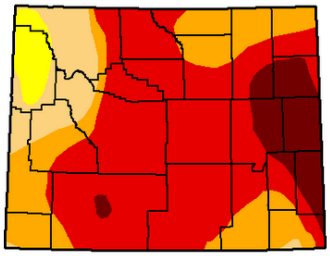
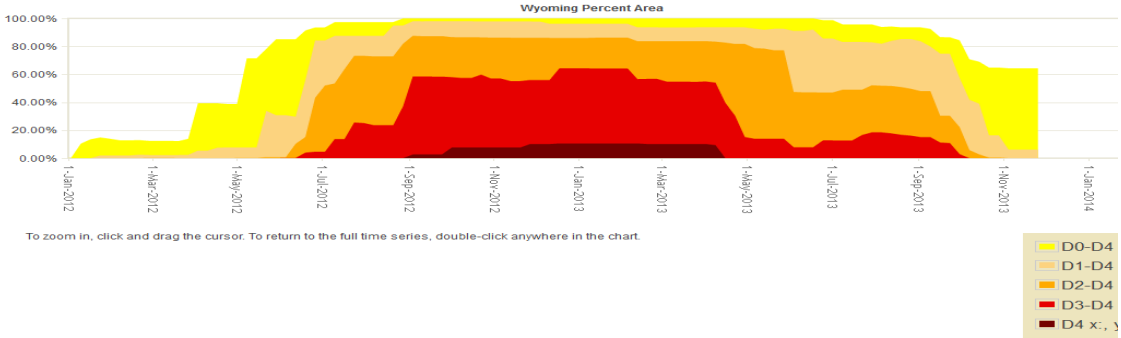




2013 Annual Fire Weather Report
WFO Riverton, WY

Kelly Allen, Fire Weather Program Manager

December 2013

To: W/CR1x11 - Jennifer Zeltwanger c/o Derek Deroche
NWS Central Region Headquarters
7220 NW 101ST Terrace
Kansas City, MO 64153-2371

From: Kelly Allen, NWS Riverton
Fire Weather Program Manager

Subject: 2013 NWS Riverton Fire Weather Program Summary

Please find attached the 2013 NWS Riverton Fire Weather Program Summary which also includes Red Flag Warning Verification and Statistics, the number of Fire Weather Watches issued, Spot Forecast Statistics, and information on IMET Dispatches

WFO Riverton Fire Weather Program Summary - 2013

Month to Month Climate and Operations:

January, February, March

Climate:

