March 2010
Spring/Summer Issue

Online version available at:
http://www.wrh.noaa.gov/byz/jargon/spring10.pdf

Jet Stream Jargon

National Weather Service—Billings, Montana

Special points of interest:

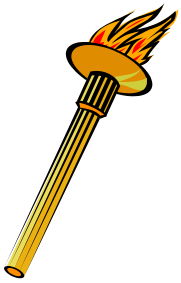
- Spring Begins March 20
- Snowpack Below Normal
- Lightning Safety

Inside this issue:

Observational Olympians

Submitted by: Keith Meier
Meteorologist in Charge

I often refer to our Cooperative Weather Observers as the unsung heroes, since they religiously document the local climate of their area by daily recording max and min temperatures, rainfall and snowfall. These routine observations provide the basis for documenting not only the local climate, but also contribute to documenting the climate of the state and the nation. Additionally, this data is utilized by other agencies, such as the USDA, to determine if various agricultural-related assistance programs are triggered. If the observations are missing or are too intermittent, data must be used from the next nearest sites to provide a basis for those decisions. As you can imagine, this may not be representative of what actually occurred, but in the absence of data it is the best that can be assumed.



Along these lines, a number of our Cooperative Weather Observers have elected to provide their observations to our office on a daily basis by entering their observations through the Internet (WxCoder), through an automated phone prompting service (IVROCS), or by calling them into our office for our staff to record. All of these methods allow us to make this data available to the world in real-time (versus waiting until the middle of the next month). After reviewing statistics for the last year, I wanted to recognize three groups of our Cooperative Weather Observers, listed by station, who have achieved three levels of service — by sending in real-time observations more than 90% of the time (Gold level), 80% of the time (Silver level) and 70% of the time (Bronze level).

If you are interested in joining these prestigious groups, please contact our Observing Program Leader, Carolyn Willis by emailing her at: carolyn.willis@noaa.gov or by calling 406-652-0851. She can set you up to enter your observations in real time.

Great work, folks!

GOLD

Gardiner
Story, WY
Huntley
Hysham
Hardin
Broadus
Mystic Lake
Roundup 15SW
Powderville 8NNE

SILVER

Roundup
Ryegate 18NNW
Columbus
Billings Water Treatment Plant
Rapelje 4S
Plevna

BRONZE

Nye
Ekalaka
Clearmont, WY
Moorhead 9NE
Red Lodge

Social Media and the National Weather Service

Submitted by Matt Solum
General Forecaster

Millions of people log on to social media sites on the Internet such as Facebook and Twitter each day, and that number continues to grow. Recently, the National Weather Service (NWS) launched a national Facebook page to connect users and customers to recent news, developments or interesting weather-related stories from across the country. NOAA, the NWS's parent agency, has also launched a Facebook page. To follow and become fans of these Facebook pages, check out these websites:

http://www.facebook.com/usnoaagov

http://www.facebook.com/US.National.Weather.Service.gov

The NWS point forecast pages recently began including buttons that provide shared bookmarking to various social media sites. The added button will allow a user to easily include a link to the NWS point forecast page in any of the social media outlets serviced by the provider. You can find it in the upper right corner of your point forecast page on the **weather.gov** website. The NWS will continue to look into and expand on more social media outlets in the near future. Stay tuned for updates!

The JetStream Jargon is published semi-annually by the National Weather Service in Billings, Montana.

Questions or comments, please email: carolyn.willis@noaa.gov or call 406-652-0851.

Old Barn - Photo by Carolyn Willis

Coop Corner

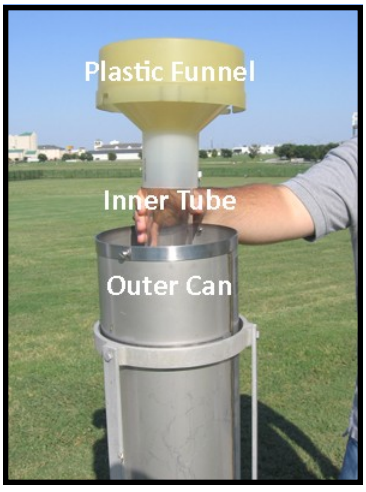
Submitted by Carolyn Willis
Observing Program Leader

If you have an 8" rain gage with a funnel, it will soon be time to put the inner tube and funnel back on it. However, don't do this too early, because if water freezes in the tube, it will break the plastic tubes, and pop the weld on the metal ones. The last week of May is the best time to put the tube/funnel combination in your gage. I will be visiting sites having Fischer Porter gages during May and early June to get them ready for summer.

If you enter your observations through the computerized WxCoder network, remember, we can download your observations from the program, so it's not necessary to mail in your monthly form.

If you need envelopes, stamps for correct postage, new daily forms or a new booklet of monthly forms, please call 406-652-0851 and ask that the supplies be mailed to you.

