



VOLUME
IX
ISSUE 4, AUTUMN 2016

Sage Winds

NATIONAL WEATHER SERVICE BOISE

Spotter Checklist

When should you call us?

- HAIL:** pea size or larger.
- SNOW:** 1" per hour or greater OR storm total 4" + OR snow causing road closures.
- REDUCED VISIBILITY:** from fog, blowing dust, rain, snow.
- WIND:** 40+ mph or damage.
- HEAVY RAIN:** ½" or greater.
- FREEZING RAIN:** Any amount.
- FLOODING:** Any water where it shouldn't be, or overflowing river/creek.
- TORNADO or FUNNEL CLOUD**
- ANY WEATHER RELATED DAMAGE, DEATH, OR INJURY.**

How to contact us:

1-800-882-1428
 @NWSBoise
 /NWSBoise
 boise.weather@noaa.gov

Questions? Comments?
 Suggestions?

Email:
 boi.spotter@noaa.gov

Season in Review

Joel Tannenholz

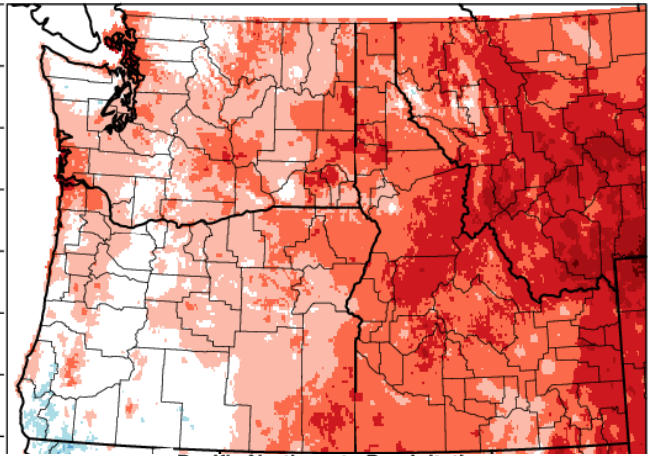
September was slightly cooler than normal across most of the region, due to upper-level troughs which moved over the area on the 2nd, 12th, and 22nd. A very warm upper-level ridge built over the region on the 25th and 26th, bringing southeast Oregon and southwest Idaho the warmest weather of the month. Highs were in the 80s and even the lower 90s at lower elevations for the last five days of the month. Little rain fell on southeast Oregon and western Idaho, but further east it was a wet month. Moist air moving up from the south fed upper-level troughs as they moved inland. This interaction occurred over south central and eastern Idaho, where precipitation for the month ranged from 200 percent to over 300 percent of normal.

October brought an end to the long dry spell for much of our area. At some locations it was the first month since March with above-normal precipitation. Temperatures averaged above normal. Thunderstorms brought brief heavy showers. Some locations even reported severe weather. On the 24th a thunderstorm pounded Gooding with hail up to three-quarters of an inch. A thunderstorm on the evening of the 30th dumped between a quarter and a third of an inch of rain on the Boise area. Looking at weather patterns, from the 3rd through the 6th, an upper-level trough settled over the western U.S., keeping temperatures below normal, but generating only a trace of rain. From the 7th through the 10th, our area was on the warm side of a jet stream centered along the Canadian border. Temperatures averaged above normal with mostly clear skies. On the 11th a cool upper-level trough, which had been lurking over western Canada, swung south over the western U.S., bringing much cooler weather. By the 14th a deep upper-level trough from the Aleutians had parked off the Pacific Northwest coast. A series of disturbances moving around the southern edge of the trough brought showery weather from the 14th through the 18th. On the 17th one of these systems dumped 2.5 inches of snow on the Soldier Mountain ski area in Camas County. There was no rain from the 19th through the 23rd, when our area was under dry upper-level flow which shifted from northwest to southwest under a weak high pressure ridge. Starting on the 24th, the southwest flow moistened up, thanks to another deep upper-level trough offshore. There were daily showers from the 24th through the end of the month, adding another two-thirds of an inch to the monthly total.

