Jet Stream Jargon

National Weather Service
Billings, MT

October 2014 Fall Issue

Inside this issue:

Special points of interest:

- 2014 Severe Weather Season
- Ending the Drought
- New Observing Program Leader

From the Desk of the Meteorologist in Charge

At the writing of our Spring Jet Stream Jargon, our attention was focused on the annual melt of the mountain snowpack. Thankfully, the melt-off occurred about as well behaved as one could request. Weather conditions in May and early June combined to allow the substantial mountain snowpack to fill our rivers and reservoirs with water our region so depends upon, with only some minor flooding issues occurring in a few areas. Despite the relatively dry spring, soil moisture conditions remained very favorable throughout the summer across most of our region.

Additionally, our severe thunderstorm season was relatively short and a bit below normal, as far as the number of storms we experienced. This is not to say that we did not have a few notable storms in the area (significant May hail storm in the Billings area, large tornado in Carter County....just to name a few). However, as we approached the traditional wildfire season, the number of storms decreased across our area which led to a lack of lightning and fire starts. The decrease in storms, combined with the cool and wet period in mid-August, pretty much ended the wildfire threat across much of the region.

As I write this current article, we are anticipating the first snow of the 2014-2015 snow season at some locations across the region. Although this does not appear to be a harbinger of an early start to winter, it certainly serves as a gentle reminder that winter is right around the corner and it is probably time for all of us to begin our preparations for winter weather.

One of the exciting things occurring within our office is finally filling vacant positions that we have had for quite some time. Earlier this year, the multi-year hiring freeze we had been under was lifted, allowing us to fill three (3) positions. Three positions may not sound like many, but it comprises about 13% of our full staffing level. Our staff has worked through being shorthanded by chipping in to work additional hours and taking on additional responsibilities to support our mission of protection of lives and property.

Later this month, Joe Chilcoat will join our staff as an Electronics Technician (i.e. one of the folks that keeps our radar, NOAA Weather Radios and observing systems running). Joe and his family will be moving from Ohio, where he is currently working for the Department of Defense. Joe joins us after 16 years of experience with the US Air Force and a Bachelor's degree in Business Administration. We are excited to have Joe join our team.

In early October, Nickolai Reimer will be joining our staff as a General Forecaster. Nickolai joins us after working 3 years at the Weather Forecast Office in San Angelo, Texas. Nickolai is familiar with the colder northern climates, after growing up in central Iowa and obtaining his Bachelor's degree in Meteorology from the University of Nebraska. In addition to his weather forecasting skills, Nickolai brings with him a large amount of technical expertise which will aid our office in continuing to provide world class service to our customers.

In late October, Larry Dooley will be joining our staff as the Observing Program Leader. Larry will be a key figure in working with our Cooperative Weather observers, in addition to our other observing programs. To find out more about Larry, look for his introduction article in the following pages.

As I close, I again want to extend my "Thank You" to all of you who volunteer your time as a weather observer, spotter, supporter, Facebook/Twitter follower, etc. Clearly we could not be as successful in our efforts to communicate weather and climate information without your assistance. We can have the most accurate information, but without hearing from you, or getting your assistance in spreading the official forecasts, watches, warnings or advisories...the accurate information would be replaced by fiction or half-truths. Thanks for your continued support and assistance!

Keith W. Meier

WCM Notes

Tom Frieders—Warning Coordination Meteorologist

Thank You to our Various Volunteers for your Observations!

As we continue to see the impacts of extreme weather, locally and nationally, we want to continue to stress the importance of your reports! All of us at the NWS office here in Billings want to thank our spotters and observers for their reports of hazardous weather. These reports are not only appreciated by our forecasters but are invaluable to our local communities to assist in accurate forecasts and warnings for the protection of life and property. Over 130 reports of severe weather have been received so far in 2014, not including the many more reports of less threatening weather that keep us informed at all times. Thank you to our Spotters, Cooperative Observers and CoCoRaHS observers for both event driven severe reports and to those that provide us daily reports!

With winter's arrival, the challenges continue and the reports remain important. Whether you have snow drifts to your rooftop, see numerous accidents during your commute, or you're sliding on a thin coat of ice from freezing drizzle, please continue to keep us informed on all your weather impacts. You may call our 800 number, send us an email, submit your COOP or CoCoRaHS report, or post to social media; whatever the means, we will be watching for your reports.

Hydrological Outlook

Todd Chambers – Senior Forecaster

Runoff Season 2014: The Flooding That Might Have Been

Mountain snowpack during the 2013-14 winter reached 150-170 percent of normal by March thanks to an unusually snowy January and February (figure 1). Flooding concerns were increased across the area due to the recent floods of 2011 and the Ice Jam flooding during the winter. Snowfall diminished significantly across the area in late March and April, but the above normal snowpack remained as we approached runoff season in the late spring. The stage was set for potential flooding on many of the streams and rivers across southern Montana and north central Wyoming. Briefings were held with area emergency managers and residents made preparations for rising waters. So, what happened during runoff season? Well, rivers and streams ran high and there was minor flooding on several rivers and streams (Clarks Fork of the Yellowstone River, Boulder River, Shields River, and Big Goose Creek).

