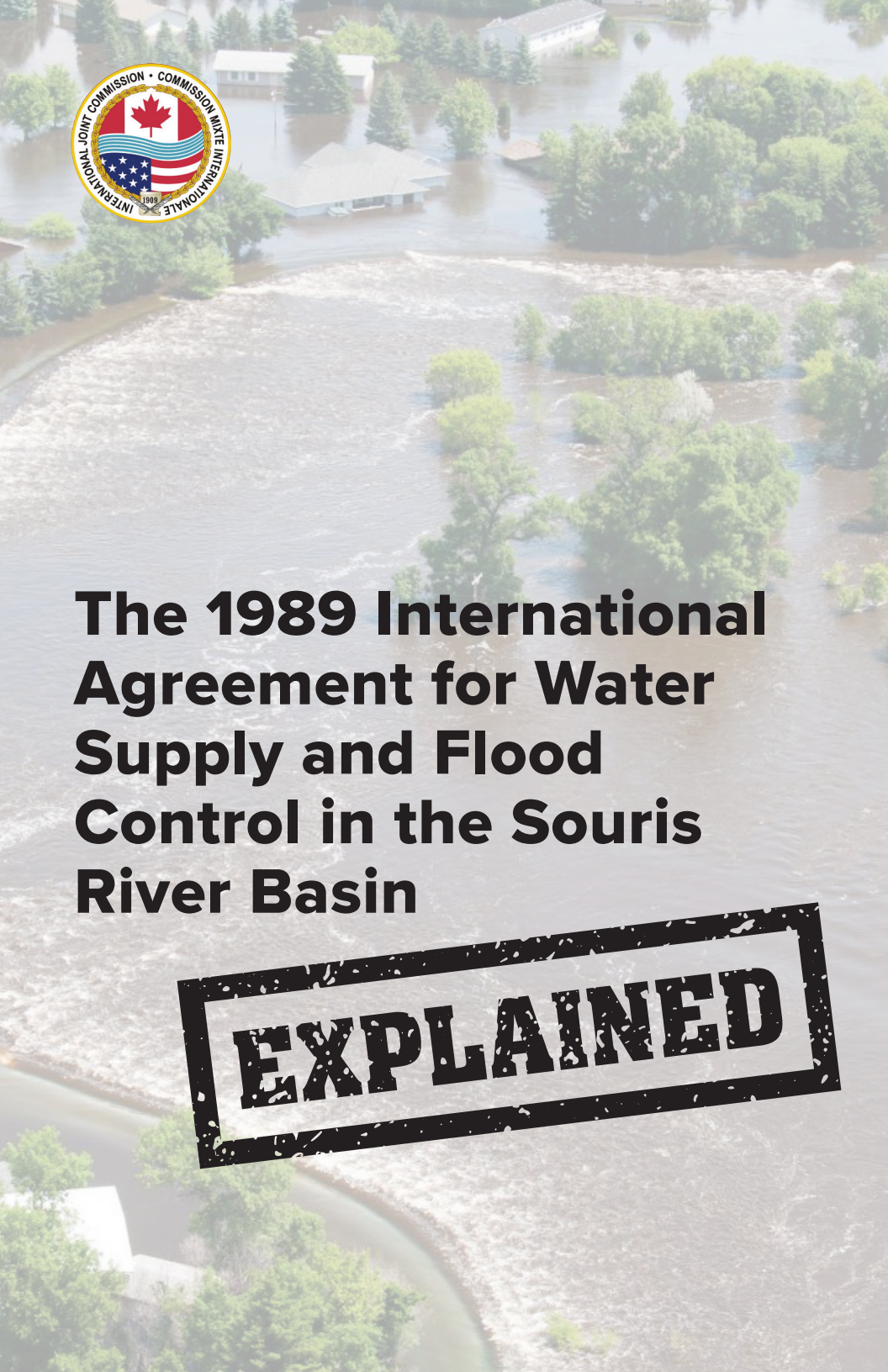


The 1989 International Agreement for Water Supply and Flood Control in the Souris River Basin

EXPLAINED

The ***International Joint Commission*** (IJC) created the International Souris River Study Board in 2017 in response to the US and Canadian governments' request to evaluate and make recommendations regarding the operating plan contained in Annex A and B of the 1989 International Agreement for Water Supply and Flood Control in the Souris River Basin. Read the ***directive*** to the study board.

Generally, the ***Agreement*** coordinates the operation of the Rafferty, Grant Devine (formerly Alameda), Boundary, and Lake Darling reservoirs, and provides for the administration of a joint water quality program.

Many agencies cooperate with the IJC in the management of the Agreement including:

THE AGREEMENT – EXPLAINED!

