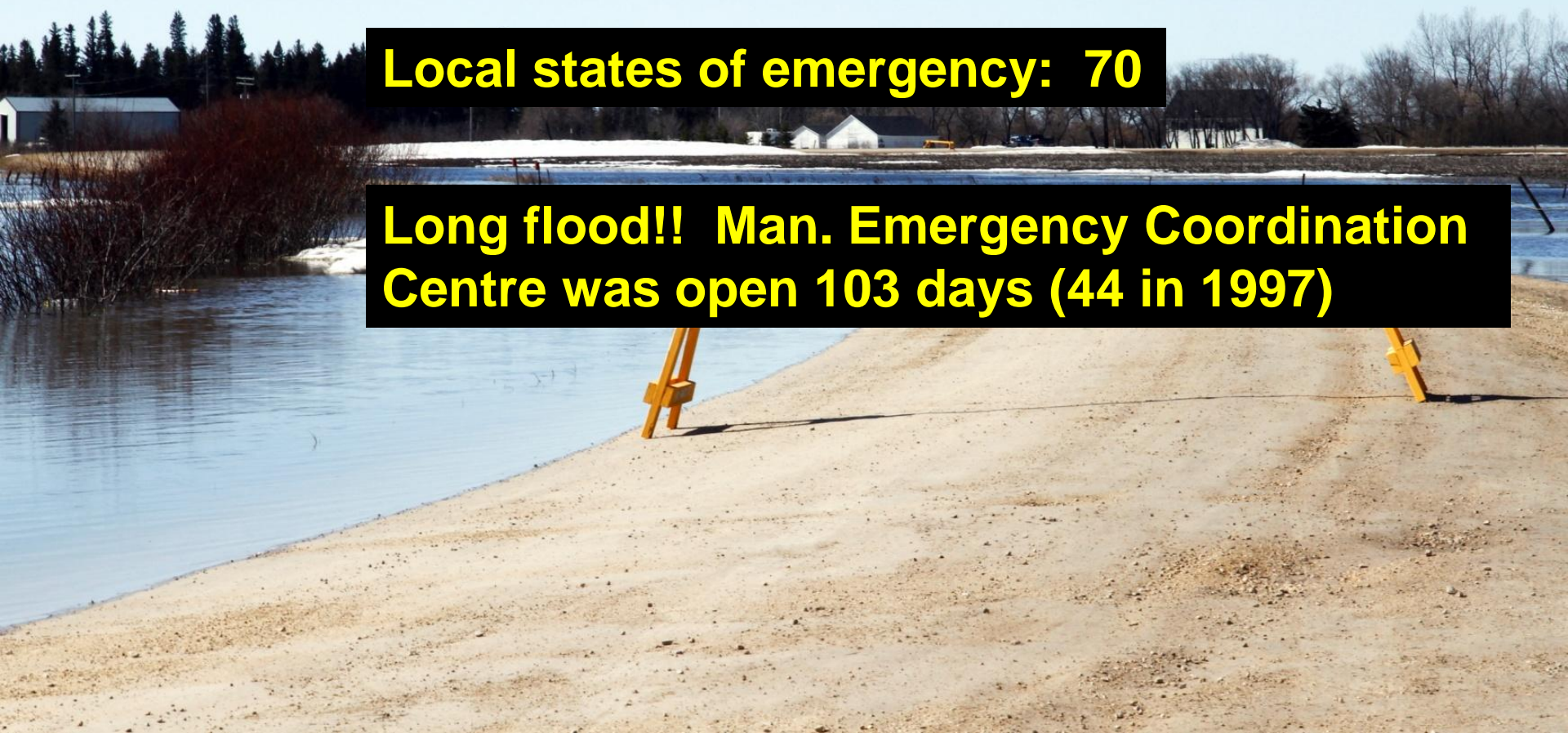


**At height of flooding, 840 municipal and provincial roads closed or affected**

**Total evacuees: 7,165**

**Local states of emergency: 70**

**Long flood!! Man. Emergency Coordination Centre was open 103 days (44 in 1997)**



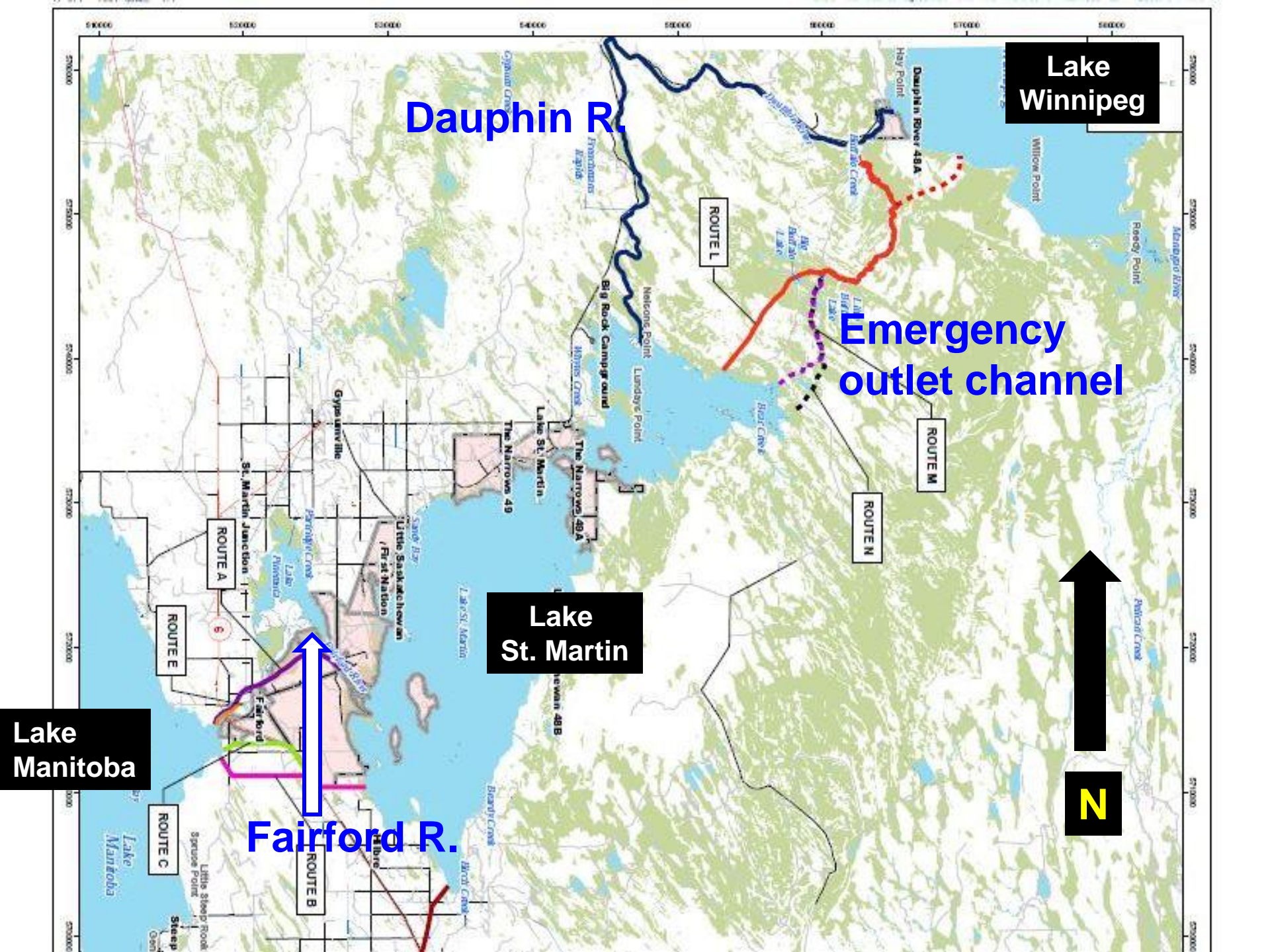
# Flood Mitigation

- Individual Flood Protection – \$75M in financial assistance
  - For raising, diking, terracing or moving
  - Homes, and farm and business buildings: 86%, up to \$100,000 project
  - Cottage: 86%, up to \$40,000 project
  - Lake Manitoba: first \$20,000 is 100% grant
  - 1,600 applications to date
  
- New community flood protection
  - 2010: 8 feasibility studies
  - 2011: application deadline is November 30<sup>th</sup>
  - Construction: \$30M in 90% grants
  
- Converting emergency dikes into permanent dikes
  - \$20M for 17 projects
  - Communities such as Souris, Melita, Wawanesa, Lake Manitoba Narrows, Peltz Drive/St. Peter's Road



# Flood Mitigation

- Community diking
  - Brandon: grant for raising to new design level
  - Petersfield: grant for construction/raising to new design level
- Shellmouth: install gates on the spillway (\$8 M)
- Portage Diversion: assessment and upgrading (\$7.4 M)
- Lake St. Martin emergency channel - \$100M
- Fairford Control Bypass - \$60M



Lake Winnipeg

Dauphin R.

