National Weather Service, Elko

The Great Basin Spotter Newsletter

Winter 2010 Edition | The online newsletter can be found at: http://www.wrh.noaa.gov/lkn/newsletter.php | Volume 14, Issue 1

What's Inside

An Autumn Of Extremes Across Northern Nevada

By Ray Martin, Climate Focal Point

The weather across northern Nevada has featured several unusual extremes during Autumn 2010. Most of these were concentrated in October and November.

First, at the beginning of October, many stations recorded their all-time highest temperatures ever attained during the month of October, courtesy of an extremely powerful ridge of high pressure which had developed in late September. Elko, Ely and Winnemucca were among them, reaching 92, 86 and 94 degrees, respectively. Several days in both late September and early October were also the latest on record that very warm readings in the upper 80s and low 90s had ever been recorded at these three locations. Later in the month, Elko recorded its 10th wettest day ever on the 24th, receiving a whopping 1.63 inches of rain in a single day! This record wasn't shared by many surrounding sites, with much lower totals in Winnemucca and Ely.

In contrast to the warm weather experienced in early October, by late November winter had arrived with a vengeance! A powerful arctic cold front ushered in the extreme cold with blowing snow and whiteout conditions in many places during a few hours on Tuesday the 23rd, just two days before Thanksgiving. The cold poured south directly from Canada, and by Thanksgiving morning, Ely and Winnemucca broke their all-time coldest temperature records for the month of November, reaching -20 and -10 degrees respectively. Elko was also very close, dipping to -14 degrees; the record for the month of November remains -16, however. Some outlying areas were well down into the -20 degree range.

Not only did temperatures turn very cold in November, but it was also extremely snowy. Ely set a record for their all-time snowiest November ever, recording just over 20 inches! Elko had its 7th snowiest November on record with over 13 inches, and Winnemucca wasn't far behind with just a bit over 10 inches.

Will the winter continue the extreme pattern which began during the autumn? Only time will tell…

From the WCM Desk ...

Warning Coordination Meteorologist

Michael Fitzsimmons

As we look back to the previous summer, the weather conditions across northern and central Nevada could be characterized as rather tranquil yet very warm. With a strong ridge of high pressure being one of the more dominant features over the Great Basin, afternoon temperatures could be found soaring well above normal. In fact, one of the more significant observations noted for the city of Elko was recording temperatures of 90 degrees or more nearly 50 times during the summer months.

In spite of the dominance of a high pressure ridge, some monsoonal moisture was found to ride along the western periphery of the ridge resulting in convection during the afternoon and evening hours. During the summer, the National Weather Service Office in Elko issued 18 severe thunderstorm warnings. A couple of the more notable storm events were associated with microbursts: one just north of Winnemucca in Pleasant Valley and the second within the city of Elko. Microbursts by definition are small but intense downdrafts accelerating toward the ground and resulting in strong wind divergence at the surface. At times, wind speeds can exceed 100 mph with aerial coverage less than two and a half miles in diameter.

Barn damage from microburst in Pleasant Valley, NV area

The damage in the three photos was from 20 miles north of Winnemucca in Pleasant Valley and associated with a microburst. A storm survey completed by the National Weather Service in Elko estimated 70 to 80 mph winds caused the roof to be torn off the barn as well as destroying a greenhouse. Another microburst was responsible for considerable tree damage at the Ruby View Golf in Elko. Winds were estimated around 70 mph resulting in numerous large branches downed along with a couple of uprooted trees.

Barn damage from microburst in Pleasant Valley, NV area

Now that we've moved into the winter months, these months can bring their own set of challenges to the residents of northern and central Nevada. To stay ahead of the next winter storm to affect your area, continue to monitor NOAA Weather Radio or visit our web site at: www.weather.gov/ELKO for critical watch, warning and advisory headline information. When on the road, remember to carry a winter weather survival kit in your vehicle. For more additional information on winter weather tips, please go to http://www.nws.noaa.gov/om/brochures/winterstorm.pdf or http://www.nevadadot.com/ .

With the entire splendor the winter season has to offer, please remember to exercise safety above all else. From the entire staff of the National Weather Service in Elko, we wish you the very best of Happy Holidays and for the New Year.

Barn damage from microburst in Pleasant Valley, NV area

West Wendover, Nevada Becomes StormReady Community

By Michael Fitzsimmons (WCM)
Warning Coordination Meteorologist

From left to right: Chris Melville, West Wendover City Manager, Michael Fitzsimmons, National Weather Service Warning Coordination Meteorologist , Donald Andersen, West Wendover Mayor, Kevin Baker, National Weather Service Meteorologist In Charge, Jeff Knudtson, West Wendover Fire Chief.

The city of West Wendover, Nevada became the third StormReady Community in Elko County this past July. Earning the StormReady Community designation indicates that West Wendover has done everything possible to improve emergency first responder and citizen preparedness in the event of a natural disaster. The cities improved communications infrastructure and increased level of severe weather awareness will minimize the loss of life and save property in the future.

Ninety percent of all presidentially declared disasters are weather related, leading to around 500 deaths each year and nearly $14 billion in damage. StormReady, a program that began in Tulsa, Oklahoma in 1999, helps prepare America's communities with the communication and safety skills needed to save lives and property, before and during an event. StormReady prepares community leaders and strengthens safety programs from the onslaught of severe weather through advanced planning, education and awareness. The following link, http://www.stormready.noaa.gov/ will provide additional information on the National Weather Service's StormReady Program.

Winter Weather Outlook Winter 2010-11

"La Nina and Nevada… snowy together?"

By Ray Martin, Climate Focal Point

While astronomical winter officially begins December 21st, for meteorological purposes, winter starts on December 1st. Meanwhile, here in northern and central Nevada, winter weather usually arrives by November, sometimes as early as October and occasionally even in September!

Weather systems during the winter months generally move from west to east (this is actually true during much of the year in this area, but it's particularly true in the winter). Thus, our weather is influenced greatly by the happenings in the biggest ocean in the world, the Pacific. Because the Pacific is so big, cycles within it tend to influence weather patterns world-wide, though of course their greatest effects are on nearby locations such as our area.

The most well known cycle, which occurs in the Pacific but affects weather globally, is the ENSO cycle, or El Nino-Southern Oscillation. The Southern Oscillation refers to the pressure changes which occur in concert with El Nino and its opposite, La Nina, in case you were wondering.

El Nino refers to the unusual warming of the waters of the equatorial eastern Pacific which generally reaches a peak around Christmas. This is in fact how El Nino got its name, as El Nino (or "Little Boy" in Spanish) refers to the Christ child. La Nina ("Little Girl" in Spanish) is its opposite, a cooling of the waters in the equatorial eastern Pacific during the winter months.

It is La Nina with which we are concerned this winter. As of this writing, a moderate La Nina has already developed and may continue to strengthen a little more during the coming months. While El Nino tends to result in stormier weather across the southern United States during the winter months with calmer weather towards the north, La Nina produces an opposite effect… stormier weather in the north and quieter weather in the south. This is particularly true across the West.

So, what does that mean for the northern and central Nevada? Well, northern and central Nevada lie along the divider between areas which are more influenced toward stormy weather by El Nino versus La Nina, so an ENSO-based forecast for our area is by no means foolproof. However, we know that northern Nevada generally falls on the La Nina side as far as active weather is concerned, which essentially means that La Nina results in stormier weather for that region during the winter months. Meanwhile, central Nevada tends to fall on the El Nino side as far as stormy weather goes, so that during La Nina, drier and less stormy weather tends to prevail.

In fact, a majority of La Nina events result in above normal winter snowfall for northern Nevada, though certainly not EVERY La Nina. Approximately three quarters of recorded winters accompanied by moderate La Nina conditions have in fact resulted in a snowier winter than the norm. As can be imagined, cold also tends to accompany La Nina events across northern Nevada.

This latter facet, colder weather than normal, also tends to accompany La Nina across central Nevada. However, with the storm track further north, drier weather tends to prevail in that region. The greater degree of cold weather tends to off-set the dryness somewhat, such that in central Nevada, snowfall is often not far from normal, or only a bit below normal, during La Nina.

Another factor which points to a colder winter with greater snowfall across northern Nevada and less snowfall in central Nevada involves the conditions prior to the current La Nina. Last winter, El Nino conditions were present in the equatorial Pacific. La Nina events which were immediately preceded by El Nino are also likely to result in a cold and snowy winter in northern Nevada and a cold and drier-than-average winter in central Nevada.

Of course, bringing up last winter's El Nino also reminds us of how things may NOT work out. As mentioned, it is La Nina which typically results in colder and snowier winters in northern Nevada, with El Nino trending toward the opposite. However, last winter was unusually cold and snowy even in northern Nevada, particularly in December and then again in April. This can be somewhat explained, however, by the El Nino's strength. Last year's El Nino was quite

Strong, one of the strongest on record, in fact. Data from previous years with particularly strong El Nino's reveals that when El Nino gets very strong, its stormy influence can become more expansive, spreading northward into northern Nevada. This was known to us before last winter began, and sure enough, proved to be true.

