



Jet Stream Jargon



National Weather Service Billings, MT

2019 Spring Issue

From the Desk of the Meteorologist in Charge

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I'm sure everyone is relieved that the recent 45 day period of below normal temperatures ended. As we all know, this period began on February 3rd and ended on March 19th. I encourage you to take a look at the article I put together on the Accumulated Winter Season Severity Index, which attempts to put each winter into a larger historical context.

Our staff continues to make strides to improve the quality of the services we provide. One of the more recent developments in this area is our use of a new approach to developing the forecasts for the next 7 days. Over the last 30 years, weather forecasters have relied upon various computer simulations (models) to provide an idea of how the atmosphere will change. Despite the advances with the various models, we've always been limited to just a handful of potential solutions which served us well on many occasions. However, as we continue to increase our precision with the forecast, we've needed ways to more adequately assess the certainty or uncertainty with any particular forecast to assist decision makers in making life and money saving decisions. This new approach allows us to use over 100 computer simulations on a continuous basis to provide us a more accurate assessment for the next 7-10 days. This will help us to provide the forecasts more efficiently, more accurately and with less variability than what you may have seen in the past. Additionally, you will see us provide more forecast insight beyond 7 days. In a recent situation, this new approach provided us with certainty on a weather pattern change 7 to 10 days into the future, which in turn allowed us to provide better service with more advance notice. We hope you notice these improvements in the months to come!