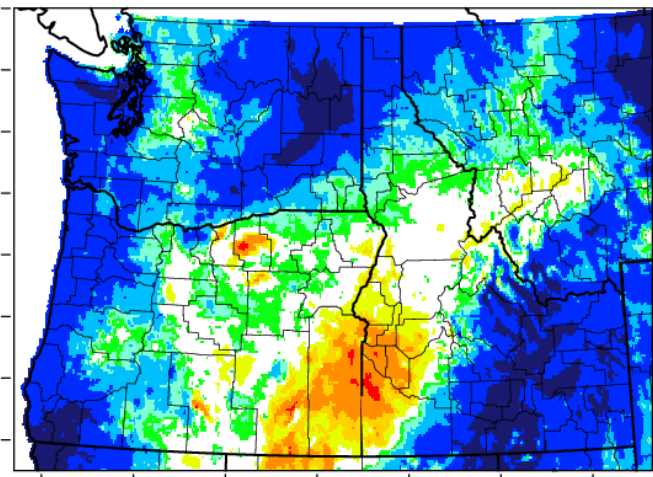
During most of November the northern intermountain area was dominated by a warm upper-level ridge which kept temperatures above normal region-wide. Pacific weather systems weakened as they moved into the ridge, bringing only meager precipitation.

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Pacific Northwest - Mean Temperature
 September-November 2016 Departure from 1981-2010 Normal



Pacific Northwest - Precipitation
 September-November 2016 Percent of 1981-2010 Normal



WestWide Drought Tracker - U Idaho/WRCC Data Source - PRISM (Prelim), created 7 DEC 2016

Starting on the 15th, a series of deep upper-level troughs crossed our area, but the ridge always managed to rebound between them. On the 26th an even deeper trough crossed the western U.S. On the 27th it was centered over the Northern Plains states, leaving our area under northwest flow aloft between the trough and a high pressure ridge over the northeastern Pacific Ocean. This pattern change paved the way for a winter-like weather system to drop in from the Gulf of Alaska. This storm brought the first snow of the season at many valley locations. Most places reported only a trace, which melted as it fell. The mountains fared better. For example, 4 inches fell at the Magic Mountain SNOTEL located at 6700 feet. On the 30th a weaker storm system from the Gulf of Alaska brought generally light amounts of snow.

Boise's Snowiest Winters, and Temperature Inversions

Joel Tannenholz

With an average annual snowfall of 19 inches, Boise is not especially snowy. For comparison, Pocatello averages 50 inches, Reno 22 inches, Spokane 45 inches, and Salt Lake City 56 inches.

Boise's snowiest winter was 1948-49 with 43.3 inches. Only 0.3 of an inch of snow fell during the winter of 1991-92.

During the 1980s, Boise experienced winters with long periods of snow cover and record-setting snow depths. Here are the top 5 all-time greatest numbers of consecutive days with snow depths of 1 inch or more.

<u>Winter of</u>	<u>Number of days</u>	<u>from - to</u>	<u>Maximum Depth</u>	<u>Total Winter Snowfall</u>
1985-86	63	Nov 16 - Jan 17	13" on Dec 2*	20.9"
1988-89	59	Dec 20 - Feb 16	10" on Jan 9	19.5"
1984-85	59	Dec 16 - Feb 12	5" on Dec 21,22/ Feb 6,7	15.6"
1983-84	57	Dec 19 - Feb 13	13" on Dec 30*	34.9"
1981-82	51	Dec 25 - Feb 13	12" on Jan 4	24.7"

*greatest depth on record

These periods coincided with persistent temperature inversions. The "inversion season" in Boise is roughly between Thanksgiving and Valentine's Day, when nights are long, days are short, and sun angle is low. During this time of year, inversions can form overnight with or without snow cover if the sky is clear and winds are light. But if there is snow on the ground, cold air can become "anchored" in the valley. With much of the solar radiation reflected back into space by the snow, the inversion deepens. Overnight lows can eventually drop to zero and below, creating "homemade" Arctic air. The occasional warm high pressure ridge, which brings mild sunny weather to the mountains, acts as a "lid" for the cold air in the valleys.

