

Advanced Weather Spotting for the Inland Northwest

Spring 2024

National Weather Service - Spokane



SKYWARN



Tornadic Thunderstorm viewed from Dishman Hills on May 6, 2022 (courtesy of Joe Bruce)



NATIONAL WEATHER SERVICE
WEATHER FORECAST OFFICE • SPOKANE, WA

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...



Flooding - April 10th, 2023

Stevens County - Heavy rain and snowmelt flooding



Flash Flooding - June 9, 2023

Lewiston, ID



National Weather Service (NWS)

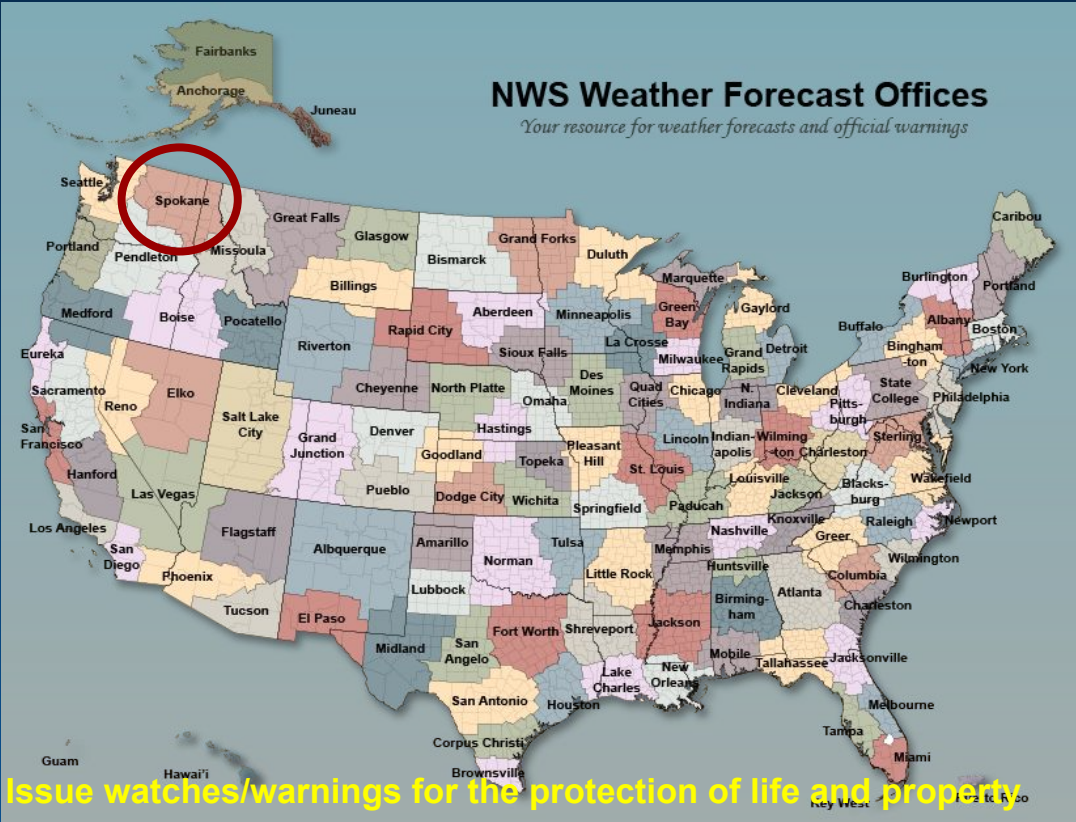
MISSION

- Part of the Federal Government
 - Dept of Commerce
 - NOAA
- One of 122 offices nationwide
- Forecasts, watches, warnings, and advisories 24/7/365 operations
- 25 staff members
- At least 2-3 people per shift

Provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the **protection of life and property and enhancement of the national economy.**



NWS Offices & Centers



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 Weather Spotter Training Schedule - Register Here!
- Spring Edition of the Weather Watcher Newsletter

NWS Forecast Office Spokane, WA
 Weather.gov > Spokane, WA

Spokane, WA
 Weather Forecast Office

Customize Your

Storm Prediction Center
 NOAA / National Weather Service

HOME NEWS SPC PRODUCTS WEATHER INFO FORECAST TOOLS RESEARCH OUTREACH NWS/CEP Search SPC...

A Moderate Risk of Severe Thunderstorms is forecast for Wed (04/10)

Widespread severe thunderstorms are forecast beginning Wednesday morning across parts of the central Gulf Coast States. The potential will exist for several tornadoes, a few of which may be strong (EF2+), and widespread damaging winds, some of which may be particularly damaging.

» For additional details, see the latest [Day 7 Convective Outlook](#).

» [Critical fire weather conditions](#) are forecast today. See details...

Overview Conv. Outlook Watches MDS Storm Reports Mesoanalysis Fire Hazards All Products Watches MDS Outlooks FI

SPC Storm Reports for 04/09/24
 Map updated at 1300Z on 04/09/24

TORNADO 0395
 - Valid until: 04/10/2024 0200Z
 - States affected: LA TX
 - Issued: 19 minutes ago

NORTHWEST RIVER FORECAST CENTER
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

River and hydrology Water Supply Observations Weather Forecasts Climate

Locate NWS ID: Criteria List Quick Zooms Refresh Data Last Refresh: 2024-04-09 12:38:15 PDT

Map showing Fraser Plateau, Queen Charlotte Sound, and Calgary.

River & ...
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WEATHER PREDICTION CENTER
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NCEP AWC GPC EMC NCO NHC OPC SPC SWPC WPC

HOME FORECASTS & ANALYSES ARCHIVES VERIFICATION INTERNATIONAL DEVELOPMENT ABOUT SEARCH

HAZARD

EXCESSIVE RAINFALL	MODERATE	MODERATE	SLIGHT
HEAVY SNOW (≥ 4")	HIGH	NO AREA	NO AREA
ICE (≥ 0.25")	NO AREA	NO AREA	NO AREA

WPC'S MEDIUM RANGE HAZARDS FORECAST
 WINTER STORM SEVERITY INDEX

Overview Surface Analysis Fronts GPE Excessive Rain Winter Wx Day 3-7 Forecast Tools

Quantitative Precipitation Forecasts Legacy Page: Valid 00Z 04/10/2024 - 00Z 04/17/2024

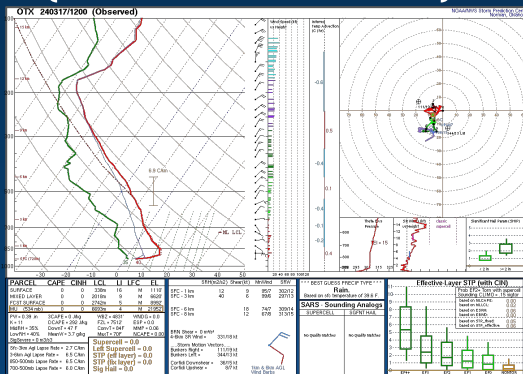
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6 Day 7 Total: Day 1-2 Day 1-3 Day 1-5 Day 1-7

How the NWS "Sees" Weather

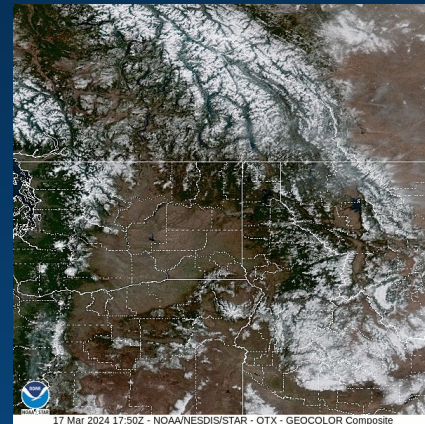
Doppler Weather Radar



Radiosonde (Weather Balloon)



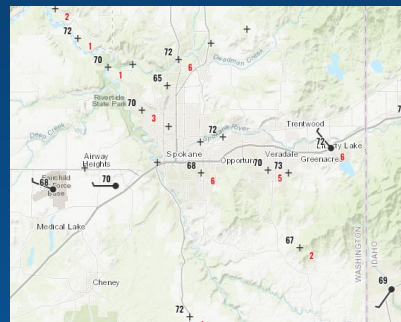
Satellite



Webcams



Weather Stations

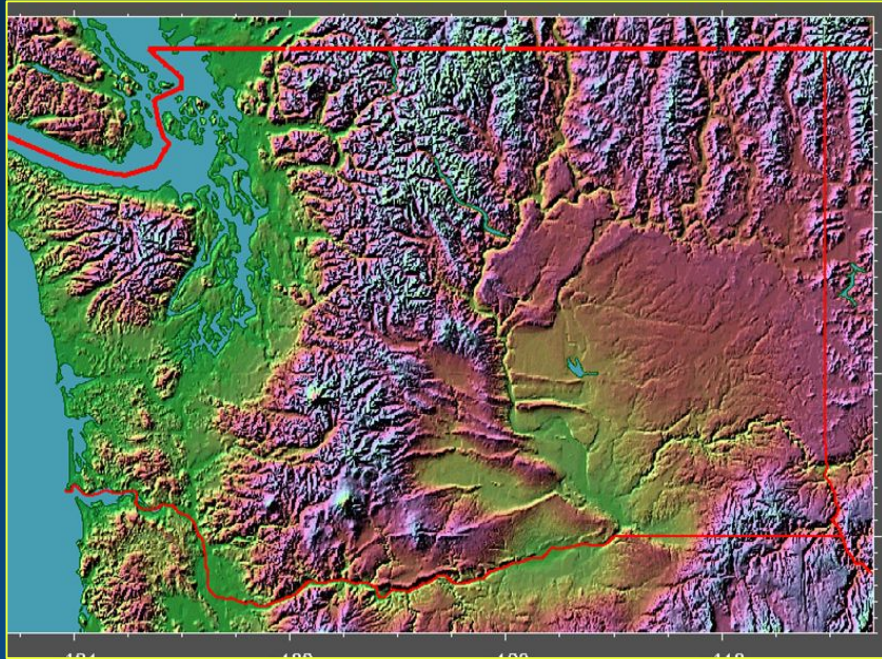


Weather Hazards Change with the Seasons

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

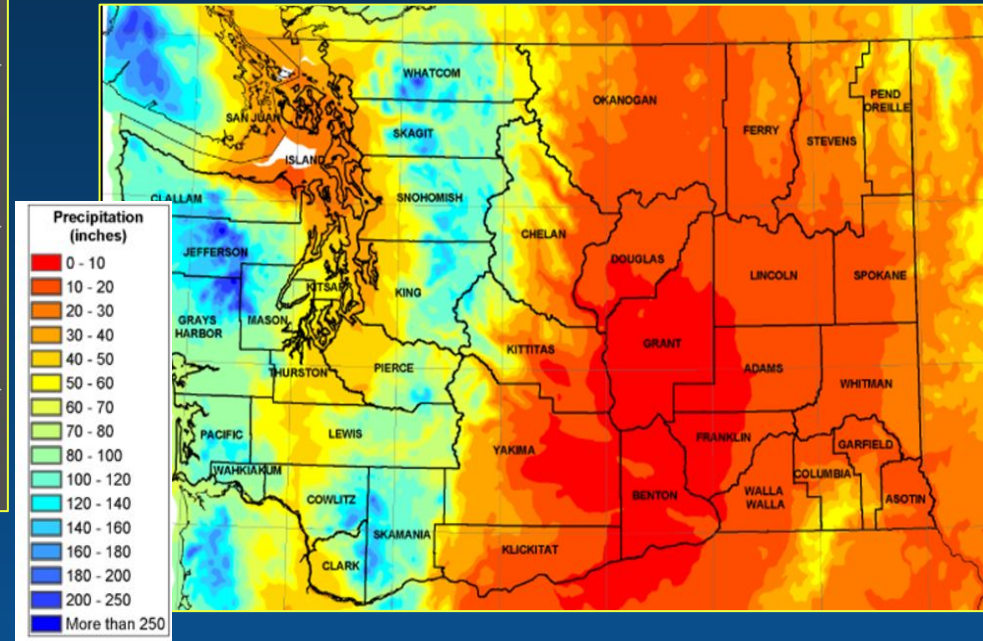


Terrain Makes ALL the Difference



Topography Map

Average Annual Precipitation Map



What's in a Spotter Report?