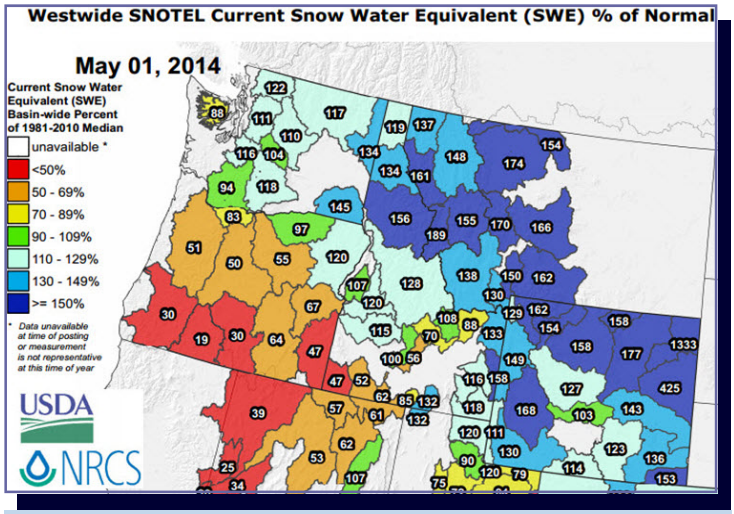


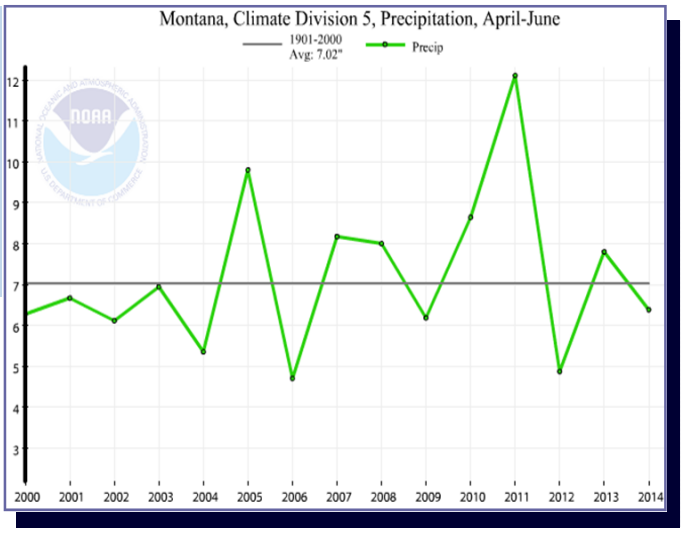
Figure 1: Percent of Normal Snow Water in the mountains as of May 1, 2014

Runoff Season 2014 con't

However, more severe flooding was averted due to a lack of large storm systems that usually make April, May and June the wettest months of the year across the Northern Rockies, the types of storms that caused the flooding of 2011 (figure 2). The area also escaped prolonged periods of hot weather in May, June, and early July that could have quickly melted the high elevation snowpack resulting in more severe flooding..

In contrast to the lack of strong rain producing storm systems during our usually wet months from April through June, an unusually strong storm system arrived during a normally dry month in August. This system produced widespread heavy rainfall from August 22nd through August 24th along and north of the Musselshell river and up to the Highline area of northern Montana. Rainfall was heaviest on August 23rd when 3 to 7 inches of rain fell over this area in 24 hours (figure 3), almost half a years' worth of rain in one day in some locations during what would normally be the height of wildfire season. Montana ended up with the wettest August on record, Figure 4 shows the ranking for each state. 1 being the driest and 120 being the wettest out of 120 years of record. Extensive flooding occurred over north central Montana along the Milk, Missouri and Lower Musselshell rivers due to this precipitation. Fortunately south central Montana was largely spared flooding impacts from this system.

Figure 2: Average Precipitation recorded across South Central Montana for April-June (scale to left in inches) going back to 2000. 2014 received just below the normal precipitation of 7 inches. Compare to the record setting rains of 2011 that caused major flooding.