North Pacific weather systems, if they aren't strong enough to dislodge the inversion, simply ride over the top of the cold air and drop more snow. The added moisture contributes to fog and stratus formation, which, in addition to particulates accumulating in the stagnant air, limit solar heating even more.



Safe Winter Driving

- **Winterize your Car**
 - ✓ Check tire **pressure, tread and traction**
 - ✓ Check car **battery**
- **DO NOT use Cruise Control**
- Keep gas tank **at least half full**
- **Allow extra time** to reach destination
- **Slow down**
- Let someone **know your timetable and route**



Have an Emergency Car Kit

- **Food and Water**
- **Shovel**
- **Ice & Snow Brush or Scraper**
- **Flashlight**
- **Waterproof Matches, Candles**
- **Gloves**
- **First Aid Kit**
- **Jumper Cables**
- **Warning Flares**
- **Blanket, Extra Clothing (Warm)**



WATCH/WARNING/ADVISORY What is the Difference?

WATCH – Conditions are **favorable for a severe weather event** in the near future. **Be Prepared!**

WARNING – Weather is occurring or imminent and **is threatening life or property**. **Take Action!**

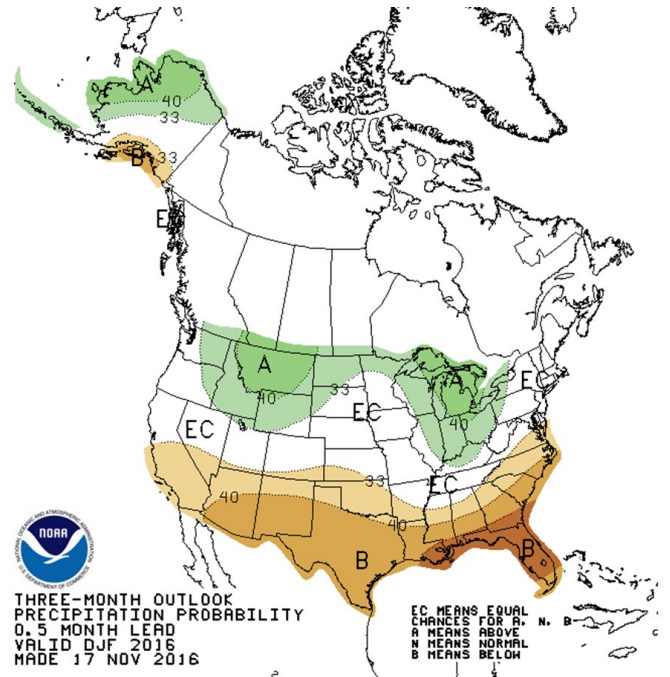
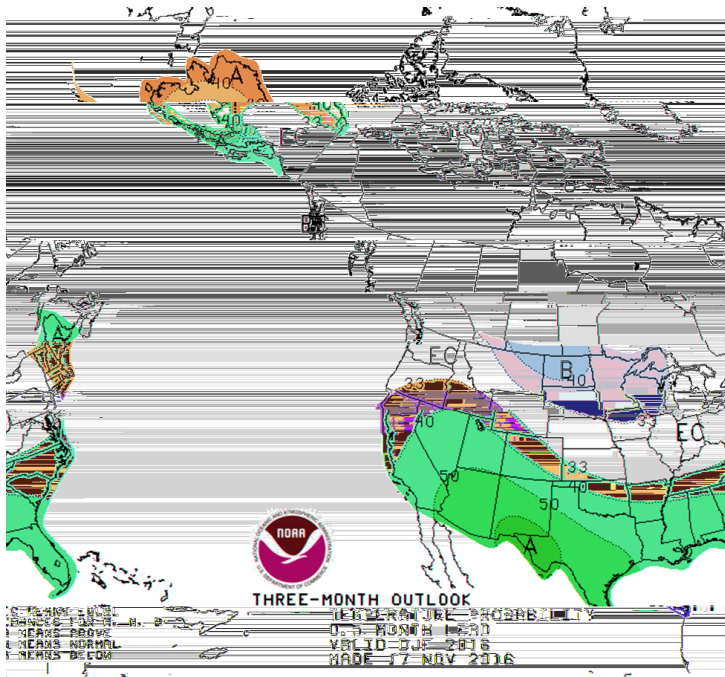
ADVISORY – Weather that will cause a **significant inconvenience**, and if caution is not taken, may be threatening to life or property. **Be Aware!**