The purpose of the Agreement, generally, is to provide water supply to Canada and flood control to the United States. The following is a summary of the accord:

Article II

Canada will provide the US with a minimum 377,800 acre-feet (ac-ft) / 466,000 cubic decametres (dam^3) of flood storage -- 265,200 ac-ft / 327,100 dam^3 at Rafferty Reservoir and 112,600 ac-ft / 138,900 dam^3 at Grant Devine Lake.

Article III

Canadian works are to be operated and maintained by Canada at no cost to the US. Canada must notify the US of any maintenance curtailment, providing one year's notice when possible, and minimize the effects of the curtailment.

Article V

The parties will prepare regulation manuals for the reservoirs in consultation with interested states and provinces. They will review the operating plan at five year intervals, or as mutually agreed, to optimize the flood control and water supply benefits.

Article X

The Province of Saskatchewan is responsible for the construction, operation, and maintenance of the structures in Canada.

Article XIII

The agreement is in effect for 100 years (1989-2090) or until the useful life of Rafferty and Grant Devine (formerly Alameda) has come to an end—whichever comes first.

Annex A

Provides the operating plan for the Rafferty, Grant Devine (formerly Alameda), Boundary and Lake Darling reservoirs, which is used for flood control and water supply. A key objective of Annex A is to provide 1:100 year flood protection at Minot, North Dakota. The 1% level of protection at Minot allows a maximum discharge of 5000 cubic feet per second (cfs) / 141.6 cubic metres per second (m3/s).

Annex B

Contains rules for low flow and apportionment, calculated annually by Environment and Climate Change Canada. In short, the Province of Saskatchewan is obligated to pass 40 or 50 percent of the flow naturally arising in that province to the United States. When local flow is insufficient, the Water Security Agency typically uses Grant Devine Lake to meet the province's obligations.

*Refer to the Glossary on page 6 for an explanation of measurements and terms used in this pamphlet.

ANNEX A – EXPLAINED!

OPERATING PLAN FOR RAFFERTY, GRANT DEVINE (Formerly Alameda), BOUNDARY, AND LAKE DARLING RESERVOIRS

General Operating Principles

1. Achieve drawdown targets prior to the start of runoff.
2. Store all reservoir inflows up to full supply.
3. Release surplus volumes without exceeding the target flow at the Sherwood Crossing, the international gaging station located where the Souris River flows into North Dakota from Saskatchewan.
4. Return the reservoirs to full supply in a timely manner.
5. Release flows in a similar pattern to what would have occurred in nature, as much as possible.
6. Ensure that apportionment obligations are being met.

Spring Runoff Forecasts

The Water Security Agency releases spring runoff forecasts, beginning around February 1 of each year, with subsequent forecasts at the middle and end of each month until runoff occurs. These forecasts are available at ***wsask.ca***

Forecasts are used to determine when flood operations will be in effect. They are also used to set the target flow at the Sherwood Crossing. The target flow applies to controlled releases, generally after the reservoirs have filled.

Reservoir Drawdown

It takes time to get water out of the reservoirs. To achieve drawdown targets prior to the start of runoff, water levels begin to be lowered in October. This contributes to flood storage, and helps to ensure flows are steady while ice is forming.

Normal Drawdown Levels:
Rafferty = 549.5 m (1802.82 ft)
Grant Devine = 561.0 m (1840.55 ft)
Lake Darling = 1596 ft (486.46 m)

A normal drawdown level is the maximum level of the reservoir on February 1 of each year.

FLOOD OPERATIONS – EXPLAINED!

Flood operations are in effect when the spring runoff estimate on February 1 or later shows a 50% or greater chance that:

- the estimated 30-day unregulated volume at Sherwood is equal to or exceeds 175,202 ac-ft / 216,110 dam^3 (about a 1:10 year event) and/or
- the local 30-day volume at Sherwood is expected to equal or exceeds 29,996 ac-ft / 37,000 dam^3.

When flood operations are in effect, additional drawdown of the reservoirs may be required to store higher than anticipated flows. These drawdown levels are based on forecasted inflows to individual reservoirs. Given the importance of water supply at Boundary Reservoir, an additional drawdown on Rafferty Reservoir may be used in lieu.

Flood operations end when the flood volumes have been safely passed through the reservoirs, and the flow at Minot is at or below 500 cfs (14.2 m^3/s).

When significant flooding occurs, the focus is to limit downstream damages while not endangering the structures themselves. This may require flows greater than 5000 cfs (141.6 m^3/s) at Minot prior to June 1.

The Canadian reservoirs are operated to ensure target flows, as outlined in the Agreement, are not exceeded at the Sherwood Crossing and consider the levels at Lake Darling and the flow at Minot.

Did you know? On average, flood operations occur in one of every 10 years.

The reservoirs must be operated as a system to achieve 100 year flood protection at Minot, which means a 1% chance of a flood occurring in any given year. When runoff events are larger than the system's design, as occurred in 2011, flood protection is limited and it may not be possible to meet all of the terms of the 1989 Agreement.