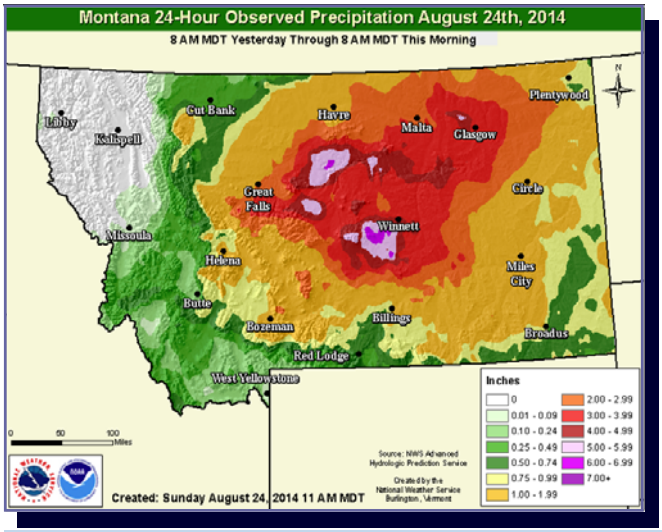


Figure 3: 24 hour Precipitation Map for August 23rd

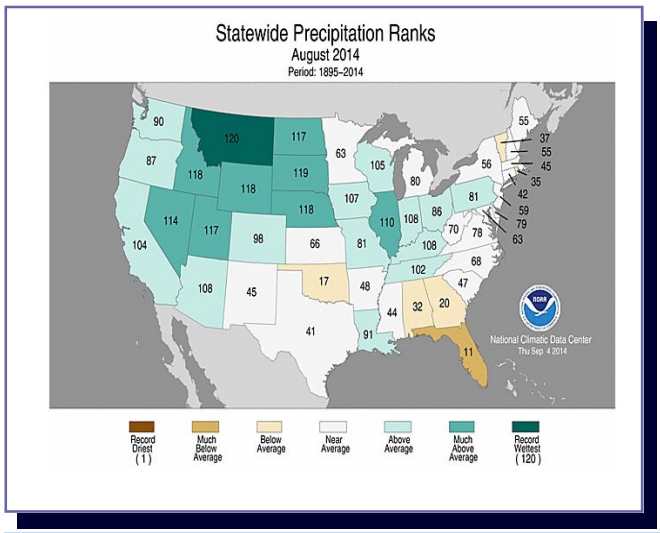


Figure 4: Statewide Precipitation Ranks August 2014

Summer Review

2014 Severe Thunderstorm Season: *First Ever Recorded EF-3 Tornado Highlights*

Tom Frieders—Warning Coordination Meteorologist

The afternoon of June 17, 2014, a severe thunderstorm developed quickly in Carter County of southeast MT, about 13 miles southwest of Camp Crook, SD. This severe thunderstorm went on to produce the first ever EF-3 tornado in southern Montana. An EF-3 tornado has winds estimated between 136-165 mph. Eye-witness reports indicate this tornado was on the ground for over an hour and traveled around 10 miles. The tornado completely destroyed a trailer home and an old A frame school house. Six vehicles were picked up and tossed several hundred yards. Thankfully, no injuries occurred, although two horses were killed by the flying debris.

This was one of a total of 4 tornadoes that touched down across southeast MT this season. The other three were much weaker, stayed over open areas and produced no damage.

EF-3 Tornado in Carter County

Aircraft Damage at Ekalaka Airport

The damaging thunderstorm season was not over for Carter County. On August 21, 2014, another damaging thunderstorm moved through central portions of Carter County, including the city of Ekalaka. This thunderstorm hit Ekalaka with microburst winds in excess of 75 mph. These winds produced considerable damage at the Ekalaka Airport along with tree and power line damage.

Likely the most costly severe thunderstorms occurred early in the season on May 18, 2014. Hail ranging from golf balls to tennis balls were reported in many areas across the region. The city of Billings and surrounding communities were hit particularly hard by hail and wind. The wind-driven hail produced widespread damage to vehicles, homes, businesses and crops across the region.

Baseball size hail in Colstrip, MT

How are Tornado Intensities Measured?

Tom Frieders—Warning Coordination Meteorologist

Anytime thunderstorms produce wind damage and there is reason to believe a tornado may have caused the damage, the National Weather Service (NWS) will send out a team of meteorologists to investigate the damage. The NWS uses the Fujita Scale to relate the damage caused by the tornado and relate that damage to wind speed. In 2007, the scale was enhanced to produce more accurate wind estimates by using damage indicators. More details can be found at: http://www.spc.noaa.gov/efscale/

Enhanced Fujita Scale	
Scale	Wind Speed Estimates (mph)
EF-0	65-85
EF-1	86-110
EF-2	111-135
EF-3	136-165
EF-4	166-200
EF-5	>200

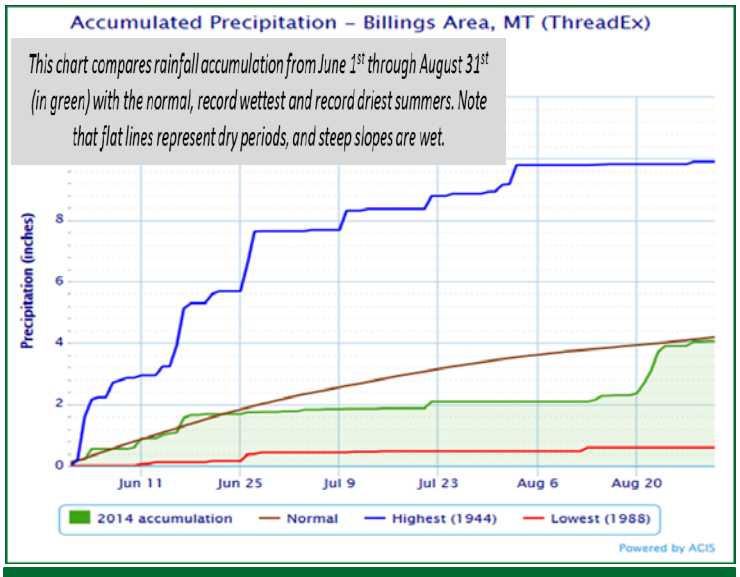
2014 Summer Statistics: *Temperature and Precipitation*