Spring begins Saturday, March 20, at 11:32 AM MDT



Stock Photo

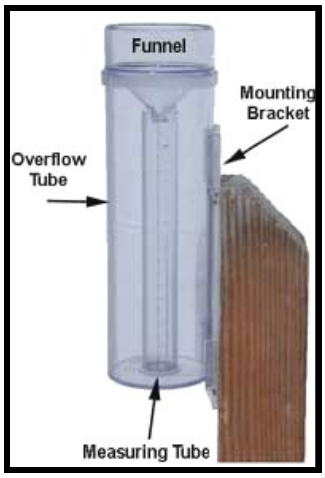
CoCoRaHS - Spring and Summer Precipitation Reporting

Submitted by Carolyn Willis
Observing Program Leader

I would like to welcome our new Community Collaborative Rain Hail and Snow *(CoCoRaHS)* network observers, as well as acknowledge our observers who have been reporting during this past year. We use your reports in our office on a daily basis. For those of you who have signed up for *CoCoRaHS* and are still waiting on the 4" plastic rain gages, we have just received them. Please email me at: carolyn.willis@noaa.gov to make sure I have your correct mailing address and I'll get one mailed to you. Please be sure to give me your station number and location.

What is *CoCoRaHS?* *CoCoRaHS* is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow). You can help fill gaps in the rainfall data by becoming a volunteer and taking measurements of precipitation from your location. The program helps meteorologists, hydrologists, and researchers study the variability of precipitation. The accumulated data will be available to anyone with a use or interest in precipitation data. The data collected by *CoCoRaHS* also supports the weather forecasting and warning responsibilities of the NWS. Everyone can help, young, old, or in between. For educators, your school and students (both at school and at home) are encouraged to participate. The only requirements are an enthusiasm for watching and reporting weather conditions and a connection to the Internet. To sign up, visit this website: http://www.cocorahs.org to fill in your information.

Proper way to mount a 4 inch precipitation gage for CoCoRaHS observing. Note how far above the post the top of the gage is placed, to assure accurate precipitation



Frost and Freeze Dates

Submitted by Matt Solum
General Forecaster

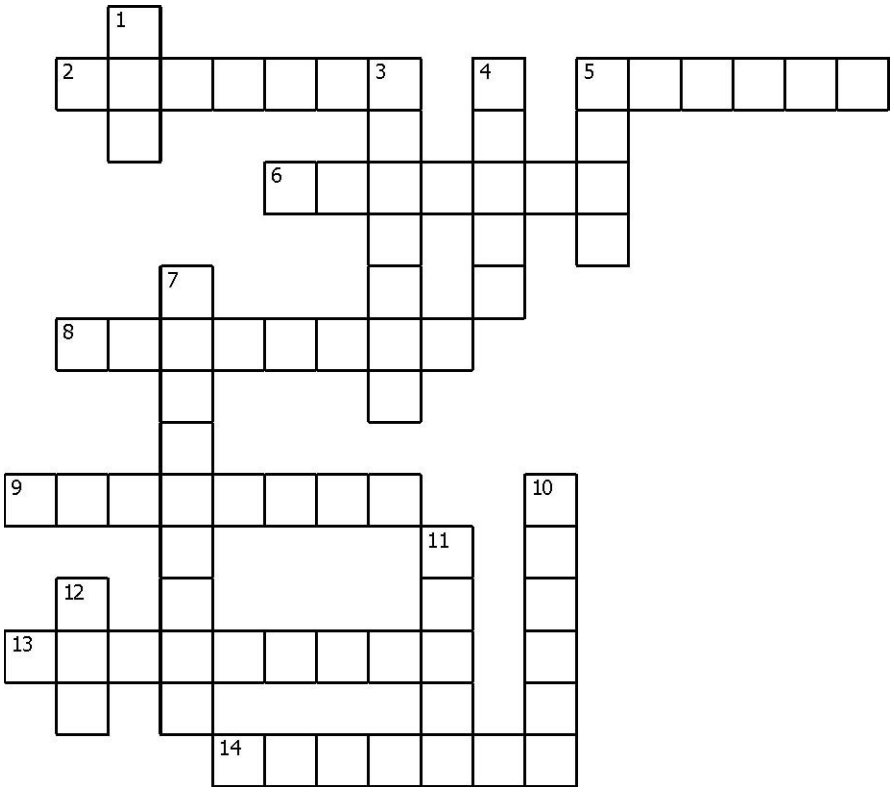
Many people will soon begin planting their gardens, and an important item to keep in mind is the average last frost and freeze. The following table shows average and latest frost and freeze dates for the Billings Airport, the Miles City Airport and the Sheridan Airport. The freezing temperature is based on 32 degrees Fahrenheit and the frost temperature is based on 36 degrees Fahrenheit. The average dates are based on a 30 year average from 1971 to 2000. The latest freeze and frost dates are based on when records began. Records began for the Billings Airport in 1934, the Miles City Airport in 1937 and the Sheridan Airport in 1934.

City	Average Last Freeze	Latest Freeze on Record	Average Last Frost	Latest Frost on Record
Billings	May 4	June 13	May 14	June 13
Miles City	May 6	June 8	May 14	June 18
Sheridan	May 18	June 24	June 7	July 30

The average last frost date in Billings is May 14

WEATHER CROSSWORD

Spring Fling



Puzzle submitted by *Julie Arthur*
General Forecaster

Answers on Page 14

ACROSS

2 A luminous arc featuring all colors of the visible light spectrum appearing during or just after a rain shower.

5 Large hail and strong damaging winds accompany ___ thunderstorms.

6 A ___ is a violently rotating column of air that can accompany a thunderstorm.

8 To protect yourself from a tornado, take shelter in a sturdy, reinforced ___.

9 Weather ___ are observers who call the National Weather Service to report significant weather.

13 Small area of rapidly descending air beneath a thunderstorm. This is a type of straight line wind that can cause a lot of damage.