*Refer to the Glossary on page 6 for an explanation of measurements and terms used in this pamphlet.

NON-FLOOD OPERATIONS – EXPLAINED!

Most years are non-flood years. During this time, the focus turns to water supply and conservation.

General Principles

- The flow passed to North Dakota will be 40 to 50 percent of the natural flow at the Sherwood Crossing.
- An apportionment balance will be estimated by the Souris River Board. If additional releases are needed to meet the apportionment balance, North Dakota will assess its needs, and may call for a release any time prior to October 1.
- If a delayed release is called for, it will be measured at the point of release. The delivery at Sherwood should not be less than the release minus the losses that would have occurred under natural conditions between the point of release and Sherwood.
- If the release is not needed, it may be retained for use in Canada.
- The annual apportionment balance will be determined on or about October 1 of each year. Any shortfall of the North Dakota apportionment remaining as of that date will be delivered by Saskatchewan before December 31.

GLOSSARY

1:100 Flood Risk

A 1:100 flood has a 1% chance of occurring every year and a 39.5% chance of occurring at least once over a period of 50 years. This is the level of protection intended by the Agreement for Minot, North Dakota.

1:10 Flood Risk

A 1:10 flood has a 10% chance of occurring every year, and a 99.5% chance of occurring at least once over a period of 50 years.

30-Day Volume

Maximum 30-consecutive-day volume that occurs in the water year.

Acre-feet and cubic decametres

An acre foot, written as ac-ft, is a unit of volume equal to an area of one acre—about ¾ as big as a football field, one foot deep.

The cubic decametre, abbreviated as dam^3, is the metric unit of area equal to 1,000 cubic metres, and is used to describe large volumes of water, as in rivers and lakes.

Cubic Feet per Second and Cubic Metres per Second

Cubic feet per second, written as cfs, is a unit used to measure water flow. One cfs is equal to 449 gallons per minute.

Cubic metres per second, abbreviated as m^3/s, is the metric unit used to measure water flow. One m^3/s is equivalent to 1000 litres per second.

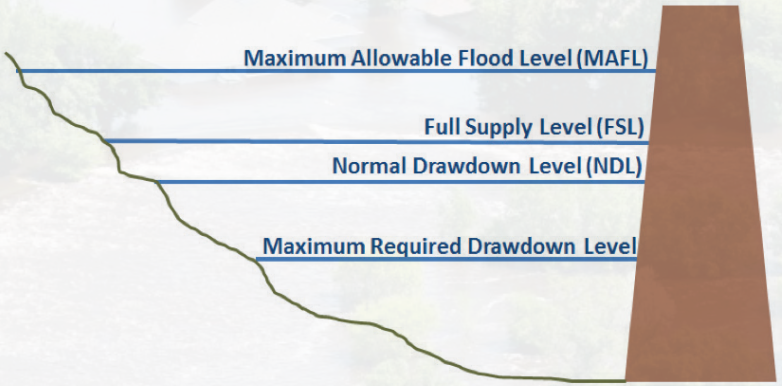
Target Flow

The instantaneous flow at a given location that should not be exceeded during a given flood event as a result of releases from a reservoir or reservoirs.

Unregulated Flow at the Sherwood Crossing

The flow that would occur at the Sherwood Crossing if Rafferty, Boundary, and Grant Devine dams were not in place. Sherwood Crossing refers to the international gaging station located where the Souris River flows into North Dakota from Saskatchewan.

OPERATING LEVEL TERMINOLOGY



	Rafferty	Grant Devine (formerly Alameda)	Lake Darling	Boundary
Maximum Allowable Flood Level highest level to which dam safety engineers are comfortable temporarily surcharging the reservoir	554.00 m/ 1817.59 ft	567.00 m/ 1860.24 ft	487.98 m/ 1601 ft	N/A
Full Supply Level highest level to which dam safety engineers are comfortable holding the reservoir over the long term	550.50 m/ 1806.1 ft	562.00 m/ 1843.83 ft	486.76 m/ 1597 ft	560.83 m/ 1840 ft
Normal Drawdown Level maximum level the reservoirs can reach on February 1	549.50 m/ 1802.82 ft	561.00 m/ 1840.55 ft	486.46 m/ 1596 ft	N/A
Maximum Required Drawdown lowest level the agreement requires for drawdown, though further drawdown is possible	547.50 m/ 1796.26 ft	555.85 m/ 1823.65 ft	484.93 m/ 1591 ft	557.78 m/ 1830 ft
Minimum Supply Level lowest level at which water can be released from a reservoir	537.50 m/ 1763.45 ft	555.85 m/ 1823.65	480.67 m/ 1577 ft	553.21 m/ 1815 ft