Joe Lester – General Forecaster

Overall, slightly below normal temperatures and above normal precipitation characterized the 2014 summer across the region, though the statistics were swayed heavily by the very cool and wet period of weather in late August. Extreme heat did not occur during the summer, with only one hundred degree day observed at Billings, Miles City and Sheridan (on July 24th). The thunderstorm season was quite active early in the summer, with severe weather beginning in May, but in late June the pattern shifted out of severe mode and into one that was warm and dry. Conditions from July through the first half of August were mostly dry (Miles City had its 2nd driest July on record), after which the pattern turned much wetter. Despite the dry weather during the mid-summer, the wildfire season was largely inactive (humidity was generally on the high side with a lack of dry/windy cold frontal passages).

The following table summarizes temperature and precipitation statistics at our four official climate sites. Records go back to 1934 at Billings, 1937 at Miles City, 1907 at Sheridan and 1948 at Livingston. Normals are calculated from the 1981-2010 period.

Jun - Aug Stats	Average Temp (deg F)	Departure from Normal	Precipitation (inches)	Departure from Normal
Billings	69.1 (38th coldest)	- 0.6	4.06 (38th wettest)	- 0.13
Miles City	69.5 (13th coldest)	- 2.0	6.60 (20th wettest)	+ 1.54
Sheridan	65.6 (27th coldest)	- 1.8	4.26 (44th wettest)	+ 0.24
Livingston	65.1 (24th warmest)	+ 0.2	5.44 (26th wettest)	+ 0.47



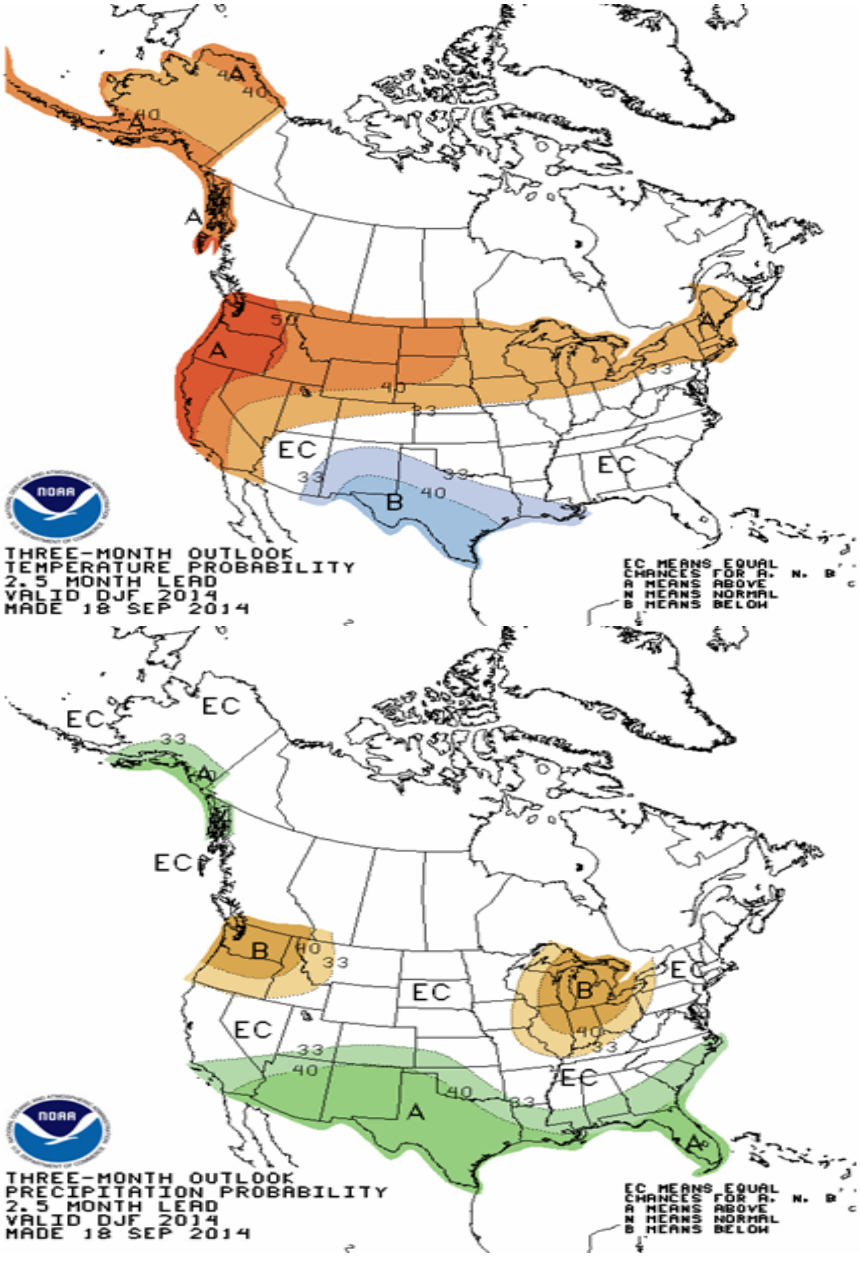
You can make charts like this @ http://www.nws.noaa.gov/climate/xmacis.php?wfo=byz

Winter Outlook

Joe Lester – General Forecaster

2014-2015 Winter

The official December-January-February outlook from the Climate Prediction Center, issued on September 18, calls for increased likelihoods of above normal temperatures and below normal precipitation. This is in large part due to the expected development of a weak El Nino episode in the tropical Pacific ocean. It should be noted that if El Nino develops, it is not expected to be strong, so the climate signal for the upcoming winter is weak. Due to our location on the eastern slopes of the Rocky Mountains, our winters are characterized by alternating periods of cold and snowy Canadian air, and warm and dry chinook winds. As always, be prepared for both extremes during the upcoming winter.



