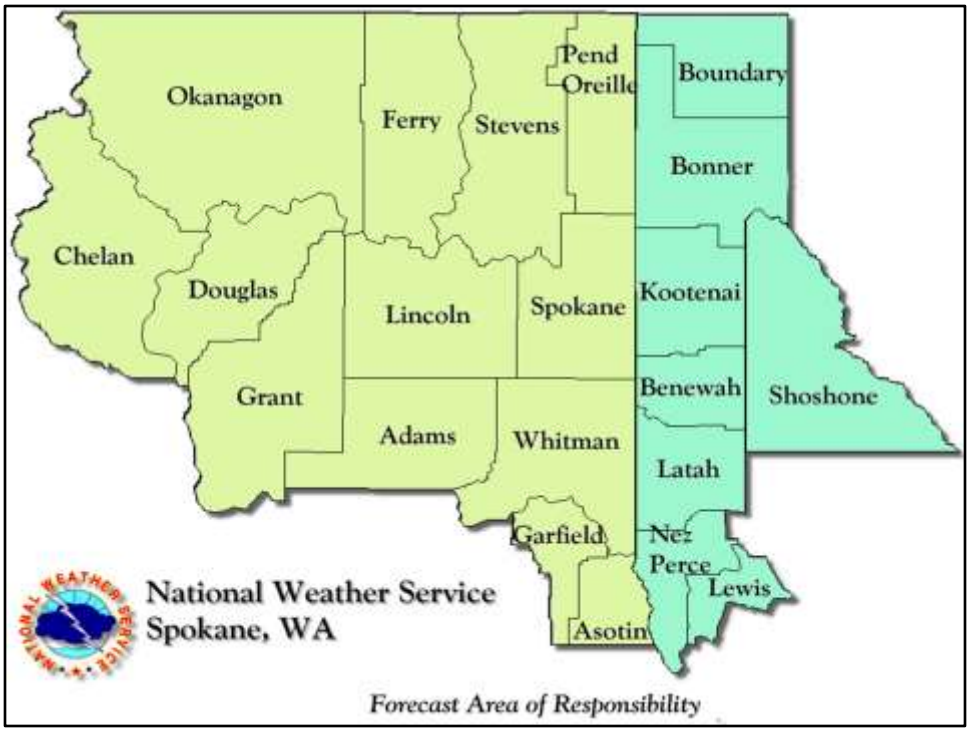
Welcome to Spotter Training for the Inland NW – Winter 2018 edition.

The agenda includes: describing the role of the National Weather Service, what is the weather spotter program and what to report, weather hazards and safety rules, how we get the word out, learning other ways to get involved, and lastly the Winter Outlook for 2018. Enjoy this winter scene at the NWS Spokane office.

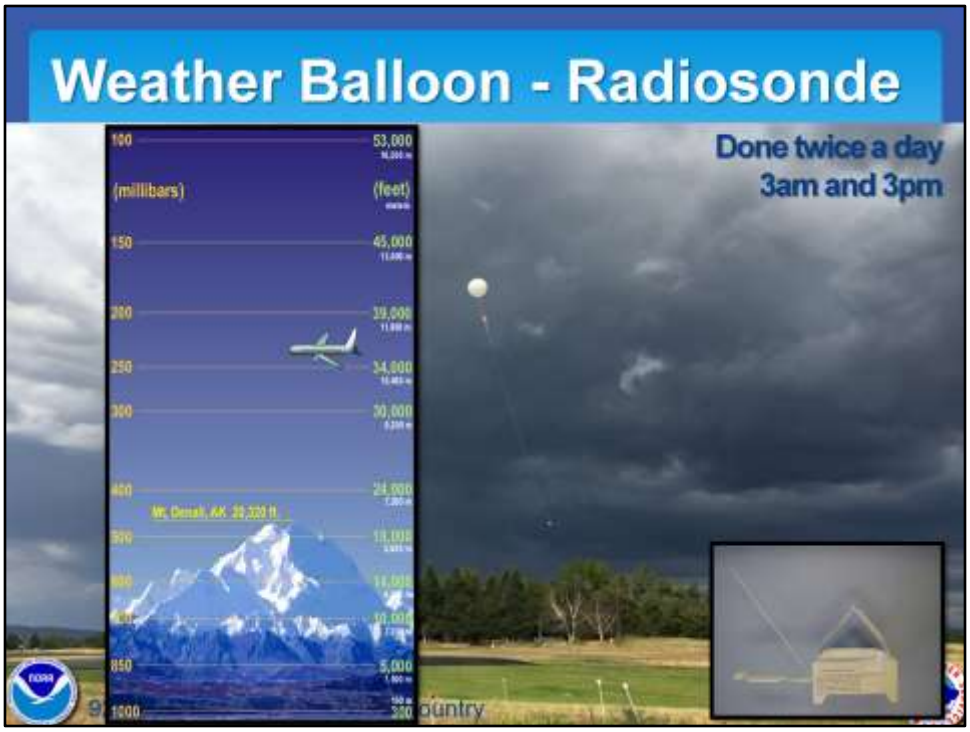
The National Weather Service (NWS) is a federal agency with 126 offices across the county. The main responsibility is to issue the weather/water watches and warning for the county warning area and work with local agencies to get the word out. NWS works behind the scenes, giving expert advice, collecting weather observations and composes weather forecasts for 7 days in advance. NWS also provide preparedness education.

The NWS Spokane is open 24 hours a day, 7 days a week with 22 employees, mostly meteorologists coming from all parts of the county. There is also a hydrologist that concentrates on the rivers and a staff of electronic technicians that fix and maintain the equipment. The main duties at the NWS Spokane include: observations including the daily weather balloon, forecasts out 7 days and all weather/water watches & warnings for the Inland NW.

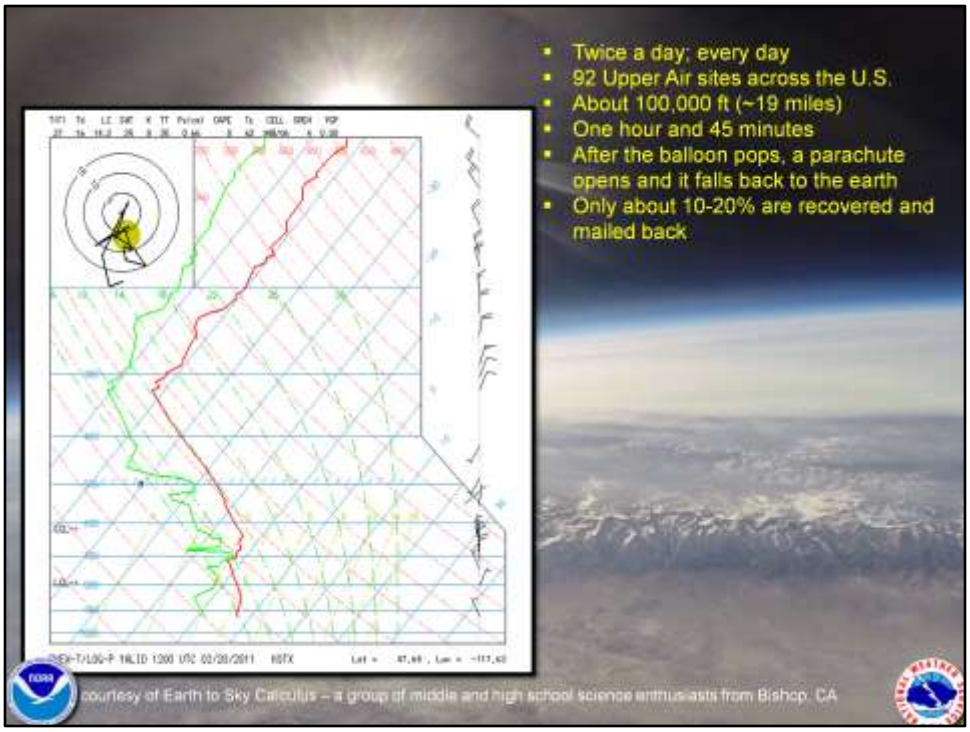


Here is a map of the county warning area for NWS Spokane.

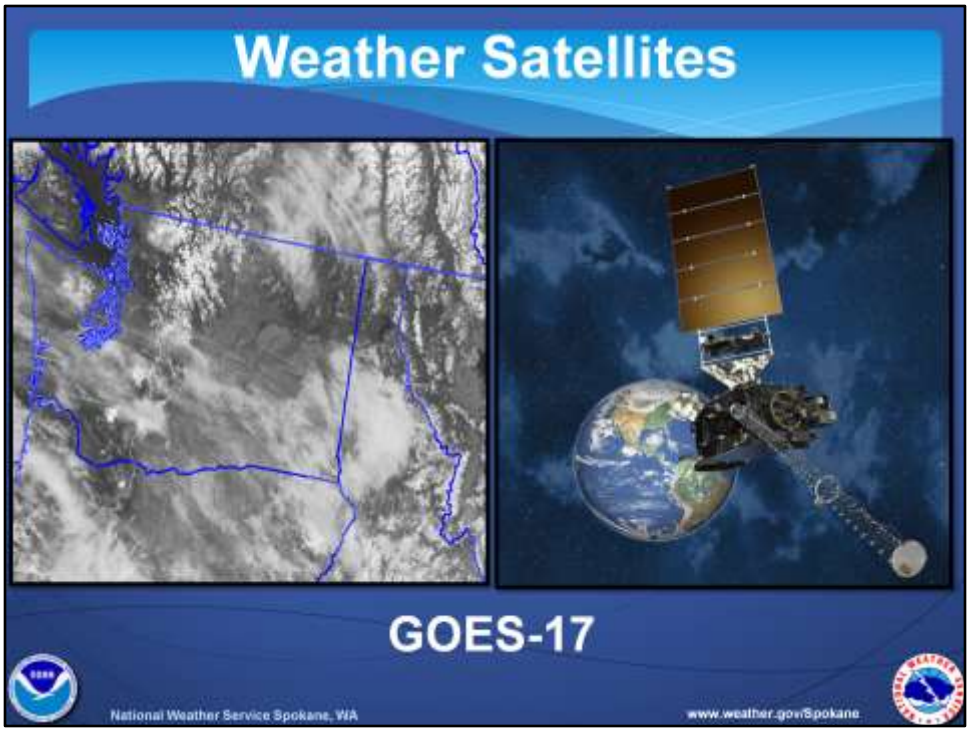
Taking observations is a priority for the National Weather Service.



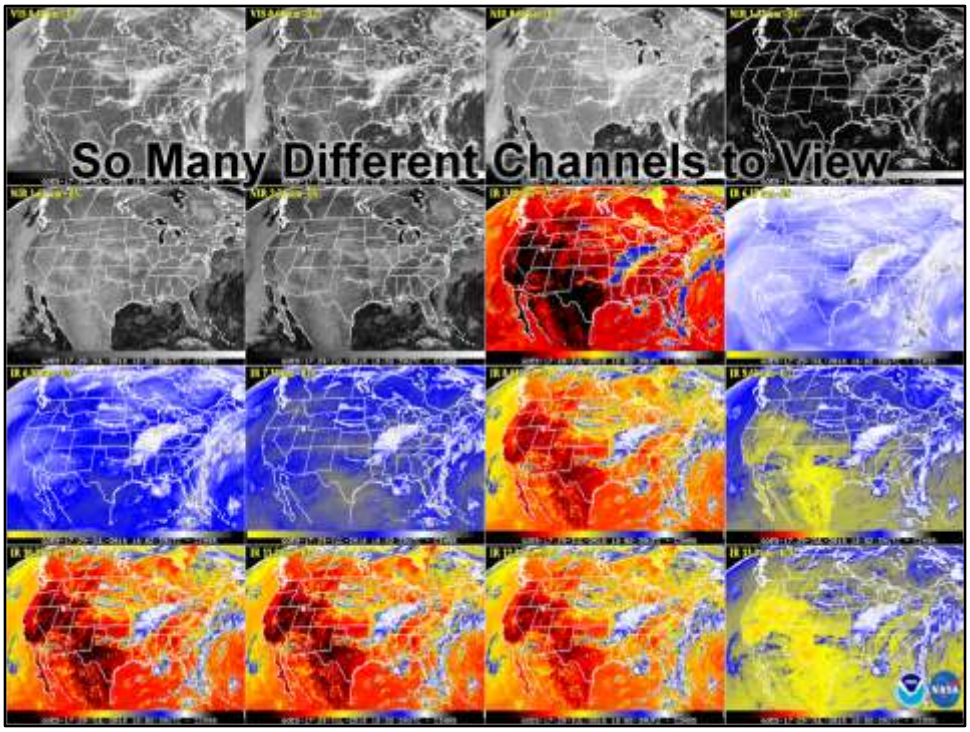
Weather balloons are launched at NWS Spokane twice daily – 3am PST and 3pm PST. These weather instruments collect valuable weather data through the entire atmosphere including air pressure, temperature, wind and humidity.



There are 92 upper air sites across the U.S. Each balloon can rise to about 100,000 ft or roughly 19 miles high. The flight takes about 1 hour and 45 minutes. The chart shows traces of temperature, humidity and winds.

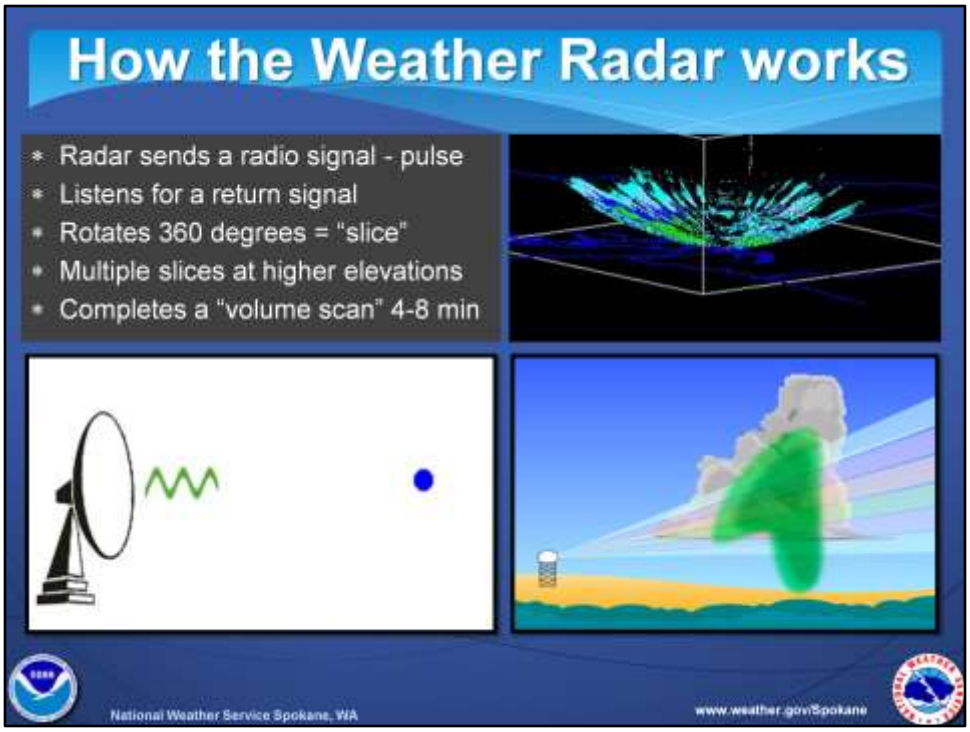


Weather satellites are cameras that orbit the earth and take images of clouds and the atmosphere. Most of the cloud cover viewed are the cloud tops; not what is seen from the ground. The newest satellite is GOES 17 which will be made operational in the western U.S. in January 2019.

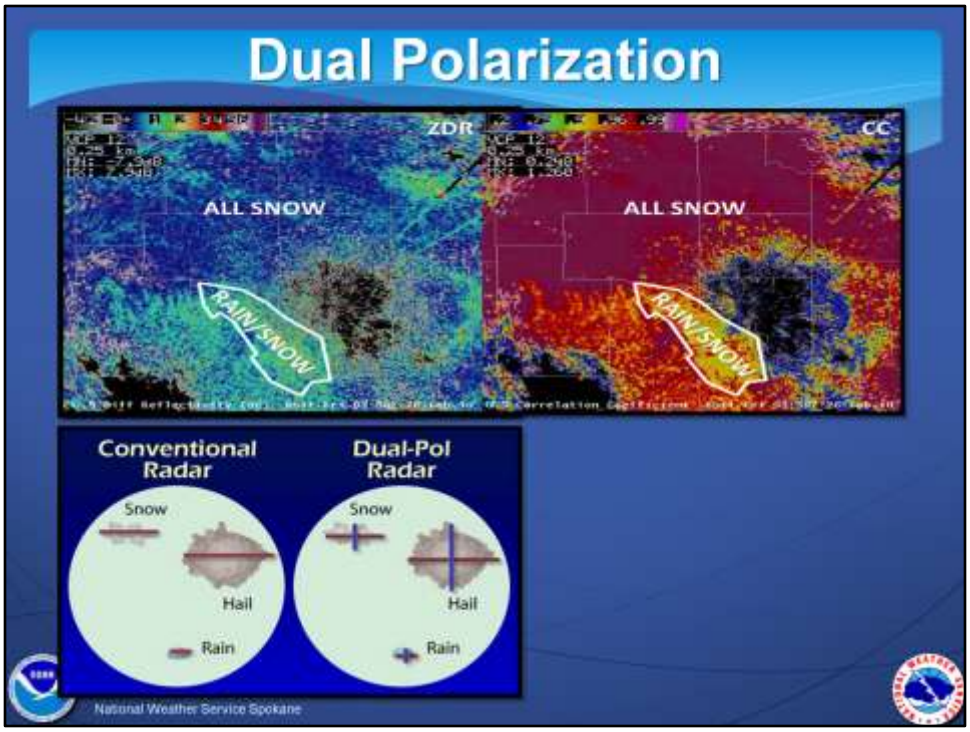


GOES 17 satellite will have at least 16 different channels to show cloud cover, temperatures and water vapor across the county.