The reason we mention this is because there are some climate computer simulations which also indicate that the current La Nina will strengthen from its current status as "moderate" and become classified as "strong". Once La Nina becomes reaches the "strong" category, our chances of typical La Nina conditions (cold and snowy in northern Nevada, cold and drier-than-normal in central Nevada) tend to drop. This is because the jet stream ends up getting pushed further north… allowing warmer and drier weather to prevail across both northern and central Nevada.

So, with that said, we can still give an overall outline to our expectations for this coming winter based on past performance:

1 – Colder- and snowier-than-normal weather in northern Nevada, with colder- but drier-than-normal conditions in central Nevada.
2 – A "front-loaded" winter, with a majority of the unusually cold and stormy weather concentrated in November, December and January, with the stormiest conditions concentrated in northern Nevada.
3 – Fairly normal conditions in February and a drier-than-normal March in both northern and central Nevada.
4 – A possible brief return of exceptionally wintry weather in April before warmth finally arrives in May.

35 Year Service Award for Eureka, Nevada

By Bill Ash, Observation Program Leader

Pictured from left to right: Sheriff Ken Jones, Sue Orr, Sgt. Sandy Mariluch , Eureka NV

On November 9, 2010 the National Weather Service Office in Elko presented the Eureka County Sheriff's Office with a Length-of-Service Award for 35 years of participation in the Cooperative Observer Program (COOP). Although the Eureka COOP site was first established in 1888; and has changed observers several times; the Sheriff's Office took over the job of taking weather observations in 1975, with many of the staff involved in the daily recording of temperature and precipitation.

The current observer for the Eureka site is Sgt. Sandy Mariluch, who has been responsible for documenting the daily weather data. Sandy says that while she may be the observer of record, she credits much of the success of the Eureka COOP site to Sue Orr, who works in the dispatch office. Sheriff Ken Jones credits both women with having the dedication and desire to provide the weather information to the National Weather Service and the community. He further stated that he had "never worked with a finer group of people."

The Elko National Weather Service Office wishes to express their gratitude to Sandy, Sue and the Eureka County Sheriff's Office for an outstanding job and look forward to a continued long association with them.

Climate Variability of Central and Northern Nevada

By Donald Dumont, Meteorologist

Climate by definition is the prevailing or average weather conditions for a particular area. The average weather conditions are calculated over a pre-defined period of time. For official National Weather Service climate records it is a 30 year period. The current climate averages for all climate sites across the country are calculated from the years 1971-2000. The climate averages are recalculated every 10 years. So next year in 2011, the averages for your location will change based upon data from 1981-2010. This means that an above average day for temperatures back in the 1920s could be average or below average day in current times. The take-away is that climate is not static, it is constantly changing.

We can also look at climate over longer periods of time for the purpose of documenting weather extremes for a specific area. The longer the observation site has existed, the more significant it is when a record is broken. For example breaking an all time low temperature record for Elko with over 100 years of weather observations, is more significant than a record low temperature at Lamoille where the period of record is only 11 years.

One other reason to look at climate records over a long period of time is for identifying long term trends. For example how much hotter is it during present day than it was 100 years ago, or is the climate generally becoming drier or wetter over the past decade? These questions are important ones, especially for agriculture. Remember climate is not static and what was normal two decades ago might not be in the future.

The question is how much has the climate been changing over Northern and Central Nevada during the past century? Is it getting warmer, colder, wetter or drier? Fortunately we have 3 observation sites at Ely, Elko, and Winnemucca with long periods of climate records. Elko and Winnemucca weather records actually span well over a century, with Ely around 70 years.

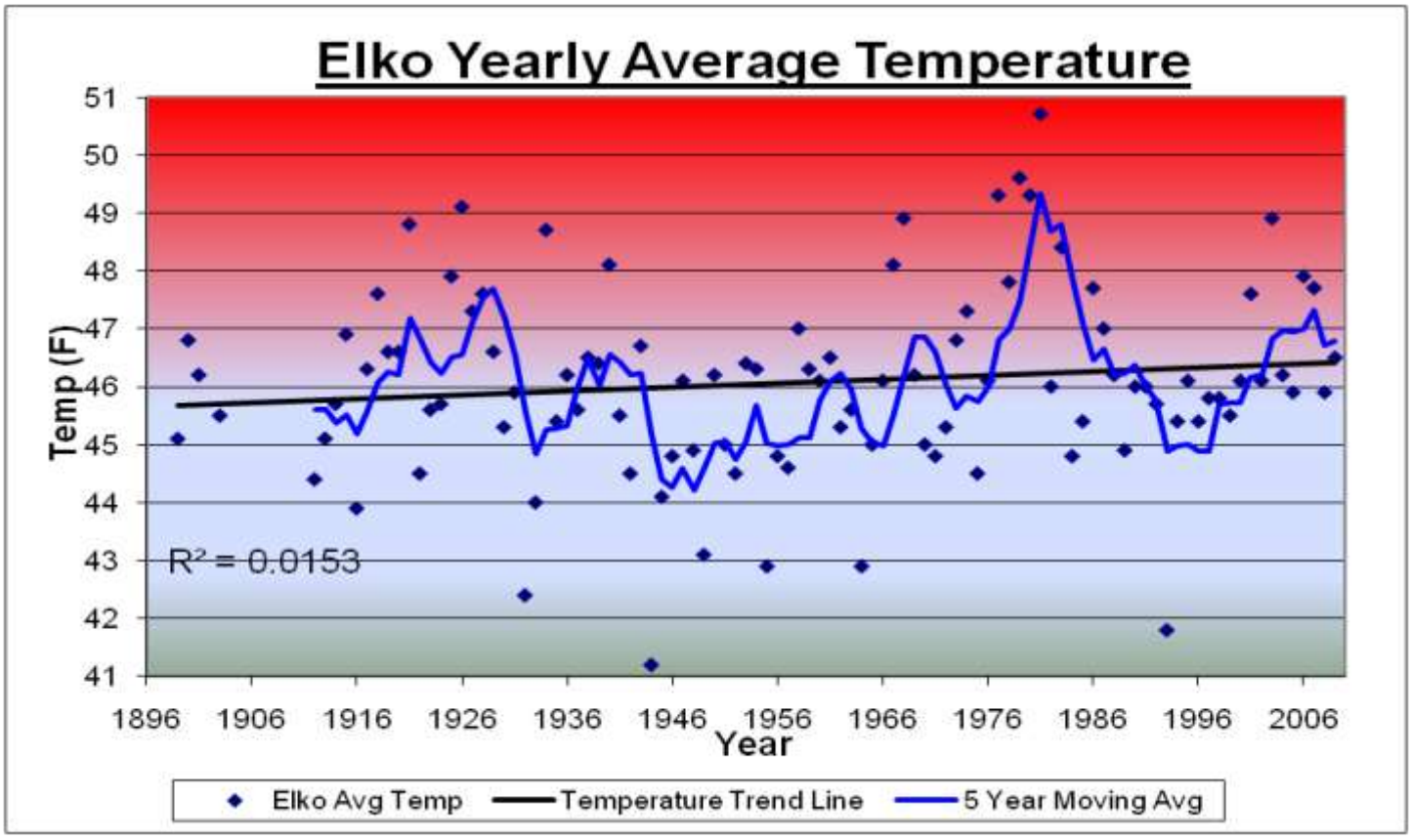


Fig 1. Average Yearly Temperature points overlaid with a 5 year moving average and trend line

Climate Variability of Central and Northern Nevada

By Donald Dumont, Meteorologist

Records for Ely exist well back into the early 20th century, but there was a large span of time from the turn of the century through the 1930s when no reliable weather observations were taken. The rest of this article will review the following graphs for average yearly temperature and precipitation trends at these three sites.
Elko temperatures over the last century have shown a modest warming trend of about 1 degree Fahrenheit with an average temperature around 46 degrees. Figure 1 shows that the hottest decades were in the 1920s and 1980s, with the coldest periods occurring in the 50s, 60s, and 90s. The extreme year on the cold side was 1944 with an average temperature of 41 and the hottest year was 1981 with an average temperature of 51.

The climate extremes indicate there is a 10 degree average yearly temperature swing possible at Elko. The climate variability compared to coastal cities that have maritime influence is doubled. Coastal sites have a 5 degree spread between the hottest and coldest years.

When it comes to historical precipitation at Elko there is virtually no long term trend over the past century, with average yearly precipitation around 9.5. Figure 2 indicates the longest period of drought occurred back in the 1920s and 30s, with another smaller drought in the late 80s into the 90s. During this past decade precipitation has been trending above average compared to the historical norm. Overall, the precipitation pattern is cyclical with alternating wet and dry decades. The climate variability is quite extreme when it comes to yearly precipitation with the lowest water year being 1919 when only 4.35" was recorded. The highest year was 1983 when 18.34" of precipitation fell, giving a spread between the highest and lowest years of 14". In percentage terms, the wettest year was 193% of normal while the driest year was 46% of normal precipitation.

