



# The Rising Barometer

Winter 2005-06

Bringing you a fair look at weather in southeast Wyoming and the western Nebraska panhandle

First anniversary issue!

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The NWS in Cheyenne is pleased to offer a couple of new features on our web site. The first is the Enhanced Graphical Nowcast. During times of active weather, our forecasters will create a graphical representation of what they expect to happen in the next couple of hours and post it on our home page. In addition we will be rolling out a new page with climate information. This is part of a national plan to standardize each NWS office's climate resources on the internet. All of this is available at <http://weather.gov/cheyenne>

## Change Isn't All Bad

William Parker



The home of the National Weather Service in Cheyenne

As the Meteorologist in Charge of the Cheyenne NWS office over the past 21 years, I can honestly

say much has changed in our nation's weather services, and for the better. The weather service arrived in the Wyoming Territory in 1860 as part of the westward migration, and we've been providing services to the citizens of Wyoming ever since. We've moved around the city several times over the course of the past 145 years, and in 1994 we settled in at 1301 Airport Parkway. Our new office was part of a massive national modernization effort that resulted in a new building specifically tailored to the unique needs of modern weather operations, and we received a Doppler Radar (WSR-88D).

Today, the Cheyenne office is part of a network of 122 offices stretching across the country, each assigned a specific piece of geography referred to as the County Warning Area. Each office has the mission to protect lives and property and enhance commerce in its assigned area, 24 hours a day, year-round. Combined with our national centers for hurricanes, severe storms, climate and environmental prediction (to list only a few), and I can honestly state today's National Weather Service is "second to none."

Nowhere was this fact more evident than the recent forecasts for hurricanes, Katrina and Rita. The precision of these forecasts could not have been delivered a decade ago. Nor could the field offices have provided the kind of 24 hour support that was needed as these storms marched northward with their drenching rains, severe storms and associated tornadoes. Nowhere in the world could two major hurricanes strike a region of a county with similar population with so few casualties.



A peek inside the NWS operations area

## Equipment Check National Weather Service Radar

Ken Pomeroy

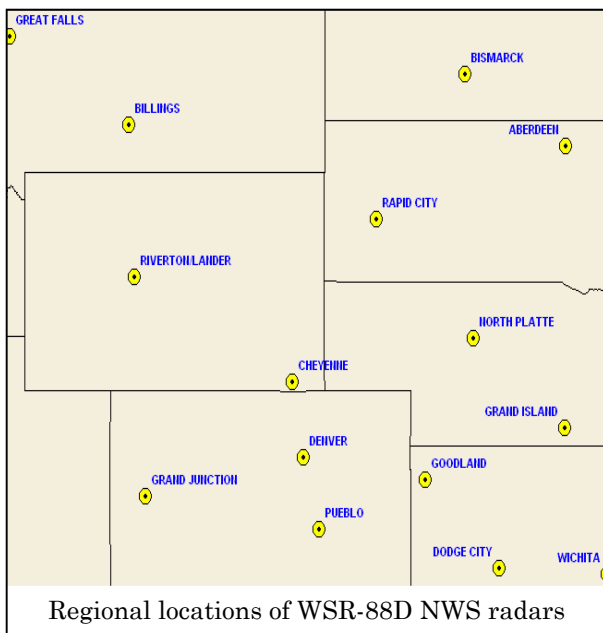
Perhaps the most important piece of equipment that National Weather Service forecasters utilize is the radar. The official name for our radar is Weather Surveillance Radar - 88 Doppler (WSR-88D). Many forecasters just call it "the 88D."

The radar is a great tool for short term forecasting. Many people think the radar is a simple apparatus, but there are complex operations associated with it.

The radar makes a sweep of the atmosphere at several different elevation angles about every five minutes. Once this is completed, we call it a "volume scan." Each volume scan gives us a complete picture of the precipitation occurring in the atmosphere.

Actually, it's not totally complete. The lowest elevation angle we are allowed to use rises 0.5 degrees from horizontal. This means the radar cannot see any precipitation occurring below this level. Close to the radar this is not much of a concern. But as the radar beam gets farther from the radar, it rises higher off the ground. This problem becomes more of an issue to the north and east of Cheyenne as the elevation of the land decreases.

For instance, at Kimball, the lowest radar beam is



Regional locations of WSR-88D NWS radars

6,000 feet off the ground. At Sidney, it is about 11,000 feet off the ground. At Douglas, the beam is 13,000 feet off the ground and at Chadron, it is about 20,000 feet off the ground!