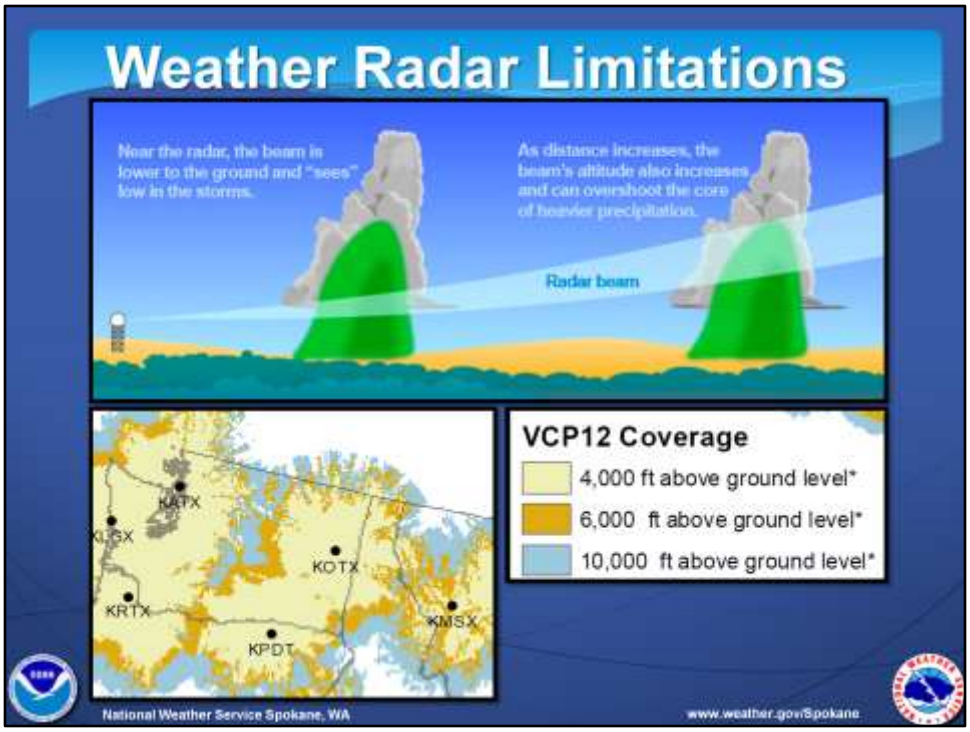
Each NWS office has a weather radar which scans the skies detecting precipitation.



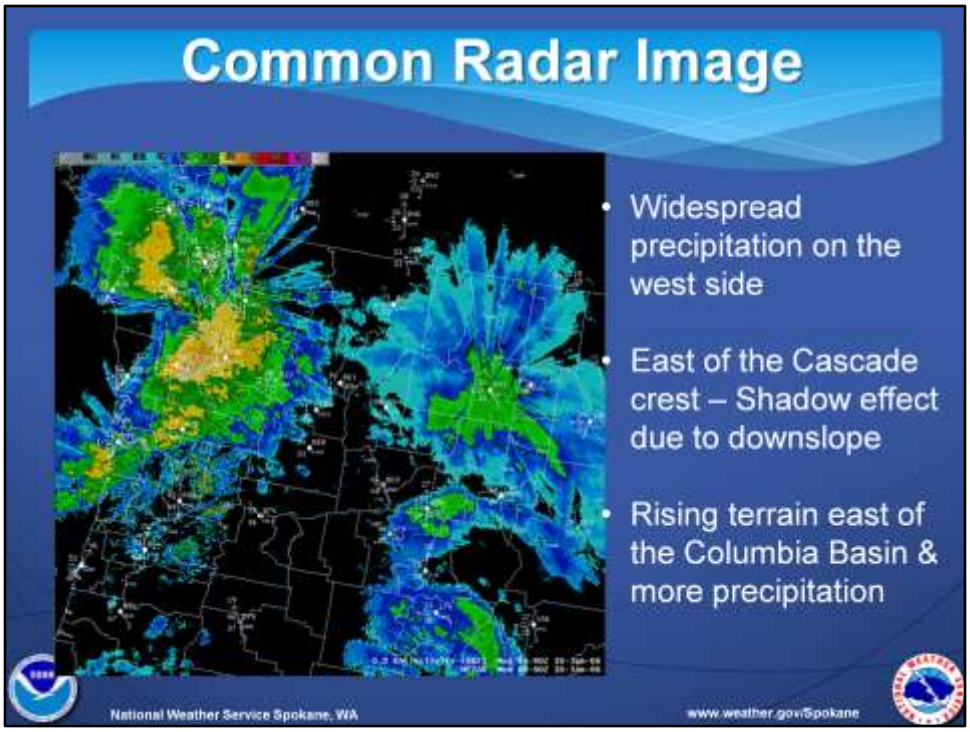
The weather radar works by sending out a radio signal – pulse. This pulse will bounce off rain drops, snow flakes and hail, returning the signal back to the radar. The radar rotates 360 degrees to make a slice and raises at multiple increment elevations. The radar completes a volume scan in 4-8 minutes.



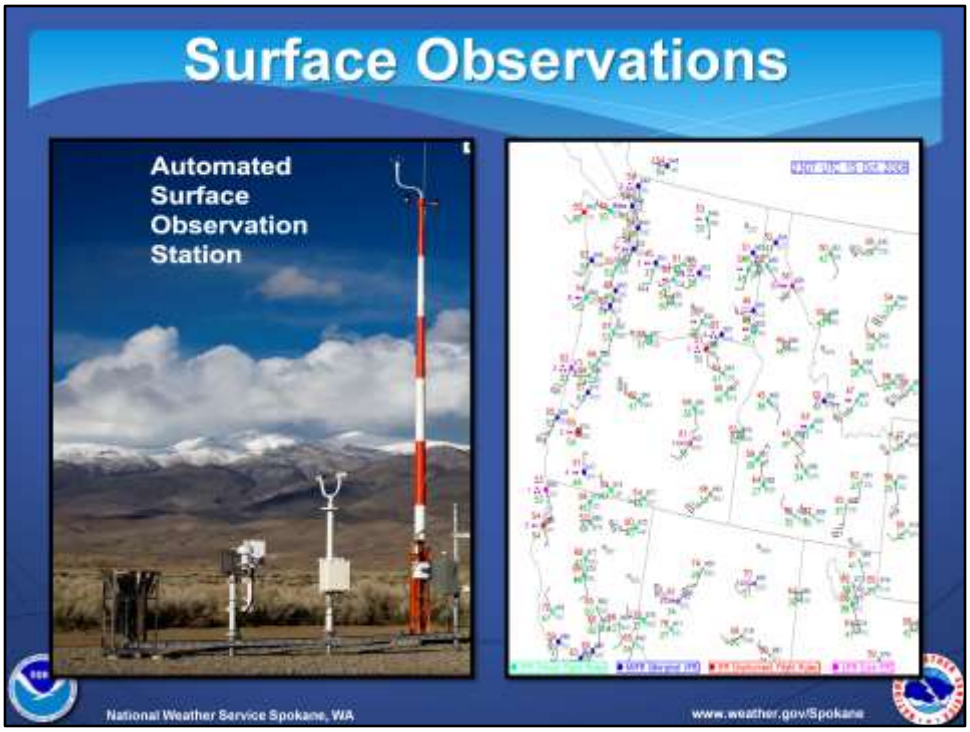
Weather radars have dual polarization, allowing them to scan not only in the horizontal but the vertical as well to better detect precipitation.



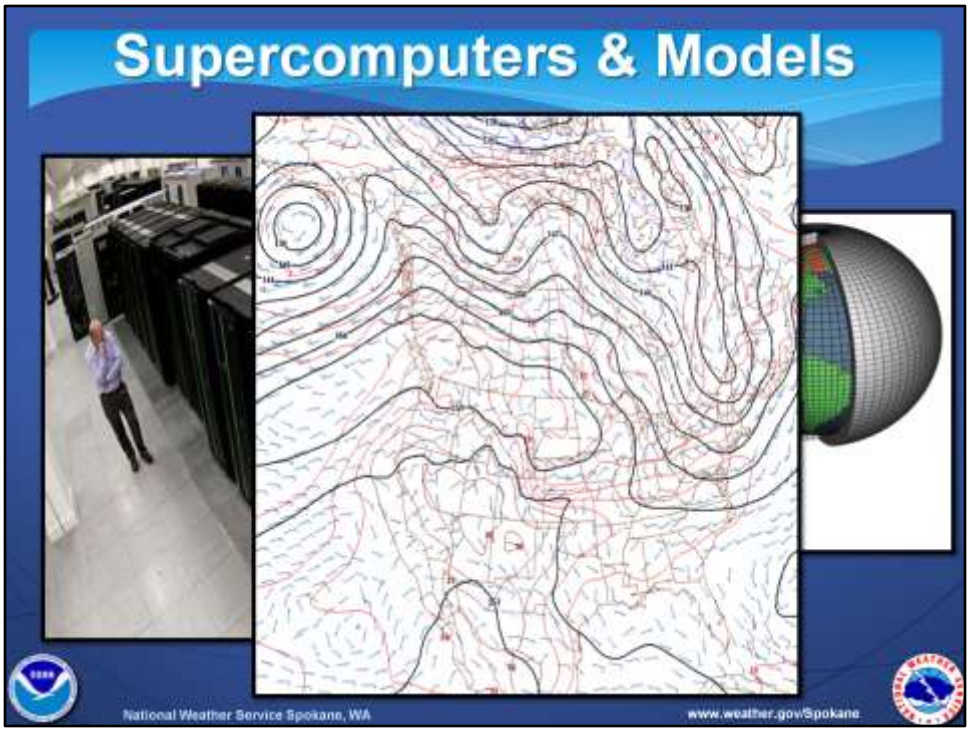
Weather radars do have limitations. As storms move farther away from a radar, the radar beam is unable to scan the lower portions of a storm. Radar beams are hampered by trees and mountains, and radar data is lost.



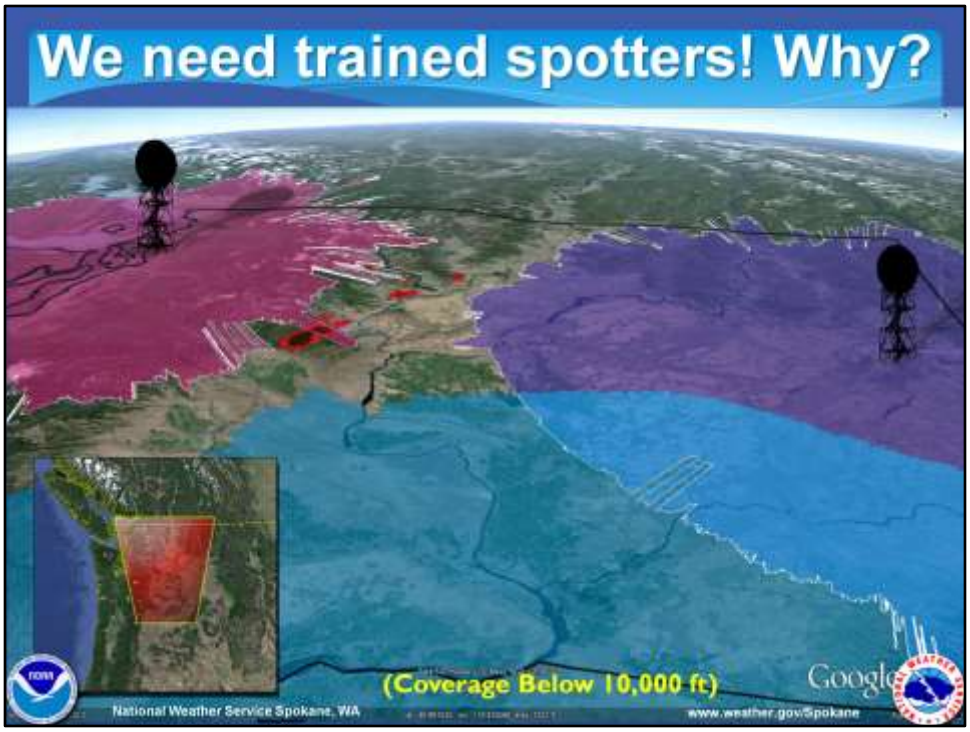
Here is a common radar image for the Pacific NW with widespread precipitation on the west side of Washington. East of the Cascade crest, a shadow effect sometimes develops due to downslope flow and less precipitation. Rising terrain east of the Columbia Basin into north Idaho can lead to more precipitation seen on radar.



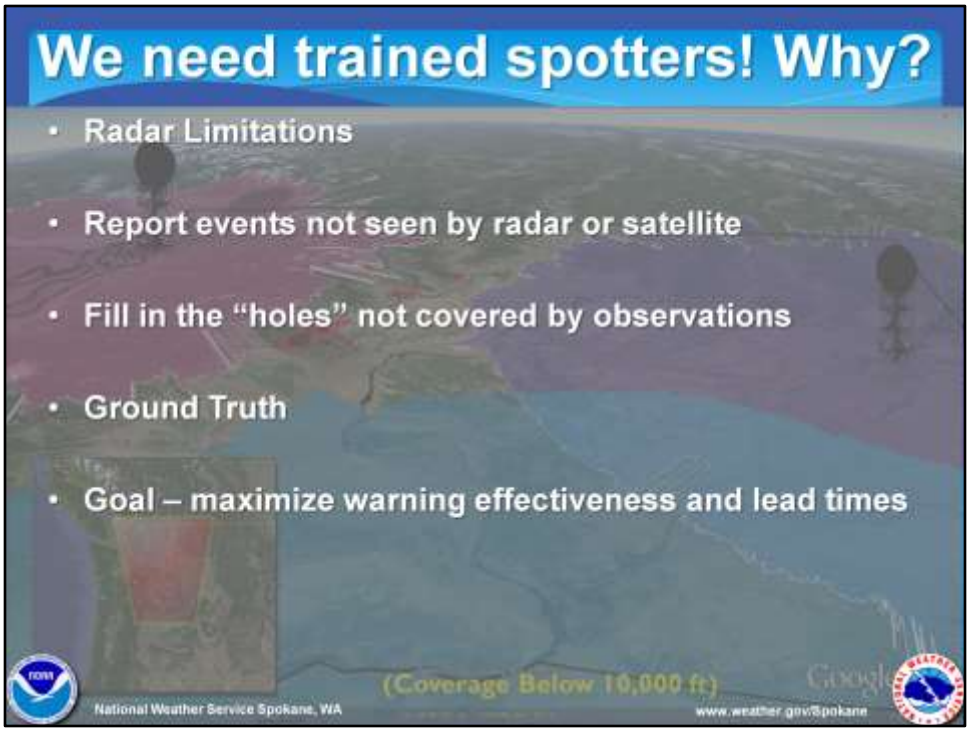
Surface observations are a valuable source of weather data. Most are located at local airports and can give hourly automated weather. This data can be plotted on a weather map.



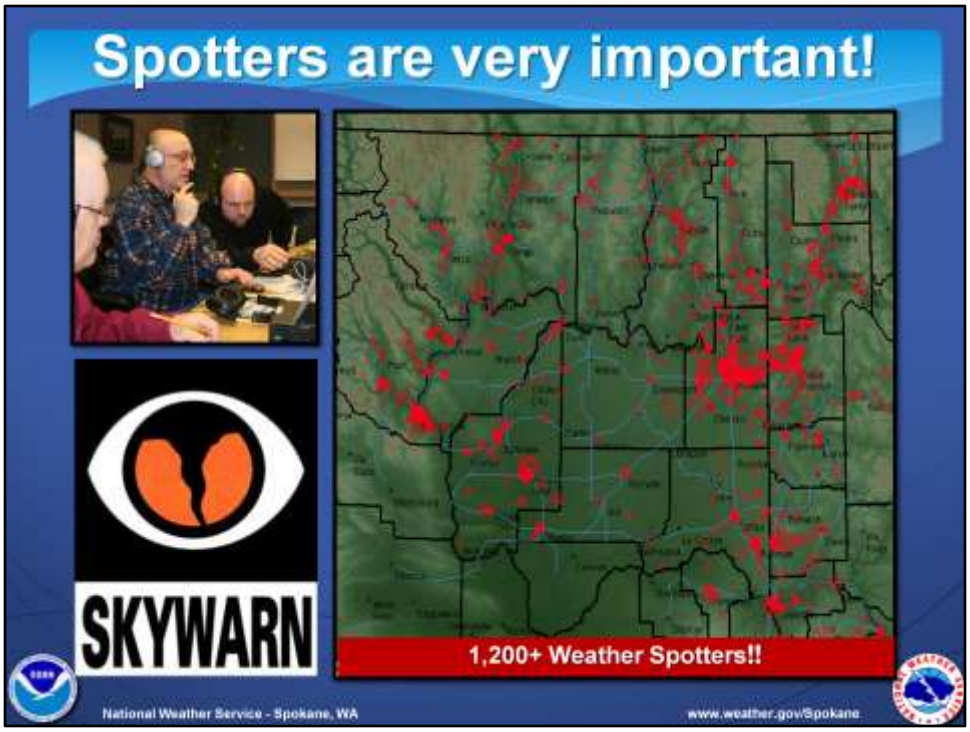
Computer power is immense in the National Weather Service, collecting the weather data from surface observations, weather balloons, satellites and radar. In addition, supercomputers run programs that model the atmosphere and give updates every 6 hours and some hourly.