Keith W. Meier

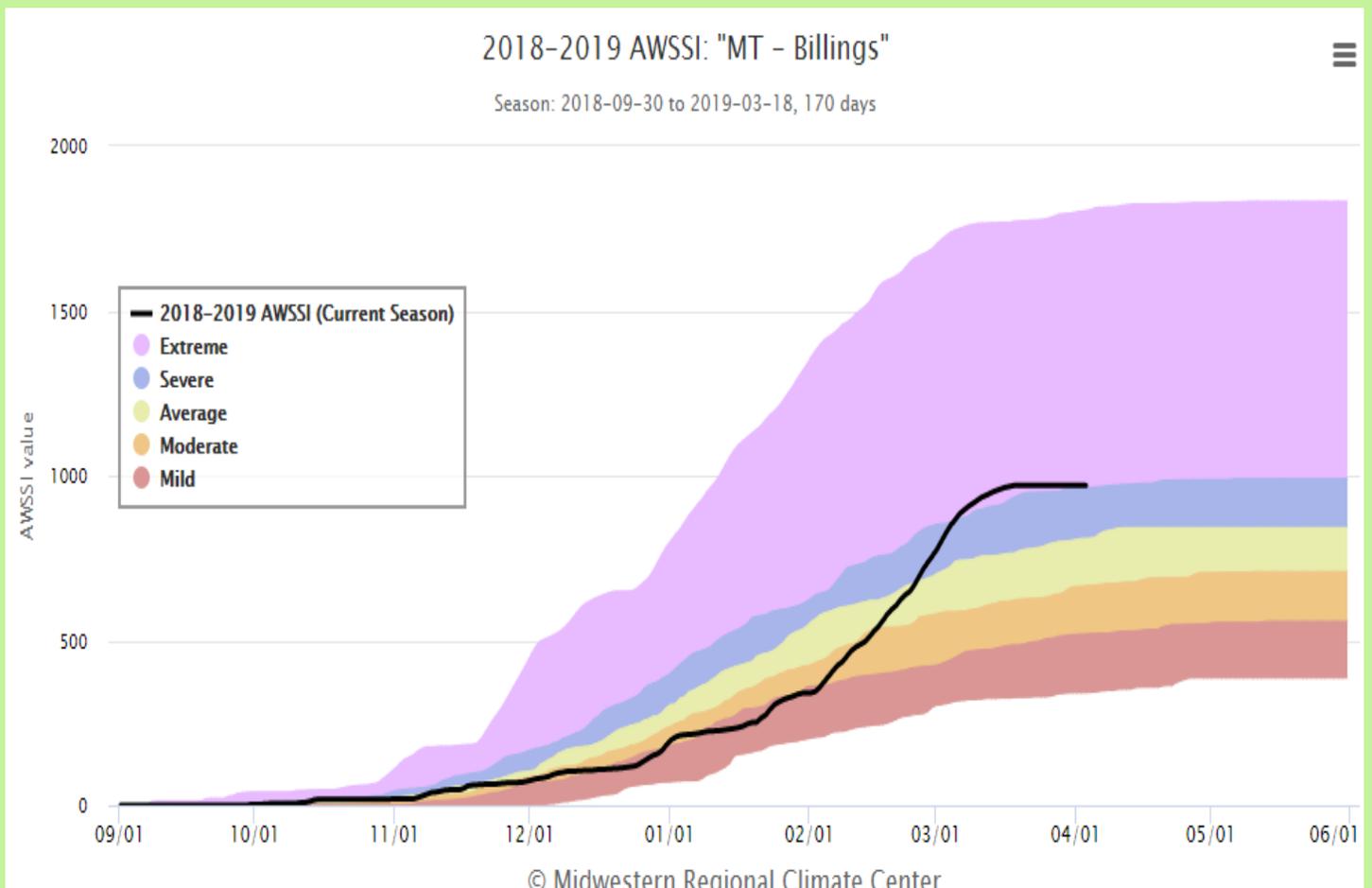


From the Desk of the Meteorologist in Charge...Cont'd

A Perspective on the Winter of 2018-2019

Winter seasons have significant societal impacts across all sectors, ranging from direct human health and mortality to commerce, transportation, and education. The question "How severe was this winter?" does not have a simple answer. At the very least, the severity of a winter is related to the intensity and persistence of cold weather, the amount of snow, and the amount and persistence of snow on the ground. The Accumulated Winter Season Severity Index (AWSSI) was developed to objectively quantify and describe the relative severity of the winter season. The image below documents the AWSSI for Billings. Up through Feb. 2nd Billings was in the Top 20th mildest winters. However, by March 6th Billings moved into the Top 20th extreme winters. What a difference over such a short period of time. Both the length and intensity of the cold, snowy period, combined with the abrupt change from what had been a mild winter up to Feb. 2nd made that 45 day period extremely challenging, both physically and mentally. Note on the image, the red line is 2017-2018, the black line is 2018-2019 thru April 3. The most extreme AWSSI (top of the purple) plotted is 1978-79 (Note: the period of record for this tool is from 1950 to present, i.e it does not include earlier years data).

You can check out this tool at: <https://mrcc.illinois.edu/research/awssi/indexAwssi.jsp>





From the Warning Coordination Desk

by Warning Coordination Meteorologist Tom Frieders

Skywarn Spotter Training – It’s Fun & It’s Free!

We currently have over 1200 volunteers in southeast Montana and northern Wyoming assisting the National Weather Service in Billings; reporting severe weather as they see it happen. For those of you on our list, we thank you for your support and dedication. We always need more of you! The more volunteers we have reporting severe weather, the better we are able to inform our local communities of approaching severe weather.

All across the country, the National Weather Service relies on our trained volunteers to supplement Doppler Radar information regarding severe storms. These weather reports are critical to our forecasters for issuing warnings for tornadoes, severe thunderstorms, and floods in the spring and summer, but also assist in the winter for heavy snow and damaging wind reports.

Come join us for Spotter Training in a neighborhood near you. If you can't attend in person, we are offering another opportunity this spring; viewing the presentation from the comforts of your home via an online webinar. Full training details can be found at: https://www.weather.gov/byz/spotter_training

How Do You Stay Informed?

Here are some options to stay informed on incoming hazardous weather:



NOAA Weather Radio: This is your direct link to NWS warnings! Specially built receivers will alert you when watches and warnings are issued for your area and also keep you informed on the latest forecast 24/7. Weather Radio receivers can be purchased in most electronic and many department stores for \$30 dollars or less.



Wireless Emergency Alerts: If you have a newer smartphone that is Wireless Emergency Alert Capable, you are already signed up! Your phone will alert you for Tornado Warnings, Flash Flood Warnings, Amber Alerts or critical Presidential alerts during national emergencies. More information:

<https://www.fema.gov/frequently-asked-questions-wireless-emergency-alerts>



Red Cross Apps: Apps available for all types of emergencies. Specifically for severe weather, a Tornado App is available. This app will alert you for both Tornado and Severe Thunderstorm watches and warnings. Check out the wide variety of apps available.

More information: <http://www.redcross.org/get-help/prepare-for-emergencies/mobile-apps>



FEMA App: Receive National Weather Service Alerts for up to 5 locations along with safety reminders and tips. More information:

<https://www.fema.gov/mobile-app>



2018-2019 Winter Recap

by Lead Forecaster / Climate Program Manager Joe Lester

After a slow start, the 2018-19 winter will be remembered for the extended period of cold and snowy (and in some respects record-breaking) weather that began in early February.

