2015 - NRGA FIRE SEASON OUTLOOK

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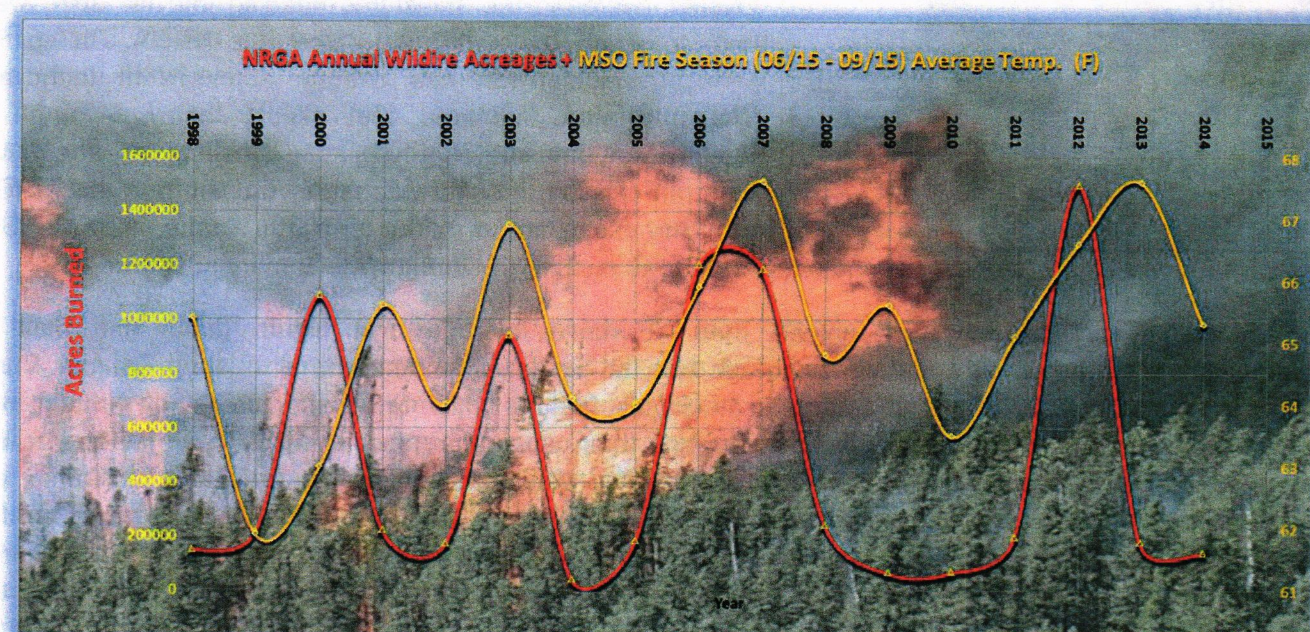
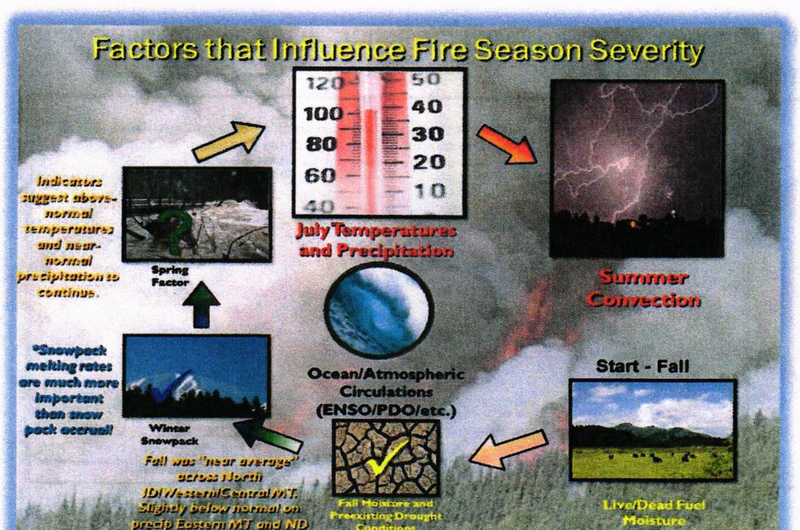
Fire season 2014 was a typical slightly below-normal one across the Northern Rockies region. By season's end in mid-October, 143,271 acres had burned from 2,665 fires. During a typical fire season, approximately 200,000 acres burn from roughly 2,800 wildfires. The historical record shows that fire seasons across the region typically fall into one of three categories: ***below normal, normal, and severe***. The below normal years are years in which less than 90,000 acres burn. During normal fire seasons, between 170,000 and 240,000 acres burn. In the severe fire seasons, like 2012, 940,000 to 1.5 million acres have burnt. Interestingly, there has been no middle ground between a normal season and a severe season since 1998, when accurate NRGA (Northern Rockies Geographical Area) fire acreage records began. We do know however that the 1988 and 1994 fire seasons would be classified as severe, but the total seasonal acreages for those years have errors as high as 10-15%. Thus, there appears to be a six-year severe fire season cycle in play in the NRGA, at least since 1988, as the above fire history graph shows. Along with a sub-cycle, which is more variable in length, 2-4 years. In addition to the NRGA fire acreages, a plot of Missoula's mid-June to mid-September average temperature is provided, as an index of overall fire season warmth. Interestingly as well, not all of the warmest years had severe seasons, 2001 and 2013 being notable examples.