Winter Outlook 2016–2017

Stephen Parker

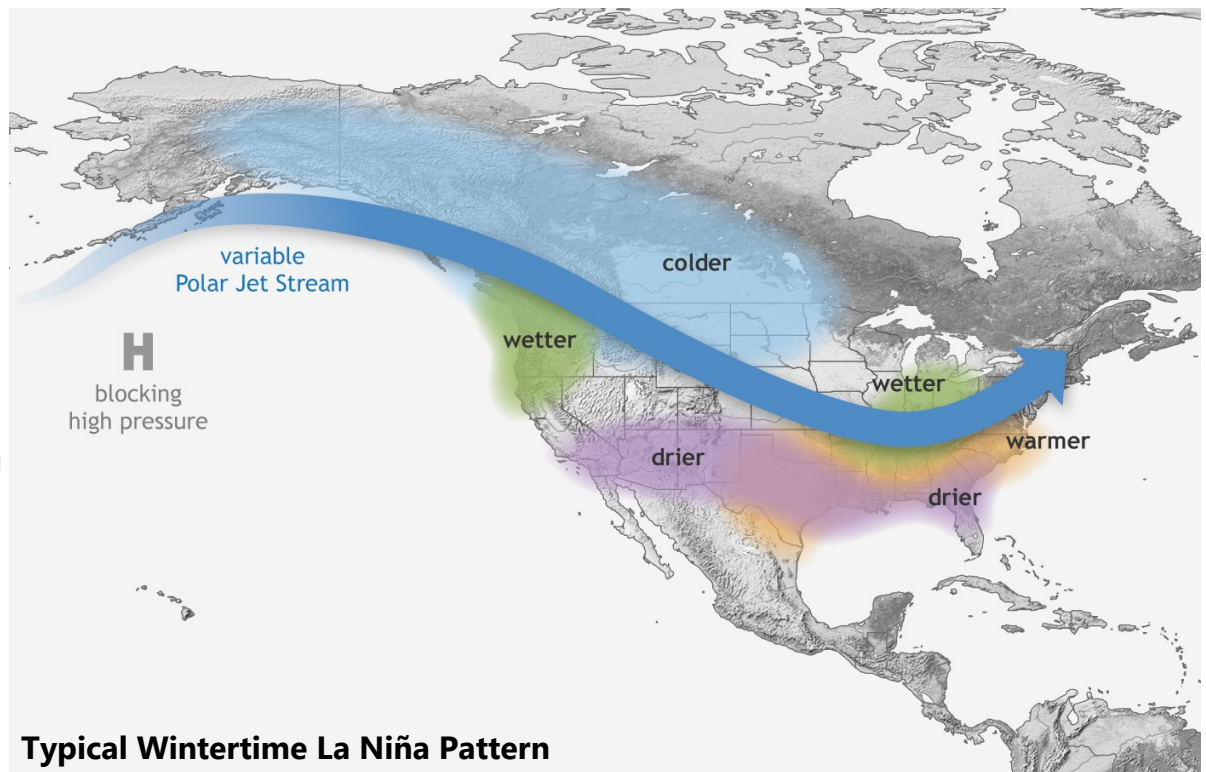
As frequent readers of the outlook section know, one of the primary forecasting tools for seasonal global weather forecasting is whether or not we are in an El Niño or La Niña condition. Over the fall, we have transitioned from neutral conditions into a weak La Niña, which means temperatures in the equatorial eastern Pacific are below normal. There is a 55% chance that La Niña conditions will persist through the winter of 2016-2017.

The following graphics show the official three-month outlook for the winter of 2016-17 (Dec-Jan-Feb). Consistent with La Niña conditions, the country's temperature outlook is for a better chance of above-normal temperatures across the south, west, and much of New England. Only the northern Plains is expected to experience below-normal temperatures.