Outside of a brief cool spell in late December and early January, the first two months of winter were dry and mild. Even the first two days of February saw temperatures that were well above normal (40s & 50s). Then everything changed. Several snow events and persistently cold temperatures impacted the entire region through the month (and into the first part of March). The cold temperatures in February were not extreme, such as occurred in the brutally cold February of 1936, but the cold was without the warmups that we typically see with chinook winds. Billings fell below zero on 19 of 28 days, the most ever for February. Miles City's 23 days and Livingston's 15 days were also records. By the end of February, most of southeast Montana had between 10 and 20 inches of snow cover. Check out the table below for a summary of February snowfall at some of our reporting stations.

The cold weather continued through the first half of March. As temperatures warmed and the snow cover melted, the still frozen ground caused snow melt to run off rather than soak into the ground, and many rivers and streams experienced ice jams and/or some flooding of low-lying areas by the third week in March. Interstate 90 from Hardin to the Wyoming state line was closed due to flood waters from March 23-26.

Here are some meteorological winter (Dec-Feb) statistics at our four main climate stations:

| Station | Average Temp (°F) | Departure from Normal | Total Precipitation (inches) | Departure from Normal | Total Snowfall (inches) | Departure from Normal | Period of Record Began |
|------------|------------------------------------|-----------------------|-----------------------------------|---|------------------------------------|-----------------------|------------------------|
| Billings | 22.6 (13 th coldest) | - 5.2 | 3.64 (7 th wettest) | + 2.18 | 51.8 (5 th snowiest) | + 29.0 | 1934 |
| Livingston | 23.4 (5 th coldest) | - 5.2 | 0.73 | These stations undercatch winter precip | | | 1948 |
| Miles City | 17.8 (22 nd coldest) | - 4.2 | 1.03 | | | | 1937 |
| Sheridan | 22.3 (47 th coldest) | - 2.5 | 1.39 (25 th driest) | - 0.08 | | | 1907 |



Yellowstone River at Billings in early March



Snow Drifts near Ryegate – Courtesy of Chris Frehse

| Location | February Snowfall |
|--------------------|-------------------|
| Mystic Lake | 77.1 inches |
| Melville 4W | 52.6 inches |
| Livingston 0.9 WSW | 46.1 inches |
| Rapelje | 43.0 inches |
| Big Timber | 40.5 inches |
| Judith Gap | 38.0 inches |
| Billings Airport | 29.4 inches |
| Hysham | 23.9 inches |

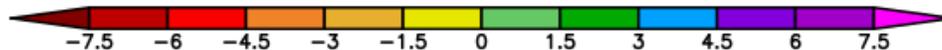
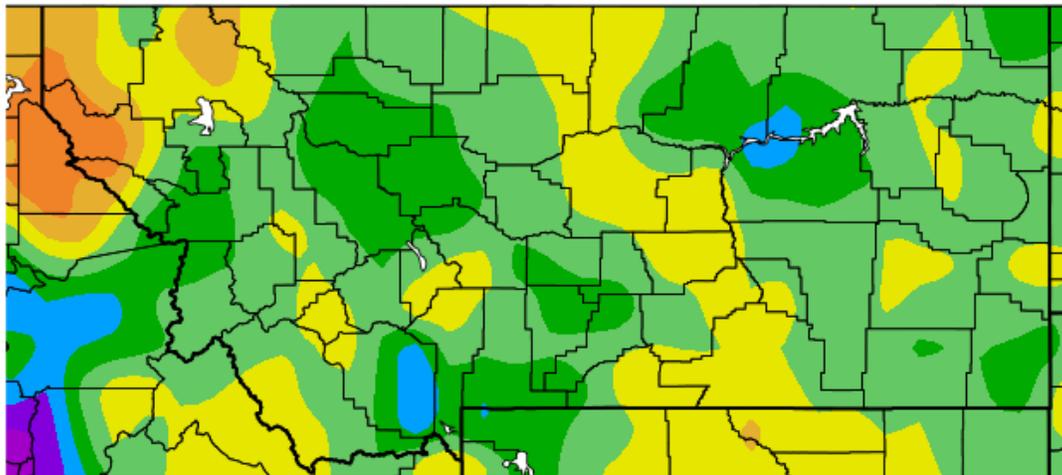


A Hydrological Outlook

by Lead Forecaster / Hydrology Program Manager Todd Chambers

Fall/Winter Precipitation - Precipitation during the fall and winter months was near normal, with pockets of above normal over the western foothills.