The checklist is titled "Inland Northwest Weather Spotter Checklist" and features the NOAA logo on the left and the SKYWARN logo on the right. It contains ten items, each in a colored box with a specific weather event and its reporting criteria:

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

Specifics...Tell us the Story!

- WHO you are (Spotter ID)
- WHAT you are reporting
- WHEN did the event occur?
- WHERE did the event occur?
- Estimates of wind speeds and hail size
- Damage and injury reports

If unsure - report your uncertainty

Feel free to include reports while traveling and any delayed or second hand reports

#1 Poll Question

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



HOW TO REPORT



PHONE CALL: 1-800-483-4532



EMAIL: nws.spokane@noaa.gov

ONLINE: inws.ncep.noaa.gov/report/

A screenshot of the NOAA Storm Reports web form. The form has a white background with a black border. At the top left is the NOAA logo. To its right is the text "Storm Reports" in bold, followed by "Alerting the NWS to local weather" in a smaller font. Below this is a navigation breadcrumb: "Report Type -> Details -> Location -> Review and Send". The main content area contains a dropdown menu with the text "Please select a report type" and a downward arrow. Below the dropdown are two buttons: "Back" with a left-pointing arrow and "Next" with a right-pointing arrow. At the bottom of the form is a link: "Privacy policy for weather reports".

SOCIAL MEDIA: X/Facebook - NWS Spokane



HOW TO REPORT: THE mPING APP

Meteorological Phenomena Identification Near the Ground

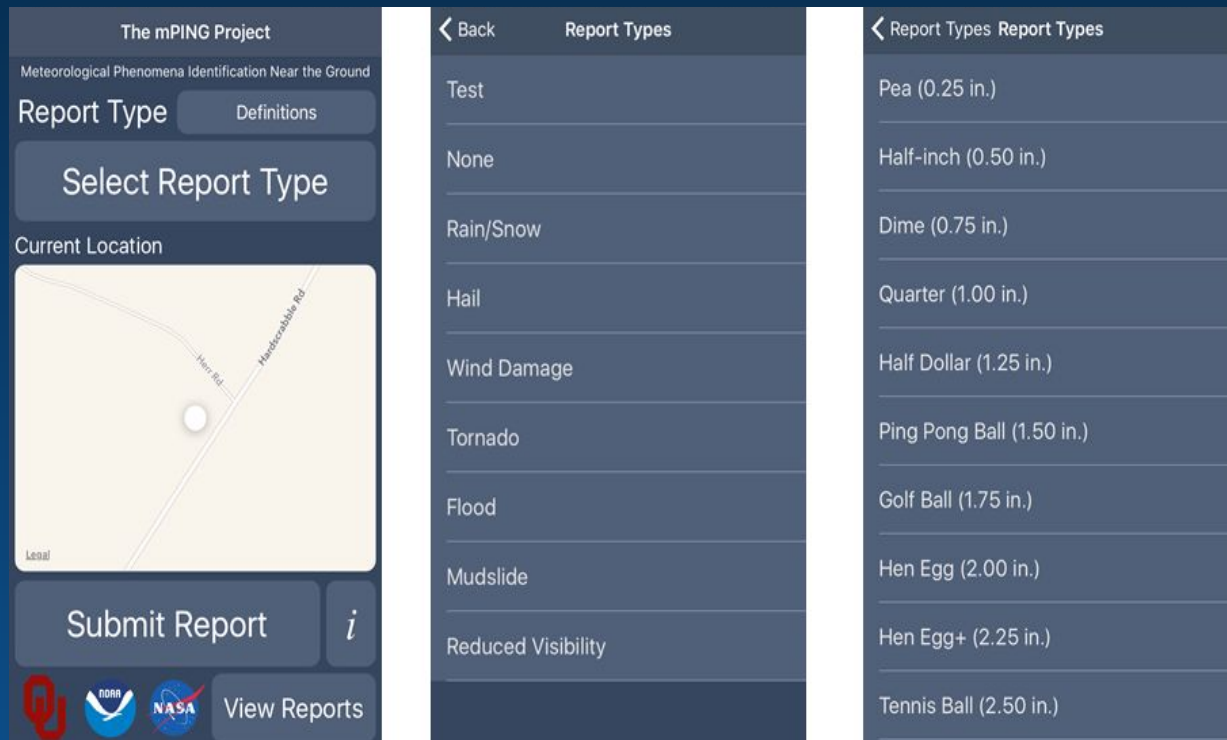
FREE APP!

Report everything
EXCEPT TORNADOES
OR FUNNEL CLOUDS

Available on the
App Store

GET IT ON
Google play

Reports are anonymous and
sent directly to the NWS



NATIONAL WEATHER SERVICE
WEATHER FORECAST OFFICE • SPOKANE, WA

Emails are Important

Besides a phone number, it's important to share your email address!

You will likely be notified by email before there is a WIDESPREAD Severe Weather Risk or Thunderstorm Outbreak.

We send periodic emails to share quarterly newsletters and upcoming training opportunities.

YOUR NATIONAL WEATHER SERVICE SPOKANE QUARTERLY REPORT

The Weather Watcher

Of the Inland Northwest

www.weather.gov/Spokane



NWS 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 you to get information on what you are experiencing (ground truth) based on what is seen on radar!



#2 Poll question

Is it important for weather spotters to keep their email and phone number current with the NWS?



U.S. Thunderstorm Distribution

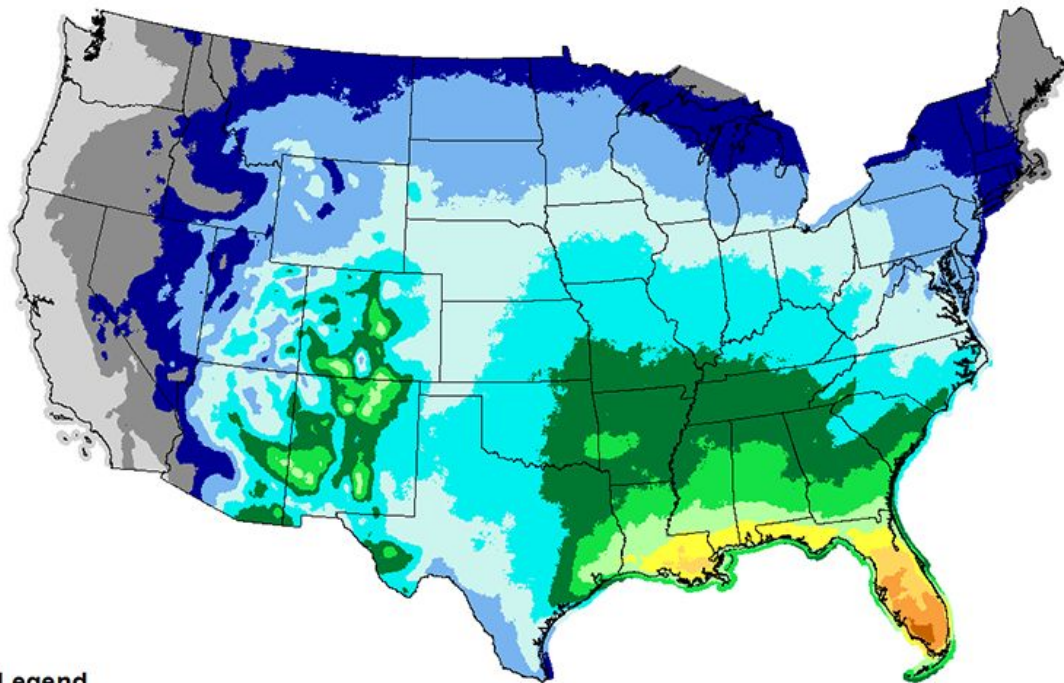
2023 Stats:

Spokane: 19 days

Lewiston: 18 days

Wenatchee: 14 days

Annual Mean Thunderstorm Days (1993-2018)

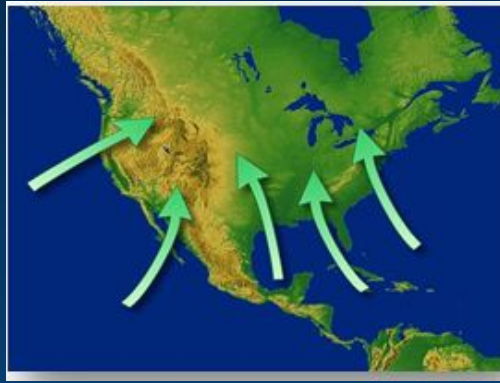


Legend

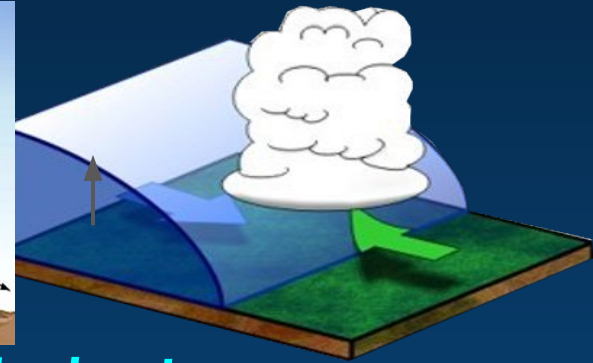
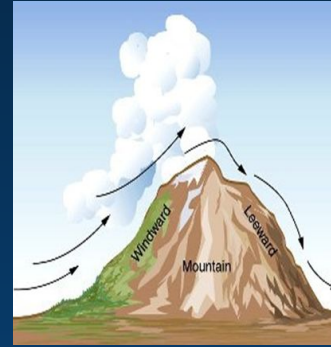


WHAT CREATES A THUNDERSTORM?

Dew Point (°F)	How It Feels
<55°	Dry
55-60°	Comfortable
60-64°	Slightly Humid
65-69°	Humid
70°-75°	Very Humid
>75°	Oppressive

