Spring/Summer 2006
Volume 1, Issue 1

NATIONAL WEATHER SERVICE BOISE, ID

SAGE WINDS

Serving Southwest Idaho and Southeast Oregon Spotters and Cooperative Observers

Please Keep Your Information Up-to-Date

Inside this issue:

Having your proper contact information is imperative to the operation of our spotter network. If you have a change in address, email address, or phone number, please let us know as soon as possible of this change.

With over 650 spotters in our southeast Oregon and southwest Idaho spotter network it can be difficult to track down spotters who have moved and/or changed phone numbers. Each time a newsletter goes out up to ten percent are returned. Quite often I have been able to call our spotters to get the new information, however about half of the numbers called are either disconnected or the person no longer lives at the number.

You as the spotter play a very important part of the warning decision and verification process and we are thankful for the reports we receive. Keep in mind that a large part of the area the Boise National Weather Service office covers has very few residents. You may be the only spotter available anywhere near the storm of interest. If the contact information we have for you is not correct, then we are not able to obtain ground truth.

If you have moved within the past year or think that your contact information may be inaccurate then please let us know by calling, mailing, or emailing us. (See our contact information, back page).

Remember that any information you give to the National Weather Service will be kept strictly confidential and will never be given to anyone outside of the Boise National Weather Service office.

Thank you for your help in this matter,

Dawn Fishler

National Weather Service Mission:

"The National Weather Service (NWS) provides weather, hydrologic and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community."

Interested in a COLOR newsletter?

I would like to be able to start doing much more email correspondence, including emailing the newsletter out to spotters. I have the email addresses of about half of our spotters, and out of these there are quite a few invalid addresses. If I had your email address then you could receive a color copy of the spotter newsletter with much better picture quality. If you do not think the NWS has your email address, or if you just are not sure, please send an email to Dawn.Fishler@noaa.gov at your earliest convenience. Include your name in the email and **"updating email address"** in the subject line. Everyone will be blind carbon copied in emails to protect your privacy. If you do not have an email address or wish to receive a paper copy I am more than happy to mail you a copy.

Thank you for your help!

Severe Thunderstorm Criteria:

- **Hail 3/4 of an inch or greater**
- **Sustained winds or gusts of 58 mph or greater**

Verification of Severe Thunderstorm Warnings

By Stephen Parker, Lead Forecaster

As you know, the top priority of the National Weather Service (NWS) is protection of life and property through the issuance of warnings, watches, and forecasts. And you can play a large role in that priority. Some of our most important warnings are those for Severe Thunderstorms. By definition, a Severe Thunderstorm is one that has hail 3/4 of an inch in diameter or larger, wind gust of 58 mph (50 knots) or greater, or one that produces wind damage consistent with wind speeds at or above 58 mph. When we issue a Severe Thunderstorm Warning, we believe that one or more of these conditions is occurring or will soon occur. At this point, spotters can play a very important role in the process by helping us gather ground truth reports and also to verify our warnings. We are tasked with the verification of our warnings to chart our accuracy and to help us improve. We want to make sure that we don't issue too many false alarms, and we also want to make sure that we don't fail to issue a warning when a storm is severe.

After a warning is issued, we need to find out what a storm is producing so we can see if it merits another warning for the next county it moves into. If 3/4 inch diameter hail occurred, or if winds were at or above 58 mph (either by estimation, measurement, or damage consistent with winds of this speed), the storm is officially "severe". If you know of any occurrence, please give us a call and let us know what you have seen or found out through a trusted friend. At times, when we see a storm come close to you, we may call you. Either way, we are liable to ask you to estimate the size of the **largest hailstone** you have seen, and to estimate the speed of the **strongest wind gust** you have experienced.

In general, we ask folks to relate the size of the hailstone to a coin. In years gone by, a report of a dime-size hail was considered to be 3/4 of an inch (0.75 inch). However, a meteorologist in NWS Headquarters in Washington, D.C. measured a dime and found out It is only 0.73 inches in diameter (just under 3/4 of an inch). Then he measured a penny. It turns out that the penny is 0.76 inches in diameter (just over 3/4 of an inch). So, now if someone call in a report of dime-sized hail, the warning is **not verified** and the storm is considered non-severe. But, if someone tells us the hail is penny-size, then it **is** a severe storm and the warning **will indeed be verified**. We know this is silly, but it's what we have to live by. All we ask is that you keep that in mind when you see hail. And by the way, using the world "marble" for hail size is a common practice. Unfortunately, marbles come in many sizes. So please, reference the hail to the size of a coin if possible, or just tell us it was smaller than a penny if that is the case. We thank you for all you do to support our mission!

