September 2009
Fall/Winter Issue

Jet Stream Jargon

National Weather Service—Billings, Montana

Special points of interest:

- Fall Begins September 22nd at 3:18 PM MDT
- Winter Begins December 21st at 10:47 AM MST
- Two Local Families Receive Prestigious Holm Award

Inside this issue:

Summer Vacation

Submitted by: Keith Meier
Meteorologist in Charge

Summer is a time many of us utilize opportunities for recreation or take family vacations. My family spent our summer vacation as we typically do, with family and friends in northeastern Iowa. We look forward to this annual trek, returning us directly to the agricultural roots (sorry for the pun) shared by my wife and I. Our kids get the opportunity to help grandpa, uncles and cousins with a variety of chores including baling hay, twice a day milking, attending to the various demands of hogs, and other things that must be done to keep the operation going. For me, I look forward to visiting with the many farmers, agricultural–related business people, and other folks who are constant consumers of weather information. I listen with a keen ear to how they are using weather forecasts and information – both successfully and unsuccessfully. This provides me tremendous insight on how we, as the National Weather Service, can adjust our products and services to better meet the needs of a customer group heavily impacted by weather. Additionally, I see first hand the impact of changing weather forecasts on decision making, such as when to cut hay. As you might suspect, weather information and forecasts are available from many different sources (radio, TV and hundreds of places on the internet). However, not all of this weather information is constructed by human hands; much of it is generated automatically by computers to satisfy the multitude of needs for weather forecasts. One of the critical roles of your National Weather Service is to provide a human touch and value-added weather forecasts and information. Despite the pleas I always receive, such as "we need rain," "can't you make it stop raining," we obviously can't control the weather. However, we can control the message we deliver through our variety of products and services, by putting the forecast into perspective. This way it is a valuable decision making tool for various interests where weather has an impact, whether it is agricultural, construction, recreationists, event planners, or the general public. As an example, nothing irritates someone trying to schedule outdoor work more than seeing a "30% chance of rain" for the next 7 days. There are some times, when that is a true reflection of the weather pattern…i.e. each of the next 7 days truly has an equal threat of rain. However, our forecasters pride themselves on being able to distinguish which days have a higher likelihood (higher probability) of rain than others, and which days

Meier Family dwarfed by corn. Keith, Pam, Garret, McKenna

(See "Vacation" Page 2)

Irrigated hay field near Absarokee, MT
Photo by Carolyn Willis

Continued from page one..."Vacation"

have no chance or a minimal threat. Decision making always involves risk management...we make decisions based on what we believe will lead to the most desired outcome.

This is certainly true when weather forecasts and information are involved in the decision making process. The staff at the National Weather Service in Billings discuss this type of information with decision makers on a daily basis via the many phone calls we receive, and answer detailed questions about timing of precipitation or amounts. Many of you reading this issue of the Jet Stream Jargon are extremely involved in assisting us in providing this service by collecting daily weather information, serving as a SkyWarn Spotter for all types of hazardous weather (hail, wind, tornadoes, heavy/blowing snow, rainfall, etc,) or serving in some other role. For that we thank you; without your dedication we would not be able to assist the many folks who rely on accurate and timely weather forecasts and information to make decisions which impact their daily lives.

As we close out the summer (although it didn't seem like summer), we now focus on the change to colder weather and begin to answer questions related to the first frost or freeze, snow events, blizzards and ice jams. Currently, the winter outlook is heavily based on a developing El Nino, which typically leads to milder and drier than normal conditions during he last half of winter (December-February.) Look deeper into this issue for more information on this subject.

"Currently, the winter outlook is heavily based on a developing El Nino, which typically leads to milder and drier than normal conditions..."

Coop Corner

Submitted by Carolyn Willis
Observing Program Leader

It is time once again to remove the funnels and tubes from inside your rain gages, as freezing temperatures approach. I will be winterizing the Fischer Porter gages over the next few weeks. If I haven't already stopped by for a visit, I hope to visit with you before winter sets in. We have been short staffed over the summer, so I have been working in the office and not had as many days on the road as usual. I am hoping to visit everyone a bit earlier next year.

Thank you for being a part of the Cooperative Observing Network. For those of you who use the **WxCoder** program to enter your observations, you no longer need to mail us the monthly B-91 form, as we are able to download your station's observations right off the Internet. For those who aren't entering data by computer on a daily basis through the Internet-based **WxCoder** program and wish to do so, please let me know. As long as you have Internet Service and an email address, we can sign you up.

