

BULLETIN

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Red River Basin Flood Potential for Spring 2001 - Status Report

Introduction

The November 20, 2000 edition of Thompson's World Insurance News (daily electronic service) contained an article on the Red River that said: "Depending on weather conditions in the next little while, Manitoba could be facing another 'flood of the century' next Spring." According to this report, the Red River was running at much higher than normal levels for that time of year and the ground was saturated with water.

That article led to this investigation into the potential for serious flooding in the Red River basin in the spring of 2001.

Recent heavy rainfall during the spring break-up has led to increased fears of flooding in the Red River Valley.

Background

The Red River flood in the spring of 1997 was the greatest flood on record along much of the river, resulting in over US\$ 1.7 billion in economic losses and almost US\$ 400 million in insured losses in Canada and the United States according to Munich Reinsurance. In

Winnipeg, it was the largest flood since 1826, making 1997 the flood of the 20th century for the Red River. The 1826 flood is still the record holder in Winnipeg (no records from the U.S. at that time).

Geographically, the Red River flows south to north from the states of Minnesota and North Dakota to southeastern Manitoba before discharging into Lake Winnipeg. The city of Winnipeg (population approximately 670,000) is the largest urban centre on the river, located at the confluence of the Red and Assiniboine Rivers about 60 km (35 miles) south of Lake Winnipeg. The majority of the Red River basin or watershed - excluding the Assiniboine River - is located in Minnesota and North Dakota.

The flow of the Red River has historically been highly variable, resulting in both floods and droughts. There have been other major floods along the Red, notably in 1897, 1950 and 1979.

Causes of the 1997 Flood

Several climatic events conspired to produce the great floodwaters in the spring of 1997. The autumn of 1996 was wetter than normal in the Red River basin. This was followed by record or near-record snowfall over the course of the

winter. Heavy precipitation continued in early spring of 1997.


The snow had begun to melt in the southern portion of the basin at the end of March when the basin was hit by a major blizzard in early April, depositing up to 48 cm (19 inches) of snow over most of the area.

Floodwaters were soon rising and the towns of Fargo, ND and Grand Forks, ND were inundated by April 22nd. The floodwaters continued north into Manitoba, peaking around May 4-5th in Winnipeg, where the Winnipeg Floodway (completed in 1968), diking and large-scale emergency measures spared the city. Surrounding farmland and non-diked communities were inundated by an inland sea up to 40 km (25 miles) wide.

There are a few non-climatic considerations that worsen the flood problem as well. The Red River valley is very flat. Floodwaters will spread out widely once the river overflows its banks. The flood plain also has clay soils with a low capacity to absorb water, thereby reducing natural infiltration into the ground. Lastly, the river flows northward, increasing the potential for ice jams to back-up rising floodwaters.



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In general, the largest floods usually occur in the Red River basin when there is heavy rainfall the previous autumn, a hard frost prior to snowfall, substantial snowfall over the course of the winter, and then heavy rainfall or wet snow conditions during the spring break-up.

Recent Flood Mitigation Efforts

The federal governments of Canada and the United States asked the International Joint Commission (IJC) - a binational organization established in 1909 to help Canada and the United States manage their shared waterways - to analyze the causes of the flood and make recommendations to minimize future damage from major flooding of the Red River.

The IJC established the International Red River Basin Task Force to conduct this study. The IJC report to the two federal governments titled "Living with the Red" (dated November 2000) containing the task force conclusions and recommendations is available on their web site at www.ijc.org. The IJC report is the source of most of the above information in this report.

The federal and provincial governments have not been idle since the 1997 flood. In March 1998, they signed the Canada/Manitoba Agreement on the 1997 Red River Valley Flood Proofing and Dike Enhancement. This agreement provided \$30 million for flood protection measures such as

elevating or diking individual residences and businesses damaged by flooding in 1997.