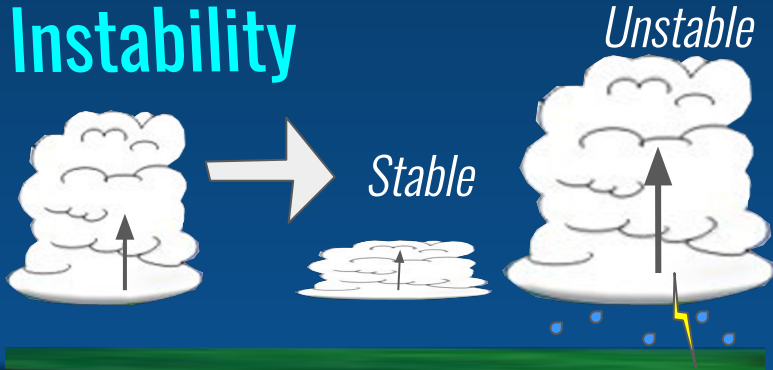


1. Moisture



2. Lifting Mechanism

3. Instability

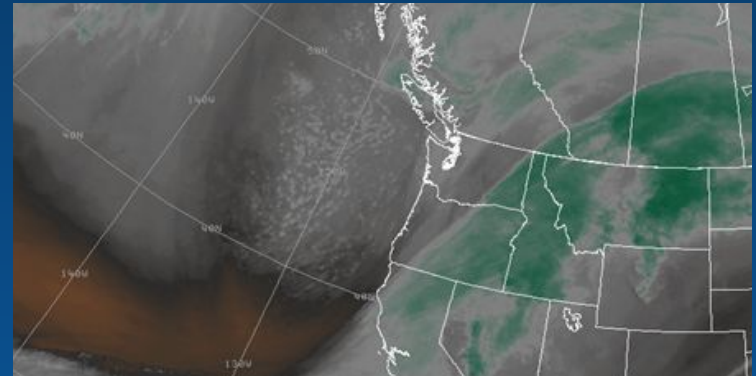


4. Wind Shear



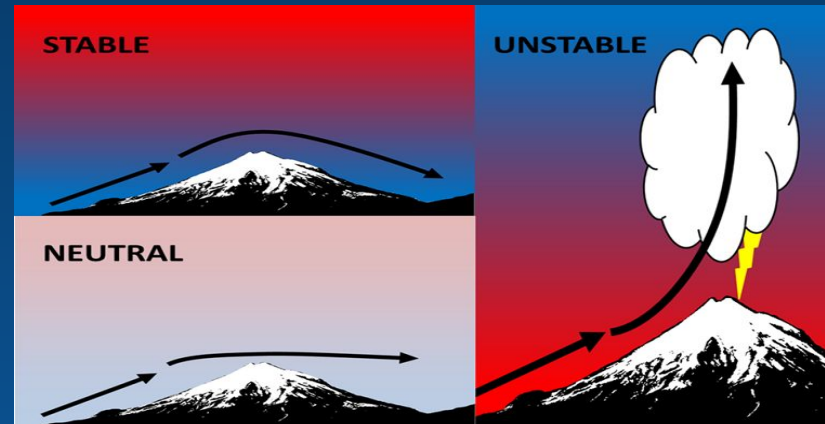
Ingredient #1: Moisture

- 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



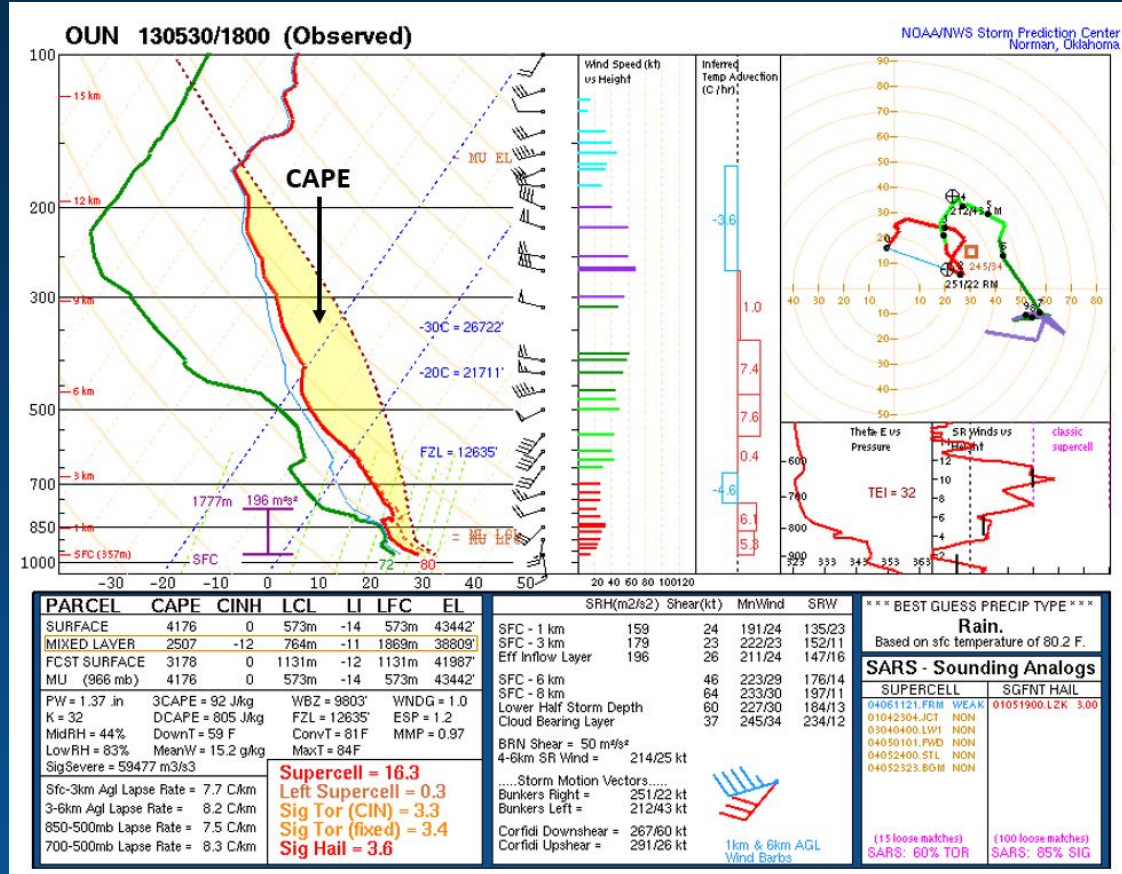
Ingredient #2: Instability

- 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



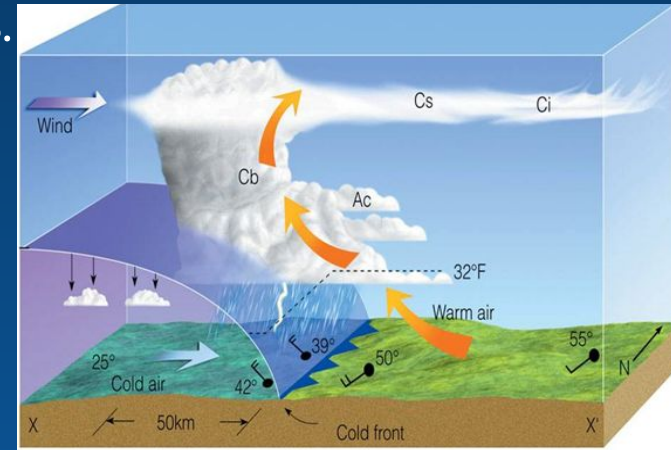
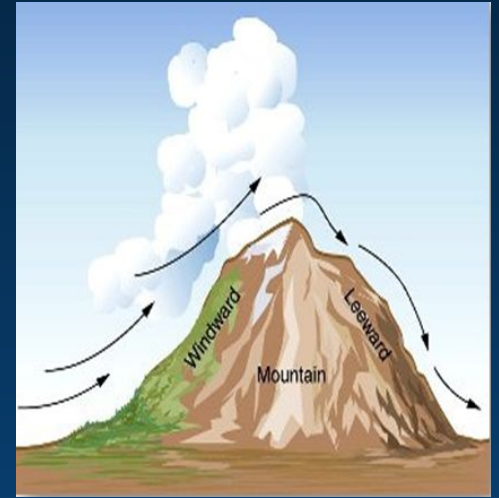
Ingredient #2: Instability

- Instability in the atmosphere is characterized by Convective Available Potential Energy (CAPE).
- CAPE is the amount of fuel available for developing thunderstorms, and provides an approximation of updraft strength.
- High CAPE means that storms will build vertically very quickly.



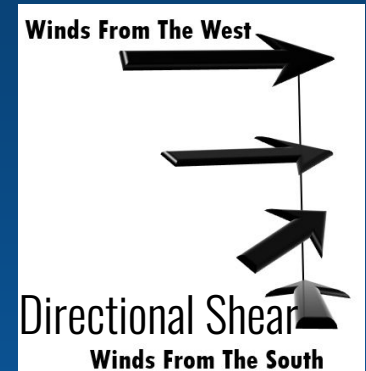
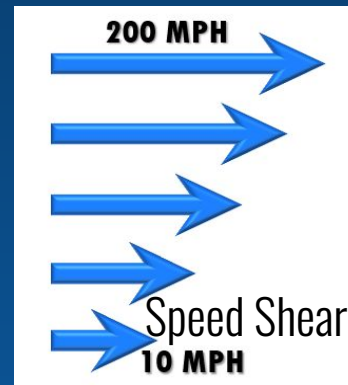
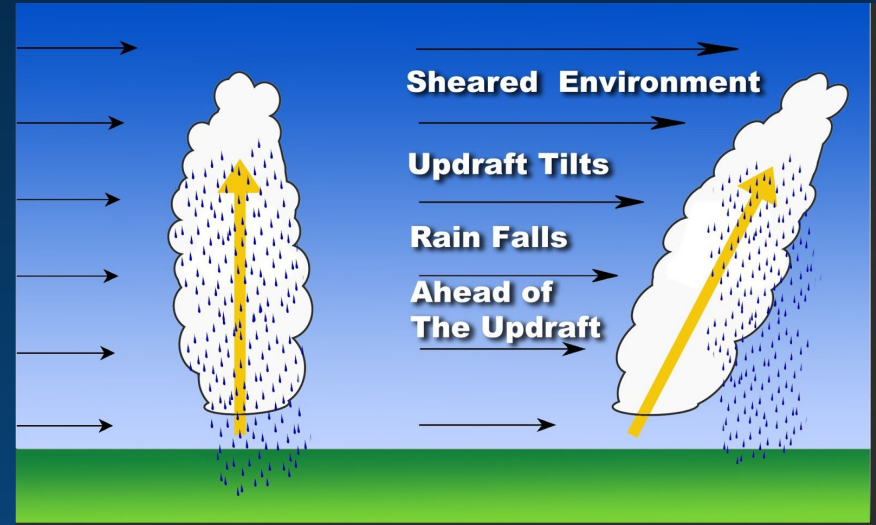
Ingredient #3: Lifting Mechanism

- 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
- Other sources of lift include warm fronts, heat from the Earth's surface, outflow boundaries, and dry lines.
- Monitor with satellite, radar, upper level soundings and surface observations
- Terms: vertical velocity, vorticity, fronts



Ingredient #4: Wind Shear

- Change in wind speed and/or direction with height
- Separates the updraft and the downdraft - allows storms to persist longer
- Enhances rotation within thunderstorms
- Monitor with radar, upper level soundings and surface observations
- Terms: Helicity, Shear, Hodograph

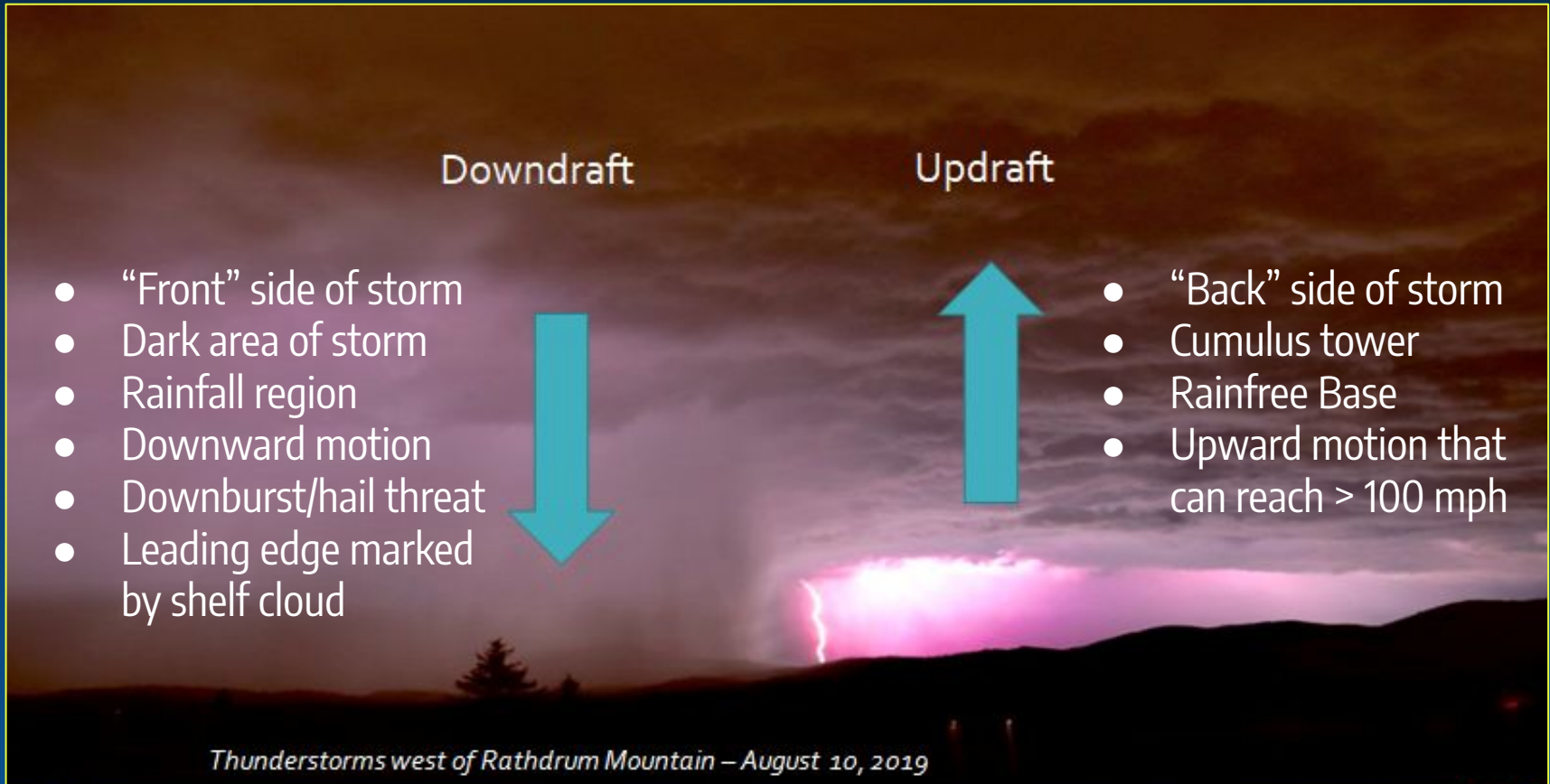


S-L-I-M – Basic Thunderstorm Elements

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?