So with all this technology and tools, why does the NWS need weather spotters?



There are many reasons. One – the limitations with the radar. Two – give reports not seen or captured by radar or satellite. Three – to fill in the holes not covered by observations. Four – to give ground truth on weather. Five – to maximize the warning effectiveness and increase lead times on severe weather.

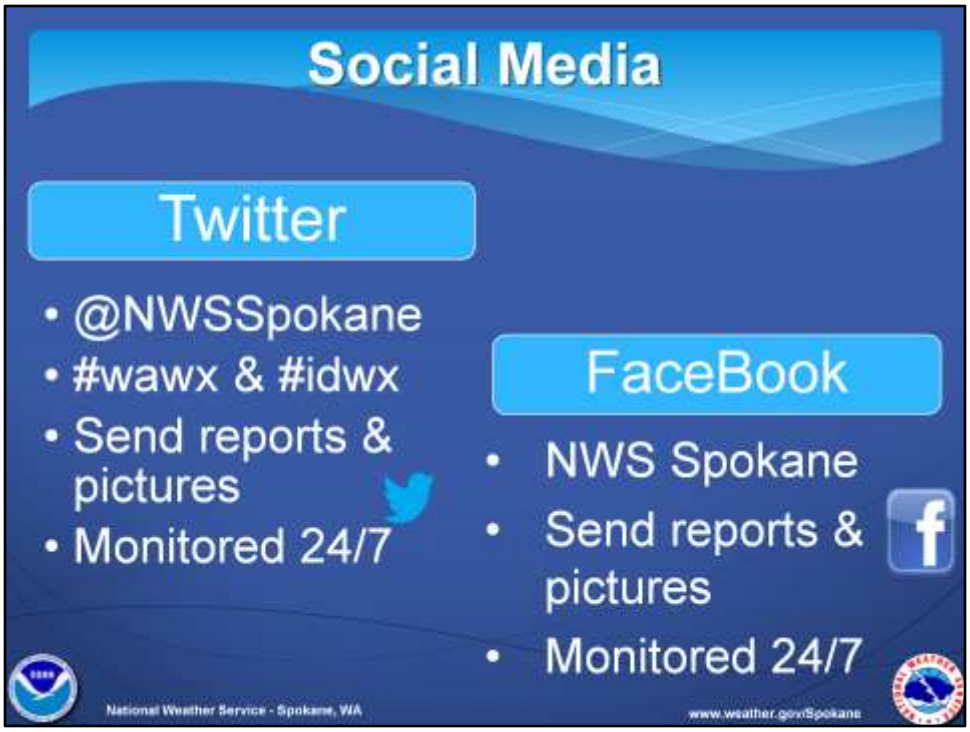


Weather spotters are very important to the National Weather Service. These volunteers number over 1200 across the Inland Northwest, clustering in the major city locations. Weather spotters are the “eyes and ears” of the National Weather Service.

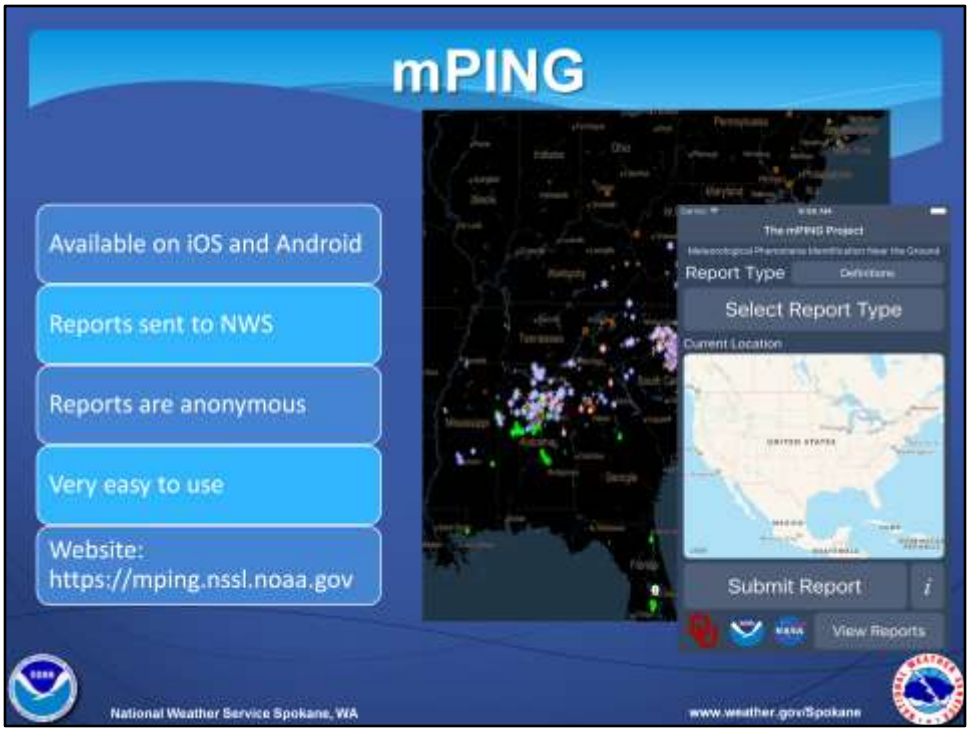
How to give a weather spotter report.

The easiest is to give a phone call. Dial the toll free number. Tell the forecaster what you see, where you are and what time it is.

If you don't feel like calling, an online report system is available on the NWS Spokane web page at www.weather.gov/spokane. Scroll to the bottom of the page and click on Submit a storm report.



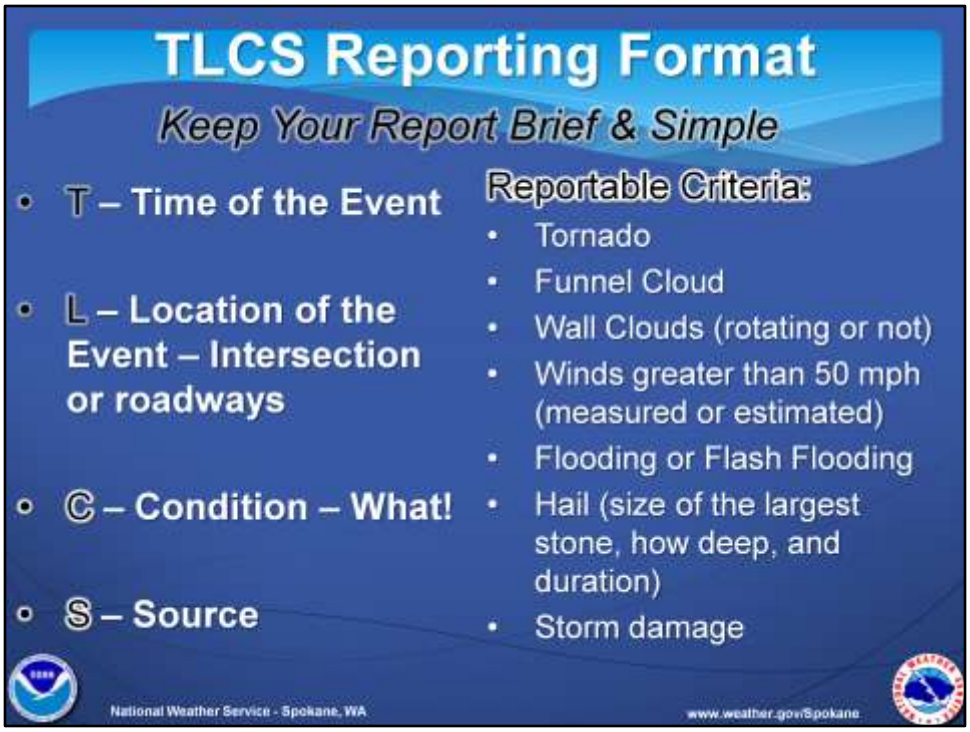
NWS Spokane is active on social media and you are welcome to share your reports on Facebook and Twitter.



Another useful weather app is mPING. It is a crowd sourcing app that allows you to report precipitation type on your phone. This data is collected and plotted on NWS radars to give ground truth reports.

Email is a great way to send pictures and images.

Remember in a spotter report to include: Who, What, Where and When. If you are describing wind, you can estimate wind speeds. Include any damage reports.

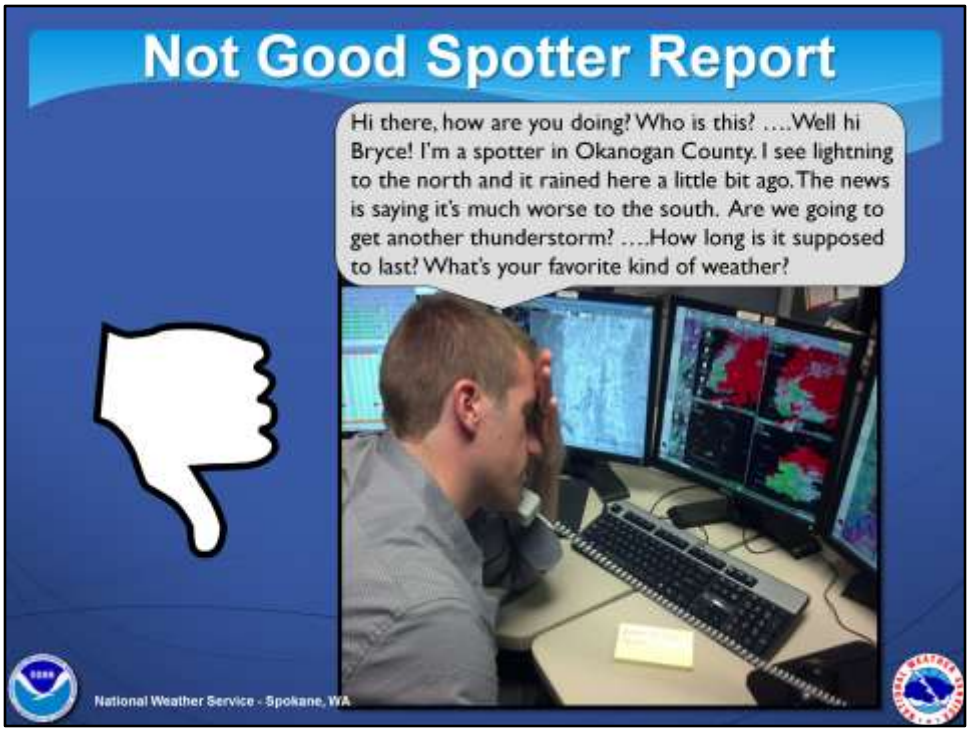


Keep your report brief and simple and follow these great criteria.

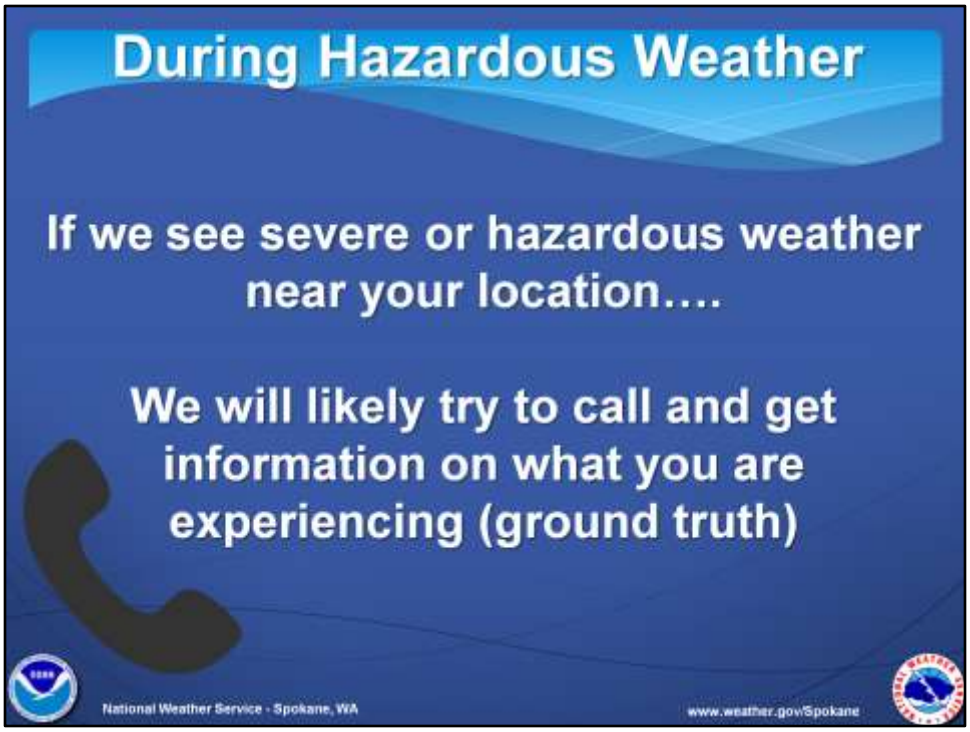
Here is the NWS Spokane weather spotter checklist. Please provide a weather spotter report when you encounter any of this criteria.

Here is an example of good spotter report!

Here is an example of another good spotter report!

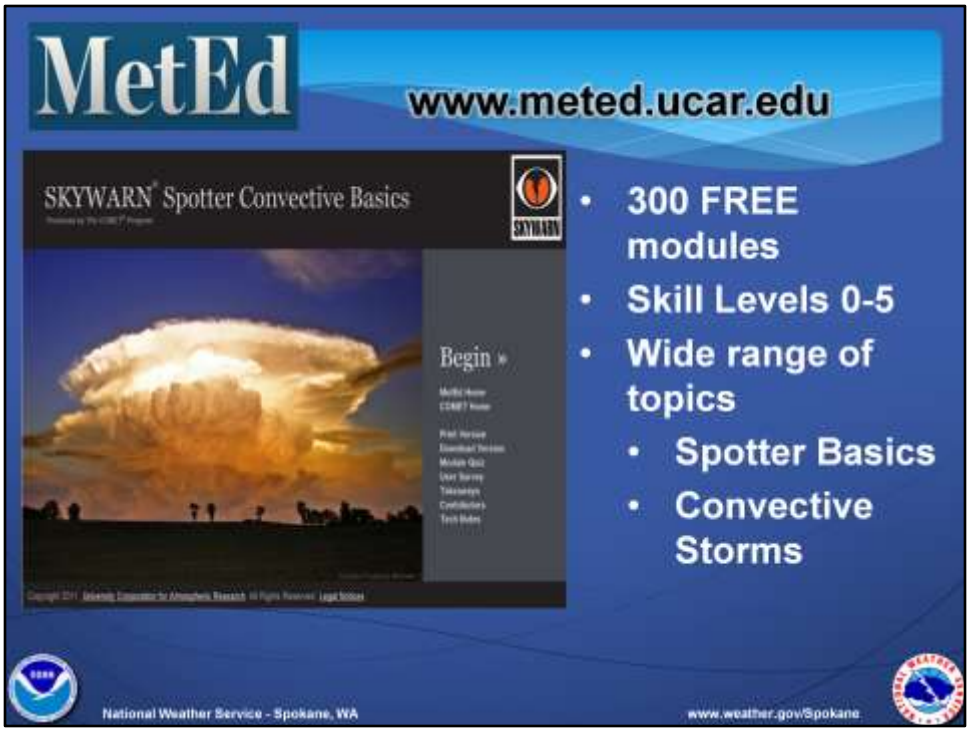


This is not a good spotter report and will need improvements. Remember to keep your reports brief and to the point.



During a hazardous weather event, NWS may call you to solicit a weather report and gain ground truth.

You can find a list of weather spotter resources on the NWS Spokane web page. Go to the Local Programs tab on the far right and select the Spotter Program.



You can get additional weather spotter training and access to free weather classes at www.meted.ucar.edu

NWS appreciate weather spotter emails. They are used to send you quarterly newsletters and to notify you on widespread severe weather risks.