14 NOAA ___ Radio All-Hazards is your source for the latest forecast and warning information from the National Weather Service.

DOWN

1 An ice ___ can create river flooding when ice blocks the flow of the river.

3 A Severe Thunderstorm ___ means that a severe thunderstorm has been seen on radar or by a trained weather observer and you should take cover if you are in the path of the storm.

4 Heavy rain, rapid snowmelt, ice jams or a dam break can all cause a rapid inundation of water into low-lying areas. This type of rapid flooding is called ___ flooding.

5 Even though winter is ending, ___ storms are still common during the spring months in the Northern Rockies.

7 Can strike as far away as 10 miles from any rainfall.

10 If flooding is observed, move to ___ ground.

11 A Severe Thunderstorm ___ means conditions are favorable for the formation of severe thunderstorms.

12 Dense ___ reduces visibility to a quarter of a mile or less.

Photo Journal of My Coop Travels

Submitted by Carolyn Willis,
Observing Program Leader

Since I began managing the Cooperative Observing network in southeast Montana and northeast Wyoming late in 2003, I have had the opportunity to put thousands of miles on the truck, and travel many back roads. I always have my camera handy, as photo opportunities present themselves daily. Here are a few of the photos I have taken during my travels across this beautiful area. Other photos are scattered throughout the newsletter. For a legend of where these photos were taken, please see page 7.

"...photo opportunities present themselves daily..."

Hellos and Goodbyes - Promotions, New Employees, and Family Updates

Submitted by Carolyn Willis
Observing Program Leader

Vickie Stephenson, formerly our Administrative Support Assistant, is now our new Hydrometeorological Technician. Vickie will be assisting with the forecast and warning duties, as well as helping Carolyn with the Cooperative Observing Program. Vickie will be attending Cooperative Program Manager's school in Kansas City in May to learn more about the program.

Patricia LeGard is our new Administrative Support Assistant. Patricia previously was employed by the Billings Clinic. She and her husband Eric make their home in Billings. Welcome Patricia!

Dan Borsum, Lead Forecaster, and his wife Michelle welcomed a new daughter to the family on January 19th. Avery Jealyn Borsum weighed in at 7 lbs. 10 oz.

Weather History

July 18, 2001

Numerous severe thunderstorms across southeast Montana. Softball sized hail fell in Broadus.

Flood and Flash Flood Safety Rules

Submitted by Kurt Hooley
General Forecaster

Monitor the NOAA Weather Radio, or your favorite reliable news source for vital weather related information.

Stock Photo

http://www.weather.gov/floodsafety

*If flooding occurs, get to higher ground. Get out of areas subject to flooding. This includes dips, low spots, canyons, washes, etc.

*Avoid areas already flooded, especially if the water is flowing fast. Do not attempt to cross flowing streams. **TURN AROUND DON'T DROWN™!**

*Road beds may be washed out under flood waters. NEVER drive through flooded roadways. **TURN AROUND DON'T DROWN™!** If your vehicle is suddenly caught in rising water, leave it immediately and seek higher ground.

*Do not camp or park your vehicle along streams and washes, particularly during threatening conditions.

*Be especially cautious at night when it is harder to recognize flood dangers.

*During periods of heavy rain, stay away from streambeds, drainage ditches, and culverts.

* Move to high ground should flooding threaten your area. Heavy rain should be a signal to alert you to possible flooding danger. If you live or work in a flood-prone area, or near streams or drainage ditches, remain alert during periods of heavy rain.

*Stay out of flooded areas. The water may still be rising, and the water is usually swift. A rapidly flowing stream or ditch can sweep you off your feet or even sweep your car downstream.

*If your vehicle stalls, abandon it if possible because flood waters could cover it or sweep it away.

Weather Spotter Training

Submitted by Tom Frieders
Warning Coordination Meteorologist

It's that time of year again, and Storm Spotter Training is underway. The National Weather Service relies on our trained volunteers to supplement Doppler Radar information regarding severe storms and tornadoes. These weather reports from trained spotters along with Doppler Radar data are critical to our forecasters for issuing warnings for tornadoes, severe thunderstorms, and flash floods.

Come join us for an enjoyable training session in a neighborhood near you. Topics discussed include Severe Thunderstorms that produce damaging winds and large hail, tornadoes and flash floods. Severe weather and lightning safety will also be discussed.

Anyone interested in becoming a trained weather spotter or interested in severe weather is invited to attend. Also, I know many of you have joined us in the past. We'd love to have you join us on an annual basis for a refresher. We always include new material, videos and new procedures. Our current schedule is printed below, but be sure to keep checking our website for an updated training list at: **http://www.wrh.noaa.gov/byz/local_news/2010/spotter10.php**

City	Date/Time	Location
Roundup	April 13; 6pm - 8pm	Ambulance Barn
Billings Amateur Radio Club	April 19; 730pm - 930pm	North Park
Billings NWS	April 20; 7pm - 9pm	Billings NWS Office
Columbus	April 22; 6pm - 8pm	Fire Station
Big Timber	April 29; 7pm - 9pm	Sweet Grass County High School
Baker	May 19; 6pm - 8pm	Senior Citizens Center

" Camouflaged Deer " Two deer near Powderville, MT blend into their surroundings. Can you find both?

