



## Are We Headed Back Into Drought?

Ryan Sandler, *Warning Coordination Meteorologist*

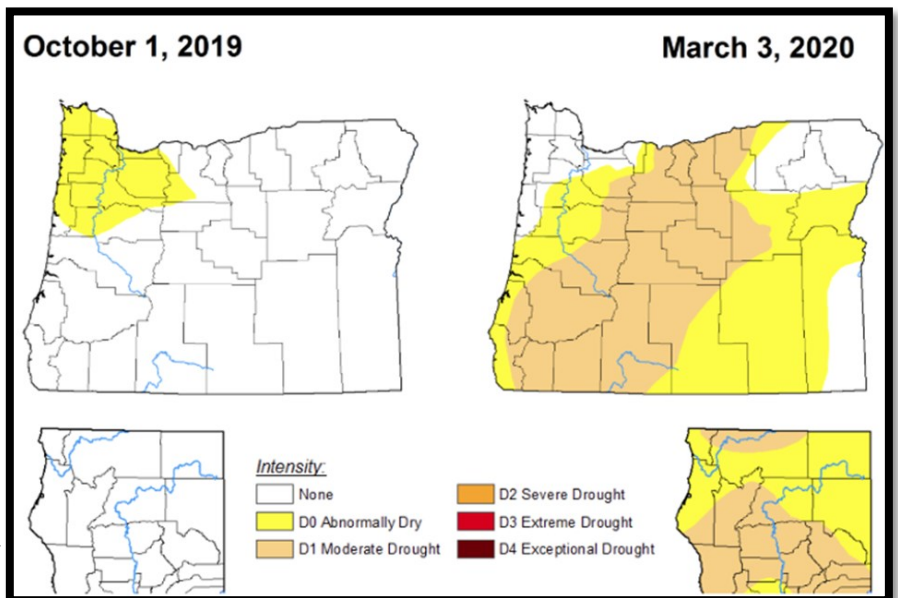
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s of early March, the 2019-20 water year has not been a good one and the outlook is not encouraging. There have been very few atmospheric river storm systems impacting the region this wet season and drought conditions were expanding across the West. In southern Oregon and northern California, the water year which began October 1st saw no drought designated across the region. However, by March 3rd all of southern Oregon and far northern California had abnormally dry to moderate drought conditions (right). On March 9th, the southern Oregon snowpack ranged from 63% to 69% of normal.

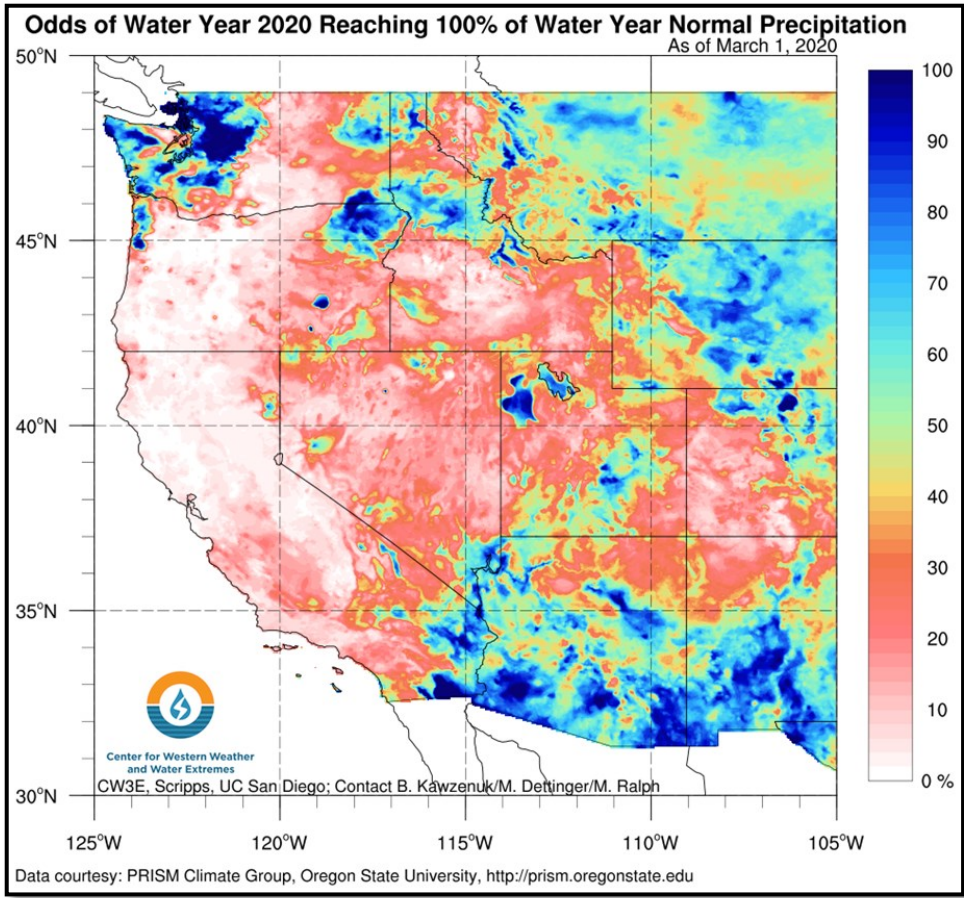
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Conditions were even worse in northern California where the Mount Shasta and McCloud areas had only 46 to 49% of normal snowpack.