Wind Gust \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.



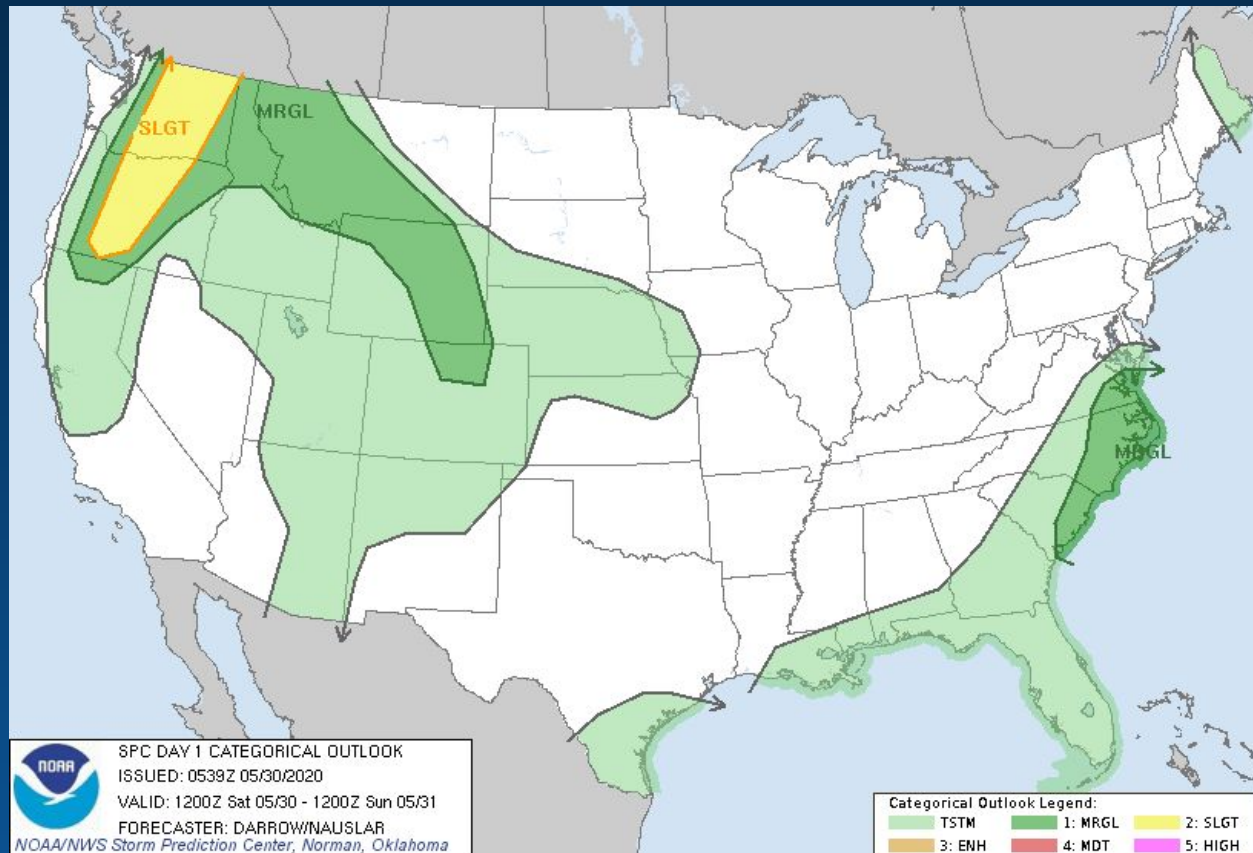
STAY INFORMED: STORM PREDICTION CENTER CONVECTIVE OUTLOOKS

Thunderstorms	1-Marginal	2-Slight	3-Enhanced	4-Moderate	5-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 <u>all</u> 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
					



STAY INFORMED: STORM PREDICTION CENTER CONVECTIVE OUTLOOKS

Example from May 30, 2020
SPC issued a “Slight” Risk for most of eastern Washington and central Oregon



STAY INFORMED: Understand the Terms

Watch, Warning, Advisory

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



STAY INFORMED

NWS Spokane Web Page www.weather.gov/Spokane

Important NWS products to follow

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

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 [Location Help](#)

Special Avalanche Bulletin
Here is a Special Avalanche Bulletin describing warming temperatures potentially causing unstable snow [Read More >](#)

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](#)

[Special Avalanche Bulletin](#) [70 Degree Climate Stats](#) [Big Warm-Up](#) [Cold Water](#) [Weather Spotter Training](#)

Overcast
66°F
19°C [Get Detailed info](#)

Tonight

Mostly Cloudy
Low: 46°F

Thursday

Mostly Sunny
High: 70°F [change location](#)

WARMING UP
HIGH TEMPERATURE FORECAST

	WED	THU	FRI	SAT	SUN
SPOKANE	71	66	73	79	76
COLVILLE	69	67	76	81	79
WENATCHEE	73	71	77	83	75
LEWISTON	74	72	79	84	81
PULLMAN	67	64	71	78	73
SANDPOINT	64	64	71	76	75

NWS Spokane Issued: 8:01 PM, Wednesday, April 26, 2023



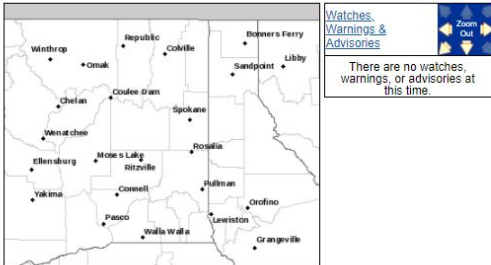
STAY INFORMED

NWS Spokane Web Page 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.





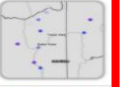
Watches, Warnings & Advisories

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

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

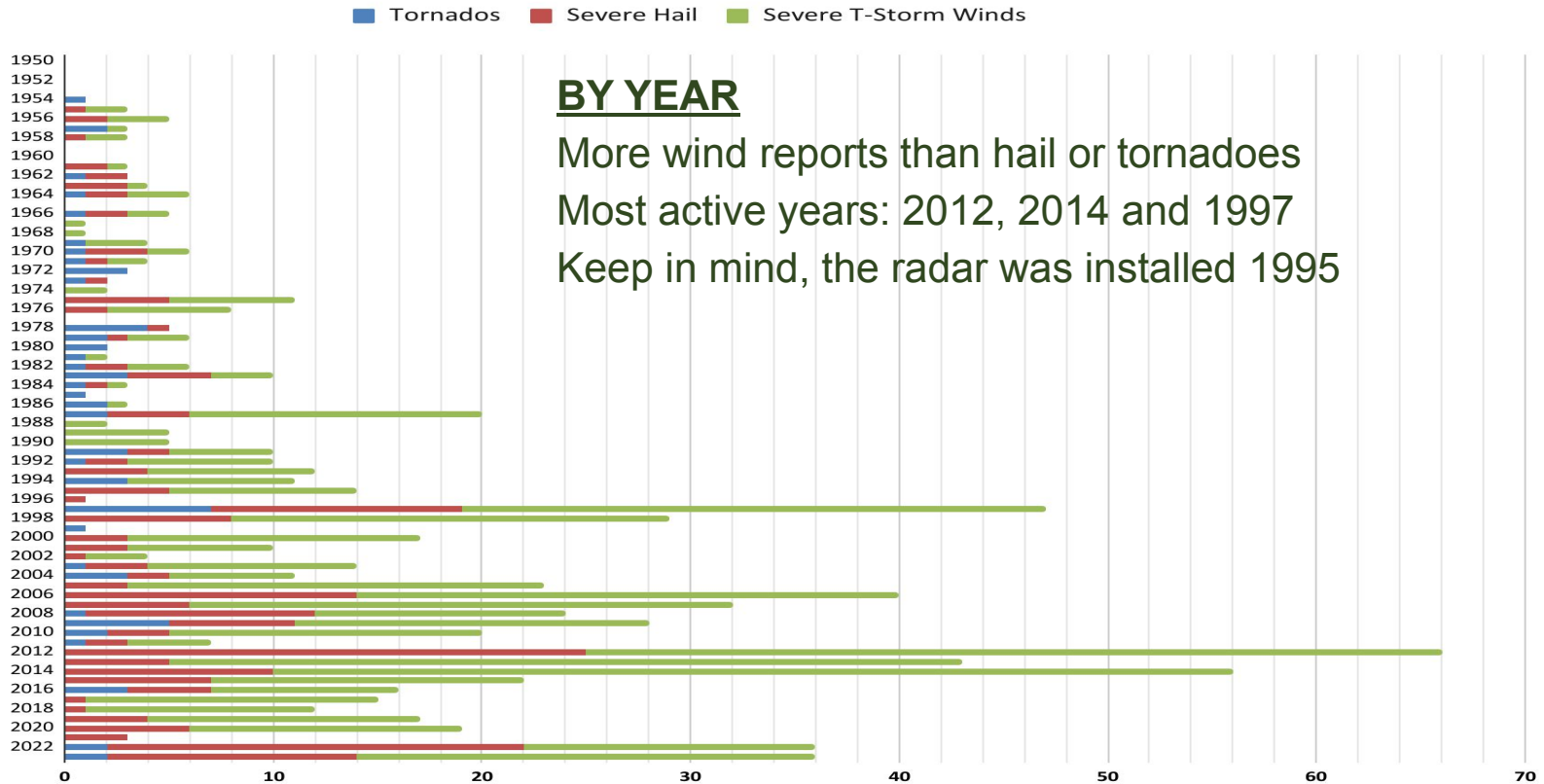
Text Product Selector (Selected product opens in current window)