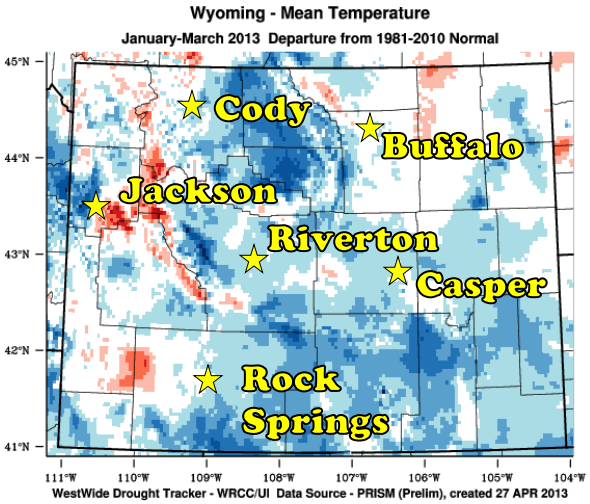


Fig. 1

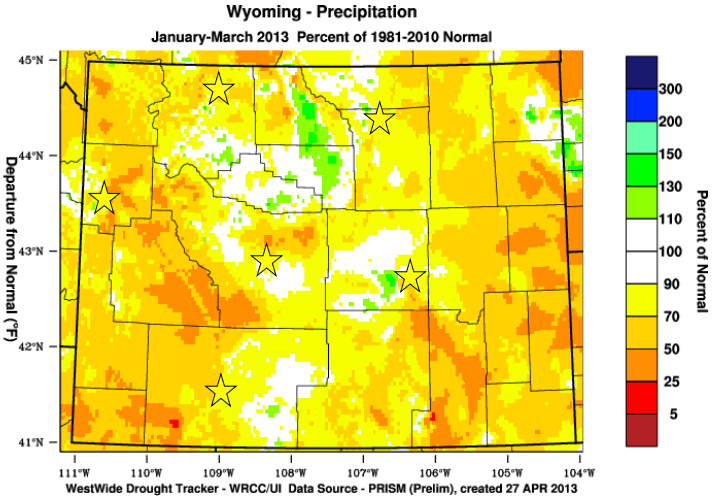


Fig. 2

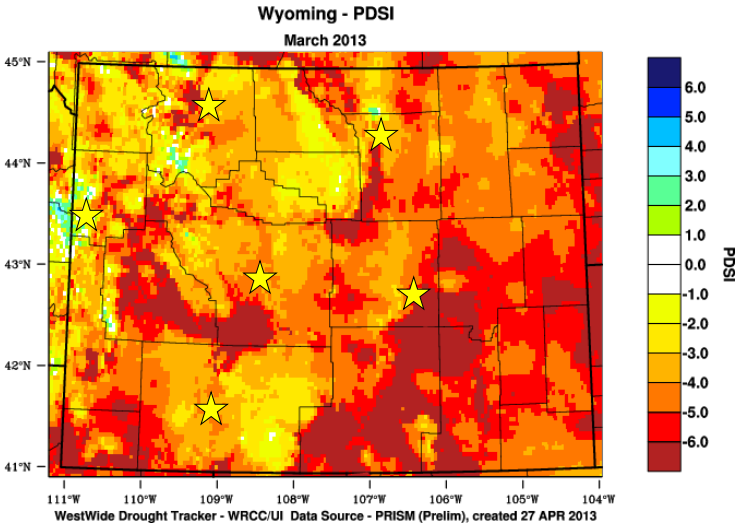


Fig. 3

Fig. 4 – February 8-10: 20 inches fell in Sinks Canyon

January was cooler than average for western and central Wyoming. There were a few storms that managed to bring some significant snowfall to both sides of the divide; which is a rather rare event for the typically dry month of January. As a result, the basins remained cooler than normal with this fresh snowpack and the mountains were able to benefit from a couple of waves of mild air aloft. There was another storm at the beginning of February that delivered a few more inches of snow in the favored upslope areas east of the Divide, like Lander and Riverton, but most of the area remained colder and drier than normal. March delivered little relief from the drought, even as a few storms moved across the region. One storm, on St. Patrick's day delivered a rare strong wind event when 60 mph winds from the northeast (an odd direction for winds this strong) downed trees, blew out windows, and took down business signs across central and southern Wyoming. Overall, the year began colder and drier than normal (figures 1 and 2) with some warmer than normal conditions experienced over the higher elevations. The long term drought left over from 2012 saw little to no relief during this period as there

were a few snowfall events, some significant, but not nearly enough moisture fell during this time to make a dent in the extremely dry conditions seen during the previous year. (fig. 3)

Operations:

- Normal off-season Fire Weather AOP discussion and coordination, and Regional Focal Point Meetings took place between surrounding WFO Fire Weather Program Leaders and GACC Meteorologists
- Kelly Allen attended three National Dry Lightning Red Flag Criteria Investigation Team meetings
- Dave Lipson taught an S-290 course on January 29th – 31st and another on March 5th
- Kelly Allen and Kathleen O'Leary completed materials for a "Safe Spring Burning Campaign" raising awareness about wildfires caused by agricultural burning through pamphlets, posters, and a local radio interview urging property owners to call the NWS to obtain weather conditions before burning. Pamphlets were tailored to meet the needs of each county and were distributed to county Fire Wardens and Chiefs.
- Dave Lipson and Chuck Baker attended the virtual IMET workshop from March 18th – 21st
- On March 21st, Kelly Allen was asked to present a Fire Weather Basics presentation at a tabletop exercise put on by Sublette County Emergency Management. This exercise was designed to explore how several federal, local, and state agencies would work together to manage a wildfire in an well known Wildland-Urban Interface in Sublette County called the Hoback Ranches. Kelly Allen held a preseason fire partner meeting the next morning in Pinedale.
- Kelly Allen held two more preseason fire partner meetings in Casper and Kaycee on March 26th
- On March 27th, Tim Mathewson, the Rocky Mountain Area GACC Meteorologist came up to our office for our annual Fire Weather Brownbag meeting. He presented a case study on the North Fork Fire / Prescribed Burn in Colorado, he also gave a presentation about the Rocky Mountain GACC Predictive Services operations and products. Kelly Allen presented a review of the 2012 season as well as gathered feedback for possible topics for discussion at the annual partner meetings, and presented the seasonal outlook for 2013 and program changes
- Wyoming Flood Awareness Week began on March 18th – 2012 Wildfire-specific burn scar maps were introduced to the public
- There were 11 spots completed in January, 4 in February, and 13 in March. 4 of these spots were for Search and Rescues, the rest were for prescribed burns

April

Climate:

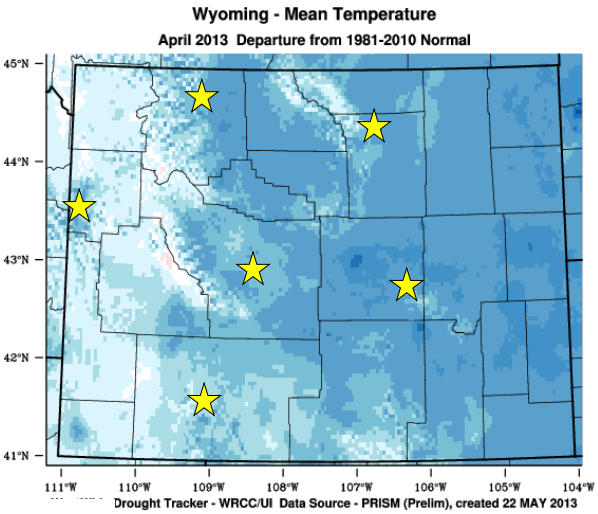


Fig. 1

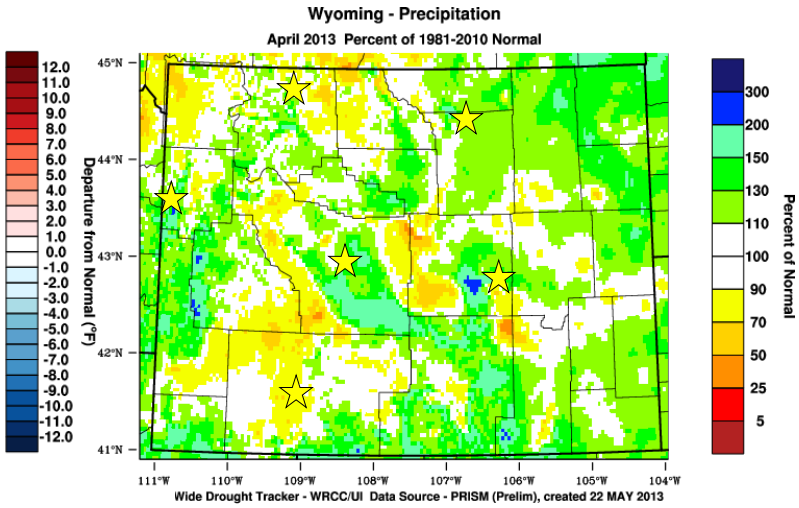


Fig. 2

Things really began to change in April. A very wet month shot precipitation averages at many climate sites east of the divide from well below to well above normal for the month (Fig. 2). Nearly SEVEN FEET of snow fell on Casper Mountain, over two feet fell in the town of Casper during the first two snow storms, likewise in Lander; a foot and a half fell in the town of Riverton. In fact, this was Casper's second snowiest April on record with 37.8" of snow and the season total now came to 81.0" with only 20.2 more inches needed to bring this season into the top 10 snowiest of all time. In Lander, the month of April looked like it was going to be as dry as it was last year with snowfall over a foot below normal for the water year. However, the first two storms brought Lander into a surplus; standing at 23.7" ABOVE normal for the month. The snowfall season (July 2012 - present) delivered 97.8" of snow by the end of April, putting Lander 14.9" above normal for the year, and 34.5" above where we were at this time last year. In Riverton, 24.7" of snow fell during the month, which is 18.6" above normal for the month, and the 3rd snowiest April on record. Riverton accumulated 54.5" of snow through the current snowfall season (July 2012 - April 2013), or 20.9" above normal for the season , and 34.1" above where we were at this time last year.

Hogadon ski lift on Casper Mountain had only the very top of the chair lift sticking out of the fresh 5 feet of snow!

Photo by Eric Aune

However, the snowpack up to this point was so far below normal that this month only shot levels up toward normal. This abundance of moisture also moderated the drought (Fig. 3), but did not completely cure it.

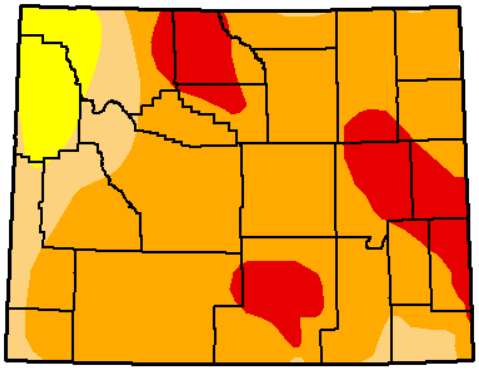


Fig. 3 – The drought improved from D3 to D2 during the month of April

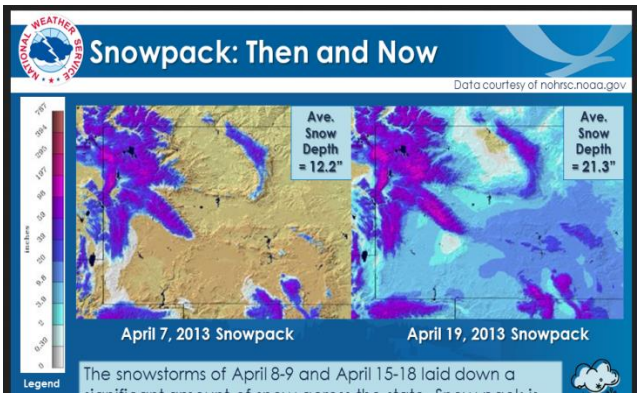


Fig. 4 – Several large snow storms improved snowpack

Operations:

- Three partner meetings took place in April: Lander, Cody, and Rock Springs. Kelly Allen also gave a presentation in Rock Springs wrapping up the 2012 season and going over the 2013 seasonal outlook
- First spot for a wildfire was issued for the season on April 28th for the "Big Fork" fire in the Bighorn Basin
- 34 Spots were issued in April, 2 of which were for wildfire
- A Fire Weather Drill was issued to the staff in early April, those were to be completed by May 24th
- Kelly Allen attended another Dry Lightning Team meeting

May

Climate:

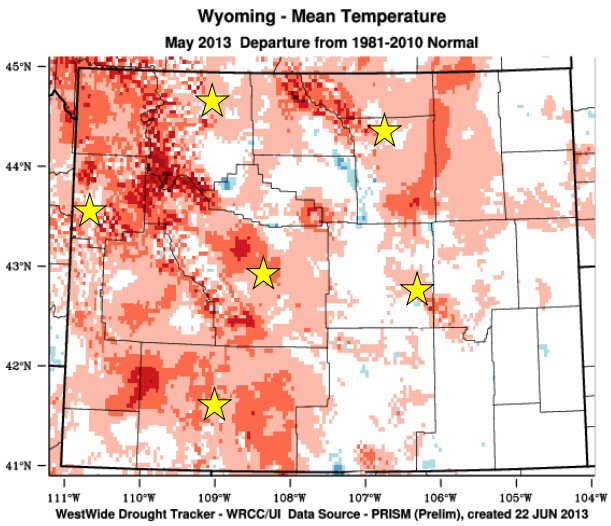


Fig. 1

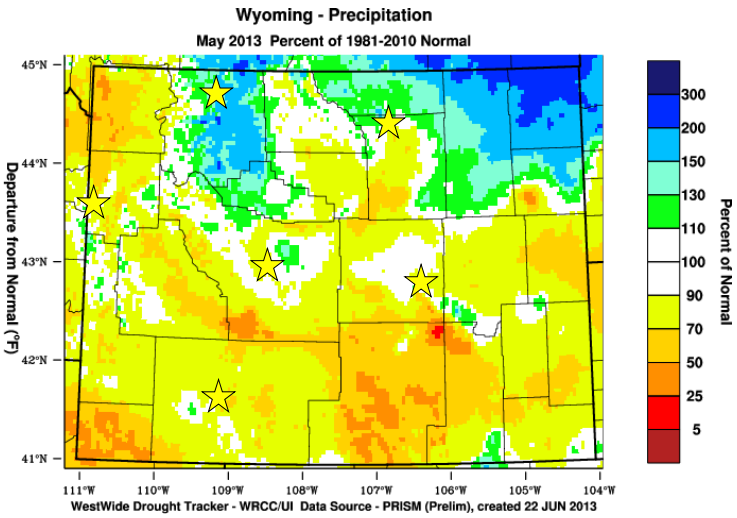


Fig. 2

May was warmer than normal (Fig. 1) and on the dry side across the south and west (Fig. 2). Record setting heat moved in toward the middle of the month with a quick transition into what will turn out to be a very long and eventful thunderstorm season. In addition, areas east of the Divide received even more snow when a very cold system moved in after most of the high country snow melted. In fact, three FEET of snow fell at the Wyoming High Country Lodge in the Bighorns at the end of May (Fig. 3) while bringing widespread wetting rains to the lower elevations.

Operations:

- The Fire Weather Planning Forecast, NFDRS Point Forecasts, and the Dispatch Area Forecast began on May 1st
- 62 Routine Narrative Planning Forecasts were issued during the month.
- 31 NFDRS Point Forecasts issued.
- 19 Spots issued; 3 of which were for wildfires, 16 for prescribed burns
- Two more partner meetings were held, one in Worland and one in Jackson where I was joined by the Eastern Great Basin GACC Meteorologist, Shelby Law. She gave the 2013 seasonal outlook.
- Kelly Allen attended the Fremont County Fire Coordination Meeting on May 29th
- Dave Lipson taught an S290 course in Rock Springs

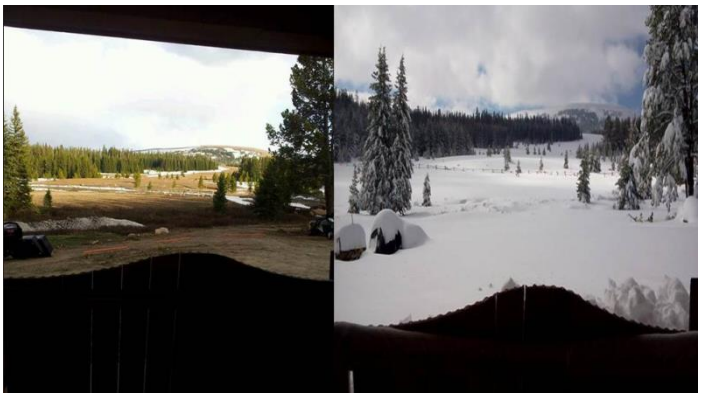


Fig. 3 – Bighorns before and after receiving 3ft. of snow out of one storm late in the month

Fig. 4 – Thunderstorm season started with a vengeance in May.

June

Climate:

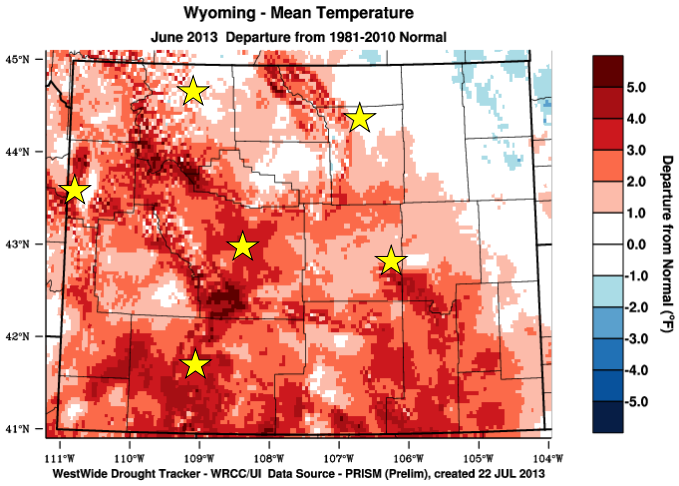


Fig. 1

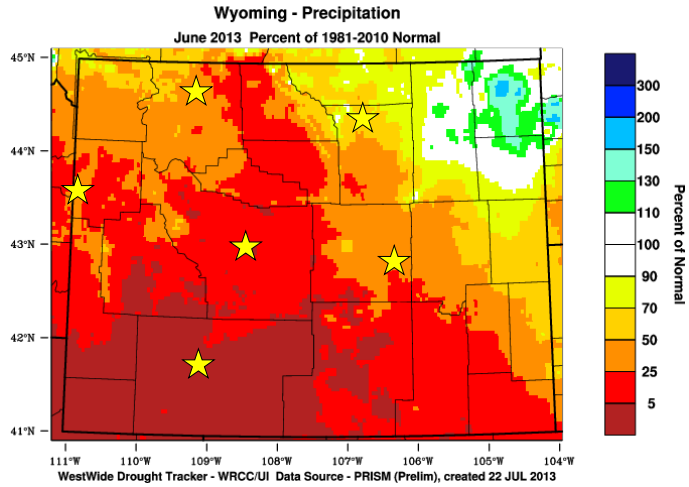


Fig. 2

June was warmer and drier than normal (Fig. 1 & 2), some places were very dry with a return to widespread extreme drought conditions feared. Active thunderstorm days continued through the month with rising concern over flash flooding over old burn scars. It took quite a while for fuels to dry out from the exceptionally wet spring, but they did eventually as a few high wind events and record temperatures worked together to cure the newly grown fine fuels.

