

# Advanced Weather Spotting for the Inland Northwest

Spring 2022

National Weather Service - Spokane



*Ritzville, WA - May 2020*



**NATIONAL WEATHER SERVICE**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

# This is a Live Virtual Class

- Voice in Computer - no phone needed - headphones helpful
- All are in listen mode until the end

## New to GoToWebinar? Here's the basics



### the Menu bar

- Audio – tests your volume
- Attendees – all in attendance
- **Poll** – answer poll questions
- **Questions** – type in a question for the speaker to answer
- **Handouts** – download & print
- Chat – speaker's comments
- Click on the **Hand** to raise
- Click orange arrow to collapse window

# Objectives

- Understand the roles & importance of the Weather Spotter
- Describe your community's severe weather threats
- Provide accurate and timely reports of severe weather
- Properly define a severe thunderstorm and basic thunderstorm structure
- Identify cloud types and features of thunderstorms.
- Learn how to prepare and be safe during severe weather

Concentration on Thunderstorms and Severe Weather Risk Awareness

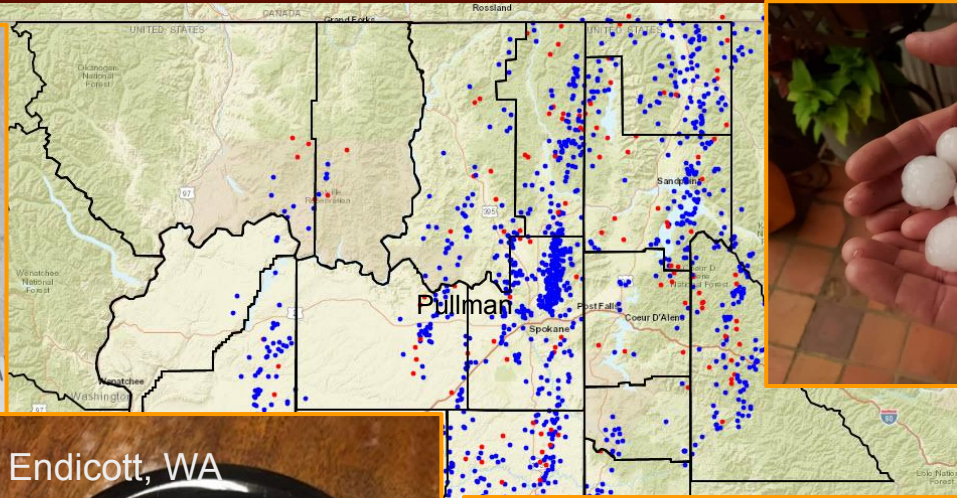
Now let's look back to last year...



# June 15, 2021 - AM Severe Thunderstorms

Database was last updated at: +

9W Pomeroy, WA



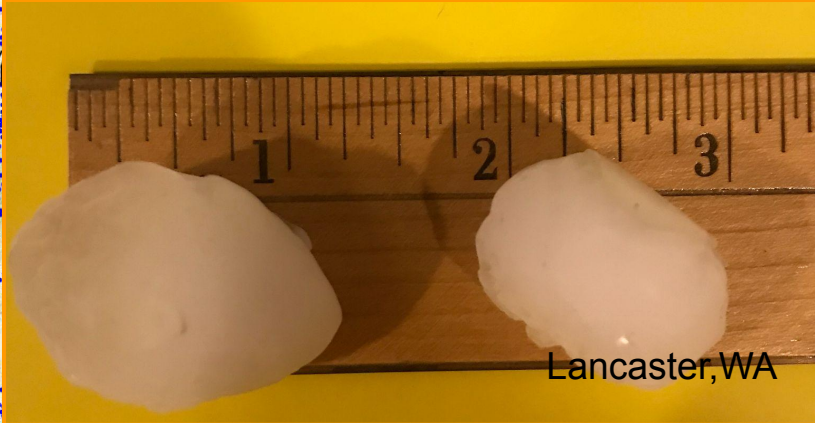
Big Creek, ID



Endicott, WA



Ferry WA	7
Garfield WA	57
Whitman WA	154
Spokane WA	308
Stevens WA	71
Bonner ID	124
Pend Oreille WA	125
Boundary ID	101
Kootenai ID	22
Latah ID	19
Benewah ID	17
Shoshone ID	111
Asotin WA	12



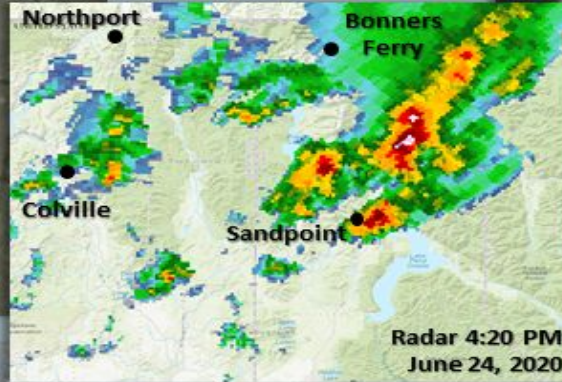
Lancaster, WA



# June 24, 2020 - Severe Thunderstorm Event



Naples, ID



Port Hill, ID



Near Ruby, WA

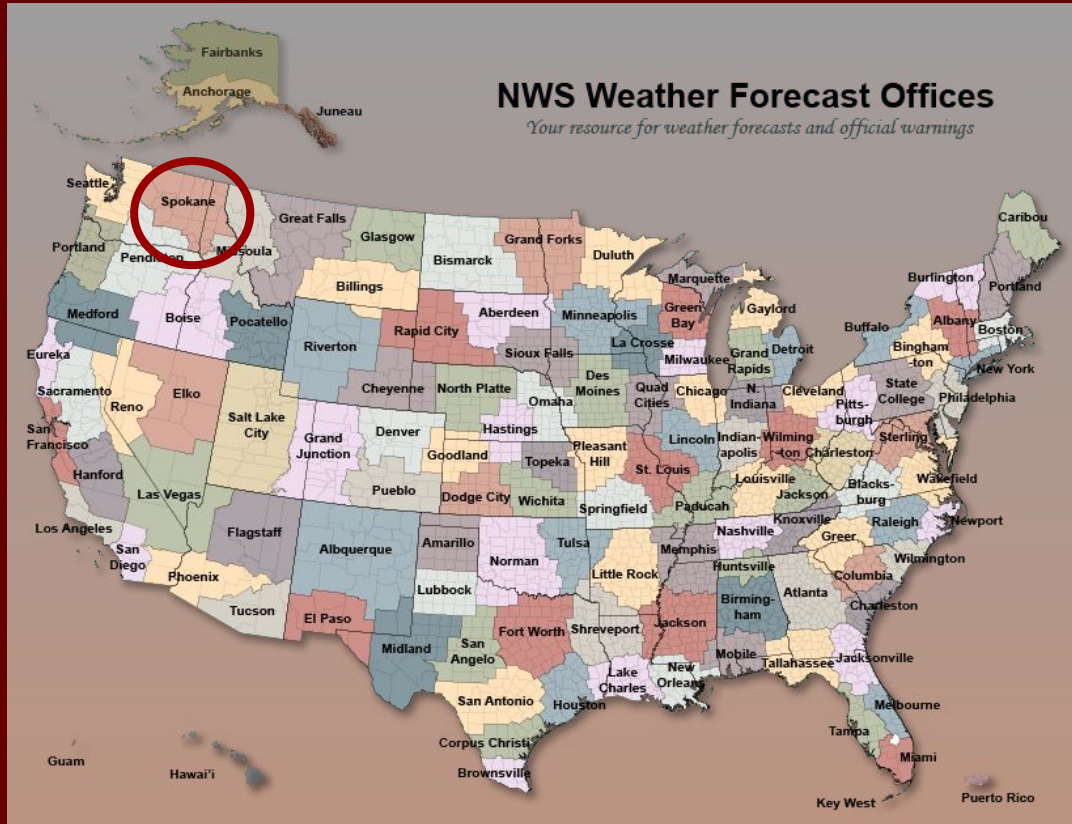


# May 30, 2020 - Severe Thunderstorm Event





# NWS Spokane Forecast and Warning Area

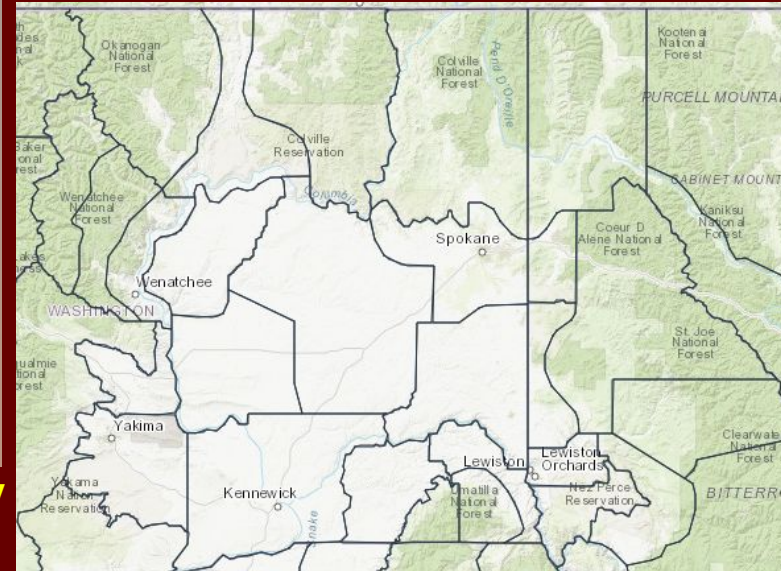


Includes 2 states

- 13 counties in eastern WA
- 8 counties in north Idaho

Elevations range

- 9500+ ft in the north Cascades
- 170 ft along the mid Columbia River



**Issue watches/warnings for the protection of life and property**



# National Weather Service (NWS)

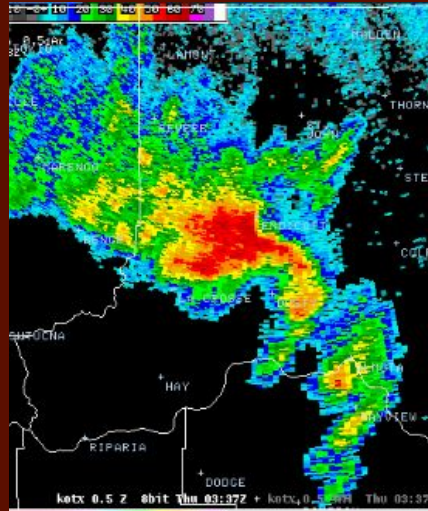
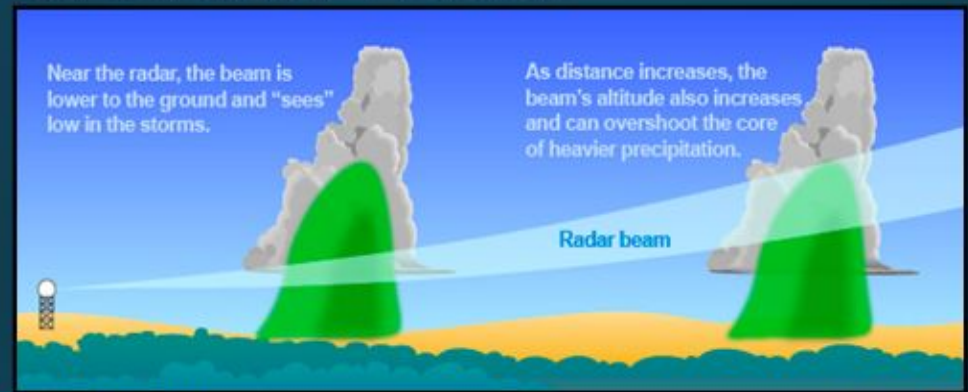
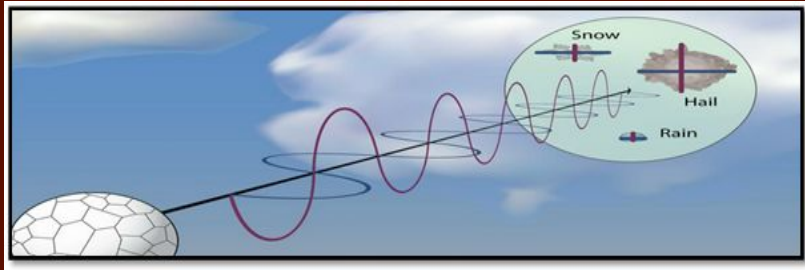
- Part of the Federal Government – Dept of Commerce
- Responsible for all weather/water Watches & Warnings
- 126 offices across the country
- Work with local agencies
- Observe & Forecast
- “Behind the Scenes”
- Decision Support
- Preparedness & Education

**Issue Weather and Water watches/warnings for the protection of life and property.**





# Doppler Weather Radar



## VCP12 Coverage

- 4,000 ft above ground level\*
- 6,000 ft above ground level\*
- 10,000 ft above ground level\*

Beam Blockage  
Undercutting distant storms

National Weather Service Spokane, WA

[www.weather.gov/Spokane](http://www.weather.gov/Spokane)



# Radiosondes

- Twice a day; every day
- 92 Upper Air sites across the U.S.
- About 100,000 ft (~19 miles) high
- One hour and 45 minutes flight
- After the balloon pops, a parachute opens and it falls back to the earth
- Less than 20% are recovered and mailed back
- Radiosonde chart gives a profile of temperature, dewpoint, winds through a column of the atmosphere.

Where to find this chart online?  
<http://weather.rap.ucar.edu/upper/otx.gif>

NWS Spokane web page:  
Forecasts tab – Forecast models

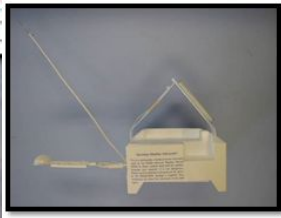
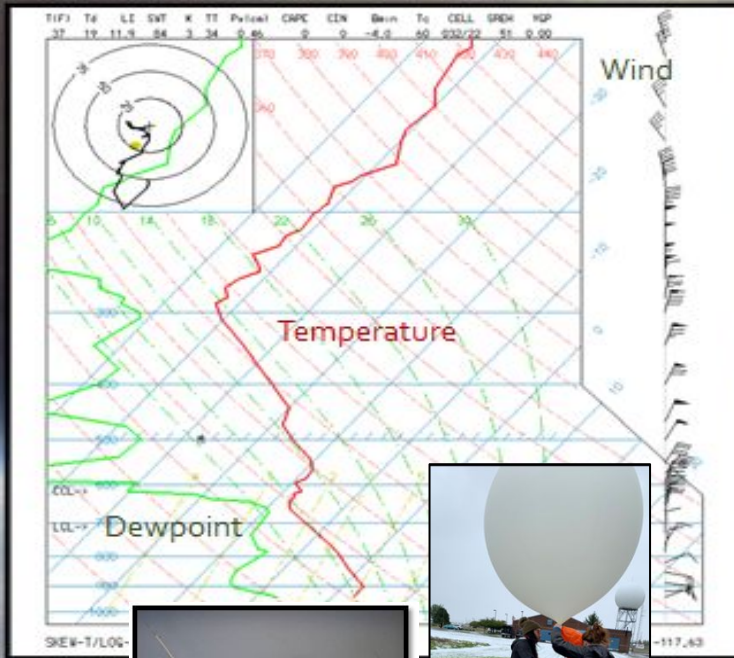


Photo courtesy of Earth to Sky Calculus



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# Weather Satellites

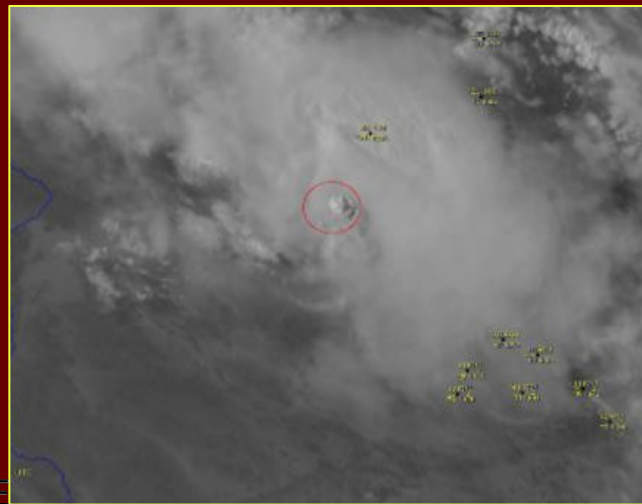
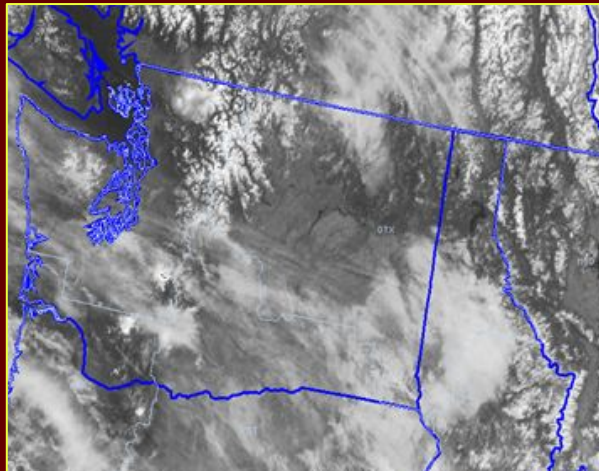
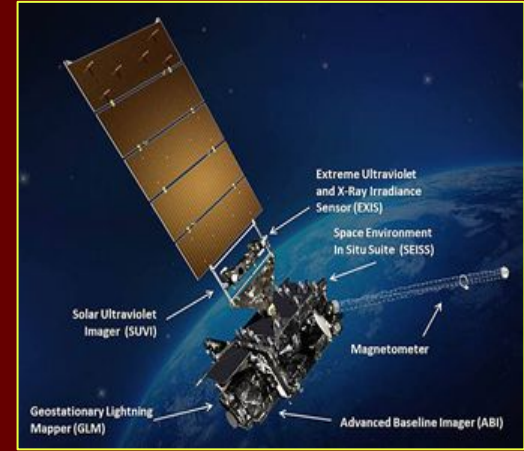
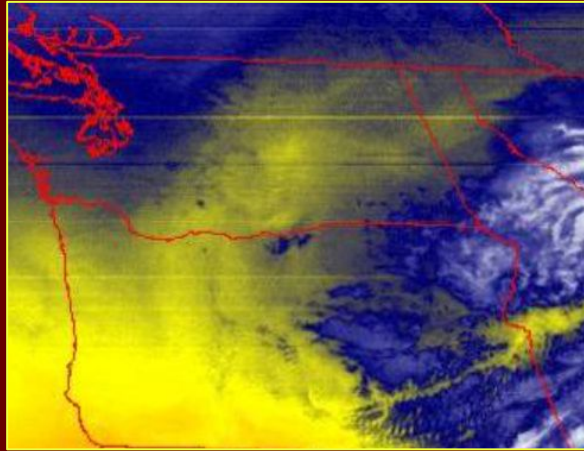
GOES 17 - 16 different channels

