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# The drain on the plain

## Tracing our flooding woes to the legacy from the loss of wetlands

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*The Broughton's Creek Watershed.*

According to the official account, the most expansive and expensive flood in southern Manitoba's modern history was the inevitable result of too much rain and snow.

The 2011 Manitoba flood wreaked havoc across the Assiniboine River basin. It devastated century-old communities along Lake Manitoba. It led to the emergency construction of a channel between Lake St. Martin and Lake Winnipeg. The cleanup and emergency price tag, so far, is \$732 million.



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*Pascal Badiou (left) and Shane Gabor.*  
(JOE BRYKSA / WINNIPEG FREE PRESS)

A combination of record precipitation, soil saturation and snowpack led to the widespread natural disaster, which remains ongoing for lakefront residents and will soon adversely affect First Nations along the Nelson River in northern Manitoba.

But a portion of the blame for what is first and foremost a natural disaster may also be laid at the feet of human beings who live on the Canadian Prairies.

The eradication of marshes, sloughs and potholes from southern Manitoba and Saskatchewan increased the severity of the catastrophic 2011 flood, contend researchers who've measured the relationship between the ongoing loss of wetlands and increased downstream flows. They believe what was already a significant flood was compounded by the

elimination of wetlands from agricultural lands.

And in a cruel bit of news for Manitobans who panicked to protect their homes and farms southeast of Portage la Prairie in May, the researchers also believe a two-year freeze on wetlands drainage across

the Assiniboine River basin could have held back enough water upstream to prevent the need for the nerve-racking Hoop and Holler cut.

"We would have had a flood no matter what this year. But there is a relationship between drainage (of wetlands) and flooding," said Shane Gabor, a Ducks Unlimited research biologist who holds the view the 2011 flood was partly anthropogenic -- in other words, caused by human beings.

What he is saying is hardly provocative in conservation circles, even as it might annoy officials eager to deny any human role in Manitoba's worst natural disaster. But the human role goes back to the beginning of European settlement.

In what's now considered a short-sighted pioneer-era practice, many of the major wetlands in the southern prairies were drained within the first few decades of colonization. The Boyne Marsh southwest of Winnipeg, Big Grassy Marsh north of Gladstone and countless smaller marshes were systematically drained between the 1880s and the 1920s. This loss of wetlands exacerbated the drought-stricken Dustbowl of the 1930s, prompting pledges to never drain wetlands again. But human memory is short.

The systematic elimination of smaller marshes, sloughs and potholes proceeded throughout the 20th century and continues almost unabated today, despite an increasing body of scientific knowledge about the environmental benefits of preserving wetlands, which include nutrient removal, carbon storage, habitat preservation, as well as drought mitigation.

The drainage continues because grain, vegetable and cattle farmers face increasing financial pressures to produce as much as possible from the increasingly large plots of land they own and lease, often in tight time frames that make it impractical to manoeuvre large pieces of machinery around small patches of wetlands.

"When you have farmers working 10,000 or 20,000 acres, they're working 12 hours a day to keep up. We're seeing tree shelter belts planted in the 1980s being pulled out because guys with 60-foot rigs won't go around it," said Bryan Osborne, a spokesman for the Tobacco Creek Model Watershed, where conservation-minded farmers are taking part in research into a variety of sustainable-agriculture practices.

"It all comes down to the micro-economics of farming," added Hank Venema of Winnipeg's International Institute for Sustainable Development. "If you're looking at developing an area to squeeze out an increment of production, you'll do what's best for your farm and your family, not to mitigate flooding downstream somewhere else."

As a result of the pressure to drain, at least 100,000 hectares of wetlands have disappeared from southwestern Manitoba alone since 1950, with another 250,000 hectares disappearing from southern Saskatchewan during the same time frame, according to Ducks Unlimited calculations.

In their natural state, wetlands store snowmelt and summer rains from a wider area -- typically, four times larger than the slough or pothole in question -- and then release this water slowly. Draining wetlands allows this water to flow quickly downstream.

Conservation-minded farmers have long suspected this drainage has exacerbated spring flooding, but have only been able to provide anecdotal evidence. Red River Valley grain farmers have pointed to earlier and earlier spring floods, while cattle farmers along the upper Assiniboine near the Saskatchewan border complain the gentle streams of their childhood have been transformed into ravines by increasing flows.