Hail Size Estimators

Hail Size	Description
0.25 inch	Pea Size or Small Marble Size
0.50 inch	Smaller Than Dime Size
0.75 inch (Severe Criteria)	Penny Size
1.00 inch	Quarter Size
1.75 inch	Golf Ball Size
2.50 inch	Tennis Ball Size

Note: Hail size refers to the *diameter* of the hailstone.

1”-1 1/2” hail

2”-2 1/2” hail causing severe damage

Wind Speed Estimators

MPH	Knots	Description	Specifications
< 1	< 1	Calm	Smoke rises vertically.
1-3	1-3	Light Air	Direction of wind shown by smoke drift but not by wind vanes.
4-7	4-6	Light Breeze	Wind felt on face; Leaves rustle; Wind vanes moved by wind
8-12	7-10	Gentle Breeze	Leaves and small twigs in constant motion; Wind extends light flag.
13-18	11-16	Moderate	Raises dust, loose paper; Small branches moved.
19-24	17-21	Fresh	Small trees begin to sway
25-31	22-27	Strong	Large branches in motion; Whistling heard in telephone wires; Umbrellas used with difficulty.
32-38	28-33	Near Gale	Whole trees in motion; Inconvenience felt walking against the wind.
39-46	34-40	Gale	Twigs break off trees; Wind generally impedes progress; Mobile homes may shake.
47-54	41-47	Strong Gale (Severe Criteria)	Slight structural damage occurs; Mobile homes, sheds, roofs, lanais, and RV's suffer minor damage.
55-63	48-55	Storm	Small trees uprooted; Moderate damage occurs to mobile homes and RV's; Brick and wood frame houses receive minor structural and roof damage; damage to TV antennas; Some signs blown down.
64-73	56-63	Violent Storm	Moderate sized trees uprooted; Large branches snapped off trees; Chimneys and road signs toppled; Significant mobile home damage; Power lines downed.
74-95	64-83	Hurricane Category 1	Mobile homes overturned; Large trees and branches downed; Moderate roof damage to wood and brick homes

Above: Pictures of the wind damage in Hagerman, Idaho the morning after the storm.

Hagerman, Idaho—April 4, 2006

By Paul Flatt, WCM

The primary cause of the damage was straightline downburst winds. However, near south 4th Avenue and Bruneau Street where a garage was destroyed, there was a pine tree that had been knocked down by a southeast wind, this is 90 degrees off all the other tree damage in the area. My guess is the fast forward motion of the gust front and tornado movement meant that winds on the left side (facing the backside of the wind) of the tornado were not strong enough to do damage. Also, there was a first hand report of a horse trailer (in the middle of Northview Drive on the southeast side of Hagerman) moving northwest, then southeast as the winds moved through.

The time of the event is slightly fuzzy. 911 Dispatch began receiving calls at 1933 MDT. The Fire Chief indicated the storm began at 1915 and lasted until 1930. Dispatch calls began to diminish around 1955. Radar images would indicate the storm hit close to 1920, possibly a bit later. My best guess is that the storm hit the southwest side of Hagerman about 1925 and winds were diminishing by 1945. The Police Chief indicated he watched the storm come over the mesa to the southwest and that may have been what the Fire Chief also saw, pinning that time at 1915 would make pretty good sense.

Most damage was due to trees uprooted or otherwise snapped and blown down. By far the vast majority of trees were uprooted. Some trees landed on houses causing substantial damage. One tree landed on a car. One garage was destroyed, one older barn was partially destroyed. A large number of houses had substantial shingles blown off. One church had substantial damage when part of their flat roof was blown off. One commercial building had their roof top air conditioner unit moved several feet and substantial damage to the roof.

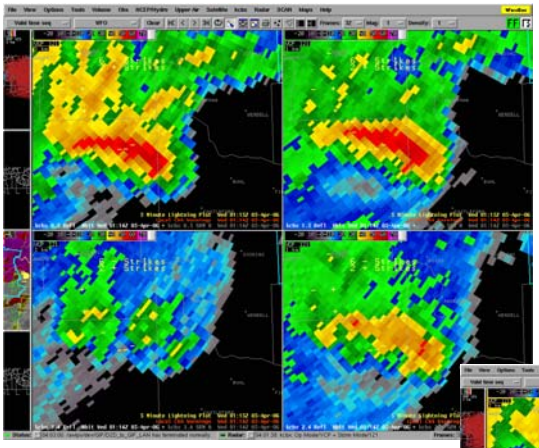
The worst damage was along Bruneau and Hagerman Avenue from State Street East. There was little or no damage to the west of highway 30 (State Street). The few houses and farms west of the highway reported no damage. The same is true when you went east of Hagerman. The cliffs leading up out of the Snake River are about 1.5 to 2 miles east of Hagerman. When the dwellings taper off east of town there are no structures or trees to damage until you get on top of the mesa heading towards Gooding. No damage was reported on top of the mesa.