IR, Water Vapor & Visible

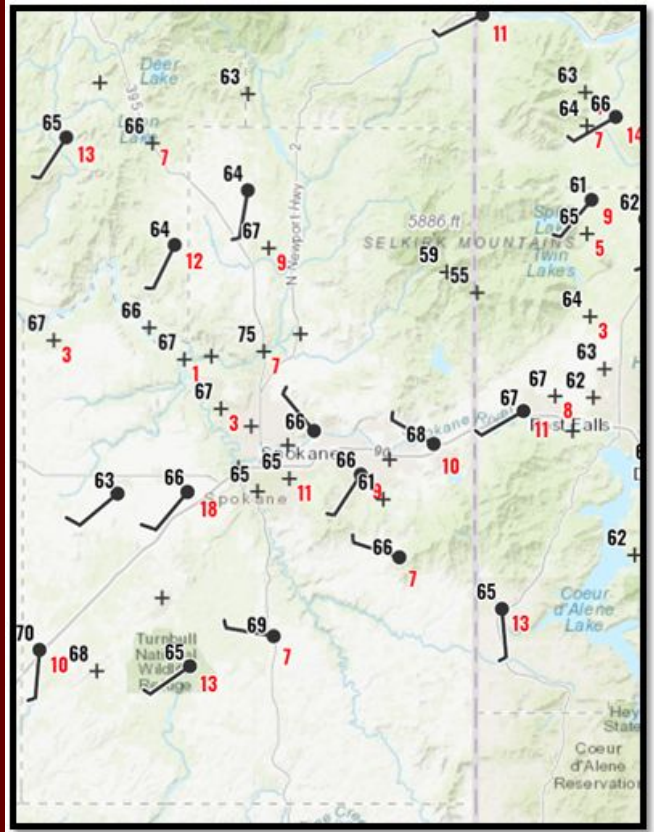
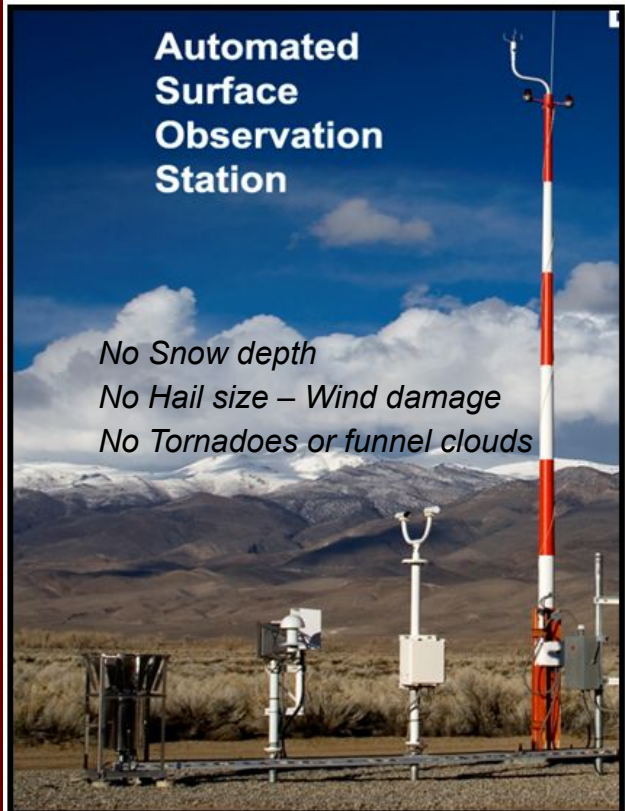
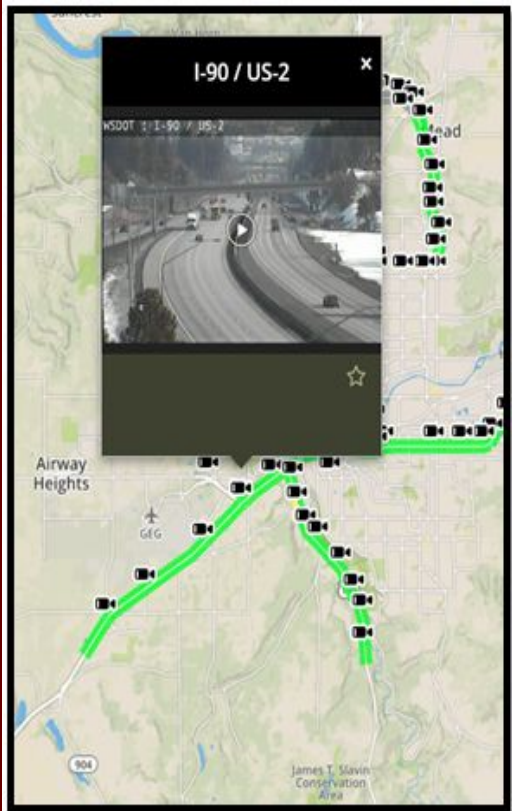
New images every 5 minutes

Aids in early detection

Thunderstorms & Wildfires

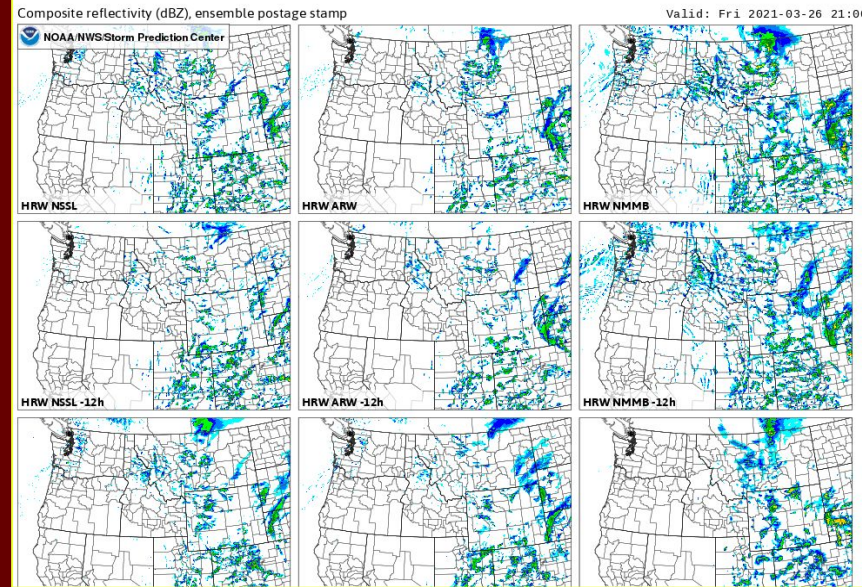
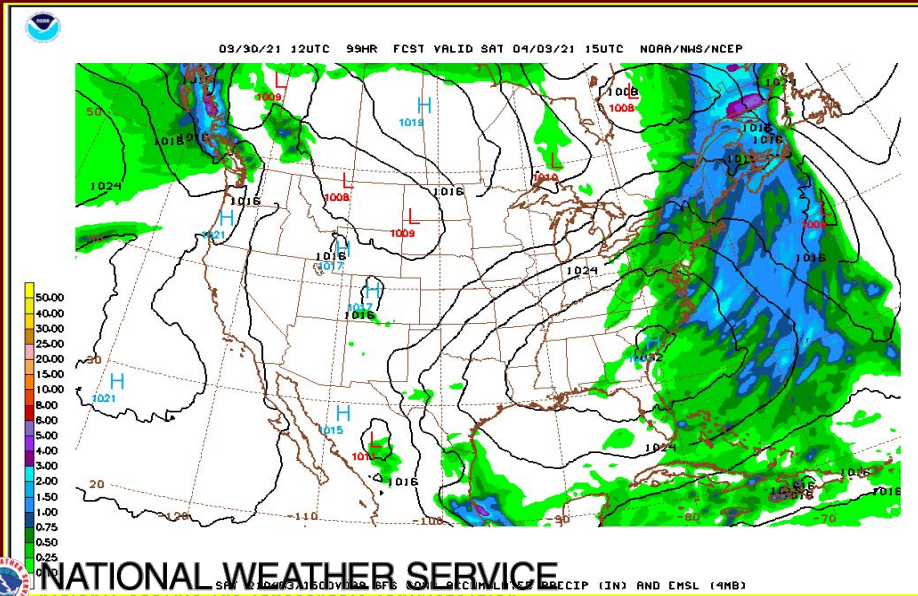


# Surface Observations & Web Cams





# Supercomputers & Resolution Models



# We need weather spotters! Why?



- Limitations to radar, satellite, and surface observations
- Receive Ground Truth on events
- Fill in the “holes” not seen by observations
- Understand the many micro-climates in the region
- Goal - maximize Warning effectiveness and lead times
- Add Credibility to NWS Warnings - Leads to Public Action!



# #1 Poll Question

Why are weather spotters important?



# Weather Hazards Change with the Seasons

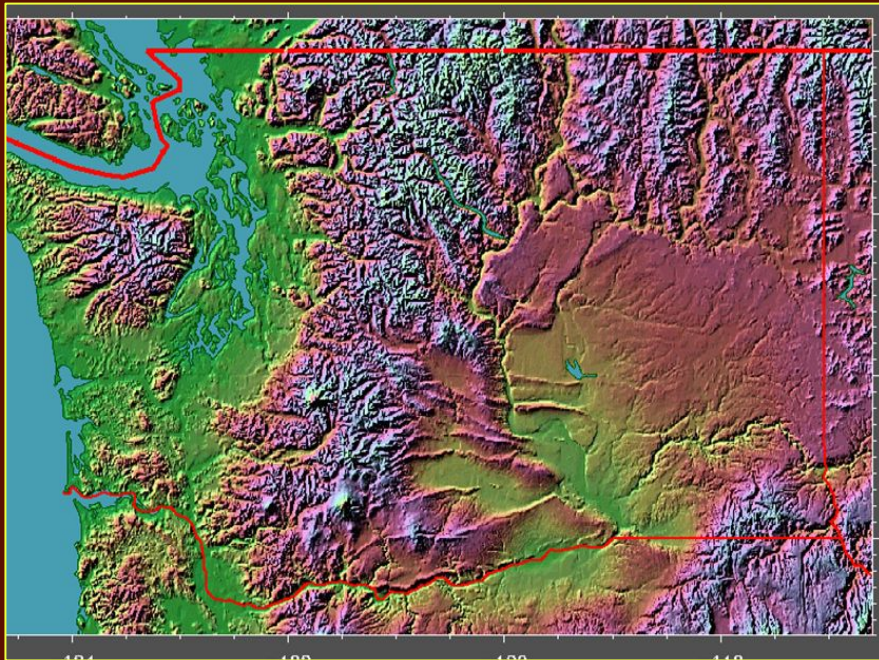
Main weather concerns change with the season & include:

- Winter storms – snow, ice, rain and wind
- Flooding – river flooding and flash flooding
- Fire weather – wind and dryness, lightning and smoke
- Thunderstorms – hail, wind, rain and lightning



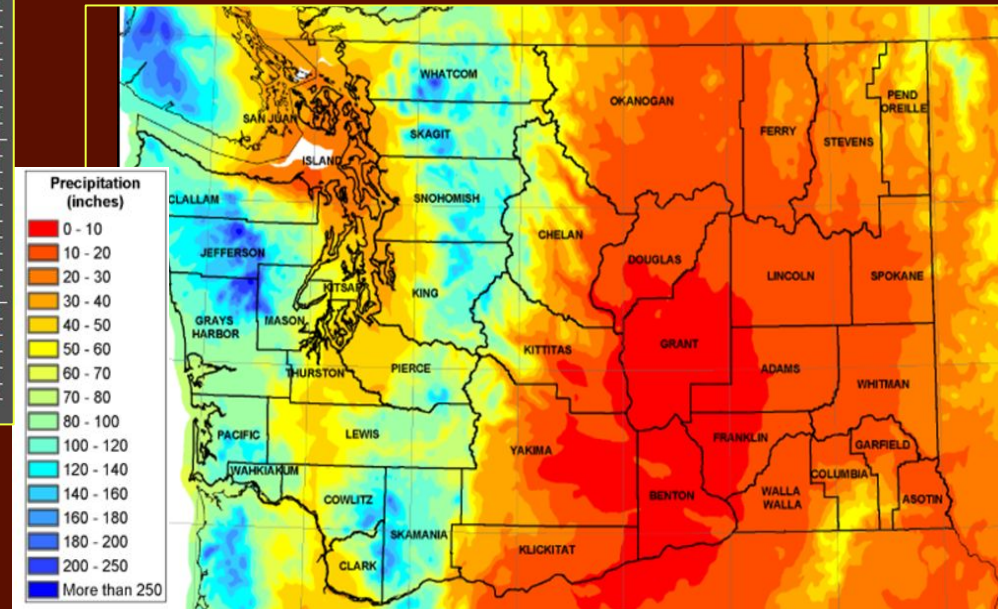


# Terrain Makes ALL the Difference



Topography Map

## Average Annual Precipitation Map



# What's in a Spotter Report?



## Inland Northwest Weather Spotter Checklist



<b>Tornado or Funnel Cloud:</b> ANY Kind
<b>Strong Winds:</b> +40 mph/Damage (58mph severe)
<b>Hail:</b> +3/4" in diameter (1" severe)
<b>Heavy Rain:</b> +1/2" in 1 hr or +1" in 12 hrs
<b>Flooding:</b> ANY Kind
<b>Mixed Precipitation:</b> freezing rain or sleet
<b>Snow:</b> +2" below 3K ft (valleys) or +6" abv 3K ft (mtns)
<b>Poor Visibility:</b> 1/2 mile or less
<b>Travel Problems:</b> due to weather
<b>Damage, Injury or Loss of life:</b> ANY
<b>Excessive Heat:</b> ANY
<b>Excessive Cold:</b> ANY

- Specifics...Tell us the story!

- Who...What...and Where

*Spotter ID & Location*

- When the event began and/or ended

- Estimate of wind speed and/or hail size

- Damage and injury reports

- If unsure - report your uncertainty

- Include reports while traveling & any delayed or second hand reports



# #2 Poll Question

What types of severe or hazardous weather do we NOT experience in the Inland NW?