Join CoCoRaHS and Help The National Weather Service With Additional Rain and Snowfall Reports

Submitted by Tom Frieders,
Warning Coordination Meteorologist

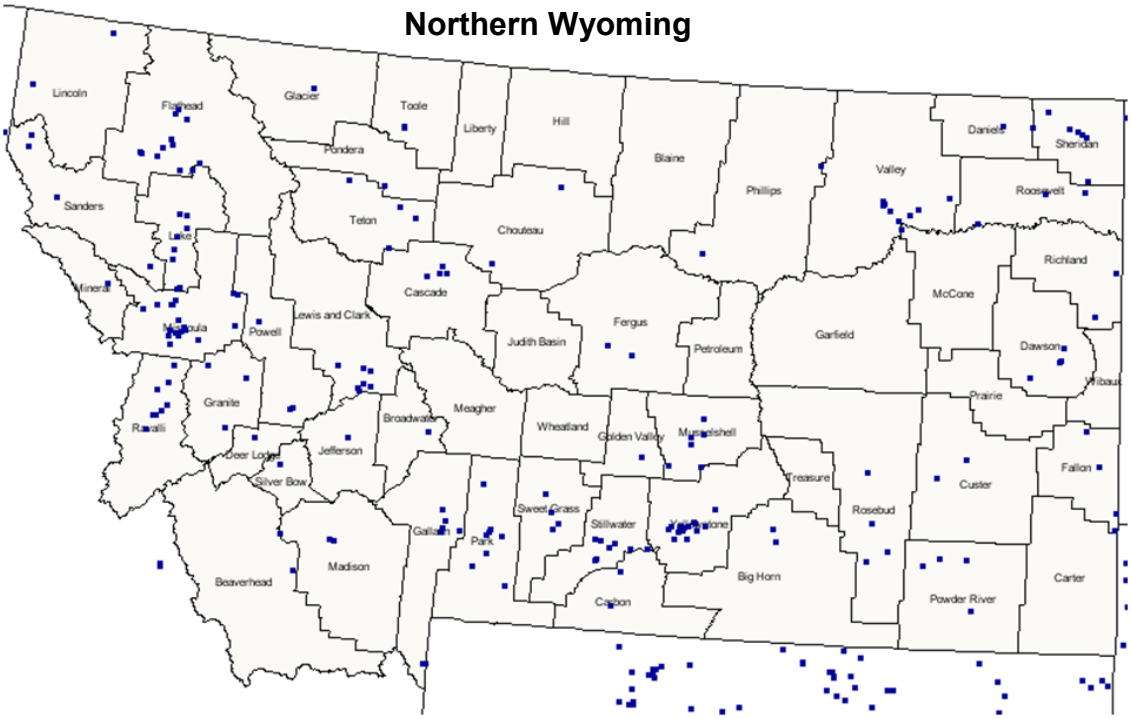
A nationwide **Co**mmunity **Co**llaborative **Ra**in, **H**ail and **S**now Network called CoCoRaHS continues to expand across Montana and Wyoming. CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow.) This program uses an interactive website for reporting and mapping out reports. Reports are also obtained by the National Weather Service (NWS) to assist our meteorologists with forecasts and warnings.

Currently, Montana has 206 registered observers with over 450 in Wyoming. The map below shows the spatial distribution of our observers. Note the many holes across the region where reports are lacking, where we are in need of observers. If you have an interest in weather reporting and cataloging your own reports, why not share with the state and your local community by registering as an observer?

If you would like additional information regarding the CoCoRaHS program, visit http://www.cocorahs.org You may also contact our local NWS coordinator Carolyn Willis by emailing her at: carolyn.willis@noaa.gov. Several training sessions are also planned across southern Montana and northern Wyoming this fall. As training sessions become available, they will be posted as a headline news story on our website http://www.wrh.noaa.gov/byz/local_news/2009/cocorahs09.php Check for training close to your area.

You may also join us for live training over the Internet from the comfort of your own home the evening of Monday October 26 from 6pm to 730pm. You will need to reserve your Webinar seat at: https://www1.gotomeeting.com/register/434584056
All of this training is free and open to current observers or others who may be interested in registering.