A final thought (no answers, just questions) - What impact did the elevation change have in this storm's development? The storm was moving along the mesa top southwest of the Snake River and descended abruptly into the valley floor. The damage was all on the northeast side of the canyon floor as the storm was ascending up the northeast side. Strong winds were reported to the northeast of Hagerman on top of the mesa towards Gooding, but not damaging. Likewise, southwest of Hagerman there are several houses and farm fields but non received damaging winds.

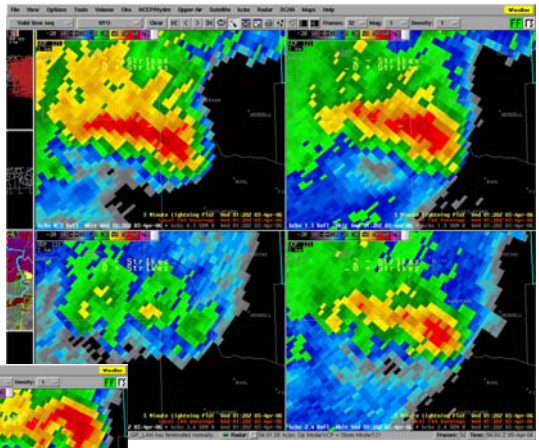
- A synopsis of the storm survey for the Hagerman, ID severe thunderstorm and F0 tornado, April 4, 2006.

Above 3 pictures: The actual storm as it passed over Hagerman.

Left: Some of the hail that fell out of the storm. Size is in comparison to a matchbook.

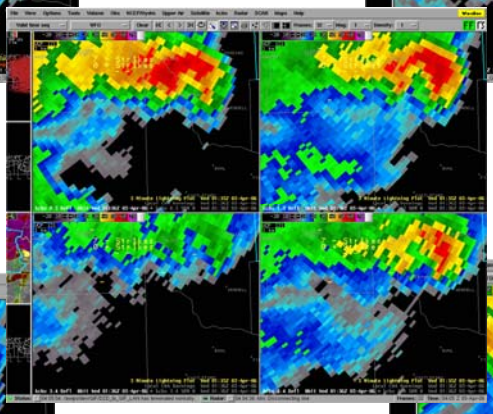


Radar Images of the storm cell as seen by the WSR-88D radar. This is one of the products we use to analyze storm severity and precipitation.