The country's precipitation outlook is for above-normal precipitation in much of the north and Midwest, with below-normal precipitation in the south. A considerable area of equal chances of above- and below-normal exists between these two areas.

For southeast Oregon and southwest Idaho, these charts generally indicate a better chance of above-normal temperatures and above-normal precipitation. However, southern Malheur and most of Harney counties fall in the equal chances area for precipitation. As warm as November was, it is not too hard to believe that we will experience an above-normal temperature pattern this coming winter. An active La Niña pattern could also bring more storm systems than normal, leading to above-normal precipitation amounts. Please remember, these outlooks are indications based on past correlations. They are not as accurate as short-term forecasts.



Typical Wintertime La Niña Pattern

Looking Back at the November 2014 Event

Les Colin

November, 2014, started off warm as Boise reached 69 degrees on the 6th ahead of a cold front on the 7th. During the next five days high temperatures lowered through the 50s and 40s, and on November 12 a stronger cold front lowered temperatures to the 20s. At that time a Pacific storm formed off the Oregon coast and moved due east across southern Oregon, where it encountered the cold air in eastern Oregon and southern Idaho. The storm's warm front brought several inches of snow to eastern Oregon and a mix of snow and freezing rain to southwestern Idaho on the 13th, as warm, moist air sailed over the cold air at the surface. Late on Thursday the 13th the storm's cold front cooled the air aloft and precipitation became all snow. Slush on Boise roads turned to ice at evening rush hour and caused a massive traffic tie-up that lasted well into the evening as snow continued to fall. Snow fell all night and through the morning of the 14th, piling up to 7.6 inches at Boise and setting a November single storm snowfall record, surpassing the old record of 7.4 inches set in 1935. Other storm totals included 15.3 inches at Pine, ID, in Elmore County, 14 inches at Lowman, 9 inches at Robie Creek, and 8 inches at Kuna.

As the snow ended and skies cleared arctic air surged in, and on Saturday morning, the 15th Boise dipped to 1 above zero. Low temperatures were in the single digits the next four nights as well, and Boise did not rise above freezing until Friday the 21st, a stretch of 10 days. The sudden and severe cold caused significant damage to area trees. But no more snow fell and by Sunday the 23rd when temperatures rose well above freezing, all the snow had melted.

As severe as this storm was, it fell far short of the events of November, 1985, when 18.6 inches of snow fell at Boise, almost all of it in the latter half of the month, and temperatures stayed continually below freezing from the 17th through the end of the month, including three sub-zero days.

The Caldwell Airport is a new Terminal Aerodrome Forecast Site

Elizabeth Padian

On October 20th, 2016 at 12 UTC (6 am MDT), the first Terminal Aerodrome Forecast (TAF) was issued for the airport in Caldwell, ID (KEUL). That brings the total of locations that the Boise NWS office issues a TAF for, to seven. This was a momentous occasion for aviators in the Caldwell area, who had previously had to use forecasts for nearby airports and local observations to estimate the conditions that they should expect. Now, we are issuing a forecast specifically for the airport and being used by the aviation community. Caldwell boasts an impressive number of students learning to fly, both fixed wing and helicopters. It is because of this large number of students practicing, that Caldwell is the busiest airport in Idaho based on the number of take-offs and landings. Many private pilots have their planes stored there for recreational use, as well as many businesses related to aviation. Because of its proximity and lack of commercial traffic (like the Boise airport) Caldwell has also become a stopping point for out-of-state aviators to begin a trip into the backcountry of the Idaho Central Mountains. The new TAF for KEUL is the forefront of communicating weather to aviators to keep their operations safe, legal, and enjoyable. We are pleased to be offering this service in collaboration with the FAA.

The Pioneer Fire: By the Numbers

- Ignited July 18, 2016.
- 188,404 acres burned.
- Largest wildfire on Forest Service land in 2016.
- During peak activity, more than 1800 assigned personnel.
- Managed by a total of 7 Incident Management Teams between July 18th and September 30th.

(Source: www.inciweb.nwccg.gov)

At right, a view of active burning near Stevens Creek, within the Deadwood Drainage.

Photo courtesy of Fire Behavior Analyst, Nate Lancaster.