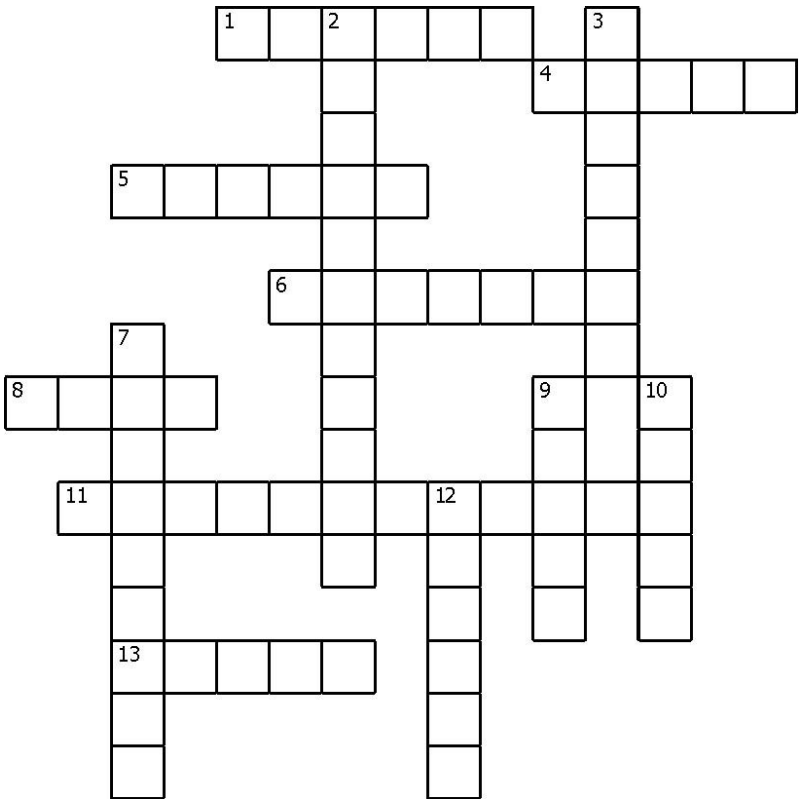
Current CoCoRaHS Observers Across Montana & Northern Wyoming



Thanks go out to all of our current observers for their timely reports. These reports are greatly appreciated.

The earliest measurable snowfall in Billings was September 7, in 1962.

WEATHER CROSSWORD



A thunderstorm that produces 1 inch diameter or larger hail and/or wind speeds equal or exceeding 58 mph is _____

The least snowiest season in Billings was 1943-1944 with 25.1 inches of snowfall

ACROSS

1 The season after summer
4 Drink plenty of this on hot days
5 A thunderstorm that produces 1 inch or larger diameter hail and/or wind speeds equal or exceeding 58 miles an hour is ____
6 It's a twister
8 Irregular pellets or balls of ice more than 5 mm in diameter occurring with some thunderstorms
11 A Summertime boomer
13 A measure of how hot it really feels is the heat _____

DOWN

2 An instrument that measures temperature
3 A luminous arc featuring all colors of the visible light spectrum appearing during or just after a rain shower
7 Cloud-to-ground _____
9 A rapid and extreme flow of high water into a normally dry area is called a flash _____
10 Hazy...hot and _____
12 Typically the warmest season of the year during which the sun is most nearly overhead.

Puzzle submitted by Julie Arthur, General Forecaster
(answers on page 6)

New Location for Cooke City Coop Station

Submitted by Carolyn Willis,
Observing Program Leader

Fischer Porter gage installed in a clearing near Cooke City, Montana
Photo by Carolyn Willis

The week of June 22, 2009, Jim Chaisson, Facilities Engineering Technician, based out of Great Falls, helped me (Carolyn Willis) relocate a complete cooperative observing station in Cooke City, Montana. Due to the amount of snow the Cooke City area receives each year, the Fischer Porter gage is located on a platform, set on a 4 foot tower, so the top of the gage is about 9 feet above the ground. We had to remove all of the equipment from 1/2 mile down the road, and reinstall it at the new location. The new location is on an incline, where footing, leveling, and keeping things from rolling down the mountain is always a challenge.

Jim struck bedrock just below the surface when digging the hole to install the tower for the Fischer Porter gage. Since this was the only location on the observer's property suitable for the Fischer Porter, he designed a method to attach the tower to the rock. He jackhammered the rock down to a depth where he felt comfortable securing the tower to it with anchor bolts, and then poured concrete into the hole to keep it secure. Jim then rebuilt the whole platform, as much of the old platform's frame had either bent or split over the years. The Fischer Porter tower and platform, the temperature sensor, cabling, snow stake and elevated 8" rain gage holder were all professionally installed by the end of the week with Jim's help.