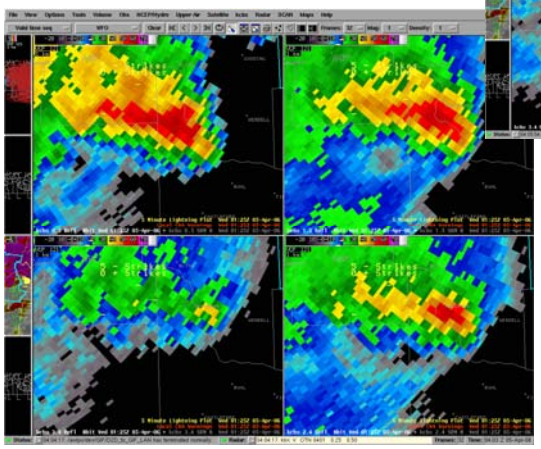
Above: 7:14 pm MDT

Above: 7:20 pm MDT

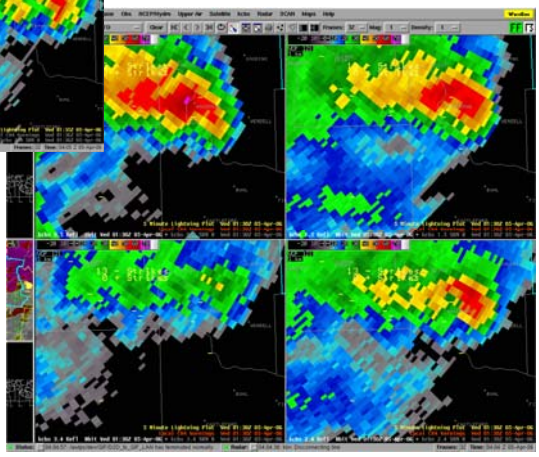


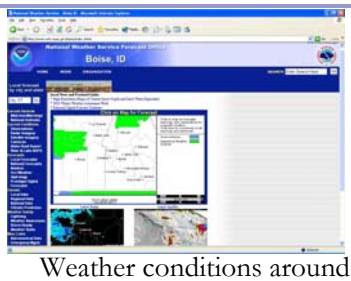
Below: 7:25 pm MDT

Below: 7:30 pm MDT



Above: 7:36 pm MDT





WEB-ED: Weather Forecasts for Your Back Yard

By: Ken Parker, Lead Forecaster

Weather conditions around our region vary greatly with yearly precipitation totals ranging from over 60 inches in northern Valley County to under eight inches around northern Owyhee County and large areas of southern Harney and Malheur Counties. Temperature extremes can vary from over 110 degrees in the summer around some of the lower southwest Idaho valleys to 30 to 40 degrees below zero in the winter around the Camas Prairie and parts of southeast Oregon. And the leading contributing factor for these wide weather ranges is our complex mountain-valley terrain. Elevations around southwest Idaho and southeast Oregon range from below 2,000 feet in Hells Canyon to well above 9,000 feet in parts of southeast Oregon and above 10,000 feet in eastern Boise County.

So, how does one find a detailed weather forecast for the back yard picnic this summer? Just stop by the "one-stop" weather page at: **http://www.wrh.noaa.gov/boi** to get that forecast.

On the home page of the Boise National Weather Service web site just select the general area you are interested in on the accompanying map. The next web page to appear will provide you with a "Forecast at a Glance" for the "weather or area zone" you selected. Southwest Idaho and southeast Oregon are divided into 12 individual "weather or area zones," each representing a different set of climate regimes. Within our smaller weather zones, such as the Treasure Valley of southwest Idaho, the "zone or area" forecast for the entire Treasure Valley would be a reasonable forecast for any particular location within the area. However, in our larger weather zones, such as the West Central Idaho Mountains or the Harney County area, due to the complex mountain-valley terrain the "zone or area" forecast is just an "average" forecast for the entire area which may not be representative of any particular location within that area.

So again, how does one get a detailed forecast for the backyard picnic, especially if you live in one of the larger weather zones. Well, this first "Forecast at a Glance" web page provides you with the text forecast of the entire "weather or area" zone you selected. However, the weather icons and spot temperatures at the top of this page come from a specific pre-selected spot designated to represent the entire zone. The location of this specific pre-selected location is denoted just above the weather icons and by a small red square on the new tan-green map to the right of the text forecast. Also note that title on the horizontal blue banner above the text forecast states "7 Day **AREA** Forecast." Frequently the spot temperatures and/or the weather icons will not match the text forecast because those spot temperatures and weather icons are for a single specific location within the entire "weather or area" zone.

To get that backyard forecast, now all you have to do is select your specific location on the accompanying tan-green map. The new "Forecast at a Glance" web page to appear will now give you a forecast for your specific point. Notice that the location of your selected point is denoted above the weather icons and by the new location of the small red square on the tan-green map. Also note that the horizontal blue banner above the text forecast has now changed to "7 Day **POINT** Forecast." Now the weather icons, spot temperatures and text forecast are for the single point you selected. Try selecting other locations on the tan/green map and note how the temperature, weather icons and forecast changes for each new location. These changes are most evident when you select a mountain-top location and a nearby valley location.

More information about the National Weather Service's "Forecast at a Glance" web page can be found at the "Total Forecast Decoding Guide" link under the "Additional Forecasts & Information" section at the bottom right side of this forecast web page.

As always, if you can not find the weather information you need, please email me and I will find the information or show you where to find it. If you have a comment on how to improve our service and products to you, please feel free to write me at:

w-boi.webmaster@noaa.gov .

Why Thunderstorms and Airplanes Don't Fly Together

By David Groenert, Forecaster

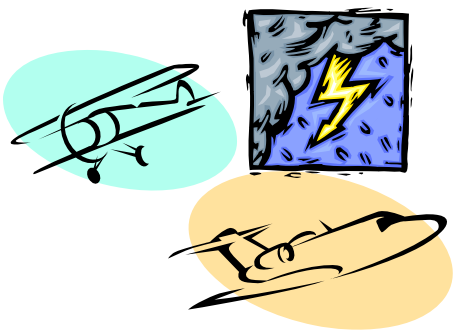
Whether you are boarding a commercial airliner for travel, or are one of the many general aviation pilots who will fill the skies of southwest Idaho and southeast Oregon this summer, there is a common summertime weather phenomena that could affect your plans. That phenomenon is the thunderstorm. While thunderstorms can develop any time of the year, they occur with a higher frequency in the spring, summer, and early fall. For those who remain on the ground, thunderstorms in southwest Idaho and southeast Oregon can bring gusty winds, hail, and flash flooding from heavy rains. When a thunderstorm passes over an airport it's these conditions along with lightning that threaten the safety of the planes and ground crews and result in the air traffic being delayed. Those who take to the air face the same threats when they encounter a thunderstorm. However, due to the vulnerabilities of airplanes and ultimately the dependency that they remain safely in the air when flying, the FAA has published guidelines recommending aircraft avoid thunderstorms at all levels.