There is some meat behind the theory, as researchers have started to quantify the relationship between drainage and increased downstream flows.

In findings that could influence the way agricultural land is developed in both Manitoba and Saskatchewan, they've concluded the drainage of wetlands compounded the 2011 flood.

"I don't think there's any doubt," said Pascal Badiou, a Ducks Unlimited research scientist who employed computer modelling to chart 37 years worth of wetlands loss in a small drainage basin called the Broughton's Creek watershed, near the town of Rivers in western Manitoba.

Using aerial photos, Ducks Unlimited mappers determined 70 per cent of the wetlands in this 260-square-kilometre watershed ---- about 5,900 of 8,500 acres -- were either drained or completely eradicated between 1968 and 2005. This added 31 square kilometres to the portion of the watershed that gets drained downstream, Badiou and colleague Gabor concluded.

The researchers then employed computer models developed at the University of Guelph in Ontario and Tarleton University in Texas to figure out how water flowed out of this watershed in 1968 and 2005. They found the flows increased by 62 per cent a year and 32 per cent during periods with the highest flows, such as the spring snowmelt and summer rains.

"We were being very, very conservative," said Badiou, noting the computer modelling only took into account the loss of the water-storage capacity of a portion of every wetland -- the upper 20 centimetres of a shallow prairie pothole, where snowmelt or rainfall pools before it spills the edge naturally.

The actual loss of capacity may in fact be far greater, he said. Nonetheless, these findings have

implications for the entire prairie pothole region, which stretches across a wide swath of southern Manitoba and Saskatchewan. Since almost every small basin within the region has lost wetlands at a similar rate in recent decades, Badiou and Gabor estimated southern Manitoba and Saskatchewan have lost 700 million cubic metres of water-storage capacity, a volume equal to that of seven Shellmouth Reservoirs. And the estimated loss of storage capacity over the past two years alone -- 9.2 million cubic metres -- easily exceeds the total amount of water that flowed through the Hoop and Holler cut, Badiou said.

At South Tobacco Creek, which flows down the Manitoba Escarpment west of Miami, complementary research led by the Tobacco Creek Model Watershed supports the Ducks Unlimited findings. The construction of 26 small dams -- essentially, artificial wetlands -- within a 79-square-kilometre drainage basin between 1991 and 1995 reduced peak flows on the creek by 26 per cent, said Les McEwan, a grain farmer who serves as chairman for the model watershed.

The dams temporarily slow the flow of water off the escarpment. They cost a total of \$250,000 to build, said McEwan, adding it's a lot cheaper to store water upstream than it is to clean up after floods.

"The water flowing into Lake Winnipeg and Lake Manitoba is unmanageable. We have to hold it back at the top of the watershed," McEwan said. He would like to see a network of similar small dams at the top of small drainage basins across southern Manitoba and Saskatchewan.

The Red River Basin Commission, which spans the Canada-U.S. border, has already committed to using small dams to reduce peak flows on the Red River by 20 per cent, said Dwight Williamson, assistant deputy minister for Manitoba Water Stewardship, the provincial ministry responsible for flood protection.

North Dakota and Minnesota have already started to put such dams in place, he said.

Williamson praised the research conducted at Broughton's Creek and South Tobacco Creek for providing more evidence of the role wetlands play in flood protection. But he disputed the suggestion the loss of wetlands played a role in the catastrophic 2011 flood.

"In an average year, (drainage) does lead to additional water moving downstream," Williamson said. "This year, the landscape was so overwhelmed by water, virtually all wetlands would have been connected in any case."

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## The numbers

### **Wetlands eliminated in southern Saskatchewan since 1950:**

250,000 hectares

### **Wetlands eliminated in southern Manitoba since 1950:**

100,000 hectares

### **Estimated loss of water-storage capacity as a result:**

700 million cubic metres

### **How much water is that?**

It would fill western Manitoba's Shellmouth Reservoir, which is used to hold back flood waters on the Assiniboine River, seven times.

### **Wetlands eliminated in Manitoba every year:**

700 to 1,000 hectares.

### **Estimated loss of water-storage capacity since 2009:**

9.2 million cubic metres.

### **How much water is that?**

More than the total flow through the Hoop and Holler cut.

-- Source: *Ducks Unlimited*

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