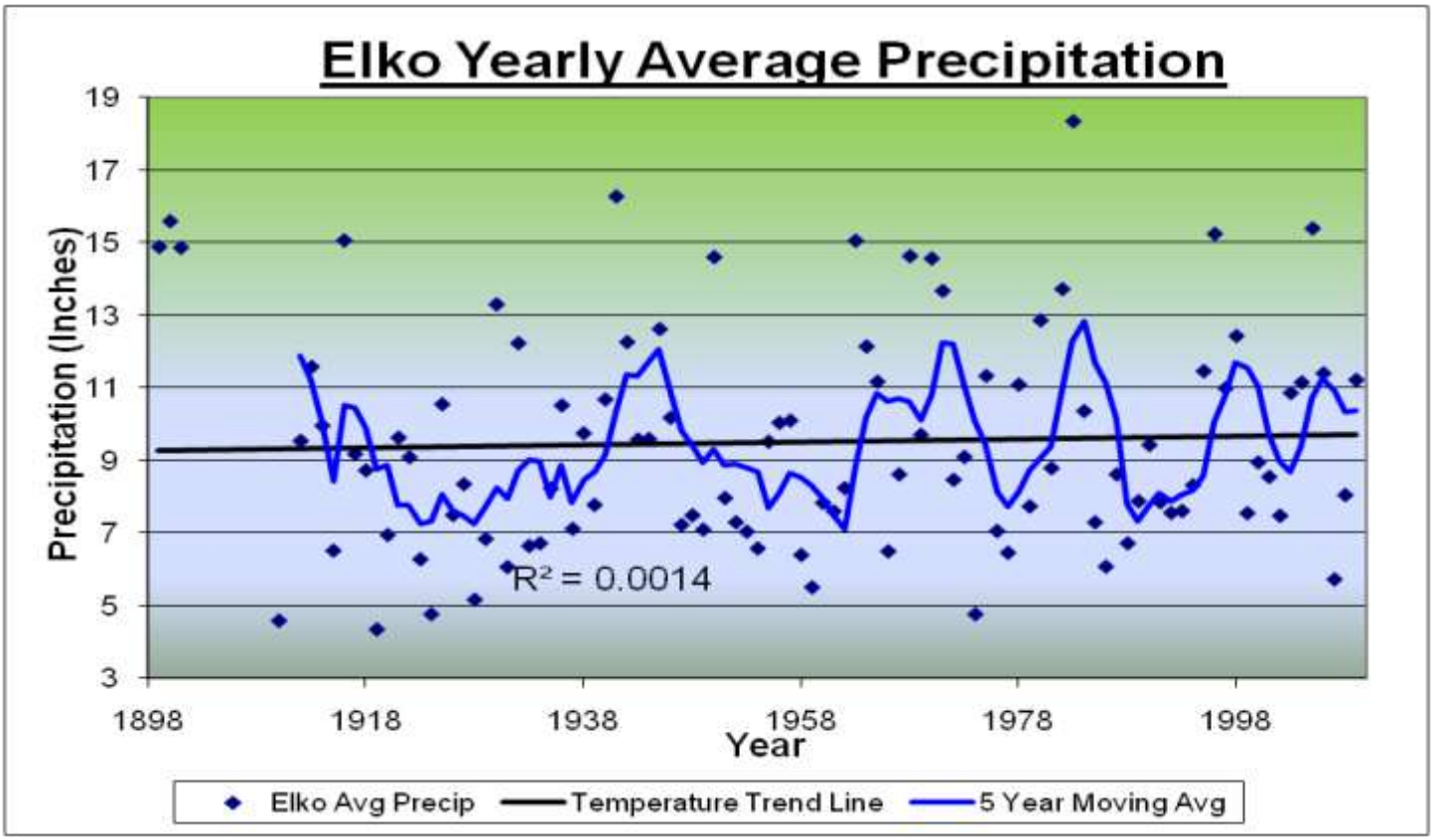


Fig 2. Average Yearly Precipitation points overlaid with a 5 year moving average and trend line.

Climate Variability

Continued

By Donald Dumont, Meteorologist

Pictures of Ely, NV area.

Ely in White Pine County shows a stronger long term warming trend then Elko when looking at Fig 3, but that comparison could be inconclusive. The reason is the observation record for Ely starts in 1938, a good 25 years later than Elko which could have an impact on the trend line. Most likely this is not the case because if the climate trends were similar at the two sites, the 1910-20s at Elko were a warm period, so it could enhance the warming trend at Ely. The data we do have shows a 1.5 degree warming trend for this site since the late 1930s, with the warmest period from the late 90s into the turn of the century. It is interesting that average temperatures have dropped the last few years, with 2009 being the coldest year since 1976. The coldest decade was in the 1940s with the coldest year occurring in 1944 with an average temperature of 41.9 degrees.

The average precipitation of Ely shown in Fig 4 indicates a modest trend upward of approximately three quarters of an inch, even though the last decade has been quite dry. Other periods of drought occurred in the 1940s into the early 50s, with the driest year on record occurring in 1974, when only 4.22" fell. The wettest decades were during the 1960s and 80s, with 1982 being the wettest year on record when 15.53" of precipitation fell. The climate variability for temperature and precipitation is not as extreme in Ely compared to Elko based on spreads but not by a significant margin.

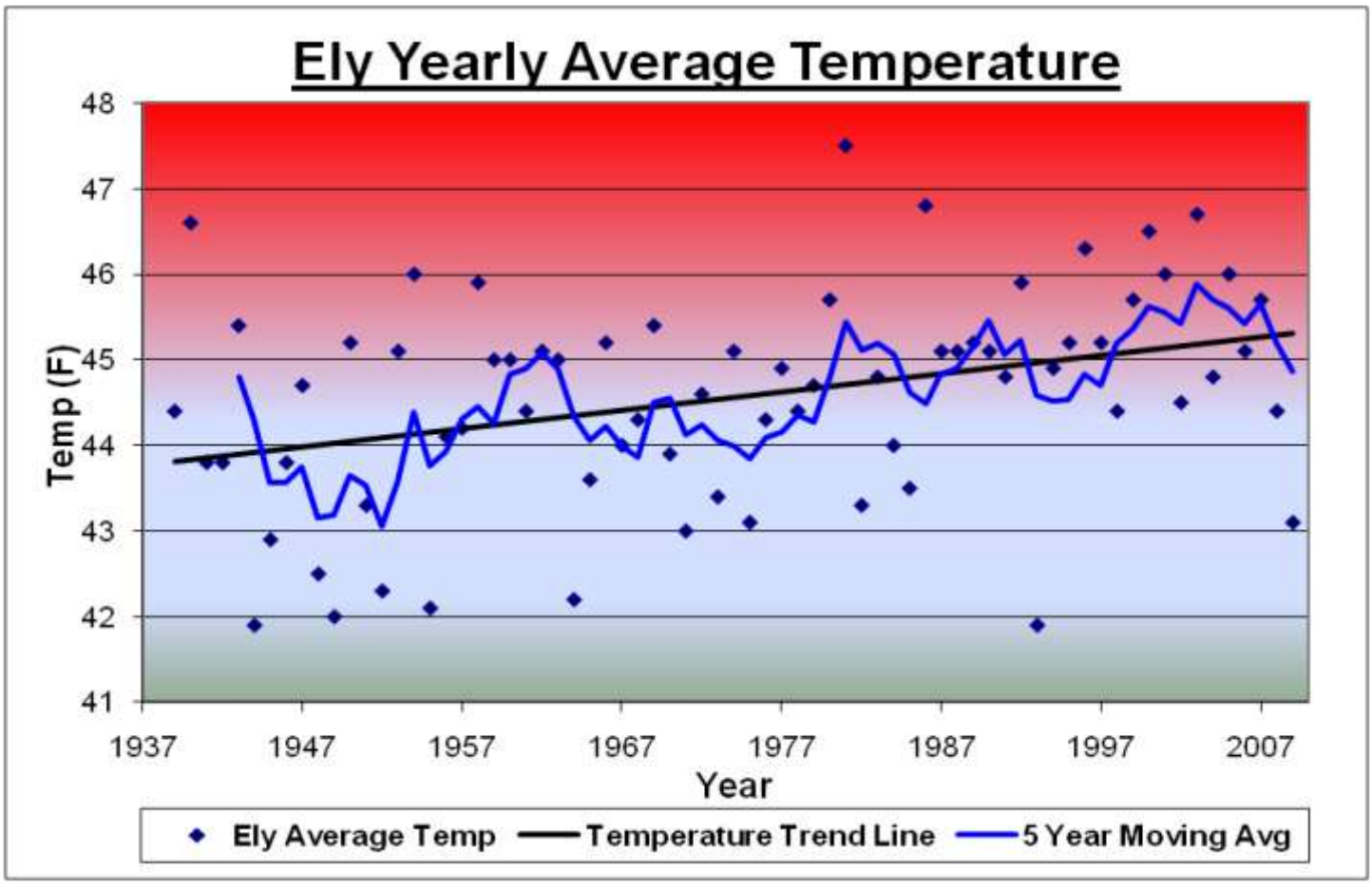


Fig 3. Average Yearly Temperature points overlaid with a 5 year moving average and trend line