Fortunately for people living in the northern Nebraska panhandle, we have access to the radar located in Rapid City. The lowest scan from the Rapid City radar is only about 8,000 feet off the ground at Chadron.



The radar located next to the Cheyenne Weather Forecast Office

This gap of missing data is not particularly troublesome during the summer, because thunderstorms typically rise as high as 30,000-40,000 feet off the ground. Severe thunderstorms rise even higher than that, and those are the storms that we are most concerned about. The complete volume scan allows forecasters to see vertically within the thunderstorm to determine if the structure of the storm has severe characteristics.

However, in the winter, clouds that cause precipitation are much less vertical, and when snow is falling in northern parts of our forecast area, the radar can miss it. This is when we rely on satellite imagery, but also on spotter reports. But most importantly we use reports from spotters like you to help us pinpoint where the nasty weather is located.

### Regional Winter Weather Trivia

- The coldest temperature in Wyoming was -66° F at Riverside Ranger Station February 9, 1933
- The coldest temperature in Nebraska was -47° F in Camp Clarke February 12, 1899
- The most snow in a single storm in Wyoming was 58 inches in Glenrock, April 18-20, 1973
- The most snow in a single season in Wyoming was 491.6 inches at Bechler River 1932-33
- The most snow in a single storm in Nebraska was 41 inches in Chadron, January 2-4, 1949
- The most snow in a single season in Nebraska was 104.9 inches in Kimball 1958-59



# Weather Folklore

Mike Weiland

Our ancestors were very much in tune with nature's signals and used small observable changes in animal behavior and plant growth to predict their weather. They used those predictions based on the changes in their environment to help them survive in the world. These observations about weather have been passed along for many generations as weather folklore.

You've probably heard of a variety of weather folklore and may even have a few of your own based on what you have seen over the years. In my opinion, since weather folklore is based on observations over time, they are based on facts and are usually true for the location from which it originated.



It is often said that rain will occur when leaves show their backs.

I will provide you with some of the weather folklore that may apply to our part of the country and you can come to your own conclusions. I'll also look at the reasons why a few of the tales are correct.

- If animals have an unusually thick coat of fur, expect a cold winter.
- When squirrels bury their nuts, it will be a hard winter.
- Roosting birds indicate an upcoming storm.
- When leaves show their "backs", it will rain.
- A warm November is a sign of a bad winter.
- If the first snow falls on unfrozen ground, expect a mild winter.
- Horses run fast before a violent storm or before windy conditions.
- Expect rain and possibly severe weather when dogs eat grass.
- When the rooster goes crowing to bed, he will rise to a watery head.
- Evening red and morning gray are signs of a fine day.
- Birds on a telephone wire indicate the coming of rain.
- When fish break water and bite eagerly, expect rain.
- Campfires are more smoky before a rain.

As you can guess, there are countless others, based on

stories told over the years about what people noted. As a side note, even in modern-day weather forecasting, the key to a good forecast is good observations of the weather. Now we watch for what clouds are doing and what type they are, what winds are doing, etc. to help come up with a forecast.

So, let's take a look at a few of the more common words of weather wisdom, or weather folklore. One that comes to mind is the saying, "Red sky at night, sailor's delight; Red sky in the morning, sailors take warning." Although there are likely more sailors in other parts of the country, this piece of weather folklore applies even here. That is because a red sky in the evening is a result of light interacting with dry dust particles and indicates dry weather is coming. A gray evening sky means that the atmosphere has many water droplets and that rain will likely fall in the near future. Interestingly enough, a similar saying is in the Bible and can be found in Matthew 16:2-3.



The red sky at night usually means dry times are ahead.

It has also been noted that when animals become quite active or act differently, they are responding to changes in pressure and possibly other atmospheric factors. As some of you may recall, when the atmospheric pressure is low or falling rapidly there is a good possibility of an upcoming storm.

Some sayings that talk about increased activity in animals meaning upcoming weather include: bluebirds chatter when its going to rain; before a storm, cows will lie down and refuse to go to pasture; ants are busy, gnats bite, crickets sing louder than normal, and flies gather in houses just before a rain.

As you can see from these examples, our weather folklore is based on observed facts, which meteorologists now can relate to changes in advance of upcoming weather. Weather folklore is fun to think about and actually can help predict the upcoming weather for the next 24 hours or even the next season.