A bear clawed through heavy sheet metal wrapped around a telephone pole. There are 8 inches between top and bottom claw marks.
Photo by Carolyn Willis

Cooke City is a place where wildlife can be seen on a daily basis. Our previous observer placed a bird feeder on top of a 15 foot telephone pole. He nailed a piece of sturdy sheet metal around the pole to keep the bears from climbing up and helping themselves. One of the bears decided to let him know just what he thought of that, by clawing completely through the thick metal sheeting around the pole.

We welcome our new Cooke City observer, Dan Hartman to our Coop family.

Cooke City receives over 200 inches of snowfall a season, on the average

View near Cooke City, Montana
Photo by Carolyn Willis

2008-2009 was the 10th snowiest season in Billings with 75.6" of snowfall

"We said goodbye to two of our employees since our last issue of the Jet Stream Jargon."

Hellos and Goodbyes

Submitted by Carolyn Willis
Observing Program Leader

We said goodbye to two of our employees since our last issue of the Jet Stream Jargon.

Sally Springer – Observing Program Leader – Sally decided to be a stay at home mom and give her kids more time and attention. She is volunteering at her kids' school to contribute her skills in helping with the education of children, and she is having fun watching her husband in "monster truck" mud bog competitions.

Brianne Vogt – Hydrometeorological Technician – Moved to the Philadelphia area to be with her new husband.

Promotions, New Employees and Family Updates –

Bryan Schuknecht was promoted from Meteorological Intern to General Forecaster.

Carolyn Willis – Cooperative Program Manager at the NWS Billings, is now the Observing Program Leader.

Sean Campbell – Hired as a new Meteorological Intern - Sean is a 10 year veteran of the USAF and comes to us from the Omaha, Nebraska area. He has already been exploring the region and loves the mountains.

Ryan Leach – Hired as new Meteorological Intern – Ryan is a 5 year veteran of the USAF and most recently was stationed in South Carolina. He is originally from Washington state. Ryan, his wife and young son are happy to be in Billings.

Marc Singer is our new Science and Operations Officer (SOO.) Marc and his wife Mikaela are from the Kansas City area.

Lead Forecaster **Brian Tesar** and his wife Emily welcomed their daughter Gabrielle Ann on August 26. Miss Gabrielle weighed 7 pounds 12 ounces and was 19 inches long.

Member of Long-Time Coop Observing Family Passes Away

Submitted by Carolyn Willis
Observing Program Leader

On August 28, Audrey Linger, Molt 6SW, passed away. Audrey's son Bill now takes the coop observations, but the station has been in the Linger family since December of 1931. In 2006 the Linger family received the Earl Stewart Award for 75 years of service. I always enjoyed visiting Audrey and catching up on what was going on in her family and community. I enjoyed hearing about the latest NASCAR races involving her favorite driver, #16 Greg Biffle. Audrey will be greatly missed.

Answers to Crossword on page 4, Word Search on Page 9, and Weather Quiz on Page 11.

Answers to Weather Quiz on Page 11
1. d
2. a
3. b
4. c
5. a

Crossword Answers page 4:
Across: 1. autumn 4. water 5. severe 6. tornado 8. hail 11. thunderstorm 13. index
Down: 2. thermometer 3. rainbow 7. lightning 9. flood 10. humid 12. summer

Answer to Word Search page 9
National Weather Service Billings

El Niño Will Impact Montana This Winter

Submitted by Virgil Middendorf
Information Technology Officer

The Climate Prediction Center (a branch of the National Weather Service) expects El Niño to strengthen this Fall and last through this Winter. The peak strength of El Niño this winter is still uncertain, so the strength of the impacts on Montana are also uncertain. In general, El Niño brings warmer than normal and slightly drier than normal winters to Montana.

El Niño is part of a three to five year cycle that occurs in the equatorial Pacific Ocean. Satellites measure the sea surface temperatures across the equatorial Pacific every day. These temperatures are averaged between the International Dateline and the West Coast of South America and compared to a 30 year normal. When the measured temperatures are 1 degree Fahrenheit or more above normal, then the equatorial Pacific Ocean is in the El Niño portion of the cycle. When the measured temperatures fall to 1 degree Fahrenheit or more below normal, then the cycle is in its La Nina phase.