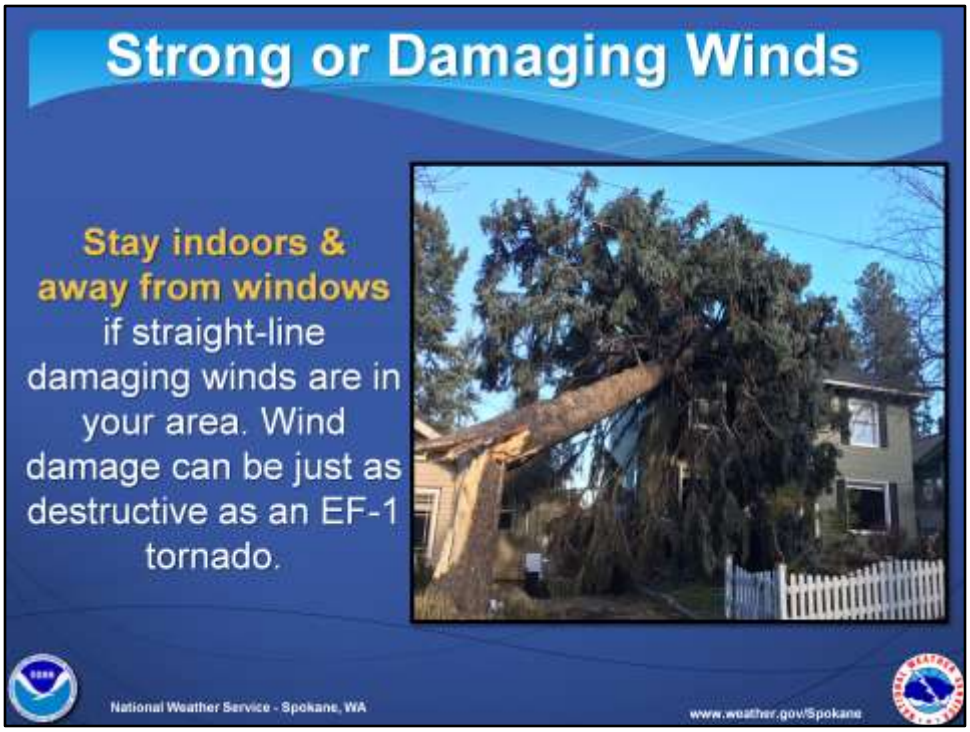
Now let’s review cold season hazards.

Please report the first snow of the season. Then at least 2” of new snow. Keep in mind: Heavy snow is 4”+ in 12 hours and 6”+ in 24 hours in most valley locations. Mountains have higher criteria.

A blizzard has specific criteria that include: winds 35 + mph, causing blowing snow with visibility of ¼ mile or less and lasting at least 3 hours. The snow will be fine and dry and usually accompanied by very cold air. These type of conditions are not very common in the Inland NW.

Mixed precipitation is any time the precipitation changes type: including freezing rain or freezing drizzle, sleet, snow changing to rain or rain changing to snow, any ice accumulation. Keep in mind ¼ inch of ice accumulation is an Ice Warning.

Report any wind damage or winds estimated to 30 mph or greater. Keep in mind severe or high winds are 58 mph or greater (50 knots +).



During extreme wind events, stay indoors and away from windows. Wind damage from straight line winds can be as destructive as an EF 1 tornado. Remember November 20, 2015.

Beaufort Wind Chart – Estimating Winds Speeds

Beaufort Number	MPH Range	MPH Average	Terminology	Description
0	0	0	Calm	Calm. Smoke rises vertically.
1	1-3	2	Light air	Wind motion visible in smoke.
2	4-7	6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	22	Fresh breeze	Smaller trees sway.
6	25-31	27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	32-38	35	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	42	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	50	Severe gale	Light structure damage.
10	55-63	60	Storm	Trees uprooted. Considerable structural damage.
11	64-73	70	Violent storm	Widespread structural damage.

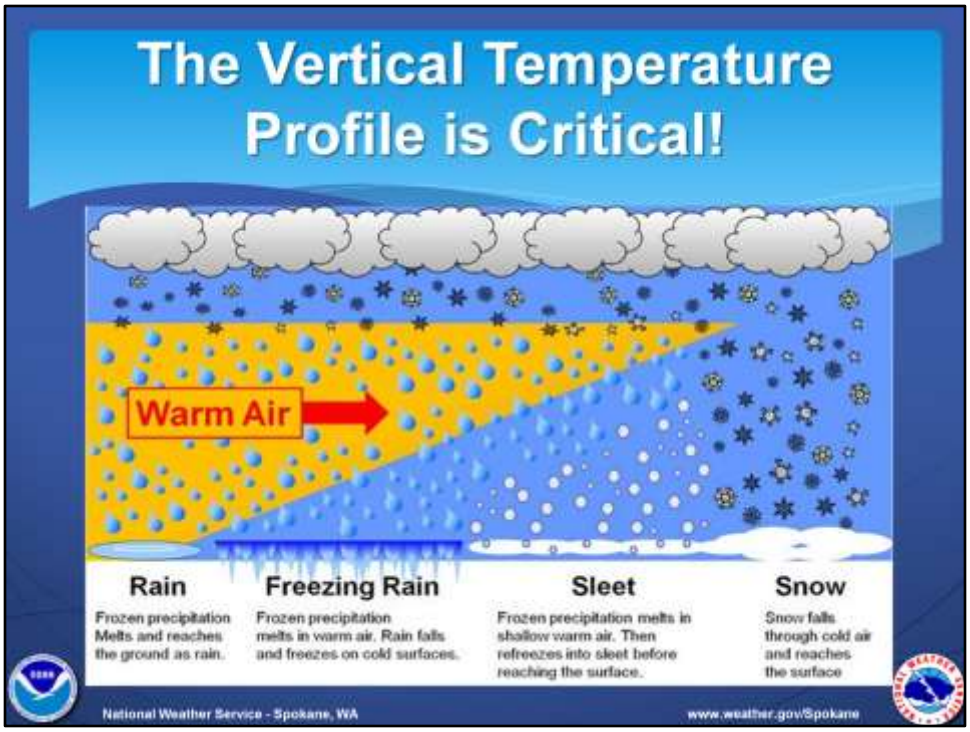
You don't need weather equipment to be a weather spotter. You can estimate wind speeds by using the Beaufort Wind Scale.

Give reports of heavy downpours or long periods of rain.

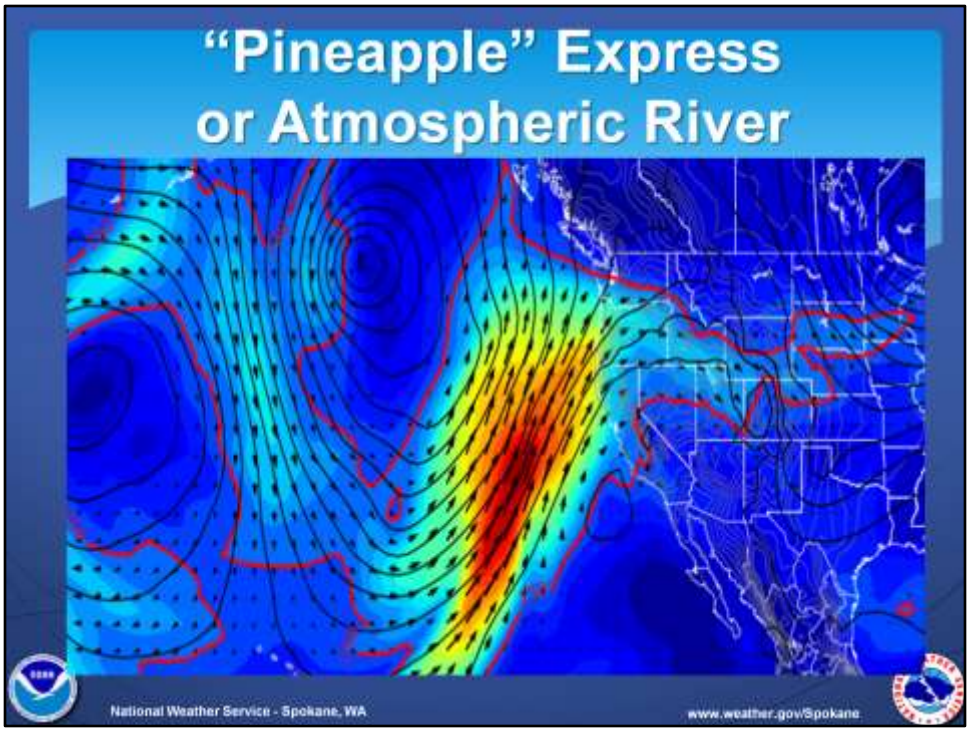
Give reports of flooding on rivers, streams or low lying areas, and especially if it associated with ice jams.

Too much rain may lead to mud and debris flows, especially in an area that has seen recent wild fire activity.

Here is a typical winter storm scenario. Cold air is in place over the Inland NW. Mild Pacific air rides over the cold air. Precipitation begins as snow, gradually changes to rain with possible freezing rain.



Knowing the freezing level and warm layers in the atmosphere is important to understanding the precipitation type.

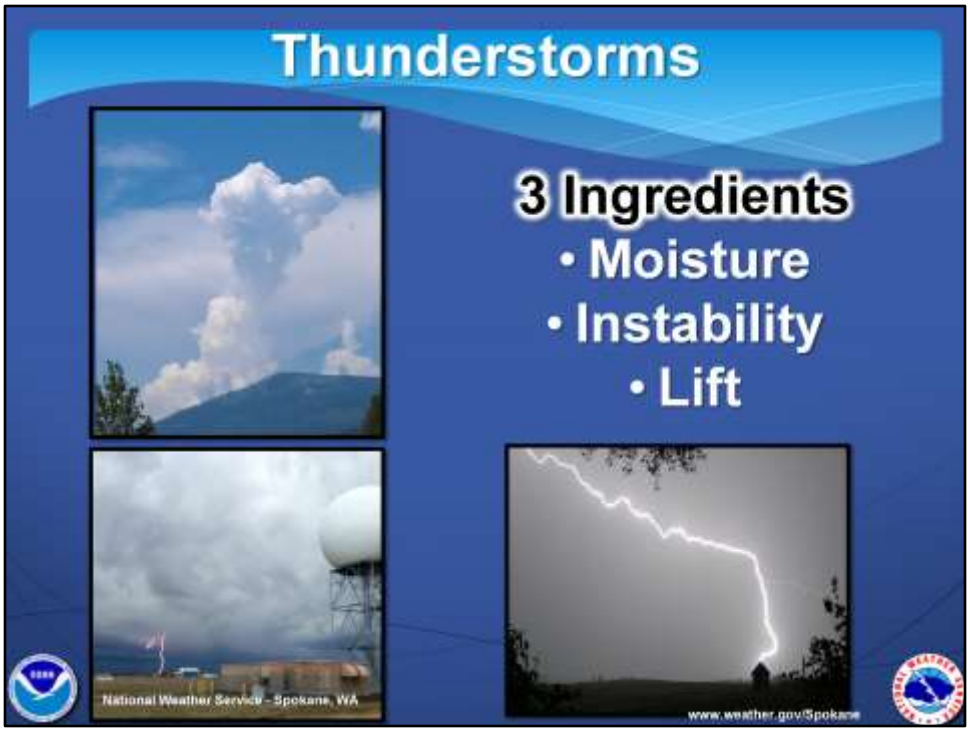


A Pineapple Express or Atmospheric River is a stream of mild moist Pacific air that moves into the region.

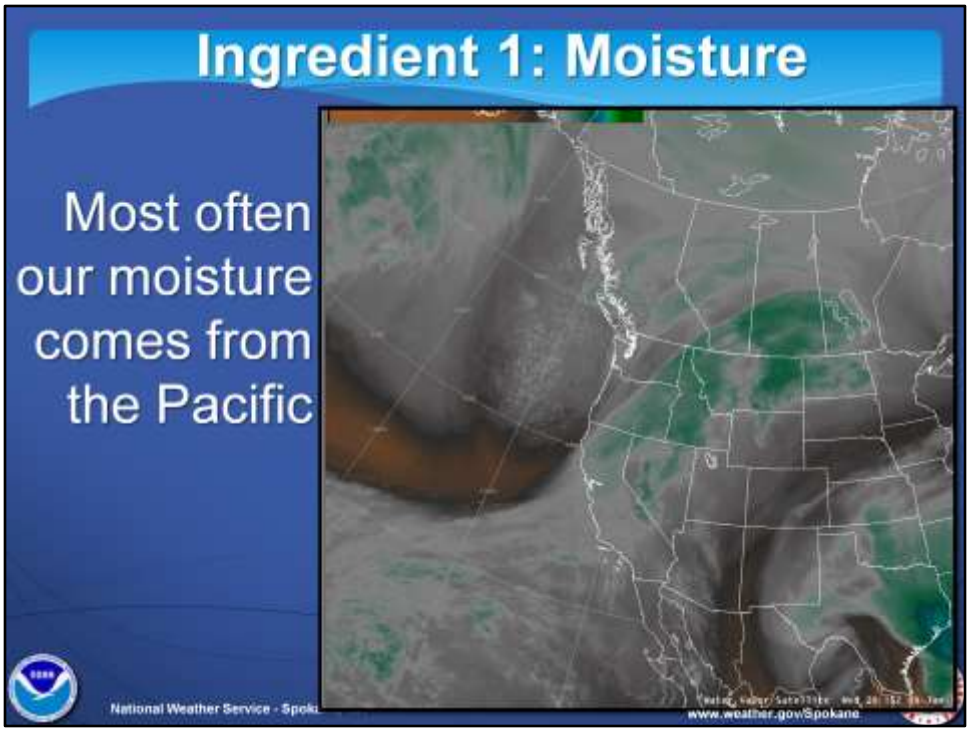
Atmospheric rivers bring an abundance of precipitation, mainly rain and high mountain snow, along wind breezy winds and possible flooding.

Cold small scale low pressure system can form behind strong cold front. They are not well forecast by the weather models and can give localized heavy snow to a region.

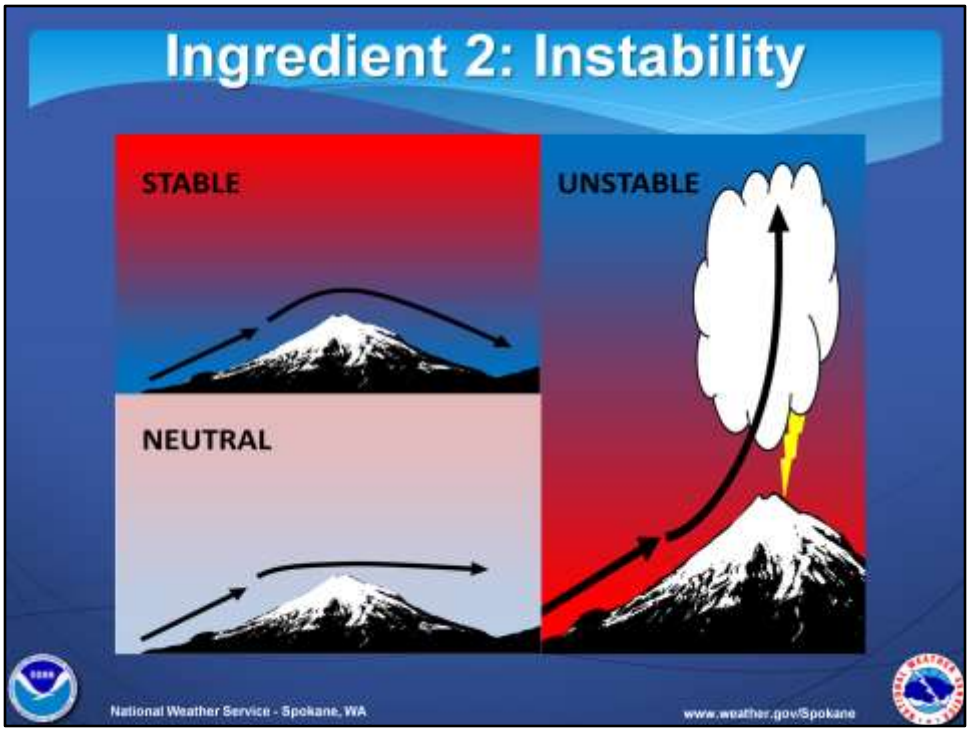
Thunderstorm hazards can occur in every season.



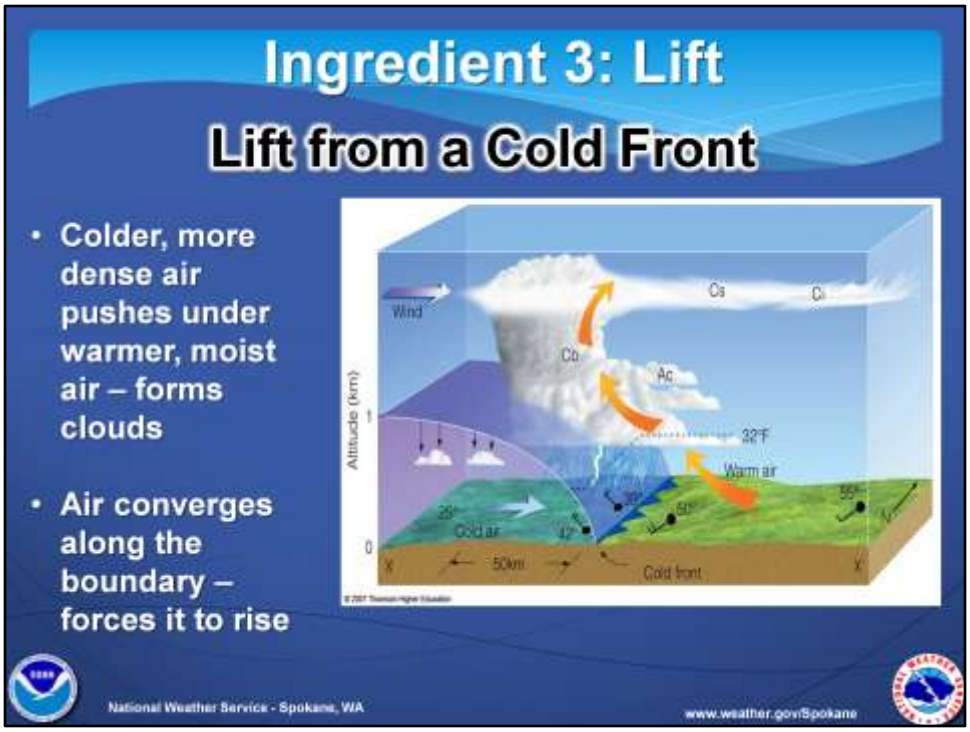
There are three ingredients needs for thunderstorms: moisture, instability and lift.