# Avalanche!

Mike Weiland

Avalanches are a common occurrence in the mountains around the world, including those in Wyoming. In a large avalanche, snow encompassing 20 football fields filled to a depth of ten feet will slide down a slope. Each year, about 150 people die in avalanches with that number increasing over the past few decades. Locally, Colorado has the largest number of avalanche fatalities in the nation. The months of January, February and March have the highest occurrence of avalanches.

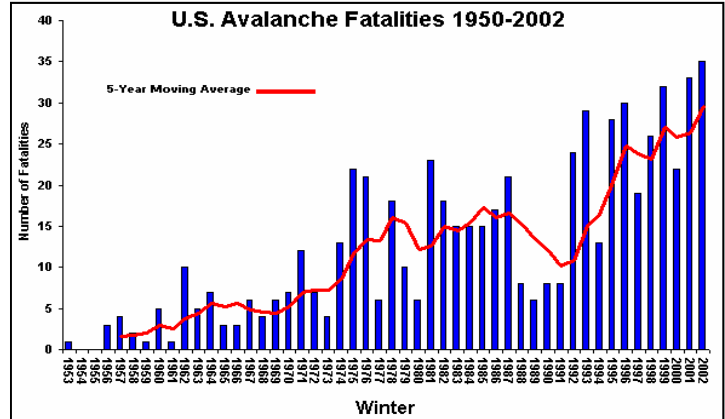
Avalanches usually occur where the slope is steep and right after a heavy and wet snow falls. That heavy snow causes the snow pack to become unstable as it does not bond completely with the existing snow pack. The snow pack conditions are very important as many layers of snow build up over the winter. Each layer was built with varying weather conditions, causing each layer to bond differently with the adjacent layers. In between snows, the temperature will rise and fall over the top, exposed layer. When that layer melts and refreezes, it creates a smoother surface upon which the next layer will not adhere.

With that in mind, there are several safety tips to remember so that you will be safer in the mountains this winter. First and foremost, avoid the areas where avalanches are more likely to occur. Those areas include steep slopes and where the slope lacks trees or is the shape of a narrow valley. Especially avoid being in those areas after a heavy, wet snow. Also, stay within the marked boundaries of ski areas - on most marked ski trails the avalanche danger will be minimized.



Avalanches can bring a large amount of snow down a mountainside in a short time.

If you are going to be in the backcountry in areas with the potential for avalanches, be sure to fasten all of your



Avalanche fatalities have steadily increased over the past 50 years, partly due to the increased use of snowmobiles in backcountry areas. (Graphic courtesy US Forest Service/Utah Avalanche Center.)

clothing in order to keep out snow. Loosen your pack, so that you can slip it off more easily and remove your ski pole straps. Perhaps the most important item nowadays is an avalanche beacon, which provides the quickest way for rescuers to locate a person caught in an avalanche.

For more information on avalanches and current avalanche danger, please visit the following website: [www.geosurvey.state.co.us/avalanche](http://www.geosurvey.state.co.us/avalanche). Enjoy this winter and be safe when you head to the mountains.