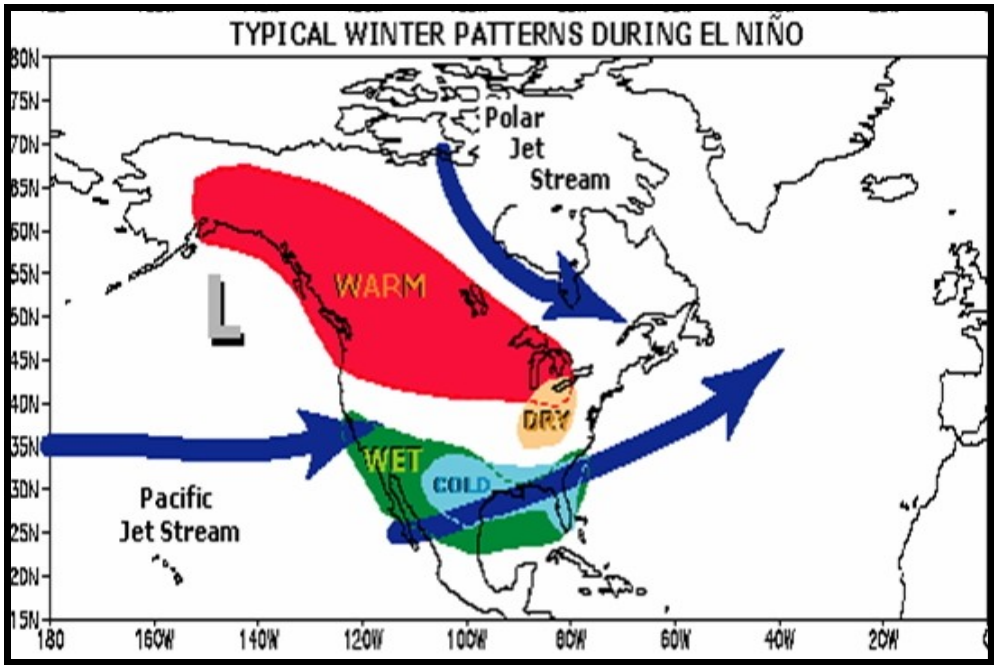
Before El Niño is officially declared, scientists also look at the easterly trade winds over the equatorial Pacific. During true El Niño events, the trade winds weaken or even turn westerly. If the trade winds remain strong, then there is a real possibility of El Niño dying before the winter arrives.

This past summer, the measured sea surface temperatures across the Eastern Equatorial Pacific were 1-2 degrees Fahrenheit above normal. The trade winds were at normal strength with periods of weaker than normal trade winds. These conditions are typical of a developing El Niño, so the Climate Prediction Center is confident that El Niño will impact this winter.

El Niño changes the weather patterns and storm tracks over the Pacific Ocean, which in turn, change the weather patterns and storm tracks over the continental United States. One storm track develops across the Southern United States. California will see more rainfall and flooding. Texas and Oklahoma and the gulf coast states to the east generally will see more tornados after El Niño winters.

The second storm track develops over Canada and reduces the number of times arctic air masses drop down into the Northern Plains. For this reason, winter temperatures from Montana to Minnesota usually are warmer than normal during El Niño Winters. Since the storm tracks spend most of their time in the North and the South, the Pacific Northwest states experience drought.

Finally, it is important to remember that all El Niño events are a little different from each other and they will impact the United States in a slightly different way. For this reason, the Climate Prediction Center is not able to exactly predict with skill how much warmer than normal this winter will be in Montana or how much drier than normal it will be.



"El Niño brings warmer than normal and slightly drier than normal winters to Montana."

Severe Weather Awareness Night—At the Billings Mustangs Baseball Game!

Submitted by Kurt Hooley, General Forecaster

Meteorologist Kurt Hooley throws out the first pitch

On August 3rd, 2009, General Forecasters Kurt Hooley, Matt Solum and Observing Program Leader Carolyn Willis staffed a National Weather Service booth at the Billings Mustangs baseball game. The night was promoted as Severe Weather Awareness Night. Throughout the evening, around 250 fans stopped by the booth. Kurt, Matt, and Carolyn discussed severe weather safety with emphasis on lightning safety. Various handouts on weather safety and education were distributed during the game. In addition, several drawings were held for rain gauges and a NOAA Weather Radio. The Billings Mustangs organization also printed a full-page advertisement on lightning safety that was in the game program throughout the season.

Fall Normals

Submitted by Matt Solum, General Forecaster

Fall arrives on Tuesday September 22nd at 3:18 PM MDT and will end on Monday December 21st at 10:47 AM MST. Here are the normal temperatures and precipitation statistics for Billings, Miles City, and Sheridan for the Fall season. Normals are 30 year averages calculated from 1971 to 2000. All temperatures are in degrees Fahrenheit and all precipitation amounts are in inches.