The spring outlook does not look promising with probabilities favoring warmer and drier than normal conditions so drought development is likely. Reservoir levels were running below normal and worsening. On March 9th, Lost Creek Reservoir was 14% below normal, and Applegate Lake was 24% below normal. The biggest reservoirs in the Talent Irrigation District were not faring well with Emigrant Lake at 73% of normal and Howard Prairie Lake at 44% of normal. *cont. on next page.*

**Spring Began on  
March 19th at  
8:49 pm PDT.**



Based on conditions as of March 1st, much of southern Oregon and northern California had just a 10% or less chance of catching back up to normal by the end of this water year (left). This may be why on March 2nd the Oregon Governor signed a drought declaration for Klamath County due to the potentially negative agricultural impacts. If we have a dry spring then other counties will likely follow suit with drought declarations.

# SNOWMELT AND FLOODING



## WEATHER-READY TIP

Never attempt to cross a flooded road on foot or in a vehicle. Remember, the water in rivers can remain dangerously cold, even if the air temperature is hot.

Heavy rain and snow is common during the spring months in the mountains and along the U.S. West Coast. All that water leads to cold, fast-moving, dangerous rivers.

# Think Twice Before Jumping In!

Spencer Higgison, *Service Hydrologist*

Here in the Pacific Northwest we are blessed with abundant recreation opportunities. One of our greatest treasures is our water. From the ocean and coastal rivers to our headwaters and mountain lakes, the possibilities are endless.

After a cold winter and chilly spring, we look forward to the warmth that late spring and summer will provide. We look forward to getting back out onto, and into, our waters. It is fairly predictable that on the first day that the temperatures climb into the 90s, people will be out in force visiting their favorite swimming hole. Sadly, it is almost as predictable that the next day we will hear about a drowning.

Rivers and mountain lakes are fed mostly by melting snowpack. The snow melt flows down into the soil where it is insulated from the warming effects of the sun and makes its way to river channels where it is still incredibly cold.

Now back to that 90 degree sunny day where people are excited for their first chance to cool off in the rivers. They feel so hot that they jump in and linger without realizing what is going on behind the scenes.

Cold water can be deadly in two ways. The first is known as “cold water shock.” Cold water shock occurs when a person jumps or falls into cold water and the immediate submersion in the cold water shocks the system. Cold water shock causes the body to involuntarily gasp and lose control of their steady breathing rhythm. Quite often, that first involuntary gasp occurs while the person’s head is under water meaning that they have just filled their lungs with cold water taking their situation from dangerous to possibly fatal.

Second, cold water can be deadly is prolonged exposure. When a person enters cold water, the skin and extremities quickly become numb to the cold. This makes the cold less noticeable meaning that the person will often stay in too long. Body heat is lost 25 to 30 times faster in water than in air. To combat this, the body draws blood away from the surface of the skin in an attempt to prevent heat loss. Muscles shiver or remain tense in an attempt to generate heat. All of this combines to zap energy without the person realizing it. After prolonged exposure the person begins to lose control and function in extremities due to fatigue, heat loss, and numbness. The person quickly becomes distressed and is often unable to self-rescue. This often proves fatal.

