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## Assiniboine River Control Structure

- Public and worker safety improvements
  - Completed in 2015
  - Works include fencing, signage, and safety boom
- Electrical and mechanical upgrades
  - Ongoing
  - Works include upgrades to 600V electrical distribution system, replacement of gate control system and motor control center, new bulkhead gate hoist, new stand-by diesel generator fuel/piping system and new exterior diesel generator



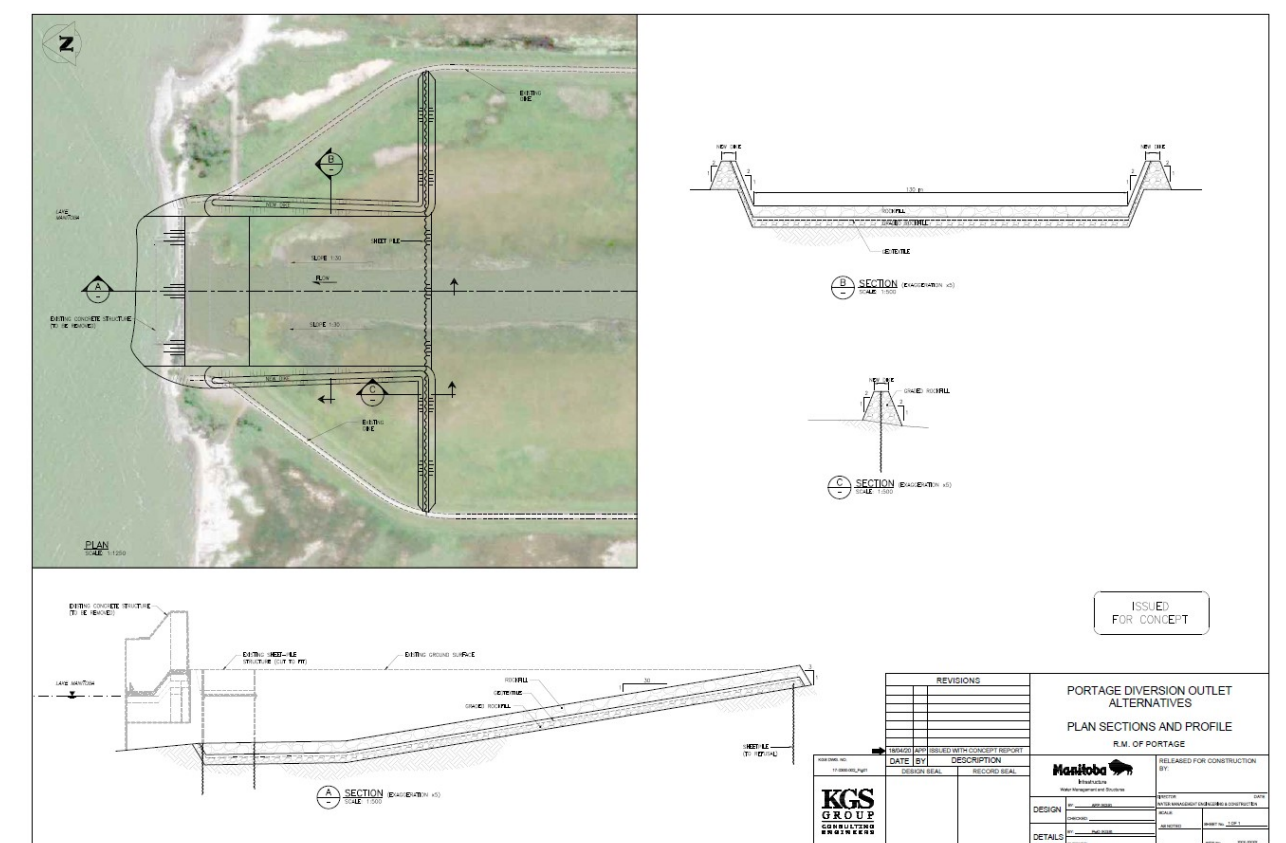
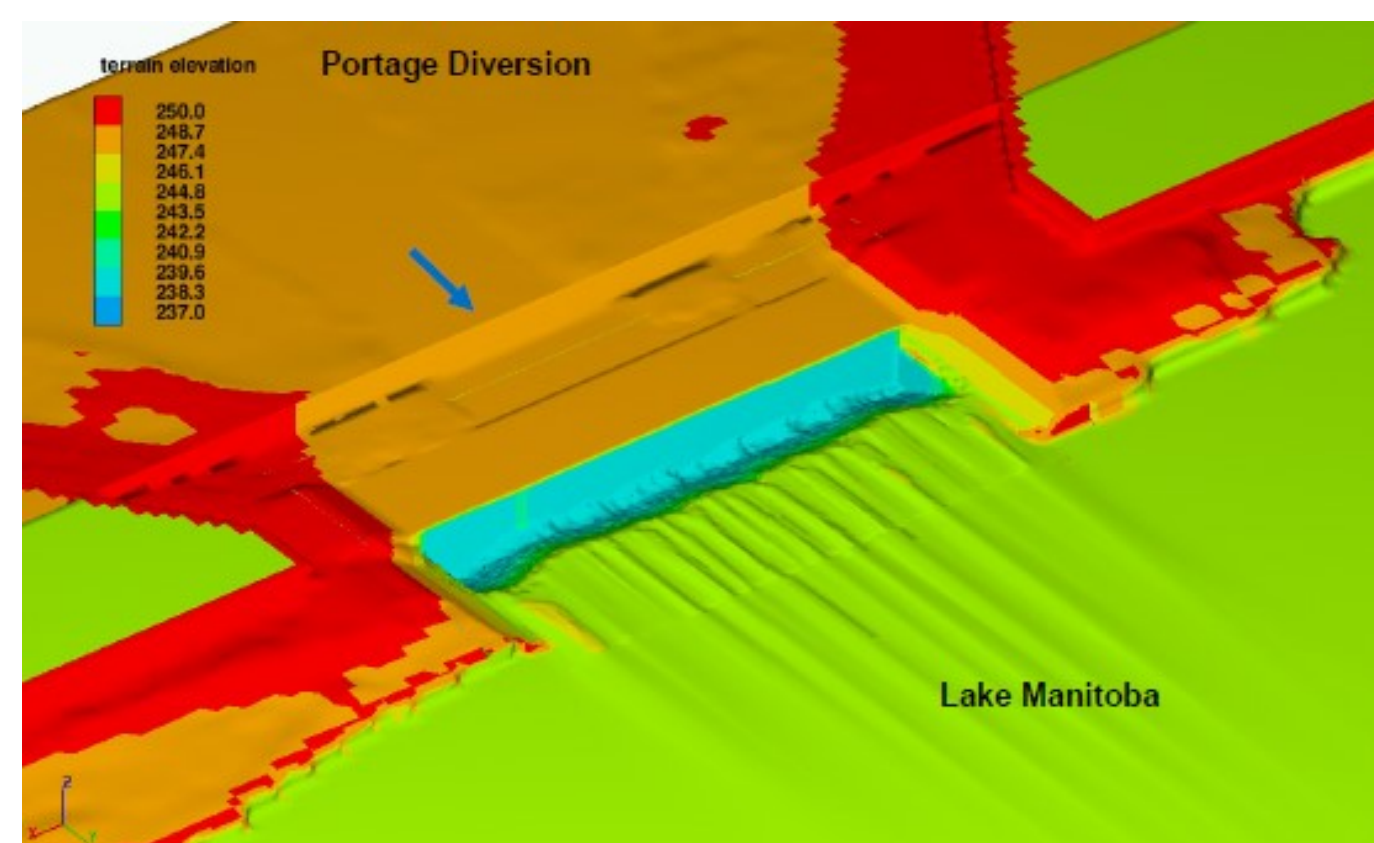
## Portage Diversion East Outside Drain

