Jet Stream Jargon

National Weather Service - Billings, Montana

weather.gov/billings

April 2013 - Spring /Summer Issue

Online version

Special points of interest:

- **2013 Snowpack near to below average**
- **Fire season 2013 Concerns**
- **Is it too early to plant my garden?**

Inside this issue:

2012 Wildfires Lead to Increased Threat Of Flash Floods in 2013

Submitted by Tom Frieders, Warning Coordination Meteorologist

The dry and hot spring and summer of 2012 led to significant wildfire activity last year with over one million acres burned across Montana and Wyoming. With all of this scarred land left behind, did you know there is an increased threat for Flash Floods in and downstream of burn areas for several years after fires? Wildfires produce hydrophobic soils, or soils that do not allow water to infiltrate into the ground. Water will then collect on the surface and quickly run off into low lying areas. In steeper terrain, debris flows can also develop. These flows are a moving mass of loose mud, sand, soil, rock and water. These debris flows can cause significant damage to areas downstream. Even if you are several miles downstream, you still could be impacted. Any quick burst of rain this upcoming spring and summer will be a concern. Reports and studies have shown that it only takes a third of an inch of rain in 15 minutes to increase the threat. We have been holding meetings in several of our more affected communities throughout the region to ensure those impacted are aware of the threat. We have a website dedicated to burn area flash flood potential, where you can find detailed information on specific burn scars. Please visit the Billings Fire Weather Decision Support Web Page for information on these burned areas.

LIGHTNING

Lightning is the third greatest storm-related killer in the United States and causes nearly $1 billion in damages each year!

Over the past 10 years, on average, lightning has directly killed about 37 people per year in the U.S. and indirectly killed about a dozen more due to fires caused by lightning. There is no safe place outside when a thunderstorm is in the area. If you hear thunder, you need to get inside a safe place immediately, avoid contact with plumbing and anything plugged into an electrical outlet, stay off corded phones, and stay away from windows and doors. Remain there for 30 minutes after the last lightning or thunder. Remember… When Thunder Roars, Go Indoors!

Visit the NWS Lightning Safety Website for more information.

Jet Stream Jargon

The Jet Stream 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.

"Coop data is also used by others for research, agricultural planning, engineering, environmental impact assessment, utilities planning, and litigation."

Coop Corner

Articles on this page Submitted by Carolyn Willis, Observing Program Leader

It's been a busy year in regards to Coop stations. Due to budget constraints, everything is being looked at as a source of money savings. The Coop program is no exception. I was selected as one of 15 people on a national team looking at streamlining the Cooperative Observing Network. My job was to convince those trying to cut stations that your data is very important to many people, companies and agencies, not only to the National Weather Service. Coop data is used internally by the National Weather Service to provide support to forecast, warning and public service programs. But coop data is also used by others for research, agricultural planning, engineering, environmental impact assessment, utilities planning, and litigation. Coop data is very important. Although our team's findings have not yet been presented formally, I think most of our Montana and Wyoming Coop stations are safe from being closed at this time. We're hoping the only stations to be closed are those where data is only received sporadically, or not at all. So keep up the good work, and please realize your data is used by many, and is important!

Remember: Don't put your funnel and inner tube into your rain gage before the last week of May. Freezes could still occur, breaking your tube.

2013 Length of Service Awards

Congratulations to each Coop observer listed below. It's is your dedication to the program that makes it successful! Thank you!

John Jonutis - 55 years - Mizpah, MT

Willis & Nadine Busenitz - 40 years - Busby, MT

Jacqulyn Hudecek - 25 years - Springdale, MT

Bill Linger - 20 years - Molt, MT

Jim Goodwin - 20 years - Ashland Ranger Stn, MT

Joann Ferguson - 20 years - Livingston Airport, MT

Mary Ann Johnson - 20 years - Vananda, MT

Vicky Schwartz - 15 years - Big Timber, MT

Judy Rue - 15 years - McLeod, MT

Elsie Shellenberger - 15 years - Reedpoint, MT

Hank & Marie Cantrell - 15 years - Pompey's Pillar, MT

Al Billings - 10 years - Story, WY

Susan Wood - 10 years - Lavina, MT

New Additions & Farewells

Submitted by Vickie Stephenson, Hydrometeorological Technician

Julie Arthur, General Forecaster, and her husband Brad, welcomed a new baby girl, Leanna Claire, on February 15th, their second daughter.