Fall begins
September 22nd
at 3:18 PM MDT

Billings				
Date	**High**	**Low**	**Average**	**Precipitation**
9/22 – 9/30	68.6	43.1	55.9	0.25
10/1 – 10/31	58.9	37.2	48.1	1.26
11/1 – 11/30	42.7	25.6	34.1	0.75
12/1 – 12/21	36.0	18.5	27.3	0.47
9/22 – 12/21	49.9	29.4	39.7	2.72

Miles City				
Date	**High**	**Low**	**Average**	**Precipitation**
9/22 – 9/30	69.6	42.0	55.8	0.25
10/1 – 10/31	60.0	35.3	47.7	1.13
11/1 – 11/30	41.8	21.6	31.7	0.52
12/1 – 12/21	32.4	12.0	22.2	0.23
9/22 – 12/21	48.7	26.1	37.4	2.10

Sheridan				
Date	**High**	**Low**	**Average**	**Precipitation**
9/22 – 9/30	69.7	37.7	53.7	0.35
10/1 – 10/31	59.8	30.3	45.1	1.41
11/1 – 11/30	43.4	18.5	31.0	0.80
12/1 – 12/21	36.4	11.4	23.9	0.51
9/22 – 12/21	50.7	23.5	37.1	3.07

Large rock formation on Highway 14 between Dayton and Burgess Juction, Wyoming
Photo by Carolyn Willis

Billings Forecast Office Still Looking for eSpotter Registration

Submitted by Matt Solum, General Forecaster

To date, over 40 people have registered online for the eSpotter program in the Billings forecast area. eSpotter is a system to facilitate the submission of spotter reports online. The system is being developed to enhance and increase, timely and accurate online spotter reporting and communications between spotters and their local weather forecast offices. The reports that were submitted this past spring and summer were greatly appreciated and helped our forecasters in the Billings office during active weather events.

Even though the summer season has passed, eSpotter can still be used to submit winter weather reports. For our registered users, remember to click on "Click Here for the Winter Weather Report Form" on the top of the severe weather reporting form to send us your winter storm reports.

If you are interested in signing up for this free service to submit reports to the Billings forecast office, visit http://espotter.weather.gov/.

You may also contact Tom Frieders, Warning Coordination Meteorologist, at the forecast office in Billings by phone at (406) 652-0851 or by email at tom.frieders@noaa.gov for more information.

The record seasonal snowfall for Billings is 98.7" in 1996-1997

WINTER WEATHER WORD SEARCH

Find the hidden words, then unscramble the remaining letters to find who proudly serves the people of southeast Montana and north Central Wyoming

H	N	N	H	I	G	H	P	R	E	S	S	U	R	E
E	G	S	D	R	A	Z	Z	I	L	B	R	I	S	K
R	L	U	E	E	L	L	I	H	C	D	N	I	W	N
C	A	B	O	C	N	O	I	S	R	E	V	N	I	I
F	H	L	A	R	R	D	R	O	L	A	N	I	N	A
L	W	I	O	T	T	A	R	C	T	I	C	A	I	R
U	S	M	N	P	S	D	N	I	W	Y	T	S	U	G
R	U	A	R	O	A	L	O	H	T	H	I	I	O	N
R	T	T	A	T	O	G	D	E	E	E	I	F	A	I
I	A	I	I	S	H	K	E	S	E	O	N	T	S	Z
E	R	O	N	O	L	L	B	N	D	L	F	T	E	E
S	T	N	O	R	F	D	L	O	C	U	N	I	C	E
E	S	I	T	F	S	E	A	W	B	A	O	I	V	R
E	R	U	S	S	E	R	P	W	O	L	I	L	N	F
O	R	E	Z	W	O	L	E	B	R	I	M	E	C	O

BLIZZARD
SNOW
FREEZING RAIN
DENDRITE
GUSTY WINDS
COLD FRONT
FLURRIES
ARCTIC AIR
ICE
WHITE
CHINOOK
STRATUS
EL NINO
STABLE
ALBEDO
LA NINA
CLOUDS
BRISK
FOEHN
POLAR
SUBLIMATION
FROST
BELOW ZERO
FOG
RAIN
RIME
HIGH PRESSURE
INVERSION
TROUGH
WIND CHILL
LOW PRESSURE

Puzzle submitted by Joe Lester, General Forecaster

(answer on page 6)

Weather Forecasts and Radar Imagery Available on your Mobile Device

Submitted by Matt Solum,
General Forecaster

Many of the same features you see on our web page, including weather forecasts and radar imagery, are now available on your mobile device by pointing your browser to mobile.weather.gov Just enter your city or zip code and you have access to local conditions, a detailed 7 day forecast, radar, satellite and current hazardous weather information wherever you go!