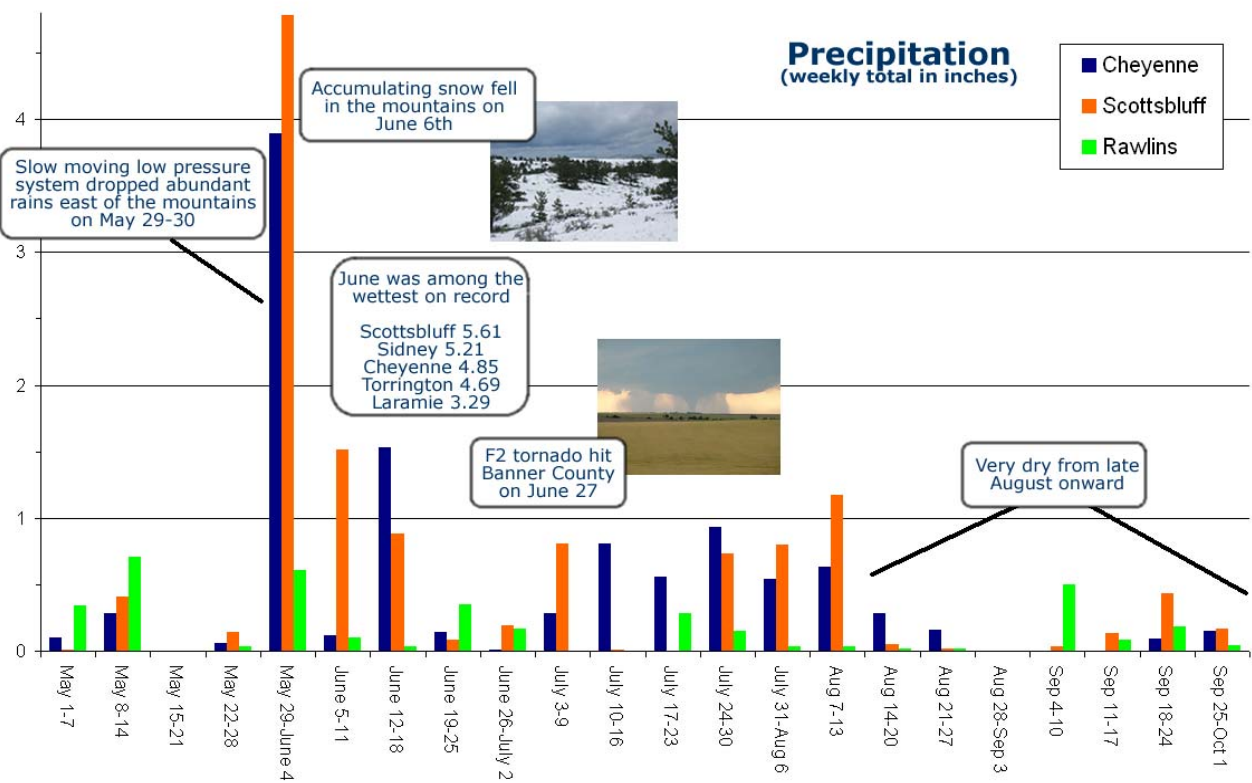
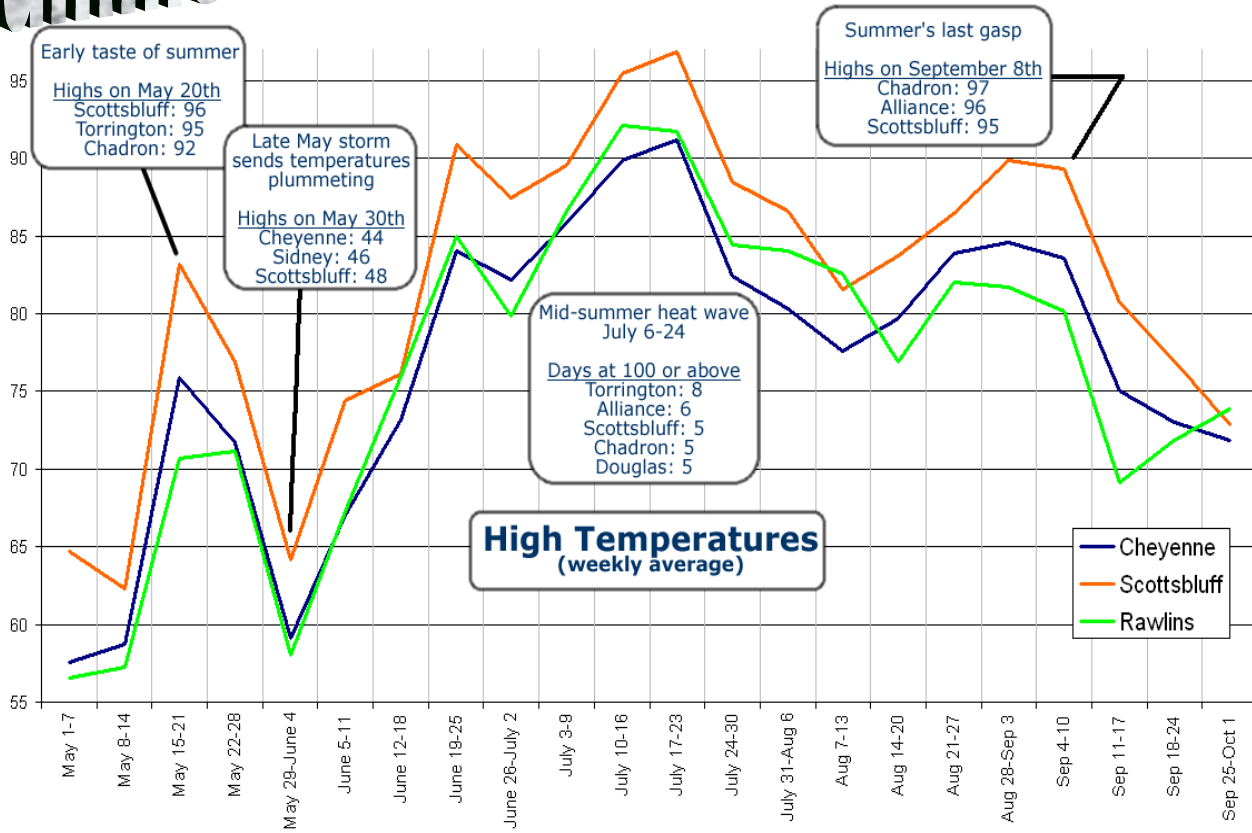
*(Freezing Drizzle, continued from page 8)*