Both of these cold-water situations have been seen frequently in our area. The victims are often in their teens or 20s and in great physical shape. Many of them are also strong swimmers. The exposure time can become deadly at varying times depending on size and body type.

The good news is that we don’t have to stop enjoying our waters. There are steps you can take to make sure you and your loved ones all

get home safely after a water outing. Enter cold water slowly so that you don’t expose yourself to cold water shock. Limit cold water exposure time to a few minutes. Exit the water frequently to help muscles relax and core heat to stabilize. Take float toys that can be thrown out to someone in distress. Wear a life jacket. While a life jacket can be cumbersome, it is similar to a seat belt. Most of the time you don’t need your seatbelt. You make it from point A to point B without incident. But like a seatbelt, when you actually need a life jacket, you’ll be glad you had it.

Warm weather is coming and we look forward to seeing you being safe out on the water!



Wild & Scenic Rogue River  
Credit: Greg Shine BLM

# Gardening for Climate: Going Beyond the USDA Plant Hardiness Designations

Brad Schaaf, *Meteorologist*

It's March 11th and so far this year, the weather has ping-ponged between the cold and wet--conditions one would find in mid-winter to the warmer and drier days associated more closely with mid-spring. My overwintered plants, such as pansies, chives, and even my ornamental pear tree have already started blooming. Neighbors are enjoying their daffodils, and even an assortment of early spring flowers have bloomed at the office here in Medford. These warm temperatures have made me, as well as many in the area, start planning my garden for this upcoming year. That being said, I understand that it is a slow process, and that we have a while before it is time to plant.

Before I go further, I have to admit that I am a novice gardener.



Last year was my first year ever planting a garden, and I had both successes and failures. I started developing a foundation by taking the free Seeds to Supper course offered in Jackson County by the OSU Extension Master Gardeners. If you're new to gardening, or want to learn some new techniques, I highly recommend the class. These classes are available to Oregon Residents and are offered in

almost all counties in the spring. For those of you in northern California, the University of California may hold similar classes. These master gardeners can answer any gardening questions you may have, so I am going to leave the actual gardening strategies to them.

What I can discuss, however, is utilizing the climate by examining the guidance that the [Climate Prediction Center](#) provides, our frost and freeze dates for southern Oregon and northern California, and even our forecasts created by the National Weather Service in Medford. Simply knowing about the weather and climate in this area helped me plant my garden last year more effectively than just knowing my plant hardiness zone by itself (I live in zone 8A).

First, I took a look at our general freeze climatology (right). To read this graph, I take a look at where I am located. For instance, if I were in Roseburg, I'd see that there was a 90% chance of having another freeze between March 4th and April 2nd. Between April 2nd and May 1st, there's a 50% chance of seeing another freeze; and after May 1st, the chances of seeing freezing temperatures in Roseburg decrease to 10%. This graph helps me start thinking about when I can start putting in my cold season crops, like beets, carrots, lettuces, and kales. These types of plants can survive frosts when they are established, so I focus on the freeze chart for these plants.

For warmer season crops that can be damaged by frost, the frost chart will be the one I focus on (right). For those of you in the Rogue Valley, you've probably heard "wait until Mother's

day." This lines up with the 50% chance of seeing a frost after May 23rd for the Medford Airport.

Normal Spring Frost (36F) Dates for Southwestern Oregon and Northern California (based on 1981-2010 data) [Change to Freeze \(32F\)](#)

Location	Elevation (Feet)	90% Chance 36F After	50% Chance 36F After	10% Chance 36F After
Bandon	20	Apr 6	Apr 29	May 17
Gold Beach	50	Mar 2	Apr 5	May 2
Medford Airport	1330	Apr 16	May 5	May 22
Medford Ag Station	1400	May 3	May 23	Jun 15
Ashland (*Cold Spot)	1750	May 17	Jun 3	Jun 23
Grants Pass	920	Apr 23	May 9	Jun 2
Cave Junction	1280	May 8	May 21	Jun 14
Ruch	1550	--	--	--
Roseburg	420	Mar 29	Apr 17	May 7
Riddle	680	Apr 11	May 1	May 19
Winchester	460	Apr 5	Apr 23	May 15
Mount Shasta	3590	All Year	All Year	All Year
Yreka	2630	All Year	All Year	All Year
Klamath Falls	4100	All Year	All Year	All Year