Moisture typically come from the west southwest – the Pacific ocean.

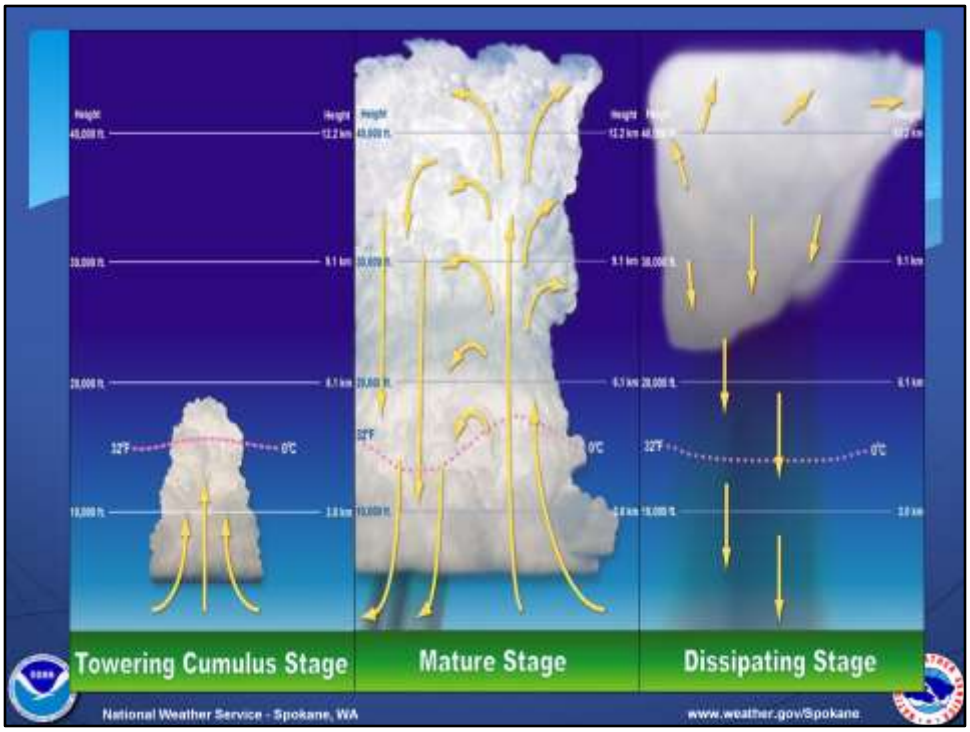


The greater the temperature difference, the greater the instability. Remember from last class the greater the environmental lapse rate the more a parcel will accelerate upward.

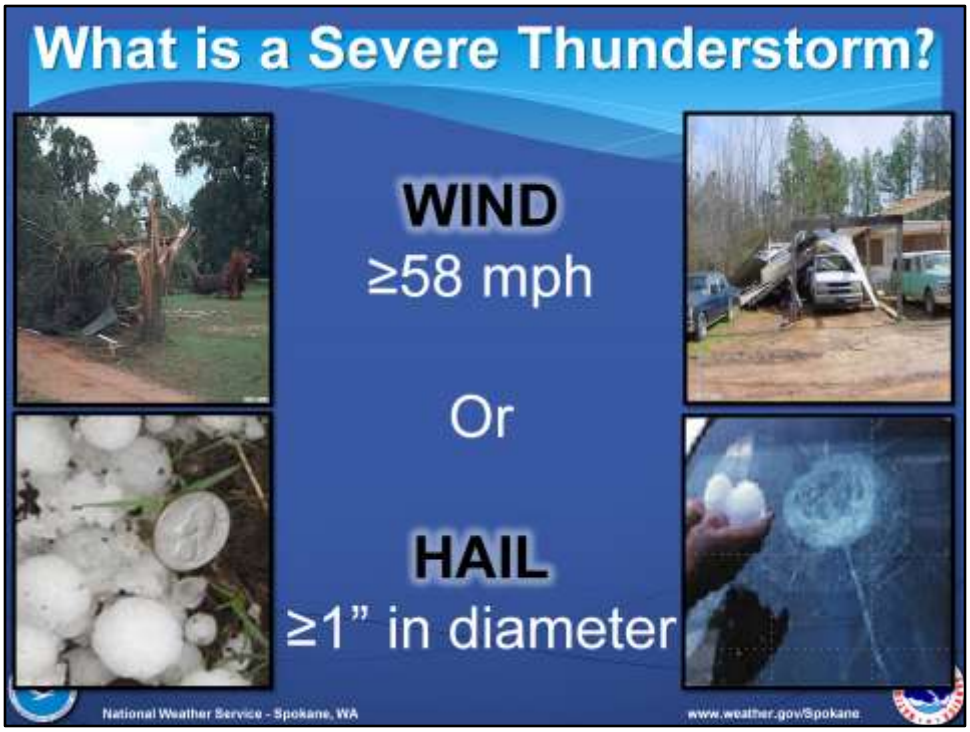


Cold fronts have a steeper and a round blunt end along the leading edge of the front, which helps push the surface air farther up and faster compared to a warm front.

Stable air being pushed up a mountain range will precipitate along the windward side, due to cooling as the air parcel expands. On the leeward side the air parcel sinks and warms due to compression. That is why Lowell Idaho gets around 40 inches of rain per year and Hamilton only gets about 14 inches. But with the environment is unstable, the terrain helps lift the air parcel and it will continue to rise.

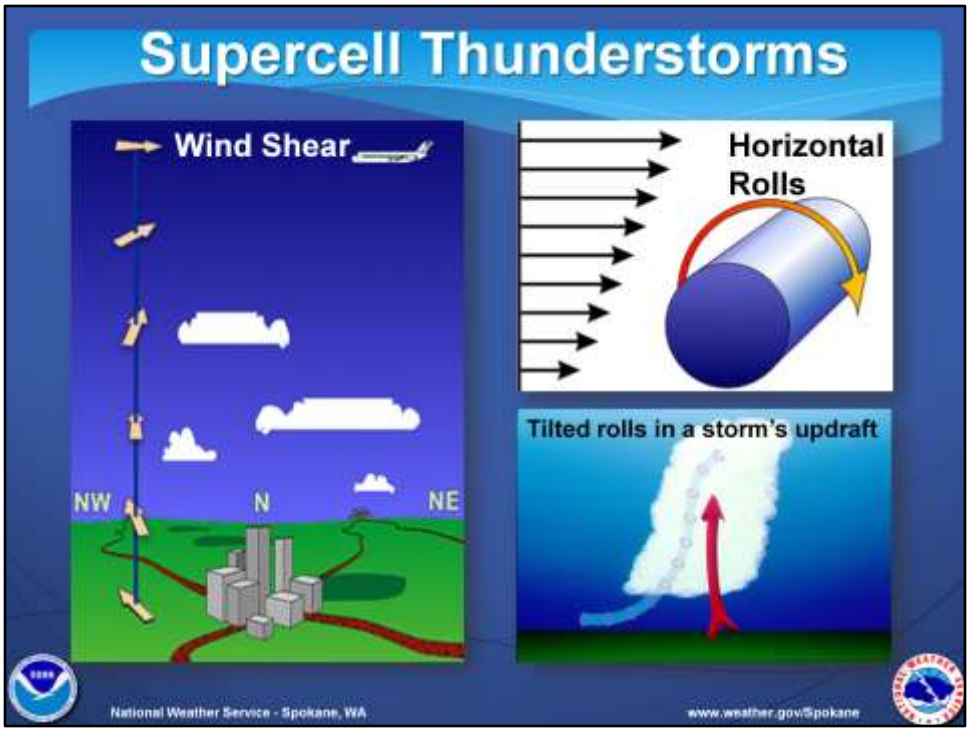


There are three stages with a typical thunderstorm. In the beginning, the towering cumulus stage is made up of an updraft. The mature stage contains both the updraft and downdraft and produces the heavy rain, hail and gusty winds at its peak. The dissipating stage is dominated by a downdraft and has gusty winds and rain.



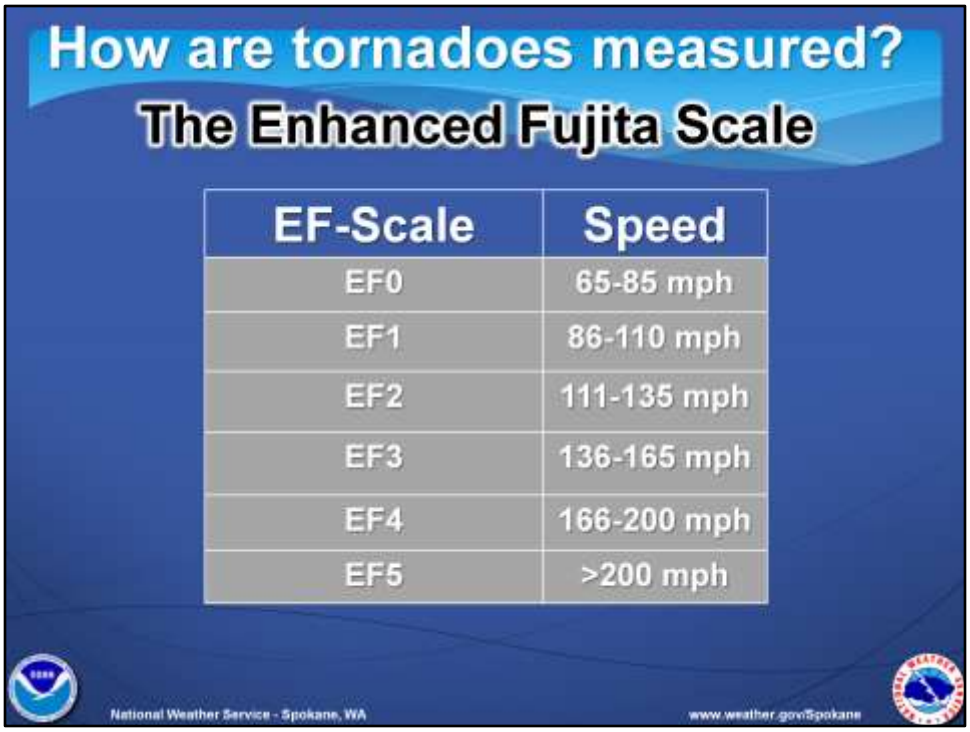
A severe thunderstorm is described as one that produces winds in excess of 58 mph and/or hail 1" in diameter.

Supercells are not your ordinary thunderstorms. They are complex thunderstorms that rotate, last for a long period time and can produce tornadoes.

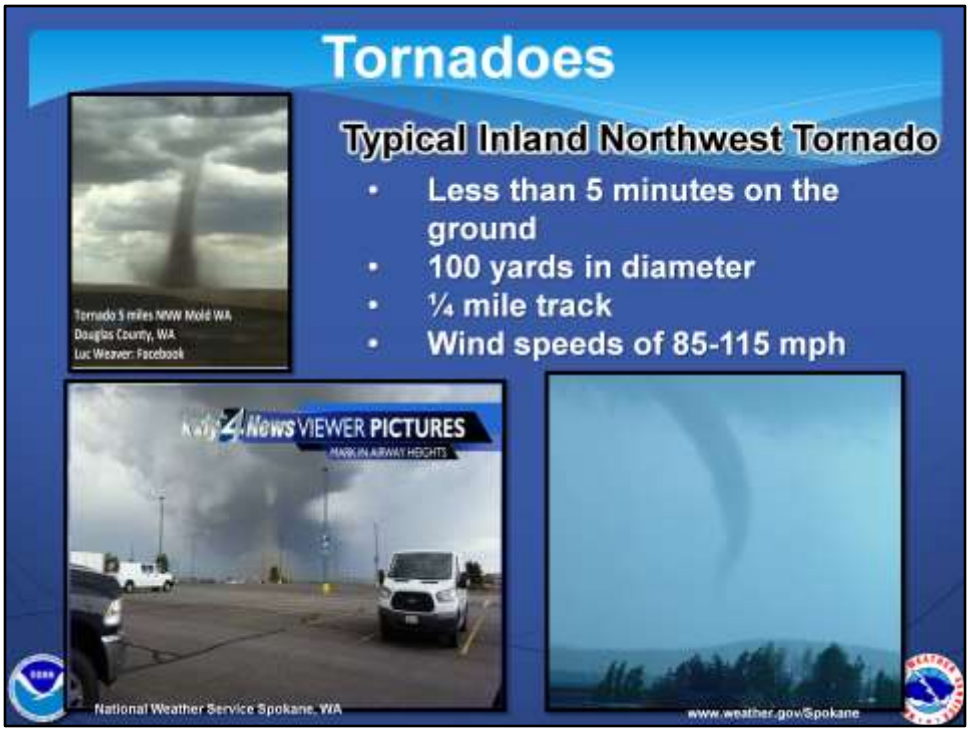


Supercell thunderstorms contain wind sheer. This is the change of wind speed and direction with height in the atmosphere. This difference in winds causes horizontal rolls in the atmosphere, which can be tilted in the vertical in a storms updraft.

These highly organized thunderstorms are able to sustain an updraft and downdraft for a long period of time because both are tilted in the vertical. They will have a well defined rain free base for the updraft and a rain shaft behind. At the interface of the two, there will be a lowering cloud that rotates. This would be the mesocyclone which would be the location of a wall cloud and possible tornado.

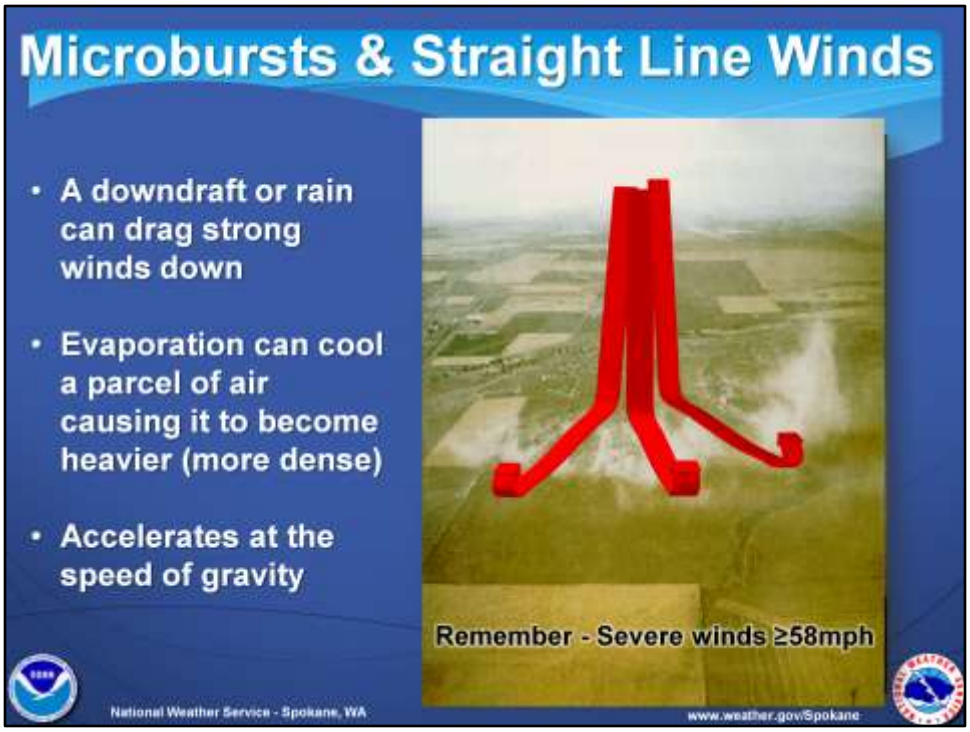


Tornadoes are measured and classified by the EF scale based on their destruction.

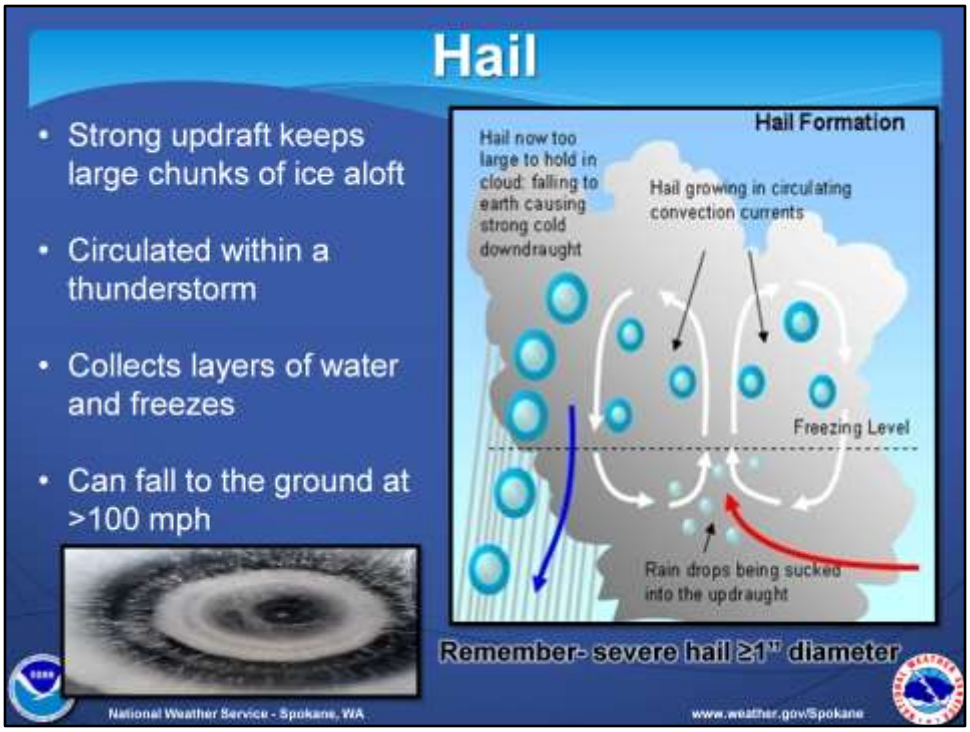


Yes, tornadoes do occur across the Inland NW. They are small, typically EF0 to EF1. Roughly 3 to 5 tornadoes occur across the region each year.