Aaron Gilstad, General Forecaster, and his wife, Kim , welcomed a new baby girl, Rhyann Ruby, on January 26th, their third daughter. Congratulations to all!

Bryan Schuknecht, General Forecaster, transferred to Central Illinois to pursue his career in the IT field. Congratulations to Bryan on his new career.

Each year, lightning is responsible for approximately:

- 37 direct deaths
- 300 injuries
- 200,000 insurance claims
- $1 billion in damages

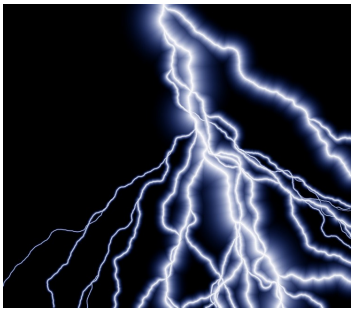
Visit the NWS Lightning Safety Website for more information

Last Hard Freeze and Frost Dates

Submitted by Sean Campbell, Meteorological Intern

Many people will start planting their crops and gardens over the next few weeks. To keep crops and plants protected from the cold, it is important to know when the ***normal*** last hard freeze, freeze and frost typically occur in the spring/summer. It is also important to know the dates of the ***latest*** hard freeze, freeze and frost. The following are the ***normal*** last hard freeze, freeze and frost dates and the ***latest*** hard freeze, freeze and frost dates for ***Billings, Miles City and Sheridan***. The hard freeze temperature is based on 28 degrees Fahrenheit, the freezing temperature is based on 32 degrees Fahrenheit and the frost temperature is based on 36 degrees Fahrenheit. The normal dates are based on a 30 year average from 1981 to 2010. Record-keeping began at the Billings Airport in 1934, at the Miles City Airport in 1937 and at the Sheridan Airport in 1907.

City	Normal Last Hard Freeze	Latest Hard Freeze on Record	Normal Last Freeze	Latest Freeze on Record	Normal Last Frost	Latest Frost on Record
Billings	Apr 23	May 28	May 7	Jun 13	May 18	Jun 13
Miles City	Apr 27	May 28	May 9	Jun 8	May 18	Jun 18
Sheridan	May 8	Jun 3	May 19	Jun 24	Jun 5	Jun 30



How hot is lightning?

It depends what the lightning is passing through. As lightning passes through air, it can heat the air to 50,000 degrees Fahrenheit: about 5 times hotter than the surface of the sun.

Visit the NWS Lightning Safety Website for more information

CoCoRaHS

Submitted by Vickie Stephenson, Hydrometeorological Technician

The CoCoRaHS Network in the Billings service area continues to grow and thrive through our dedicated and reliable observers. We currently have 142 observers in our area and most every day there are 60-70 reports, even on days with NO precipitation! This is an awesome number, but there is always room for improvement. I would like to increase our number of daily reports coming in.

Spring and Summer are just around the corner, and with them comes severe weather. Remember there is a "Significant Weather" feature on the left hand menu on your CoCoRaHS account screen, used for heavy rain/snow and flooding information. There is also the "Hail" report form, so feel free to use this form to alert us of hail in your area. You can take advantage of these features for supplemental severe weather reports in real time. Once submitted, the NWS office forecasters receive an alarm immediately. These immediate reports help us get warnings out to the public as events unfold and establish a good lead time for life and property protection.

Both forms have boxes for comments, so you can add information that you think would be helpful to our forecasters. You can get as detailed as you like. If you are unaware of these features in the program, feel free to contact me for assistance.

I look forward to seeing your reports and hope to meet some new observers this summer! If you have questions or concerns, please feel free to contact Vickie Stephenson,

vickie.stephenson@noaa.gov or Tom Frieders,

tom.frieders@noaa.gov at the Billings National Weather Service office at (406) 652-0851. We are happy to be your first contact if you have concerns about the website or the program itself. And once again, thank you for your commitment and dedication! You are appreciated more than you know!