- Reconstruction of 18 km of drain
  - Completed in 2013
- Replacement of culverts beneath three (3) railway crossings
  - Completed in 2018



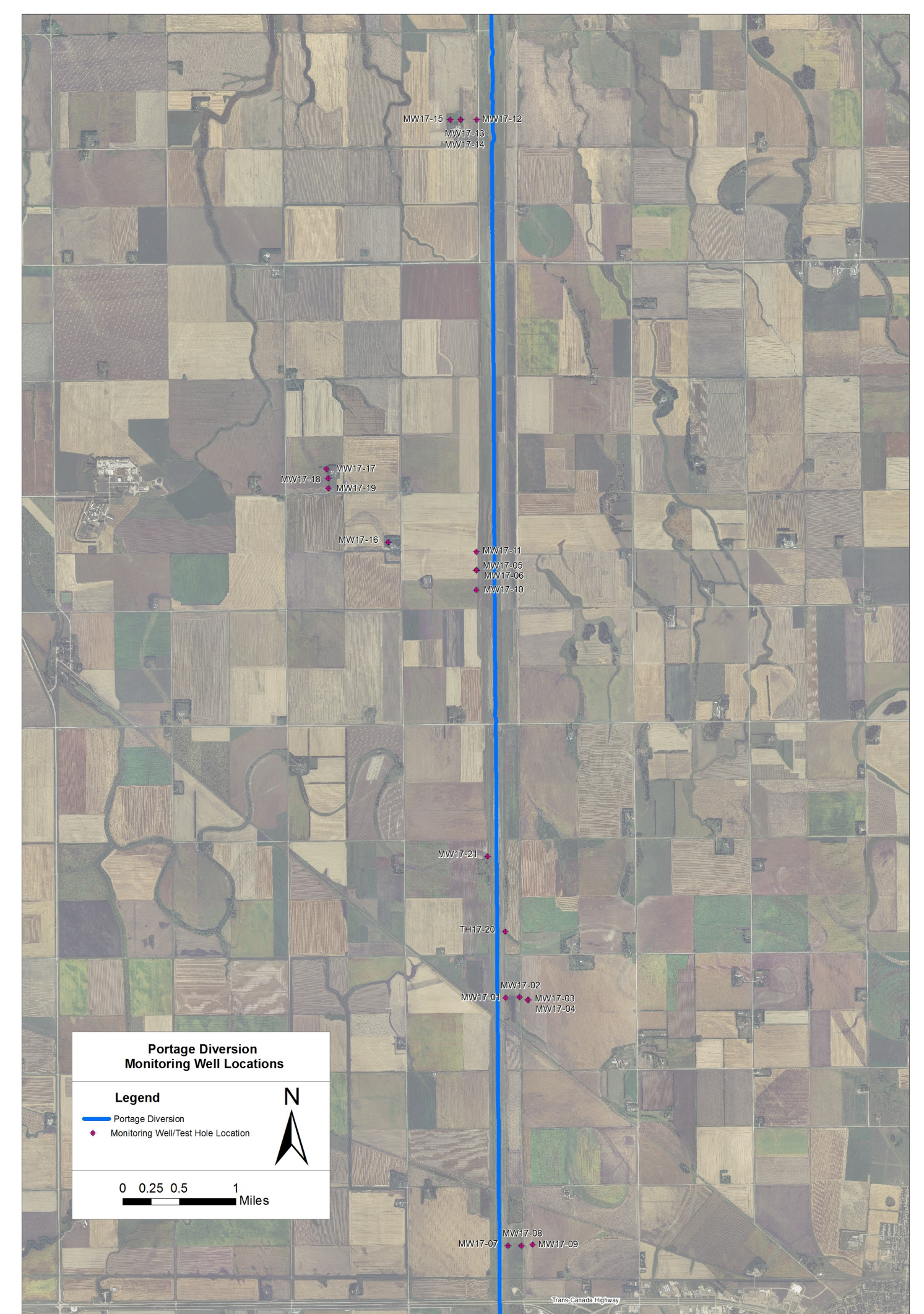
## Portage Diversion Outlet Structure

- Construction of temporary rock apron to stabilize outlet structure
  - Completed in 2018
- Conceptual Design for options to repair or replace structure
  - Completed in 2018
- Outlet structure major repair or replacement prioritized over next few years



## Portage Diversion Channel

- Removal of sedimentation within channel
  - Completed in 2017
- Groundwater/soil salinity study for the Portage Diversion
  - Ongoing—commenced in 2016
- Enhancement of East Dike north of PR 227 to address freeboard issues at design capacity of 25,000 cfs
  - Proposed to commence in 2018
  - Multi-phase over the next couple of years
- Failsafe assessment and potential enhancement of West Dike to handle design capacity of 25,000 cfs
  - Prioritized for future years—yet to be approved



## Portage Diversion Operating Guidelines

### 1984 Red River Floodway Program of Operation

#### Operation Objectives

The Portage Diversion will be operated to meet these objectives:

1. To provide maximum benefits to the City of Winnipeg and areas along the Assiniboine River downstream of Portage la Prairie.
2. To minimize ice jams forming along the Assiniboine River.
3. Not to increase the water level in Lake Manitoba beyond maximum regulated level of 812.87 ft (247.76 m), if possible.
4. Prevent overtopping of the failsafe section in the Portage Diversion, if possible.

#### Operating Rules

1. Except as provided for under Rule 8, the Portage Diversion shall be utilized to its maximum capability to keep water levels in Winnipeg below 17.0 feet (5.2m), City Datum.
2. The flow in the Diversion shall not be allowed to exceed 25,000 cfs (708 m<sup>3</sup>/s).
3. If the flow forecasts indicate that the peak inflow into the reservoir to be 20,000 cfs (566m<sup>3</sup>/s) or more, the Diversion will be put into use as soon as possible to flush out snow blockages and in situ ice.
4. During the period that there is ice on the reservoir, the water level of the reservoir will not be allowed to exceed 865.0 feet (263.65m) to provide room for releases from breaching of upstream ice jams.
5. The conduits of the Spillway Structure shall be closed while there is water going over the bascule gates.
6. While there is ice on Assiniboine River downstream of Portage la Prairie it is desirable to limit flows to approximately 5,000 cfs (142m<sup>3</sup>/s) in the River if possible. Flows of this magnitude appear to be optimum flows required to assist in flushing the ice down the river without causing major ice jams or flooding to adjacent farm lands through local drainage inlets. This procedure provides additional capacity, if required, on the River downstream of Portage la Prairie when the second peak arrives. The level of Lake Manitoba should not be taken into account while there is ice on the Assiniboine River, as the period during which there is ice on the River during the spring runoff is only a few days, and diverted flows for this short a period of time have a negligible effect on the level of Lake Manitoba
7. After the ice has gone from the Assiniboine River downstream of Portage la Prairie, it is desirable to maintain flows less than 10,000 cfs (283m<sup>3</sup>/s) in the River if possible. Flows greater than 10,000 cfs (283m<sup>3</sup>/s) are above natural bank stage of the River, and backup of local streams which outlet into the Assiniboine may occur at this level. There also may be seepage problems through the dike, leakage under the dike through the gated culverts and flooding of cultivated land between the dikes.
8. For flows of up to 30,000 cfs (850m<sup>3</sup>/s) under open water conditions, the failsafe section of the west dike of the Portage Diversion should not be breached if the peak stage in Winnipeg will not exceed 18.0 feet (5.5m).