November, March, and April were the months that had the most occurrences of freezing drizzle having 26, 22, and 20 of the 106 events respectively, or nearly 65% of the total. These months are seasonal transition times into winter and spring, when warmer air aloft can be present. During the coldest months of December, January, and February, temperatures at all levels are usually too cold for freezing drizzle to take place.

While no comprehensive studies have been done elsewhere in the region, it is believed that freezing drizzle occurs nearly as often at Pine Bluffs and Kimball as it does in Cheyenne. Elsewhere in the area, freezing drizzle is even more rare.

In conclusion, while it is relatively rare in southeast Wyoming, freezing drizzle does occur a few times each winter, mainly early in the season, and again late.

# Summer Weather Review



## Winter Weather:

It's on the way!

John Griffith

Whether we like it or not "Old Man Winter" is right around the corner. Across the United States dozens of people will die this winter due to exposure to the cold. Many others will die in car accidents plus there will be fatalities associated with fires due to improper use of heaters. Hypothermia and frostbite will lead to loss of fingers and toes.

A major winter storm in southeast Wyoming and western Nebraska can last for several days and may consist of heavy snow, high winds, and cold temperatures. People may be trapped in their homes or cars without utilities or other assistance. Attempting to walk in a winter storm can be a deadly decision.

Since there is nothing we can do to keep winter weather from coming, the only logical thing to do is to be prepared and know what to do to keep yourself and

*(Change Isn't All Bad, continued from page 1)*

The results of which are directly linked to advanced warnings.

While we are only as good as our last forecast, the simple fact is that today's national weather services are able to deliver high quality warning of impending severe weather with ever increasing reliability. Much can be said about the performance of local, state and federal resources in the aftermath of the hurricanes, but the National Weather Service clearly succeeded in meeting its mission in what turned out to be the most devastating back-to-back disasters in our nation's history.

I invite you to visit our office and view our work first hand. With the receipt of this newsletter, feel free to call Connie, our Administrative Support Specialist and set up a visit at your convenience. You can call M-F 8AM-4PM 307-772-2468 x0 and set up a tour.

After all, it's your tax dollars that are responsible for this service, and we are proud to show it to you.

- William T. Parker, Meteorologist-in-Charge

your family safe when the snow is falling and the winds are howling.

First, know the terms that the National Weather Service uses to provide winter weather information.

**Outlooks:** The Hazardous Weather Outlook, issued each morning around 6 a.m., will let you know if winter storm conditions are possible in the next 2 to 7 days. You should stay tuned to NOAA All Hazards Radio and the local media for further updates.

### Winter Storm Watch:

A winter storm watch is issued when winter storm conditions are possible within the next 36 to 48 hours. You should start preparing for the storm now!

### Winter Storm

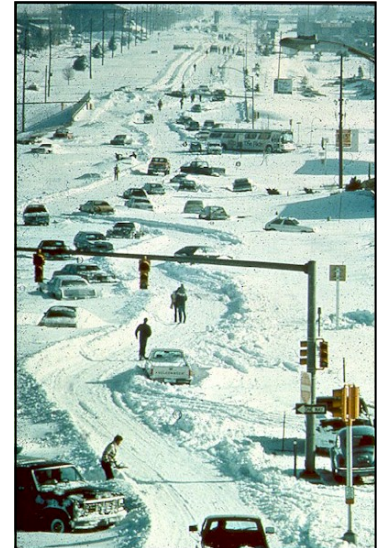
**Warning:** A winter storm warning is issued when life-threatening conditions have begun or are expected to begin within the next 36 hours. You should be taking action now!

Another term you may hear during the winter months is a **Winter Weather Advisory**. Advisories are issued for winter weather conditions that are expected to cause significant inconveniences and may be hazardous, but if you are cautious, these situations should not be life-threatening.

The best advice about winter weather is to be prepared **before** the storm arrives. At home and work the primary concern is the loss of heat, power, and telephone services. If the storm lasts several days you should have the following available: a flashlight and extra batteries, extra food and water, extra medicine and baby items, heating fuel, an emergency heat source, and a fire extinguisher. Don't forget about your pets. Make sure your pets have plenty of food, water and shelter. Just like people, your pets are affected by wind chill.