Normal Spring Freeze (32F) Dates for Southwestern Oregon and Northern California (based on 1981-2010 data) [Change to Frost \(36F\)](#)

Location	Elevation (Feet)	90% Chance 32F After	50% Chance 32F After	10% Chance 32F After
Bandon	20	Feb 15	Mar 25	Apr 21
Gold Beach	50	Jan 2	Feb 22	Apr 3
Medford Airport	1330	Mar 19	Apr 13	May 4
Medford Ag Station	1400	Apr 6	Apr 28	May 19
Ashland (*Cold Spot)	1750	Apr 25	May 11	May 31
Grants Pass	920	Mar 23	Apr 18	May 9
Cave Junction	1280	Apr 11	May 1	May 21
Ruch	1550	Apr 24	May 12	Jun 4
Roseburg	420	Feb 16	Mar 21	Apr 17
Riddle	680	Mar 4	Apr 2	May 1
Winchester	460	Feb 26	Mar 28	Apr 23
Mount Shasta	3590	Apr 30	May 19	Jun 8
Yreka	2630	Apr 28	May 17	Jun 3
Klamath Falls	4100	May 5	May 29	Jun 23

Although these charts are extremely useful on their own, they can be used with other guidance provided by the National Weather Service and the Climate Prediction Center. For instance, I will look at the weeks 3-4 guidance, 1 month and 3 month outlooks. This year (right), the guidance suggests increased chances for a colder than normal March and early April for our area.

Last year this time, we were looking at increased chances for above average temperatures for all three pieces of guidance. As a result, I had my beets, kales, and lettuces in the ground and my aeroponic tower by mid April. This is because our climatological freeze chart showed a 50% chance of freezing conditions normally, and the guidance was suggesting our warmer and drier than normal pattern would continue. This year, however, I am going to wait until mid to late april again, making sure I check the updated Climate Prediction Center's forecast to see their thoughts. If conditions continue to indicate cooler and wetter, I may hold off until Mothers Day to plant my cooler season crops. This becomes a risk because we can heat up quickly, and I would like to enjoy my cool season crops for

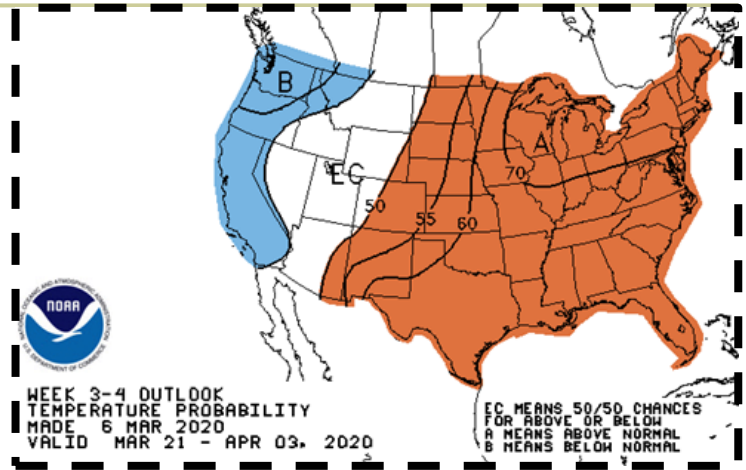


a few weeks by the time my lettuce starts bolting in late June early July.

When it came to my warm season crops last year, I had planted most of them on Mother's day weekend using similar forecasts, but using the frost chart instead of the freeze chart. My tomatoes thrived, as did most of my warm season crops. That being said, my bell peppers never took off. What likely occurred

was that despite only receiving one or two more frosty mornings in May and having covered my plants, the cold temperatures likely stunted the peppers. For this year, I plan to harden them off, but bring them inside during chilly nights and plant them in the ground in late May when the frost chart indicates a 10% chance of seeing a frost.