So what can we expect for fire season 2015? Before the question can be addressed

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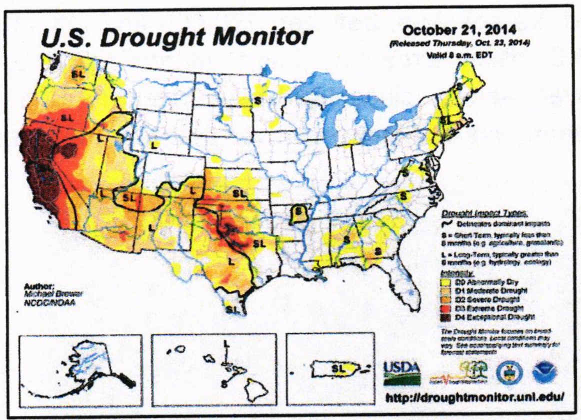
the factors that impact NRGA fire season severity need to be evaluated.

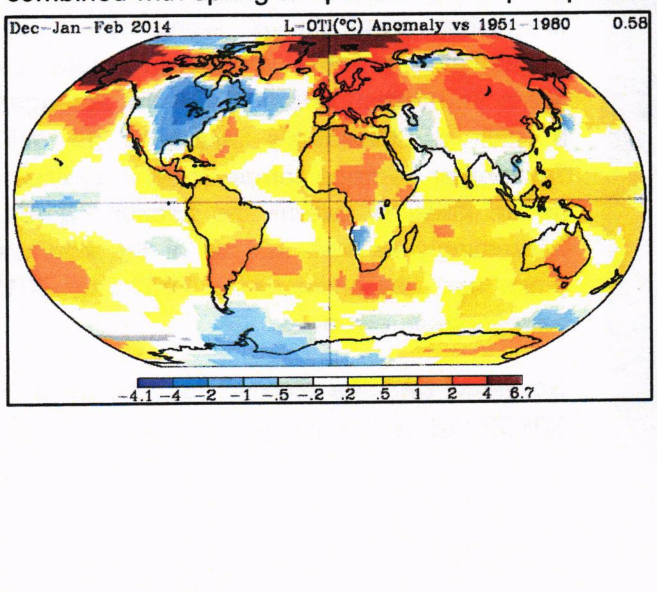
There are many factors that contribute to fire season severity in the NRGA. Among them there are 6 major inputs which are governed in part by oceanic and atmospheric circulations. ENSO (El Nino/La Nina) is perhaps the best known to most people and is a major driver for the preceding fall/winter conditions over the NRGA. For the coming summer, moderate El Nino conditions are forecast to develop, and continue into next fall and winter. However, summer El Nino conditions tend to have only negligible effects on NRGA temperatures/precipitation. Another is the Pacific Decadal Oscillation, which is less well-known, but in its positive phase, which we are just re-entering, tends to promote warmer temperatures the year-round over all the western US, including the NRGA. http://en.wikipedia.org/wiki/Pacific_decadal_oscillation.