Operations:

- 60 Routine Narrative Planning Forecasts issued
- 30 NFDRS Point Forecasts issued
- 24 Spot forecasts were issued, 8 of which were for wildfires, 2 were SAR, the remainder were for prescribed burns
- 10 Red Flag Warnings were issued, there was 1 missed event, and 1 unverified warning
- The first Red Flag Warning of the season was issued on June 19th
- A new Fire Weather Website developed by lead forecaster, Arthur Meunier was rolled out on June 26th
- All Casper Dispatch Zones (280, 281, 285, and 300) in the eastern portion of the forecast area had critical fuels by June 17th. All other zones remained not critical for the month.
- Weekly Eastern Great Basin coordination calls began on June 5th
- Dave Lipson (IMET) was dispatched from June 12th-19th to the Big Meadows Fire in Colorado

Fig. 3 – Even the Jackson Area had severe thunderstorms

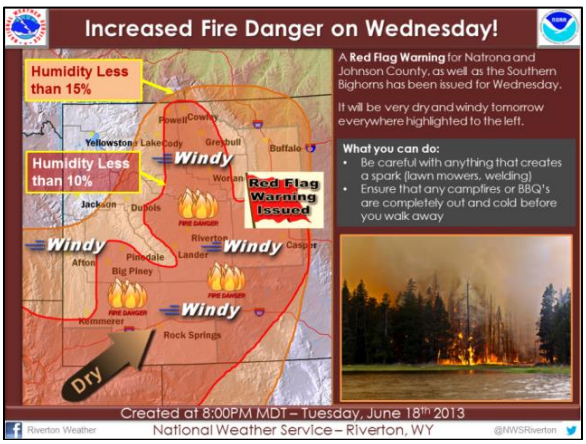


Fig. 4 – Dry and windy conditions prompted the first Red Flag Warnings of the season

July

Climate:

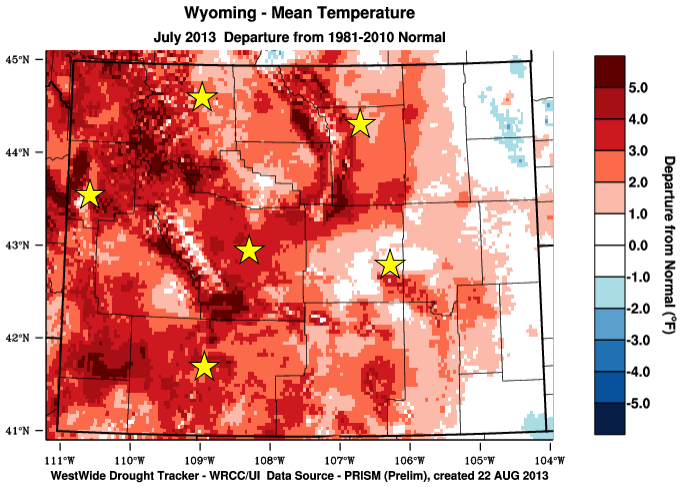


Fig. 1

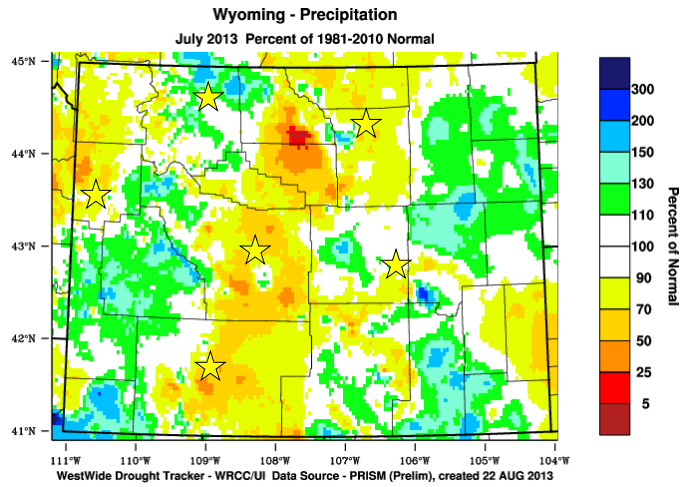


Fig. 2

July was hot – much warmer than normal across the state (Fig. 1) but the thunderstorms continued. Luckily, the state started to receive monsoonal pushes fairly early and many of the thunderstorms were wet, especially over the higher elevations and portions the west (Fig. 2). There were also several easterly low level pushes of moisture wrapping around into the eastern portion of the state, so many of the thunderstorms over Natrona and Johnson counties were wet as well, many were also severe. These storms produced some torrential downpours once again, raising the flash flood threat over the 2012 burn scars. One of these storms managed to start the first significant wildfire of the season, the Sensebaugh Fire on Casper Mountain, another storm started the Hardluck Fire in the southern Absarokas, the Fairfield Fire also started this month above Lander, causing the evacuation of the Homestead Park neighborhood and closing the Loop Road, a popular road used by many in the summer. Another one of these storms managed to cause a flash flood in the Sheepherder Hill burn scar, also on Casper Mountain (Fig. 3), causing a devastating flash flood east of Casper.