Departure from Normal Precipitation (in) 10/1/2018 - 4/3/2019



Generated 4/4/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers

March Flooding - The combination of a deep frost layer in the ground (up to 6 feet deep in some areas) and 2 to 5 inches of water locked up in the lower elevation snowpack in early March, set the stage for mid to late March flooding. As temperatures warmed up and melted the snow, the melt water could not soak into the ground and ran off, producing overland flooding. Many fields saw ducks and geese swimming in quite deep pools of melt water. The water eventually worked into rivers and streams where thick ice covered the waterways. As the water lifted and broke up the ice, reports of ice jam flooding began to come in. The Tongue River at Miles City was one of the first areas to see this type of flooding on March 20th. By March 23rd the Little Bighorn River was pushed out of its banks and across I-90 near Crow Agency, closing this major transportation route for several days. Flooding subsided by March 29th as the ground frost disappeared and river channels opened up.

Current Mountain Snowpack - At the end of March mountain snowpack ranged from 110 percent in the Beartooth Mountains, to 82 percent in the Tongue River basin. April and May typically add significant snow water to the higher elevations as slow moving pacific storm systems bring several days' worth of precipitation. So there is still time to add to the water supply, especially in the Bighorn Mountains.



A Hydrological Outlook ...cont'd

by Lead Forecaster / Hydrology Program Manager Todd Chambers

Flood Outlook – With the mountain snowpack near seasonal levels the flood outlooks remain near average for western watersheds, and slightly below average for those basins draining into the Big-horn Mountains. The main determining factor for whether rivers will flood during the runoff season is rainfall in May and June. Heavy rain for several days on top of already high rivers is a recipe for flooding in the northern Rockies. Take away this heavy rain and current projections are for a normal runoff season.

Flood Stage Changes – Flood stages were assessed during the fall to determine if they were still valid based on the past several high water years we’ve experienced. After consultation with local officials new flood stages were established and became effective on March 15th.

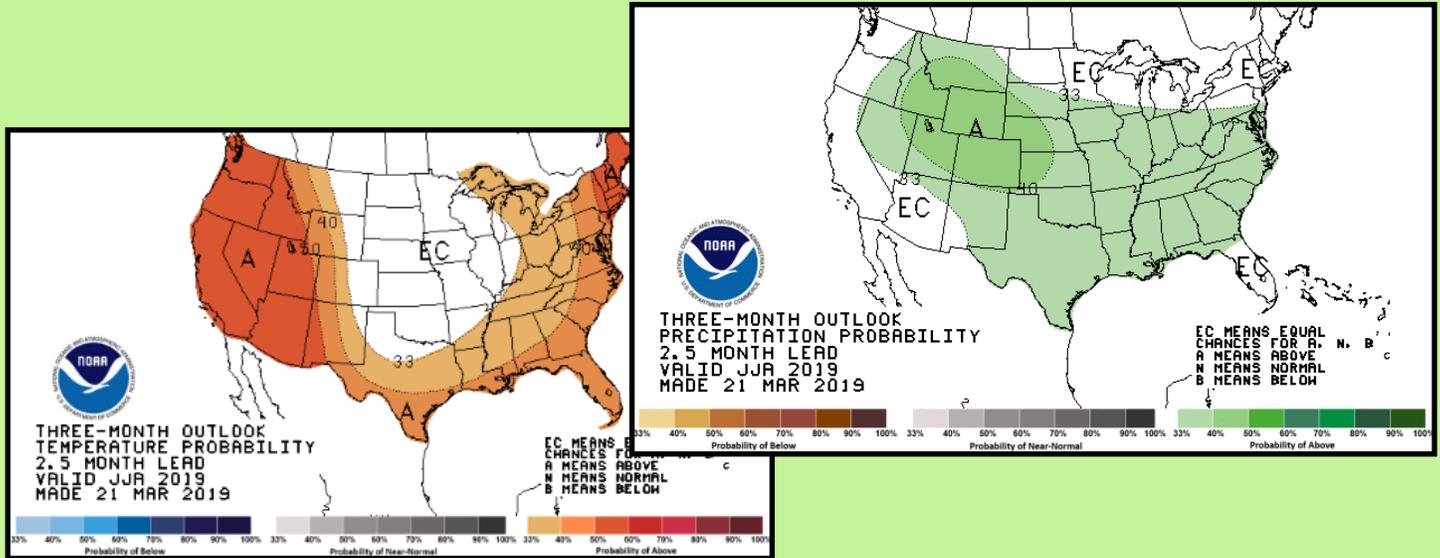
| <u>Site</u> | <u>Old FS</u> | <u>New FS</u> | <u>Change to Mod/Maj Stage</u> |
|---|---------------|---------------|--------------------------------------|
| Musselshell River | | | |
| Harlowton | 7.0 feet | unchanged | (remove Moderate & Major categories) |
| Shawmut | 6.5 feet | 7.0 feet | (remove Moderate & Major categories) |
| Lavina | 8.5 feet | 9.5 feet | (remove Moderate & Major categories) |
| Shields River | | | |
| Near Livingston | 5.5 feet | unchanged | (remove Moderate & Major categories) |
| Boulder River | | | |
| Big Timber | 7.5 feet | 8.0 feet | (remove Moderate & Major categories) |
| Stillwater River | | | |
| Absarokee | 7.0 feet | 7.5 feet | (remove Moderate & Major categories) |
| Clarks Fork of the Yellowstone River | | | |
| Belfry | 8.0 feet | 8.5 feet | (remove Moderate & Major categories) |
| Edgar | 8.5 feet | 9.0 feet | (remove Moderate & Major categories) |
| Yellowstone River | | | |
| Corwin Springs | 11.0 feet | unchanged | (remove Moderate & Major categories) |
| Livingston | 9.5 feet | 10.0 feet | (remove Moderate & Major categories) |
| Forsyth | 14.0 feet | unchanged | (remove Moderate & Major categories) |
| Miles City | 13.0 feet | 14.0 feet | (remove Moderate & Major categories) |