# Portage Diversion Operating Guidelines

## Recommended by Flood Control Infrastructure Operation Review Panel (2015)

### Pre-Spring Break-up Operation

1. While there is ice on the Assiniboine River downstream of Portage la Prairie, it is desirable to limit flows to approximately 5,000 cfs in the river if there is a potential for ice jamming.
2. During the period that there is ice on the reservoir, the water level of the reservoir must not be allowed to exceed 865.0 feet to provide room for releases from breaching of upstream ice jams.
3. If flow forecasts indicate that the Portage Diversion will likely be put into operation, the Diversion should be put into use as soon as practical to flush out snow blockages and in situ ice.

### Spring Run-off Operation

4. During the spring run-off, after the ice has gone from the Assiniboine River downstream of Portage la Prairie:
  - a. If the Lake Manitoba level is forecast to peak below 813 feet, maintain a maximum flow in the lower Assiniboine River of 10,000 cfs, reduced if necessary to keep the river level in Winnipeg below 19 feet James Avenue Datum if possible. Even when there is no risk of flooding on Lake Manitoba maintain a target flow of 10,000 cfs in the lower Assiniboine river to minimize environmental impact of diversion flows on Lake Manitoba.
  - b. If the Lake Manitoba level is forecast to peak above 813 feet, and the projected volume of water from the Portage Diversion into Lake Manitoba will be less than 590,000 ac-ft, maintain a flow in the lower Assiniboine River of 12,000 cfs, reduced as necessary to keep the river level in Winnipeg below 20 feet James Avenue Datum.
  - c. If the Lake Manitoba level is forecast to peak above 813 feet, and the projected volume of water from the Portage Diversion into Lake Manitoba will be greater than 590,000 ac-ft, increase flows on the Assiniboine River above 12,000 cfs so as to balance impacts between the Lower Assiniboine River and Lake Manitoba, reduced as necessary to keep the river level in Winnipeg below 21 feet James Avenue Datum.

### Growing Season Operation

5. On or after May 25th, if Lake Manitoba levels are below 813 feet the lower Assiniboine flow may be limited to 10,000 cfs if the forecast indicates that Lake Manitoba will not go above 813 feet or that the projected volume of water from the Portage Diversion (from May 25th on) will be less than 236,000 ac-ft. Otherwise operate the Portage Diversion so as to balance impacts between the lower Assiniboine River and Lake Manitoba.
6. In years that the spring thaw occurs early ( ice clear from the lower Assiniboine River prior to April 15), flows on the Assiniboine River can be limited to 10,000 cfs at an earlier date than May 25th, conditional on guideline 5.

### General

7. The conduit of the spillway structure should be closed while there is water going over the bascule gates

The revised operating guidelines provide more prescriptive targets for balancing the distribution of flow through the Portage Diversion Channel and down the Lower Assiniboine River. City of Winnipeg river level targets are also raised to reduce reliance on the Portage Diversion.

### Lower Assiniboine Flows

#### Old Rule:

- . Limit flow on the Lower Assiniboine to 10,000 cfs if possible

#### New Rule:

- . If Lake Manitoba Level is forecast to remain below 813 ft, limit flow on the Lower Assiniboine to 10,000 cfs.
- . If Lake Manitoba Level is forecast to be above 813 ft, limit flow on the Lower Assiniboine to 12,000 cfs.
- . If Lake Manitoba Level is forecast to be above 813 ft, and the total diverted volume will be greater than 590,000 ac-ft, allow flow on the Lower Assiniboine to exceed 12,000 cfs.