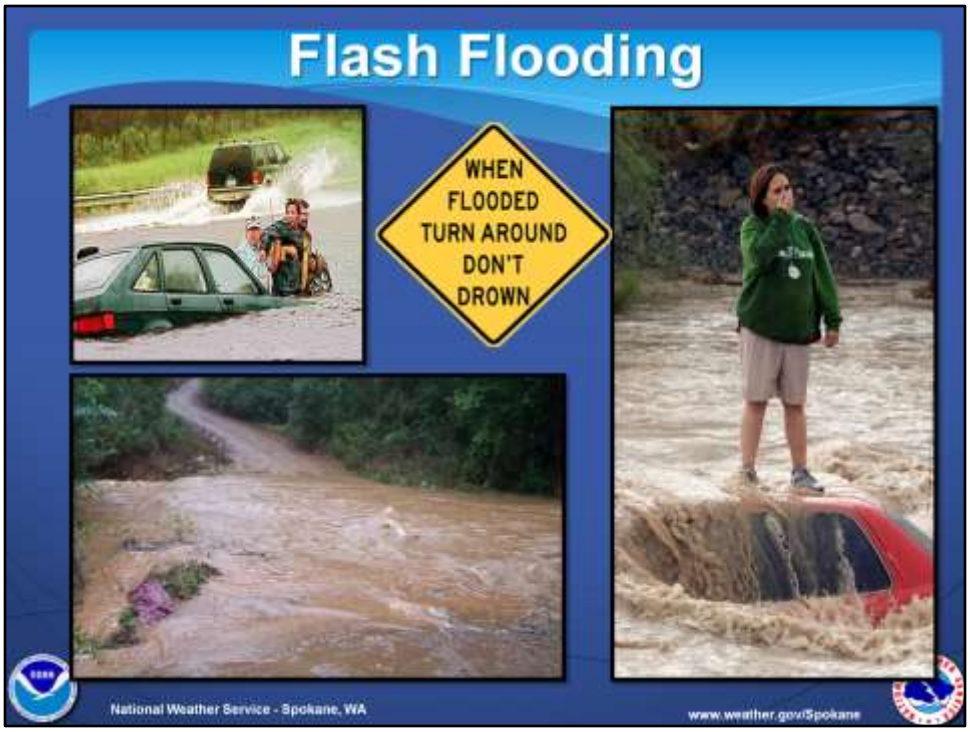
Funnels clouds stay aloft and tornadoes touch in the ground. When in doubt, check the ground for debris.



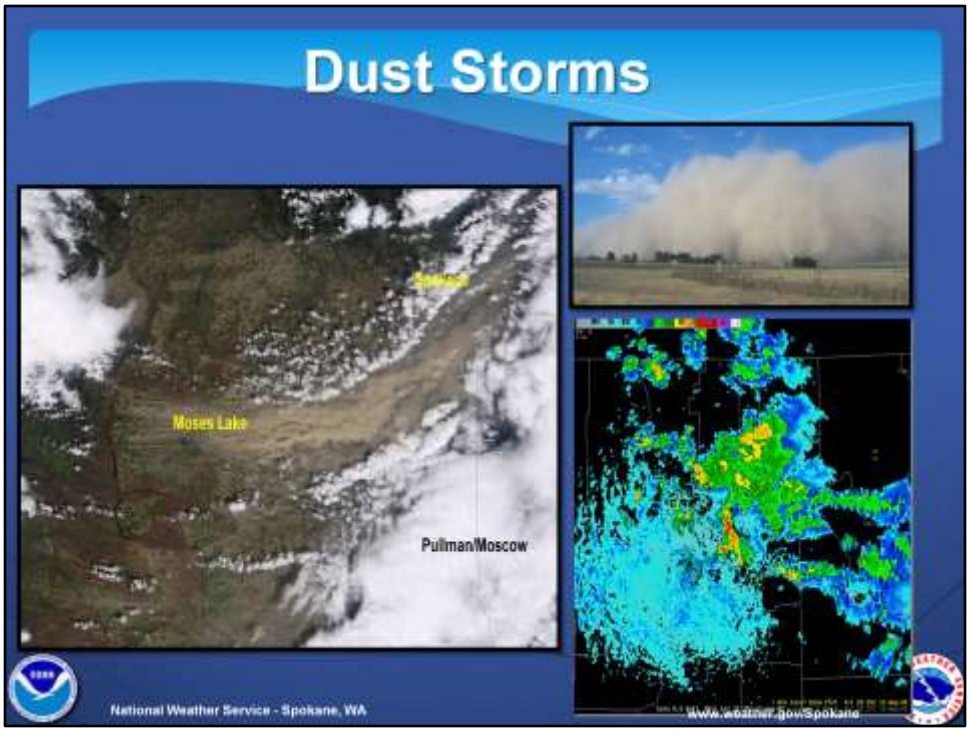
Microbursts produce strong outflow winds and the cooler dense air falls to the surface.



Hail grows in a thunderstorm as it rotates through the updraft and downdraft of a thunderstorm. The stronger the updraft, the larger the hail.



Flash flooding is deadly and occurs during heavy thunderstorm rains. When you encounter water covered roadways, turn around – don't drown.



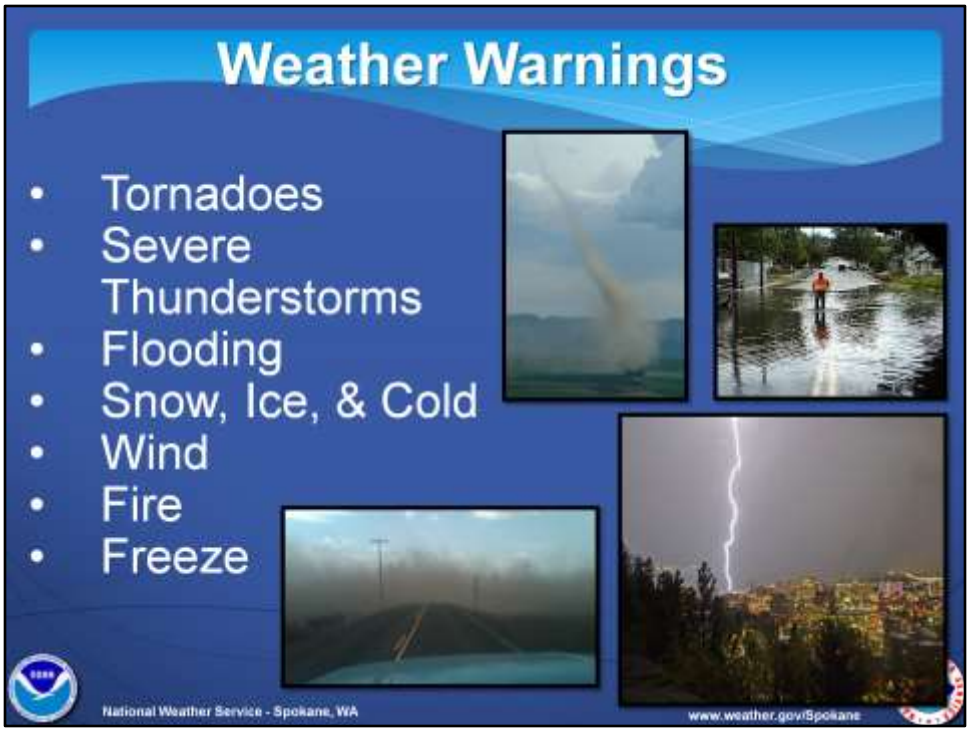
Strong thunderstorm outflows can produce clouds of dust or dust storms that lower visibilities to less than a mile.

Lightning forms from electric charge separation in a growing thunderstorm. The more frequent the lightning, the stronger the thunderstorm. You can estimate how far away a thunderstorm is by counting the seconds between the flash and the bang.

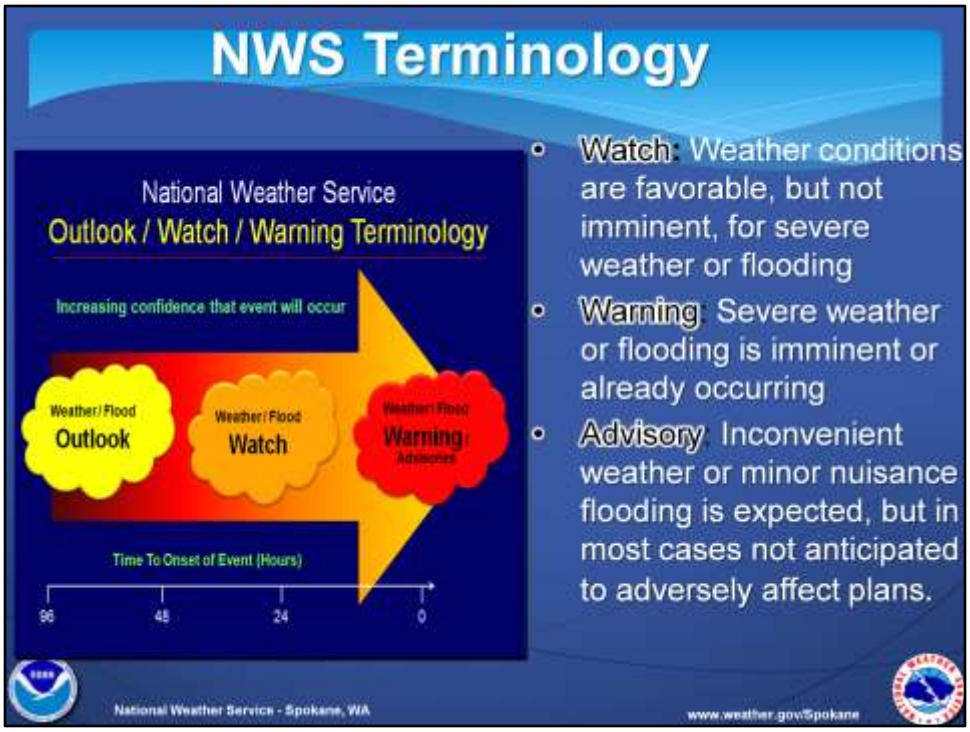
Lighting can be deadly. Go indoors when lightning is observed. If outdoors, seek shelter away from trees, tall objects and water. If you feel your hair stand on end, cover your head and drop immediately to the ground.

Remember to be safe when observing severe or hazardous weather. Your personal safety is the #1 priority.

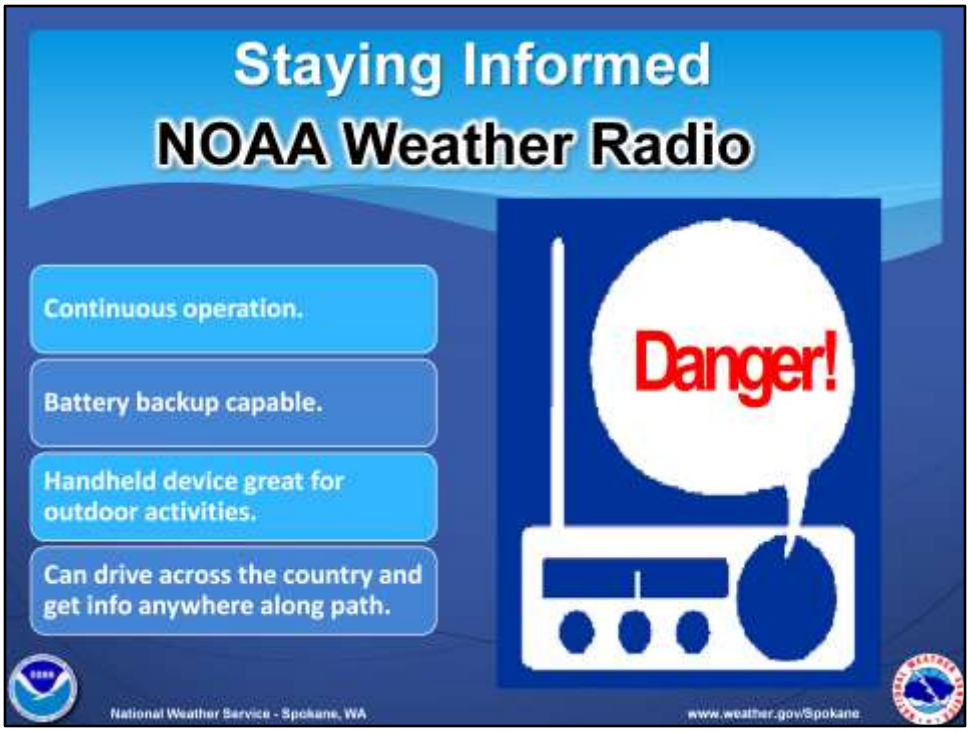
The National Weather Service has many ways to get the word out on severe or hazardous weather.



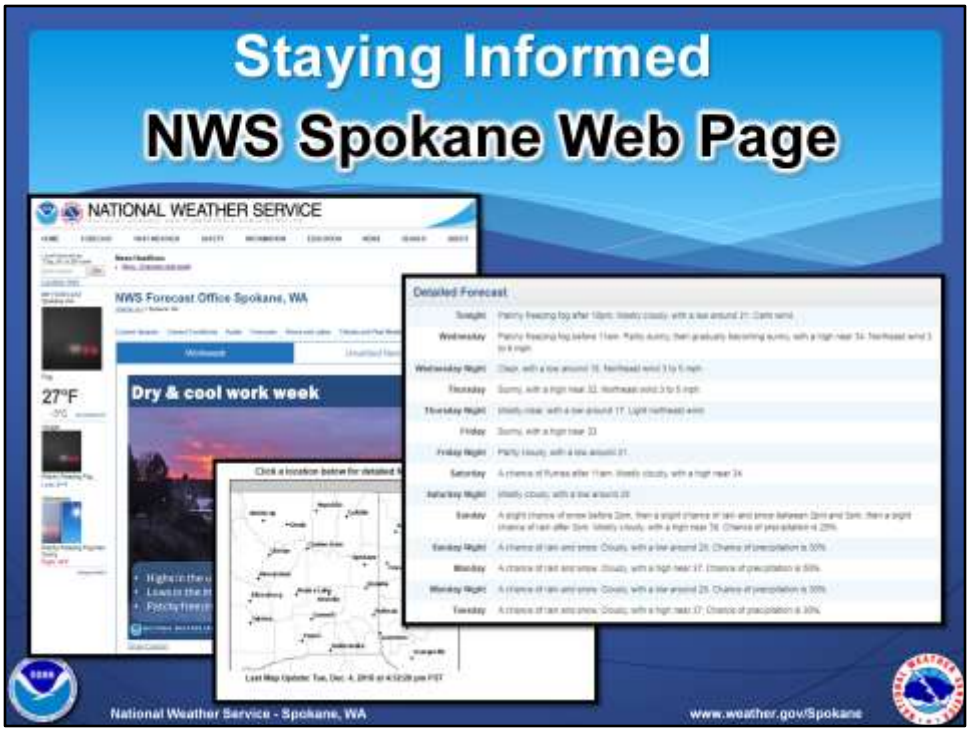
Weather warnings are issued for different types of weather. They are used with severe or hazardous weather is likely to occur and pose a threat to life and property.



The NWS uses different terms to express the confidence, timing and threat with severe or hazardous weather.