After putting the plants in the ground, I checked the forecast everyday to see if I needed to take any preventative actions. A piece of advice my master gardener shared with me that I would love to share with you: Take note of the patterns regarding the forecast and what happens at your house. Our forecasts are averaged out for a 2.5 km by 2.5 km area. This is very large considering the number of microclimates southern Oregon and northern California have. My friend notes that temperatures at her house run about 4 degrees colder than our forecast, so if she sees 40 degrees in the forecast, she takes preventative measures for frost. I noticed that my thermometers read about 3 degrees warmer than the one at the airport, so I have a little extra leeway when it comes to frost and



freeze considerations, but will still take action when I see temperatures near 36 degrees.

One other thing that I did not consider until I was knee deep in blossom end rot was the effect the previous winter's rainfall would have on my seasonal crops. I built new soil with help of a friend who is a master gardener over the winter, yet all of my fruit bearing plants, minus the zucchini, had blossom end rot. My friend suspects that the abundant rainfall washed away some of the needed nutrients. This year; I'm going to act early and take the necessary precautions and add some nutrients back to the soil to help prevent this from occurring again. I understand that this might be a bit controversial; but worry not avid gardeners, I am going to take it slow and see how the plants react this year. The last thing I want to do is wreck

the soil my friend and I made. This year, it is worth noting that we are considerably behind regarding rainfall in the water year, yet somewhat closer to normal for the calendar year. So, were my plants to have done well last year, I would wait to see how they are doing this year before amending the soil and opting to go the route of foliar spray.



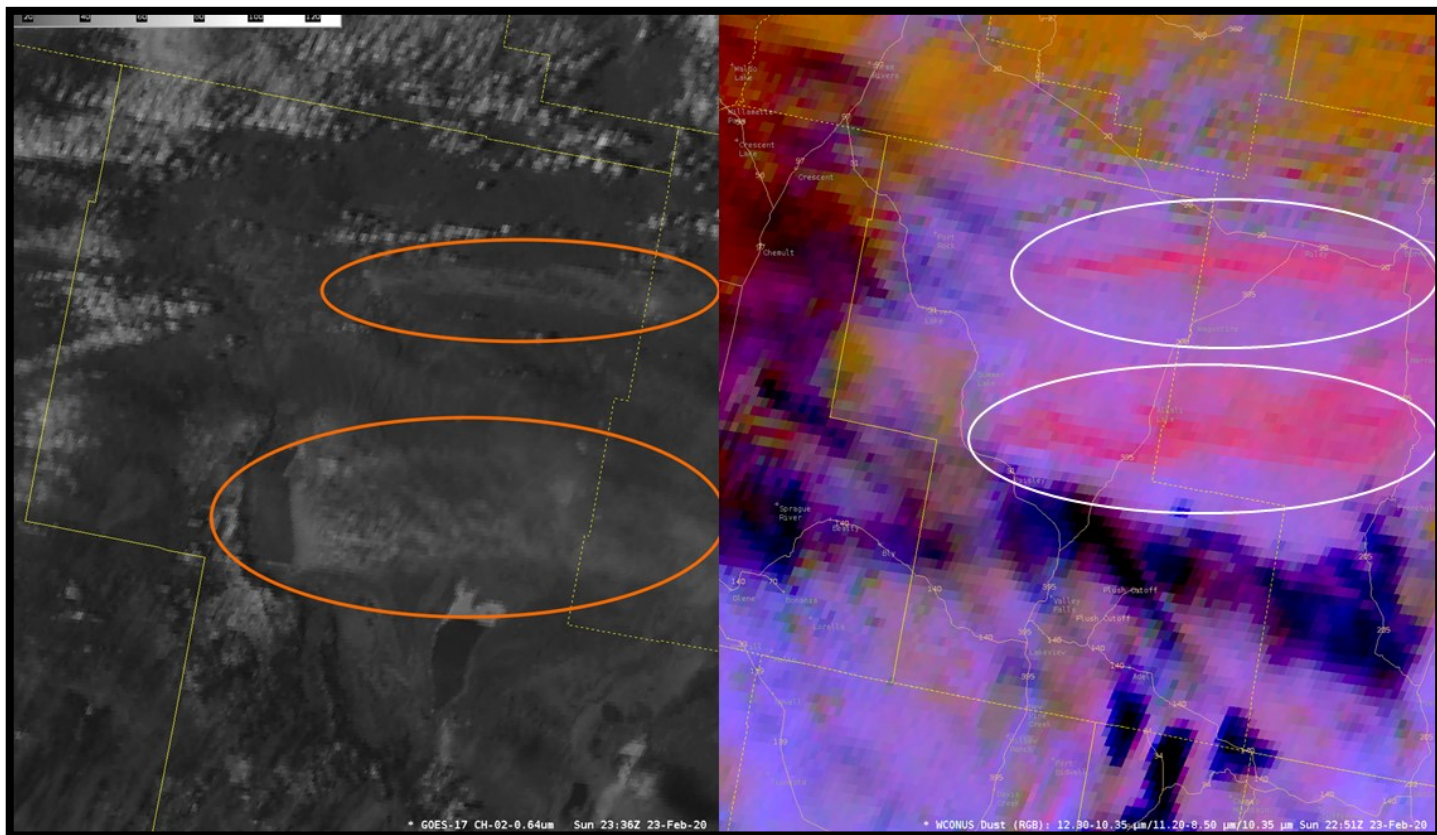
In all, I learned a lot about gardening last year, and I will continue to learn and make changes to the way I do things. I know that gardening can be difficult. I also realize that many of the struggles have to do with weather. Knowing your plant hardiness zone is a good start, but digging into the weather and climate of the area helped me successfully give myself the best start possible. From last year's take-away, I have to find a way to make sure my garden gets watered when I'm working during the time I normally water my plants. Consequently, I hear that there's a timer that does that.