Emergency outlet channel

Lake St. Martin

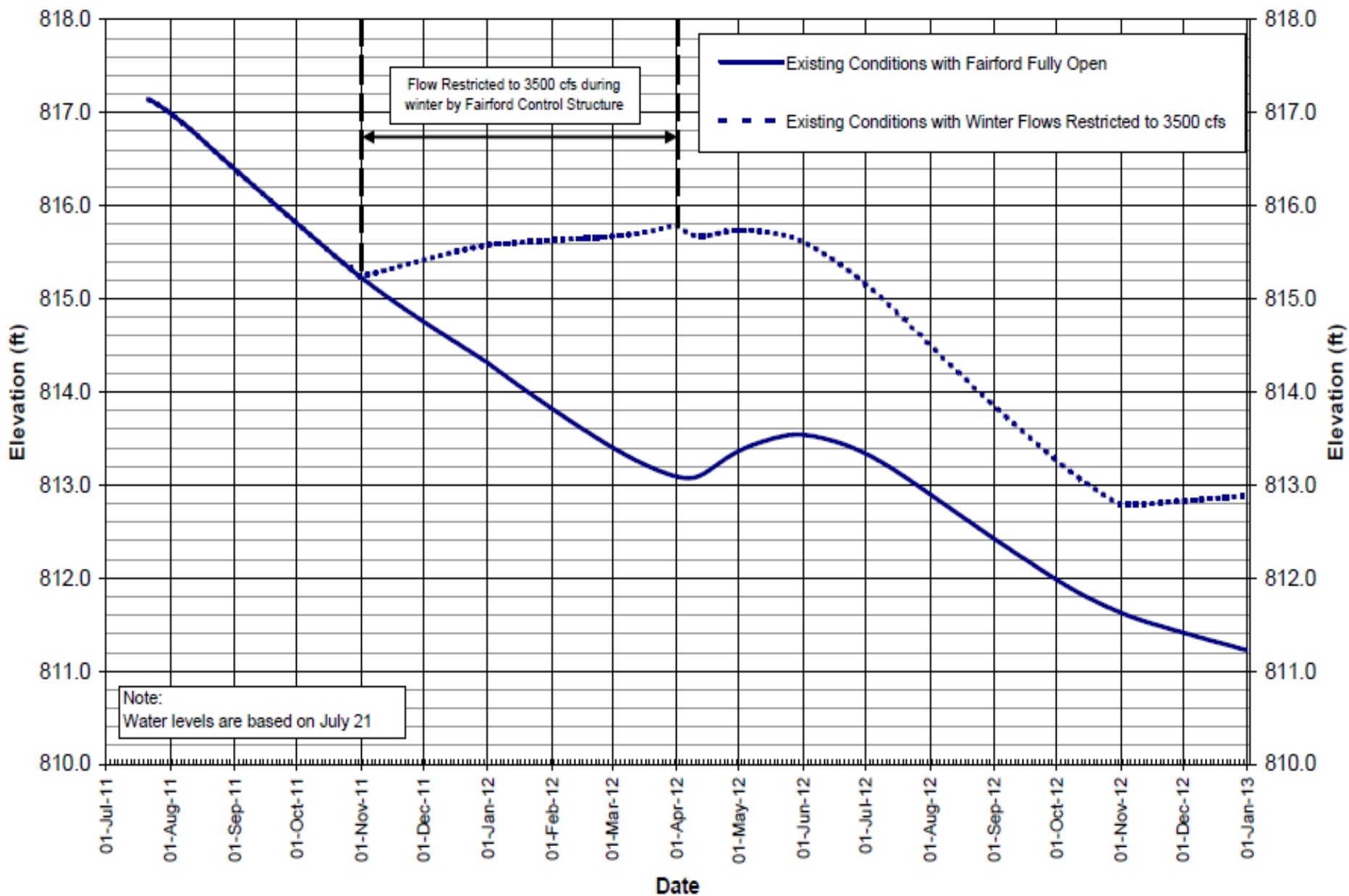
Lake Manitoba

Fairford R.

N



# Projected Lake Manitoba water levels







# Thank You



## Questions?