2019 Summer Outlook

by Lead Forecaster / Climate Program Manager Joe Lester

With the passage of the spring equinox, we are rapidly shifting gears toward the summer season. Nearly half of our region's annual precipitation occurs from April through June, and current indications lean slightly in favor of wetter than normal during this 3-month period. Weak El Nino conditions currently exist in the tropical Pacific Ocean. El Nino is not a good predictor of conditions in the summer, but we do tend to see a bit more thunderstorm activity (and severe weather) when it exists. The official June-July-August temperature and precipitation outlooks from the Climate Prediction Center, issued on March 21st, show slightly increased probabilities of warmer and wetter than normal conditions in our region during the summer months.



Do you like the heat, or do you prefer cool summers? Here are all-time record high temperatures at our four main climate stations. Records go back to 1934 at Billings, 1948 at Livingston, 1937 at Miles City, and 1907 at Sheridan.

| SITE | ALL-TIME RECORD HIGH | DATE |
|------------|----------------------|-------------------------------|
| Billings | 108° | July 14, 2002 |
| Livingston | 105° | August 5, 1961 |
| Miles City | 111° | June 26, 2012 |
| Sheridan | 107° | July 13, 2005 & July 14, 2002 |

TORNADO

ACTION
Take shelter immediately in a sturdy structure

HAIL

ACTION
Move indoors away from windows

LIGHTNING

ACTION
Move indoors if you hear thunder

WIND

ACTION
Move indoors away from windows

FLOODING

ACTION
Avoid rising creeks and water-covered roads



Spring Data Tables

Spring Averages

Meteorological spring is classified as the months of March, April and May. 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 calculated using a 30-year period of record: 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 |

“In the Spring, I have counted 136 different kinds of weather inside of 24 hours.”

Mark Twain



Summer Data Tables

Summer Averages

Meteorological summer is classified as the months of June, July and August. 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 calculated using a 30-year period of record: 1981 to 2010. All temperatures are in degrees Fahrenheit and all precipitation amounts are in inches.

| Billings | | | | |
|------------|------|------|---------|--------|
| Date | High | Low | Average | Precip |
| 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 | Precip |
| 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 | Precip |
| 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 |

Last Hard Freeze, Freeze and Frost Dates in the Spring/Summer

Many people will start planting their crops and gardens over the next few months. To keep crops and plants protected from the cold, it is important to know when the **average** 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 **average** last hard freeze, freeze and frost dates and the **latest** hard freeze, freeze and frost dates for select locations. 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. Averages are based on a 30 year period of record: 1981 to 2010. Recordkeeping began at the Billings Airport in 1934, at Livingston in 1948, at the Miles City Airport in 1937 and at the Sheridan Airport in 1907.

| City | Average Last Hard Freeze | Latest Hard Freeze on Record | Average Last Freeze | Latest Freeze on Record | Average Last Frost | Latest Frost on Record |
|------------|--------------------------|------------------------------|---------------------|-------------------------|--------------------|------------------------|
| Billings | Apr 23 | May 28 | May 7 | Jun 13 | May 18 | Jun 13 |
| Livingston | May 13 | June 5 | May 28 | June 29 | June 10 | June 30 |
| 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 |



Summer Solstice

by General Forecaster Kurt Hooley

You know it as the first day of summer. Others refer to it as the longest day of the year. So, what makes this day, the solstice, special? To understand, you will need a little background about the sun and the earth.