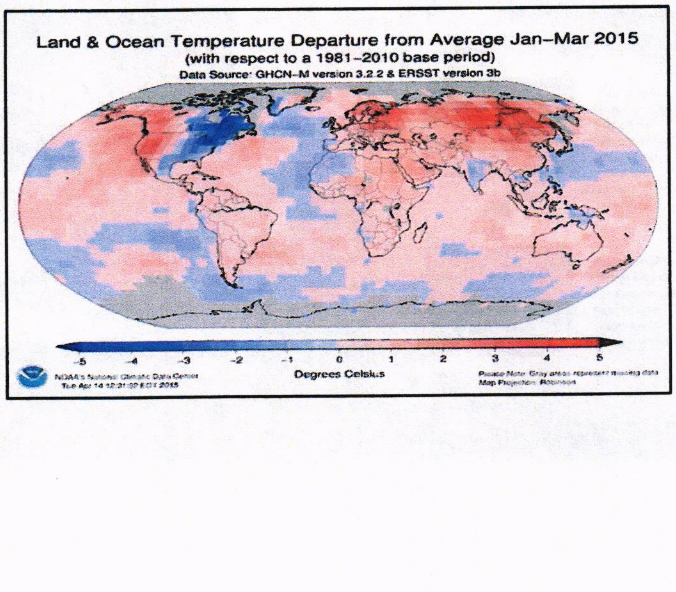


As fire season approaches, these inputs increase in importance. Starting at the bottom on the chart and working clockwise around the circle, the first considerations are fall live/dead fuel moistures and pre-existing drought conditions. Overall, live/dead fuel moistures heading into fall 2014 were near to slightly below normal across the NRGA. During Fall 2014 precipitation was near average across North Idaho and Western/Central Montana, but slightly below average in Eastern Montana and North Dakota. Heading into the winter then, pre-existing drought was largely absent from the NRGA, with the exception of parts of North Idaho, in our PSAs (Predictive Service Areas, see map at end of article) 3-5-6, as this US Drought Monitor image shows.

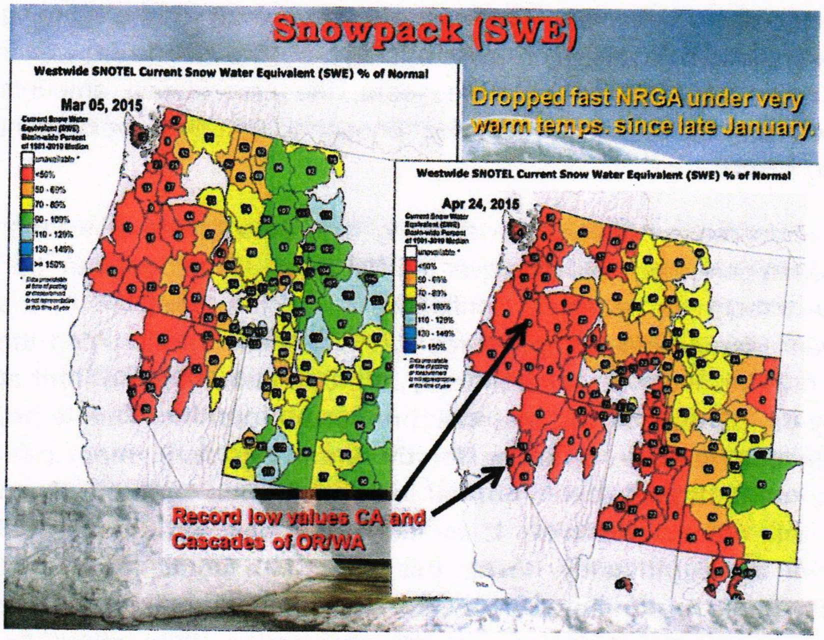
Over the winter, precipitation was actually near to above average over North Idaho and most of Western/Central Montana, but well below average over far Eastern Montana and all of North Dakota. There was a very important reason for this, a large scale climatic feature which has been increasingly present over the past four years during the winters. A much stronger than usual high pressure ridge in the jet stream has been present overall along the west coast of North America, which has caused the drought in California, and brought increasingly warmer winters northward over all of the West Coast, to Alaska. Downstream from this feature, a more persistent very deep, and cold low pressure trough brought much colder than normal winter conditions to the Central and Eastern US. Climatic researchers are actively researching the causes and significance of this. http://www.climatecentral.org/news/warm-west-cold-east-weather-divide-18889. Because of this, there was a colder, drier winter in North Dakota, which brought short term drought stress, but should diminish as we head into summer, July and August are their wettest months, generally.