## Forecasters' Eyes from Space—Satellites

Brian Nieuwenhuis, *Meteorologist*

**F**orecasters in the NWS keep constant watch over their areas through various means, but one of the best ways to keep an eye on everything at once is through satellite imagery. While keeping watch, particularly interesting events can sometimes be spotted by satellite that we might not know about otherwise. Two such events happened in just as many days during the latter part of February.

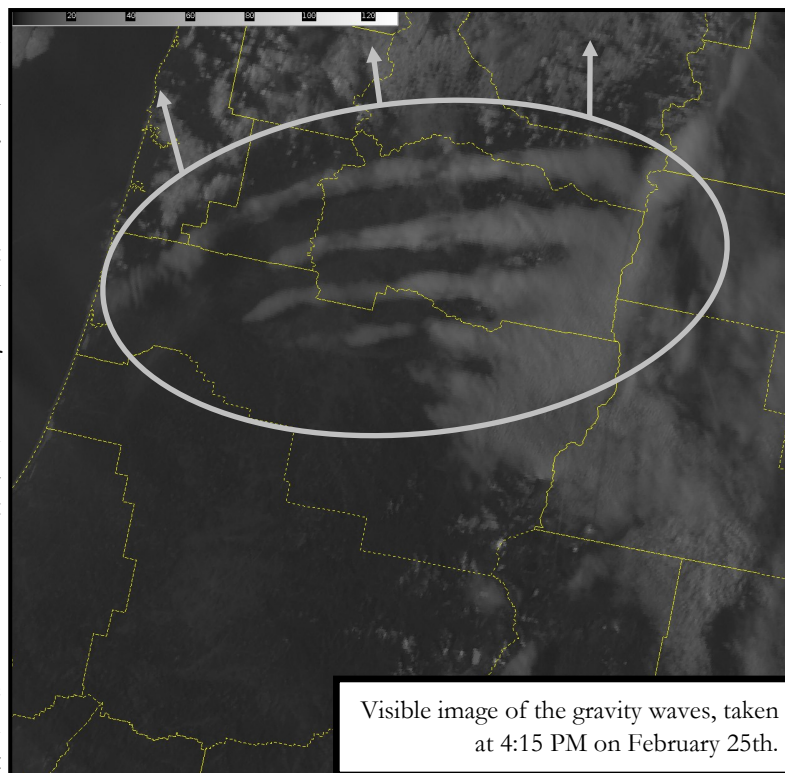
The first interesting event occurred during the afternoon of Sunday, February 23, when forecasters saw what appeared at first glance to be smoke pouring off of Summer Lake and Christmas Lake in Lake County, a similar image to the fires we frequently see during the late summer (see the left image below). Strong west winds were being measured across the area that day, a result of a passing cold front that itself produced a high east-west pressure gradient across the state. Maximum wind gusts of 64 mph were recorded at the fire weather station near Summer Lake, and gusts up to 77 mph were recorded at Wagonfire. Of course, lakes (and in this case, dry lake beds) do not burn, so considering the gusty winds and the abnormally dry month of February, the culprit in the visible satellite pictures was assumed to be blowing dust. The GOES weather satellite, with high resolution imagery and the ability to detect various wavelengths of light, has a channel dedicated to detecting blowing dust, which appears pink in the provided imagery (see the right image below). With this tool, the forecasters were able to quickly identify that, indeed, clouds of dust were being lofted by the wind, and blown across eastern Oregon and into Idaho. A quick look at ODOT traffic cameras at Alkali Lake, directly downwind, showed that visibility was quickly dropping, and with all of the data at hand, a rare Blowing Dust Advisory was issued by the office. *cont. on next page.*



