

RECORD RAIN-ON-SNOW FLOODING IN NORTH DAKOTA

by

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The Des Lacs River basin is located in northwestern North Dakota. It is a tributary of the Souris River and empties into the Souris about 30 km upstream from Minot, North Dakota. The Des Lacs drains an area of about 2400 km² above the U.S. Geological Survey river gage at Foxholm, North Dakota. About 1,000 km² of the area is noncontributing. The river lies in a 1.5 km wide valley which is about 60 m below a treeless plain.

There are three low dams located on the Des Lacs River. The first is about 16 km below the town of Kenmare. These structures are part of the Des Lacs National Wildlife Refuge and do not affect peak flows at Foxholm. Consequently, the record snowmelt flooding at Foxholm occurred from an area approximately 800 km² in size.

Events leading to the April 19, 1979 record snowmelt flood on the Des Lacs River were:

- Fall 1978 - The fall precipitation (August through October) in and around the Des Lacs drainage ranged from 90 percent to 142 percent of normal. Moisture totals ranged from 102 to 172 mm. September was the wettest month during the fall with precipitation averaging about 150 percent of normal.
- Early winter - Winter snow cover was established by the end of November. Snow depths in the Des Lacs basin were near 150 mm by the end of the month.
- Late winter - Peak snow depth/water content occurred in early March. Snow depths on March 5 varied from 200 to 560 mm with water content ranging from 50 to 130 mm in the basin.
- April 1 to 16 - Total precipitation during early April was 25 mm. All moisture during the month fell in the form of snow.

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Presented at the 51st Annual Western Snow Conference,
Vancouver, Washington, April 19-21, 1983.

- April 16 - Significant snowmelt began in mid-month. Snow depth/water content data indicate that the Tagus-Berthold area had approximately 150 mm of snow on the ground with a water content of approximately 60 mm.
- April 18 - High temperatures rose above 15°C in the Des Lacs basin. Strong southerly winds combined with sunshine to rapidly melt the snow cover. A cold front moved into western North Dakota in the late afternoon and showers and thunderstorms formed along the front. By early evening, rain fell over the Des Lacs basin above Foxholm. The precipitation continued into the early morning of April 19.
- April 19 - Precipitation totals for the 12 hour period ending at 6 a.m. on April 19 in the basin ranged from zero at Tagus to 15 mm at Berthold. East of the Des Lacs basin rainfall amounts at Lake Darling totaled 8 mm while at the Minot Air Force Base the total was 6 mm. The hydrograph for the U.S. Geological Survey river gage at Foxholm indicated a rapid rise during the early morning hours. A record stage of 6.47 m was reached at approximately 8 a.m. with a flow of 120.63 m³/s.

In the town of Carpio, North Dakota 215 people were forced from their homes while half the population at Foxholm, North Dakota (about 50 people) were forced to evacuate during the early morning of April 19. The return period for the record flow has been estimated by the U.S. Geological Survey as one in 50 years.