### City of Winnipeg Water Levels

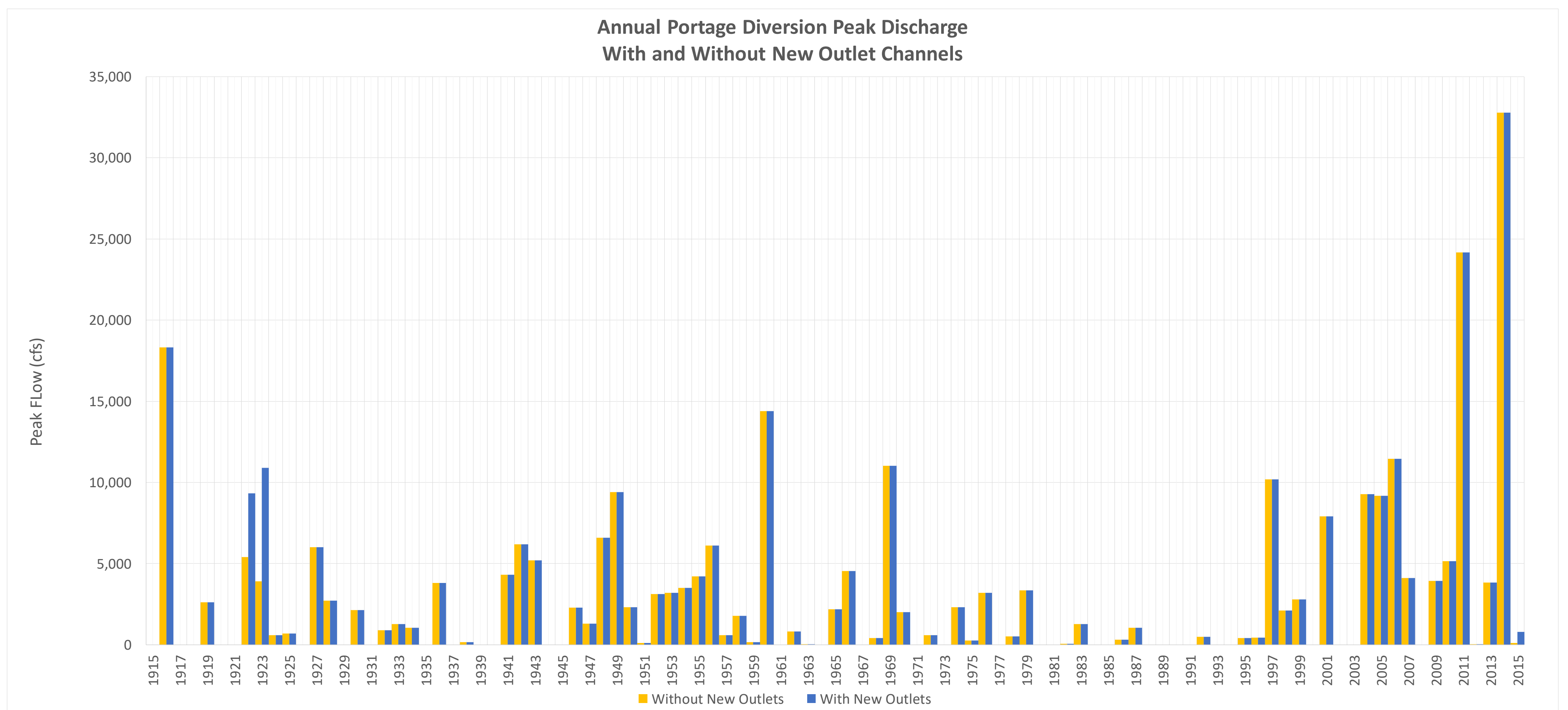
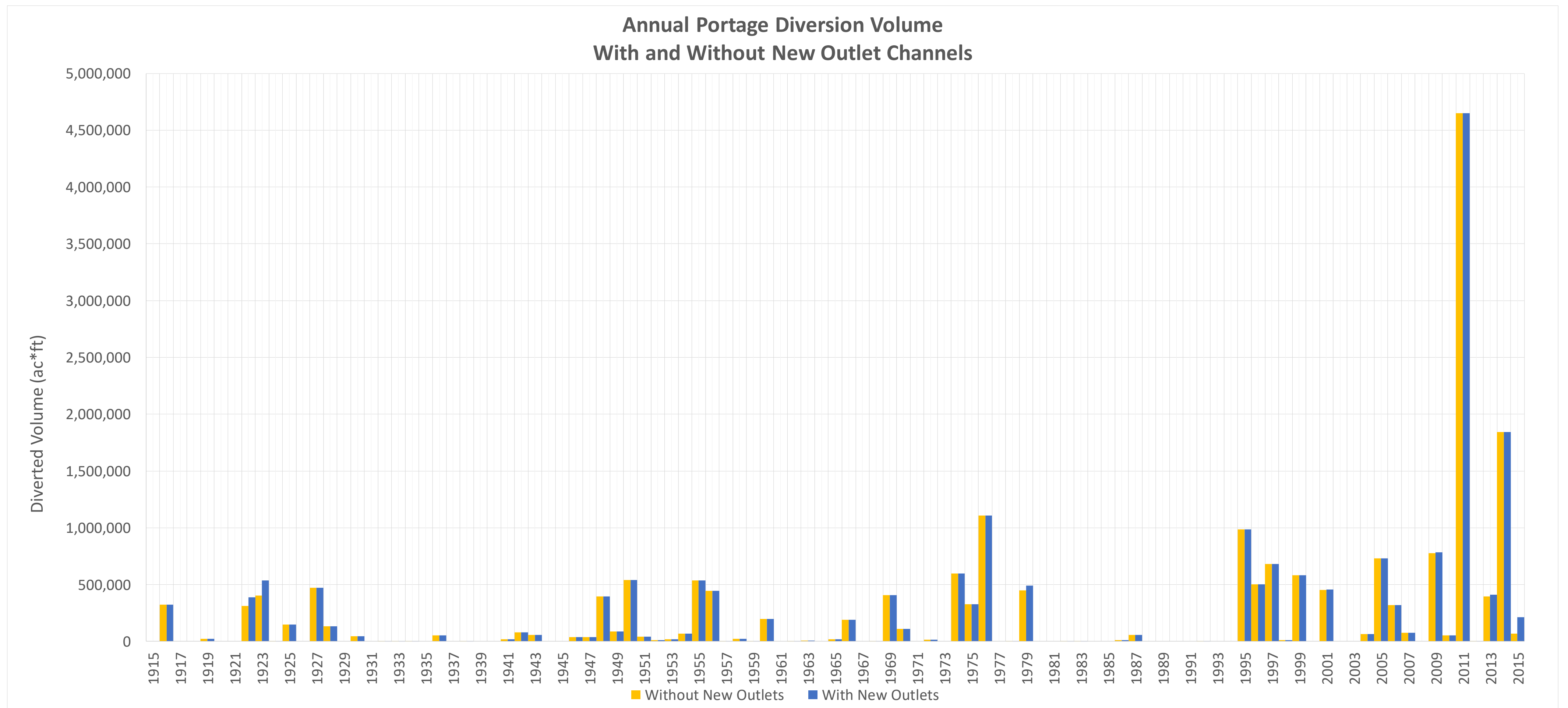
#### Old Rule:

- . The Portage Diversion shall be utilized to its maximum capability to keep water levels in Winnipeg below 17 ft James Avenue datum.
- . For flows up to 30,000 cfs into the Portage Reservoir, do not breach the fail-safe if the level at James Avenue will not exceed 18 ft.

#### New Rule:

- . If Lake Manitoba Level is forecast to remain below 813 ft, reduce flow on the Lower Assiniboine to maintain the level at James Avenue below 19 ft.
- . If Lake Manitoba Level is forecast to be above 813 ft, reduce flow on the Lower Assiniboine to maintain the level at James Avenue below 20ft.
- . If Lake Manitoba Level is forecast to be above 813 ft, and the total diverted volume will be greater than 590,000 ac-ft, reduce flow on the Lower Assiniboine to maintain the level at James Avenue below 21 ft.

# Effect of the Lake Outlets on Frequency of Portage Diversion Operation (based on simulation of 100 years of data)

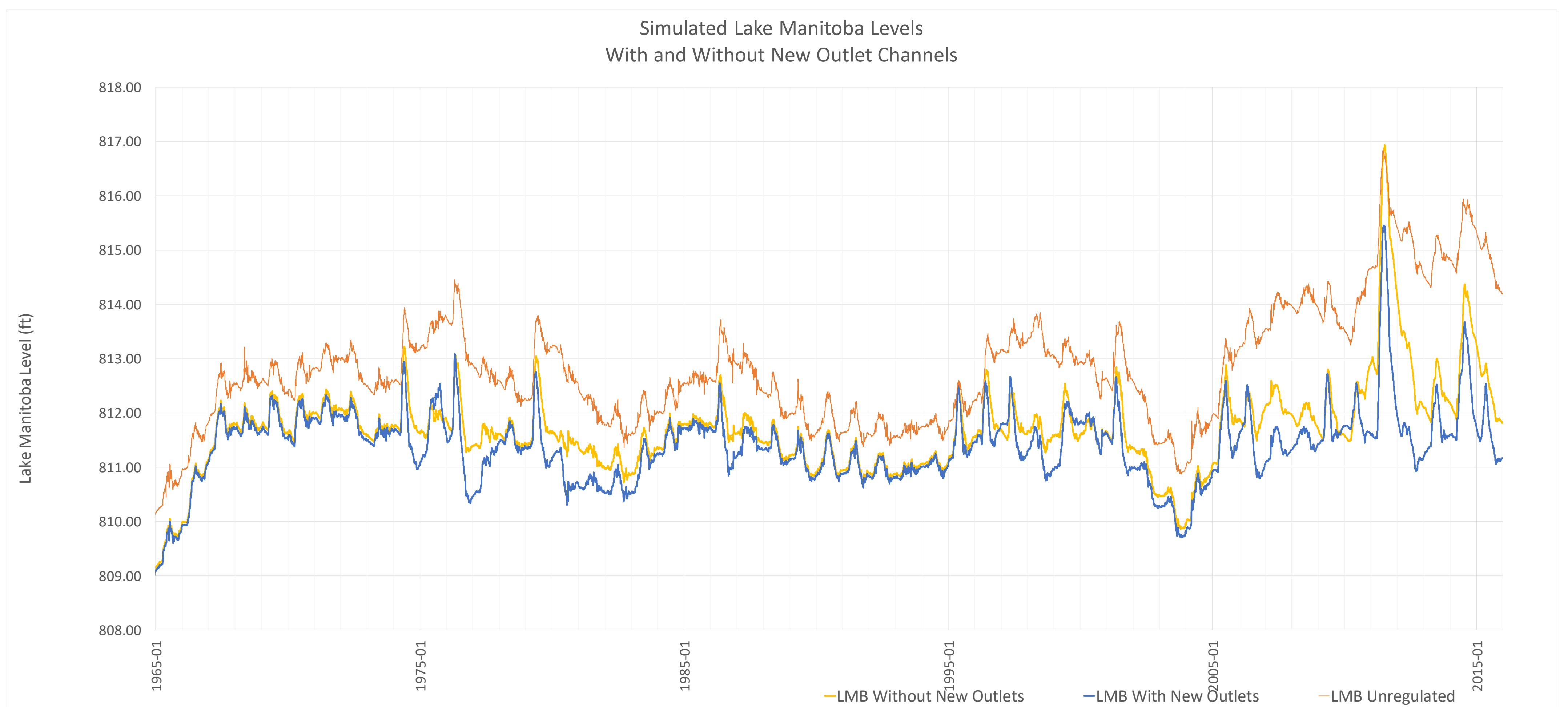
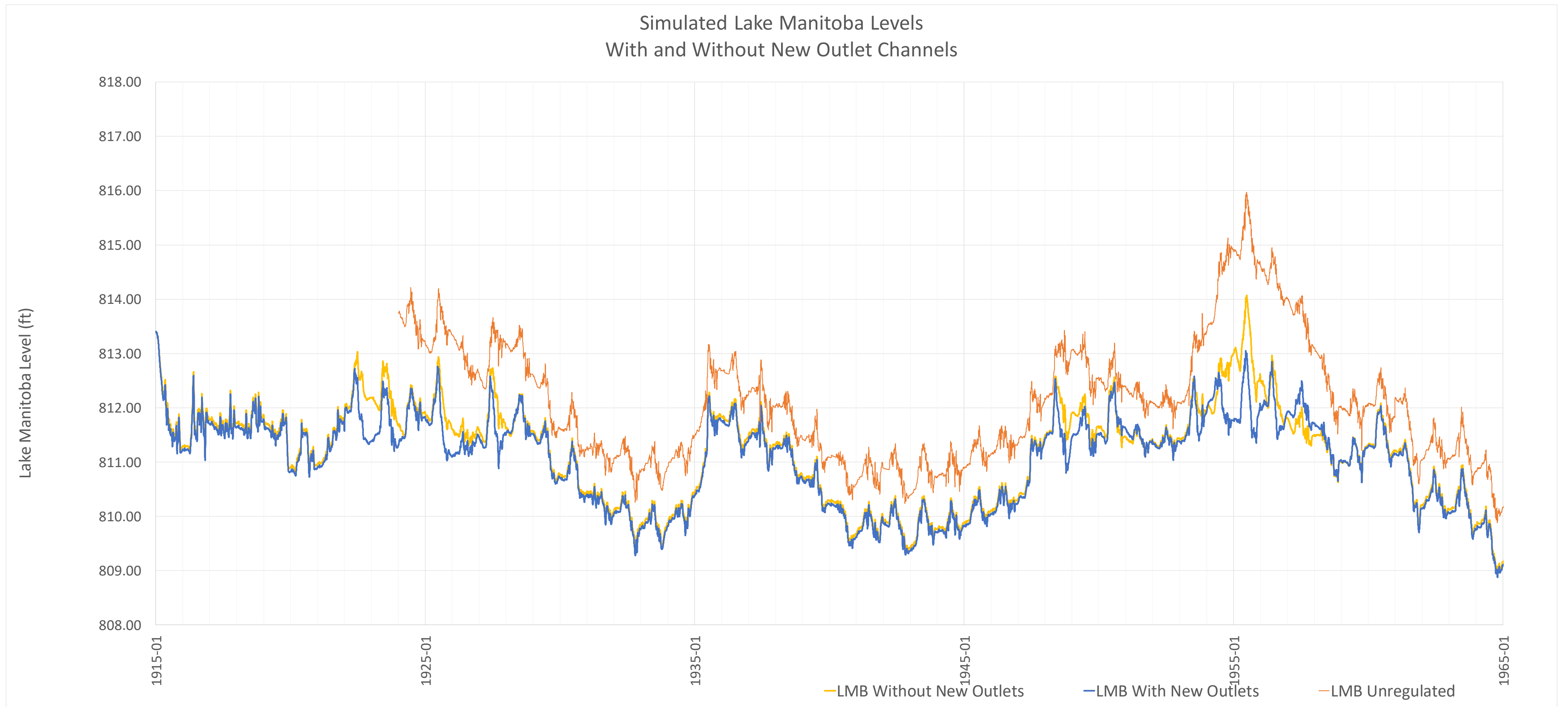