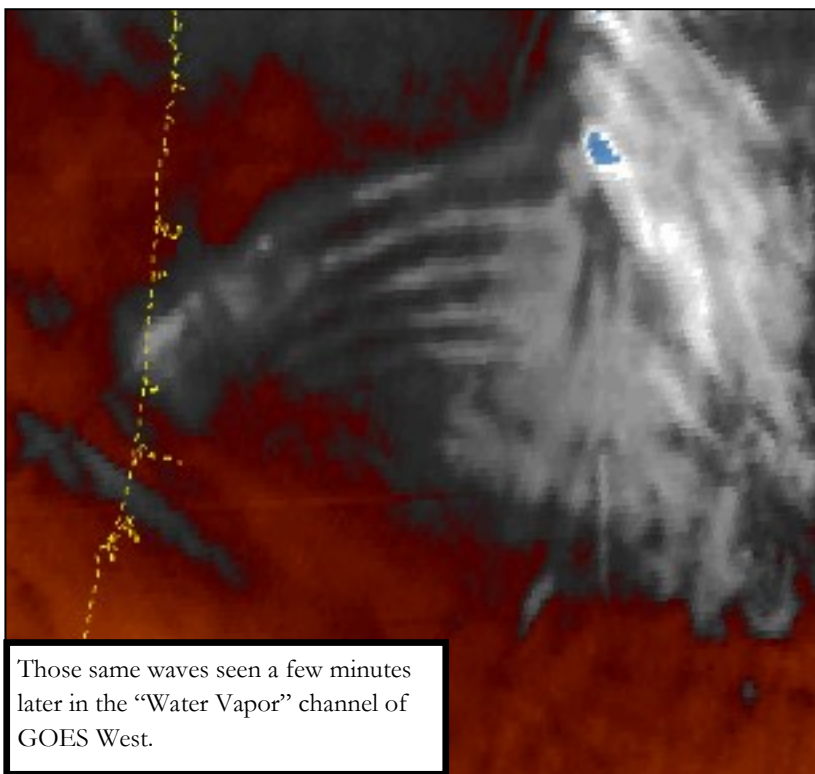
Left: Visible satellite from 3:36 PM PST Sunday, February 23rd. The areas of blowing dust are circled in orange.

Right: An RGB image from the “Dust” channel from GOES West, with the same areas of dust appearing as pink. Higher clouds appear as orange and deep purple.

The second event occurred the very next day, but did not result in any hazardous weather. Forecasters on the afternoon of February 24th instead had the opportunity to watch backward propagating gravity waves make their way over the Willamette Valley, a very uncommon feature, or at least one not typically seen so clearly. Atmospheric gravity waves are waves generated within or at the boundary of a very stable layer of air, usually by wind interactions with a front, mountains, or even thunderstorms; anything that can disrupt the usual flow of the wind. Gravity and buoyancy then try to restore equilibrium and the waves can spread across the area, much like the ripples made when a pebble is dropped into a pond. “Backward propagating” waves are waves that travel against the flow of the prevailing wind. In this case, the “pebble” that formed the waves was likely the Cascades, as the origination point appeared to be the area around Crater Lake and Mount Thielsen. The waves, once formed, then travelled through a very stable layer of air, probably at the height of one of several strong inversions that existed well above the surface that day. Despite the strong winds from the northwest, the



Visible image of the gravity waves, taken at 4:15 PM on February 25th.