(Answer on page 14) Photo by Carolyn Willis

Legend for Photo Journal on Page 5

1. "Prune Creek" -Near Burgess Junction, Wyoming
2. "Alpacas" - Near Moorhead, MT
3. "General Store" - Near Barber, MT
4. "Big Guy," Yellowstone Park, WY
5. "Forest of Dead Trees" - Near Powderville, MT
6. "Reflecting Chokecherries" - Near Mystic Lake, MT
7. "Boarded Up" - Near Pompeys Pillar, MT
8. "School Outhouse" - Near Hedgesville, MT

Severe Weather Terminology

Submitted by Kurt Hooley, General Forecaster

The National Weather Service uses specific terminology to relay the weather threat to the public. In the summer, there are a variety of watches and warnings you need to understand in order to be prepared:

Tornado Watch: Conditions are favorable for tornadoes to develop. If you are in or near the tornado watch area, stay informed through NOAA Weather Radio, your local television station or on the Internet at www.wrh.noaa.gov/byz Be prepared to take cover at short notice, as tornadoes can occur with little or no warning.

Tornado Warning: A tornado has been sighted, or a developing tornado is reported by trained spotters or indicated on Doppler radar. If a tornado warning is issued for your area...**take cover immediately!**

Severe Thunderstorm Watch: Conditions are favorable for thunderstorms to produce wind gusts to 58 mph or stronger and/or hail 1 inch in diameter or larger in the watch area. Stay informed, watch the sky, and take cover if a severe thunderstorm approaches you.

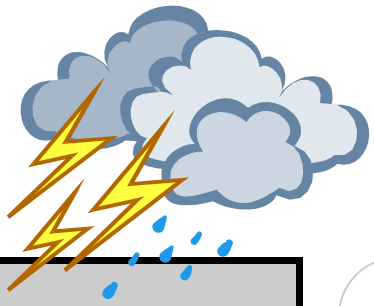
Severe Thunderstorm Warning: A severe thunderstorm has been detected by radar, or by a trained spotter. Take cover if you are in or near the severe thunderstorm.

Flash Flood Watch: Issued when heavy rain may develop and result in flash flooding in or near the watch area.

Flash Flood Warning: Flash flooding has developed or is imminent. Move to higher ground at once!

Small Stream Flood Advisory Alerts the public to flooding which is generally only an inconvenience (not life-threatening) to those living in the affected area. This is issued when heavy rain will cause flooding of streets and low-lying places. Also used if small rural or urban streams are expected to reach or exceed bankfull. Some damage to homes or roads could occur.

Hazardous Weather Outlook: Issued to discuss the potential for significant weather. For spotters and Emergency Managers, this product will detail the type of severe weather expected, timing and expected location of the severe weather. The Billings Forecast Office issues this outlook when significant weather is possible within the Day 1 through Day 7 Forecast Period. This product can be found on our homepage at www.wrh.noaa.gov/byz



Severe Weather Awareness Week - April 19 - 23, 2010

Submitted by Tom Frieders Warning Coordination Meteorologist

The week of April 19th through 23rd has been proclaimed Severe Weather Awareness Week in Montana and Wyoming. This is an excellent time to learn about severe thunderstorms and what you can do to stay safe this spring. With spring, comes increasing thunderstorm potential across the Rockies. That means our chances for severe weather and flooding will be increasing over the next few months. Don't get caught off guard by the dangers of thunderstorms.

Learn more about severe weather by visiting the following websites:

Montana: http://www.wrh.noaa.gov/byz/severe/index.php?wfo=byz

Wyoming: http://www.crh.noaa.gov/cys/severeweekWY.php?wfo=byz

Weather History:

August 21, 2002

Thunderstorm produced heavy rain causing flash flooding in Sheridan - some downtown business basements flooded, and ground whitened by penny-sized hail.

Attention Weather Spotters! We Need Your Email Address!

Submitted by Tom Frieders
Warning Coordination Meteorologist

The National Weather Service (NWS) in Billings is in the process of updating our storm spotter database to improve our electronic means of communication with our volunteers. We are implementing a process to notify our volunteers prior to significant weather events, as a friendly reminder regarding what weather conditions to report and how to report them. We hope this will increase the volume of incoming reports to our office. We would also use this as a means to announce NWS events and training that might be coming up in your local neighborhood.

Since many of you have been spotters for several years, but e-mail addresses have only been requested for the past few years, our database is severely lacking this information. We would appreciate it if you could take just a few moments of your time to send us your most current e-mail accounts. Please forward your name and e-mail to Matt Solum at Matt.Solum@noaa.gov These e-mail addresses are for NWS use only and will not be distributed outside of our office. Thank you for your time.

Please Keep Calling Us With Hazardous Weather Reports!

Weather History:

March 9, 1935 Record snowiest March day in Billings with 13.1 inches

Severe Weather Reporting

Submitted by Tom Frieders
Warning Coordination Meteorologist

Spring has arrived. With spring comes an increasing threat for severe thunderstorms. Keep those reports coming! **Reports from our volunteers are an important part of our forecast and warning process.** Do you remember what and how to report?

