THE
ATMOSPHERIC RESERVOIR
Examining the Atmosphere and Atmospheric Resource Management

Record Snows

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THE BISMARCK TRIBUNE

April 1997 Bismarck blizzard dumps 17 inches of snow and boosts the seasonal snowfall to a record 101.4 inches.

The "White Christmas" over eastern North Dakota this holiday season can be attributed to the record snowfall that the Fargo-Grand Forks areas received in early December. Storms of note were the Dec. 1st storm, which brought 7.4 inches of snow to Fargo and 5.9 inches to Grand Forks, and the Dec. 4th storm where Fargo received 5.9 inches and Grand Forks had 8.1 inches. Both storms produced daily record snowfalls for the cities. Because the fall months were drier than normal, these record snowfalls merely placed Fargo and Grand Forks a few inches above their seasonal normals. As of mid-December, most areas of western and central North Dakota were well below their normal snowfalls. Bismarck's snow deficit was 11 inches and Williston needed an additional nine inches of snow to reach their seasonal normal.

North Dakota's record snowfalls usually come from what are known as Colorado Lows. These low-pressure systems originate on the eastern or lee-side of the Rocky Mountains in Colorado and intensify as they move out onto the Central Plains. What separates Colorado Lows from Alberta Lows or "Clippers" is that they generally move slower and carry more moisture with them. When Alberta Clippers develop in Canada, they don't generally have an abundant moisture source to tap into. North Dakota typically receives snowfalls on the order of only a few inches from these quick moving storms. A Colorado Low, however, will generally transport significant amounts of water vapor from the Gulf of Mexico up through the Central Plains and provide the moisture needed for our record snowfalls. Oftentimes the center of a Colorado Low will pass well south of our state, but an inverted trough of low pressure can extend hundreds of miles further north and transport the abundant moisture needed.

When you're out shoveling snow, its moisture content is usually apparent by the weight required to lift each shovelful. If you've ever wondered just how much liquid water equivalent snow has, here is a general guide. When the air temperature is warmer, say 28 to 34 degrees Fahrenheit, the ratio of inches of snow to inches of water is approximately 10 to 1. Ratios of 20-40 to 1 are observed with air temperatures between 0 and 20 degrees Fahrenheit. In general, when it's warmer outside and snow is falling, more liquid water content is present.

Significant snowfalls aren't always welcomed by North Dakotans. Many people would prefer that we received the additional moisture as rain during the spring and summer growing season instead of as snow. However, for farmers growing winter wheat, snow cover is a necessity because it insulates the ground and provides winterkill protection for the wheat's crown. Research conducted here in North Dakota has shown that a snow cover of at least three inches is required for winter wheat protection. A four- to six-inch snow cover is ideal, especially during colder winters.

With snow cover being such a vital ingredient to growing winter wheat and grain prices reaching record highs, western and central North Dakota farmers are hopeful that a few inches of snow will cover their fields before the coldest months, January and February, are upon us.

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