Meet & Greet

Aviva Braun

Every winter, as the region prepares for less than ideal road conditions, the National Weather Service (NWS) ramps up communication with our partners at the Ada County Highway District (ACHD) in order to keep up with our mission – the protection of life and property. As winter sets in, roads can become a real hazard and it takes work on the part of both organizations to serve the public and keep the roads safe. For this Sage Winds edition, we were able to sit down with Tim Nicholson, the Maintenance Manager at ACHD, and get his take on the upcoming winter season and the low-down on their day to day operations.

NWS: Good morning Tim! Could you introduce yourself to our readers?

Tim: Sure. I'm the Maintenance Manager for ACHD, and I've been in this position for about a year and a half. I'm also a registered professional civil engineer in the state of Idaho.

NWS: How did you become interested in this line of work?

Tim: My father ran an excavating and paving business in Pennsylvania, so I grew up in the family business, interested in his daily operations. In school, I discovered that I was pretty good at math and science, so in college, I pursued a civil engineering degree from Virginia Tech. After graduation, I returned home to further learn and advance our family business. I did everything from running equipment to running the day to day operation of the business. Over time, we went from a \$500,000 a year company to a \$2.7 million a year company. I really enjoyed the work – managing people and building things. These two loves have brought me to where I am now in my career.

NWS: Would you describe how the start of your career got you to where you are now?

Tim: My family and I decided it was time for a change and we wanted to be out west. We fell in love with Boise and decided to make the move. At first, I worked for an engineering firm, for about a year and a half. Afterwards, I jumped around a bit and soon learned of an opening at ACHD. I was fortunate enough to get the job here with the Construction Department, later with the Development Services Department, and now as the Manager of the Maintenance Division. I have been at ACHD now about 5.5 years and it's been a pleasure, and a bit of a journey. I think this work ties my skillset together from start to finish.

NWS: What's the nature of your day to day work?

Tim: Being the Maintenance Manager, I oversee both of our maintenance yards, the one on Adams Street in Garden City and the other on Cloverdale Road in west Boise. Each facility's superintendent looks after the maintenance of all of the roads under their jurisdiction and reports to me. Some day to day examples of their work include: paving roads, replacing pipes, patching potholes, cleaning out storm-drains, maintaining vegetation within the right of way, sweeping streets, and so on. I'm mainly responsible for maintaining the budget for our department and working with engineers and contractors to get things built. I'm also responsible for bigger picture planning, emergency response planning, and ensuring that all of our material and supply contracts are in place.

NWS: So, weather probably comes into play in your daily operations.

Tim: It certainly does. This time of year especially, since we are now looking forward to snow removal, deicing, and maintenance of the roads for winter operations.

NWS: How are you planning for upcoming winter operations?

Tim: As of November 1st, we shifted into winter operations. This will continue until early April. We have an on-call supervisor that will rotate through every week and our crews are on stand-by. All equipment has been tested and calibrated, our winter operations plan is in place, and all training has been conducted. In terms of our snow removal fleet, we have 58 pieces of equipment with a total of 37 plows. Many have the capability to put down magnesium chloride to anti-ice and pretreat the roads. We also have salt and sand available if necessary. We are ready for anything!

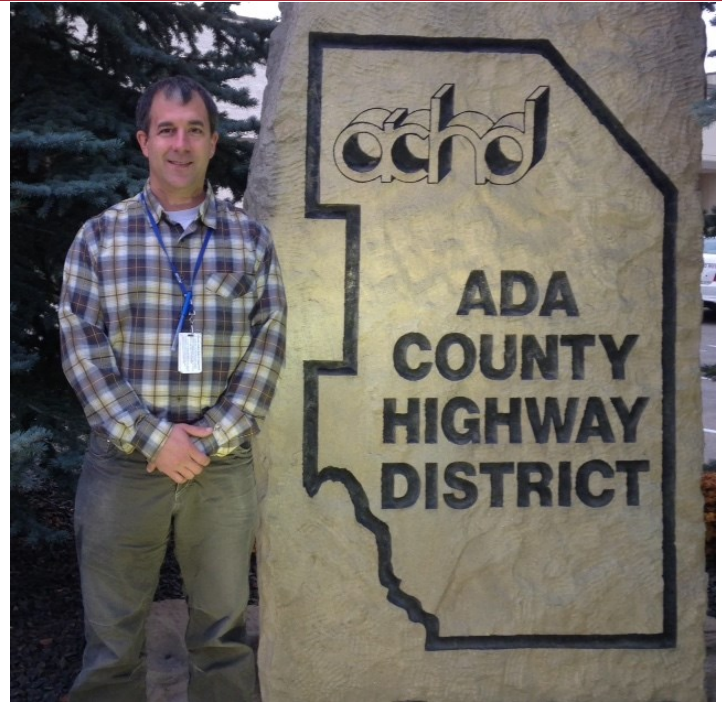
NWS: How does communication between our two offices contribute to your team's success?