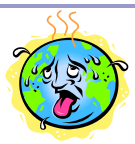
One specific recommendation of the FAA is that pilots do not attempt to fly under a thunderstorm. The biggest threat from flying under a thunderstorm is the presence of wind shear. Wind shear is the change in wind direction or speed over a distance. The greatest threat to aircraft is a large change in wind direction or speed over a short distance; especially during takeoff or landing. Strong winds in the downdraft of a thunderstorm can produce dangerous wind shear which has been the cause of numerous aircraft accidents and fatalities. One such incident was the crash of Delta flight 191 on approach to Dallas-Fort Worth International Airport in August of 1985. In this case the pilots encountered a 30 MPH headwind approaching the microburst, which quickly turned to a 53 MPH tailwind as the plane passed through the microburst. A quick shift from a headwind to a tailwind will end up decreasing the speed of the aircraft, and result in a quick loss of altitude. If unanticipated the loss of speed and altitude can be too much for a pilot and aircraft to overcome in time to avoid crashing. Research during the late 1980's and early 90s led to the development of a forward-looking airborne Doppler radar which is positioned in the nose of the aircraft. The radar can reliably detect the presence of wind shear in the flight path of an aircraft.

However this instrumentation is only available for large commercial airliners, which means those flying smaller aircraft are at the mercy of their own judgment in determining the presence of dangerous near-surface wind shear. There are a couple of clues that could alert a pilot to the occurrence of wind shear. One clue is the presence of virga, which is rain falling out of a cloud but evaporating before it reaches the surface. Even through the rain never reaches the surface, the downdraft continues down to the ground. These 'dry' microbursts are more common in the West. Also, the presence of blowing dust would be another sign of strong winds and potentially dangerous near-surface wind shear.

Because of the many dangers of thunderstorms above the surface, the FFA guidelines also state that planes should fly a minimum of 20 miles around a thunderstorm. If one were to fly through a thunderstorm, besides the frequent lightning, they would encounter severe turbulence with vertical velocities of up to 8000 feet per minute, dangerous icing conditions, heavy rain, and hail. Even flying through an innocent looking building cumulus cloud can be dangerous as you would encounter moderate to severe turbulence with updraft speeds of more than 1000 feet per minute along with potentially dangerous icing conditions. Not only is it unsafe to fly through a thunderstorm it's dangerous to fly near a thunderstorm. Flying in the vicinity of a thunderstorm increases the potential for encountering strong turbulence, lightning, and hail; all damaging and potentially deadly conditions for an airplane and its passengers. Because of this the FAA suggests pilots circumnavigate a thunderstorm by 20 miles.

The numerous dangers thunderstorms present to the crew and passengers in an aircraft dictate the necessity for pilots to heed the FAA's recommendations on thunderstorm avoidance. Ignoring these recommendations would make for an uncomfortable flight at best, and as the past has shown a potentially deadly flight at worst. For those who wish to avoid the potential delays and dangers from thunderstorms when flying in southwest Idaho and southeast Oregon, you should plan a flight for the morning as thunderstorms are more likely to develop during the afternoon.





Global Warming: Fact vs. Speculation

By Stephen Parker, Lead Forecaster

Over the past decade, much talk in the world of weather, and in the world at large, has centered around global warming. Sincere scientists on both sides of this debate give us their best forecasts as to the causes and ultimately the results of global climate change. This article will attempt to give you objective facts in this ongoing politically-charged debate, and compare them to the speculation that is sometimes passed off as fact.

First, the facts.

1). Warming has occurred, and the rate of warming is accelerating. Since the late 1800s, the average temperature of the earth's atmosphere has warmed about 1 deg F. During this last hundred or so years, the atmosphere has undergone oscillating periods of cooling and warming, but overall, we have experienced a slight net warming. During the past 10 years we have experienced the nine warmest years on record. In addition, polar ice packs and glaciers have been melting, and the rate of melting has been increasing.

2). Carbon dioxide in the atmosphere has increased. Globally, the amount of carbon dioxide (CO2) in the atmosphere has increased from around 278 parts per million (ppm) since 1900, to 381 ppm today (an increase of 36%). Carbon dioxide is a "greenhouse" gas and considered by itself, an increase in CO2 would have a warming effect on the earth.

3). Incoming Solar Radiation: Incoming energy from the sun to the earth has varied significantly in the past, and fluctuates according to many different cycles. These cycles affect how much the sun warms the earth. Several important cycles are converging to create warming during the last part of the 20th Century, and the first part of the 21st Century. There is a 208-year cycle reaching its warm maximum in 2002, an 88-year cycle reaching its warm maximum in 2030, and a 232-year cycle reaching its warm maximum in 2038. Each of these cycles is in its warm period at a this time, and has been since the mid 1980s.