Skywarn Spotter Training

Submitted by Tom Frieders

Warning Coordination Meteorologist

Help protect your local communities and assist our forecasters by observing and reporting severe weather through the Skywarn Severe Storm Spotter Network. Training will be conducted through May. A list of spotter training sessions can be found here. Click and see when training will be conducted near you, or sign up for a webinar and view the presentation the comforts of your home or business.

Time for Severe Thunderstorms

Submitted by Tom Frieders

Warning Coordination Meteorologist

While last year was one of the quietest years for thunderstorms and severe weather for this region, an active weather pattern can quickly change those trends for 2013. Severe Thunderstorms produce hail one inch in diameter or larger, damaging winds in excess of 60 mph, flash flooding and even tornadoes. **Know your risk and what to do before that warning is issued.** You can learn more by visiting this page on our website.

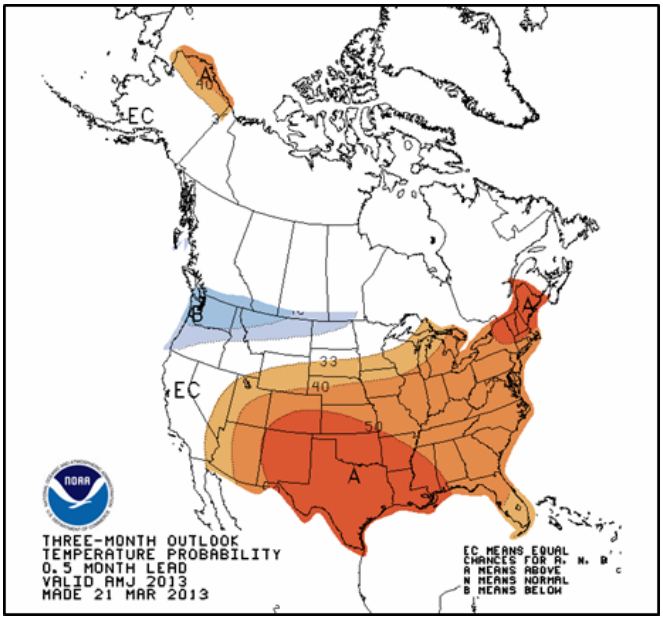
2012-2013 Winter Recap and 2013 Spring Outlook

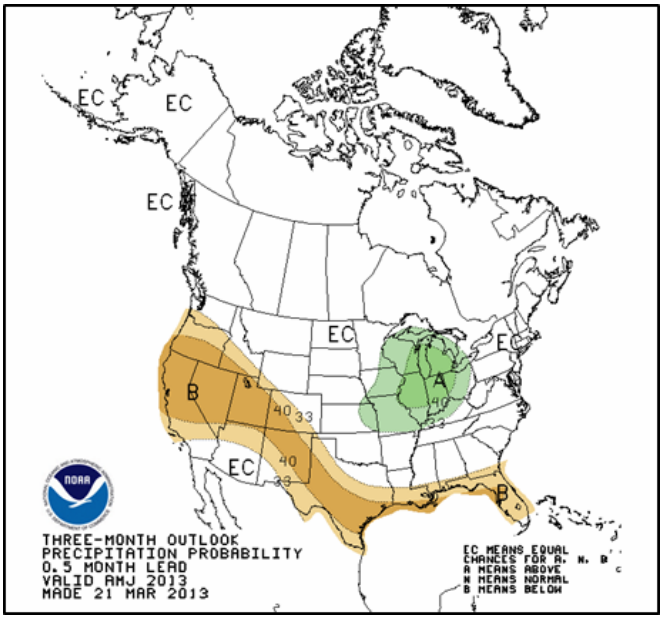
Submitted by Joe Lester, General Forecaster

2012-2013 Winter Recap: Generally speaking, the 3-month period from December through February was slightly warmer and drier than normal for most of the region. The exception to this was in the Sheridan area, where more frequent snow events on the north side of the Big Horn Mountains resulted in cooler and wetter than normal conditions. Also, there was a distinct lack of arctic air throughout the winter. As an example, Billings fell below zero on only two days, and the average since 1934 is 15. The following table summarizes temperatures and precipitation at various climate sites for the 2012-2013 mid-winter months.