Fall and Winter Data Tables

Tom Frieders– Warning Coordination Meteorologist

Fall Normals

Meteorological fall is considered the months of September, October and November. Here are the normal temperatures and precipitation for Billings, Miles City and Sheridan for the fall season. Normals are 30 year averages calculated from 1981 to 2010. All temperatures are in degrees Fahrenheit and all precipitation amounts are in inches.

Billings					
Date	**High**	**Low**	**Average**	**Precipitation**	**Snowfall**
9/1 – 9/30	73.1	47.5	60.3	1.30	1.1
10/1 – 10/31	59.4	37.1	48.2	1.18	4.1
11/1 – 11/30	45.3	26.3	35.8	0.63	6.5
9/1 – 11/30	59.3	37.0	48.2	3.11	11.7

Miles City				
Date	**High**	**Low**	**Average**	**Precipitation**
9/1 – 9/30	74.2	46.1	60.1	1.08
10/1 – 10/31	59.2	33.8	46.5	0.92
11/1 – 11/30	43.2	20.9	32.0	0.39
9/1 – 11/30	59.3	34.7	47.0	2.39

Sheridan				
Date	**High**	**Low**	**Average**	**Precipitation**
9/1 – 9/30	74.2	41.6	57.9	1.43
10/1 – 10/31	60.1	30.9	45.5	1.41
11/1 – 11/30	45.9	19.4	32.7	0.71
9/1 – 11/30	59.9	31.5	45.7	3.55

Jeff Bridges-Electronics Technician

Winter Normals

Meteorological winter is considered the months of December, January and February. Here are the normal temperatures and precipitation for Billings, Miles City and Sheridan for the winter season. Normals are 30 year averages calculated from 1981 to 2010. All temperatures are in degrees Fahrenheit and all precipitation amounts are in inches.

Billings					
Date	**High**	**Low**	**Average**	**Precipitation**	**Snowfall**
12/1-12/31	35.2	17.8	26.5	0.50	8.2
1/1-1/31	36.4	17.8	27.1	0.48	8.4
2/1-2/28	40.2	20.6	30.4	0.48	6.2
12/1-2/28	37.2	18.7	28.0	1.46	22.8

Miles City				
Date	**High**	**Low**	**Average**	**Precipitation**
12/1-12/31	30.9	9.7	20.3	0.29
1/1-1/31	30.0	8.9	19.5	0.32
2/1-2/28	35.5	13.2	24.4	0.23
12/1-2/28	32.4	11.5	22.0	0.84

Sheridan				
Date	**High**	**Low**	**Average**	**Precipitation**
12/1-12/31	35.2	10.6	22.9	0.56
1/1-1/31	36.2	11.4	23.8	0.56
2/1-2/28	39.0	14.2	26.6	0.54
12/1-2/28	36.7	12.9	24.8	1.66

Average Frost and Freeze Dates

The following are the normal first frost, freeze and hard freeze dates for Billings, Miles City and Sheridan. The frost temperature is based on 36 degrees Fahrenheit, the freezing temperature is based on 32 degrees Fahrenheit and the hard freeze temperature is based on 28 degrees Fahrenheit. The normal dates are based on a 30 year average from 1981 to 2010. The first frost, freeze and hard freeze dates are based on a period of record. Recordkeeping began for the Billings Airport in 1934, the Miles City Airport in 1937 and at the Sheridan Airport in 1907.

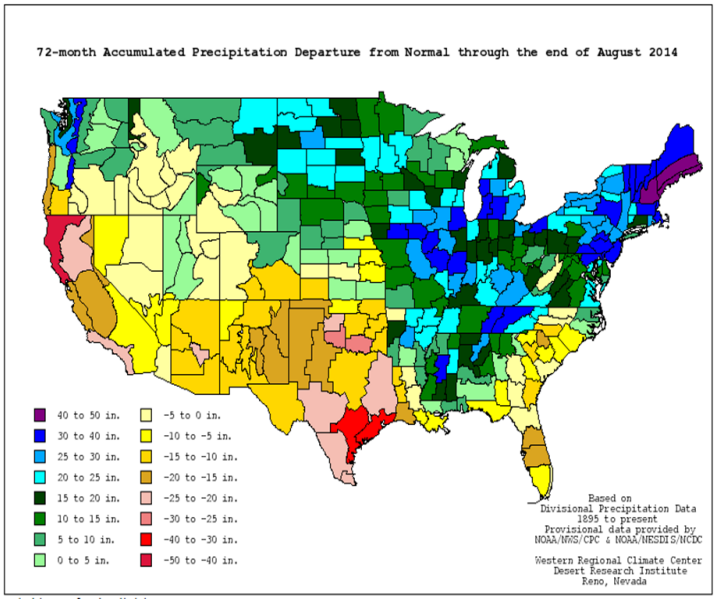
City	Normal First Frost	Earliest Frost on Record	Normal First Freeze	Earliest Freeze on Record	Normal First Hard Freeze	Earliest Hard Freeze
Billings	Sep 24	Aug 24	Oct 4	Sep 4	Oct 11	Sep 11
Miles City	Sep 21	Aug 22	Sep 29	Sep 2	Oct 7	Sep 11
Sheridan	Sep 11	Jul 2	Sep 20	Aug 17	Oct 3	Aug 25