# How Spotters Report - Easiest Phone Call



**Dial :**  
**1-800-483-4532**  
Spotter ID

**What:**  
Event you  
Witnessed

**Where:**  
Location  
of event

**When:**  
Time of  
the event



# How Spotters Report – Just as easy Online Reports

[www.weather.gov/Spokane](http://www.weather.gov/Spokane)



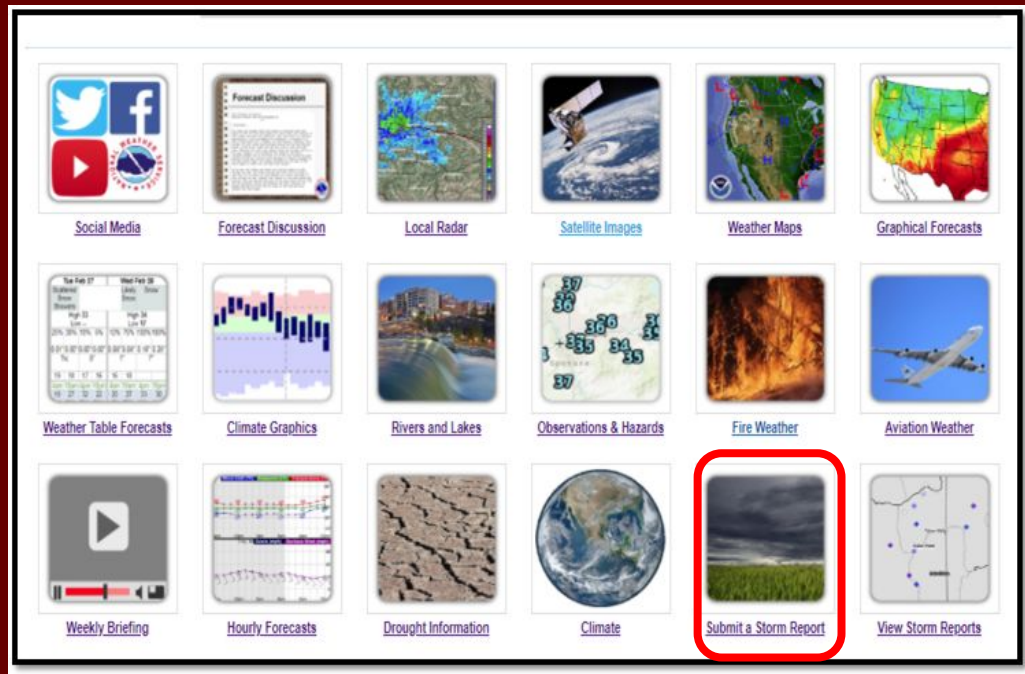
 **Storm Reports**  
Alerting the NWS to local weather



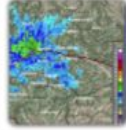
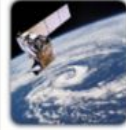



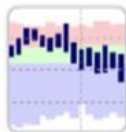





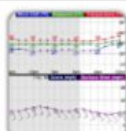




Report Type -> Details -> Location -> Review and Send

Please select a report type ▼

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# Share weather data - Social Media

## Twitter



- @NWSSpokane
- #wawx & #idwx
- Share reports & pictures
- Monitored 24/7

## Facebook

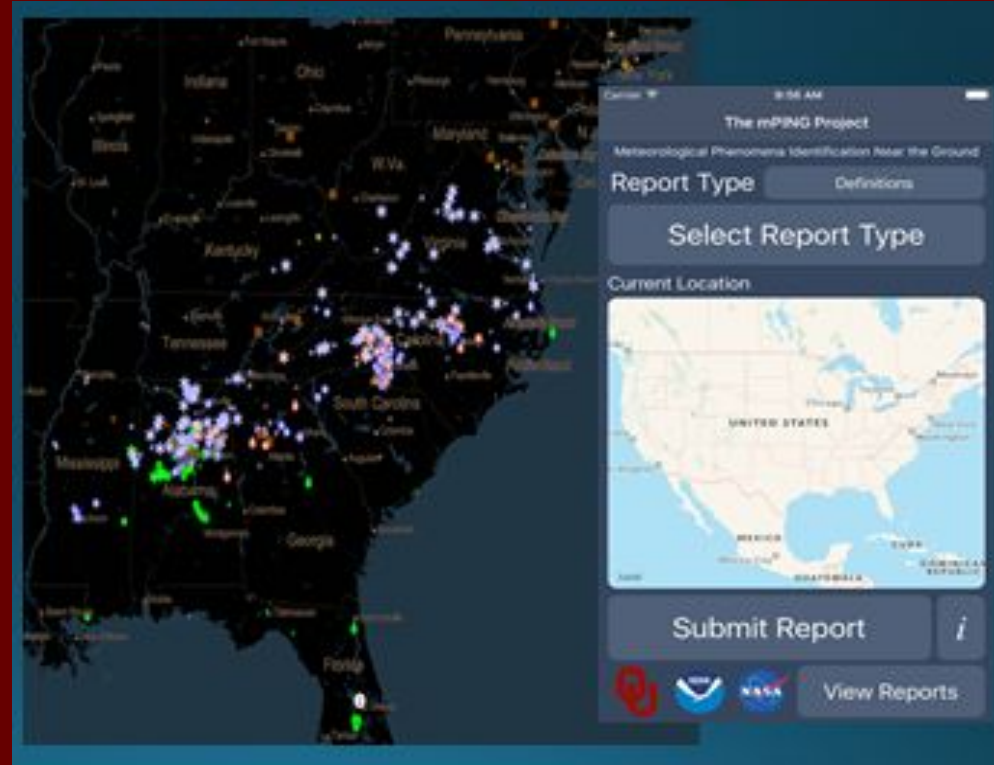


- NWS Spokane
- Send reports & pictures
- Monitored 24/7



# Share weather data - mPING

- Smartphone App
- Available on IOS and Android
- Reports sent to NWS
- Reports are anonymous
- Crowdsourcing
- Very easy to use
- <https://mping.nssl.noaa.gov>





# Share weather data - Email Photos

[nws.spokane@noaa.gov](mailto:nws.spokane@noaa.gov)



If ARES/RACES Hams, relay report to your central collection point.



National Weather Service - Spokane, WA

[www.weather.gov/Spokane](http://www.weather.gov/Spokane)



# Emails are Important

Besides a phone number, it's important to keep emails current.

You will likely be notified the day before/day of by email when there is a WIDESPREAD Severe Weather Risk/Thunderstorm Outbreak

We send periodic emails to alert you of the quarterly newsletter and upcoming training opportunities.



National Weather Service Spokane, WA

[www.weather.gov/Spokane](http://www.weather.gov/Spokane)



# Keep in Mind – We may contact you

As a registered weather spotter, you'll share your phone number with the NWS.

If we see severe or hazardous weather near your location....

**We will likely try to call and get information on what you are experiencing (ground truth) based on what is seen on radar**



National Weather Service - Spokane, WA

[www.weather.gov/Spokane](http://www.weather.gov/Spokane)





# #3 Poll question

What would be your preferred way to send reports to the NWS?



# Thunderstorm Hazards

## Main Ingredients

- Moisture
- Lift
- Instability
- Vertical Wind Shear



National Weather Service - Spokane, WA



# Ingredient #1: Moisture

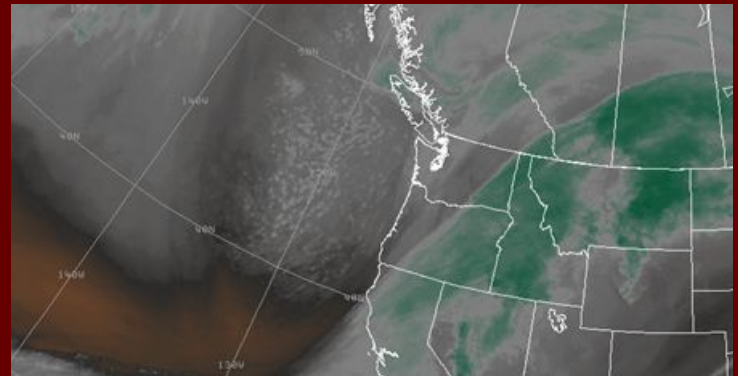
Forms the clouds and precipitation associated with thunderstorms

**Primary Sources:** Pacific Ocean

**Occasionally:** Gulf of California/Mexico during Monsoon Season

Monitor with satellite, upper level soundings and surface observations

Terms: Precipitable Water, Dewpoint, Relative Humidity





# Ingredient #2: Instability

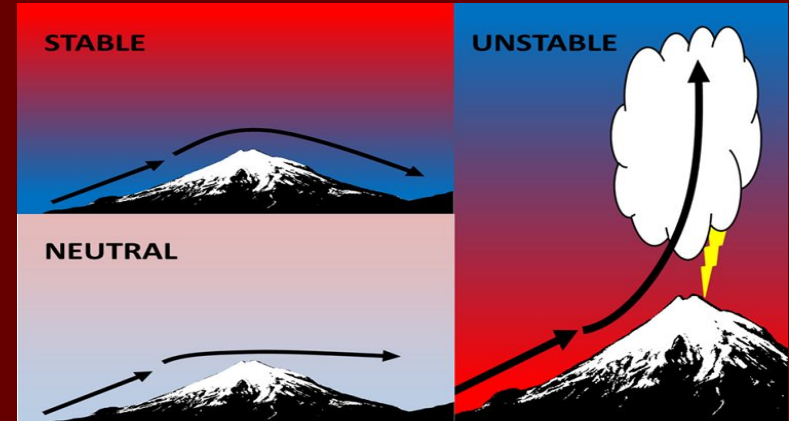
How the atmosphere naturally mixes

**Unstable:** warm moist air near the ground with cold air above

**Stable:** cold air at the surface and warm air above

Monitor with upper level soundings and surface observations

Terms: CAPE, Lifted Index, Lapse Rates



# Ingredient #3: Lifting Mechanism

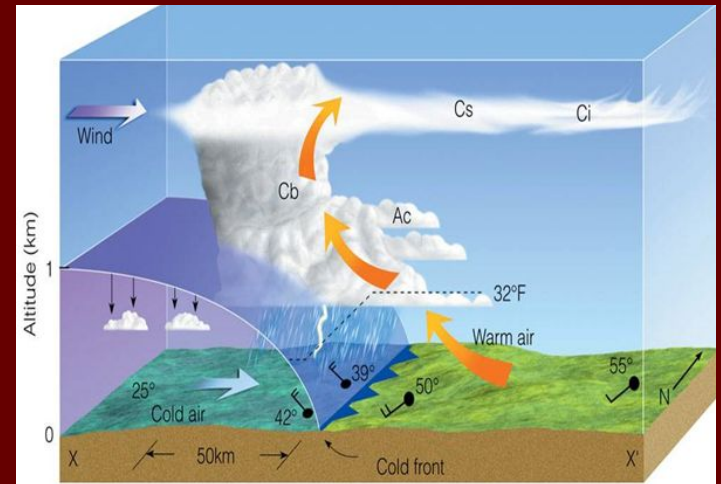
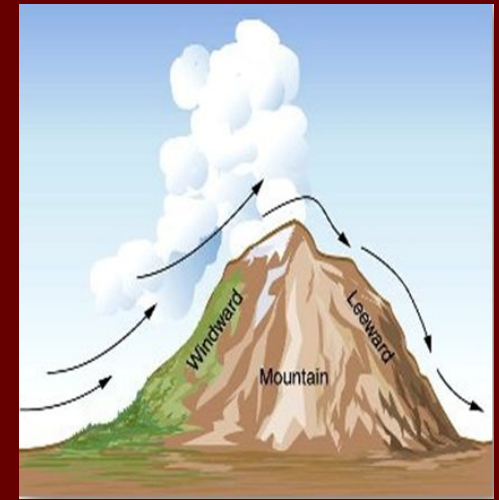
Something to force the air upward in the atmosphere.

**Mountains/Terrain:** air forced up a slope

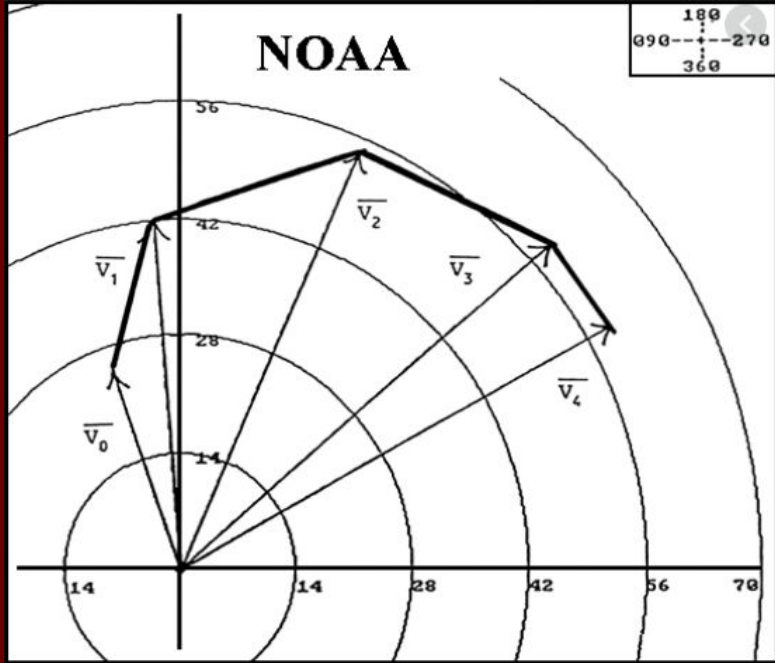
**Cold Front:** air is forced up by a frontal boundary

Monitor with satellite, radar, upper level soundings and surface observations

Terms: vertical velocity, vorticity, fronts

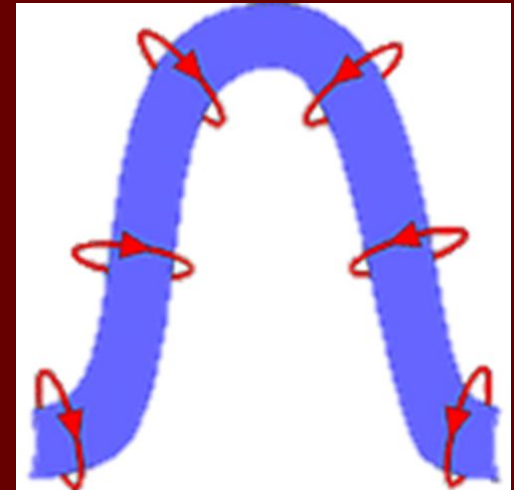
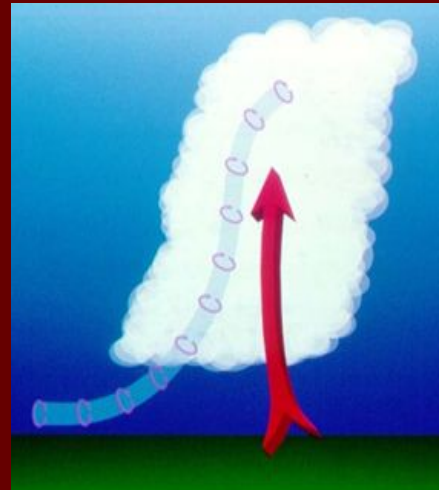
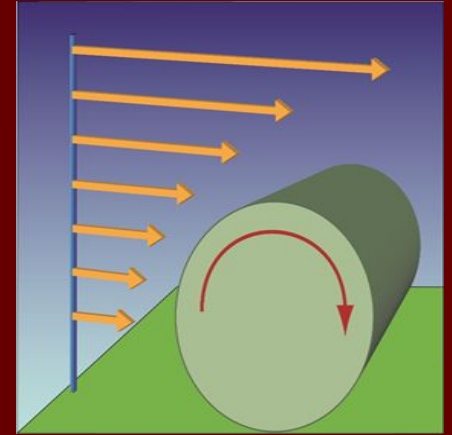
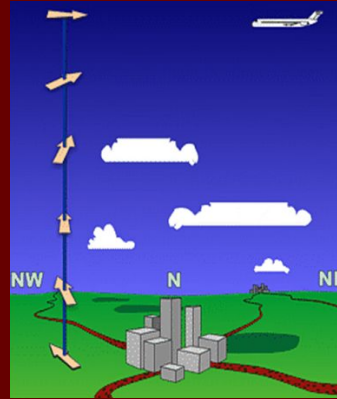


# Ingredient #4: Wind Shear



Winds / Vents

Height / Hauteur (km)	Dir	Speed / Vitesse
Sfc	161°	25
1	175°	42
2	204°	54
3	229°	59
4	241°	59



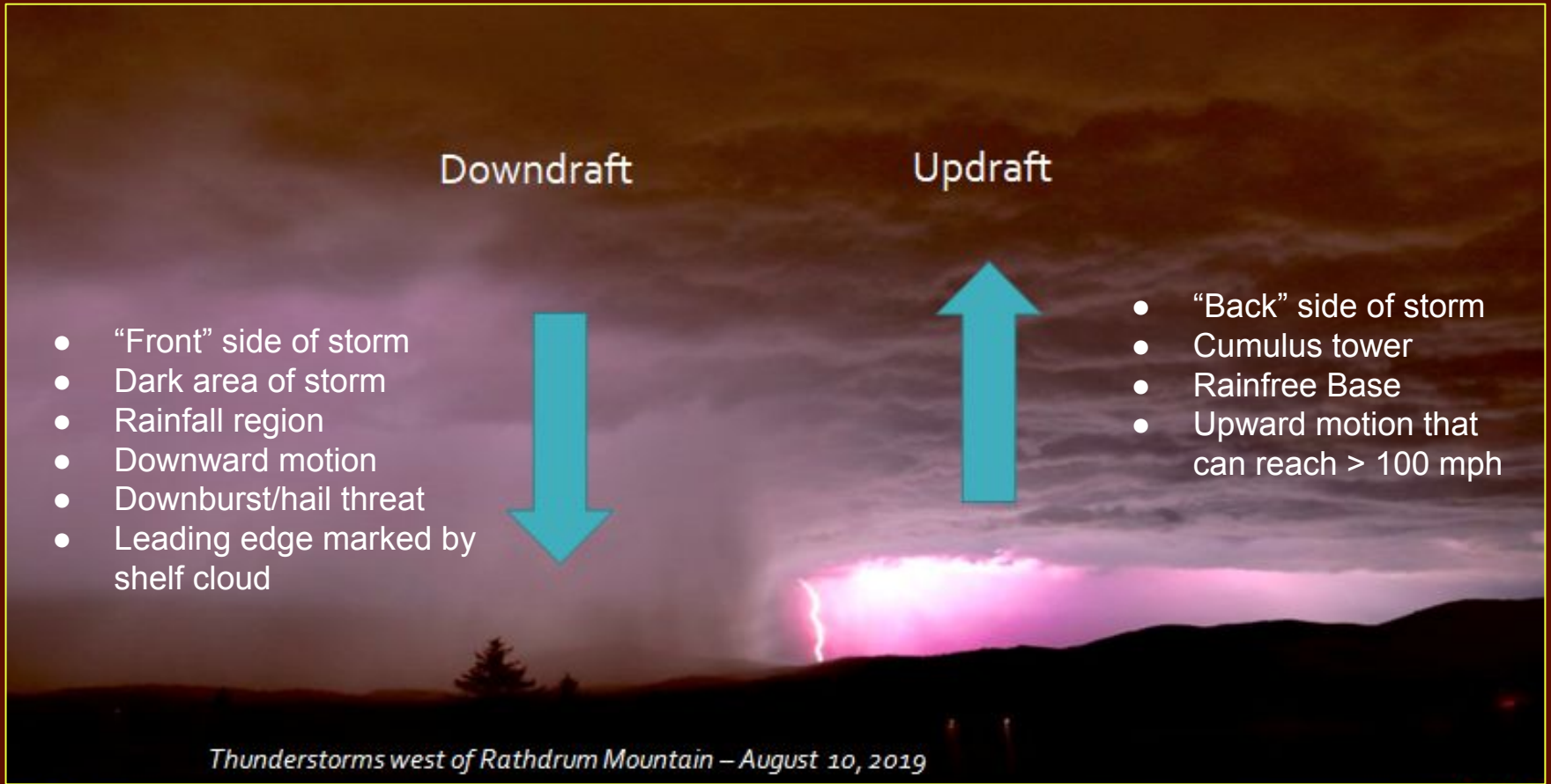


# S-L-I-M – Basic Thunderstorm Elements

Shear	Lift	Instability	Moisture
Changing wind speed and direction with height	Mechanism to force air upwards	“Energy” for thunderstorms	Obviously!
Helps storms become better organized, increasing severity and longevity	Creates a focus for where storms can develop	Ability for air to rise or sink as storms develop	Needed to produce clouds and storms
Common ahead of or along a front	Cold Front, Warm Front, Leftover storm boundary, Lake Breeze	Warm surface, cool upper levels (cools at a very fast rate as you go up)	Use Dew Point