December through February Statistics							
	Avg Temp	**Normal**	**Departure**		**Total Pcpn**	**Normal**	**Departure**
Billings	29.4	27.8	+ 1.6		1.15	1.46	- 0.31
Livingston	29.6	28.6	+ 1.0		1.13	1.51	- 0.38
Miles City	24.9	22.0	+ 2.9		0.39	0.84	- 0.45
Sheridan	24.3	24.8	- 0.5		2.25	1.66	+ 0.59

Outlook for Spring 2013: Spring is the wettest time of year across our region. In fact, of the 13.66 inches of precipitation Billings normally receives over the course of a year, 5.96 inches (44%) falls between April and June. In 2011, we experienced a record wet May. In stark contrast, spring of 2012 was warm and dry, leading to a difficult fire weather season and intensifying drought conditions. What will 2013 hold? Seasonal climate predictions are always difficult, and currently there is not a strong climate signal to suggest either wet or dry conditions over the next few months. The latest outlooks from the Climate Prediction Center are shown below. For our region, they show equal chances of above, below, and normal temperatures and precipitation in the April through June period.





Cloud Type Quiz

Submitted by Joe Lester, General Forecaster

Do you know your Cloud Types? Match the following cloud types with their definitions. The answers are located on page 8.

1. ____ Wall Cloud
2. ____ Shelf Cloud
3. ____ Cumulonimbus Cloud
4. ____ Cumulus Cloud
5. ____ Lenticular Cloud
6. ____ Stratus Cloud

A. Detached clouds, generally dense and with sharp outlines, showing vertical development.

B. A low, horizontal, banded cloud attached to the base of the parent cloud, usually a thunderstorm, and associated with strong winds.

C. A low, generally gray cloud layer with a fairly uniform base.

D. An isolated lower cloud attached to the rain-free base and below the main storm tower; associated with potentially severe storms.

E. A cloud characterized by strong vertical development in the form of mountains or huge towers topped at least partially by a smooth, flat often fibrous anvil.

F. A very smooth, round or oval, lens-shaped cloud that is often seen, singly or stacked in groups, near or in the lee of a mountain range.

FLASH FLOOD SAFETY

http://www.nws.noaa.gov/floodsafety

Each year, more deaths occur due to flooding than from any other severe weather related hazard. The main reason is people underestimate the force and power of water. More than half of all flood related deaths result from vehicles being swept downstream. Of these, many are preventable. Follow these safety rules:

- Monitor the NOAA Weather Radio All Hazards, or your favorite news source for vital weather related information.
- 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!
- 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.