Solstice comes from the Latin word “sol” which means “sun” and “sistit” which means stand. For several days before and after each solstice, the sun appears to stand still in the sky, that is, its noontime elevation does not seem to change.

In the summer, days feel longer because the sun rises earlier in the morning and sets later in the evening. When the North Pole of the earth is tilted toward the sun, we, in the Northern Hemisphere receive more sunlight and it is summer. As the earth moves in its orbit, the tilt of the North Pole changes. When it is tilted away from the sun, it is winter in the Northern Hemisphere. In between we have autumn and spring.

The day that the earth’s North Pole is tilted closest to the sun is called the summer solstice. This is the longest day (most daylight hours) of the year for people in the Northern Hemisphere. It is also the day that the sun reaches its highest point in the sky.

When the North Pole of the earth is tilted toward the sun, we receive more sunlight and the days are longer. In addition, the sun rises higher in the sky, so the sunlight is more direct; that is, it comes down from above. This increases the amount of light that a given area on the earth receives. More sunlight means more warmth, or summer. When the North Pole is tilted away from the sun, the days are shorter and the sun does not rise as high in the sky. Less sunlight means less warmth, or winter.

One may ask “Doesn’t the distance of the earth from the sun cause our seasons?” Many people think so, but this is not the main reason. The earth is closest to the sun in late December, but this is definitely not the warmest time of the year for people living in the Northern Hemisphere! It has more to do with the direction of the tilt of the earth.

Another popular question is “Why are the hottest days after the first day of summer, and the coldest days after the first day of winter?” Even though there is more sunlight in the summer, it takes time to warm up the earth and the atmosphere. This is just like heating up food in the oven, it doesn’t happen in a second. So the heating and cooling effects from greater and lesser sunlight have a delay of almost two months!





From the Fire Weather Desk

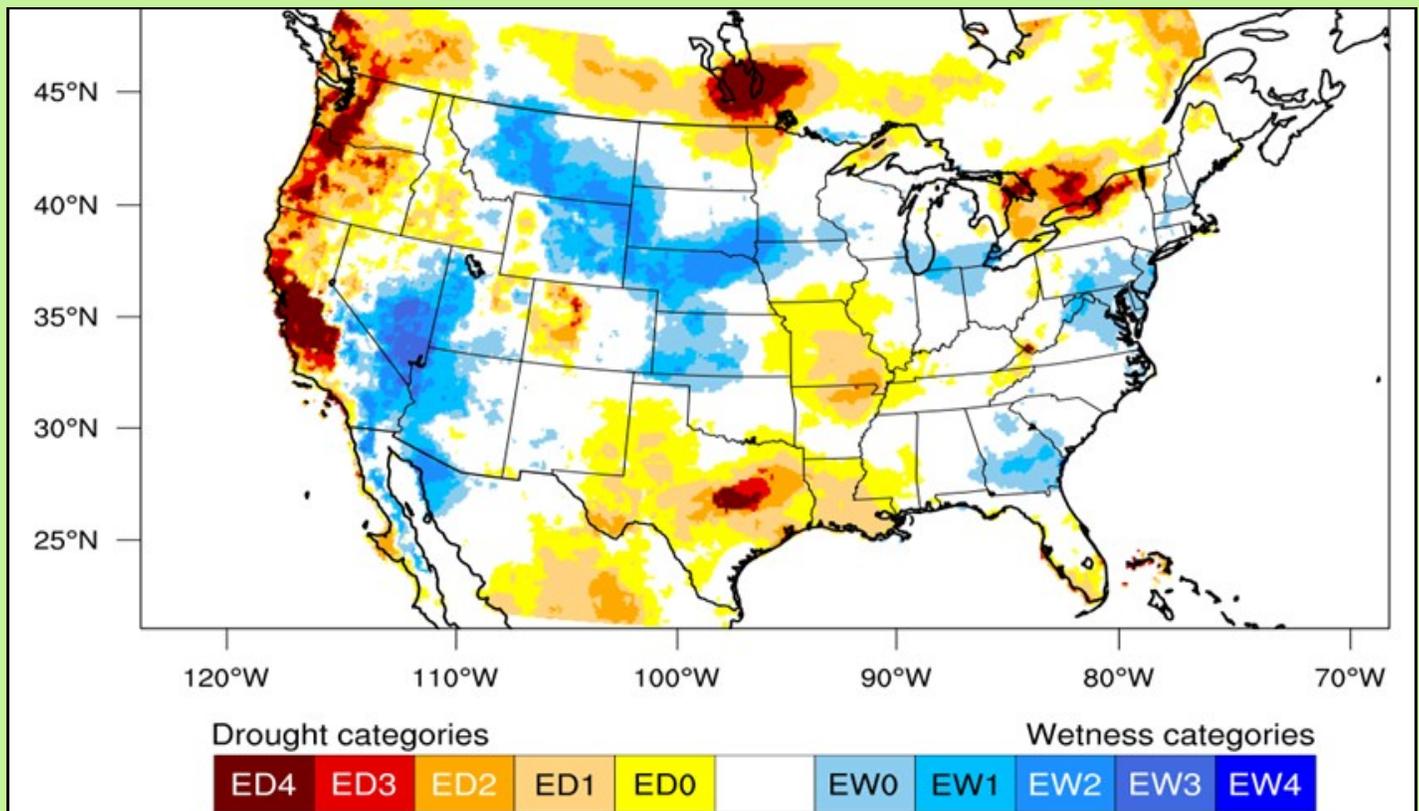
by Lead Forecaster / Incident Meteorologist Dan Borsum