Fig. 3 – An intense thunderstorm caused flash flooding and debris flows downstream of the Sheepherder Hill burn scar

Operations:

- 62 Routine Narrative Planning Forecasts issued
- 31 NFDRS Point Forecasts issued
- 45 Spot forecasts were issued, 40 of which were for wildfires, 5 were SAR
- 10 Red Flag Warnings were issued, there were 2 missed events
- Most other low elevation zones (275, 277, 279, 282, 283, 289) had critical fuels by the end of the month. Many mountain zones remained not critical, mitigating the number of Red Flag Warnings for lightning.
- Two impactful wildfires were caused by lightning in July: the Sensebaugh and the Hardluck Fire. The Hardluck fire would eventually grow to be 24,648 Acres.
- Weekly conference calls with the Bridger-Teton National Forest began on Tuesday, July 2nd
- Weekly conference calls with the Eastern Great Basin continued each Wednesday
- The first decision support page was created for the Sensebaugh Fire on July 13th
- There was also a decision support page created for the Fairfield Fire above Lander, Chuck Baker was requested as an IMET Trainee on this fire from July 22nd through the 28th

August

Climate:

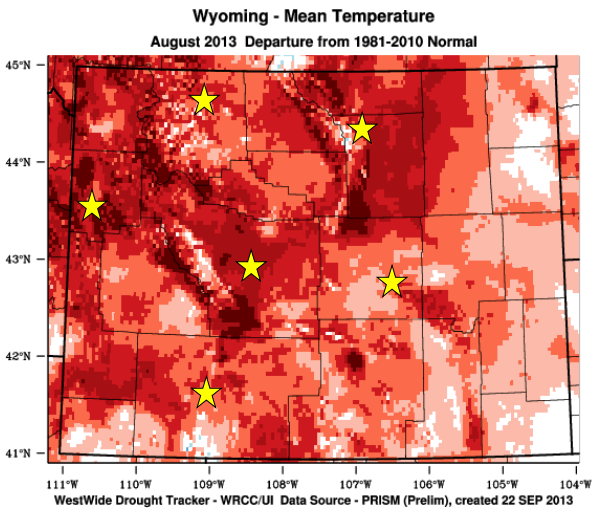


Fig. 1

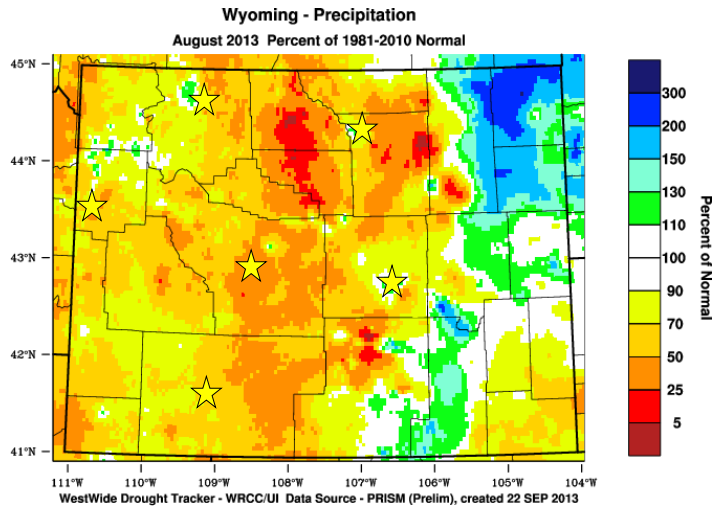


Fig. 2

The warm trend continued into August (Fig. 1) but it was much drier than normal just about everywhere (Fig. 2). Every single official climate site in the forecast area had above normal temperatures and below normal precipitation. Some low elevation sites east of the Divide had less than 0.05" of rain for the entire month. Lake Yellowstone set 9 new high temperature records during the month and was by far the most active zone when it came to major wildfires. Even with all of the hot and dry days, it still took a while for the fuels to cure out enough to become critical in the mountain zones, otherwise there probably would have been quite a few Red Flag Warnings for critical thunderstorm activity. There were not too many windy days, this also kept the number of Red Flag Warnings down. However, wildfire activity really began ramping up toward the end of the month for much of the west once the fuels did reach critical levels, and wildfire smoke began to overspread the state. Yellowstone was impacted the most with several wildfires starting near some of the most widely used areas. In fact, a NIMO team was eventually brought in to manage the complex, what would eventually be known as the "Druid Complex." The most impactful fire was the Alum fire, which burned several acres along the Grand Loop, leading to some temporary closures of the road in addition to some popular tourist attractions (Fig. 3).

Fig. 3 – Alum Fire closed a portion of the Grand Loop in Yellowstone

Operations:

- 62 Routine Narrative Planning Forecasts issued.
- 31 NFDRS Point Forecasts issued.
- 161 Spot Forecasts were issued, 159 for wildfires, 2 for search and rescue operations. This was by far our busiest month for spots.
- 17 Red Flag Warnings were issued, 3 events were missed
- Dave Lipson (IMET) was dispatched on the Eureka Fire near Ennis, Montana from August 16th through the 29th
- The Packer Creek Wildfire started 16 miles east of Bondurant on August 2nd, it was later joined by two other wildfires that would eventually be managed together as the Packer Creek / Green / Kendall Wildfires. A DSS Page was created for these fires and hosted on our homepage
- A DSS page was also created and routinely updated for the fires in Yellowstone
- A DSS page was created for the Hardluck Fire as it became more impactful on the area
- IMET Dan Borsum arrived on the Druid Complex on August 28th
- Bridger-Teton and Eastern Great Basin coordination calls continued weekly through the month

September

Climate:

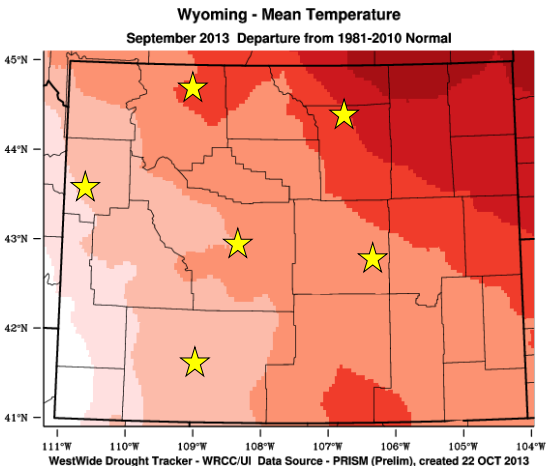


Fig. 1 – Mean Temperature without PRISM adjustment

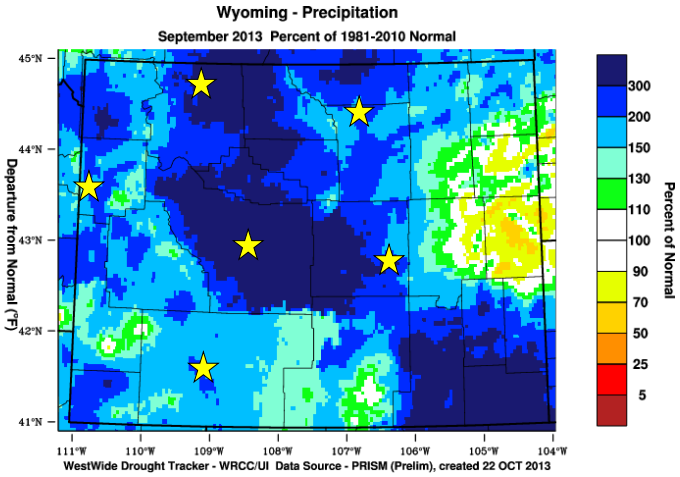


Fig. 2 – Percent of Normal Precipitation with PRISM adjustment

September started off hot (Fig. 1) and dry, with a new wildfire north of Dubois called the Bourroughs Fire. Smoke continued to pour out of the fires across the western states, in addition to the smoke billowing out of our local fires in Yellowstone and the upper Green River basin. The summer of 2013 brought a near record number of days with high temperatures of 90 degrees or higher, with many climate sites recording just one or two days shy of the records set in 2012 or 1988, depending on the site. Mercifully, the rain came back by mid month with most places receiving over an inch of rainfall between September 10th and 15th. This pattern helped to finally suppress wildfires and further relive the drought conditions. From this same system, rainfall records were shattered in eastern Colorado and highly populated areas were devastated by flood waters. While our area definitely received our fair share of moisture, over 300% of normal (Fig. 2) across a wide swath of the state, our flooding was more localized and the rain provided more benefit than harm. By the end of the month, we were already talking about snow in the low elevations as an abnormally cold and wet system headed our way. Light to moderate rain eventually turned to snow early on September 27th, before the snow ended, 4 to 8 inches of snow fell in Fremont, Johnson, and southern Hot Springs counties, with 8 to 12 inches in the Wind River Mountains, Bighorn Mountains, and adjacent foothills. This system caused significant tree damage and widespread power outages around Riverton (Fig. 3) because of how many leaves still remained on the trees. Riverton, Worland, Buffalo, Greybull, and Lake Yellowstone had the wettest Septembers on record.

Fig. 3 – Copious moisture at mid month through the end of the month, including an early season snowfall ended fire season

Operations:

- 60 Routine Narrative Planning Forecasts issued
- 30 NFDRS Point Forecasts issued
- 60 Spot Forecasts issued, 51 were for wildfires, 8 for prescribed burns, and 1 search and rescue
- 5 Red Flag Warnings were issued and verified
- A DSS Page was created for the Burroughs fire on September 1st
- All other active wildfire DSS pages were updated as needed through mid month
- The last Red Flag Warning of the season was issued on September 24th
- All fire weather zones no longer had critical fuels by the end of the month

October, November, December

Climate:

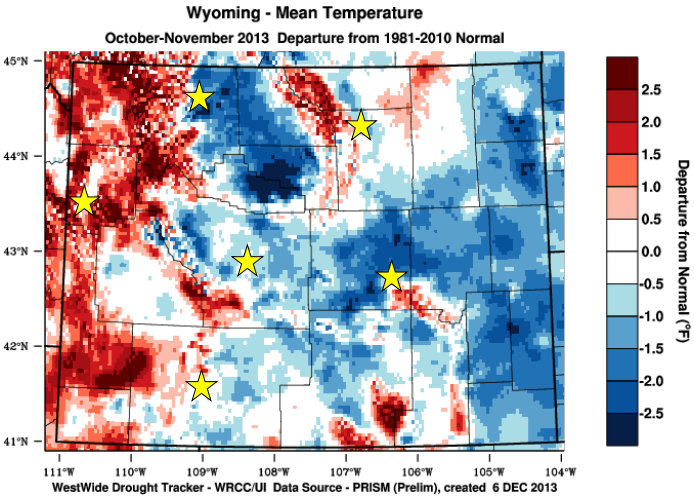


Fig. 1 – Early snow led to inversion-dominated temp patterns

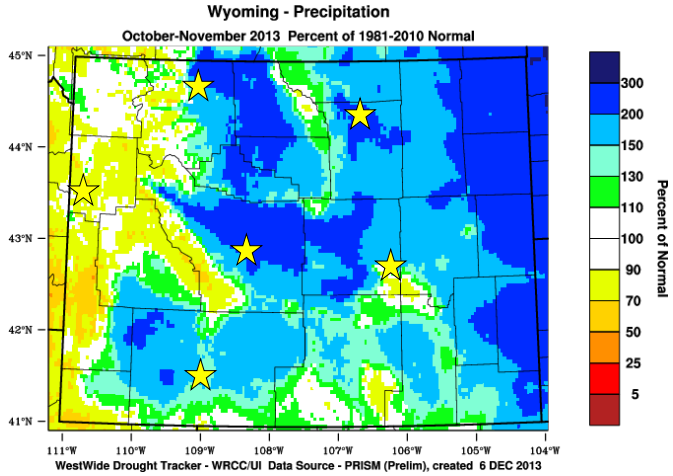
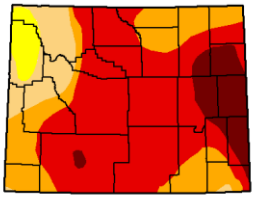
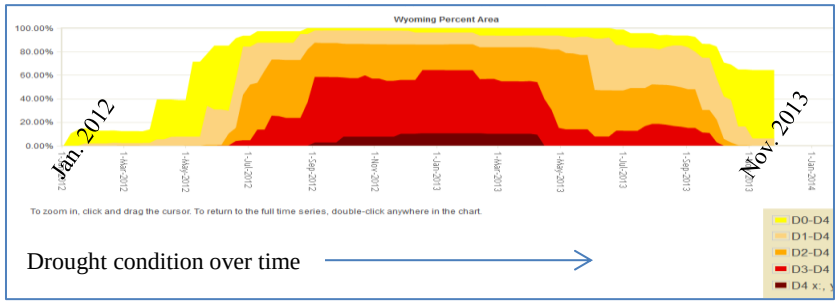


Fig. 2 – Overall, the wet October made up for the very dry November in the lower elevations. Precip in the mountains was near normal.

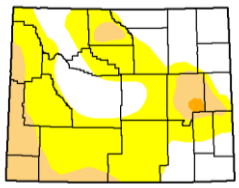
October continued to be wet with another big snow storm on October 3rd through 5th, this time, widespread power outages and tree damage visited Casper. Another storm hit mid month, with yet another at the end of the month, effectively putting the nail in the coffin of the long term drought that began in early 2012 (Fig. 3). It was also cooler than normal. Riverton, Lander, Casper, Buffalo, Greybull, and Lake Yellowstone had one of the top 5 wettest Octobers on record. After a wet October, November was much drier than normal and had near to slightly above normal temperatures. Some locations, such as Riverton, Rock Springs, Buffalo, Greybull and Lake Yellowstone had one of the top 5 *driest* Novembers on record. There were not many high temperature records in November, however, a strong arctic front brought several record low temperatures toward the end of the month. This front also brought some snow with it, mostly benefiting the western mountains. December started out cold and unsettled with a few storms bringing snow to the area. A deep arctic cold pool sunk temperatures well below zero following the fresh layer of snow.



WY Drought - Jan 2013



Drought condition over time



WY Drought - Nov 2013

Fig. 3 – The timeline above center shows the percentage of area in Wyoming covered by drought type from January 2012 through November 2013. The area covered by D2 drought and worse increased significantly in June of 2012 and persisted through winter of 2013, it was reduced significantly by the end of March 2013, and was gone by November 2013

Operations:

- Routine Fire Weather Planning Forecasts and NDFRS Point Forecasts stopped for the season on October 31st , 31 FWF forecasts were issued in October and 31 NDFRS Forecasts were issued
- 13 Spot Forecasts were issued during the period, all of which were for prescribed burns
- Kelly Allen attended the Western Region Fire Weather Focal Point seasonal wrap up conference call on November 20th

☼ NWS Riverton 2013 Red Flag Warning Events and Verification:

- **Summary**:

A total of 43 RFW events occurred this season, much fewer than the 487 warnings issued during the 2012 season. The zone with the most Red Flags issued was Zone 280, Natrona County, with 8 Red Flags issued; the least warned zones are located in the Bighorn Basin (Zones 275 and 282) where 0 Red Flags were issued for the season. Of the 43 warnings, 42 of them were verified. There were a total of 6 missed events. The following represents our performance for these events:

POD:	0.88
FAR:	0.02
CSI:	0.86

The average lead time for the Red Flag Warning was 12.2 hours.

There were a total of 17 Fire Weather Watches, 15 of which were followed by a successful Red Flag Warning. There were 6 watches not followed by a successful warning. 30 Red Flag Warnings were not preceded by a watch.

☼ NWS Riverton 2013 Fire Weather Spot Forecast Archive:

Spot forecasts issued for Wildfires:	263
Spot forecasts issued for prescribed burns:	110
Spot forecasts issued for other purposes:	14
Total Number of Spot Forecasts issued:	387

This year ranks 7th for total number of spots. Last year, 451 spots were issued, which ranked the 2012 season second for number of spots behind 2006 when 496 spots were issued. National Weather Service-wide, the Riverton office ranked 15th for number of spots this year, but #2 in the Central Region behind Grand Junction. Riverton ranked 4th overall for number of spots for wildfire.

☼ NWS Riverton IMET Dispatch Days:

Dave Lipson was dispatched for a total of 22 Days during the 2013 fire season (this includes travel days). Chuck baker was dispatched for a total of 7 days; since the fire was local, no travel days were needed.

Total number of IMET dispatches: 3
Total number of IMET dispatch days: 29