We are a mobile society so there is a good chance you could be in a vehicle during a winter storm. There are some things you should consider when traveling this

*(Continued on page 7)*



Winter weather can make traveling dangerous.



The National Weather Service is always looking for more people to supply weather observations. If you would like to have this opportunity, there are a few options.

For precipitation measurements, you can join the CoCoRaHS network (<http://www.cocorahs.org>)

If you are a Nebraska resident, the NeRAIN network is looking for volunteers to measure precipitation (<http://dnrdata.dnr.state.ne.us/NeRAIN>).

Also, if you know of a neighbor or friend in the area that would be interested in becoming a severe weather spotter, have them call Mike Weiland at the NWS (307-772-2468).

We still value spotter reports during the winter months. If you have a report of snowfall or high winds, please call us at **1-800-269-6220**.

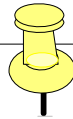
*(Winter Weather, continued from page 6)*

winter. Plan your travel and check the latest forecast before you leave, have your vehicle checked and winterized before the winter season, carry a winter storm survival kit, keep your gas tank near full and let someone know your timetable.

Some items that you might consider having in your winter storm survival kit: a cell phone, sleeping bag, flashlight, first-aid kit, knife, high-calorie non-perishable food, extra clothing, small can with waterproof matches, sand or cat litter, shovel, and a water container.

You should dress for the season. Some tips are to wear loose, lightweight, warm clothes in layers. The layers of clothes trap air which in turn insulates the body. As you get warm, remove layers to avoid perspiration and subsequent chill. Outer garments should be tightly woven, water repellent, and hooded. Make sure you wear a hat; over half of your body heat loss can be from the head. You should cover your mouth to protect your lungs from extreme cold. Mittens that are snug at the wrist are better than gloves. Most importantly, try to stay dry.

The dangers of winter weather are many. Be prepared to recognize winter weather threats, develop an action plan, and be ready when severe weather threatens. Remember...your safety is up to you.



Spotters get briefed on the ongoing operations of NWS Cheyenne.

The National Weather Service office in Cheyenne held an open house for spotters in the Cheyenne area on September 11th. About 80 spotters and family members attended and were permitted to venture inside the office to see forecasters in the process of creating the local forecast. As expected, the weather cooperated with sunny skies and temperatures in the 80s, allowing the staff to grill hamburgers and hot dogs for our guests.



Volunteer spotters collect handy information on weather safety.



Visitors enjoy hamburgers and sodas during the NWS open house.

National Weather Service  
1301 Airport Parkway  
Cheyenne, WY 82001

Phone: 307-772-2468  
Fax: 307-772-2099  
<http://www.crh.noaa.gov/cys>

The Rising Barometer is a semi-annual production of the National Weather Service office in Cheyenne.

Thanks for reading!

## Freezing Drizzle:

How rare is it in southeast Wyoming?

Jim Hatten

**F**reezing drizzle is drizzle that falls as a liquid but freezes on impact with surfaces that are at temperatures below freezing, producing a coating of glaze on power lines, tree limbs, vehicle windows, and roads. A small amount of freezing drizzle can impact travel - and even walking - more than a much larger amount of snow.

I was part of a study in the mid 90's that looked into the frequency and duration of these weather events in southeast Wyoming.

The study analyzed data from the Cheyenne airport from 1970-1995. The results showed that freezing drizzle was a relatively rare event in southeast Wyoming (probably due to the elevation of the site being above 6000 feet). During this time period, there were a total of 106 freezing drizzle events for an



Freezing drizzle seldom coats trees like the one shown here, but only a little of it can make driving and walking hazardous.

average of just over four per year. It should be noted here that freezing rain was even more rare with less than ten occurrences in the same 25 year time span.

Of the 106 freezing drizzle events, only 20 (or just under one a year) lasted more than five hours. The longest event lasted just over 14 hours in November 1978. Fortunately, most freezing drizzle episodes in southeast Wyoming last under two hours.

The typical weather pattern needed for these events to occur includes a shallow layer of cold air at the surface along with warmer air aloft. A moist upslope wind flow at the surface caused by high pressure to the east and low pressure to the west

also needs to be present for these events to occur. In southeast Wyoming, upslope flow occurs from wind directions ranging from north through east to south. This study discovered that south and southeast were the favored wind directions for freezing drizzle.

*(Continued on page 4)*