More long-term flood protection measures are being addressed by the Canada-Manitoba Partnership Agreement on Red River Valley Protection that was signed on April 1, 1999. This four-year, \$100 million agreement will provide for:

- the construction of ring dikes around 15 communities (\$35 million)
- an individual flood protection program for some 3,000 eligible applicants (\$44 million)
- enhancement of Winnipeg's secondary dike system (\$10.5 million)
- repairs and improvements to the provincial flood control infrastructure (\$4.5 million)
- further research and data collection on flooding and flood forecasting (\$5 million)

As of January 2001, five of the community ring dikes have been completed and another four are well underway. The ring dikes for the remaining communities are in the planning/design stage. Approximately 1,500 of the flood-proofing projects for individual homes, farms and businesses in the Red River valley have also been completed.

In Winnipeg, the refurbishment of the inlet control structure for the Red River Floodway is in progress, reconstruction of the west dike of the Red River Floodway entrance is nearing completion, and a project to notch the outside embankment of the Floodway is just beginning. The city is improving flood preparedness

by preparing a comprehensive flood activity manual.


A major study for a higher level of flood protection for Winnipeg has been initiated as well. It will look at increasing the capacity of the Red River Floodway or building a flood control structure near Ste. Agathe, MB, approximately 30 km (18 miles) upstream of Winnipeg.

Improvements have also been made to Manitoba's flood forecasting capability. Additional stream flow and water level information is available from new and improved gauging stations, a new climatic network of 160 stations will be operational next spring in southern Manitoba, and new weather radar imagery will soon be available. A mathematical, flood routing model of the Red River valley has been developed that will improve forecasting of water levels in the flood plain.

Most if not all of the above improvements are in compliance with the IJC recommendations.

Current Forecast Information

The Water Resources Branch of Manitoba Conservation (provincial government ministry) has several documents and study reports pertaining to Red River flooding on their web site at www.gov.mb.ca/natres/watres. Previously, the most important document was their updated "Spring Flood Prospects for Manitoba" dated March 23,



2001. A two-page summary of this forecast is also available at the same web site under News Releases.

More recently, an updated flood forecast for the Red River was issued on April 9, 2001 by Manitoba Conservation because of extensive rainfall over most of the U.S. portion of the Red River watershed. Between 25 mm and 50 mm (one to two inches) of rain fell over the previous weekend, producing heavy run-off on top of the snow melt run-off.

The revised forecast now calls for the Red River water levels to rise close to those observed during the 1996 flood. The crest is expected at Emerson, MB (at the U.S. border) on April 22 and in the Winnipeg area on April 27.

In 1996 there was extensive flooding of agricultural lands from Emerson to the Winnipeg Floodway Inlet. However, there would be few buildings flooded due to the extensive flood proofing activities undertaken since 1997. Existing flood control works would adequately protect the city of Winnipeg, as they did in 1996. It is interesting to note that the Winnipeg Floodway was put into operation on Saturday, April 7, 2001.

Minor flooding is currently happening in the Breezy Point area due to ice jamming. Breezy Point is located north of Winnipeg where the Red River flows into Lake Winnipeg. Significant flooding could occur if more serious jamming develops, but forecasters considered it unlikely that the levels of 1996 will be repeated in this area.

Future Forecast Information

The end-of-March flooding forecast from the Water Resources Branch of Manitoba Conservation was supposed to be the last forecast unless unusual conditions developed. The recent heavy rainfall in early April resulted in the updated flood forecast of April 9, 2001.

Another updated flood forecast may be issued if unusual conditions continue to develop.

Conclusions

The International Joint Commission report "Living with the Red" concludes that "Flooding in the Red River basin is a natural hydrometeorological event. Although the 1997 flood was a rare event, floods of the same magnitude as 1997, or even greater, can be expected to occur in the future."

Based on the current spring flooding forecast, it looks like there will be extensive flooding of agricultural land in the Red River Valley this April from Emerson, MB at the U.S. border to the Winnipeg Floodway Inlet, similar to that experienced in 1996.

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Munich Reinsurance Company of Canada

Special Risks Department,
Munich Re Centre,
390 Bay Street, 22nd Floor,
Toronto, Ontario
M5H 2Y2

Main:416-366-6245
Fax:416-366-6528
Toll Free:1-800-268-9705