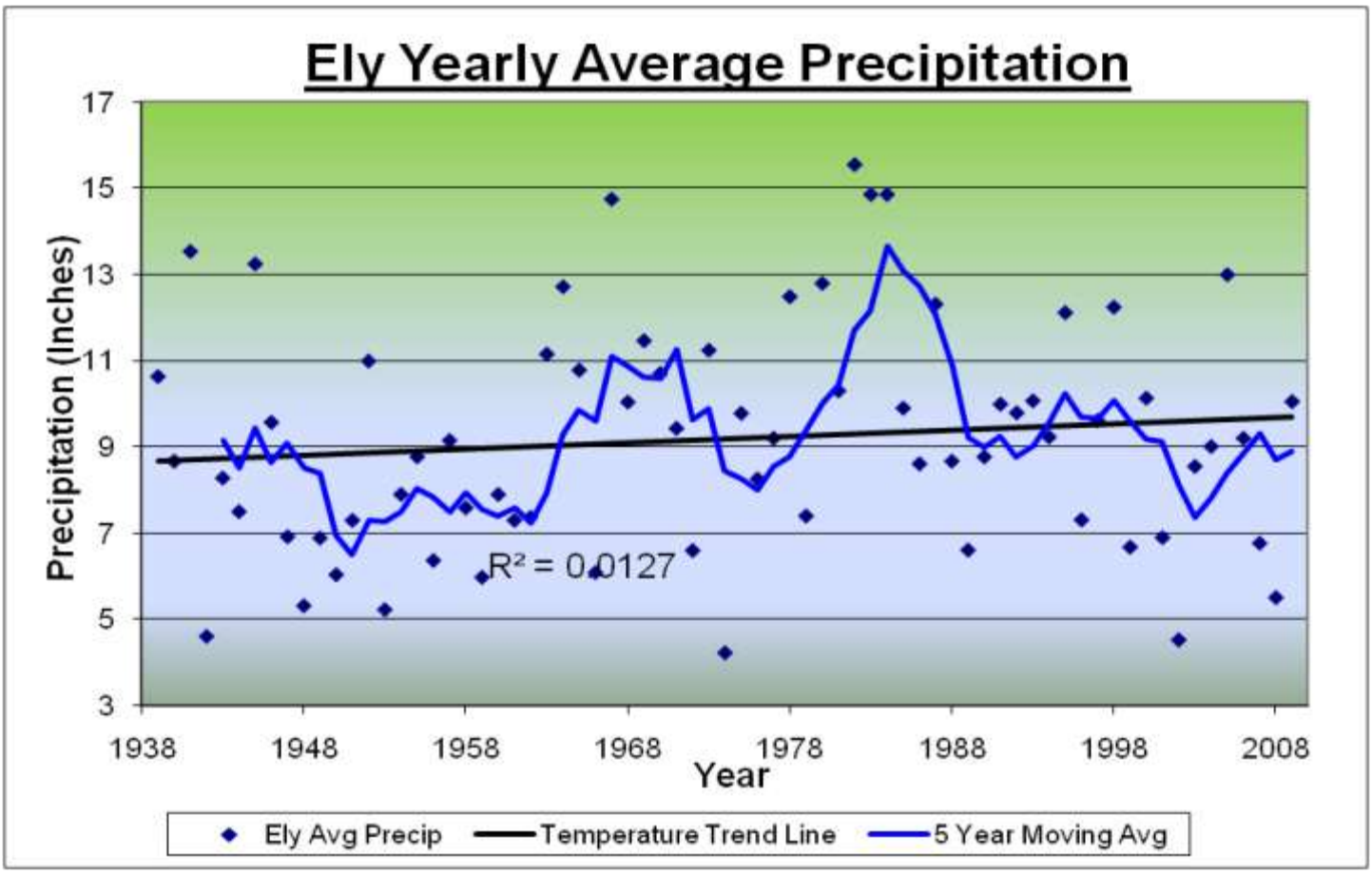


Fig 4. Average Yearly Precipitation points overlaid with a 5 year moving average and trend line

Further west in Winnemucca the climate is slightly warmer and drier than Eastern Nevada, due to a lower elevation and closer proximity to the Sierra Nevada "rain shadow" effect. Winnemucca's long term temperature trend also has a modest warming trend comparable to Elko of about 1 degree over the past 130 years (Fig 5). The graph shows that the warmest period occurred during the 1930s, with secondary warm peaks in the 1880s and 1970s. The warmest year on record occurred back in 1934 with an average temperature of 53.1 degrees, while the coldest year was 1985 with a temperature of 45.9 degrees. Temperature variability at Winnemucca is less extreme than Elko. Recent temperatures over the past 5 years have been average to slightly above average compared to historical normalcy.

The long term precipitation trend at Winnemucca is different from Elko and Ely, because there is drying trend. Albeit it is very small of about one quarter of an inch over the past 130 years. Figure 6 indicates the wettest period occurred back in the 1940s, with shorter wet periods during the 70s and late 90s. Overall the graph shows there is high variability in precipitation from year to year. The lowest water year occurred in 1954 with 3.13" being measured, compared to the super El Nino year of 1998 when 16.1" of precipitation occurred. In percentage of historical averages the driest was 41% of normal, while the wettest year was 201% of normal. This shows Winnemucca has the highest precipitation variability of the three sites. *Please see graphs on next page.*

Pictures of Winnemucca, NV area.

Climate Variability

Continued

By Donald Dumont, Meteorologist

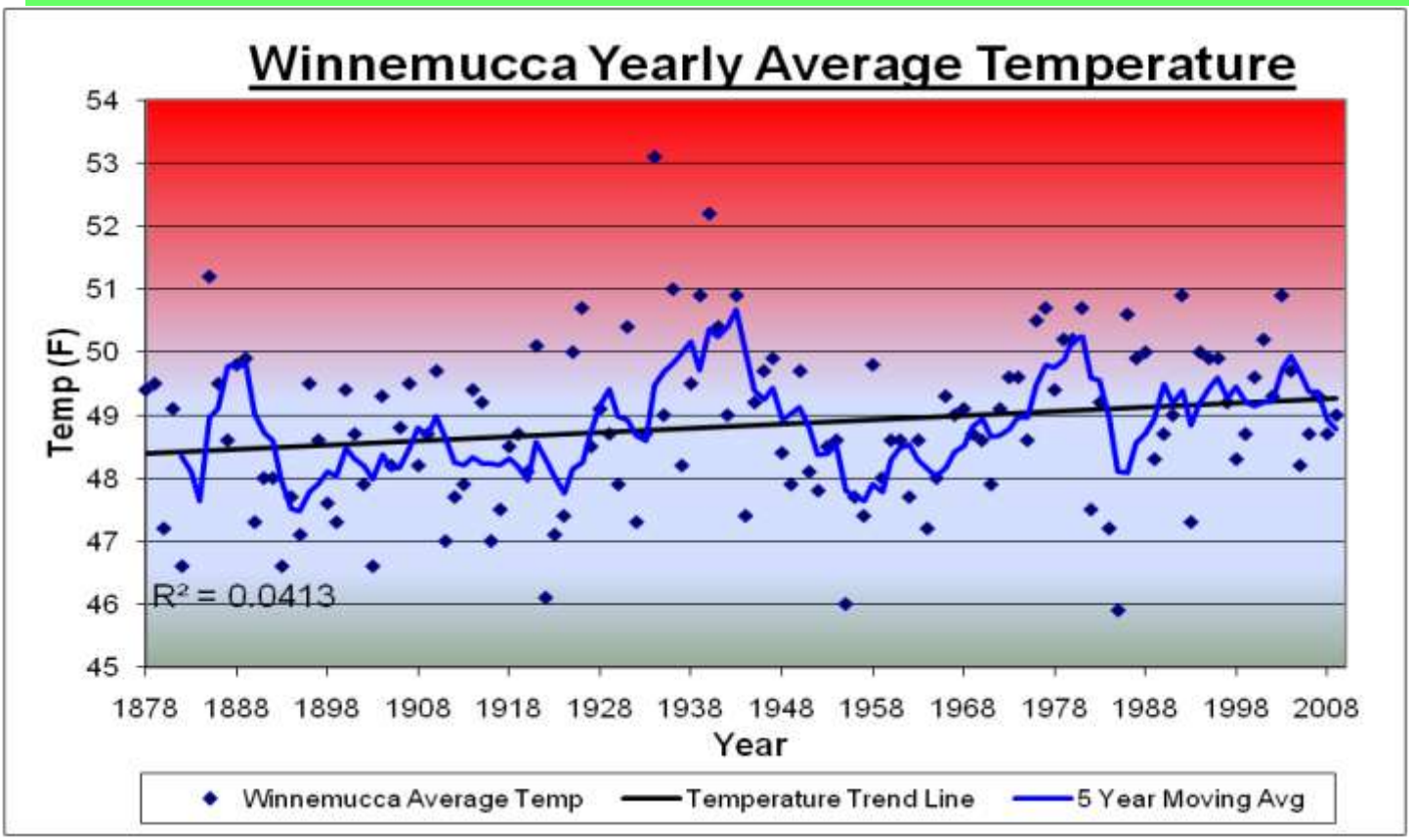


Fig 5. Average Yearly Temperature points overlaid with a 5 year moving average and trend line