Evaporative Demand Drought Index: Looking at the Land's Thirst for Moisture

A key part of mitigating wildfires is identifying the periods of time when dryness increases the receptiveness of vegetation to flame. One of the historical methods to accomplish this includes monitoring precipitation trends to identify lack or surpluses of moisture.

But that only tells one part of the story. If it rains one day, if it is sunny and windy the next, it's likely the mud will dry up quickly, whereas clouds and light winds will keep the soil from drying out. A new index has been developed to account for all of these factors: the Evaporative Demand Drought Index. It considers the following elements over an extended period of time: precipitation, humidity, wind and solar radiation to determine the "thirst for moisture" of the landscape. It is particularly effective at detecting emerging trends on shorter term bases, like was experienced in July 2017 in western Montana.

You can access the EDDI information here: <https://www.esrl.noaa.gov/psd/eddi/> and click "Current Conditions". From there you can look at different time lengths window to see areas where moisture has been bountiful and allowed to soak into the ground or areas where things are drying out quickly.





COOP Corner

(Cooperative Observer Program)

by CoCoRaHS Coordinator Vickie Stephenson

2019 Cooperative Observer Length of Service Awards

Please join me in wishing our Observing Program Leader, Larry Dooley, a fond farewell in mid-April. Larry provided his long time experience and dedication to the Billings' Observing Programs in his almost 5 year tenure here. We appreciate Larry's impressive work ethic, can-do attitude, and jovial personality, which won over much of the staff. He will be missed! Bon Voyage and good luck in Alaska, Larry!

It will soon be time to insert the inner tube and funnel back into your rain gauges. The last week of May is the best time to do this. I will be out to visit your stations within the calendar year and will be calling you to set approximate times for my visits. Feel free to contact me if you have questions, concerns, or need repairs. You may call the 800 number or 406-652-0851, ext 225, or email vickie.stephenson@noaa.gov .

Recognition for many years of service is part of the culture of a successful organization. Awards are a time honored, tangible method of showing appreciation for many years of dedication. The awards may be given to individual observers, families, and/or institutions for length of service or in recognition of significant achievements. Congratulations to this year's National Weather Service, Billings Coop Observers, who will be recognized for their years of dedication and receive awards for their continued outstanding service!

Clint Dietz of Plevna will receive a 40 Year Award.
Dorothy Jean Stanley of Volborg will receive a 35 Year Award.
Bob and Connie Moore of Clearmont, WY will receive a 25 Year Award.
Wes Hill of Roberts will receive a 25 Year Award.
Dian and Mark Giesick of Bridger will receive a 20 Year Award.
Clayton Giesick of Bridger will receive a 20 Year Award.
Clinton Giesick of Bridger will receive a 20 Year Award.
Doug and Shirley Parrott of Roundup will receive a 15 year Award.
Calvin and Jodi Christiansen of Gibson will receive a 15 Year Award.
Lee Howard of Hysham will receive a 15 Year Award.
Gary Bischoff of Albion will receive a 10 Year Award.