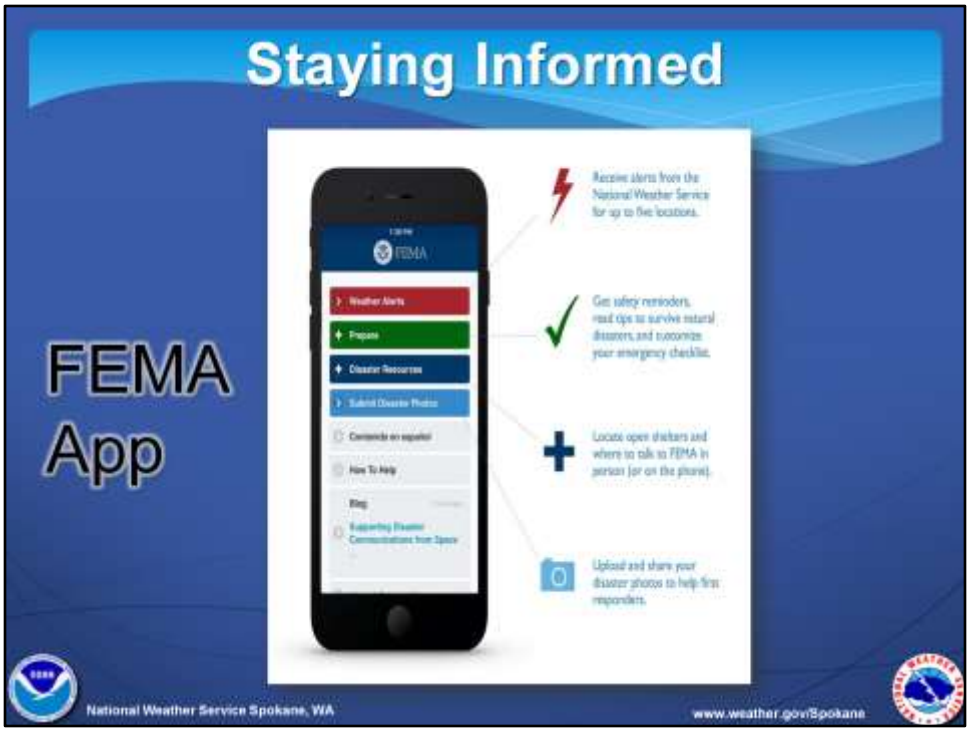


The NWS issues forecasts and warning on the NOAA Weather Radio. You will need a special weather band radio to receive this broadcast or a special smartphone app. Special radios can alert when a weather warning is issued for your area.



The NWS Spokane web page is a good source for weather and water information.

You can get a NWS forecast app for your smartphone. Simply go to mobile.weather.gov. Type in your location. Hit Go. The forecast appears. Add this website to your 'Home" screen for quick access. It puts a NWS widget on your phone.



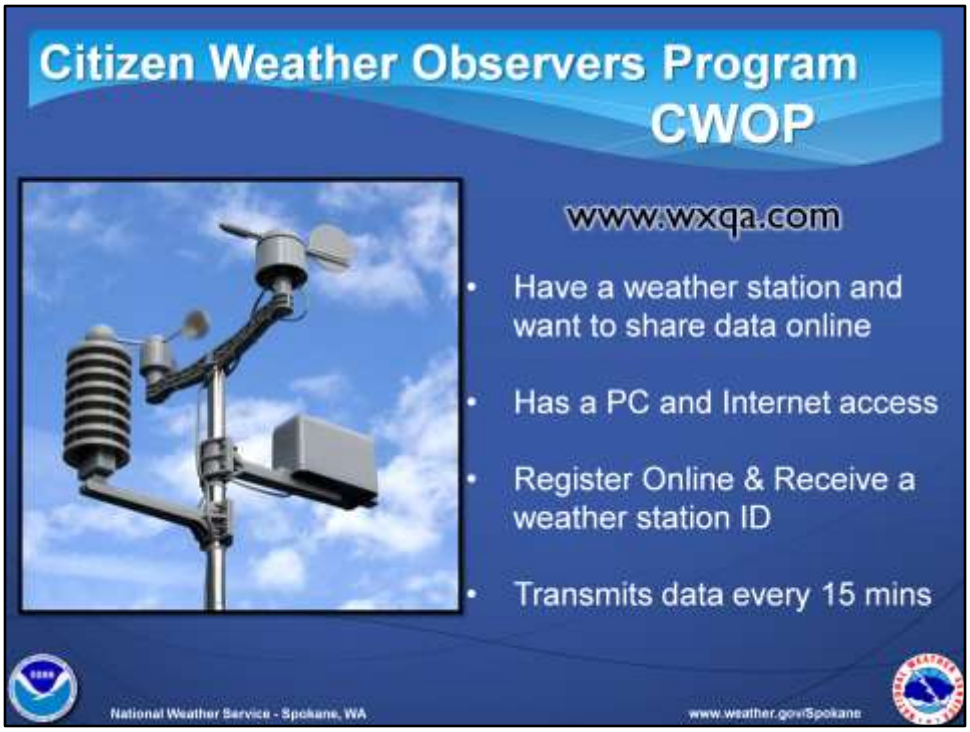
FEMA has a great app that receives alerts for the NWS. It also provide safety reminders and can locate the nearest shelters when an emergency strikes your area.

Besides being a weather spotter, there are other volunteer opportunities through the National Weather Service.

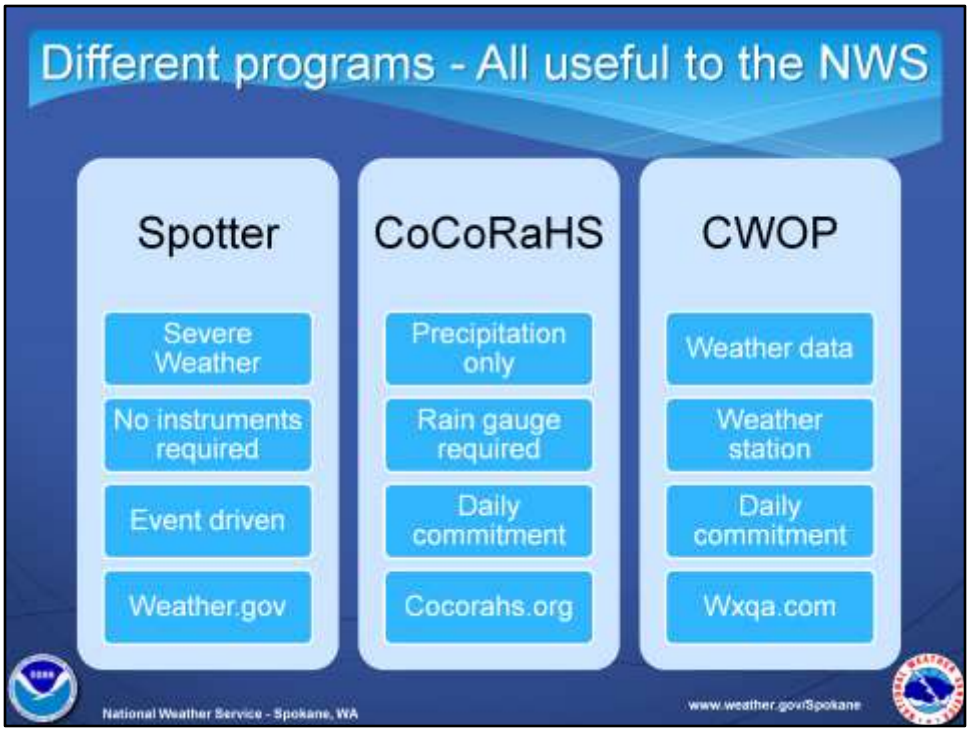
The Community Collaborative Rain, Hail and Snow network is a program where you can report precipitation daily. You will need to acquire a rain gauge. Use the web site www.cocorahs.org to register, receive extra training and acquire a rain gauge.

Once you get a rain gauge, you set it up in your yard and give daily reports on the web page. Measuring rain is easy.

Winter time can be tricky with snow. There at least 3 different measurements to take, including: snowfall, snow water equivalent and snow depth.

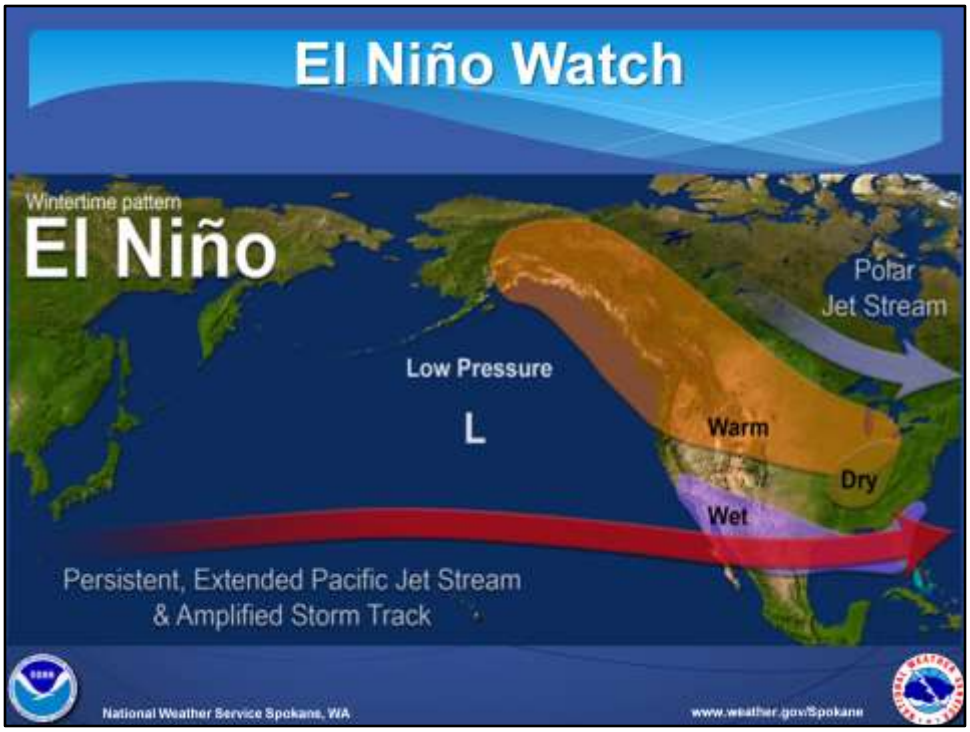


If you are a weather enthusiast and have a weather station, you can hook it up online and share your weather data on the internet. The NWS can access private weather data through www.wxqa.com

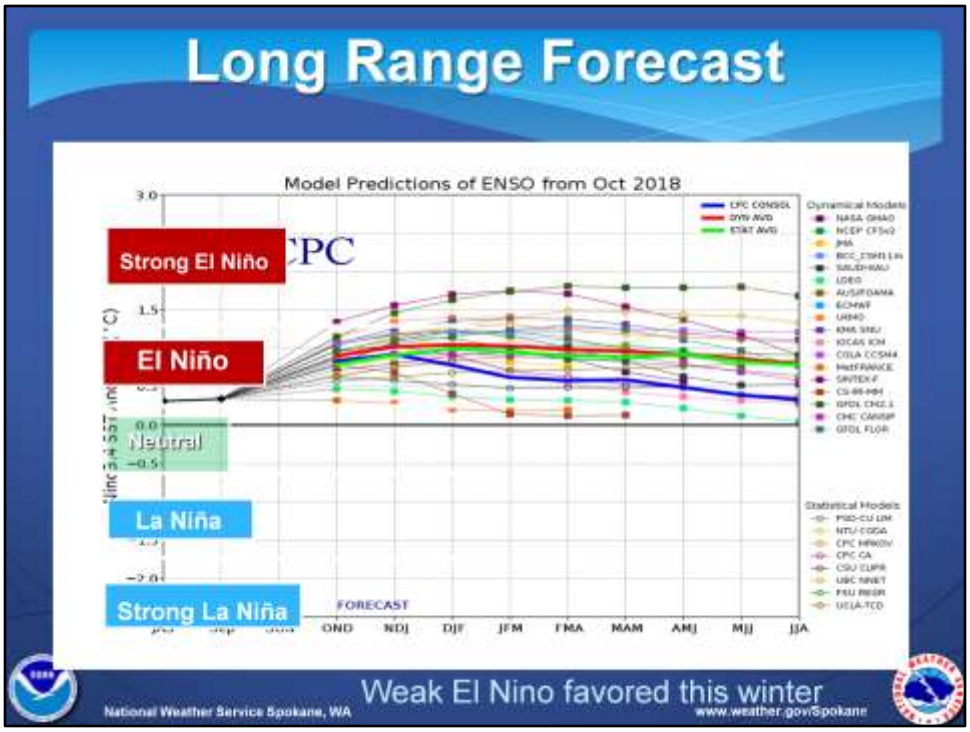


Each of these programs are different but important to the National Weather Service.

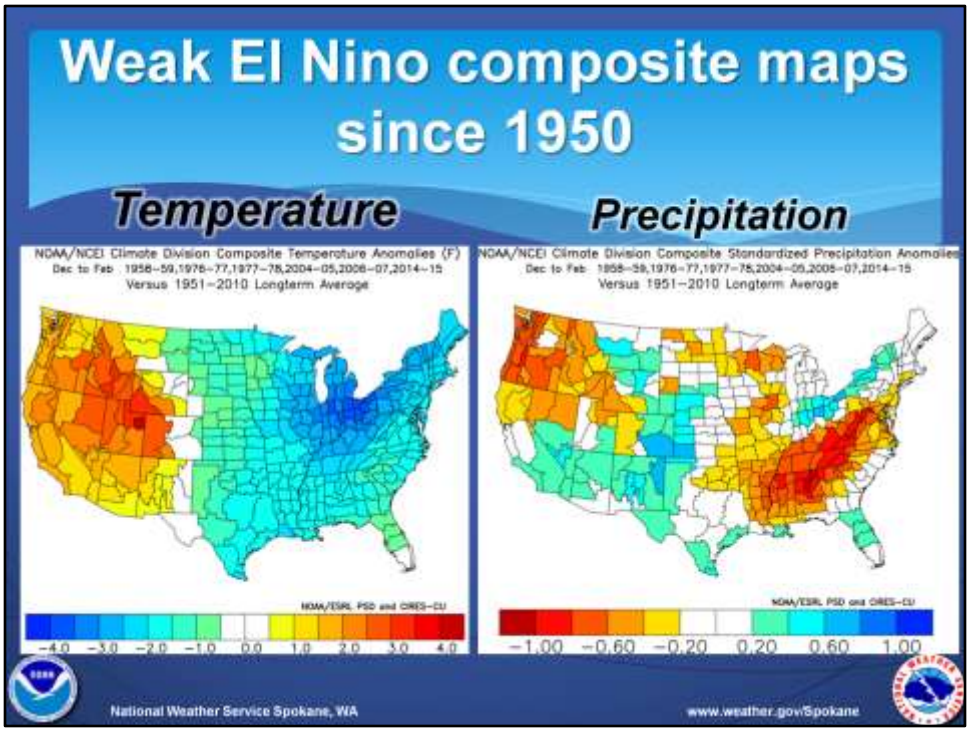
Now it's time for the Winter Outlook for 2018-19.



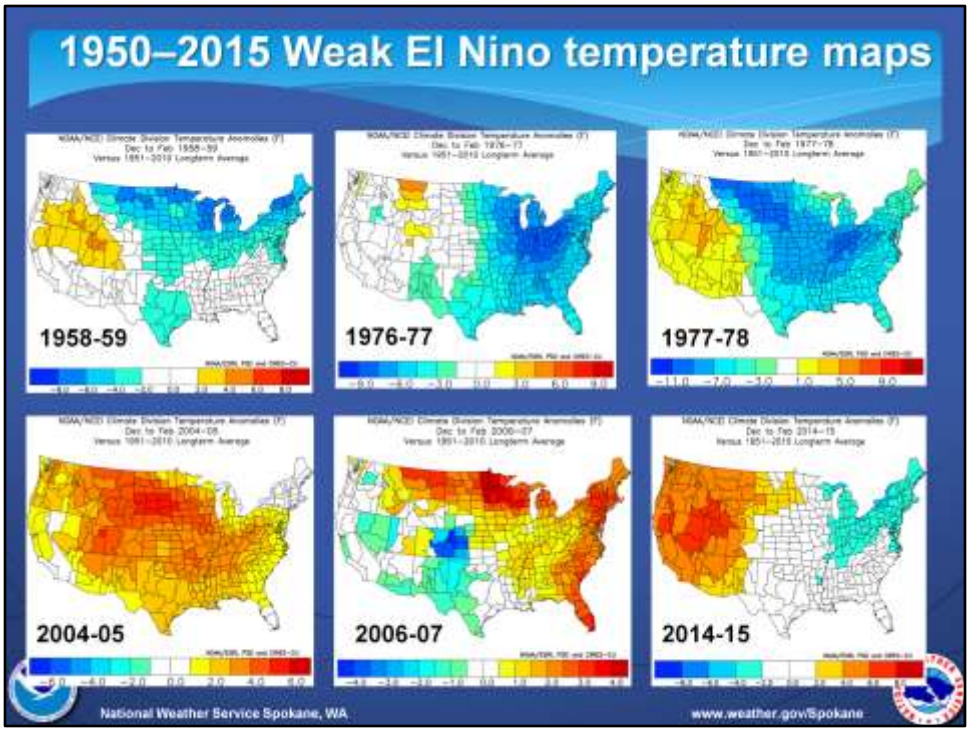
An El Nino Watch has been issued for this winter and spring. El Nino tend to bring a strong westerly jet into California and southern states, while the Inland NW remains mild and drier.