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



Local Severe Weather Climatology



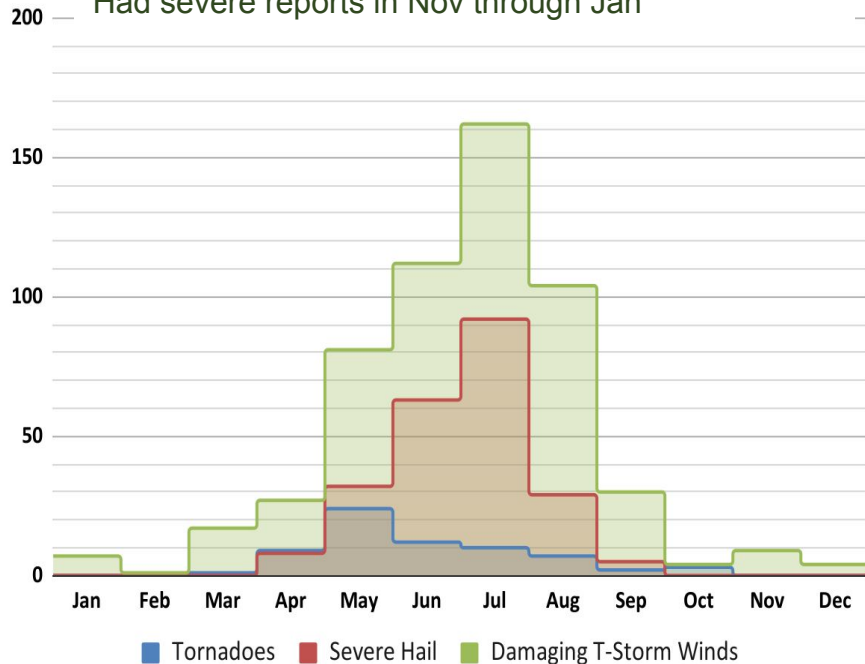
Local Severe Weather Climatology

BY MONTH

Peak month for Damaging Winds/Hail – July

Peak month for Tornadoes – May

Had severe reports in Nov through Jan

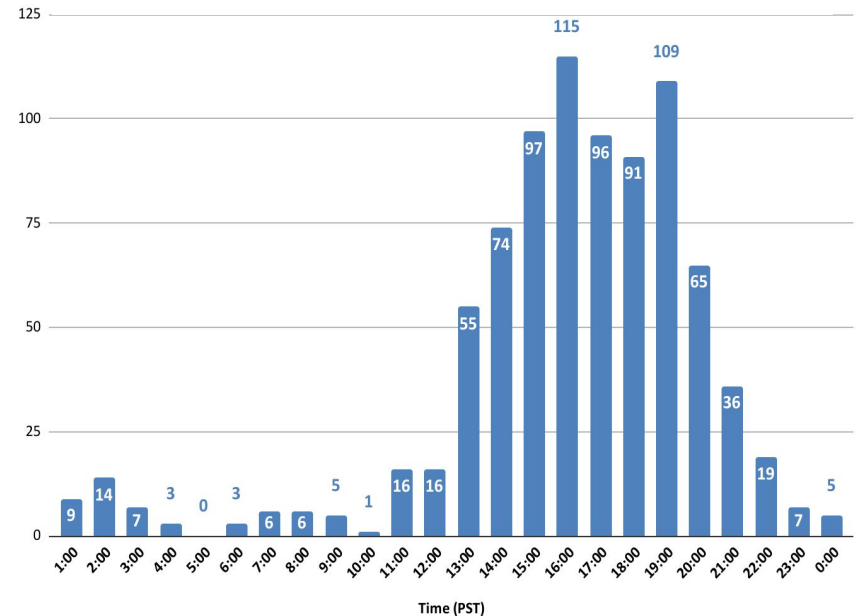


BY TIME OF DAY

Most active mid afternoon to mid evening

Less active in the morning

Still get wind reports late at night



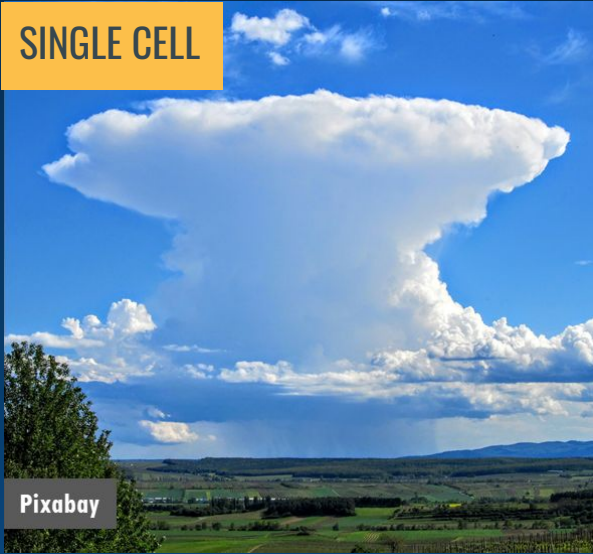
#3 Poll Question

What would be a good ingredient for thunderstorm development?



Types of Thunderstorms

SINGLE CELL



Usually Weak
Short Lived
May Produce Severe Weather

MULTI-CELL



More Organized
May Last for Hours
All-Hazards Are Possible

SUPERCCELL



Strongest Storm Type
Longest Lasting
All-Hazards Are Possible



SINGLE CELL THUNDERSTORMS

DURATION: <30 minutes **THREATS:** (Mostly Non-Severe) Gusty Winds, Small Hail, Lightning

Most common in the summertime as pop-up thunderstorms, these can move in any direction and are short-lived.

Weak wind shear keeps the storm vertically stacked.

Eventually, heavy rain in the downdraft will cut off the energy needed for the storm to survive, resulting in the storm to rain itself out in a short period of time.



MULTICELL THUNDERSTORMS

DURATION: Long Duration **THREATS:** Strong Winds, Hail, Heavy Rain/Flash Flooding, Weak Tornadoes

Overall Severe Weather
Threat Level:

Low - Moderate

Wind



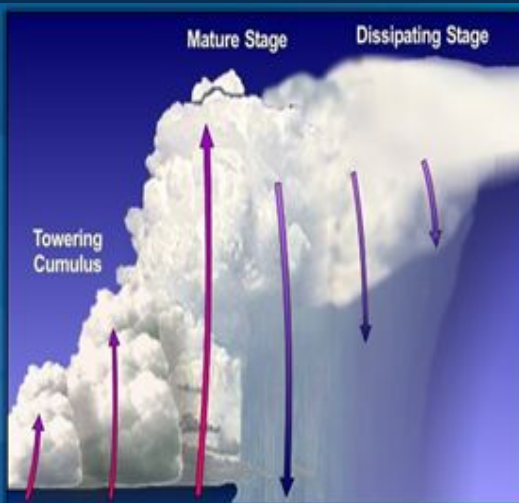
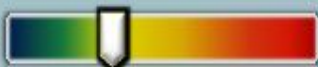
Hail



Heavy
Rain



Tornado

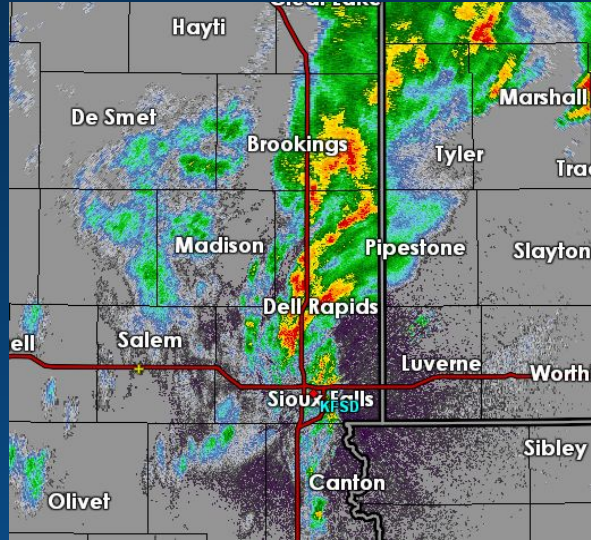


- Flash flooding due to slow movement
- Downbursts, straight-line winds, small-med sized hail, lightning



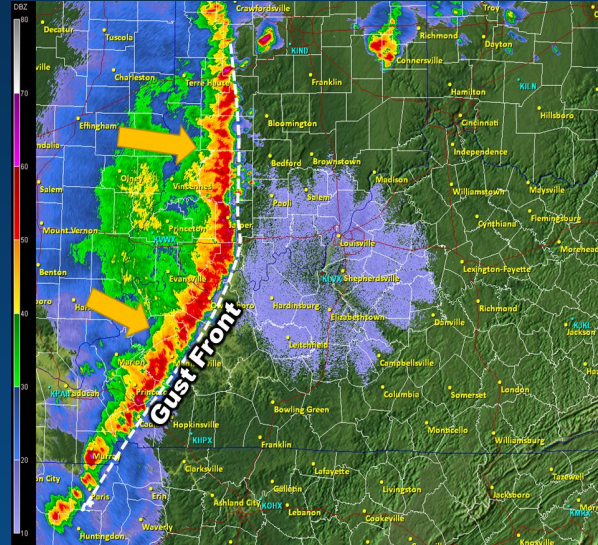
THUNDERSTORMS: TYPES OF MULTICELL STORMS

DISORGANIZED



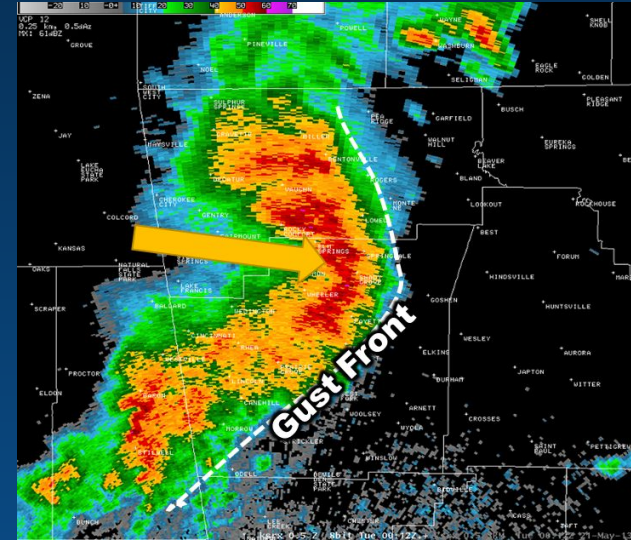
Limited Organization

SQUALL LINES



Long Lines of Multicell Storms
Sharp Reflectivity Gradients

BOW ECHOES



“Bowing” appearance can indicate
strong winds



LARGE HAIL



Pea = $\frac{1}{4}$ inch



Penny = $\frac{3}{4}$ inch



Nickel = .88 inch



Quarter = 1 inch



Half Dollar = $1\frac{1}{4}$ inch



Walnut = $1\frac{1}{2}$ inch



Golf Ball = $1\frac{3}{4}$ inch



Egg = 2 inch



Billiard Ball = $2\frac{1}{4}$ inch



Tennis Ball = $2\frac{1}{2}$ inch



Baseball = $2\frac{3}{4}$ inch



Softball = $4\frac{1}{2}$ inch

If a ruler isn't available, reference hail to a common object



NO MARBLES!

*Otis Orchards -
August 2022*



STRONG WINDS



30-40 mph

- Whole trees in motion



40-50 mph

- Twigs / Small branches breaking



50-58 mph

- Branches / Small limbs breaking



58-75 mph

- Large branches broken / Structural damage?



Over 75 mph

- Loss of roofing / Trees uprooted or snapped



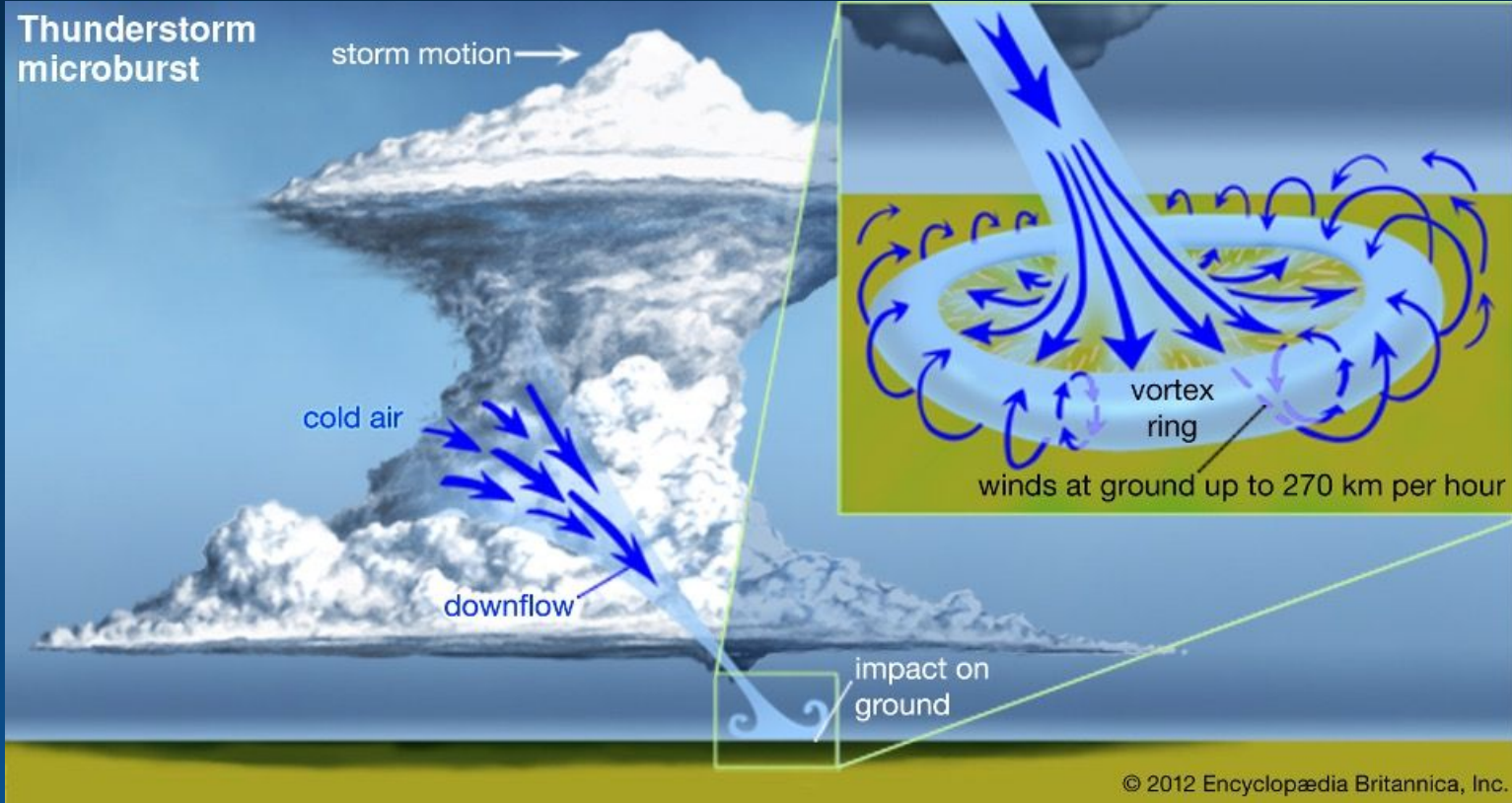
May 6, 2022



January 13, 2021



MICROBURSTS & STRAIGHT LINE WINDS



MICROBURSTS & STRAIGHT LINE WINDS



Microburst winds flow in the same direction and cause straight-line wind damage. This is different from wind that flows in a circular pattern with tornadoes.