# Thunderstorm Basics



# What is a Severe Thunderstorm?

**Winds  $\geq$  58 mph or Wind Damage**



**Hail  $>$  1" in diameter**



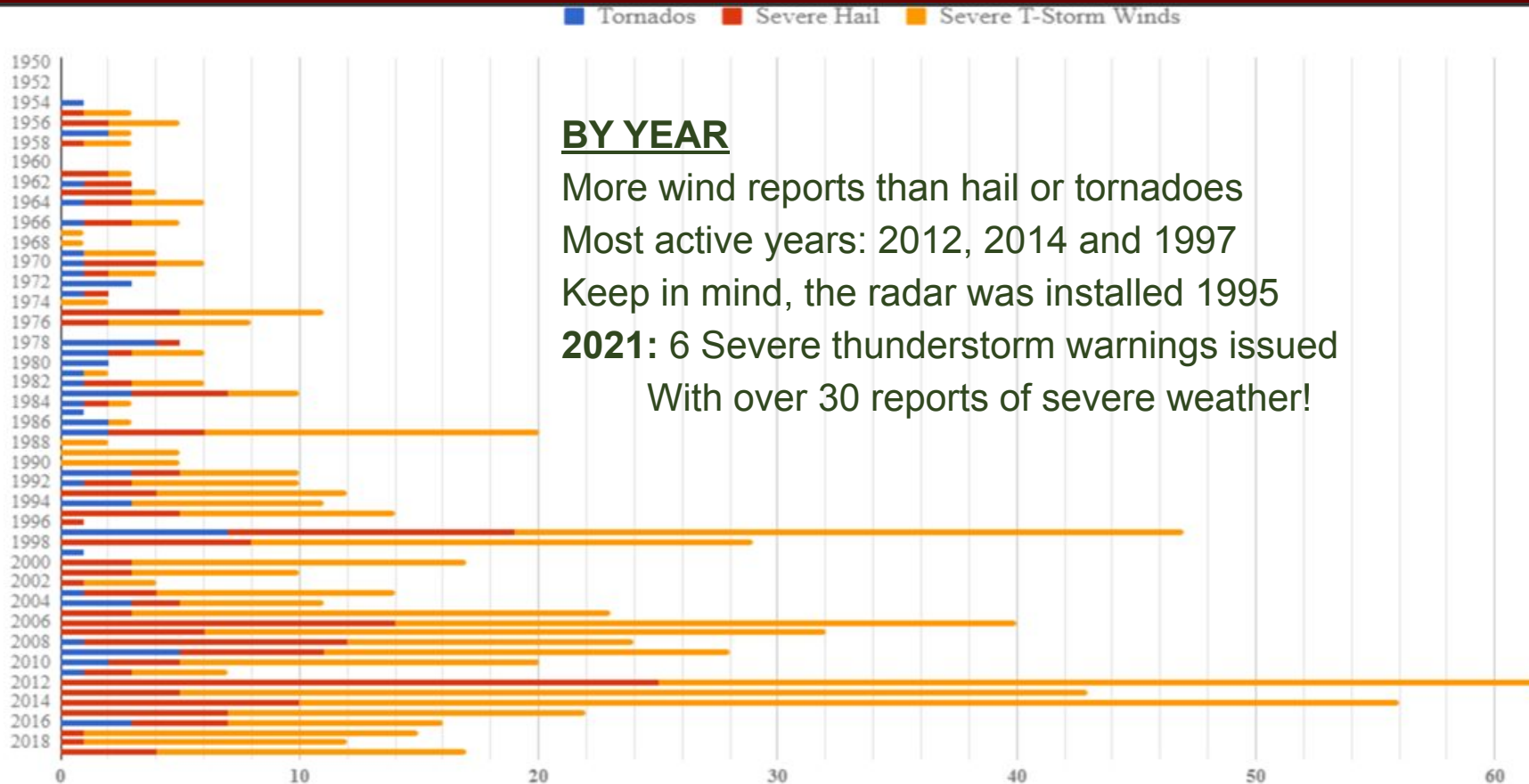
**Tornado**



- Less than 10% of all thunderstorms are Severe
- Though Lightning is ALWAYS extremely dangerous, the amount of lightning does not make a storm SEVERE.



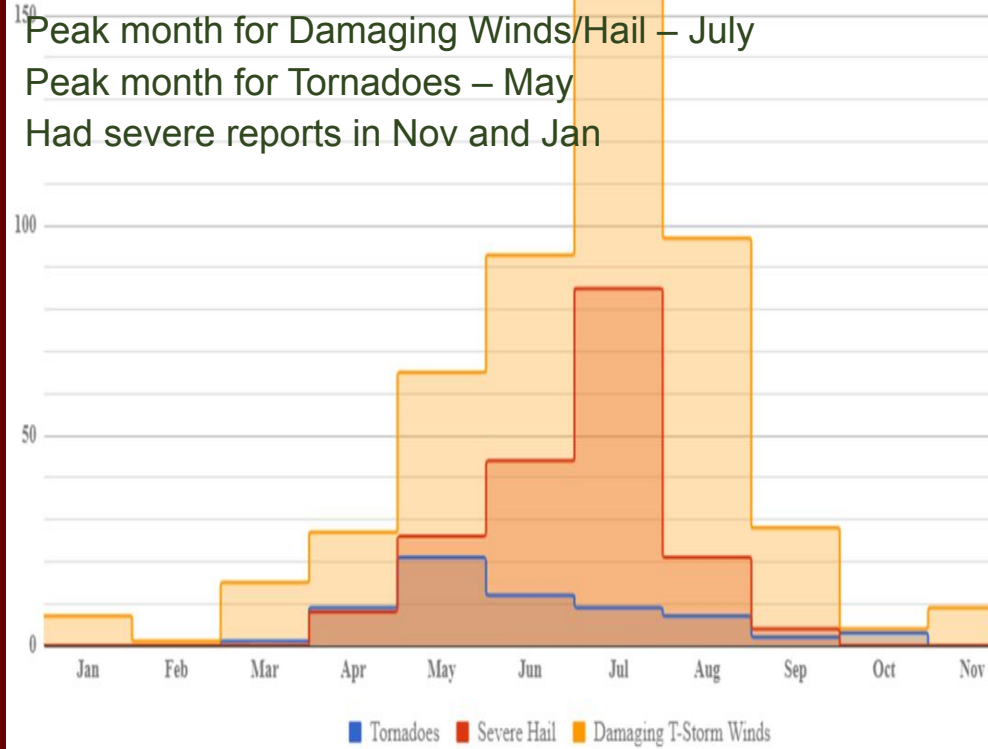
# Local Severe Weather Climatology



# More Local Severe Weather Climatology

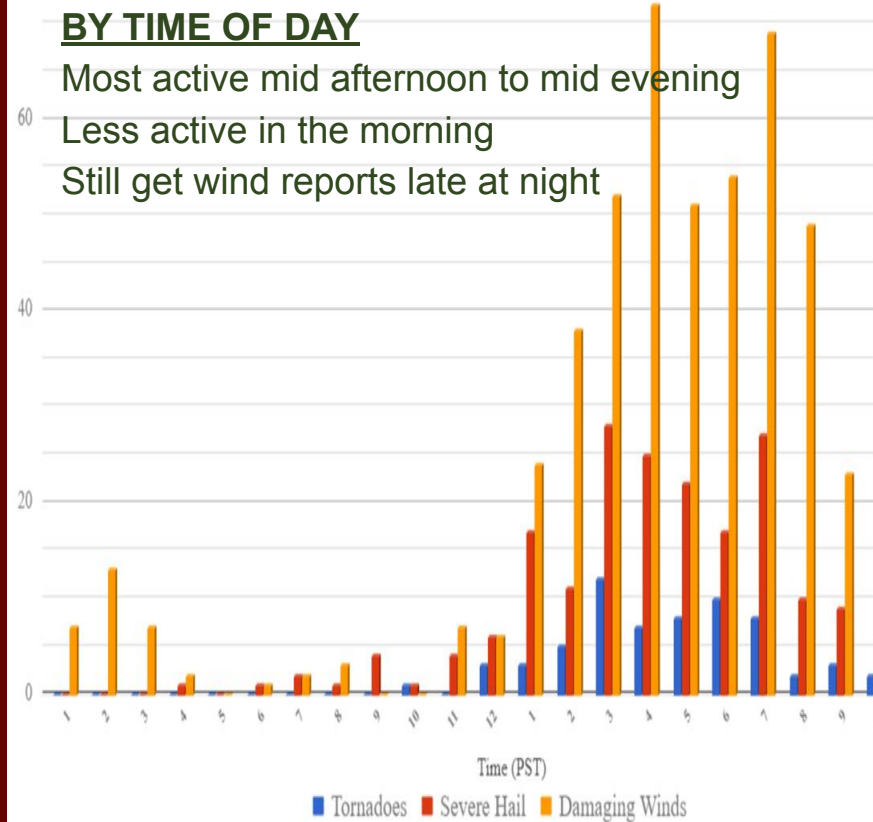
## BY MONTH

Peak month for Damaging Winds/Hail – July  
Peak month for Tornadoes – May  
Had severe reports in Nov and Jan



## BY TIME OF DAY

Most active mid afternoon to mid evening  
Less active in the morning  
Still get wind reports late at night



# #4 Poll Question

What would be a good ingredient for thunderstorm development?





# Types of Thunderstorms

Single Cell



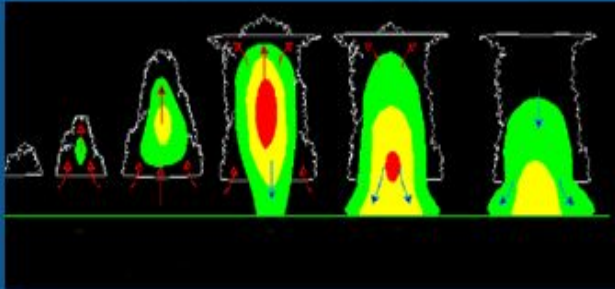
Multi-Cellular



Supercell



# Single Cell Thunderstorm



**Mostly Non-Severe**

Life Cycle of < 30 minutes

May Contain Small Hail  
& Gusty Winds



# Heavy Rain

Report heavy downpours or long periods of steady rain  
Give specific locations - streets and creeks

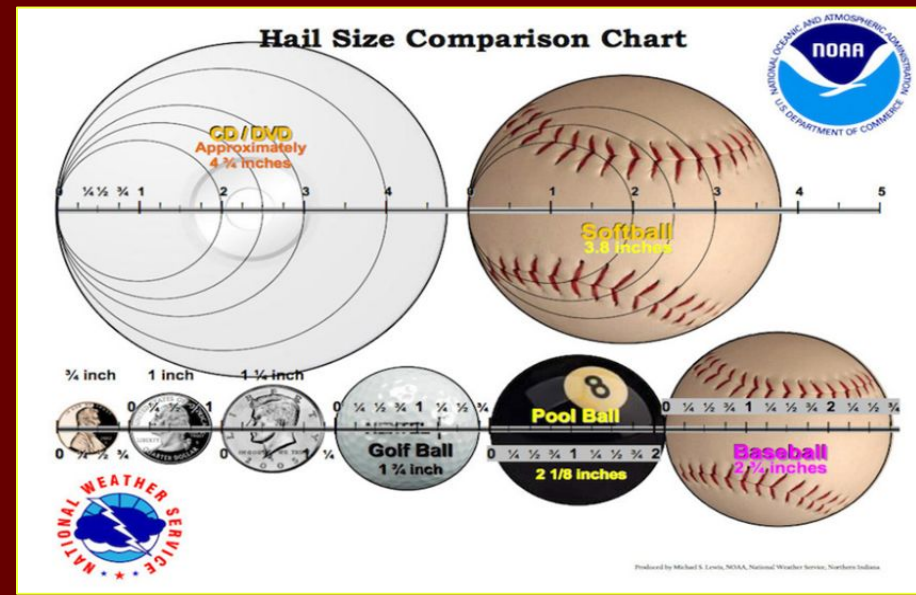
- 0.50"+ in 1 hour - convective
- 1.0" in 12 hours or 1.5"+ in 24 hours - stratiform





# Hail

- Strong updraft keeps chunks of ice aloft
- Circulated within a storm and collects layers of water and freezes
- Can fall to the ground at  $> 100$  mph
- Severe hail  $\geq 1$ " diameter
- Always report the largest Hailstone you see in the pile.



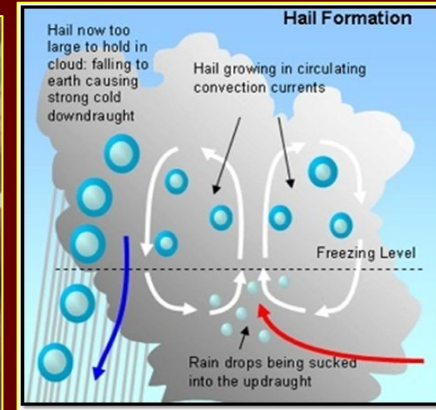
Naples, ID - May 2020



July 2019 - Metaline, WA



Spokane -  
July 2016



# Damaging Winds

- Strong downburst winds or straight line winds
- Can be convective or sustained strong winds
- Report any winds estimated to be over 40 mph
- Winds that product any damage
  - Downed trees, power lines, structure damage
- Remember, severe/high winds  $\geq$  58 mph



Windstorm 2015



April 27, 2019



January 13, 2021

Beaufort Wind Chart – Estimating Winds Speeds

Beaufort Number	MPH		Terminology	Description
	Range	Average		
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.



# Dust Storms

- Prolonged dry spell + strong winds + plowed fields
- Sudden reduction in visibility
- Give locations of roads and intersections
- Also called Haboobs

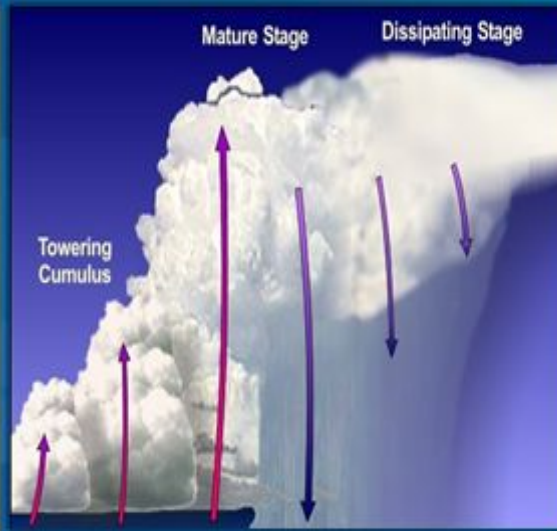
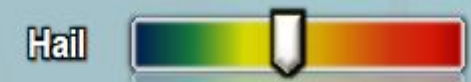




# Multicell Thunderstorms

Overall Severe Weather Threat Level:

**Low - Moderate**



- Flash flooding due to slow movement
- Downbursts, straight-line winds, small-med sized hail, lightning



# Downburst & Straight Line Winds



Microburst: affecting an area *less than 2.5 miles* across.

Macroburst: winds extending in excess of *2.5 miles* across.

Evaporative cooling causes the air parcels to become heavy/more dense.