Year with Change	Additional Diverted Volume from Portage Diversion (ac*ft)	Additional Days Of Operation
1922	75,372	0
1923	134,052	3
1979	43,863	0
2001	2,993	0
2009	5,402	0
2013	16,345	0
2015	144,407	30

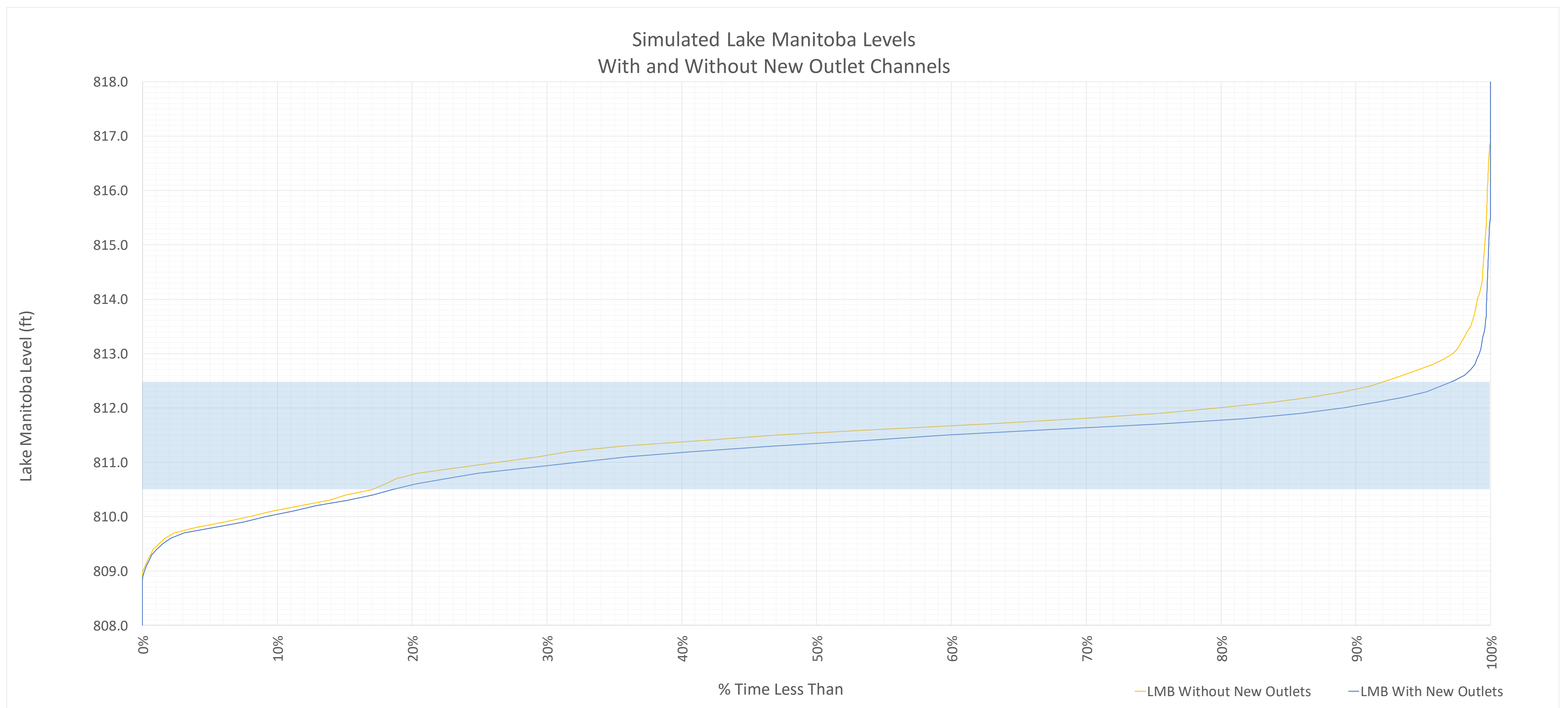
**Percent Total Increase in Volume Diverted to Lake Manitoba 2.1%**

**Percent Total Increase in Portage Diversion Operating Days 1.9%**

**New Years of Portage Diversion Operation 0**







Use of the new outlet channels increases the amount of time that Lake Manitoba stays within the desired operating range of 810.5 ft to 812.5 ft.

- . Currently Lake Manitoba is below 813.0 ft approximately 97.2% of the time.
- . With the new outlets, Lake Manitoba will be below 813.0 ft 99.1% of the time