What to Report:

- Tornadoes and Funnel Clouds
- Strong Winds and/or Wind Damage (Structural damage, tree damage, power lines down, etc.)
- Largest Hail Size
- Heavy Rainfall and/or Flooding
- Snow Accumulations and Poor Travel Conditions

How to Report

- Call the toll-free spotter number or 406-652-3109
- Who are you?
- What did you see?
- Where did it occur? (referencing towns, landmarks, highways, mile markers, etc)
- When did it occur?

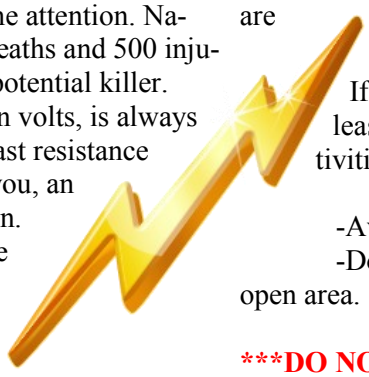
You may also sign up for electronic reporting by registering for "e-spotter". Log onto **http://espotter.weather.gov** to obtain a secure account. If you are interested in daily precipitation reporting, check out the *CoCoRaHS* program at **http://www.cocorahs.org** This program is described in more detail on page 3 of this newsletter.

Lightning - The Underrated Killer

Submitted by Kurt Hooley,

http://www.lightningsafety.noaa.gov

Lightning has been rightfully called "the underrated killer" since it does not usually get headline attention. Nationally, the average toll is around 80 deaths and 500 injuries. Every thunderstorm contains this potential killer. Lightning, which may reach 100 million volts, is always present and searching for the path of least resistance to complete the circuit. It might strike you, an isolated tree, or an object out in the open. Keep in mind that you do not have to be standing directly beneath a cloud to be hit.



The Threat

Lightning is the #2 storm killer in the U.S., killing more than hurricanes or tornadoes on average. Only floods kill more. But the real story of lightning isn't the deaths, it's the injuries. Only about 10% of those struck are killed; 90% survive. But of the survivors, many suffer life-long severe injury and disability. Lightning also causes about $5 billion of economic loss each year in the U.S.

Lightning Safety

Lightning safety involves several easy steps that anyone can do. While lightning safety can be inconvenient, consider how inconvenient the alternative of not following these simple rules could be! Adults are ALWAYS responsible for the safety of children under their care; this includes lightning safety

No place outside is safe near thunderstorms!
If you are going to be outside anyway stay near proper shelter and use the 30-30 Rule to know when to seek the proper shelter.

The 30-30 Rule: When you see lightning, count the time until you hear thunder. If this time is 30 seconds or less, seek proper shelter. If you can't see the lightning, just hearing the thunder is a good back-up rule. Wait 30 minutes or more after hearing the last thunder before leaving shelter.

---The best shelter commonly available against lightning is a large fully enclosed substantially constructed building. Substantially constructed means it has wiring and plumbing in the walls.

---Once inside, stay away from any conducting path to the outside. Stay off the corded telephone except for emergencies. Stay away from electrical appliances, lighting, and electrical sockets. Stay away from plumbing. Don't watch lightning from windows or doorways. Inner rooms are generally better.

If you can't get to a proper lightning shelter, at least avoid the most dangerous locations and activities such as:

-Avoid higher elevations
-Do not stand beneath a tall isolated tree, or in an open area.

*****DO NOT SIT OR STAND UNDER TREES TO KEEP DRY DURING THUNDERSTORMS*****

-Avoid tall isolated objects like trees, poles, and light posts.
-Avoid projecting above the surrounding landscape as on a hilltop in an open field, on a beach, or fishing from a boat.
-Avoid swimming (includes indoor pools)
--Move away from open water or from tractors or other farm equipment.
--Get off and away from motorcycles, scooters, golf carts, riding lawn mowers, and bicycles. Put down golf clubs.
--Stay away from wire fences, clotheslines, metal pipes, rails or other metallic paths which could carry lightning to you from some distance away.
--Avoid standing in small isolated sheds or other small structures in open areas like picnic pavilions, rain shelters, and bus stops.
--Avoid metal fences and metal bleachers.
--In a forest, seek shelter in a low area under a thick growth of small trees. In open areas, go to a low place such as a ravine or valley. Be alert for flash floods.
--If you feel your hair stand on end, this indicates that lightning is about to strike. Drop to your knees and bend forward putting your hands over your ears. Do not lie flat on the ground.

There is no truth to the old myth that "lightning never strikes twice."