# Flooding & Flash Flooding

Rising water on rivers, streams & low lying areas

Give specific locations of streams & streets



Wenatchee - Sept 2019



Williams Flats Fire Flood - Aug 11, 2019



Moscow - April 2019



Turn Around, Don't Drown



April 9, 2019 - Pullman





# Mud & Debris Flows

Water-saturated rock, mud and debris moving down a slope

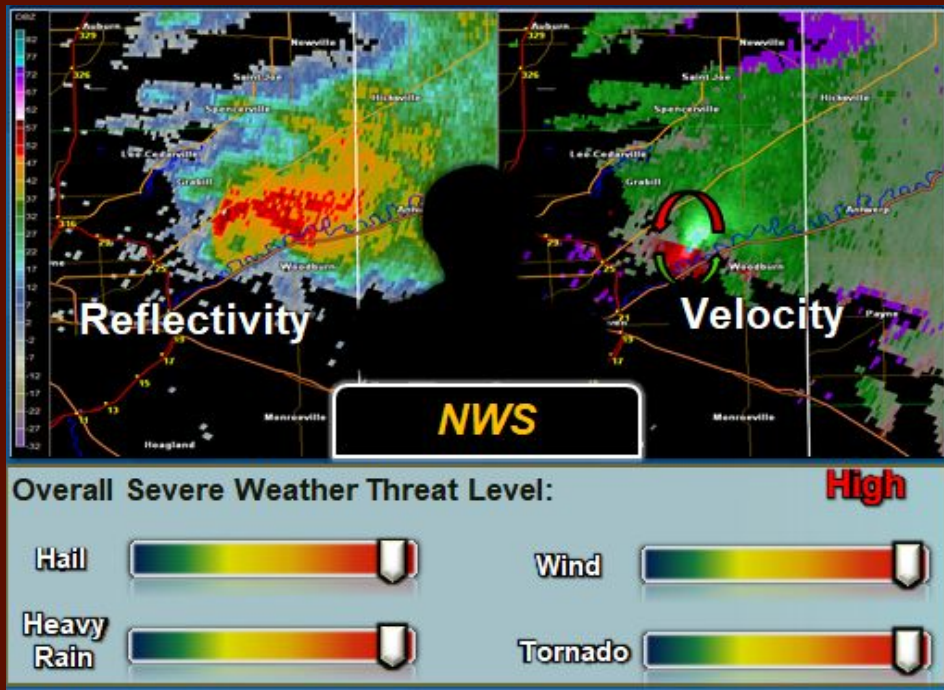
Give specific locations, roadways or intersections

Post-fire Floods



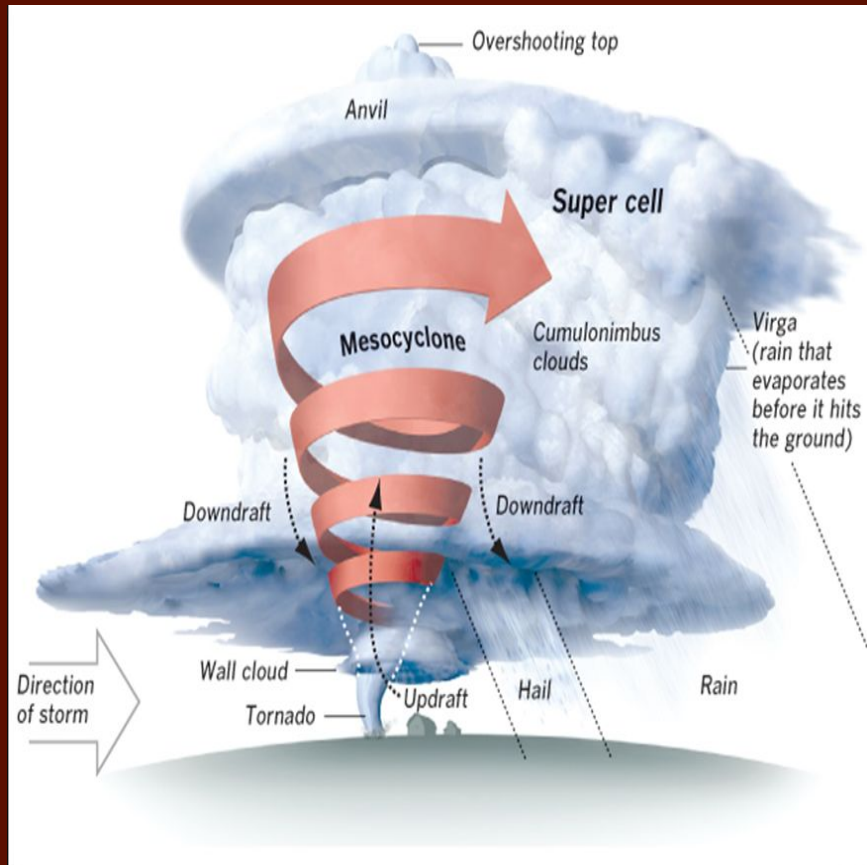


# Supercell Thunderstorms





# Supercell Thunderstorm Clues



Overshooting Tops



Cauliflower shaped towers



Mesocyclone or Wall Cloud



# Cloud Types

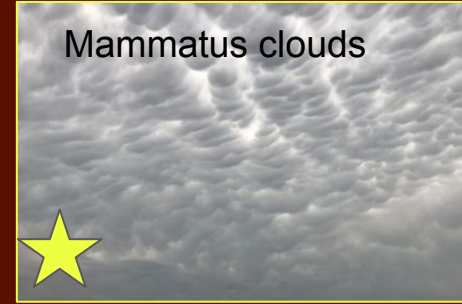
Scud clouds - ragged



Cumulus



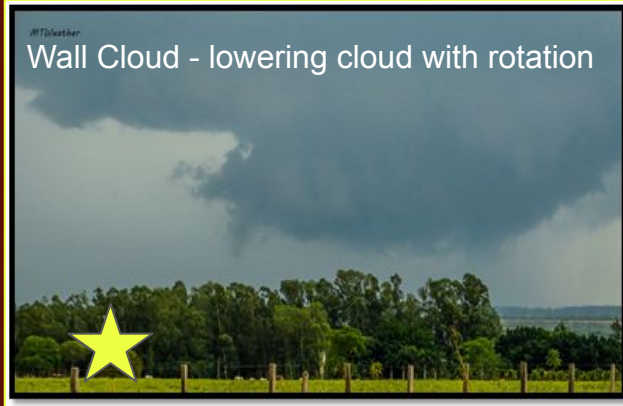
Mammatus clouds



Stratus clouds - stable, hugs mountains



Wall Cloud - lowering cloud with rotation



Towering Cumulus



# Tornado

A violently rotating column of air, attached to a thunderstorm and touching the ground.

## Typical Inland NW Tornado

- Less than 5 minutes on the ground
- 100 yards in diameter
- ¼ mile track
- Max wind speeds of 85-115 mph
- Mostly EF0 to EF1

Mold - July 2016



Spokane - July 2016





Posted by **KREM 2 News**

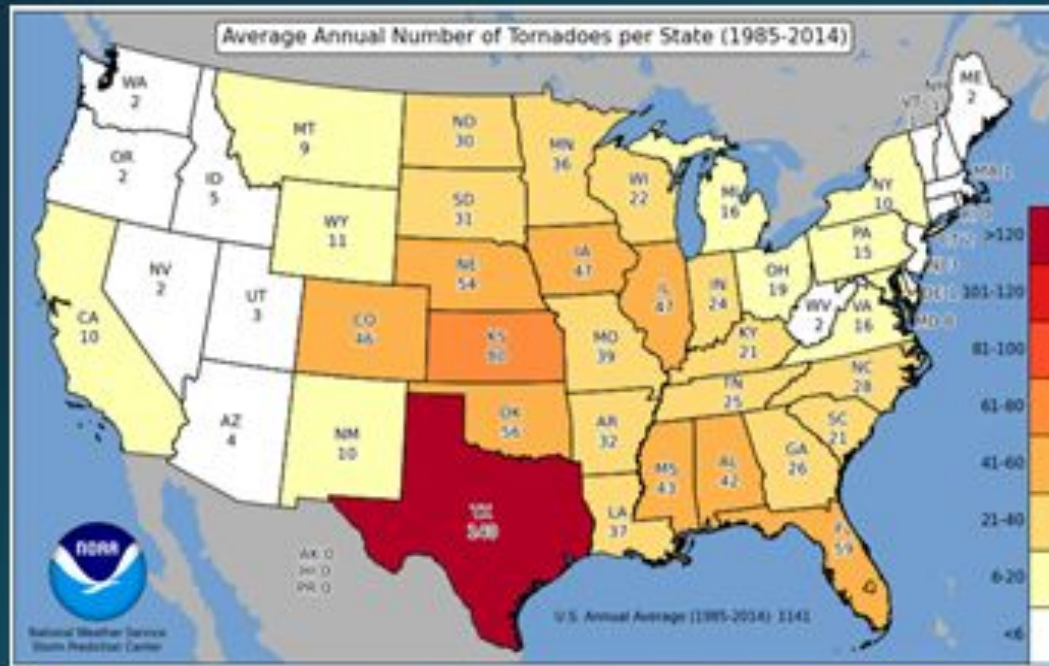
408,129 Views

Press **Esc** to exit full screen



# How are tornadoes measured?

## The Enhanced Fujita Scale



EF-Scale

Speed

EF<sub>0</sub>

65-85 mph

EF<sub>1</sub>

86-110 mph

EF<sub>2</sub>

111-135 mph

EF<sub>3</sub>

136-165 mph

EF<sub>4</sub>

166-200 mph

EF<sub>5</sub>

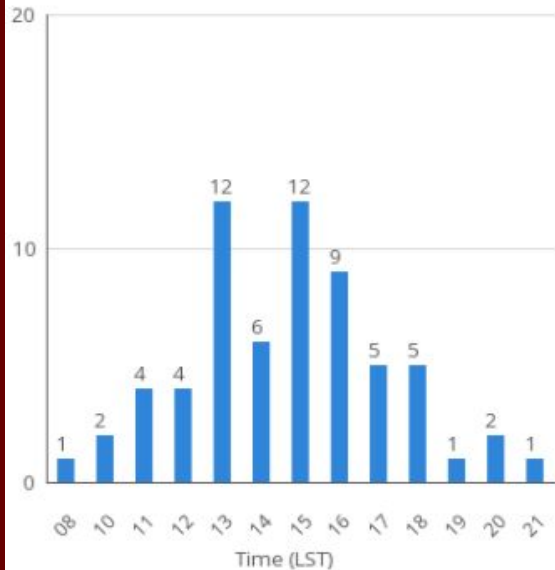
>200 mph



# Inland NW Tornado Stats ~ 64 reports (1936-2016)

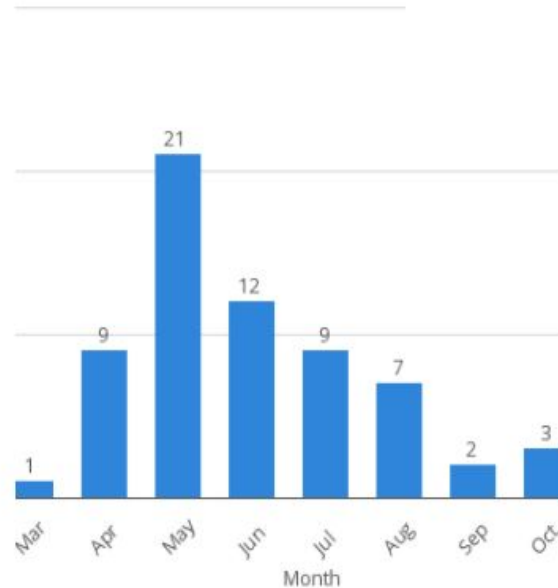
## Tornadoes by time of day

Total number of tornadoes by time of day



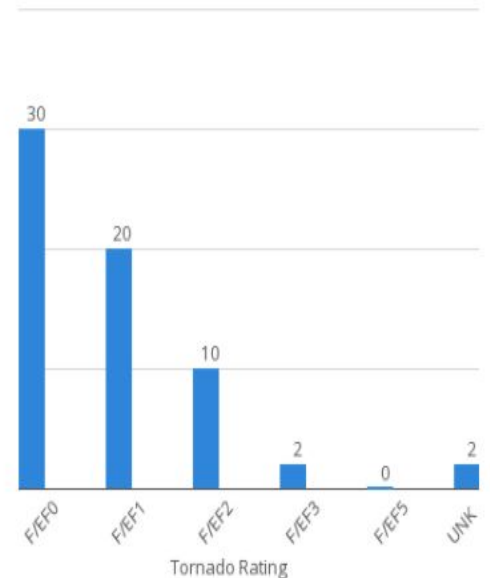
## Tornadoes by month

Total number of tornadoes by month



## Tornadoes by rating

Total number of tornadoes by RATING from 1936 to 2016





# Tornado Tracks, 1950-2017

Show Touchdown Points

## Filter by Magnitude:

- F/EF 0 —
- F/EF 1 —
- F/EF 2 —
- F/EF 3 —
- F/EF 4 —
- F/EF 5 —

## Filter by Year Range:

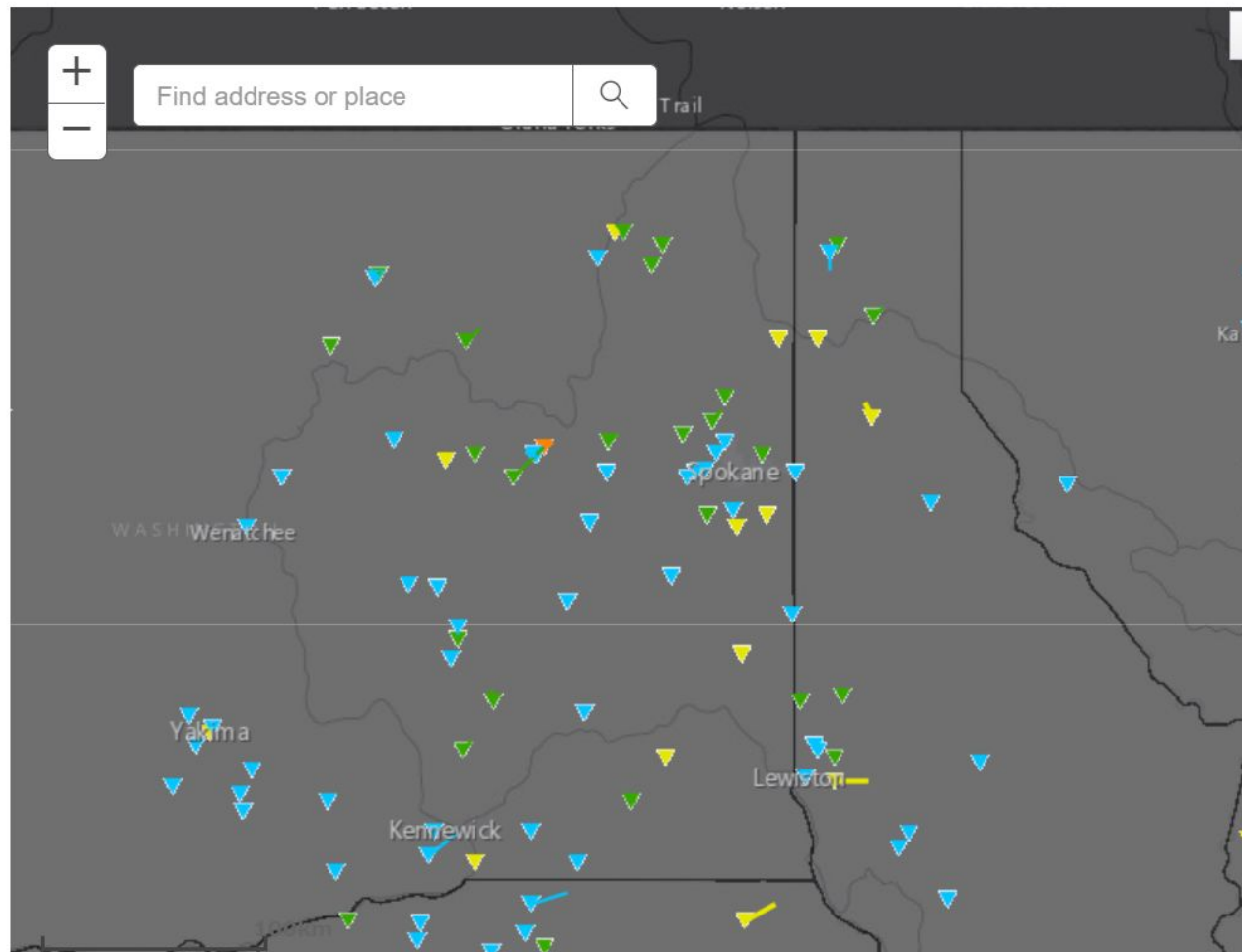
1950  through 2017

## Filter by Month:

All Months

## Filter by Casualties:

- Injuries > 0
- Fatalities > 0



# What about Funnel Clouds & Dust Devils?

- Funnel clouds stay aloft attached to storm cloud
- Dust devils start at the ground and extend upward
- Tornadoes extend from storm cloud to the ground
- In doubt, check for cloud cover and debris on ground
- Take a picture and share!



# Cold Air Funnels - May 2020 Pullman

- No reports of damage or touchdowns
- Additional reports in Ritzville & Columbia Basin
- Weather pattern - upper level trough





# #5 Poll Question

Identify this image.



# #6 Poll Question

Identify this image.