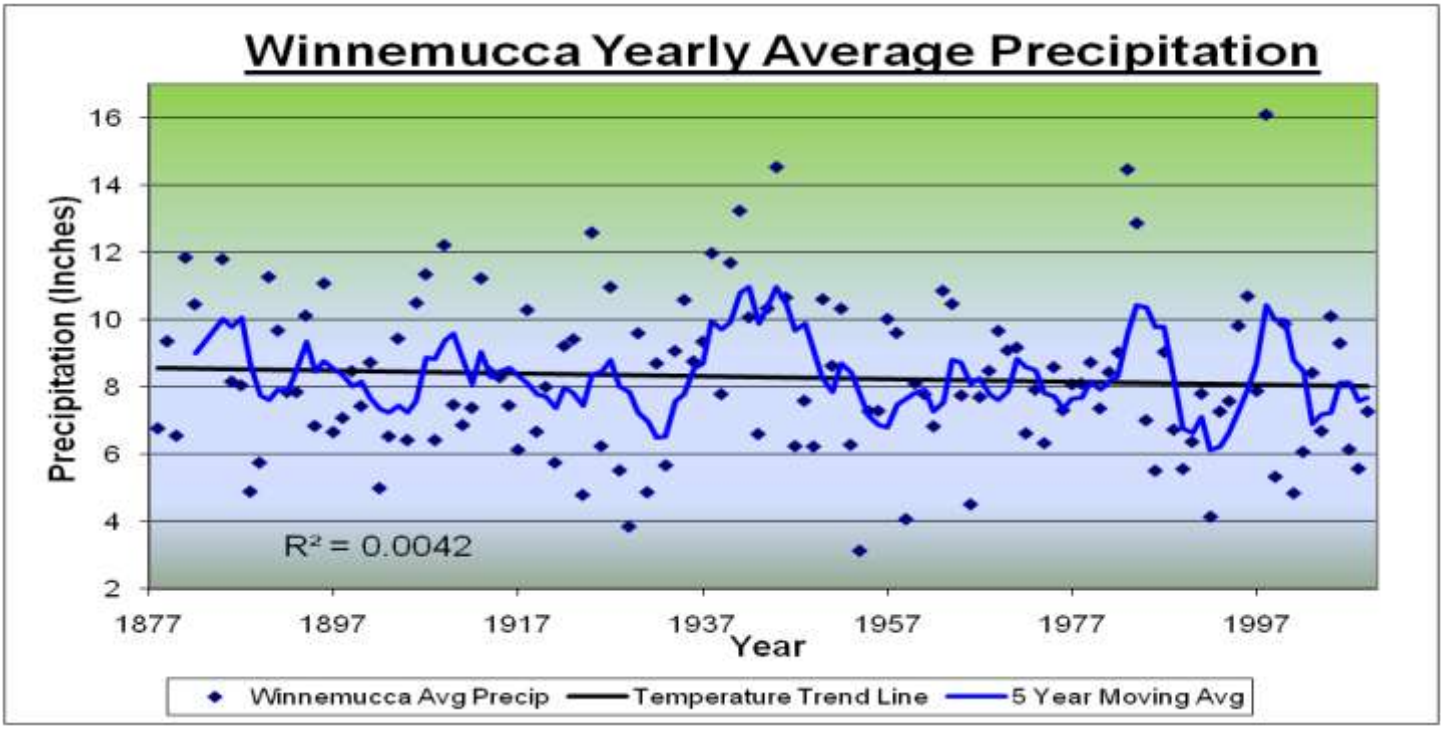


Fig 6. Average Yearly Precipitation points overlaid with a 5 year moving average and trend line

Winter Season Watches, Warnings and Advisories

By Delyne Kirkham, Hydro-Meteorological Technician

Winter Storm Watch

Issued when weather conditions are favorable for a winter storm event (heavy sleet, heavy snow, heavy ice accumulation, blowing snow, or a combination of events.) *A Winter Storm Watch is issued when these conditions may be met 12 to 48 hours in the future.*

Winter Storm Warning

Issued for a winter weather event in which there is heavy snow, blowing or drifting snow, sleet or multiple precipitation types and wind below blizzard criteria is expected or occurring. For heavy snow the following criteria should be met: Valleys: more than 6 inches in 12 hours, more than 8 inches in 24 hours. Mountains: more than 8 inches in 12 hours or more than 12 inches in 24 hours.

Winter Weather Advisory

Issued for a winter weather event in which significant snow, sleet, or multiple precipitation types is expected or occurring. Also issued for a combination of precipitation types and wind. For snow, the following criteria shall be met: Valleys: more than 3 inches in 12 hours or more than 4 inches in 24 hours. Mountains: more than 5 inches in 12 hours or more than 7 inches in 24 hours.

Ice Storm Warning

Issued when a period of freezing rain is expected to produce ice accumulations of 1/4" or greater, or cause significant disruptions to travel or utilities.

Freezing Rain Advisory

Issued for freezing rain when ice accumulations are expected to cause travel problems, but not exceed 1/4".

Wind Chill Warning

Issued when wind chill values will reach –35°F or colder, with wind speeds of 10 mph or greater lasting at least one hour. *A Wind Chill Watch is issued when these conditions may be met 12 to 48 hours in the future.*

Wind Chill Advisory

Issued when wind chill values will reach –20°F to –34°F, with wind speeds of 10 mph or greater lasting at least one hour.

Blizzard Watch

A Blizzard Watch is issued when blizzard conditions may be met 12 to 48 hours in the future.

Blizzard Warning

Issued for sustained wind or frequent gusts greater than or equal to 35 mph accompanied by falling and/or blowing snow, frequently reducing visibility to less than 1/4 mile for three hours or more.

Freezing Fog Advisory

Issued when light ice accumulations are expected from freezing fog.

High Wind Watch

Issued when conditions are favorable to meet/exceed high wind warning criteria in the next 12 to 48 hours. Sustained wind of more than 40 mph for 1 hour or gusts more than 58 mph.

High Wind Warning

Issued when observed or imminent sustained winds of more than 40 mph for 1 hour or longer, or gusts more than 58 mph.

Wind Advisory

Issued when sustained winds of 30-39 mph for 1 hour or longer, or gusts 45-57 mph are expected.

Flood Watch/Flash Flood Watch

Issued when there is possible flooding/flash flooding within 36 hours.

Flood Warning/Flash Flood Warning

Issued when there is imminent or occurring flooding or flash flooding.

Flood Advisory

Issued when there is minor, not life threatening, flooding expected to cause little or no damage.

Winter Storms

Did you know…
During a **blizzard**, winds over 35 mph cause blowing snow and dangerously low visibility below ¼ mile.

Heavy Snow and Blizzards

Heavy snow can immobilize a region and paralyze a city, stranding commuters, closing airports, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Homes and farms may be isolated for days and unprotected livestock may be lost. The cost of snow removal, repairing damage, and the loss of business can have severe economic impacts on a community.

Ice Storms

Significant ice accumulation can topple trees, utility poles, and communication towers. Communication and power disruptions may last for days while extensive damage is repaired. Even a light coating of ice can pose extreme danger to both motorists and pedestrians. Bridges are particularly hazardous because they freeze before other surfaces.

Extreme Cold

Extreme cold varies in different parts of the country. In the southern U.S., near freezing temperatures are considered extreme cold, while in the northern states it means temperatures or wind chills are well below zero. Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat. Exposure to cold can cause frostbite or hypothermia and become life-threatening, especially for infants and the elderly.

Frostbite is damage to body tissue caused by that tissue being frozen.

Warning signs: Loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes, or the tip of the nose

Take action! Get immediate medical help! If you must wait for help, slowly re-warm affected areas. However, if the person is also showing signs of hypothermia, warm the body core before the extremities.

Hypothermia occurs when the body temperature drops below 95°F.

Warning signs: Uncontrollable shivering, disorientation, incoherence, slurred speech, drowsiness, and/or apparent exhaustion.

Take Action! Immediately seek medical care! Slowly begin warming the person, *warming the body core first.* (Warming the arms and legs drives cold blood toward the heart and can lead to heart failure.) Get the person into dry clothing and wrap in a warm blanket, covering the head and neck. Do not give the person alcohol, drugs, or any hot beverage or food.

Winter Storms

Before the storm strikes…

At home and work, the primary concerns are loss of heat, power, and communications and a shortage of supplies if storm conditions continue for more than a day. Have available:

Flashlight and extra batteries
Battery-powered NOAA Weather Radio All-Hazards
Extra food and water, medicine, and baby items for at least 3 days
First-aid supplies
Emergency heat source and heating fuel
Fire extinguisher, smoke detector

In vehicles, it is critical to be prepared should you become stranded.
Fully check and winterize your vehicle before the winter season begins.
Check weather forecasts frequently and plan your travel to avoid the storm.
Carry a winter storm survival kit.
Keep your gas tank near full.
Avoid traveling alone.
Let someone know your timetable.
Carry a cell phone and make sure it is charged.

Animals suffer, too!
Make sure pets and livestock have plenty of food, water, and shelter.