4). Complex System: The atmosphere-ocean system is extremely complex. Virtually all of the parts of the system affect each other, and most of these effects are not easy to measure or predict. Furthermore, there are varying amounts of sensitivity in this system, meaning that some small changes have big impacts, while other seemingly large changes have little or no impact. This is a large part of what makes prediction so difficult.

Now, the speculation.

1). Man's use of fossil fuels and the associated release of carbon dioxide is the reason for the warming.

This may or may not be true. Looking into earth's history, scientists have found times when earth was considerably warmer than it is now, and man was not using a significant amount of fossil fuel. At the same time, it is true that carbon dioxide produces a "greenhouse effect", and should produce warming. In fact, most scientists feel that carbon dioxide is a factor in our current warm period. The speculation comes into play when we try to figure out how much warming will result, and whether or not it will be offset by other factors (such as increased cloud cover). The truth is that we don't know the answer to that question.

2). The sun's cycles control the global climate much more so than any component of the atmosphere.

Again, this may or may not be true. The sun is powerful enough to have a large influence on the planet's global climate, but we have not been taking measurements long enough to know how much these cycles actually matter. It is possible, but again, we don't know.

3). Computer models say we are going to warm up, so it must be true. The computer models that we at NOAA's National Weather Service use to forecast just a few days in advance often have significant errors. The types of models that the climate modelers use run years and years into the future, and are much more simplified than the ones we use for short-term weather prediction. In addition, the interactions between the energy from the sun, cloud cover, carbon dioxide and other greenhouse gases, snow pack, atmospheric pollution, and the oceans (along with many other factors) are not well understood. Yet these are critical to long-term climate prediction. All these uncertainties make accurate prediction of future climate conditions extremely difficult, and prone to large error.

In summary, we know things have warmed up a little over the past 100 years, and we know the warming is accelerating, but we don't know all the reasons why. It is likely that carbon dioxide is a contributing factor. However, we literally don't understand the science of climate change well enough to know if the greenhouse effect will be overwhelmed or offset by other effects. This is not to say that we shouldn't worry about burning fossil fuels, because there are other reasons to limit burning them (air pollution, for example). However, the truth is we simply don't know how many factors are contributing to the warming, or how much more warming will occur.

The Winter of Many Surprises

By: George Skari, Lead Forecaster

The Winter season of 2005-2006 across Southwest Idaho and Eastern Oregon was quite varied and had something for everyone. As Winter began, conditions in the Tropical Pacific were quiet and there was neither "El Nino" or "La Nina" occurring but rather one of neutral conditions. This changed however and by December a weak "La Nina" episode had developed. Then during January and February as sea surface temperatures in the Central and Eastern Pacific continued to cool, a moderate "La Nina" episode continued to strengthen and was officially declared by the Climate Prediction Center. This had implications for our area as typically the "La Nina" signature brings colder and wetter conditions to our region and a considerably heavier Mountain snowpack.

Things got off to a chilly wet start in November but there was some decent weather days early in the month as well. A long lasting inversion developed in the Treasure Valley just before the Thanksgiving Holiday and this delayed or cancelled many flight operations in Boise during the peak holiday travel period. Overall, November was about 2 degrees below normal in temperature and slightly wetter than normal. December arrived with truly cold winter weather in place. During the first two weeks of the month bitterly cold arctic air had settled into the region and we were on track for one of the coldest December's on record, and this was with minimal or no snow on the ground. Mother nature had other ideas however and the tables were about to be turned. Near the middle of the month, the cold ridge of high pressure that was stationary over the region during the month was breaking down. This breakdown then allowed a nearly continuous series of Pacific Storms to begin flowing into the area bringing heavy mountain snow and copious amounts of rain to lower elevations. The milder flow from the Pacific brought temperatures up to above normal readings and turned things completely around from what occurred during the first half of the month. The mild and very wet weather continued through the Christmas holiday and lasted through the end of the year. Small stream and urban flooding occurred in the Treasure Valley during the last few days of December with heavy rain in the area. With all the mild and wet conditions during the last half of the month, December turned out a meager one degree below normal in temperature but a whopping three times wetter than normal. Snowfall in lower elevation areas was almost non existent during this mild stretch.

January continued the active weather trend of December with many moisture laden Pacific storms passing through the area. This milder flow kept temperatures well above average but it was cold enough in the mountains to produce plenty of snow. In the valleys, most days in January had temperatures in the 30s and 40s and this was typically the coldest time of the year on average. At times, it seemed like winter had completely disappeared and strangely, there was no temperature below 20 degrees during the entire month at Boise. In the end, the month averaged more than 6.0 degrees above normal with above normal precipitation. Not surprisingly, snowfall was very low in the valleys and highlands but continued heavy in the mountains throughout the month.