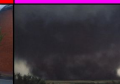


# Stay Informed

National Storm Prediction Center

[www.spc.noaa.gov](http://www.spc.noaa.gov)

## Understanding Severe Thunderstorm Risk Categories

THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected	Isolated severe thunderstorms possible	Scattered severe storms possible	Numerous severe storms possible	Widespread severe storms likely	Widespread severe storms expected
Lightning/flooding threats exist with all thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, a few intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
					

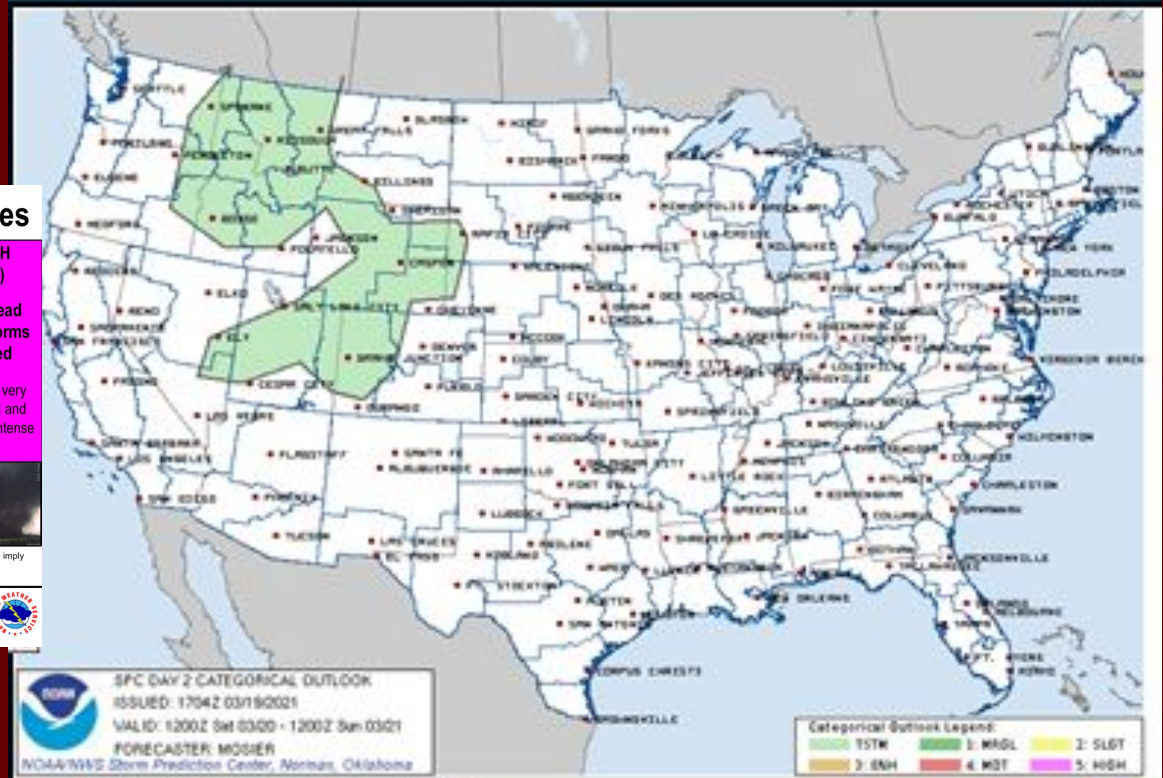
\* NWS defines a severe thunderstorm as measured wind gusts to at least 58 mph, and/or hail to at least one inch in diameter, and/or a tornado. All thunderstorm categories imply lightning and the potential for flooding. Categories are also tied to the probability of a severe weather event within 25 miles of your location.




National Weather Service

[www.spc.noaa.gov](http://www.spc.noaa.gov)







SPC DAY 2 CATEGORICAL OUTLOOK

ISSUED: 1704Z 03/19/2021

VALID: 1200Z Sat 03/20 - 1200Z Sun 03/21

FORECASTER: MOSEIER

NOAA/NWS Storm Prediction Center, Norman, Oklahoma

Categorical Outlook Legend:

<span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black;"></span> 1: MRGL	<span style="display: inline-block; width: 15px; height: 10px; background-color: #FFFF00; border: 1px solid black;"></span> 2: SLGT
<span style="display: inline-block; width: 15px; height: 10px; background-color: #FFA500; border: 1px solid black;"></span> 3: ENH	<span style="display: inline-block; width: 15px; height: 10px; background-color: #FF0000; border: 1px solid black;"></span> 4: MDT
<span style="display: inline-block; width: 15px; height: 10px; background-color: #800080; border: 1px solid black;"></span> 5: HIGH	



# Stay Informed

## Watch, Warning, Advisory

TYPE	DEFINITION	THREAT	ACTION
<b>WARNING</b>	Hazard is occurring, imminent, or very likely	Threat to life & property	Take protective action
<b>WATCH</b>	Conditions are <u>favorable</u> for hazard to occur	Threat to life & property	Have a plan of action
<b>ADVISORY</b>	Hazard is occurring, imminent, or very likely	Threat of significant inconvenience	Use caution



# Stay Informed

## NWS Spokane Web Page

[www.weather.gov/Spokane](http://www.weather.gov/Spokane)

The screenshot shows the NWS Spokane website interface. At the top, there are navigation links: HOME, FORECAST, PAST WEATHER, SAFETY, INFORMATION, EDUCATION, NEWS, SEARCH, and ABOUT. Below this is a search bar for local forecasts by city, state, or ZIP code. A 'News Headlines' section lists recent updates. The main content area is titled 'NWS Forecast Office Spokane, WA' and includes a 'Spokane, WA' sub-header. A horizontal menu contains several links: 'Current Hazards', 'Current Conditions', 'Radar', 'Forecasts', 'Rivers and Lakes', 'Climate and Past Weather', and 'Local Programs'. The 'Current Hazards' link is circled in red. Below the menu, there are three tabs: '5 Day Outlook', 'April Record Cold', and 'Breezy Tuesday'. The '5 Day Outlook' tab is active, displaying a large graphic with the title '5 DAY OUTLOOK' and a background image of a sunset. The graphic shows weather icons and text for each day from Monday to Friday. The 'Rivers and Lakes' link is also circled in red. At the bottom of the page, there is a 'Show Caption' link and the NWS logo.

**NATIONAL WEATHER SERVICE**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME FORECAST PAST WEATHER SAFETY INFORMATION EDUCATION NEWS SEARCH ABOUT

Local forecast by "City, ST" or ZIP code  
Enter location ...    
[Location Help](#)

**News Headlines**

- [Spring 2022 Weather Spotter Training Schedule - Register Here!](#)
- [Latest Edition of the Weather Watcher Newsletter - Spring 2022](#)

**MY FORECAST**  
Spokane WA

**NWS Forecast Office Spokane, WA**  
[Weather.gov](#) > Spokane, WA

**Spokane, WA**  
Weather Forecast Office

[Current Hazards](#) [Current Conditions](#) [Radar](#) [Forecasts](#) [Rivers and Lakes](#) [Climate and Past Weather](#) [Local Programs](#)

5 Day Outlook April Record Cold Breezy Tuesday

**5 DAY OUTLOOK**

Inland Northwest

- Mountain Snow/ Valley rain
- Highs 40-50s
- Highs 40-50s
- Gusty SW Winds 25-40 mph
- Isolated thunderstorms NE WA/Northern ID
- Highs low 50s
- Evening showers
- Highs low 50s
- Morning showers, Afternoon isolated thunderstorms
- Highs low 50s
- Partly cloudy
- Panhandle showers
- Highs 50s

MON TUE WED THU FRI

[Show Caption](#)

**NATIONAL WEATHER SERVICE**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Important NWS products to follow

- Current Hazards
- Radar data
- Forecast Computer Models
- River and Lake - forecasts

# Stay Informed

## NWS Spokane Web Page

[www.weather.gov/Spokane](http://www.weather.gov/Spokane)

### Important NWS products to follow

- Area Forecast Discussion (AFD)
- Radar images
- Satellite Images
- Current Observations
- Submit a Spotter Reports
- View Storm Reports

Click a location below for detailed forecast.



Watches, Warnings & Advisories

There are no watches, warnings, or advisories at this time.

Zoom Out

Zoom In

Last Map Update: Mon, Apr. 5, 2021 at 10:44:15 am PDT

Text Product Selector (Selected product opens in current window)

Latest Text Products Issued by OTX



Social Media

Forecast Discussion

Local Radar

Satellite Images

Weather Maps

Graphical Forecasts

Weather Table Forecasts

Climate Graphics

Rivers and Lakes

Observations & Hazards

File a Report

View Storm Reports

Weekly Briefing

Hourly Forecasts

Drought Information

Climate

Submit a Storm Report

View Storm Reports

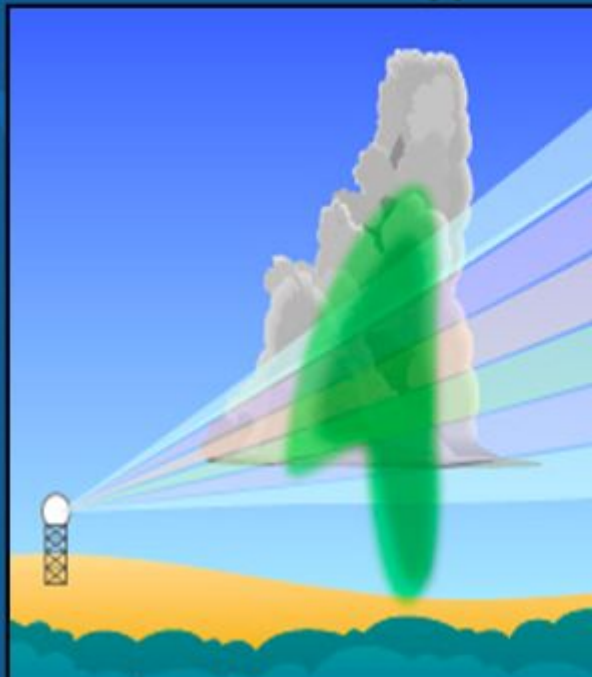




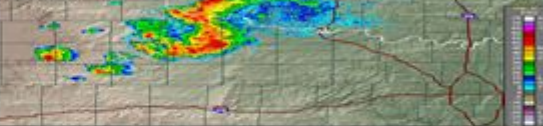
# Basic Radar Interpretation

Updated Radar Map  
Local Radar - Select Site

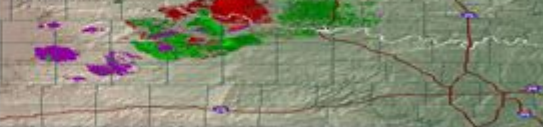
## Doppler Weather Radar



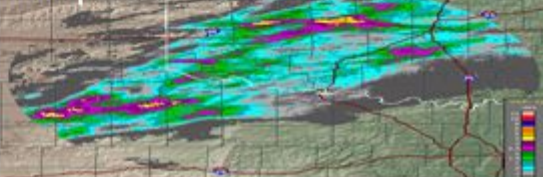
**Reflectivity** - A picture of the weather based on energy reflected back to the radar.



**Velocity** - The average speed and direction of travel of objects detected by radar.



**Precipitation Amount Estimates**



☑ KOTX ▾ CREF (NCR) ^ ⚠ No Alerts ▾

Select the radar product:

- Super Resolution Base Reflectivity
- Super Resolution Base Velocity
- Dual-Pol Precipitation Type
- Dual-Pol Differential Reflectivity
- High Resolution Echo Tops
- One Hour Precipitation Accumulation
- Storm Relative Motion
- Digital Storm Total
- Storm Total Precipitation
- Base Velocity
- Composite Reflectivity
- High Resolution VIL

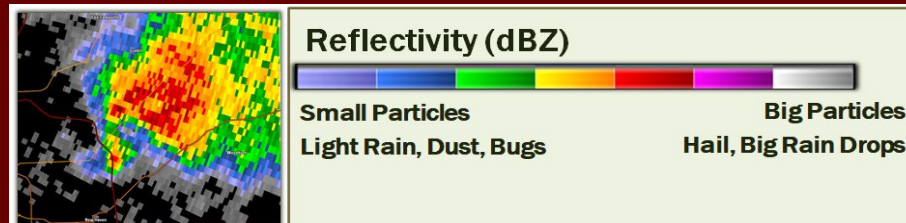
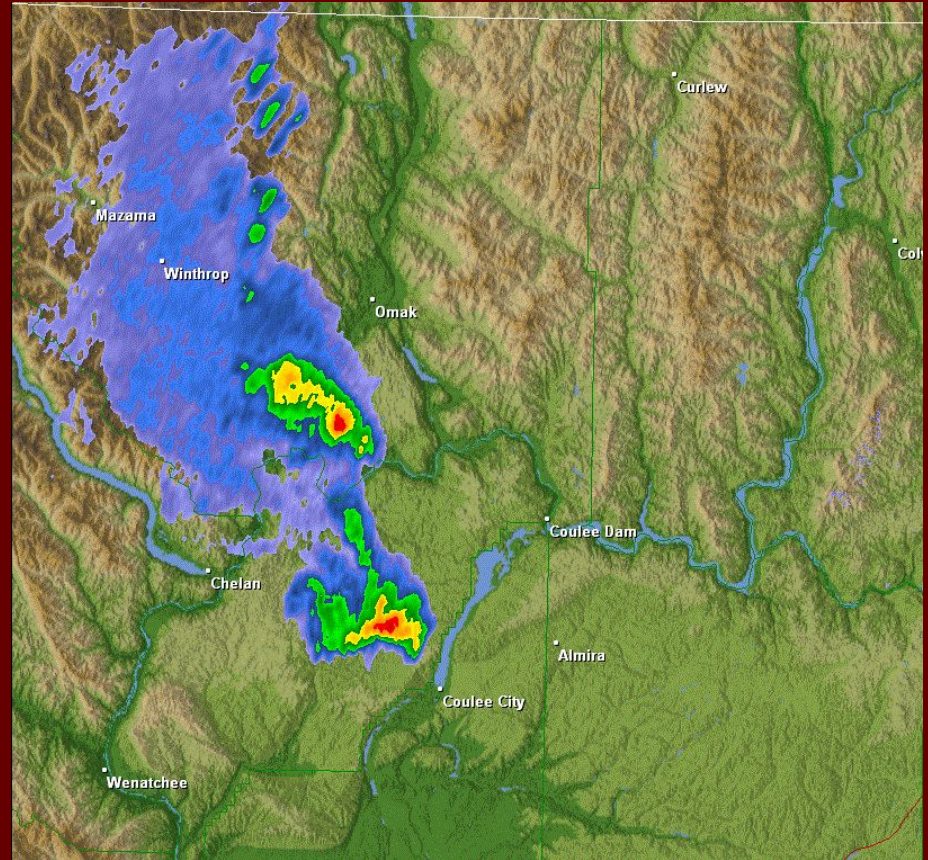
# Radar Products - Reflectivity

Raw measure of how reflective targets within the beam are - typically (BUT NOT ALWAYS) indicates precipitation intensity

Measured in dbZ

“Base” or “Tilt X” = One Slice

“Composite” = Worst of all Slices



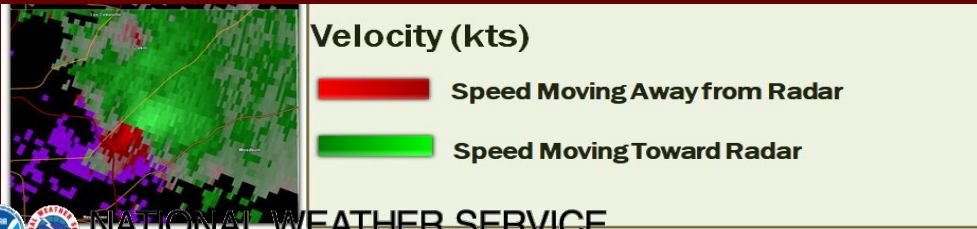
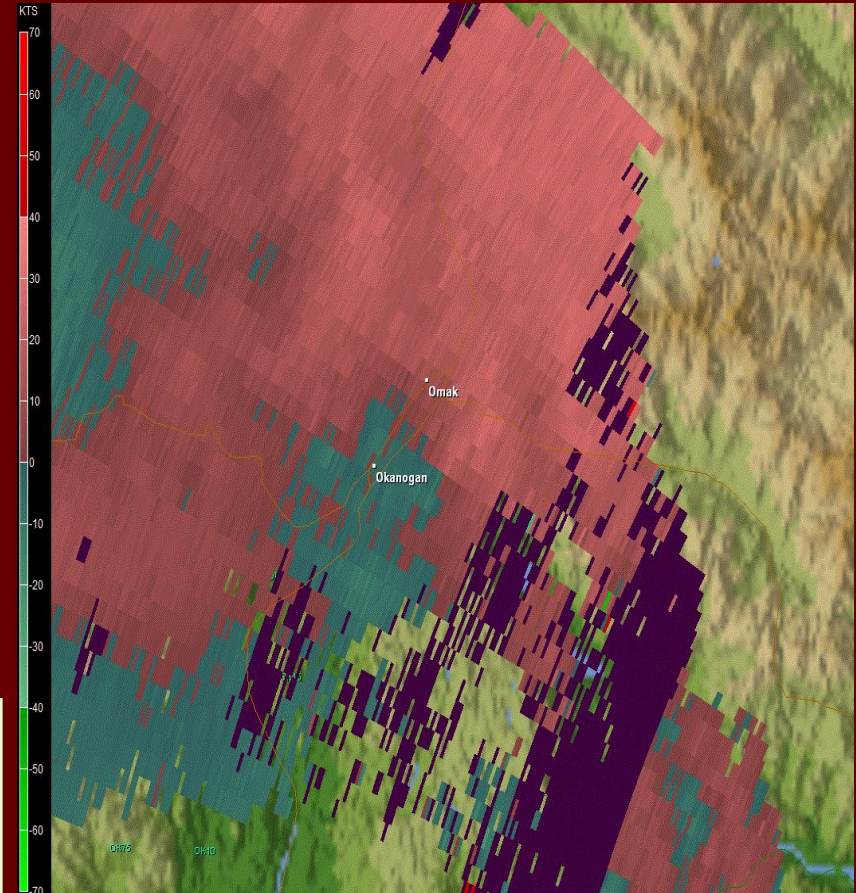


# Radar Products - Velocity

Speed and direction of targets - rain, snow, hail, debris or other biological particles. Measured in knots.