2013 Snowpack Near to Below Average - Runoff Flood Threat Low

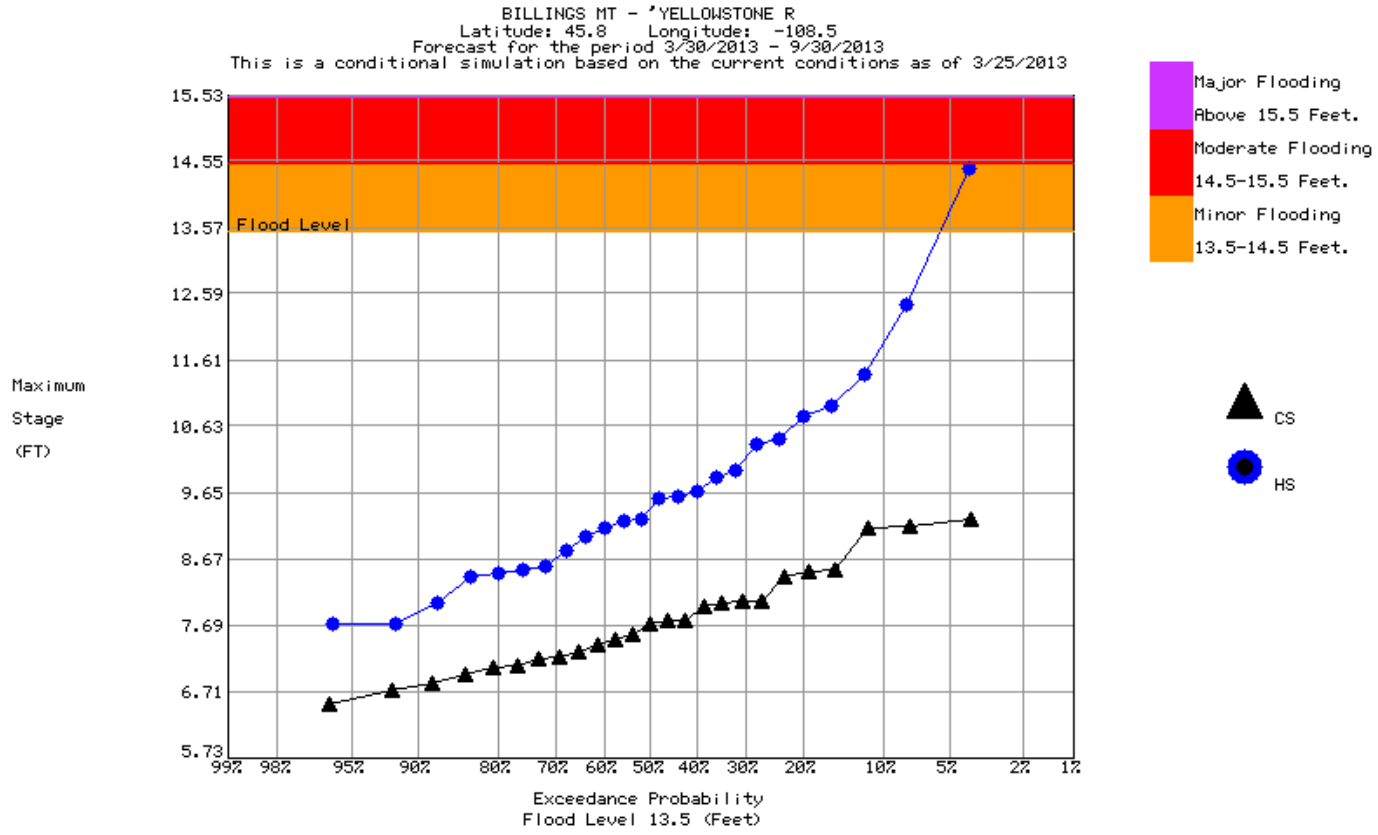
Submitted by Todd Chambers, Lead Forecaster

As of late March snowpack that feeds the rivers across the area was near to below average for this time of year. The following shows the percent of normal snowpack for the listed river drainages as of late March.

Yellowstone – 92%	Rock Creek – 75%	Little Big Horn – 91%
Shields – 87%	Clarks Fork - 92%	Tongue – 87%
Boulder – 98%	Musselshell – 97%	Powder – 96%
Stillwater – 98%	Big Horn – 86%	

April, May and June are very wet months across the Northern Rockies with the potential to see several significant rain and snow events which could impact the runoff potential going forward. However, at this point the potential for flooding on area waterways going into this summer is quite low.

You can view the flood risk for many locations across southern Montana and northern Wyoming by going to our homepage and clicking on the Rivers and Lakes tab, then selecting the Experimental Long-Range Flood Risk tab. The color coding of the points on this map correspond to the threat of flooding during the runoff season, with green indicating less than a 50% chance for runoff season flooding.



Selecting a point on the map will bring up a graph (similar to above) showing the Current flood potential (triangle CS), and the average Historical flood potential (circle HS) for this location. As the graph for the Yellowstone River at Billings shows, the flood potential this season is well below normal.

Spring Normals

Submitted by Sean Campbell, Meteorological Intern

Meteorological spring arrived on Friday, March 1, 2013 and will end on Friday, May 31, 2013. Here are the normal temperatures and precipitation for the Billings Airport, the Miles City Airport, and the Sheridan Airport for the spring 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**
3/1 – 3/31	48.6	26.9	37.7	1.06	10.2
4/1 – 4/30	57.6	34.7	46.2	1.66	8.3
5/1 – 5/31	67.5	43.6	55.6	2.18	2.0
3/1 – 5/31	57.4	35.1	46.3	4.90	20.5

Miles City				
Date	**High**	**Low**	**Average**	**Precipitation**
3/1 – 3/31	46.5	22.8	34.7	0.60
4/1 – 4/30	58.8	33.2	46.0	1.37
5/1 – 5/31	68.6	43.1	55.9	2.18
3/1 – 5/31	58.4	34.2	46.3	4.15

Sheridan				
Date	**High**	**Low**	**Average**	**Precipitation**
3/1 – 3/31	48.4	22.0	35.2	0.98
4/1 – 4/30	57.4	29.8	43.6	1.60
5/1 – 5/31	66.7	38.2	52.5	2.35
3/1 – 5/31	57.8	31.4	44.1	4.93

Each year, lightning causes about:

- 25,000 total fires
- 4,400 home structure fires
- 1,800 non-home structure fires
- 12 fire-related deaths

www.lightningsafety.noaa.gov

How far away was that lightning?