Two Coop Observing Couples in Our Area Receive the Prestigious John Companius Holm Award

Submitted by Carolyn Willis,
Observing Program Leader
Description of award taken from: http://www.history.noaa.gov/legacy/coop.html

"No more than twenty-five Holm awards are given annually nation-wide"

Congratulations to John and Heather Balock of Melstone, and Donald and Lucille Ottesen of Sonnette as they have received the prestigious John Companius Holm Award for 2009. This award is given to honor cooperative observers for outstanding accomplishments in the field of meteorological observations. It is named for John Companius Holm, a Lutheran minister, who was the first person known to have taken systematic weather observations in the American Colonies. Reverend Holm made observations of climate without the use of instruments in 1644 and 1645, near the present site of Wilmington, Delaware. No more than twenty-five Holm awards are given annually nation-wide, so for two of our observer families to have received them this year is a special testimony to their dedication in providing us with the most accurate information. The certificate is signed by the Administrator of the National Oceanic and Atmospheric Administration (NOAA), as well as by the Director of the National Weather Service. Planning is underway for both award ceremonies to be held in their communities in September..

Where Did the Weather Story Go?

Submitted by Matt Solum,
General Forecaster

You may have noticed that the Weather Story graphic no longer shows up on our web page on a routine basis. The reason for the change was to get away from generating a story during non-significant weather days and generate stories for those significant events that may affect our forecast area over the next 7 days. To grab your attention regarding a potential hazardous weather event, this Weather Story graphic will appear at the top of our web page as warranted. Some types of expected events where a weather story graphic may be produced include:

- **When watches and/or warnings are in effect or anticipated (potential for a significant event)**
- **When a significant change in weather is anticipated**
- **When any other unusual weather pattern develops that may warrant a story (i.e. record temperatures, extended heat wave, holiday forecasts, etc)**

Winter Normals

Submitted by Matt Solum, General Forecaster

Winter arrives on Monday December 21st at 10:47 AM MST and will end on Saturday March 20th at 11:32 AM MDT. Here are the normal temperatures and precipitation statistics for Billings, Miles City, and Sheridan for the Winter season. Normals are 30 year averages calculated from 1971 to 2000. All temperatures are in degrees Fahrenheit and all precipitation and snowfall amounts are in inches.

Billings					
Date	**High**	**Low**	**Average**	**Precipitation**	**Snowfall**
12/21 – 12/31	33.1	15.3	24.2	0.21	3.3
1/1 – 1/31	32.8	15.1	24.0	0.81	10.9
2/1 – 2/28	39.5	20.1	29.8	0.58	6.5
3/1 – 3/20	46.1	25.3	35.7	0.69	6.8
12/21 – 3/20	38.0	18.9	28.5	2.29	27.6

Miles City				
Date	**High**	**Low**	**Average**	**Precipitation**
12/21 – 12/31	27.8	8.4	18.1	0.20
1/1 – 1/31	27.3	7.4	17.4	0.50
2/1 – 2/28	35.2	14.3	24.8	0.34
3/1 – 3/20	44.0	21.8	32.9	0.30
12/21 – 3/20	33.8	13.1	23.4	1.28

Sheridan				
Date	**High**	**Low**	**Average**	**Precipitation**
12/21 – 12/31	33.2	9.7	21.5	0.19
1/1 – 1/31	33.0	9.7	21.3	0.77
2/1 – 2/28	39.0	14.9	26.9	0.57
3/1 – 3/20	46.5	21.7	34.1	0.57
12/21 – 3/20	38.1	14.0	26.1	2.05

Winter Begins
December 21st
at 10:47 AM MST

WINTER WEATHER QUIZ!

Submitted by Joe Lester General Forecaster

How well do you know the extreme weather that occurs in southeast Montana and north central Wyoming during the winter?