Ending the Drought?

Dan Borsum- Incident Meteorologist/Senior Forecaster

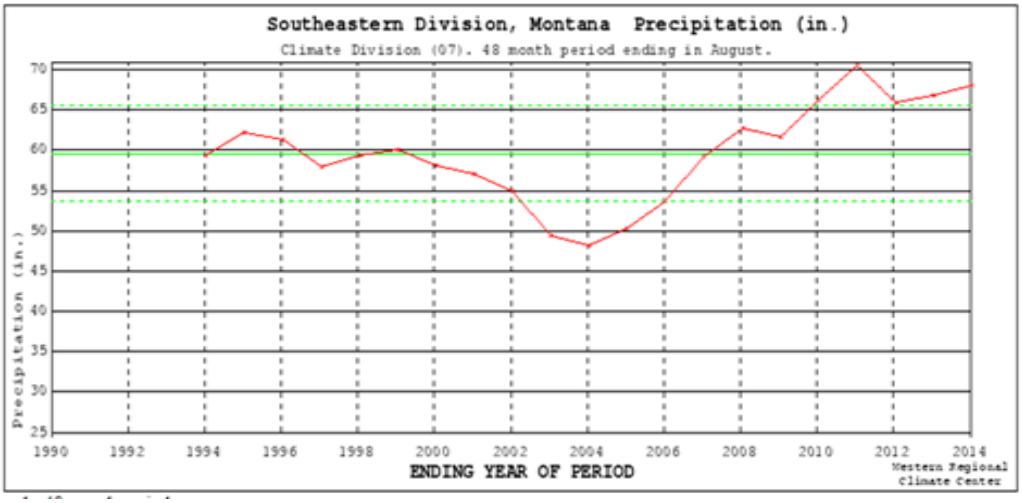
Have We Recovered from the Drought of the Early 2000s?

Suppose someone told you we are recovering from the dry years we saw from 1999 to 2007. Would you believe them? The evidence is compelling. Here is a map of the United States showing how much accumulated moisture above normal has fallen over the past 6 years. In southeast Montana it shows in excess of 15 inches...an extra years worth of moisture!



How Stark is the Difference Between Early 2000s and Early 2010s?

It's large. Below is a graph of the 4 year running total of moisture. While each year's crop does depend on a 12 month moisture cycle, it is useful to look at longer time lengths to get a feel for accumulated drought stress on trees and on aquatic systems. This graph shows that for a period in the early 2000s, the running 4 year total of moisture was less than 50 inches. For the past 4 years that running total has been in excess of 65 inches. If you think the springs are running stronger and the trees are looking healthier, its probably because we have been getting a lot more moisture recently compared to 10 years ago.



COOP Corner

Vickie Stephenson—Cooperative Program Manager

Fall is on its way, with winter right behind! You will want to remove your funnels and tubes from your rain gauges for the snow season in the next month or so.

There have been a lot of changes to the Billings COOP program in the past few months. As most of you know, Carolyn Willis retired and I took over the program the first of April. Since that time, I have spent a lot of time in the field doing repairs, maintenance, and moving various stations for various reasons. Though, it is always sad to lose our dedicated observers, we appreciate the time and efforts that were a daily part of their lives for many years. So as they "pass the baton", I am excited to see the interest and excitement of individuals who have stepped up and accepted the commitment these duties will require.

Please join me in welcoming to our program, the following new observers:

* Cooke City 2W station was relocated to Silver Gate, the Mount Republic Faith Chapel of Peace on August 1, 2014 – Don Taylor, Pastor, is the new observer. Thanks Don!
* Story, WY station was relocated just about ½ mile from its previous location of 24 years - Steve Small is the new observer in Story. Thanks Steve!

2014 Length of Service

10 Years

Mark & Dianne Giesick – Bridger 2N
Clinton & Clayton Giesick – Bridger 2N
Calvin & Jodi Christensen – Gibson 2NE
Lee Howard – Hysham 25SSE

15 Years

Joyce Sarrazin – Clyde Park

20 Years

Wes Hill – Roberts1N

50 Year Award – The Brown Family of Powderville

The Brown family of Powderville reached a milestone of 50 years reporting observations for the National Weather Service. In April of 1964, Albert Brown began taking observations on their ranch north-northeast of Powderville. In October 1982, his wife, Ingrid took over the duties and has never looked back. In January, 2001, daughter Stacy Brown became the secondary observer, continuing the family tradition. We are so appreciative for this family's dedication over the past 50 years.