Snowpack Well Below Normal

Submitted by Thomas Humphrey, Lead Forecaster

http://www.wcc.nrcs.usda.gov/cgibin/snowup-graph.pl?state=MT

Despite the fact that much of southern Montana has received above normal snowfall for the season so far, the mountains have not been as fortunate. Billings is currently 11 inches above normal for snowfall as of February 23, 2010. However, the mountains are mostly below normal - some dramatically so. The upper Yellowstone River basin is currently sitting at 71% of normal for the season, with the Big Horn basin at 67%. The Tongue River basin is at 74% of normal with the Powder River basin at 88% of normal. The only basins across southern Montana and northern Wyoming that are not dramatically low are the Smith, Judith and Musselshell River basins…which are at 99% of normal. The snowless mountain winter so far is in stark contrast to last year where most of the basins were sitting at 100-120% of normal at this time of the year. (Table as of February 23, 2010)

Basin	Snow Water Equivalent Percent of Average
KOOTENAI RIVER BASIN	69%
FLATHEAD RIVER BASIN	71%
UPPER CLARK FORK RIVER BASIN	70%
BITTERROOT RIVER BASIN	51%
LOWER CLARK FORK RIVER BASIN	53%
JEFFERSON RIVER BASIN	73%
MADISON RIVER BASIN	69%
GALLATIN RIVER BASIN	83%
MISSOURI HEADWATERS	73%
HEADWATERS MISSOURI MAINSTEM	83%
SMITH, JUDITH, AND MUSSELSHELL RIVER BASINS	99%
SUN, TETON AND MARIAS RIVER BASINS	58%
MISSOURI MAINSTEM RIVER BASIN	79%
ST MARY AND MILK RIVER BASINS	72%
UPPER YELLOWSTONE RIVER BASIN	71%
WIND RIVER BASIN (WYOMING)	66%
SHOSHONE RIVER BASIN (WYOMING)	58%
BIGHORN RIVER BASIN (WYOMING)	67%
TONGUE RIVER BASIN (WYOMING)	74%
POWDER RIVER BASIN (WYOMING)	88%
LOWER YELLOWSTONE RIVER BASIN	68%

Legend:	<70%	70-90%	91-110%	111-130%	>130%

Weather History:

July 1, 1945

Record coldest temperature for July 1 in Miles City, with 41

Top 10 Weather Events of the Decade

Submitted by Joe Lester, General Forecaster

The following weather events were rated by staff of the Billings Weather Forecast Office. Events occurred from 2000-2009 in the Billings Forecast Area.

10. Summer 2003 Record Hot and Dry Spell: A record hot and dry spell occurred at Billings from late June through most of August. Billings did not receive measurable rain from June 26th through August 26th, a record 62 straight days. During this period, Billings also recorded 38 consecutive days with a low temperature of 60 degrees or warmer, and 40 consecutive days with a high temperature of 85 degrees or more. Both of these are records as well. Billings finally observed 0.03 inches of rain on August 27th.

9. October 2005 Heavy Snow Event: A deep upper level low pressure system over the central Rockies combined with a tap of Gulf of Mexico moisture and cold Canadian air to produce heavy wet snow from October 3rd through 5th. As this was an early fall event, many trees were still green and the heavy snow caused a significant number of downed trees and power lines, and power outages were widespread. Road closures also resulted from the significant snowfall. Snow amounts ranged from 8 to 14 inches across most of the region, and the Billings airport received 10.8 inches.

8. December 2003 Christmas Blizzard: A strong winter storm brought heavy snow and strong winds to the region from December 26th through 28th. Significant blowing and drifting snow produced 2 to 5 foot drifts and many roads were closed, including Interstates 90 and 94 in the Billings area. Storm totals included 2 feet at Lame Deer, 18 inches at Pryor, 15 inches at Judith Gap, 14 inches at Ryegate and Roundup, 12 inches at Lavina and Red Lodge, and 11 inches at Billings and Joliet.

7. July 2002 Record Hot Spell: A record hot spell affected the region during the middle of July. Billings recorded consecutive high temperatures of 107, 106 and 108 degrees. These are currently 3 of the top 5 all-time hottest temperatures observed at Billings, with 108 being the record. Miles City reached 110 on the 14th of July, and had 5 consecutive days of 100 degrees or hotter. Sheridan hit 107 degrees on the 14th.

6. October 2008 Heavy Snow Event: A deep upper level low pressure system over the central Rockies brought periods of heavy snow to the region from October 9th through the 12th. Up to 2 feet of wet snow fell in the Billings area, nearly 3 feet of snow fell along the foothills from Nye to Red Lodge, and 4 feet fell along the north and east slopes of the Beartooth and Absaroka Mountains. Power outages resulted from downed trees and power lines.

5. November 2007 Wind Event: Widespread damaging winds affected much of the region from the afternoon of the 12th through the morning of the 13th. Strongest winds were observed along the eastern slopes of the mountains, and winds were estimated at near 100 mph at Nye and Red Lodge. A significant number of downed trees was reported along the foothills near Red Lodge. Downed trees and power lines resulted in a large number of power outages as well. Recent dry and warm weather helped to cause the Chi Chi Fire near Melville, and estimated 80 to 100 mph winds during the night of the 12th spread the wildfire rapidly. The fire, which burned across highway 191 north of Big Timber, torched over 30,000 acres and destroyed 3 homes in a short time.

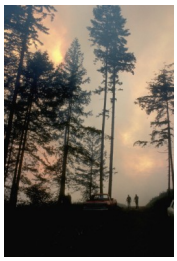
4. May 2005 Beartooth Highway Washout: A strong spring storm system brought up to 7 inches of precipitation to Red Lodge and the surrounding mountains on May 10th and 11th. The heavy precipitation, which was in the form of rain and snow, produced mudslides which washed out the Beartooth Highway just southwest of Red Lodge. The highway was closed for the entire summer of 2005, affecting tourism and travel in the Cooke City area and Yellowstone National Park. The highway was repaired during the summer and early fall, and opened briefly in October of 2005, before closing for the winter season shortly thereafter. The heavy precipitation also produced significant lower elevation flooding across portions of Sweet Grass, Stillwater, Carbon and Sheridan Counties as the combination of significant rainfall and mountain snowmelt raised river and stream levels quickly.