The sound of thunder travels about a mile every 5 seconds. If you count the seconds between the flash of lightning and the crack of thunder and divide by 5, you get the number of miles away from you (10 seconds is 2 miles.)

Visit the NWS Lightning Safety Website for more information

CLOUD TYPES QUIZ

ANSWER KEY

(From page 6)

1. D
2. B
3. E
4. A
5. F
6. C

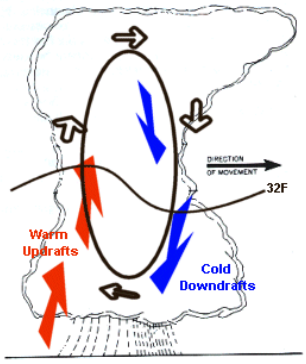
Summer Normals

Submitted by Sean Campbell, Meteorological Intern

Meteorological summer arrives on Saturday, June 1, 2013 and will end on Saturday, August 31, 2013. Here are the normal temperatures and precipitation for the Billings Airport, the Miles City Airport, and the Sheridan Airport for the summer season. Normals are 30 year averages calculated from 1981 to 2010. All temperatures are in degrees Fahrenheit and all precipitation amounts are in inches.

How Does Hail Form?

- Inside a thunderstorm are strong updrafts of warm air and downdrafts of cold air.
- If a water droplet is picked up by the updrafts...it can be carried well above the freezing level. With temperatures below 32F...our water droplet freezes.
- As the frozen droplet begins to fall...carried by cold downdrafts...it may thaw as it moves into warmer air toward the bottom of the thunderstorm
- But...our little half-frozen droplet may also get picked up again by another updraft...carrying it back into very cold air and re-freezing it. With each trip above and below the freezing level our frozen droplet adds another layer of ice.



- Finally...our frozen water droplet...with many layers of ice - much like the rings in a tree...falls to the ground - as hail!

Billings				
Date	**High**	**Low**	**Average**	**Precipitation**
6/1 – 6/30	77.2	52.1	64.7	2.12
7/1 – 7/31	86.8	58.8	72.8	1.32
8/1 – 8/31	85.7	57.3	71.5	0.75
6/1 – 8/31	83.3	56.1	69.7	4.19

Miles City				
Date	**High**	**Low**	**Average**	**Precipitation**
6/1 – 6/30	78.6	52.6	65.6	2.51
7/1 – 7/31	88.3	59.5	73.9	1.64
8/1 – 8/31	87.2	58.0	72.6	0.91
6/1 – 8/31	85.2	57.8	71.5	5.06

Sheridan				
Date	**High**	**Low**	**Average**	**Precipitation**
6/1 – 6/30	76.7	46.4	61.6	2.12
7/1 – 7/31	87.1	53.0	70.0	1.18
8/1 – 8/31	86.3	51.6	69.0	0.72
6/1 – 8/31	83.3	51.4	67.4	4.02