Tim: Well, your office was just out at our yearly training, which is always helpful. And when there are storms predicted, your office has made a point of joining us on our conference calls daily, if not more frequently. This has been great for our decision making. We really appreciate what NWS does for us; you have the information ahead of time and can best predict how things are going to go and what's going to happen. This is essential for us, especially when making early morning decisions concerning road treatments that can cost \$25,000 to \$40,000. We wouldn't be as effective as we could be without your input. We also really want to help your office, and so we have been encouraging our supervisors to call your office with local reports as they drive their routes. We know conditions can change over short periods of time and over small distances.

NWS: It's partnerships like yours that make our job more exciting! So, many thanks to you as well.

Tim: Thanks. That's great to hear.

NWS: How does your office use our forecasts specifically in order to plan for a winter event?



Tim Nicholson

Continued on Page 6...

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Fire Weather Meteorologists

Chuck Redman

Megan Thimmesch

Hydrometeorological Technician

Wasył Hewko

Meteorologist Interns

Aviva Braun

Jessica Caubre

Tim: If NWS is calling for a precipitation event that could produce snow or ice, we will go out to pre-treat the roads, with priority locations treated first. If we get the treatment down early enough before the event, traffic helps us out a lot by spreading the treatment out across the road surfaces for us. One little fun fact to consider is that we have to apply materials based on the road temperatures, not necessarily the ambient temperature. Sometimes people are confused about why we are applying material when we do.

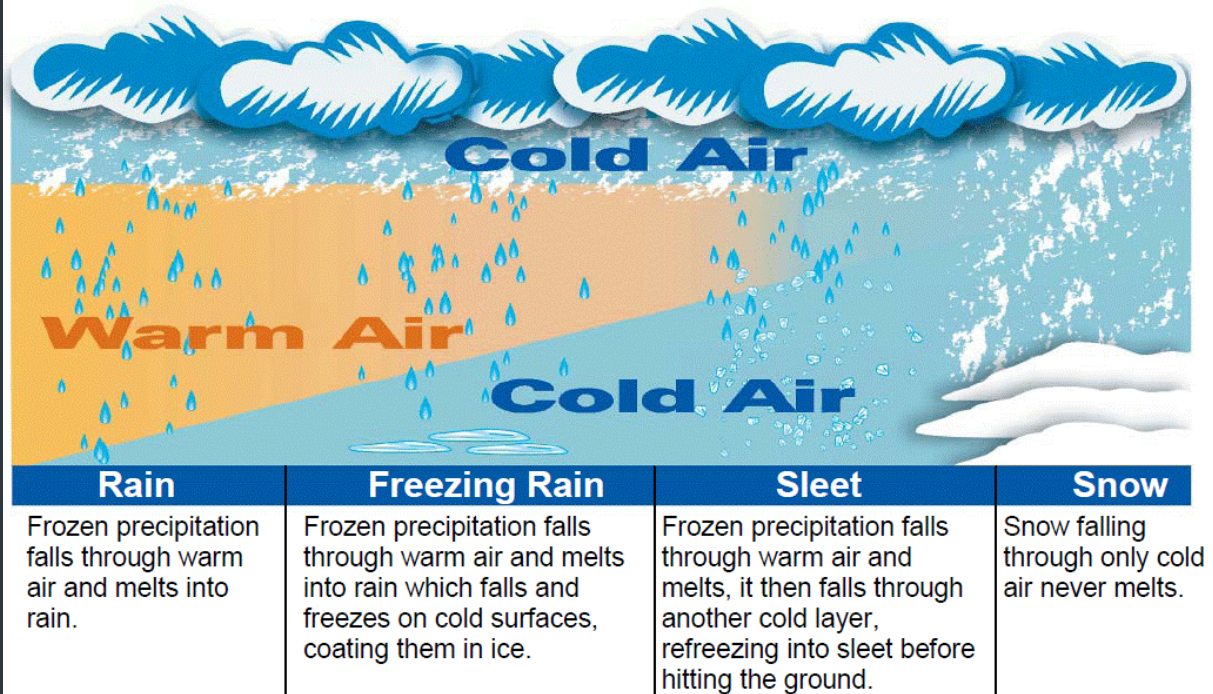
NWS: Yeah, that's a good reminder! So tell me, what type of winter weather has the greatest impact on the maintenance team and why?