...**continued from page 12 - Top 10 Weather Events of the Decade**

3. July 2001 Severe Weather: A persistently favorable weather pattern along with abundant low level shear and moisture allowed for significant severe thunderstorm activity from late June through the end of July. Large hail associated with the thunderstorm activity was common during this period. One of the more significant thunderstorms occurred on the evening of July 18th at Broadus. This storm produced baseball to softball size hail, and there were reports of numerous car windshields smashed, roof/siding/window damage on homes, and trees stripped of leaves. The Broadus Elementary and High schools reported approximately 60 to 70 windows broken with this storm. Several private businesses had their outdoor signs broken. Other significant severe weather reports include: 80 mph winds just south of Roundup on the 2nd, flash flooding in Livingston on the 12th, baseball size hail and broken windows near Ryegate on the 13th, flash flooding in Hardin on the 13th, flash flooding in Decker on the 14th, flash flooding in Billings on the 17th, 91 mph wind gust and trees downed north of Pompey's Pillar on the 19th, two tornadoes observed north of Baker on the 25th, flash flooding in Miles City on the 25th, baseball size hail near Hysham and Hathaway on the 26th, 80 mph winds south of Miles City on the 26th, 100 mph wind gust with large trees downed near Hardin on the 27th, 60-70 mph winds and damage from Joliet to Billings and Forsyth on the 28th, flash flooding in Miles City on the 31st.

The Derby Fire was ignited by lightning on August 22, 2006 and not contained until October

2. March & April 2009 Southeast Montana Blizzards: Three blizzards affected southeast Montana in a span of only 2 weeks from late March to early April. The first blizzard occurred on the 23rd and 24th, bringing heavy snow and strong winds to Fallon, Carter and Powder River Counties. Highway 212 from Broadus to the Wyoming state line was closed, as was the highway from Ekalaka to Alzada. Drifts to 8 feet were reported, and motorists were stranded across Powder River and Carter Counties. In an attempt to rescue stranded motorists, two Department of Transportation trucks became stuck and stranded between Boyes and Hammond. The stranded motorists and DOT drivers spent the night in a cab of a DOT truck before making it to safety the next day. Snowfall totals in this first event ranged from 1 to 3 feet. Due to the wind and significant drifting, a large number of livestock was lost during the event. The second blizzard occurred on the 29th and 30th of March, and brought heavy snow and strong winds from north central Wyoming across southeast Montana, affecting the area also impacted by the 23-24 event. Snowfall up to a foot along with wind gusts to 40 mph caused significant blowing and drifting snow. The third blizzard occurred on April 3rd and 4th, bringing an additional 6 to 12 inches of snow to an area from Broadus and Biddle to Ekalaka.



Stock photo

1. 2006 Fire Season: The fire season of 2006 was a memorable one, and definitely the most significant one of the decade for southeast Montana. Several large wildfires occurred throughout the region, including fires near populated areas of Yellowstone County. Wildland fires burned over a million acres across Montana in 2006. The **Pine Ridge Complex** and **Bundy Railroad Fire** ignited in July and together burned over 230,000 acres in eastern Yellowstone and extreme northern Big Horn Counties. These fires spread rapidly due to strong thunderstorm winds on July 12th. The Bundy Railroad Fire affected areas north of Pompey's Pillar, whereas the Pine Ridge Complex burned nearby south of Interstate 94. The **Emerald Hills Fire** in Lockwood burned 3800 acres in August, threatening several homes and causing evacuations. The **Derby Fire** south of Big Timber spanned an area along the foothills south of Interstate 90 between the Boulder and Stillwater Rivers, and burned nearly 200,000 acres. The fire caused periodic evacuations of many residents near the fire, and at one point closed Interstate 90 between Livingston and Columbus as the fire surged toward the highway. The fire also impacted operations at Stillwater Mine. The fire was ignited on August 22nd by lightning and was not contained until October. The **Jungle Fire** in rugged terrain southeast of Livingston in Park County burned over 24,000 acres along the West Boulder River. The fire was ignited on August 25th and was contained in October. Other notable fires during the 2006 season include: **Sarpy Creek Fire** (northeast of Custer), **Watt Draw Fire** (southeast of Ashland), **Horton-Hay Complex** (near Hathaway), and **Big Creek Fire** (in Paradise Valley).

Spring Normals

Submitted by Matt Solum, General Forecaster

The 2010 spring season officially arrives on Saturday March 20 at 11:32 AM MDT and will end on Monday June 21. Here are the average temperatures and precipitation for the Billings Airport, the Miles City Airport, and the Sheridan Airport for the spring season. Averages are 30 year averages calculated from 1971 to 2000. All temperatures are in degrees Fahrenheit and all precipitation amounts are in inches.