This ties directly in to the next two inputs, winter snowpack, and the spring factor, snowpack melting rates, combined with spring temperatures and precipitation.

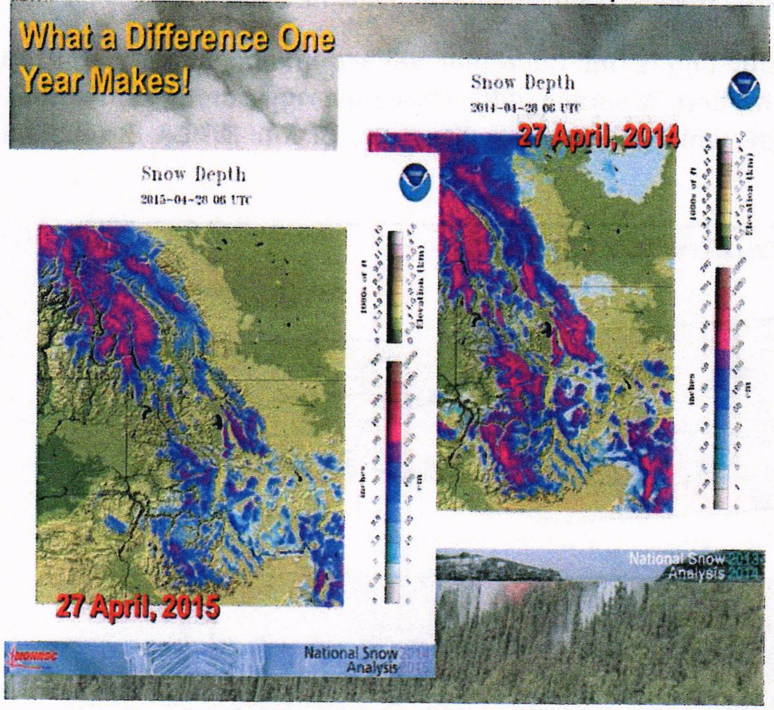




As you probably remember, the winter of 2013-2014 saw exceptionally heavy snowpacks develop over the NRGA, which only slowly melted off through the spring of last year. This helped to delay the onset, and reduce the severity of the 2014 fire season. These global surface temperature anomaly images, above, help illustrate why this occurred. The position of the ridge was further west in winter 2013-14, compared to its position this past winter. Overall then, during winter 2013-15, especially in February, 2014, the NRGA was in a cooler, fairly moist northwest flow, which helped to produce the exceptional mountain snowpacks then. Unfortunately, this past winter, the large West Coast upper ridge shifted its position further east, and this led to much warmer conditions overall, especially from late January through February and March. **This meant that snow levels were much higher than usual in North Idaho and far Western Montana, producing below average snowpacks there, which then began melting much faster than usual, as we can see below.**