I would like to sincerely thank all of our Cooperative Observers for your assistance and patience during my first season as the Cooperative Program Manager.

CoCoRaHS

Vickie Stephenson– CoCoRaHS Coordinator

Snow Measuring 101

The warm weather will soon be replaced with cold and snow! Measuring snow can be pretty tricky in Montana & Wyoming. It is, however, a key ingredient to our climatology across the country.

The tools you need are a snowboard approximately 2' x 3', painted white to reflect the sun, and a snow measuring stick or yardstick to measure the snowfall on the board and the snow depth on the ground. A rain gauge is used to measure the amount of moisture in the snow after it melts.

How to evaluate the exposure of your snowboard:

1) Avoid structures and obstructions that could affect the wind patterns in the surrounding area. You should re-evaluate this after the first snowfall to ensure a good location.

2) Determine a clear and safe path to take snow measurements. The remainder of the area should stay as undisturbed as possible as this area is used for each measurement until it's gone.

Snowfall: Maximum amount of new snow that has fallen since the previous observation, usually measured on a snowboard. Snowfall is reported in tenths of an inch. Snowfall can also be measured on other flat surfaces, but a snowboard or the ground are the best places to get an accurate reading, preferably not on top of a vehicle or table.

Snow Depth: Snow Depth is the total depth of snow (including ice) on the ground at the normal time of observation. Snow Depth is reported to the nearest WHOLE inch (single number value) rounding up when ½ inch increments are reached. When less than ½ inch total, report a trace "T". **Be aware when taking measurements in the grass that air space might be present within the grass. You may need to reduce the snow depth reading by an appropriate amount.**

Montana & Wyoming are notorious for windy snow storms. An effective method for measuring windblown snow is to take several measurements around the area, where the snow depths obviously vary. Figure your average by adding those together and dividing by the number of measurements you took. This method has proven to be fairly accurate in most cases.

There are a couple of helpful resources for measuring snow. Click here for Snow Measuring Video. This is a helpful video, especially for those with rain gauges. If you don't have a rain gauge, just pay particular attention to the snow measuring sections. You can disregard sections on snow melt & water equivalent. In addition to the video,
Snow Measurement Guidelines is a helpful document covering the entire subject of snow measuring.

Thanks to all of our spotters and observers for your help in retrieving this important data!

In the News

Larry Dooley-Observing Program Leader

My name is Larry Dooley and I will be arriving in Billings in the middle of October. I will be assuming the duties of the Observing Program Leader.

I graduated from Black Hills State University with a Bachelor's of Science degree in May of 1992. After completion of my degree, I finished my commitment with the US Air Force at Ellsworth AFB, SD. I transferred from a position as a Weather Forecaster at Ellsworth to a spot at the National Weather Service in Springfield, MO in November of 1998. I have been serving as the Observation Program Leader at Springfield for the past seven years.

I am looking forward to my return to the Mountain West, am very excited about the new challenges, and meeting our observers in the National Weather Service Billings area of responsibility.

In our spare time, my family and I enjoy camping, hiking, riding bicycles, and scenic drives. I think Billings will be the perfect place to explore all of these activities.

Did You Know....

Winter Solstice

Kurt Hooley– General Forecaster

Winter brings a variety of emotions. Some people can't wait for the cooler weather that brings snow, skiing, ice skating, curling up by a fire, and the holiday spirit. Other people dislike the frigid temperatures, blizzards, and dangerous road conditions.

The word solstice comes from the Latin words for "sun" and "to stand still." In the Northern Hemisphere, as summer advances to winter, the points on the horizon where the Sun rises and sets advance southward each day; the high point in the Sun's daily path across the sky, which occurs at local noon, also moves southward each day. At the winter solstice, the Sun's path has reached its southernmost position. The next day, the path will advance northward. However, a few days before and after the winter solstice, the change is so slight that the Sun's path seems to stay the same, or stand still. The Sun is directly overhead at "high-noon" on Winter Solstice at the latitude called the Tropic of Capricorn. In the Northern Hemisphere, the solstice days are the days with the fewest hours of sunlight during the whole year.

It is important to note that the Earth does not move at a constant speed in its elliptical orbit. Therefore the seasons are not of equal length: the times taken for the sun to move from the vernal equinox to the summer solstice, to the autumnal equinox, to the winter solstice, and back to the vernal equinox are roughly 92.8, 93.6, 89.8 and 89.0 days respectively. The consolation in the northern hemisphere is that spring and summer last longer than autumn and winter (when the December solstice occurs).

You may ask, "Why is there such a time lag between the shortest day of the year and the lowest average daily temperature of the year?" Although the winter solstice is the time of the year when the Sun reaches its southernmost point in the sky, the earth is still cooling as its great thermal mass still retains some heat from the summer and fall. As the gradual cooling process continues over the next two months, temperatures will continue to fall, and the coldest temperatures will be recorded. The same pattern holds true for the summer solstice in June, as the warmest temperatures are recorded later, in July and August.