Billings					
Date	**High**	**Low**	**Average**	**Precipitation**	**Snowfall**
3/20 – 3/31	49.8	28.3	39.1	0.44	3.6
4/1 – 4/30	57.5	34.7	46.1	1.74	7.6
5/1 – 5/31	67.4	44.0	55.7	2.48	1.8
6/1 – 6/21	76.0	50.9	63.5	1.54	T
3/20 – 6/21	63.8	40.4	52.1	6.21	13.3

Weather History:
June 4, 1988
Record earliest occurrence of 100 degrees in Billings; the high was 101 with 102 the next day.

Miles City				
Date	**High**	**Low**	**Average**	**Precipitation**
3/20 – 3/31	50.1	27.0	38.5	0.29
4/1 – 4/30	58.8	34.5	46.7	1.40
5/1 – 5/31	69.5	44.9	57.2	2.19
6/1 – 6/21	78.2	53.2	65.7	1.83
3/20 – 6/21	65.5	41.2	53.3	5.71

Weather History:
June 18, 2002
4.5 inch diameter hailstones reported in Alzada

Sheridan				
Date	**High**	**Low**	**Average**	**Precipitation**
3/20 – 3/31	50.3	24.5	37.4	0.45
4/1 – 4/30	57.5	30.4	43.9	1.77
5/1 – 5/31	66.4	38.6	52.5	2.41
6/1 – 6/21	75.2	46.6	60.9	1.74
3/20 – 6/21	63.5	36.4	50.0	6.38

Answers to Crossword on Page 4

Across: 2. rainbow 5. severe 6. tornado 8. building 9. spotters 13. downburst 14. weather

Down: 1. jam 3. warning 4. flash 5. snow 7. lightning 10. higher 12. fog

Left - **"Camouflaged Deer"** (from Page 7.) A doe is laying in the sagebrush center left. A buck, is laying in the center of the photo...behind the sagebrush. His antlers blend in with the sage brush branches, and his white nose blends in with the snow patches. I (Carolyn Willis) didn't know the buck was there while I was taking photos of the doe, until he jumped up and startled me! I caught some good shots of them both running.

Summer Normals

Submitted by Matt Solum, General Forecaster

The 2010 summer season officially arrives on Monday June 21 at 5:28 AM MDT and will end on Wednesday September 22. Here are the average temperatures and precipitation for the Billings Airport, the Miles City Airport, and the Sheridan Airport for the summer season. Averages are 30 year averages calculated from 1971 to 2000. All temperatures are in degrees Fahrenheit and all precipitation amounts are in inches.

Weather History:
July 31, 2001
Flash Flooding in Miles City with water up to car hoods and under-pass with 7 feet of water

Billings				
Date	High	Low	Average	Precipitation
6/21 – 6/30	82.2	54.5	68.3	0.43
7/1 – 7/31	85.8	58.3	72.0	1.28
8/1 – 8/31	84.5	57.3	70.9	0.85
9/1 – 9/22	74.0	48.0	61.0	1.10
6/21 – 9/22	82.4	54.8	68.6	3.69

Miles City				
Date	High	Low	Average	Precipitation
6/21 – 6/30	83.5	56.6	70.1	0.73
7/1 – 7/31	87.9	60.2	74.1	1.61
8/1 – 8/31	86.8	58.9	72.9	1.16
9/1 – 9/22	75.5	48.5	62.0	0.94
6/21 – 9/22	84.1	56.6	70.4	4.49

Sheridan				
Date	High	Low	Average	Precipitation
6/21 – 6/30	81.4	49.5	65.4	0.35
7/1 – 7/31	85.2	52.4	68.8	1.11
8/1 – 8/31	84.9	51.5	68.2	0.80
9/1 – 9/22	75.5	43.7	59.6	1.07
6/21 – 9/22	82.9	50.2	66.5	3.41

Summer begins on Monday, June 21 at 5:28 AM MDT

Weather History:
June 16, 1998
An unseasonably cold storm brought snow to elevations above 7000'. Cooke City received 4 inches.

2009-2010 Winter in Review - (December Through February)

Submitted by Virgil Middendorf, Information Technology Officer

This past winter was colder than normal for all of South Central and Southeast Montana and for Northeast Wyoming. Billings and Miles City both experienced the 12th coldest winters on record. Sheridan, Wyoming experienced the 14th coldest. For most places across the area, this was the coldest winter since 1992-1993...a winter which was impacted by the cooling effects of the Mount Pinatubo eruption. A strong El Nino occurred in the Pacific Ocean this past winter and usually that means mild temperatures for Montana and Northern Wyoming. However, the polar vortex was unusually weak this past winter. This allowed more arctic air to move into the Northern United States than is typical and, therefore a colder winter than normal for our area.

In terms of precipitation, the region generally received normal to below normal precipitation. However, some areas near Billings received above normal precipitation. In fact, Billings recorded its 6th snowiest winter on record. The above normal snowfall combined with cold temperatures preserved the snowpack in and around Billings. A trace or more of snow stayed on the ground for 89 consecutive days in Billings from December 1 to February 27, which is the 4th longest stretch on record. With the exception of the Billings area, the below normal precipitation and snowfall across the region is consistent with El Nino.

Jet Stream Jargon
National Weather Service
2170 Overland Avenue
Billings, MT 59102

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REQUESTED

We're on the web!
www.weather.gov