Reds = outbound motion  
Green = inbound motion

“Base” = ground relative motion  
Good for straight line winds  
“Storm Relative” = storm motion removed  
Good for rotation in storms

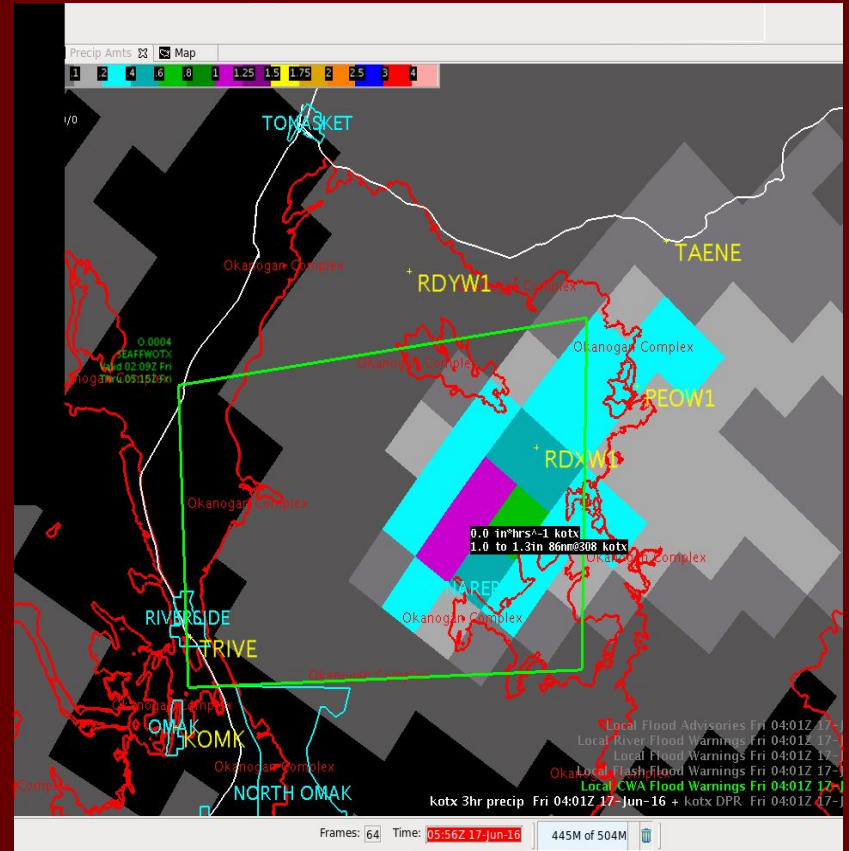




# Radar Products - Precipitation

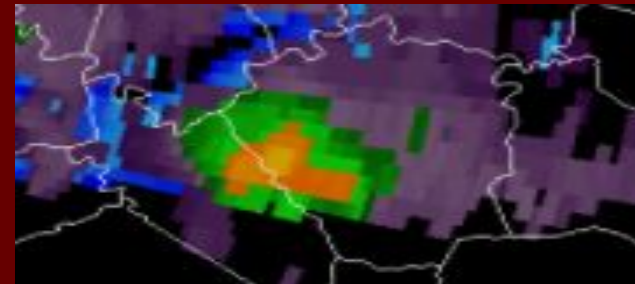
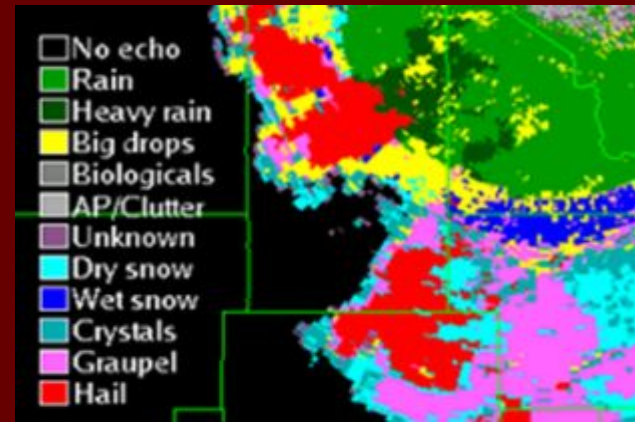
Radar estimate of precipitation reaching the ground. This can be overestimated from hail contamination

Hourly - 1 hour precipitation  
Storm Total - total precipitation through the storm



# Radar Products - More Products

- Precipitation Type
  - Estimate of type of precipitation
- Echo Tops
  - Estimate of height above ground of the 18 dBz echo or storm top
- Vertically Integrated Liquid - VIL
  - Estimate of the liquid water content - hail size



# Stay Informed

## Do you have the time?

- Many weather products use the UTC/GMT/Z time zone
- UTC = PDT + 7 or PST +8
  - 10:00 AM PDT is 17:00 UTC
  - 10:00 AM PST is 18:00 UTC
- 00z and 12z are common times for models, weather balloons and other important weather information



00z = evening

12z = morning

24 hour clock is used for UTC/Z

Based off the lines of longitude

0 degrees = Greenwich, England





## Cold Air Funnel

- Circulation on Radar near I-90 where it was seen around 4:45 pm TO 4:50 pm May 26<sup>th</sup>
- “Red Shading” moving away from radar
- “Green Shading” moving away from radar

### What is a “Cold Air Funnel”?

A funnel cloud that can develop from a small shower or thunderstorm when the air aloft is unusually cold (hence the name). They typically do NOT touch the ground and do not cause damage. But always be alert if you see one.



May 2015



# #7 Poll question

What are some useful radar products?



# Spotter Safety

Even the most careful and conscientious driver may have problems under severe weather conditions

Sadly 3 OU students were killed in a traffic accident while storm chasing

## Number 1 Threat: Driving on the highways!

- Spotters are prone to:
  - Drive with less than 100% attention
  - Drive above the speed limit
  - Drive down rain/hail covered roads
  - Make sudden stops and starts without warning
  - Drive in adverse conditions, i.e. low visibilities, strong gusty winds etc.
  - Distractions due to various in-car devices, i.e. cell phone, laptop, PDA, GPS, camera etc.





# Spotter Safety - Lightning

Close Enough to Hear Thunder,-  
Close Enough to be Struck!

- Lightning can strike as far as 10 miles from the thunderstorm.
- More than 50% of lightning deaths occur AFTER the storm has passed

## When Thunder Roars, Go Indoors

Seek Safe Shelter indoors - or vehicle if needed  
Stay away from windows & doors  
Don't use a corded phone or take a bath/shower



Spokane, WA April 2017



Kahlotus - May 2020



Ritzville - May 2020



# Spotter Safety - Standing Water on Roads



- **Hydroplaning is a serious threat.**
- **During a storm, water will likely collect along the tire paths.**
- **If you are hearing water splashing under your car, then you are on the verge of hydroplaning, if you are not doing so already.**
- **Use your headlights.**

# Spotter Safety - Night Spotting

**Be extra cautious at night**

**Obviously, it is more dangerous to deal with something you cannot clearly see. Storms at night present special problems for spotters and you should be extremely cautious when observing storms after dark.**





# Spotter Safety - Storm Damage

## Stay out of damage areas

- **Damage paths are full of hazards; downed power lines, jagged pieces of sheet metal, broken boards, etc.**
- **Avoid such places unless you have been asked to participate with cleanup or rescue efforts.**
- **Hindering cleanup – too many people in the way.**
- **Folks who have been hit by storm damage tend to be suspicious of strangers in their area.**
- **Gawkers are usually not appreciated and you could be taken for a potential looter.**



# Spotter Safety

## Responsible Spotting...

- **Effective spotting is a constant learning process, and responsible spotters should always be aware of the latest science relating to severe thunderstorms and tornadoes.**
  - *Attend as many storm spotting classes as you can.*
  - *Each time you attend, you WILL learn something new.*
  - *Do additional research on your own (join blogs, forums etc)*





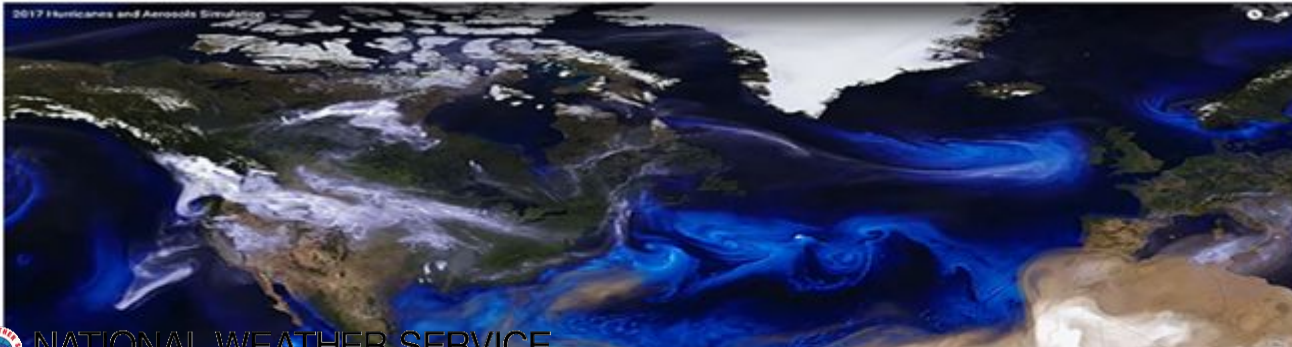
# Additional Training



Spotter Resources

[www.weather.gov/  
Spokane/Spotter\\_  
Resources](http://www.weather.gov/Spokane/Spotter_Resources)

## JetStream - An Online School for Weather



### JetStream's Topics

- The Atmosphere
- The Ocean
- Global Weather
- Clouds
- The Upper Air
- Upper Air Charts
- Synoptic Meteorology
- Thunderstorms
- Lightning
- Derechos
- Tropical Weather
- Doppler Radar
- Remote Sensing
- Tsunamis
- The National Weather



# #8 poll question

What would be a SAFE weather spotting scenario?



# Seasonal Outlook 2022

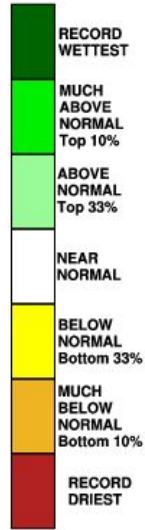
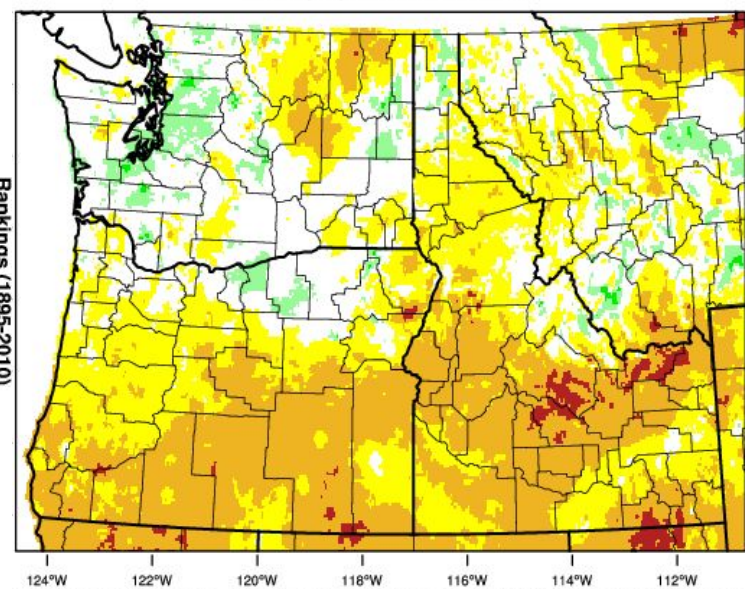
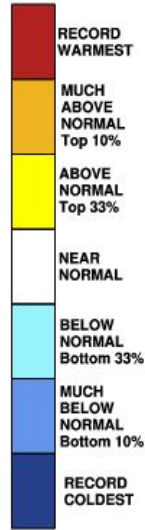
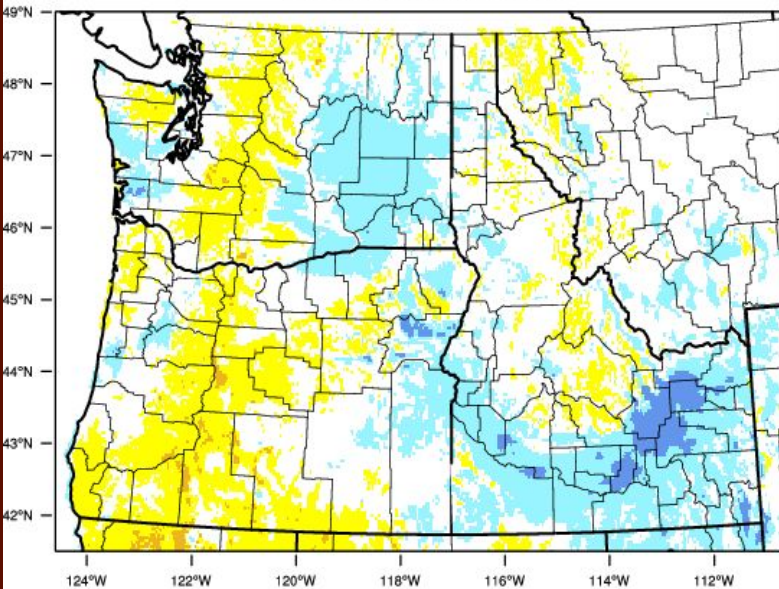
So far this year...

[wrcc.dri.edu/](http://wrcc.dri.edu/)

January - Wet for the first half of the month/then dry  
February - Cool and dry  
March - Mild and dry  
April - Cold & somewhat wetter

Pacific Northwest - Mean Temperature  
January-April 2022 Percentile

Pacific Northwest - Precipitation  
January-April 2022 Percentile



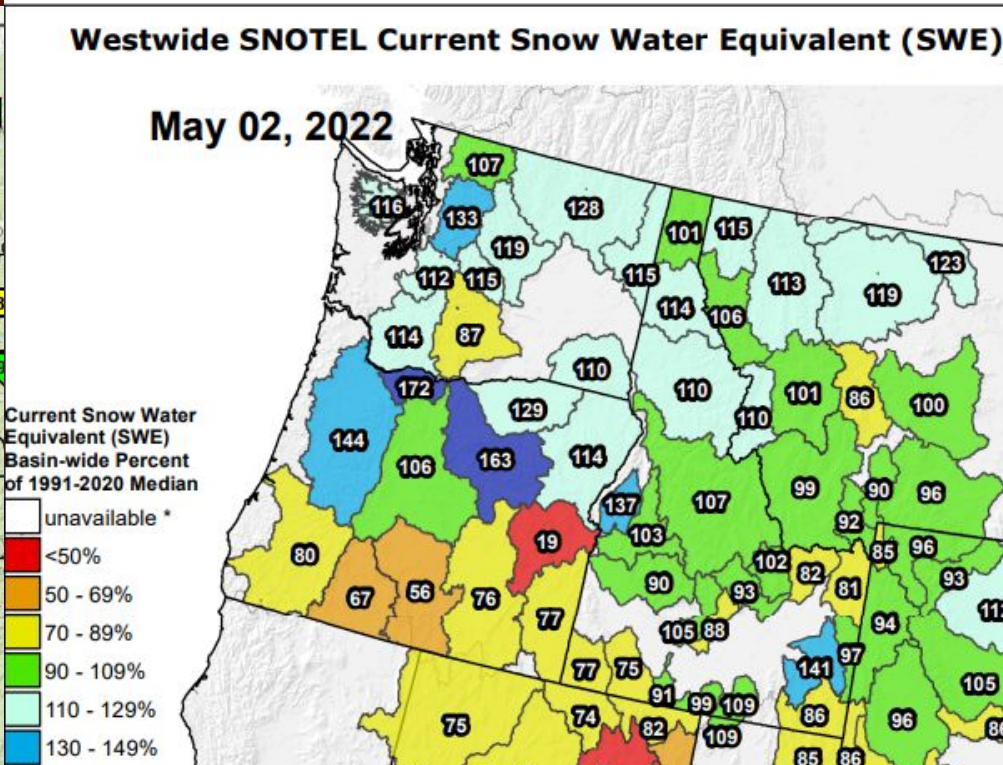
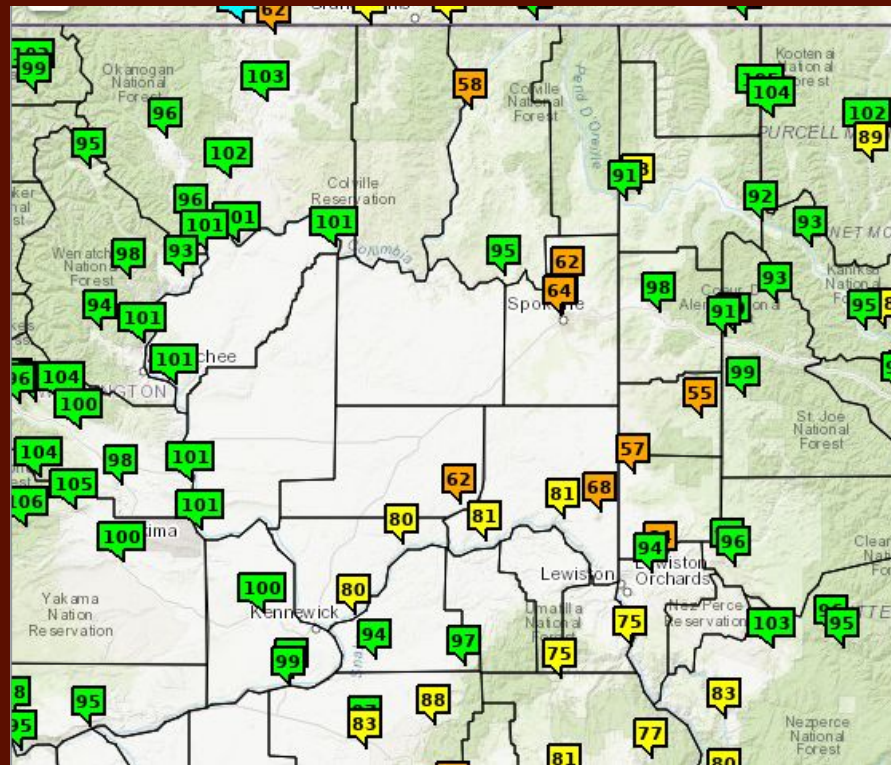
WestWide Drought Tracker - U Idaho/WRCC Data Source - PRISM (Prelim), created 2 MAY 2022