Tim: Snow and ice are the big ones, though we can handle snow better than ice. November 2014 is a good example of a bad ice event. I think that event caught a lot of us by surprise. It was predicted to change over to rain, but it never did and snowed about 8 inches instead of the expected 2 inches. And then it stayed cold for about a week! For 8 or 9 days, the temperatures never got above freezing. We had a real mess that year because it never warmed up, the snow never melted off, and we couldn't plow; we would maybe get a little melting during the day but then it would refreeze overnight. That is probably the hardest condition we have to deal with – melting snow that freezes overnight. If we don't get it all off the roads, it just makes for a lot of slick spots and a lot of extra treating. We now have more plows and materials available for this type of event, a better plan in place, and we plan on being more proactive. We didn't really have a chance to test any of these new capabilities last year; hopefully we will have a chance this year.

NWS: I hope so as well! Well Tim, it has been a pleasure speaking with you. Thank you.

Tim: My pleasure.

Different Types of Winter Precipitation



Want to help NOAA
weather scientists
with research?

If you own a smartphone or tablet download the free **mPING** app in the App Store or Google Play.

FOLLOW US on Twitter @NWSBoise and LIKE US on Facebook!

WINTER is HERE!

Friendly reminders on keeping you and your family safe

- Prepare a **Disaster Supply Kit** with a week's worth of food and water.
- Create a **Family Emergency Plan**, so you know how to communicate to your family and others when disaster strikes.
- Check **weather.gov** everyday so you aren't caught off guard.
- Inspire others to **take action** by showing your friends and family how you are prepared.

Visit www.ready.gov for more information.

Keeping Pets Safe

- If possible, keep pets indoors.
- Routinely check outdoor water dishes to make sure they don't freeze.
- Keep food dishes well stocked; it takes lots of energy to stay warm.
- Keep antifreeze where pets cannot access it.
- Protect paws from salt and other anti-icing chemicals, or wipe paws with damp towel to remove these irritating compounds.

CoCoRAHS observers needed!

Calling all weather enthusiasts in Oregon and Idaho! We need more weather observers interested in taking daily measurements of precipitation or snowfall. If you would like to participate in CoCoRaHS, please contact us at: boise.weather@noaa.gov or visit <http://www.cocorahs.org/>



Six Basic Steps for Properly

MEASURING SNOW



Accurate and timely snowfall measurements are extremely important to your National Weather Service office, your community, local media, and many others. Here are the six steps you need to know for measuring snow:

3 **Set-up**

Set up before snow begins

Put your board out and mark it with the flag

4 **Measuring Snow**

Record your total to the nearest tenth of an inch

Wipe the board off after measuring

Measure once daily at the same time, after measuring place the board on top of snow

1 **Supplies**

Ruler or yard stick
24" X 24" white board, flag

2 **Planning**

Find an open area away from tall objects, but sheltered from wind

5 **When Snow Stops**

Measure as soon as the snow stops to avoid lower totals due to melting, settling and drifting

6 **Reporting**

weather.gov social media

SEND us your report!