If you're caught by a winter storm…

In a Vehicle…
Stay in the vehicle: People become quickly disoriented in wind-driven snow and cold.
Make sure the exhaust pipe is not blocked. Run the motor about 10 minutes each hour for heat. Open the window slightly for fresh air and to avoid carbon monoxide poisoning.
Be visible to rescuers. Turn on the dome light at night when running the engine.
After snow stops falling, raise the hood to indicate you need help.
Occasionally move your arms, legs, fingers, and toes vigorously to keep blood circulating and to keep warm.

Outside…
Find shelter!
Try to stay dry.
Cover all exposed body parts.
If shelter is not available, build a lean-to, windbreak, or snow cave for protection from the wind. Build a fire for heat and to attract attention, placing rocks around it to absorb and reflect heat.
Melt snow for drinking water. (Eating snow without melting will lower your body temperature.)

On the web:

National Weather Service……..www.weather.gov.safety.php
Red Cross Preparedness ..... www.redcross.org

Wind Chill Temperature Index

For more Information on cold-related health problems and outdoor safety visit the web site from the Centers for Disease Control and Prevention (CDC) at: http://www.cdc.gov/nceh/hsb/extremecold

Visit the National Weather Service Wind Chill web page at: http://www.nws.noaa.gov/om/windchill/

Visit Environment Canada's Wind Chill web page at: http://www.msc.ec.gc.ca/windchill/index_e.cfm

What is Wind Chill Temperature?

It is the temperature it "feels like" outside and is based on the rate of heat loss from exposed skin caused by the effects of wind and cold. As the wind increases, the body is cooled at a faster rate causing the skin temperature to drop. Wind Chill does not impact inanimate objects like car radiators and exposed water pipes, because these objects cannot cool below the actual air temperature.

What does this mean to me?

The NWS will inform you when Wind Chill conditions reach critical thresholds. A **Wind Chill Warning** is issued when wind chill temperatures are life threatening. A **Wind Chill Advisory** is issued when wind chill temperatures are potentially hazardous.

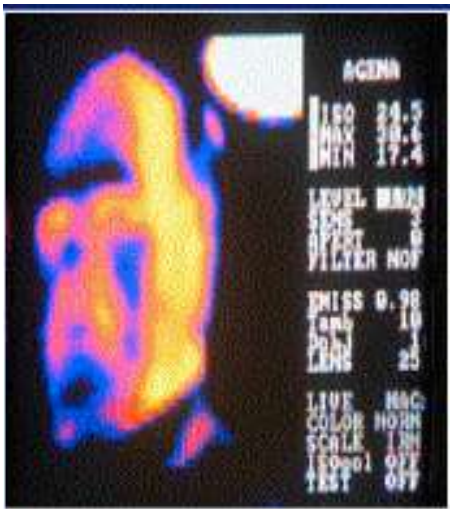
Wind chill test subjects walking on a treadmill in a chilled wind tunnel. Facial temperature readings were taken to help refine the new wind chill index.

What is Frostbite?

Frostbite is an injury to the body caused by freezing body tissue. The most susceptible parts of the body are the extremities such as fingers, toes, ear lobes, or the tip of the nose Symptoms include a loss of feeling in the extremity and a white or pale appearance. Medical attention is needed immediately for frostbite. The area should be SLOWLY re-warmed.

What is Hypothermia?

Hypothermia is abnormally low body temperature (below 95 degrees Fahrenheit). Warning signs include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness, and apparent exhaustion. Medical attention is needed immediately. If it is not available, begin warming the body SLOWLY.

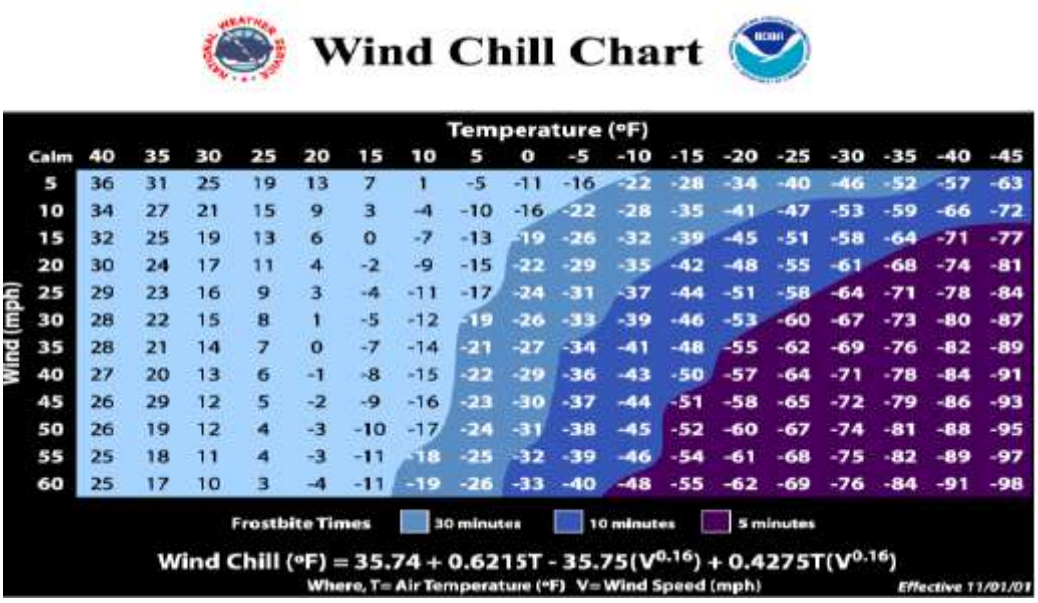


Tips on how to dress during cold weather.

- Wear layers of loose-fitting, lightweight, warm clothing. Trapped air between the layers will insulate you. Outer garments should be tightly woven, water repellent, and hooded.
- Wear a hat, because 40% of your body heat can be lost from your head.
- Cover your mouth to protect your lungs from extreme cold.
- Mittens, snug at the wrist, are better than gloves.
- Try to stay dry and out of the wind.

Wind Chill Temperature Index for Winter 2001-2002

On November 1, 2001, the National Weather Service implemented a new Wind Chill Temperature (WCT) index for the 2001/2002 winter season, designed to more accurately calculate how cold air feels on human skin. The former index used by the United States and Canada was based on 1945 research of Antarctic explorers Siple and Passel. They measured the cooling rate of water in a container hanging from a tall pole outside. A container of water will freeze faster than flesh. As a result, the previous wind chill index underestimated the time to freezing and overestimated the chilling effect of the wind. The new index is based on heat loss from exposed skin and was tested on human subjects. .For the first time, the new Wind Chill Chart includes a frostbite indicator, showing the points where temperature, wind speed and exposure time will produce frostbite on humans. The chart above includes three shaded areas of frostbite danger. Each shaded area shows how long (30,10 and 5 minutes) a person can be exposed before frostbite develops. For example, a temperature of 0°F and a wind speed of 15 mph will produce a wind chill temperature of -19°F. Under these conditions, exposed skin can freeze in 30 minutes.



Wind Chill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Development of the new Wind Chill Temperature Index

During the fall of 2000, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) organized a joint U.S.–Canadian government-sponsored action group to develop, test and implement a new WCT Index. The group is called the Joint Action Group for Temperature Indices (JAG/TI). The goal of JAG/TI is to internationally upgrade and standardize the Wind Chill Index. Early summer of 2001, Human trials were conducted at the Defence and Civil Institute of Environmental Medicine in Toronto, Canada. The trial results were used to improve the accuracy of the new formula and determine frostbite threshold values. During the human trials, twelve volunteers (six men and six women) were placed in a chilled wind tunnel and thermal transducers were stuck to their faces to measure heat flow from the cheeks, forehead, nose and chin while walking 3 mph on a treadmill. Each volunteer participated in four trials of 90 minutes each and was exposed to varying wind speeds and temperatures. The new wind chill index is now being used in Canada and the United States. Specifically, the new WCT index:

- calculates wind speed at an average height of five feet (typical height of an adult human face) based on readings from the national standard height of 33 feet (height of an anemometer).
- is based on a human face model
- incorporates modern heat transfer theory
- lowers the calm wind threshold from 4 mph to 3 mph
- uses a consistent standard for skin tissue resistance
- assumes no impact from the sun (i.e. clear night sky).

National Weather Service
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Since 1870

Heavy October Rainfall Causes Rivers to Rise

By Lawrence Whitworth, Hydrology Focal Point

In October of 2010, a heavy rainfall event caused some rivers across northern Nevada to rise substantially due to significant surface water runoff. Normally a sparse period for water, a rare rainfall event on October 24th ensured the month would become one of the wettest at Winnemucca and Elko, representative of the wide-spread coverage across northern Nevada.