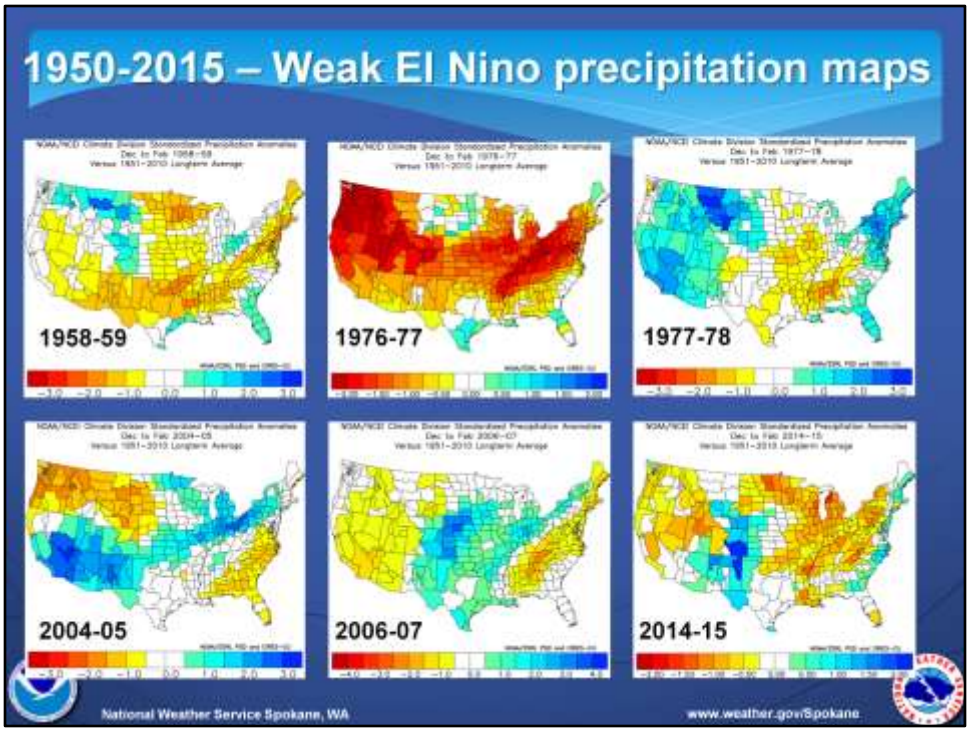
The majority of the seasonal weather models indicate a weak El Nino is favored for this winter.



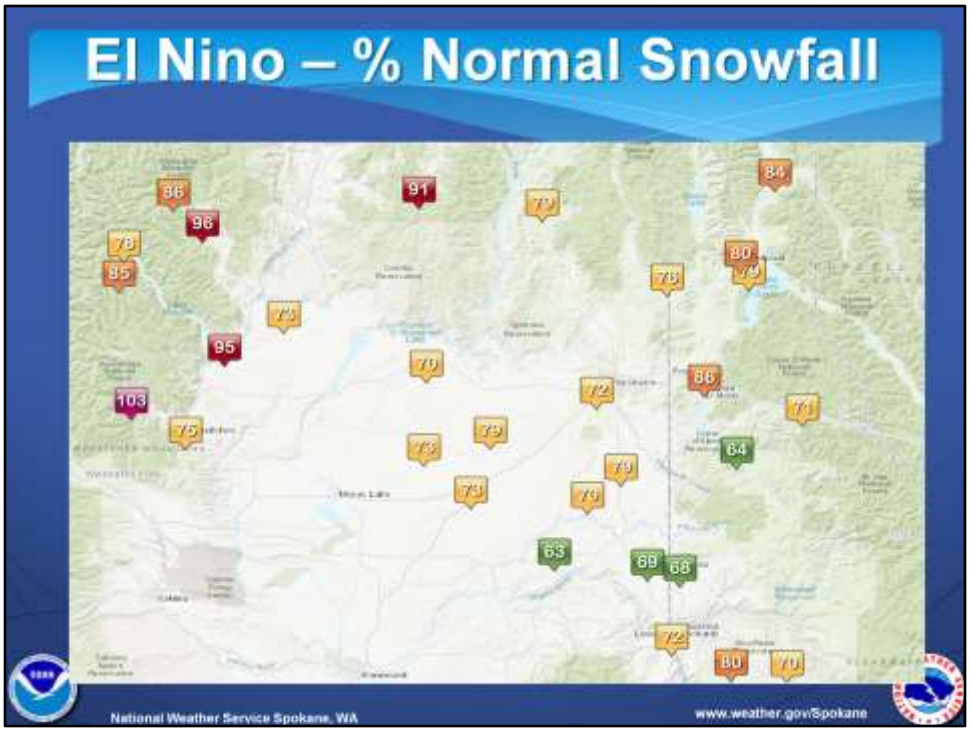
Several weak El Nino winters have occurred since 1950, and they tend to average above normal temperatures and below normal precipitation.



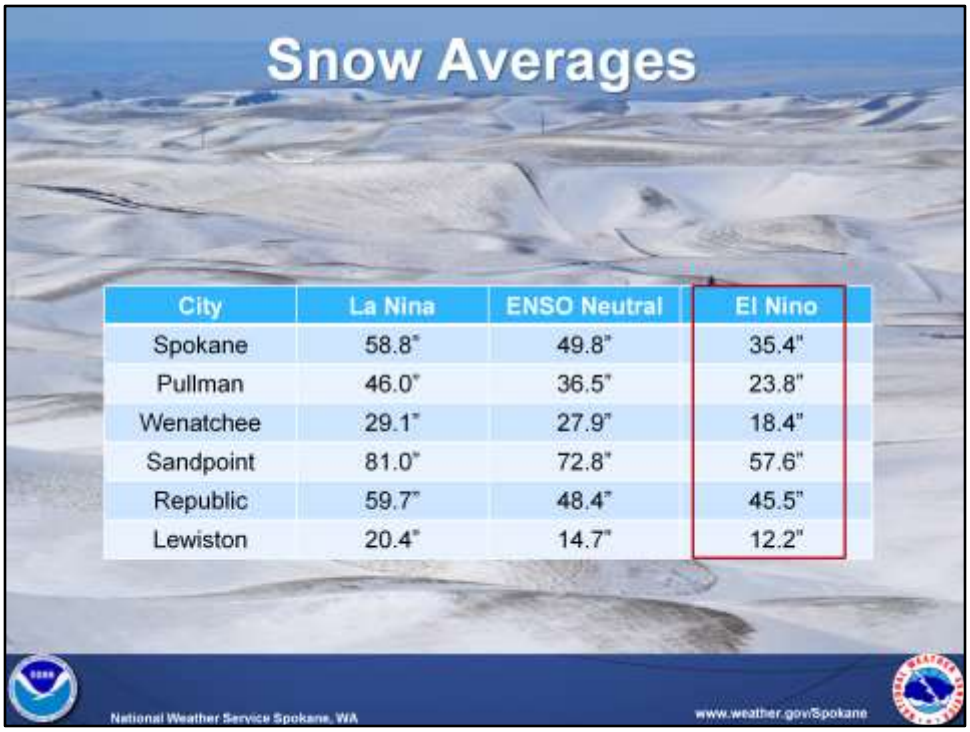
Here is a list of weak El Nino winters through the years and how the trended temperatures during each one with near to above normal temperatures.



Precipitation trends have not been so clear during the past weak El Nino winters. In the late 50s and 70s, there was above normal precipitation. Although since 2000, weak El Nino have had below normal precipitation.



Here is a map that shows the percentage of normal snowfall for El Nino winters across the Inland NW>



Here are snow averages at many locations across the region, comparing amounts from La Nina to ENSO Neutral and El Nino.

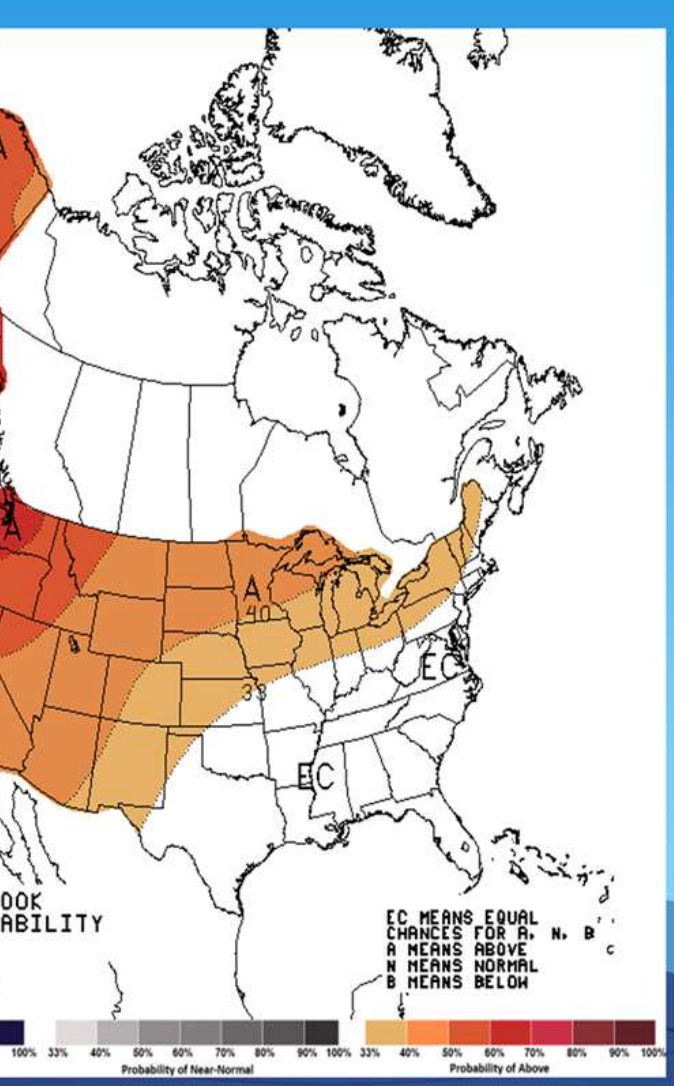
Keep in mind that hazardous weather is possible during El Nino winters, as in the winter of 2004-05.

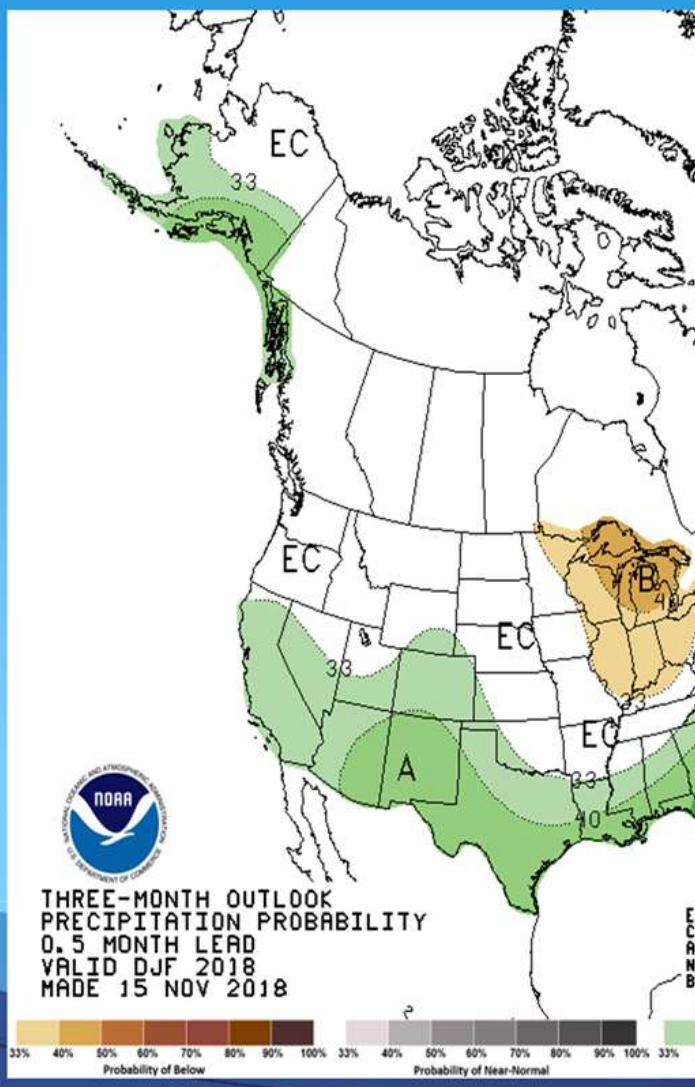
In the winter of 2006-07, there was a strong wind storm.

In the winter of 2014-15, there was an ice storm.

Seasonal Outlook

December – January - February





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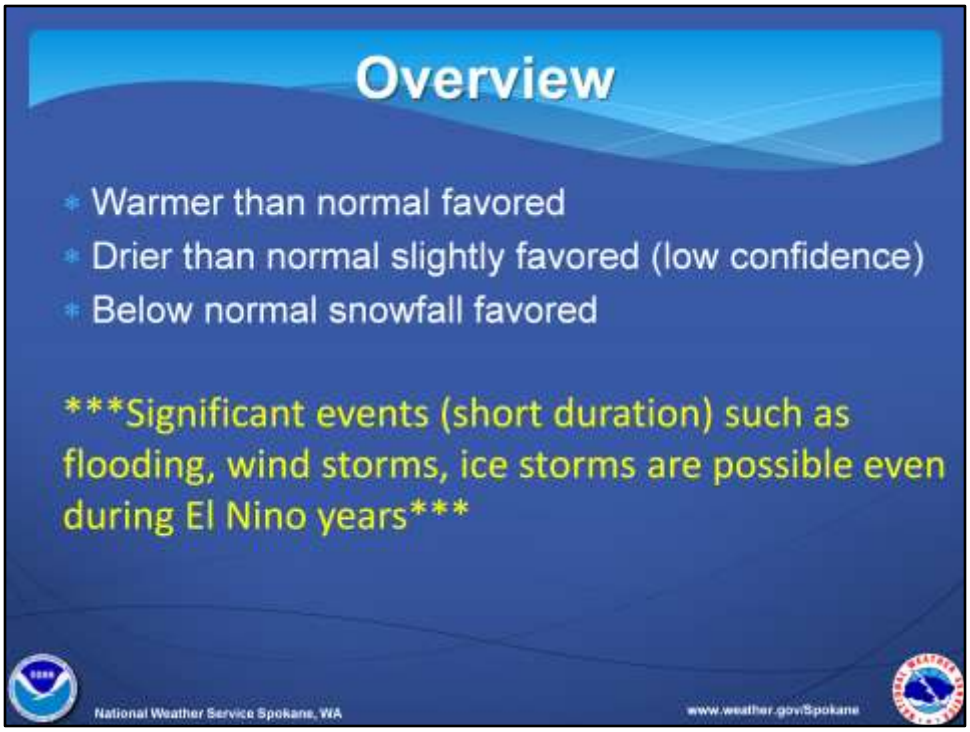
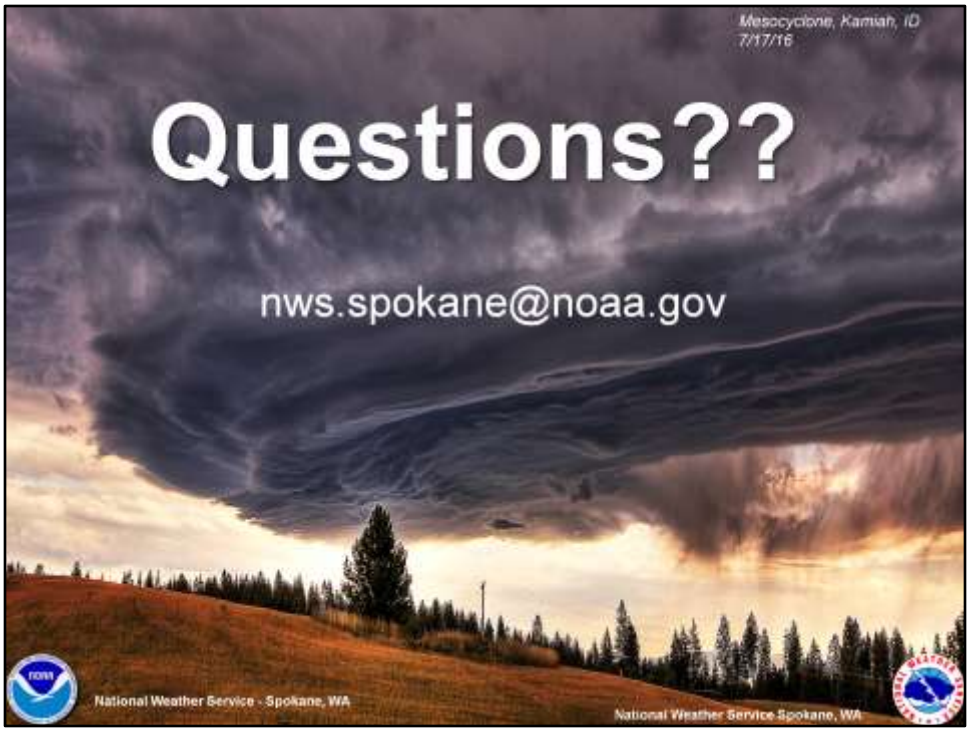
SPHERIC ADMINISTRATION

http://www.cpc.ncep.no

The 8-14 Day Outlook from the Climate Prediction Center calls for elevated odds of warmer and drier than normal for December through February.



The Winter 2018-19 overview leans toward warmer than normal temperatures, drier than normal precipitation slightly favored and below normal snowfall. Keep in mind significant events such as flooding, wind storms, ice storms are possible during El Nino years, making weather spotting important.



If you have any questions, please email nws.spokane@noaa.gov

To Register as a weather spotter, the NWS Spokane will need your contact information. Please email the information on this form to **nws.spokane@noaa.gov .** Once received, NWS Spokane will assign you a weather spotter ID based on your location. It will be emailed to you.

Congratulations! You have completed the Basic Weather Spotter course at NWS Spokane.

Remember, NWS plus weather spotters equals saved lives. Please email any questions or information to nws.spokane@noaa.gov. Thank you!