Those same waves seen a few minutes later in the “Water Vapor” channel of GOES West.

waves were travelling towards the north and northwest, directly into the wind. Atmospheric waves such as these have been known to instigate or enhance thunderstorms, and can also produce strong winds at the surface, should they be at low altitude. This event occurred well above the ground and on a very stable day, so none of these more drastic effects were seen. They did, however, affect the local weather in the area, albeit subtly, by producing bands of clouds at each wave crest where the air was rising, and with descending air between the crests clearing the area of the cumulus clouds that were covering the region just before the waves arrived.

Events like these show that even on seemingly quiet or low-impact weather days, the atmosphere is still capable of producing rare features and uncommon impacts. It pays to watch our eye in the sky every day, because you never know what sights you might catch!



# WFO Medford - A Tale of Two Partner Agencies

Connie Clarstrom, *Senior Meteorologist*

**N**WS Medford forecasters Shad Keene and Connie Clarstrom explored the unique decision support services (DSS) needs of two diverse partner groups during a visit to rural Coos County, Oregon.

During a regularly scheduled outreach trip to USCG Sector North Bend in Coos County, forecasters took the opportunity to explore a new partnership with the City of Coos Bay. The Coos Bay Public Works director, Randy Dixon, was eager to meet with the NWS forecasters. During an enlightening discussion about the unique needs of the city's Public Works, the forecasters were able to identify several avenues to enhance services to the city. The forecasters gained a better understanding of flooding on Highway 101 during heavy rainfall and high tides, and will provide additional DSS during these situations. This support will ensure that the Oregon Department of Transportation and Coos Bay Public Works can better anticipate and plan for flooding. Given the high benefit in just a short visit, Shad and Connie are planning additional visits to other coastal cities.

As part of a long and close partnership, Shad and Connie next visited the U.S. Coast Guard Sector North Bend for an annual DSS outreach meeting. As U.S. Coast Guard pilots and staff frequently change, the DSS program at NWS Medford prioritizes one to two outreach meetings yearly with all local U.S. Coast Guard stations. In the meeting, Shad Keene gave a presentation on NWS Medford DSS resources to the North Bend Search and Rescue (SAR) Pilots. The forecasters engaged in discussion with the SAR pilots on their specialized DSS needs, and solicited feedback on DSS products and services. WFO Medford provides a targeted DSS web page specifically designed for USCG air station uses, and this page was discussed lengthily, with a couple of potential improvements identified. This webpage has provided a high level of DSS to the SAR pilots and has been enthusiastically used, with pilots engaging with the web page over 9000 times in the past year. To cap off the trip, LCDR Josh Smith provided the forecasters with a facility tour and a thorough introduction to the SAR capabilities of their helicopters. The need for a continued close relationship with the U.S. Coast Guard station was recognized and welcomed during the visit.

Senior Meteorologists: Connie Clarstrom (front) & Shad Keene (back)



Senior Meteorologist Connie Clarstrom & USCG SAR pilot LCDR Josh Smith

**Weather-Ready Nation**  
National Oceanic and Atmospheric Administration



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## Our Vision

Professionals focusing on science, teamwork, and customer service to design and deliver the best decision-support information to our community.

## Our Mission

Our team at the National Weather Service Office in Medford strives to deliver the best observational, forecast, and warning information through exceptional customer service, extensive training and education, maintaining quality electronic systems, and relying upon an outstanding team of weather spotters and cooperative observers. We do this within the overall mission of the NWS to build a Weather-Ready Nation:

To provide 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.

## Our Values

Trust, Integrity, Professionalism, Service, Teamwork, Ingenuity, Expertise, and Enthusiasm.

## About Us

The Weather Forecast Office in Medford, Oregon, is one of more than 120 field offices of the National Weather Service, an agency under the National Oceanic and Atmospheric Administration and the United States Department of Commerce. The Weather Forecast Office in Medford serves 7 counties in southwestern Oregon and 2 counties in northern California, providing weather and water information to more than a half-million citizens. We are also responsible for the coastal waters of the Pacific Ocean from Florence, Oregon, to Point St. George, California, extending 60 miles offshore. The office is staffed 24 hours a day, 7 days a week, and 365 days a year by a team of 26 meteorologists, hydrologists, electronic technicians, hydro-meteorological technicians, and administrative assistants.

