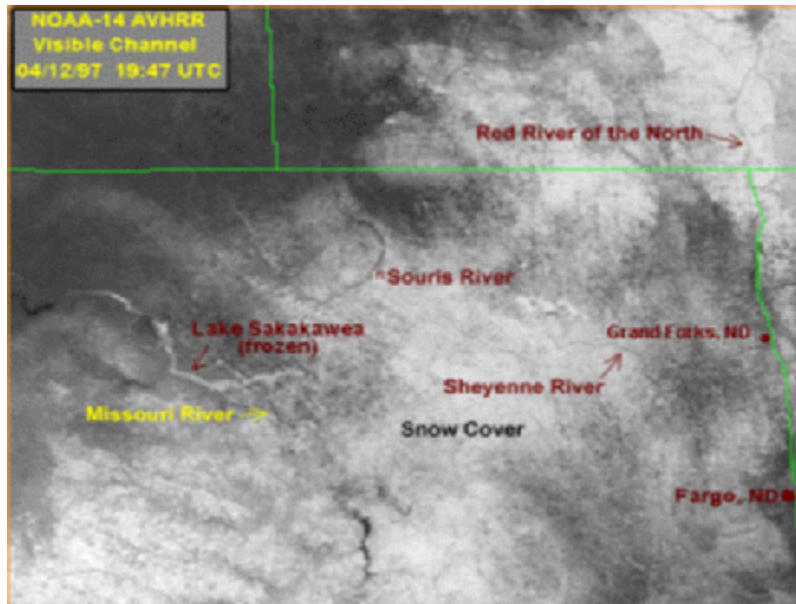


# Northern Plains Flooding



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## Brief Summary

The Red River broke the 100 year flood crest record at Fargo, ND on Thursday, April 17th, 1997. The river crested at 39.6 feet, 22.6 feet above flood stage, which also broke the 100 year record of 39.1 feet. Federal disaster aid was made available for people and communities in the Dakotas and portions of Minnesota. The declaration covers damage resulting from flooding, severe winter storms, high winds, heavy spring rain, rapid snow melt, and ice jams.

North Dakota has thus far reported 7 deaths, with Minnesota reporting 4 deaths. Approximately 90 percent of Grand Forks was under water at one point as the Red River crested at 26 feet above flood stage and remained near that level for several days. 60,000 residents were forced to evacuate Grand Forks and East Grand Forks. In the Grand Forks area alone, overall damages and cleanup costs are estimated in the \$1-2 billion range.

A long winter of numerous heavy snowstorms is to account for this disaster. Also, an early April blizzard which dumped up to 3 feet of snow in parts of the northern plains made river level forecasting even more difficult, as the water content and rate of melting of this new snow added another variable to the equation. Several records set by the Red River included:

Wahpeton--19.2 feet  
Fargo--39.6 feet  
Grand Forks--54.0 feet  
Pembina--54.9 feet

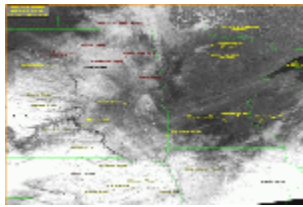
The Minnesota River also caused a great deal of damage, although less extensive than the Red River.

Finally, North Dakota's Devils Lake has expanded to more than twice its normal size and may set a new record for its highest level (existing record set in 1830). This has caused local flooding in the area and may worsen over the next few weeks.

This is the third major flood event of the past 5 months in the U.S., with late December - early January in California and the Northwest being the first, and early March in the Ohio Valley being the second. Damages for these events combined probably exceed \$4 billion.

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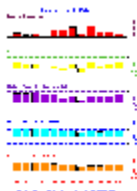
## Images



[Figure 1](#)  
400Kb

Click on image for larger view.

[Figure 1](#) is a 1 KM resolution satellite image of the Northern Plains on April 12, 1997 at 19:47 GMT. (2:47 PM CDT). The image clearly shows a deep snowcover over parts of the Dakotas and most of Nebraska where up to 1 foot of snow fell during a recent storm. Lesser amounts of snow are visible in other areas while across portions of Minnesota a forest canopy and cloud cover obscure the lighter snow cover. The image highlights many rivers in the various river basins across the Northern plains. Many rivers show up well in contrast with the surrounding snowcover. Ice jams, frozen lakes and rivers can also be seen. The severity of spring flooding over the Northern Plains is impacted by the following factors: heavy spring rains/snows, snowmelt, deep snowcover, freeze/thaw cycles, ice jams, and ground saturation due to high water tables. The National Climatic Data Center has divisional monthly data that is useful in these types of analyses.



[Figure 2](#)

Click on image for larger view.

[Figure 2](#) and [Figure 3](#) show trends for the January 1996 through December 1996 and January 1997 through March 1997 respectively. The graphs show the monthly values for North Dakota (Division # 6 - Fargo, ND area). Data plotted include, monthly divisional precipitation along with four Palmer Drought Indices: Palmer Drought Severity Index (PDSI), Palmer Hydrological Drought Index (PHDI), Palmer "Z" Index (ZNDX), and Modified Palmer Drought Severity Index (PMDI). The drought indices indicate the severity of a wet or dry spell. Indices generally range from -6 to +6, with negative values denoting dry spells and positive values indicating wet spells. Note the trend for positive Palmer Drought indices and fairly high precipitation amounts. The data and information on these indices for any of the 344 Climate Divisions in the U.S. can be plotted and then downloaded using our system [Climate Division data](#).



[Figure 3](#)

Click on image for larger view.

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## **Additional Resources**

[NWS National Operational Hydrologic Remote Sensing Center](#)  
[Federal Emergency Management Agency](#)  
[North Dakota State University - Coping with Floods](#)

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### Citing the Article

Ross, Tom; "Northern Plains Flooding", 1997, NOAA's National Climatic Data Center, Asheville, NC