Winter Folklore

Kurt Hooley– General Forecaster

The larvae of Isabella Tiger Moths--more commonly known as woolly worms, or woolly bear caterpillars--are easily recognized by their short, stiff bristles of reddish-brown and black hair. According to legend, the width of the middle brown band judges the severity of the upcoming winter. If the brown band is narrow, the winter will be cold and long. However, if the band is wide, then the winter will be a mild and short one.

Some consider the woolly's hair thickness to be another indicator, with a thicker coat signaling a harsher, and sparse hairs a milder, winter season. (What's more, the woolly has exactly 13 segments to the length of his body--the same number of weeks there are of winter.)

The woolly worm's talent was first discovered in the late 1940s by Dr. Charles Curran, former curator of insects at New York City's Museum of Natural History. By observing caterpillar markings and comparing these to winter weather forecasts (provided by a reporter at the New York Herald Tribune) Curran found that the width of reddish-brown hair correctly matched the winter type with 80% accuracy. Since then, researchers haven't been able to replicate Dr. Curran's success (coloration is said to have less to do with weather and more to do with a caterpillar's development stage and genetics), but this hasn't seemed to influence the woolly worm's popularity. In fact, annual festivals are held in its honor in the cities of Banner Elk, NC, Beattyville, KY, Vermilion, OH, and Lewisburg, PA.

Weather Watch

Winter Weather Preparedness and Safety Tips

The National Weather Service in Billings, MT issues various products to keep you informed and aware of possible hazardous winter weather. See below for product definitions:

Hazardous Weather Outlook: Issued when winter storm conditions are possible in the next 7 days. Stay tuned to the National Weather Service and local media for updates.

Watch: Hazardous winter weather is possible in the next 12 to 48 hours, but the exact location and timing is not known. Stock up on needed supplies such as water and food and make sure you have a plan to protect pets and livestock.

Warning: Hazardous winter weather either is occurring or will be shortly. Immediate action should be taken to protect yourself as well as your pets and livestock. Only travel outside of your home if you absolutely have to.

Advisory: Winter weather conditions are expected to cause significant inconveniences and may be hazardous. If you are cautious, these situations should not be life threatening.

It's a good idea to prepare ahead of time for winter storms. See below for how to prepare your home, work, vehicle, farm and pets for winter:

At Home and Work

Have these items available:

- Flashlight and extra batteries
- Battery powered NOAA Weather Radio
- Extra food and water
- Extra medicine and baby items
- First-aid supplies
- Emergency heat source
- Make sure pets and livestock have plenty of food, water and shelter
- If you have no heat, wear layers of loose-fitting, lightweight, warm clothing. Remove layers to avoid overheating, perspiration and subsequent chill.

In Your Vehicle

Plan your travel and check the latest weather reports to avoid the storm. Winterize your vehicle before the winter season begins. Carry a winter storm survival kit with these items:

- Mobile phone and charger
- Blankets/sleeping bags
- Flashlight with extra batteries
- First-aid kit
- Extra clothing
- Shovel
- Windshield scraper and brush
- Tool kit
- Tow rope
- Battery booster cables
- Water container
- Compass and road maps
- High-calorie, non-perishable food
- Small can and waterproof matches to melt snow for drinking water

Winter Weather Preparedness and Safety Tips Con't

On the Farm/Pets

Take these steps before the storm hits to ensure the safety of your pets and animals:

- Move animals to sheltered areas.
- Haul extra feed to nearby feeding areas.
- Have water available. Most animals die from dehydration in winter storms.
- Make sure pets have plenty of food, water and shelter.

What If You Are Caught Outside During a Winter Storm

- Find shelter and try to stay dry. Cover exposed body parts.
- Build a lean-to or windbreak if you have no shelter. Also build a fire for heat and to attract attention.
- Melt snow for drinking water to stay hydrated. Do not eat snow as it will lower your body temperature.
- If in your vehicle, stay there. Run the motor about 10 minutes each hour for heat and open the window a bit to avoid carbon monoxide poisoning. Make sure your exhaust pipe is not blocked.
- Be visible to rescuers by turning on the dome light, or tying a colored cloth to your antenna or door. After the snow stops, open your hood to show you need help.
- From time to time, move to keep blood circulating and to keep warm.

Good to know: **Montana Winter Weather Awareness Week** is October 20-24, 2014. The National Weather Service offices in Montana are sponsoring this week to provide you information about the different types of winter weather we have in Montana and to give you safety information related to each type. Click here to learn more.

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Information Stop

Winter Weather Preparedness
http://www.wrh.noaa.gov/byz/winter/index.php?wfo=byz

Red Cross Winter Storm Safety Checklist
http://www.redcross.org/images/MEDIA_CustomProductCatalog/m4240231_WinterStorms.pdf

Wind Chill Resources
http://www.nws.noaa.gov/os/windchill/index.shtml

Local Climate Records
http://www.nws.noaa.gov/climate/index.php?wfo=byz

NOAA Education Resources
http://www.education.noaa.gov/

Owlie Skywarn Weather-Ready Kids Page
http://www.weather.gov/owlie/

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