February was a dry...cool and rather quiet month as far as storms go. This was a complete reversal from the very stormy pattern of December and January. Precipitation occurred on only three days during February and there was a 22 day stretch where no precipitation occurred at all but it did remain cold. In Boise for example, there was no measurable snow recorded during the month and very little on the ground in most areas of Eastern Oregon and the Snake River Valley. Heavy snow cover however continued in the mountains. By now, a moderate intensity "La Nina" was in full swing and beginning to affect our area with its signal of cool and wet conditions.

March came in like a lamb but ended roaring like a Lion. During the first two weeks of March, conditions resembled those of February, cool and dry. In the second half of the month however, a series of storms came into the region and the moisture tap was once again flowing. With this warmer and moist flow came the first severe weather outbreak of the season. On the 25th of March, severe thunderstorms producing penny-sized hail and damaging winds moved across the Treasure Valley and Magic Valley. The month ended on a soggy note with flooding on the Weiser River in Idaho and heavy rain in Southwest Idaho and parts of Eastern Oregon. Overall, March was about 2 degrees below normal in temperature but had 2 to 3 inches of precipitation making this the 7th wettest March in the Treasure Valley of Idaho. Many other areas also observed these wet conditions.

So there you have it! The varied and interesting winter season of 2005-2006. Lots of precipitation with a heavy mountain snowpack and wide swings in temperature from very mild to bitterly cold. Severe thunderstorms and dense fog, inversions and Flooding. This was a winter season that had something for just about everyone and kept us busy with varied patterns of weather. So what lies ahead for the rest of spring and the summer ahead? One thing we know for sure is that the heavy mountain snowpack so late in the season is likely to cause hydrologic concerns as we get later into May and June. It's also likely to be a very active and challenging time in the weather office and your timely and accurate reports will be a critical piece of the larger weather puzzle.

Enormous Mountain Snow Pack Threatens More Spring Flooding

By Jay Breidenbach, Senior Service Hydrologist

After nearly 6 years of drought, river flooding has been a significant problem on many rivers and streams across Southwestern Idaho and Southeastern Oregon this year. Flooding occurred several times during the winter on the Weiser River in Washington County, Idaho and a few times on the Malheur River in Malheur County, Oregon. The National Weather Service issued flood warnings when rain fell on low elevation snow causing the rivers to rise rapidly.

The mountain snow pack normally peaks in early April. This year's peak was very large with above average snow water equivalent measured in all stream basins. The biggest amounts relative to normal extended from southeastern Oregon into southern Idaho and were measured in the range of 150 to 170 percent of normal.

Heavy precipitation in early April added even more snow at the highest elevations. However…rain at the lower elevations combined with melting snow below 5000 feet caused another round of flooding with flood warnings issued for the Owyhee River and Malheur River in Oregon. Flooding also occurred on the Weiser River in Washington County, Bruneau River in Owyhee County, Big Wood River in Gooding County, Mores Creek in Boise County, and Camas Creek in Camas County.

The Boise River also reached flood stage of 7000 cfs in Ada County and Canyon County, Idaho, during the month of April as the U. S. Army Corps of Engineers, and the U.S. Bureau of Reclamation were forced to increase discharge to make room in upstream reservoirs for large inflows expected later this spring when the high elevation snow melts. The volume of water produced by the snow in the Boise Mountains is expected to be near 2 million acre feet as measured from April 1st through July 31st. This is 145 percent of normal and more than twice the combined capacity of Lucky Peak, Arrowrock, and Anderson Ranch reservoirs which can hold 950,000 acre feet when full. Fortunately, all of this water will not run off at once! However…peak inflows into the reservoirs are expected to be between 20,000 and 25,000 cfs in mid to late May. If the reservoirs are full when this peak occurs, that amount of water would have to be passed though heavily populated areas down stream resulting in a very major flood. However…with the current releases being made from Lucky Peak, there should be enough space available in the reservoirs to handle the peak runoff. Mild and dry weather would be ideal for the current situation and significant increases above 7000 cfs should not be required. However…if heavy rain combined with warm temperatures, occur in mid May, reservoir operators may need to release even more water down stream.

Snow pack on May 1st continues to be well above normal with the biggest amounts in south central Idaho. On May 1st, the Weiser River basin was 167 percent of normal and the Payette and Boise Basins were near 130 percent of normal. Other basins of concern include the Bruneau Basin, and the Big Wood and Little Wood basins which are near 150 percent of normal for this time of year. These basins will have to be watched carefully for more flooding this spring.