Social Media

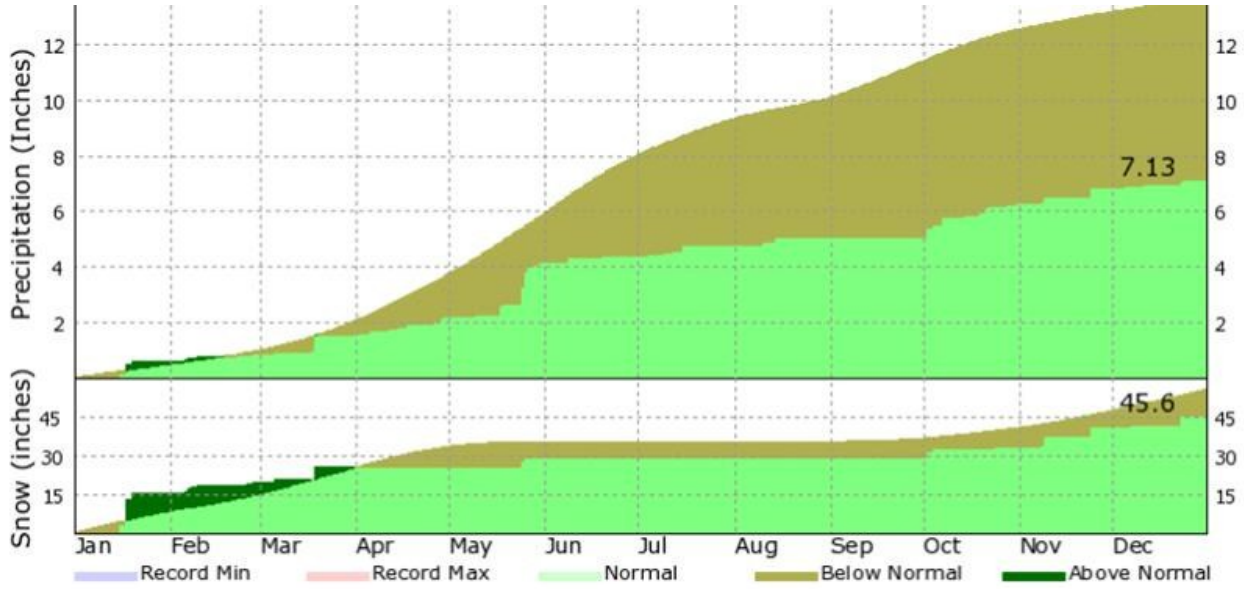
Submitted by Tom Frieders, Warning Coordination Meteorologist

Our presence on social media continues to expand. We'll be looking to expand our total likes to over 3000 in the coming months on Facebook. For those of you following us on Facebook or Twitter, you can help spread our weather message. Especially for our posts of changing weather conditions and significant weather events, you can help spread the information by sharing or re-tweeting . This will ensure that even more people get the word and are not surprised by our next major storm. Thank you for making this newer communications tool a success.

Another Significant Wildfire Season for 2013?

Submitted by Tom Frieders, Warning Coordination Meteorologist

So, how will the 2013 wildfire season fare as compared to 2012? Let's start by looking at the climate trends since 2012. Below is a chart of precipitation trends for Billings. Reading the chart from left to right, notice that the region saw significant precipitation deficits that spanned the entire year, with Billings ending 2012 nearly 7 inches below normal. Many areas of southern Montana and northern Wyoming transitioned into Severe to Extreme drought conditions just one year after the record flooding of 2011. This led to a quick transition to dry fuels (grasses) and a significant wildfire season across the region. It's still too early to get a good indication of how 2013 will fare. With our wet months of April through June still ahead of us and an uncertain outlook on precipitation, we still have the opportunity to turn these trends around. We'll be monitoring our weather patterns closely in the coming weeks. Given the current drought conditions already in place, if the warm and dry pattern continues, the wildfire threat will become a significant concern again in 2013. Stay tuned!



Monitor the latest temperature and precipitation trends for Billings, Miles City, Livingston, Baker, and Sheridan, WY on our webpage by clicking here.

General Guidelines for Estimating Wind Speeds

30-44 mph Whole trees in motion. Inconvenient walking into the wind. Light-weight loose objects (e.g., lawn furniture) tossed or toppled.

45-57 mph Large trees bend; twigs, small limbs break and a few larger dead or weak branches may break. Old/weak structures (e.g., sheds, barns) may sustain minor damage (roof, doors). Buildings partially under construction may be damaged. A few loose shingles removed from houses.

58-74 mph Large limbs break; shallow rooted trees pushed over. Semi-trucks overturned. More significant damage to old/weak structures. Shingles, awnings removed from houses; damage to chimneys and antennas.

75-89 mph Widespread damage to trees with large limbs down or trees broken/uprooted. Mobile homes may be pushed off foundation or overturned. Roof may be partially peeled off industrial/commercial/ warehouse buildings. Some minor roof damage to homes. Weak structures (e.g., farm buildings, airplane hangars) may be severely damaged.

90+ mph Many large trees broken and uprooted. Mobile homes damaged. Roofs partially peeled off homes and buildings. Moving automobiles pushed off the road. Barns, sheds demolished.