Can result in wind gusts of 60+ mph

Two types:

- Wet microburst
- Dry microburst



DUST STORMS

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



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



FLOODING & FLASH FLOODING

Rising water on rivers, streams & low lying areas
Give specific locations of streams & streets



Turn Around, Don't Drown





NATIONAL WEATHER SERVICE
WEATHER FORECAST OFFICE • SPOKANE, WA

MUD & DEBRIS FLOWS

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

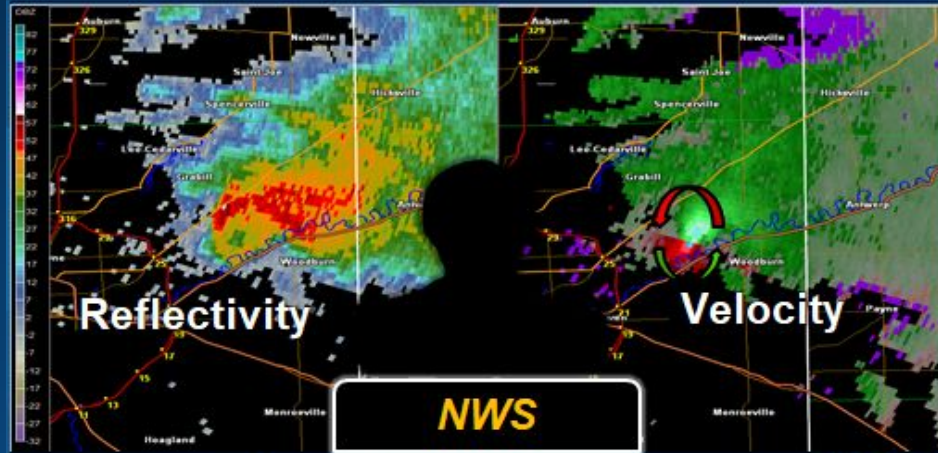
Give specific locations, roadways or intersections

Post-fire Floods

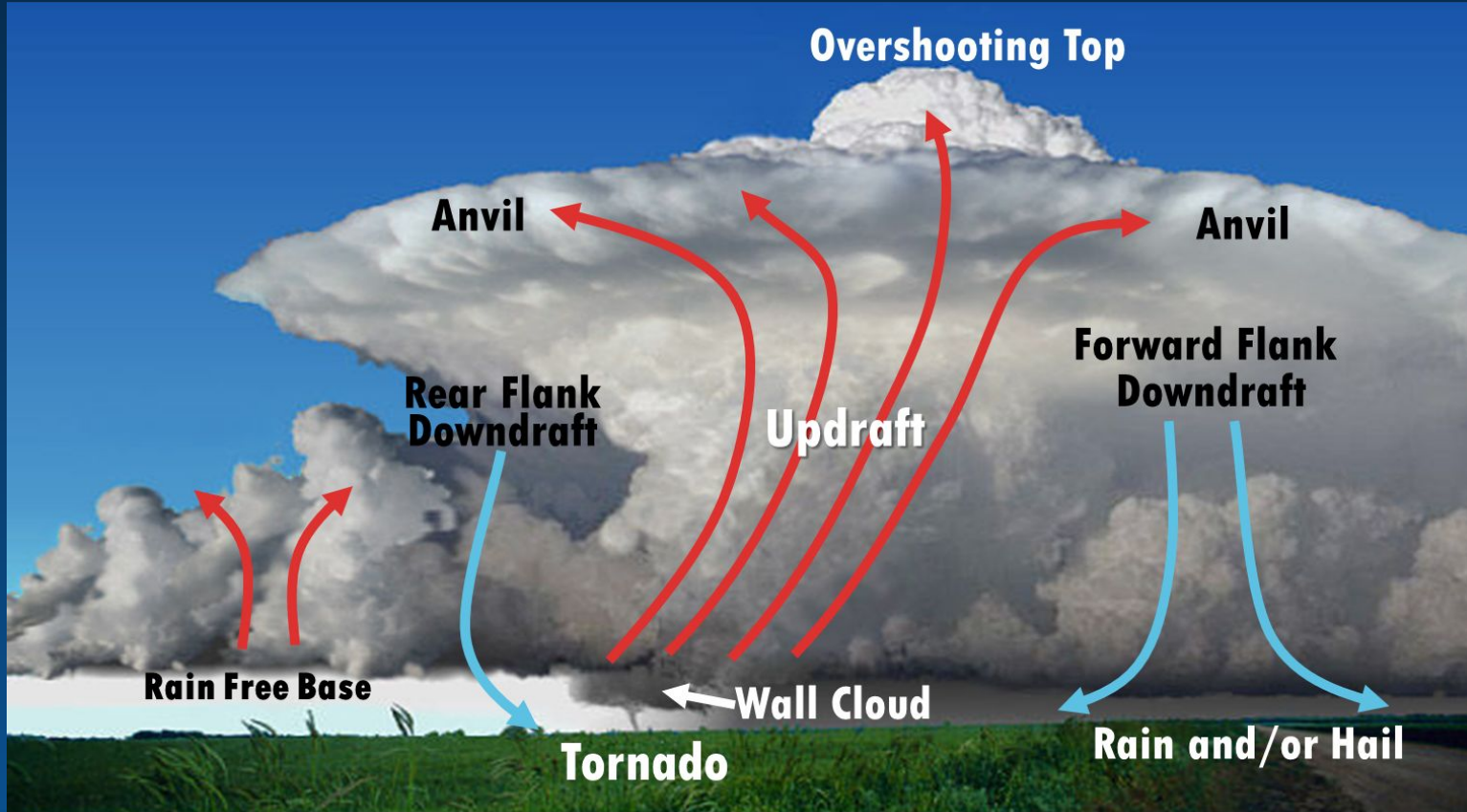


SUPERCCELL THUNDERSTORMS

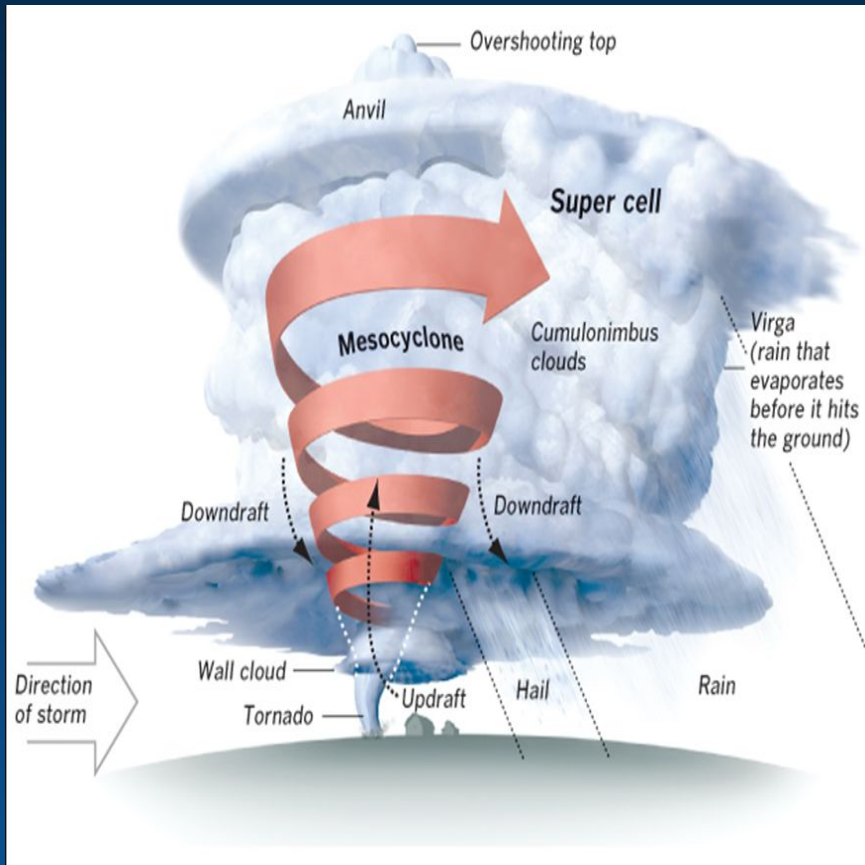
DURATION: Long Duration **THREATS:** Strong Winds, Large Hail, Heavy Rain/Flash Flooding, Tornadoes



SUPERCELL THUNDERSTORMS



SUPERCELL THUNDERSTORM FEATURES



Overshooting Tops



Cauliflower shaped towers



Mesocyclone or Wall Cloud



Cloud Types

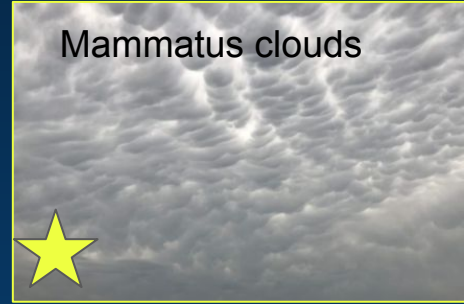
Scud clouds - ragged



Cumulus



Mammatus clouds



Stratus clouds - stable, hugs mountains



Wall Cloud - lowering cloud with rotation



Towering Cumulus



Tornado

Look at the ground...look at the cloud base...is it in contact with both?

If yes...TORNADO!

If no...most likely funnel cloud or dust devil

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

Spokane - May 2022



Posted by **KREM 2 News**

408,129 Views

Press **Esc** to exit full screen





How are tornadoes measured?

After the storms have passed, NWS will conduct surveys to assess the tornado damage. We use a list of damage indicators that align with the Enhanced Fujita Scale.