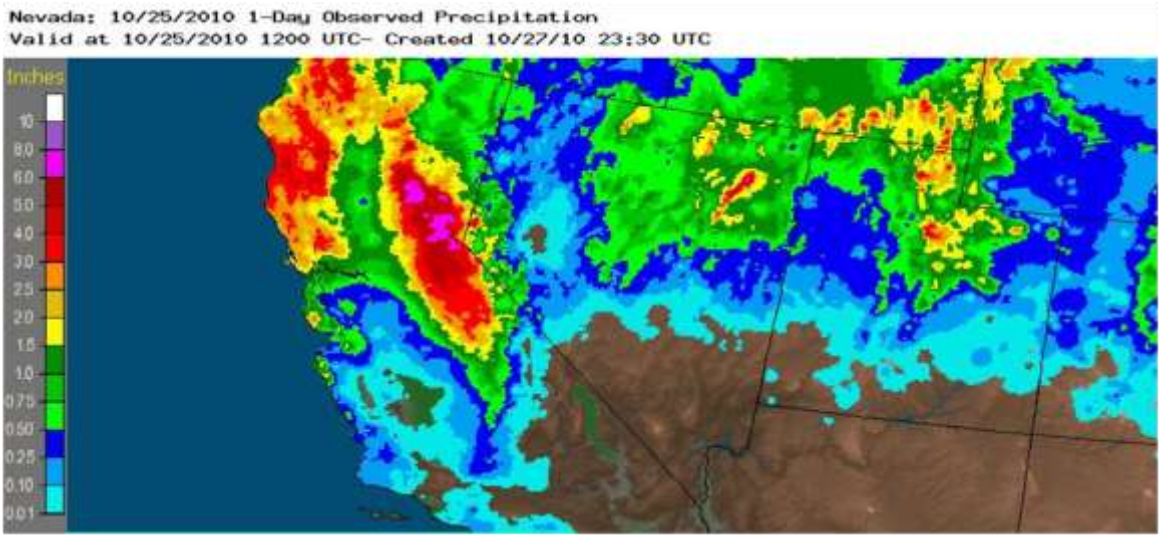
In general, surface runoff occurs when the rate of rainfall on a surface exceeds the rate at which water can infiltrate the ground. Surface runoff into rivers typically includes all the water coming in directly to the hydrological network during rainfall or snowmelt, plus groundwater from the upper aquifers feeding rivers more or less evenly throughout the year. In arid or semi-arid climates, the ground can become so dry that surface sealing occurs. This can lead to a situation where runoff is increased along with the potential for flash-flooding after substantial rainfall.

On October 24th, a wet storm system moved through the state depositing substantial precipitation amounts across northern Nevada causing rapid runoff into rivers and streams. The following statistics provide a snapshot of how rare the event was. At Elko, the 1.63 inches of precipitation that fell on October 24th was the 10th wettest day ever recorded and boosted monthly totals to 263% of normal, making it the 11th wettest October on record. At Winnemucca, nearly one-half inch of precipitation fell on the 24th, helping to boost monthly totals to 412% of normal, the 2nd wettest October on record (see table below).

----OCTOBER 2010 PRECIPITATION----

Station	Precip. (in.)*	Normal (in.)*	Departure (in.)*	% Normal
Winnemucca	**2.72**	**0.66**	**2.06**	**412%**
Elko	**1.87**	**0.71**	**1.16**	**263%**

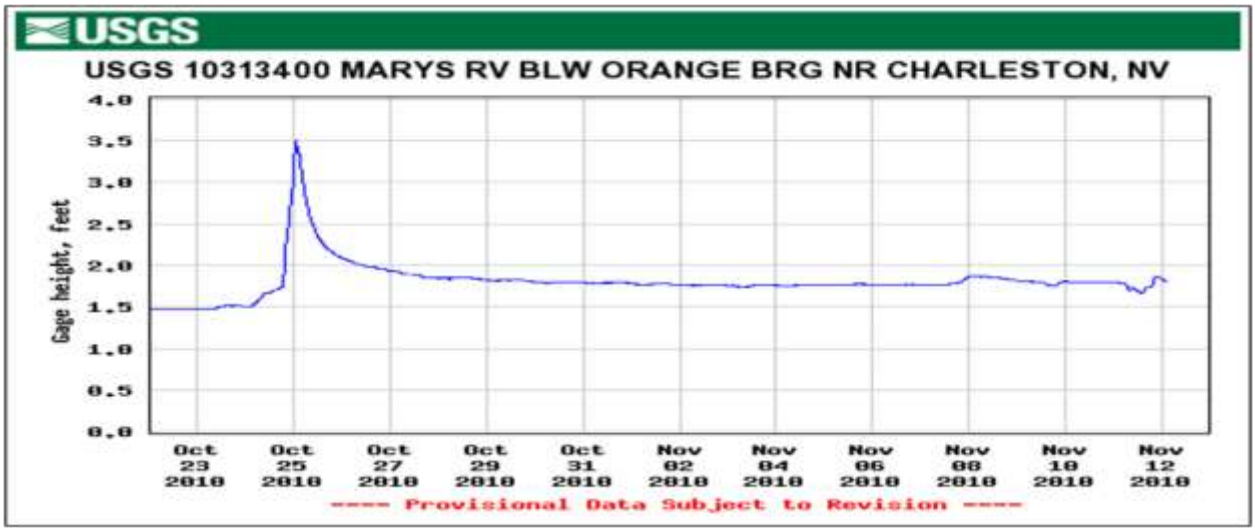
Several river basins across northern Nevada have steep slopes that allow for water to quickly enter the river. One such river, the Mary's River near Charleston, NV, responded dramatically to the rainfall episode that occurred on October 24th. The map below shows the precipitation pattern for the 24 hour period ending at 5 am Pacific Time on the 25th.



Precipitation pattern for the 24 hour period ending at 5 am Pacific Time on October 25th, 2010.

The Mary's River near Charleston, NV, rose sharply in response to rainfall entering the steep-sloped basin. The USGS-operated gage (United States Geological Survey) recorded a rise of nearly two feet in a six-hour period, peaking at 3.5 feet around midnight on the 25th following the day of heavy rainfall and rapid runoff into the headwaters of the Mary's River. The photograph below shows one perspective of the steep slope that is typical along the reach of the Mary's River. The following graph depicts the rise in river level due to the large amount of rainfall runoff.

The Mary's River basin has steep slopes along the river reach that can lead to rapid runoff.



The Mary's River near Charleston, NV, rose nearly two feet in 6 hours on October 24th, 2010.

Rapid surface runoff from a precipitation event can be dramatic in arid or semi-arid regions or when rainfall is intermittent to the extent that surface sealing occurs. Although no flooding occurred during October, 2010, the Mary's River in northern Nevada rose two feet in a short period of time. If rivers are already running high, flash-flood potential can be increased.

National Weather Service in Elko Hosts Second Annual Open House October 9th

By Michael Fitzsimmons, Warning Coordination Meteorologist

Thanks to the American Red Cross, Bureau of Land Management (BLM), Community Emergency Response Team (CERT), Elko Fire Department, Elko Police Department, Elko Public Works, Partners Allied for Community Excellence (P.A.C.E.), Temoke Tribe, all local media, the National Weather Service staff, and everyone who attended, for making this a successful event!

The National Weather Service in Elko was host to the second annual Open House on Saturday, October 9th. This event featured the general public receiving a guided tour of the National Weather Service facility led by several forecasters and management staff.

The tour included demonstrations of the Radar computer system, NOAA Weather Radio Console Replacement System (CRS), MSCF WSR-88D, AWIPS forecasting computer system, and the Kenwood TS-2000 HF/VHF/ UHF all mode multi bander amateur radio equipment.

Several local customers and partners participated in this year's event with outside booths including the Elko Police and Fire Departments demonstrating Bomb Squad robots, Community Emergency Response Team (CERT) providing information on Emergency Preparedness and Training, Te-Moak Tribe of Western Shoshone Housing Authority on Drug Prevention, American Red Cross on Preparing Communities for Emergencies and P.A.C.E. Coalition on Children's Safety Seat use. Several Boy Scouts from Pack 850 in Spring Creek had the opportunity to shake hands and even talk to the robots when the Elko Police Department's Bomb Squad went through their demonstration.

A CoCoRaHs water balloon contest was also available and a highlight of the outdoor activities for everyone to participate in. Each guided tour concluded with the observing of an upper air weather balloon launch performed every thirty minutes. Many people attending the Open House expressed their appreciation to the office staff and also mentioned how informative all the presentations were.

2010 SKYWARN

Recognition Day Event

By Michael Fitzsimmons, Warning Coordination Meteorologist

From left to right: Left forefront Peter Johnson,W7TKO, Justin Gleeson KF7DLW, Mike Zwier KC8WSB.

From left to right: Gene D Asto WA7BWF, Don Carlson KQ6FM, Jack Larason KE7HTY, Peter Johnson W7TKO

Each year, the first Saturday in December is set aside by the National Weather Service (NWS) and the American Radio Relay League (ARRL) to celebrate the many contributions the amateur radio SKYWARN volunteers make to the NWS. Amateur radio operators from the local area visit their NWS office and set up antennas and radio equipment to make contact with the nearly 100 other registered NWS offices as well as other radio operators from around the world.

This year, the 12th annual SKYWARN Recognition Day (SRD) Event was held at the National Weather Service Office in Elko from 00 GMT December 4th to 00 GMT December 5th.

Several members from the Elko Amateur Radio Club (EARC), the Winnemucca Amateur Radio Emergency Service (ARES) and the Nevada State Emergency Coordinator from Reno participated in the event. In spite of the less than optimal band conditions, nearly 350 contacts were made by the amateur radio operators using a beam and inverted-V antennas during the twenty-four hour event. In addition to the radio operation, the fellowship and camaraderie between the amateurs and the NWS office staff made for a great event.