WestWide Drought Tracker - U Idaho/WRCC Data Source - PRISM (Prelim), created 2 MAY 2022

# Seasonal Outlook 2022

## Mountain Snowpack

### Water Supply Outlook

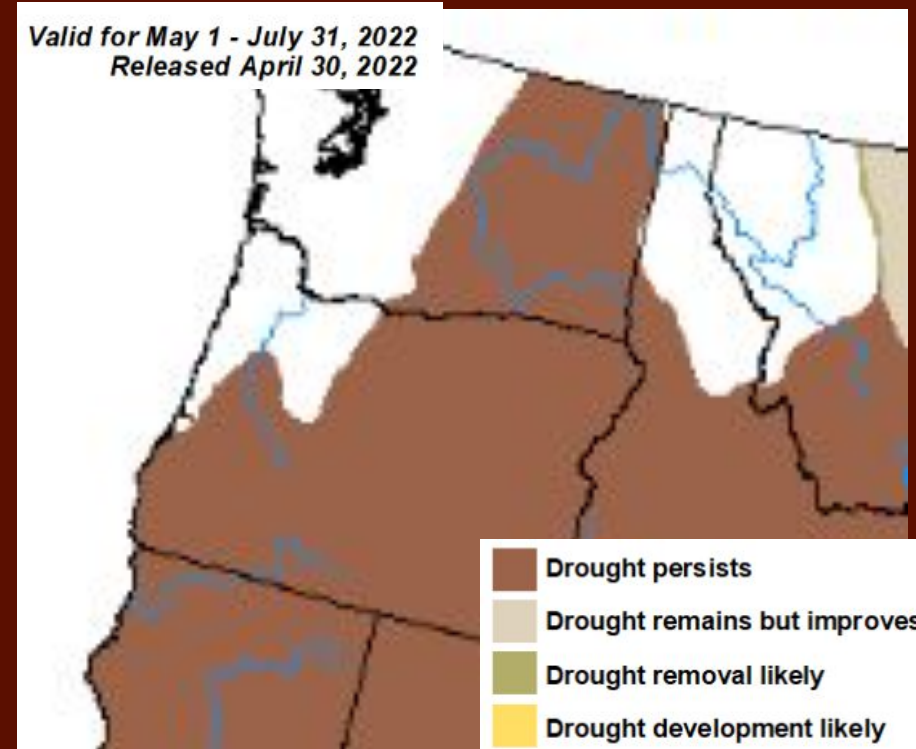
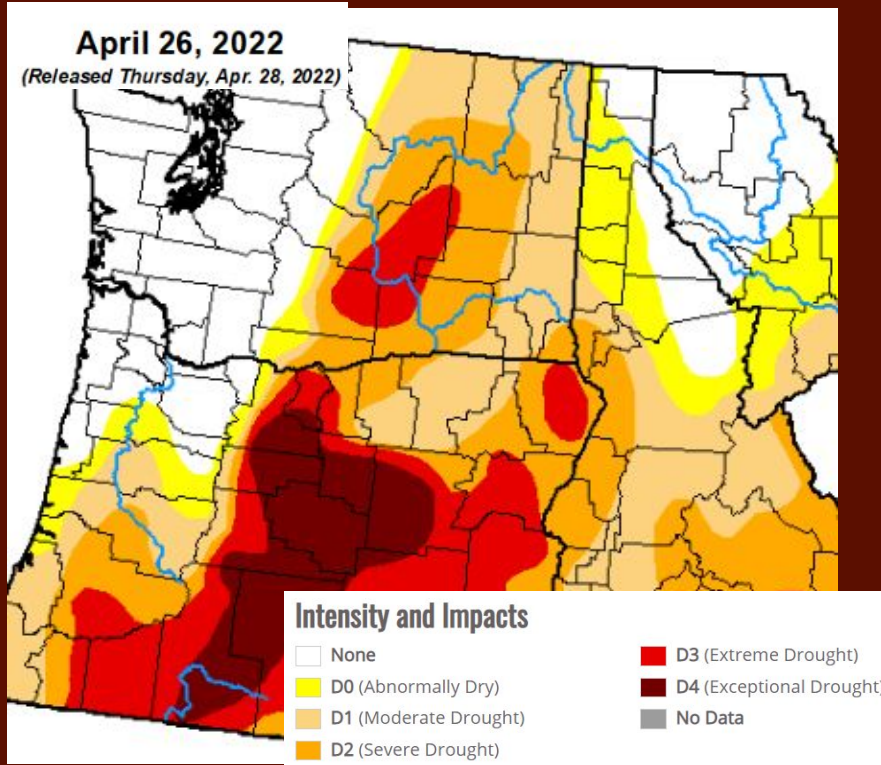




# Seasonal Outlook 2022

US Drought Monitor & Seasonal Outlook

[www.cpc.noaa.gov](http://www.cpc.noaa.gov)

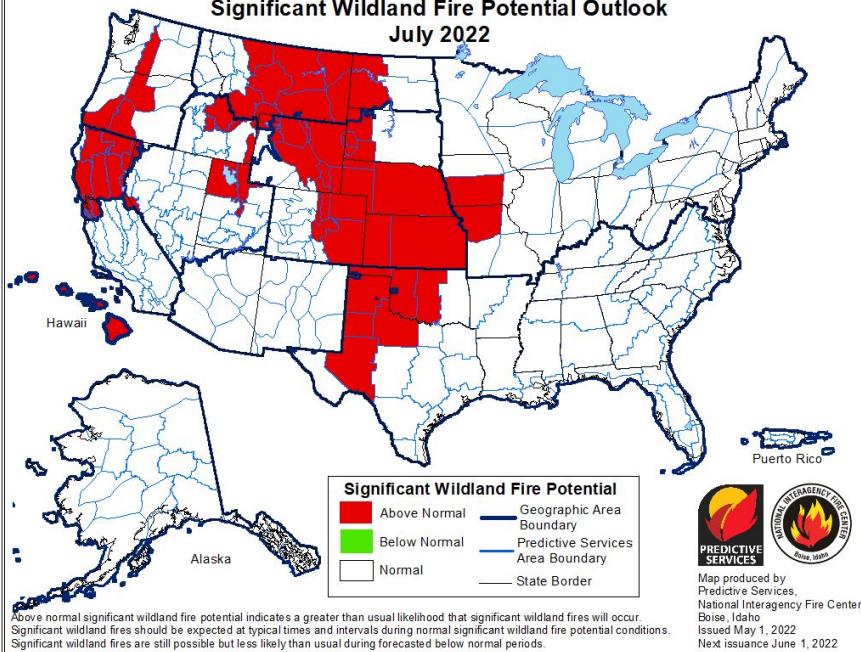


# Seasonal Outlook 2022

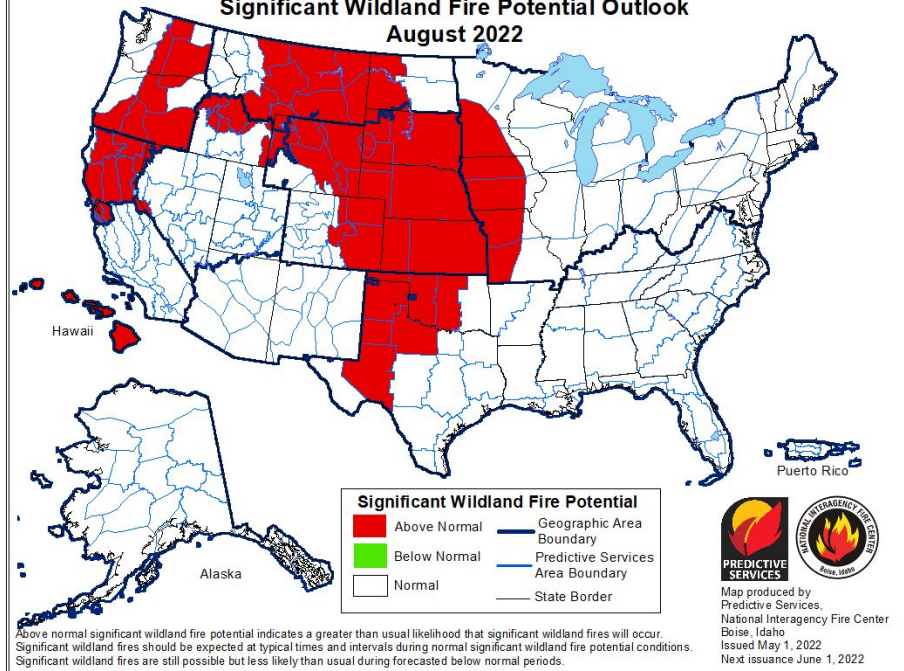
## Wildland Fire Potential

[www.nifc.gov](http://www.nifc.gov)

Significant Wildland Fire Potential Outlook  
July 2022



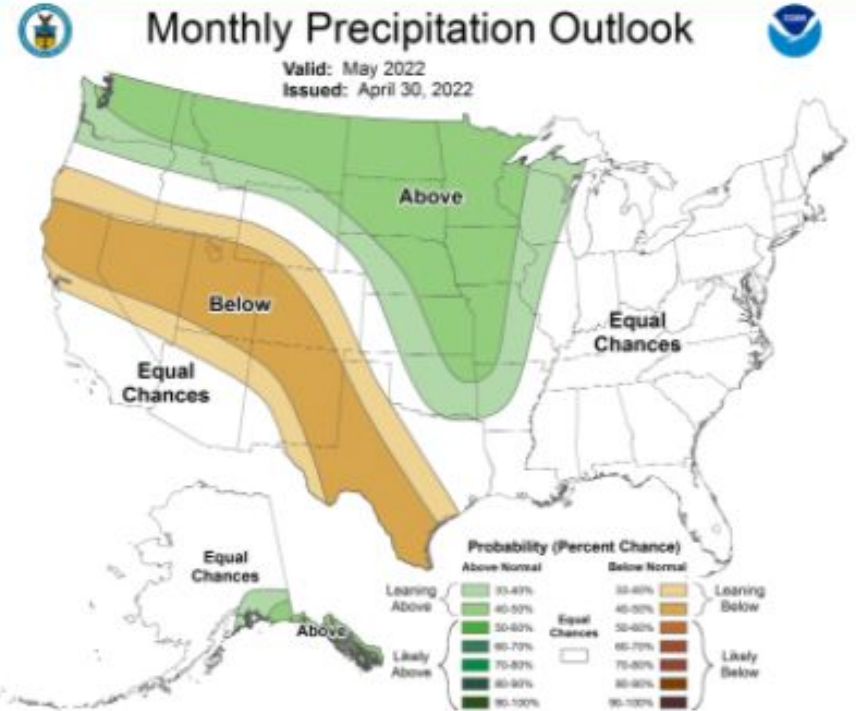
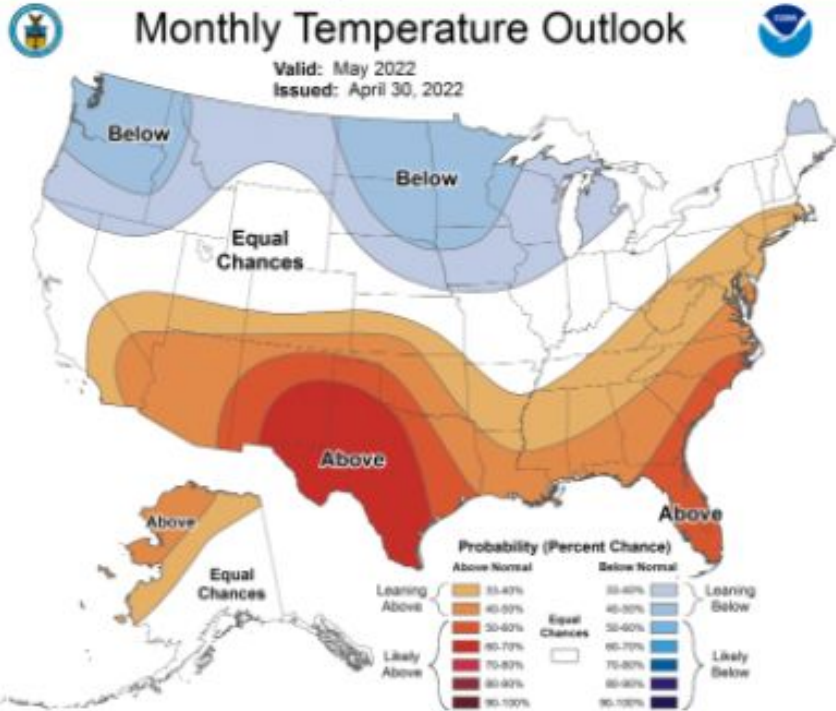
Significant Wildland Fire Potential Outlook  
August 2022



# Seasonal Outlook 2022

## Monthly Outlook

[www.cpc.noaa.gov](http://www.cpc.noaa.gov)

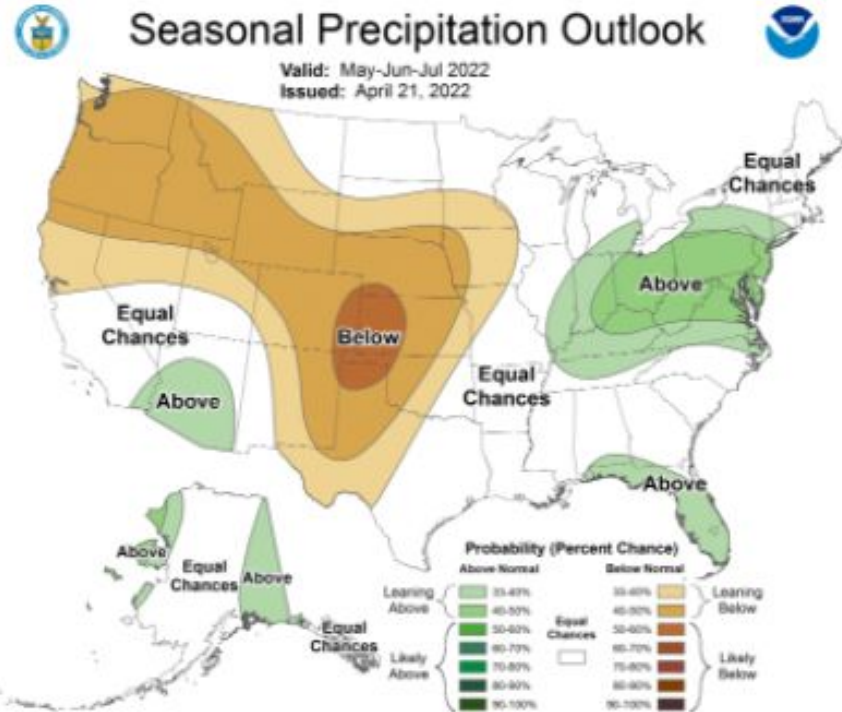
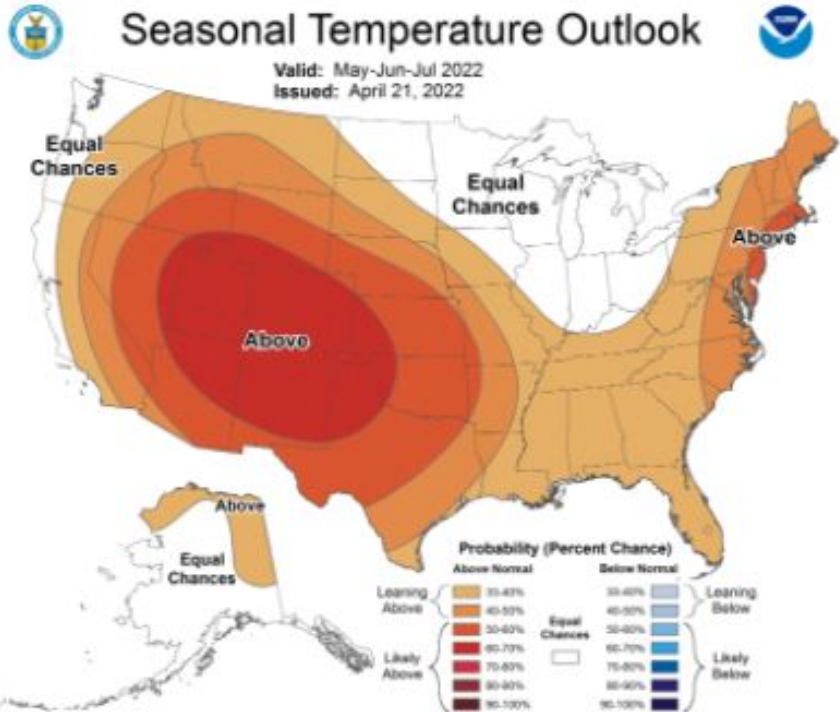




# Seasonal Outlook 2022 - May through July

## 3 Month Outlook

[www.cpc.noaa.gov](http://www.cpc.noaa.gov)



# NWS + Weather Spotters = Saved Lives

[nws.spokane@noaa.gov](mailto:nws.spokane@noaa.gov)

## THANK YOU!

## Any Questions?

I will unmute you - then you unmute yourself to talk.

### What's Next?

You will receive a follow-up email

- register as a weather spotter
- Spotter ID
- Spotter training certificate