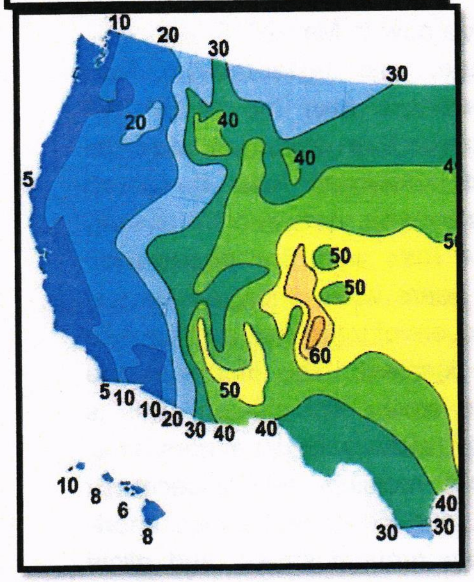
So here we are now in May 2015, with well-below average, and faster-melting than average snowpacks over the NRGA. **Of more importance than snowpack accrual is the rate of snowpack loss. Research shows a relationship between the timing of snowpack loss and fire occurrence and size.** In years when snowpack is lost early, the numbers of large fires and the size of large fires increase. This increases the potential for a severe fire season. This is because of our relatively dry summers here, winter snowmelt moisture deficits decrease soil moisture, and hence will cause short-term vegetative drought stress, and allow large dead fuel moistures to dry out faster, earlier in the season. The rate at which snowpack is lost is governed by the spring factor. Warm Springs accelerate the rate of snowpack loss. Once the rate of snowpack loss accelerates, the snowpack continues to melt at the accelerated rate until it is lost even if there happens to be a cool down in temperatures. This is exactly what has been occurring through the late winter and spring this year.



Long range temperature outlooks maintain above-average temperatures over North Idaho and Western Montana through the rest of the spring, and into this summer. Hence, accelerated melting of the already skimpy remaining snowpack is expected to continue as we approach our main fire season. There is higher confidence than usual in these outlooks this year, due to an unusual and very large area of warmer than average sea-surface temperatures off of the West Coast of North America, that is forecast to persist through this summer and fall.

The final factors, July Temperature and Precipitation, and Summer Convection, are the largest drivers of the severity of our NRGA fire seasons. July temperatures and precipitation feed directly into the drying and curing rates of the live and dead fuels during the most critical time of year. In warm and dry years, the fuels dry more quickly and are able to support fire development and growth earlier than in other years. That said, there needs to be a trigger that starts the fires: lightning.

Number of Thunderstorm Days/Year (NOAA)



Slightly more than 50% of the fires that start in the Northern Rockies region start from lightning. The chart to the left shows a climatological average of the number of thunderstorm days across the Western United States. There are years in the historical record that show much warmer and drier than normal conditions in July, but little lightning activity. The fire seasons during these years tend not to be severe. There are also years in which the lightning activity is observed to be average or above average, but the storms are wetter under the cores than normal. In these years, the precipitation amounts associated with passing storms are sufficient enough to limit fire development from lightning strikes.

Long-range temperature outlooks are showing high probabilities of warmer than average temperatures persisting over the Northwest US and western half of the NRGA through the summer. Confidence in which is bolstered by the unusually warm sea surface temperatures in the Eastern Pacific along the entire coast of North America. **Interestingly, outlook data does not hint at significantly dry signals during the peak fire season months. This is not typical when compared to outlooks for the same period in most past years. This could suggest that a normal to above normal amount of wet convection will occur. However it is likely that live and dead fuel moistures will be significantly lower this year than usual. Such that marginally "wet" thunderstorm outbreaks, those producing .10 to .25 of an inch rainfall, would be capable of causing more ignitions, which would spread faster and become larger, than otherwise would be the case under a more "normal" spring/summer temperature regime.** This is already showing up in the fire danger indices throughout North Idaho and Western Montana, some areas are at record levels already, in large dead fuel moistures, and the Energy Release Components (a measure of fire intensity).

Putting all of these factors together, **the current thinking is that the region will experience an early start to the main fire season in North Idaho and far western Montana, with above-average acreage potential, shifting further east through July and August, which would look like this, on our NRGA Predictive Service Areas map.**