For other NWS office contact information and event photos, please check out the SRD clearing house web site: http://www.wrh.noaa.gov/mtr/hamradio/ .

From left to right: Gene D Asto WA7BWF, Don Carlson KQ6FM, Jack Larason KE7HTY, Peter Johnson W7TKO

From left to right: Dave Potter KE7GIU, Dave Hough W7GK, Gene D Asto WA7BWF, Jack Larason KE7HTY

2010 SKYWARN

Recognition Day Event

By Michael Fitzsimmons, Warning Coordination Meteorologist

Standing in back from left to right: Shane Wiggins NV7SU, Dan Schooley KB7SJZ, Michael Fitzsimmons KB1ELT, Gene D Asto WA7BWF, Joe Giraudo N7JEH, Don Carlson KQ6FM, Jack Larason KE7HTY,
Sitting at table from left to right: Peter Johnson W7TK, Carolyn Tanner KF7HTI, Justin Gleeson KF7DLW

Left to right: Don Tanner KF7GGR, Dave Hough W7GK, Dan Schooley KB7SJZ

From left to right: Dave Hough W7GK, Jack Larason KE7HTY, Don Carlson KQ6FM

2010 SKYWARN

Recognition Day Event

By Michael Fitzsimmons, Warning Coordination Meteorologist

From Left to right Jack Larason KE7HTY, Dave Hough W7GK, Justin Gleeson KF7DLW, Don Tanner KF7GGR, Carolyn Tanner KF7HTI

Jack Larason KE7HTY

Picture courtesy of SKYWARN Home page
http://www.skywarn.org/

Picture courtesy of SKYWARN Home page
http://www.skywarn.org/

Michael Fitzsimmons KB1ELT, Joe Giraudo N7JEH, Dave Hough W7GK, Jack Larason KE7HTY, Don Carlson KQ6FM

Michael Fitzsimmons KB1ELT, Joe Giraudo N7JEH, Dave Hough W7GK, Jack Larason KE7HTY, Don Carlson KQ6FM

Meteorologist Richard Arkell Retiring

By Richard Arkell, Lead Meteorologist

Rick Arkell, a lead forecaster at the Elko forecast office, will be retiring on January 1st. Rick grew up in New York City and received his B.S. in Meteorology from the City College of New York in February, 1975. He began his career at National Weather Service Headquarters in Washington in September, 1975, working on the GARP Atlantic Tropical Experiment. Since then, he has been in several forecast offices, including Louisville, KY, Nashville, TN, Amarillo, TX, Phoenix, AZ, Charleston, WV, Raleigh, NC and Davenport, IA. He has been at the Elko forecast office for the past 6 years.

Rick will be retiring with his wife, Lisa, to Columbia, SC. Lisa plans to continue working for a few years. She has obtained a full-time position as librarian at the University of South Carolina Business School Library. Their children, Matt and Valerie, live in New York City, and Lawrence, Kansas, respectively. Rick plans on remaining active in the United States Coast Guard Auxiliary, and will pursue his hobbies of participating in independent film festivals, collecting nautical memorabilia, and hiking. Because of his love of animals, he may work part-time at the Riverbanks Zoo. He also plans on remaining active in politics.

Matt and Valerie Arkell

Young Rick at top, Rick and Lisa Arkell above.

Rick Arkell is the second from left in the black and white group pictures;

above taken in 1984, on the right in 1990.

Lisa Arkell and Ellen Fitzsimmons

Rick Arkell at various Outreach events in Elko; Second from right in group photo.

New Faces

At The

National Weather Service

Erik Youngquist
Information Technology Officer (ITO)

My name is Erik Youngquist. I have a beautiful wife named Stephanie. We have been married for 15 years. I have two wonderful sons. Talon (13) and Cade (9). We lived and worked in the Sacramento, CA area for a number of years. I was recruited out of Sacramento to head-up the I.T. team at a community bank in Elko, NV. We moved to Elko, NV from Roseville, CA approximately 6 years ago.

I have worked in information technology for many years. Until six months ago, all of my information technology work had been in the private sector. Prior to coming to work for the National Weather Service in Elko I held the "Chief Information Officer / Security Officer" position at a community bank that spanned across Northern Nevada. I have worked in banking and credit unions for approximately 11 years. I have degrees in "Digital Information Technology / Computer Science"; I hold certifications from Microsoft and SANS; and have been trained in Cisco, Citrix, management and numerous other areas.

My family is my life. However, when I have time, I like the following activities:

- ***Playing and learning with my kids (they teach me just as much as I teach them)***
- ***Spending time with my wife (whatever we do is fun)***
- ***Weight lifting***
- ***Electronics, programming and science***
- ***Dirt bike riding (we all have our motorcycles so we can go as a family)***
- ***Building things (from home improvements to cub scout racers (cub-mobiles))***
- ***Video games***

There is much more that I like to do. However, this is supposed to be a short list. I consider myself to be well rounded and my interests lie in many different areas. I believe this makes me a commodity as I am a jack-of-all -trades. I am not afraid of a challenge and tend to meet them head-on with a good attitude and a fighting spirit.

Bill Ash
Observing Program Leader (OPL)

As the new Observing Program Leader (OPL), I am tasked with ensuring that the Cooperative Observing Program (COOP), the Upper Air (UA) Unit, the Public Service Unit (PSU), and the office climate services all run smoothly and that they compliment and support each other.

Although I am responsible for the overall program, I work with a dedicated and extremely qualified and proactive group of people. I feel I know a lot, but have much to learn to accomplish my goals and aspirations for this program.

I am also confident that the people with whom I work will make the transition into the job easy, and ultimately it is they who will make the Observing Program a resounding success, deserving of accolades from peers and supervisors alike.

Lynn Maple
Administrative Support Assistant

I joined the Elko WFO in September as the new Administrative Support Assistant.

Prior to working for the NWS, I spent 10 years or 15 fire seasons with the Bureau of Land Management in the Elko, Twin Falls and Battle Mountain Districts as an Engine Captain and Fuels Technician. I decided to quit commuting two hours a day and accepted a great job with the NWS. Those extra two hours each day are well spent with Cozmo, my Australian Shepherd, and I still occasionally have time for my hobbies of scrapbooking and quilting.

Though I already have two Associate degrees (General Studies and Science) I am steadily working toward my Bachelors degree in Resource Management at Great Basin College in Elko, NV.

Mike Zwier (& wife Kim)
Meteorologist Intern

Growing up in Northwest Iowa, I got to experience many types of weather from a very young age. However, my love of weather didn't really develop until I was in middle school when my grandma gave me a book about weather. Soon I was hooked and knew I wanted a career in meteorology.

I attended The Ohio State University, where I received a degree in atmospheric science and geography. After college, and before joining the National Weather Service, I worked as a broadcast meteorologist for five years in Sioux City, Iowa and Columbus, Ohio.

My wife, Kim, and I are settling into Elko along with our two horses and St. Bernard named Herbie.

Lynn Maple (second from left in front) and family

Bill Turner
General Forecaster

Bill Turner is the newest general forecaster at WFO Elko. Bill is originally from Iowa, and graduated from Creighton University in Omaha, Nebraska in 1994. Previously, Bill was a meteorologist intern at WFO Tucson, AZ.

Before joining the National Weather Service, Bill was a television meteorologist for 9 years in Amarillo and Lubbock, TX.

Bill has always been interested in the weather. There was never really a time when he decided "what he was going to be when he grew up." He was watching the clouds in kindergarten in Iowa, and was doing weather science fair projects by fourth grade. Bill even did a mock television weathercast for his fifth grade class.

Over the years, Bill has been an avid storm chaser, and has seen over 100 tornadoes. A lot of people are surprised when he tells them the most dangerous part of storm chasing is not the tornado, it is all the traffic on the roads, with lightning a close second!

The online newsletter can be found at:
http://www.wrh.noaa.gov/lkn/newsletter.php

Spotter Reporting Helpful Hints

- **WHO -** Give your name and any affiliations you may have (i.e. member of a spotter organization, amateur radio club, sheriff's department, etc).
- **WHAT** - Provide a detailed description of what happened, including any damage, measurements, injuries, or fatalities. Mention how you arrived at your values. For instance, don't just say there was "nickel size hail", say whether you measured this with a ruler or estimated.
- **WHEN** - Try to give as precise of a time as possible for the event occurrence.
- **WHERE** - Give as exact of a location as you can when reporting. Try to give a distance to the nearest tenth of a mile from the nearest town, village or city. Cross streets can be very valuable to include in your report, especially if you are in an urban area. Be aware of where you are! Also, **be sure to distinguish between where YOU are and where the EVENT is occurring.**

EXAMPLE OF A GOOD REPORT *"My name is Joe Public and I'm a trained storm spotter. I measured quarter sized hail with a ruler at 4:46PM about 1.5 miles west of Ely, NV. Also, at the same time I can see a rotating wall cloud about 2 miles to the west of my location."*

Spotter reports of severe or near severe weather are critical to our forecast and warning operations. NWS Elko office (778-6720 or 866-326-5364) appreciates the efforts of all of the Spotters who support our mission.

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