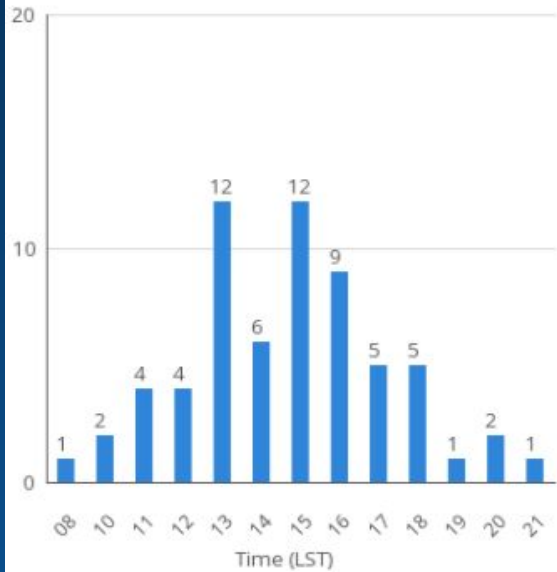
EF Rating	Wind Speeds	Expected Damage
EF-0	65-85 mph	<p>'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.</p> 
EF-1	86-110 mph	<p>'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.</p> 
EF-2	111-135 mph	<p>'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.</p> 
EF-3	136-165 mph	<p>'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.</p> 
EF-4	166-200 mph	<p>'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.</p> 
EF-5	> 200 mph	<p>'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.</p> 



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

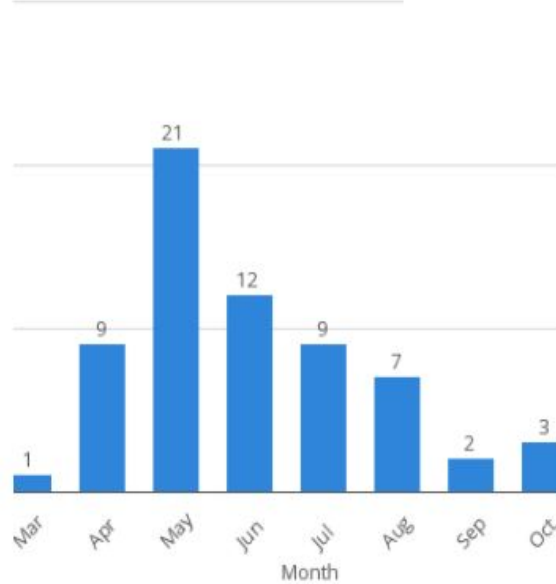
Tornadoes by time of day

Total number of tornadoes by time of day



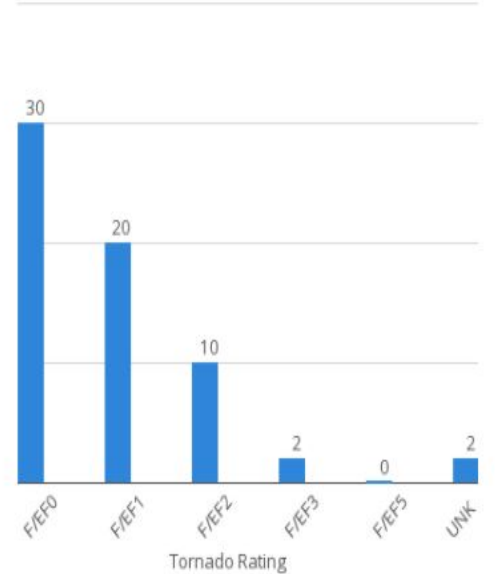
Tornadoes by month

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:

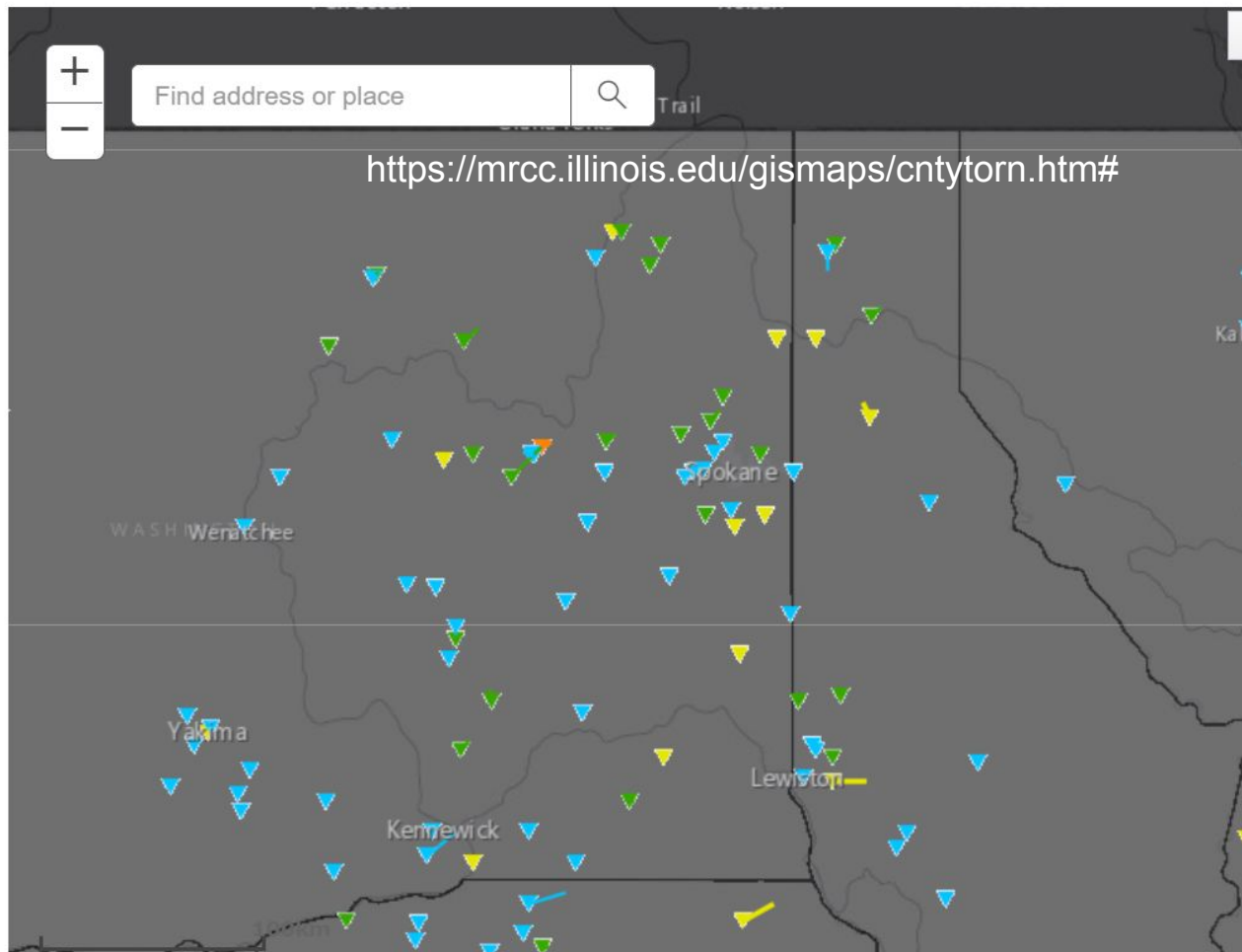
1950 through 2017

Filter by Month:

All Months

Filter by Casualties:

- Injuries > 0
- Fatalities > 0



NON-SUPERCCELL TORNADOES



- Landspouts are narrow, rope-like condensation funnels that reach the ground.
- Landspouts form during the towering cumulus or mature stage of a thunderstorm.
- There is no rotating updraft - spinning originates near the ground.



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



#4 Poll Question

Identify this image.



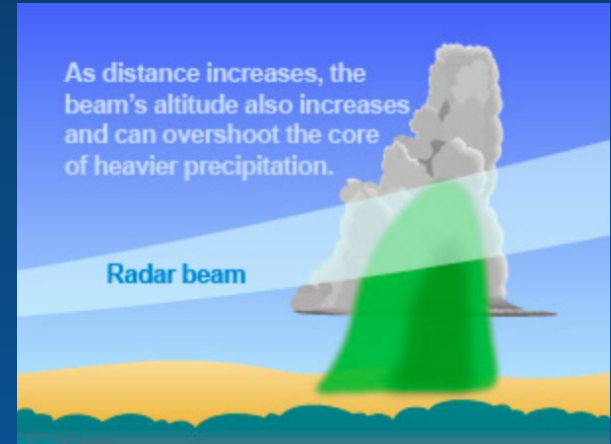
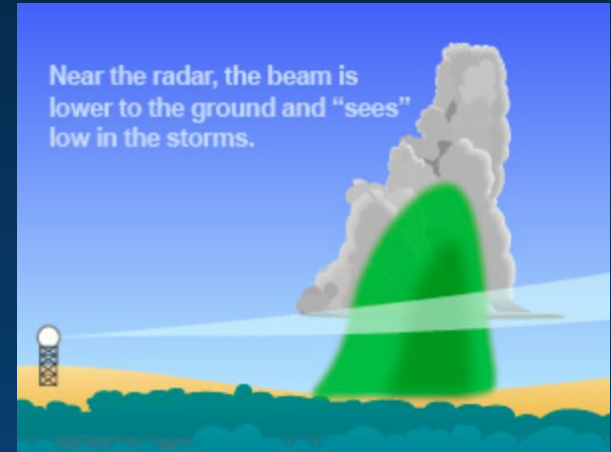
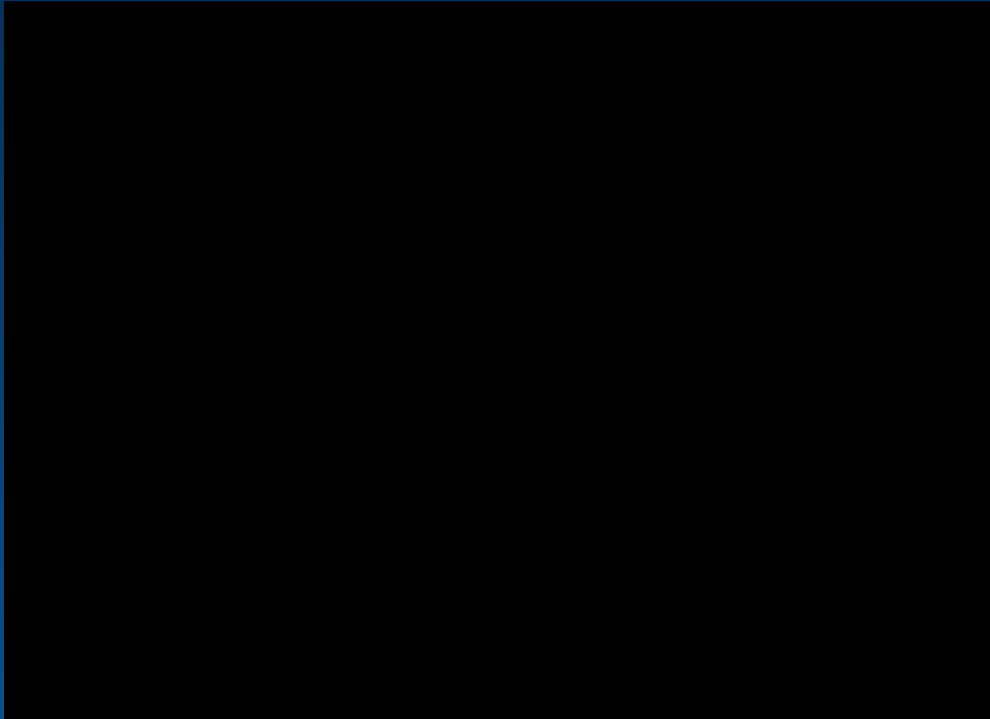
#5 Poll Question

Identify this image.



Basic Radar Interpretation

radar.weather.gov



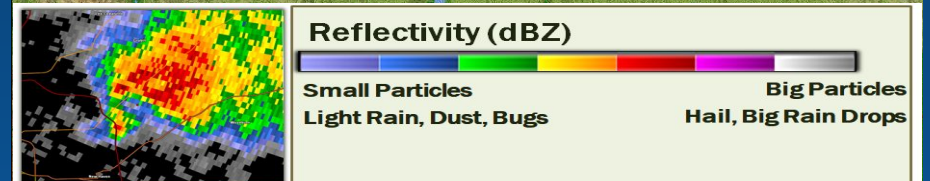
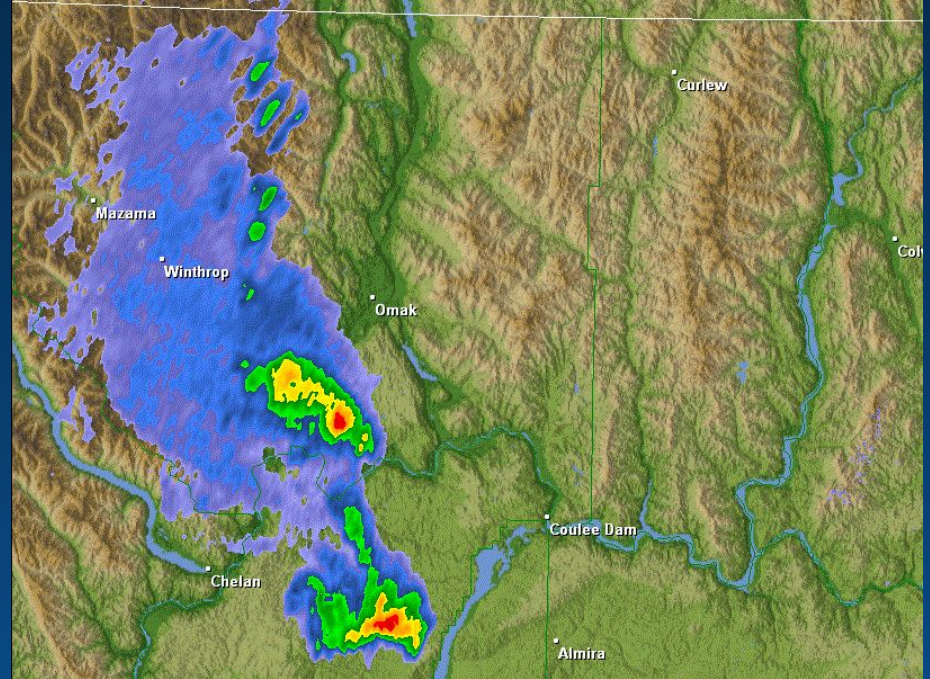
Radar Products - Reflectivity