Thanks to each and every one of you. You play a very large role in the success of our mission of protecting life, property and the enhancement of the national economy. For more information about the NWS Cooperative Observer Program please visit:

<http://www.weather.gov/coop>



Community, Collaborative, Rain, Hail and Snow Network (CoCoRaHS)

by CoCoRaHS Coordinator Vickie Stephenson

The CoCoRaHS Network in the Billings service area continues to thrive through our dedicated and reliable observers. We currently have about 120 observers in our area, of whom 50-60 submit data to us most every day, including days with NO precipitation! This is an awesome number because ZERO IS an observation. I wish to thank you all very much for your dedication.

Spring is here, with summer just around the corner, which means severe weather, i.e. thunderstorms. There are “Significant Weather” & “Hail” report forms on the left hand menu on your CoCoRaHS Home screen, used for heavy rain/hail/snow and flooding information. Feel free to use these forms to alert us of such *real time* issues in your area. Once submitted, the NWS office forecasters receive an alarm immediately. These immediate reports help us provide timely warnings to the public as events unfold. These reports also help forecasters to establish a good lead time for the protection of life and property. Both forms have space for comments, so you can add information that you think would be helpful to our forecasters. You can get as detailed as you like, but be aware that your comments may be seen by the general public. If you are unaware of these features, please peruse through them on the CoCoRaHS website at www.cocorahs.org, or feel free to contact me for assistance at vickie.stephenson@noaa.gov.

Shop the CoCoRaHS.org website store, located at the bottom of the Resources link from the home page on the left hand side of the webpage. There are many items, including new rain gauges and pieces and parts, if you don't need the whole thing replaced! Lots of fun stuff, too! Ever heard of a “Snow Swatter”?

We are always looking for volunteers to take “back yard” weather observations. Please spread the word and if you are already a Skywarn Weather Spotter and are interested, I would love to hear from you. Run through the Cocorahs.org website and see what you think. The best part is that I still have some rain gauges from our sponsor, but only while supplies last!

I look forward to seeing all of 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 or your provided 800 number. 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!



Purchase an official
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Rain Gauge supplier"

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from a meteorologist and
fellow CoCoRaHS Observer





Are You “Weather-Ready”?

by Warning Coordination Meteorologist Tom Frieders & Forecaster Kurt Hooley



Here are some things you can do to ensure you are Weather-Ready:

- * **Know Your Risk:** Don't leave home without knowing the forecast. Check our [website](#) each and every morning.
- * **Take Action:** Have an [emergency supply kit](#). This includes a 72 hour supply of food and water. Also, develop a plan to ensure family and friends know how they can reach you in an emergency. This plan would include meeting places and alternate ways to communicate in case of an emergency.
- * **Be A Force of Nature:** Inspire others by sharing your preparedness activities with family and friends.

For more information, visit our severe weather preparedness website at:

<https://www.weather.gov/byz/SevereWxAware>

Severe Thunderstorms produce:

- * **Tornadoes**
- * **Hail one inch in diameter or larger**
- * **Damaging winds in excess of 60 mph**

Know the difference:

Funnel Cloud: A funnel-shaped cloud, extended outward or downward from a thunderstorm, that corresponds to a rotating column of air. If the rotation is violent and reaches the ground, the funnel cloud is associated with a tornado.

Tornado: A violently rotating column of air, in contact with the ground, that extends from the base of a thunderstorm to the ground. This is often visible as a funnel cloud with swirling dust or debris near the surface.

Know the difference:

Watch: The potential exists for severe weather to occur within the next hours but the exact location and timing is not known. Action can be taken to protect property such as putting your vehicle in the garage, putting away patio furniture, etc.

Warning: Severe weather either is occurring or will be shortly. Immediate action should be taken to protect yourself by going to the lowest portion of a sturdy building, or into a closet, hallway or room without windows.



Information Stop

by Warning Coordination Meteorologist Tom Frieders

Stay Informed during Hazardous or Severe Weather

Severe Weather Preparedness:

<http://www.nws.noaa.gov/om/thunderstorm/>

Lighting Safety:

<http://www.lightningsafety.noaa.gov/>

Flood Safety:

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

Advanced Hydrologic Prediction Services (Rivers and Lakes):

<http://water.weather.gov/>

Owlie – NWS Education

<https://www.weather.gov/owlie/>

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