1. The all-time record coldest temperature at Billings occurred on February 15, 1936. How cold did it get?
   a. -42 degrees b. -33 degrees
   c. -49 degrees d. -38 degrees

2. A strong winter storm produced very heavy, wet snow at Red Lodge from April, 25-27, 1984. How much snow fell during this 3-day period?
   a. 73 inches b. 100 inches
   c. 85 inches d. 92 inches

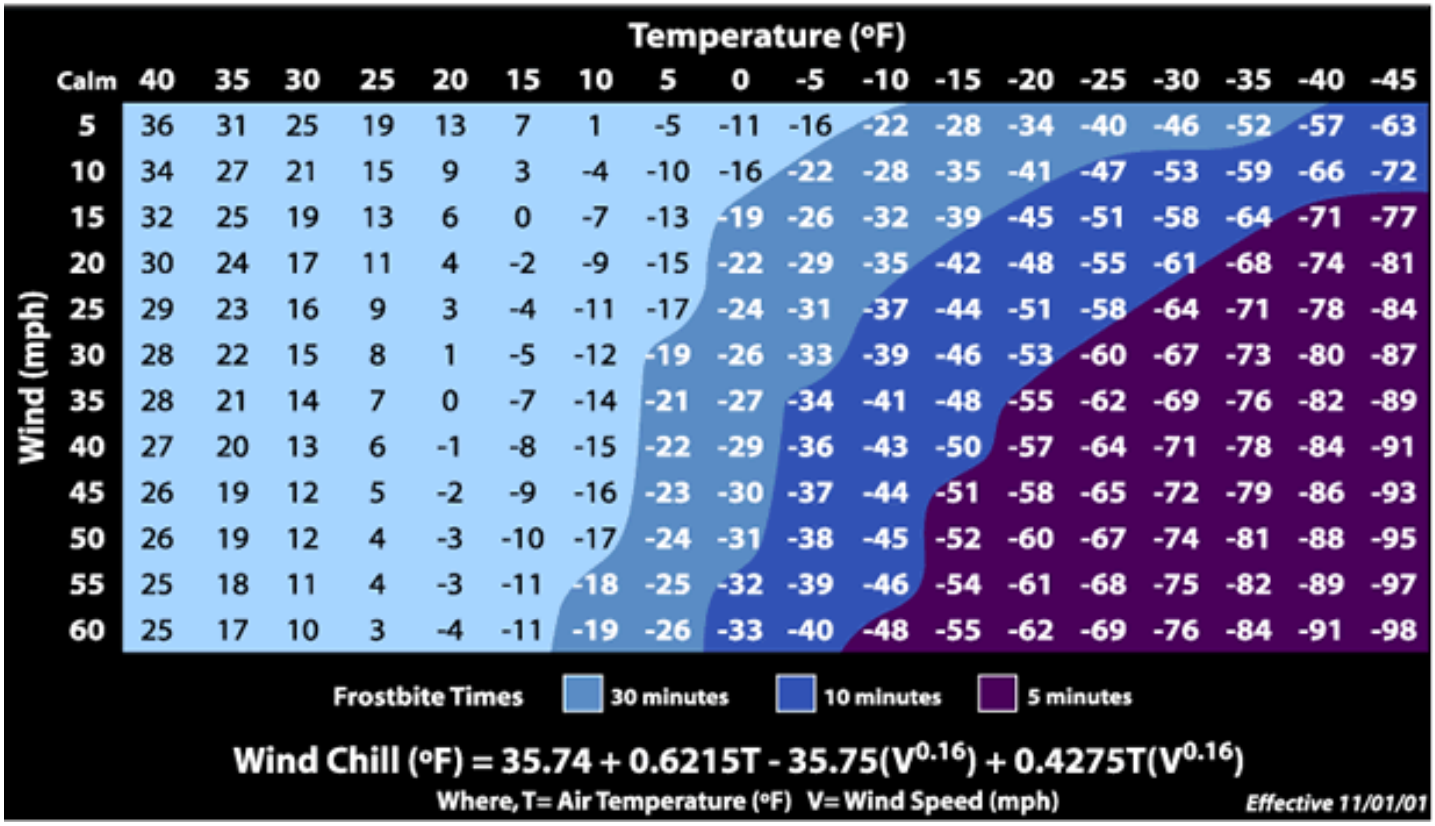
3. January 9, 1953 was a very warm day in Sheridan, WY. What was the high temperature that day? (It was a January record)
   a. 80 degrees b. 70 degrees
   c. 75 degrees d. 65 degrees

4. 42.3 inches of snow fell at Billings over a 3-day period in April, the record single storm snowfall record at Billings. What year did this occur?
   a. 1997 b. 1982
   c. 1955 d. 1941

5. What is the greatest snow depth ever observed on Christmas day in Billings?
   a. 9 inches b. 15 inches
   c. 12 inches d. 6 inches

Answers on Page 6

NWS Windchill Chart



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

PRSRT STD
US POSTAGE
PAID
Billings MT
PERMIT NO. G19

RETURN SERVICE
REQUESTED

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