All of the tributaries, discussed above, feed into the Snake River, which is also experiencing the highest flows since 1998. So far, no serious flooding has occurred on the Snake River. However…one of the most spectacular sites in the Western United States can be see this year at Shoshone Falls located near the city of Twin Falls Idaho. For the last six years only a mere trickle of water has flowed over the falls. This year…the falls should average more than 10,000 cfs through the month of May and perhaps into early June truly making them the Niagra Falls of the West!

"The volume of water produced by the snow in the Boise Mountains is expected to be near 2 million acre feet...This is 145 percent of normal and more than twice the combined capacity of Lucky Peak, Arrowrock, and Anderson Ranch Reservoirs..."

Figure 1. Shoshone Falls on April 23th, 2006 at a flow near 18000 cfs.

Figure 2. Water flows through glory hole spillway at Owyhee Reservoir in April 2006.

Rainfall Intensity and Snowfall Intensity Definitions

Rainfall Intensity is a measure of rainfall rate.

Rain is defined as: Precipitation in the form of drops larger than 0.02" (0.5 mm), or smaller drops, which in contrast to drizzle are widely separated.

Rainfall Intensity	Rate-of-fall in 6-minutes	Rate-of-fall in one hour	Visual Estimation
Light	<0.01"	Up to 0.10"	From scattered drops that, regardless of duration, do **not** completely wet an exposed surface up to a condition where individual drops are easily seen.
Moderate	0.01"-0.03"	0.11"-0.30"	Individual drops are not clearly identifiable; spray is observable just above pavements and other hard surfaces.
Heavy	>0.03"	>0.30"	Rain seemingly falls in sheets; individual drops are not identifiable; heavy spray to the height of several inches is observed over hard surfaces.

Drizzle is defined as: Fairly uniform precipitation composed exclusively of fine drops with diameters less than 0.02 (0.05 mm) which are very close together. Drizzle appears to float while following air currents, although unlike fog droplets, it falls to the ground. The intensity of drizzle is based solely on visibility.

Drizzle Intensity	Visibility
Light	> 1/2 statue mile
Moderate	1/4 to 1/2
Heavy	< 1/4 mile

Snowfall Intensity is measured by visibility

Snow Intensity	Visibility
Light	> 1/2 mile
Moderate	1/4 to 1/2 mile
Heavy	< 1/4 mile

The amount of snow that falls is highly dependent upon temperature. For example, at 10 degrees Fahrenheit (F) , one inch of precipitation can produce 30" of snow. At 20 degrees F, one inch of precipitation can produce 20" of snow. At 30 degrees F, one inch of precipitation can produce 10" of snow. At freezing, one inch of precipitation will produce approximately 6" of snow.

As always, these are just guidelines and the amount of snowfall is also dependent upon moisture content of the air mass.

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Working together to Save Lives

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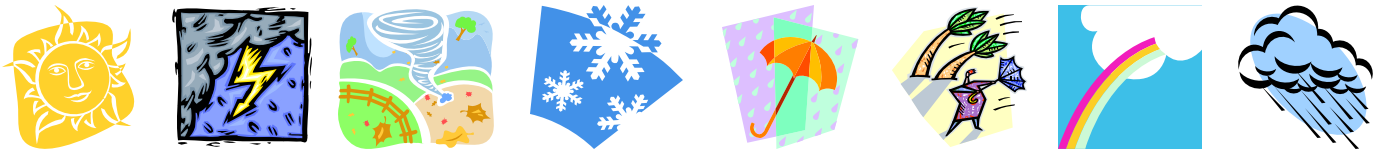
Reporting Guidelines—Skywarn Spotter Reporting Criteria

Call us when you observe:

- **Tornado—**All tornadoes
- **Funnel Cloud—**All funnel clouds, watch for rotation
- **Hail—**1/2 inch in diameter and larger
- **Near Continuous Lightning**
- **Winds—**All winds greater than 35 mph
- **Heavy Rain**—Falling at a rate of 1" per hour or greater (1/2" in 30 minutes), or more than 1" per day in the winter
- **Freezing Rain**—Any measurable freezing rain
- **Heavy Snow**—1" per hour or greater, or storm total 4" or more, or snow causing road closures
- **Flooding—**Any water flowing where it doesn't normally or rivers flowing above their banks
- **Low Visibility—**Visibility less than 1/4 mile for any reason
- **Weather Related Damage, Death, or Injury—**If weather causes damage, death, or injury, please let us know



Always Report! Even if you aren't sure what you are seeing is of reporting criteria, please still call us. Also, don't assume someone may have called in the same storm. Even if we received a call already, it is still helpful to get other perspectives and more details for ground truth. Every report benefits the warning process that may save lives. Delayed reports also help us to verify events that have happened thus improving our warning process for the future.