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” = Maximum of all Slices



Radar Products - Velocity

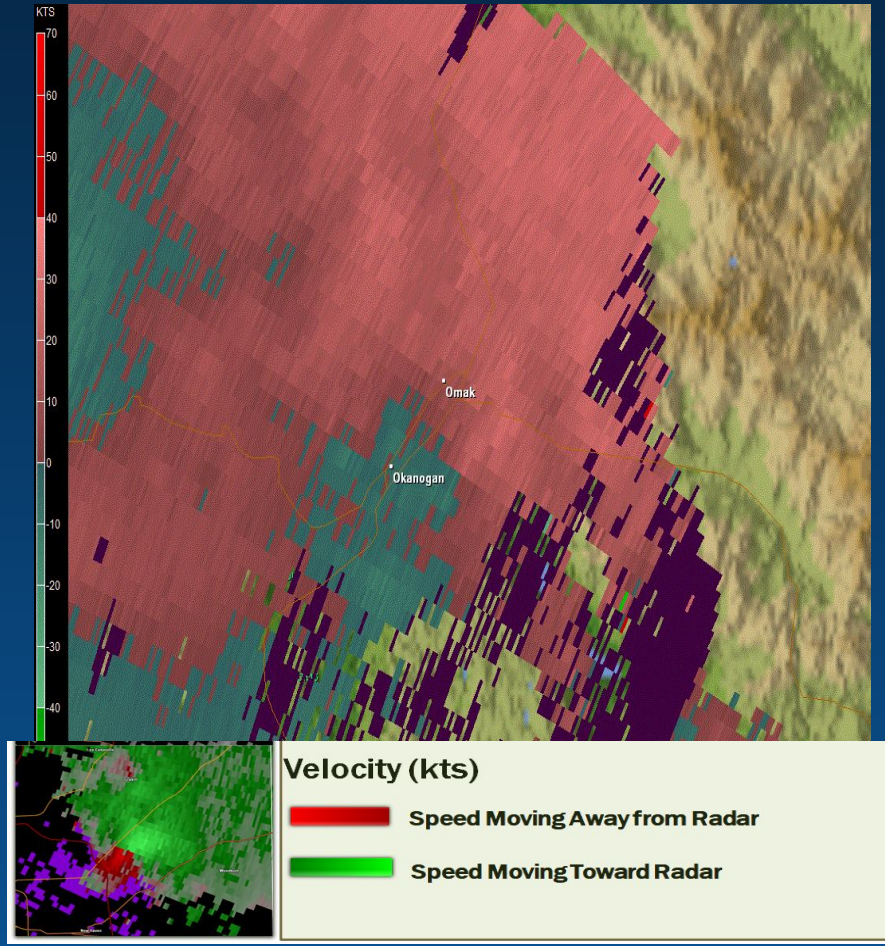
Speed and direction of targets - rain, snow, hail, debris or other biological particles. Measured in knots.

Red: Moving away from radar

Green: Moving toward radar

“Base” = ground relative motion
Good for straight line winds

“Storm Relative” = storm motion removed
Good for rotation in storms



Radar Products - Correlation Coefficient (CC)

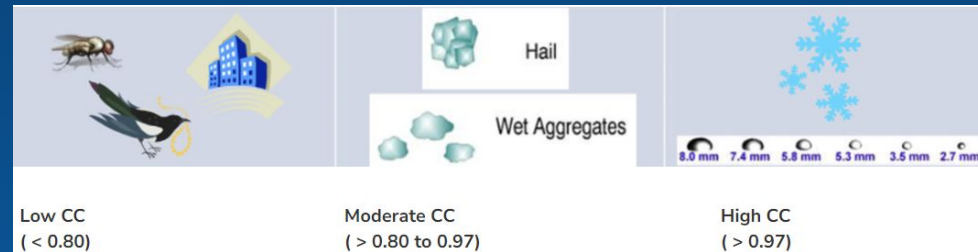
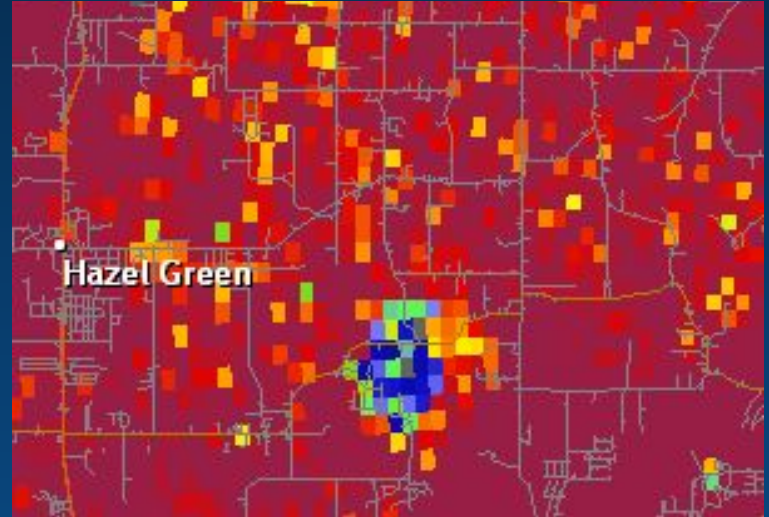
Possible Values: 0.2 to 1.05 / **Units:** (none)

Provides a measure of the consistency of the shapes and sizes of targets within the radar beam.

Higher value = higher consistency in the size and shape of radar targets

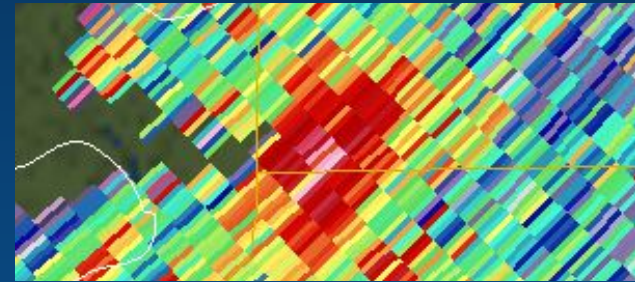
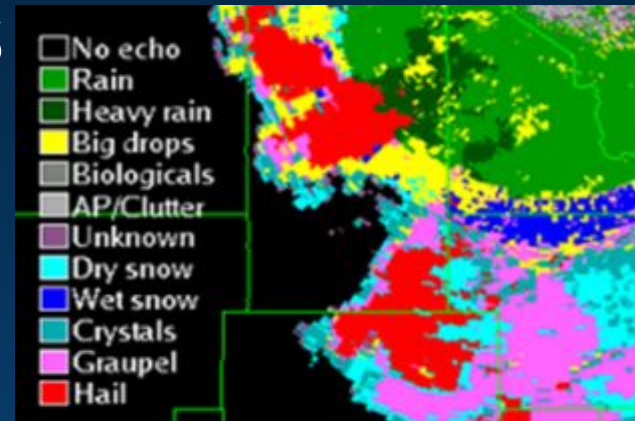
Lower value = greater variability in shapes and sizes

USES: Help distinguish between meteorological and non-meteorological targets, find the melting layer, identify giant hail, identify tornadic debris, and check the quality of other dual-pol products.



Radar Products - More Products

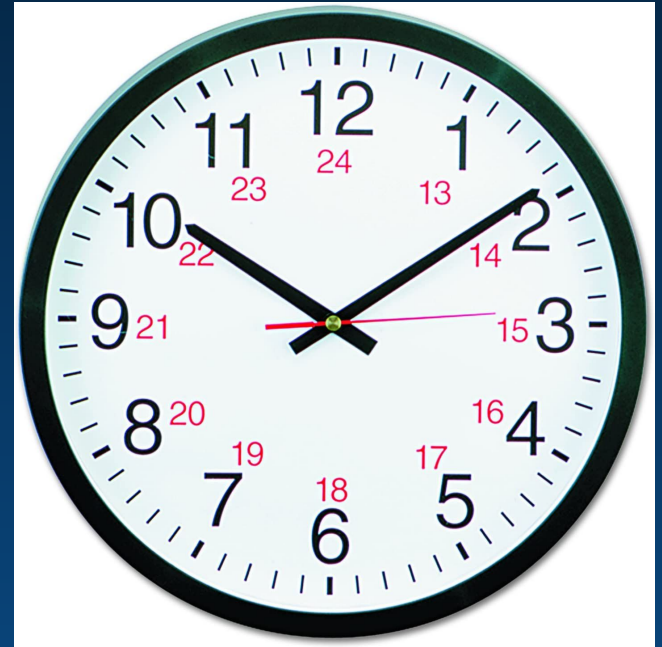
- Hydrometeor Classification
 - Estimate of type of precipitation
- Differential Reflectivity (ZDR)
 - Helps identify the dominant target shape
 - Spherical, randomly oriented targets (hail, debris, snow) = near 0
 - Horizontally elongated targets (medium to large raindrops) = positive values > 0
- Specific Differential Phase (KDP)
 - Identifies regions of heavy rain
 - Increasing KDP is an indication of an increase in the size and concentration of rain drops, and thus, an increase in rain rate.



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



#6 Poll question

What are some useful radar products?



Spotter Safety

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

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.



WEATHER SAFETY: LIGHTNING

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

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



WEATHER SAFETY: LARGE HAIL



Speeds of Falling Hail By Size

Dime size	35 mph
Quarter size	50 mph
Golf Ball	66 mph
Baseball	85 mph
Softball	100+ mph

Terminal velocity of an object assumes a round smooth surface



WEATHER SAFETY: FLOODING



- **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.**



WEATHER SAFETY: FLOODING

Do You Really Know How Deep the Water is?

12 inches of fast-moving water can carry away a small car.

WHEN FLOODED
TURN AROUND
DON'T DROWN

6 inches of fast-moving water can knock over and carry away an adult.

18-24 inches of fast-moving water can carry away most large SUVs, vans and trucks.



WEATHER SAFETY: TORNADOES



OUTSIDE

- Cars are NOT safe!
 - Drive to the nearest sturdy building and seek shelter
 - Abandon the vehicle and find an area noticeably lower than the level of the road – lie down and cover your head.

Treat Severe Thunderstorm or High Wind Warnings Seriously! Straight line winds can be as destructive as a Tornado

INSIDE

- Seek shelter in a strong building
- Lowest level of a sturdy building (basement is best)
- Small interior room away from windows (bathroom or closet)
- Put as many walls between you and the outside as possible
- Abandon mobile homes - move to a sturdy shelter close by



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.**



Weather Spotter Resources Online

weather.gov/otx/Spotter Resource Page

- Latest radar & satellite images
- Current watches, warnings & forecasts
- Latest NWS Storm Reports
- Maps of NOAA Weather Radio frequencies
- Current & Past Newsletters
- Spotter Guide
- Additional training resources - **MetEd**
- www.weather.gov/jetstream/

What about Weather Spotter Training?

Spotter training sessions are important and needed to stay current on severe weather spotting. The sessions are conducted by the National Weather Service in the spring and fall. It's an opportunity for spotters to review basic spotter techniques and weather safety concerns.

- [Spotter Training Schedule](#) will be posted when and where classes are offered.
- Recorded Spotter training is available locally and nationally

Locally Recorded Spotter Training

Fall Spotter Training 2022 Notes	Snow Measurement Training 2022 Notes
Basic Spotter Training 2022 Notes	Advanced Spotter Training 2022 Notes
Fall Spotter Training 2021 Notes	Snow Measurement Training 2021 Notes
Basic Spotter Training 2021 Notes	Advanced Spotter Training 2021 Notes

National Spotter and Observer Training

COMET MetEd	CoCoRaHS
SKYWARN Spotter Training - Basic	CoCoRaHS slide shows
Role of the SKYWARN Spotter	CoCoRaHS videos
SKYWARN Spotter Convective Basics	Wx Talks Webinars



#7 poll question

What would be a SAFE weather spotting scenario?



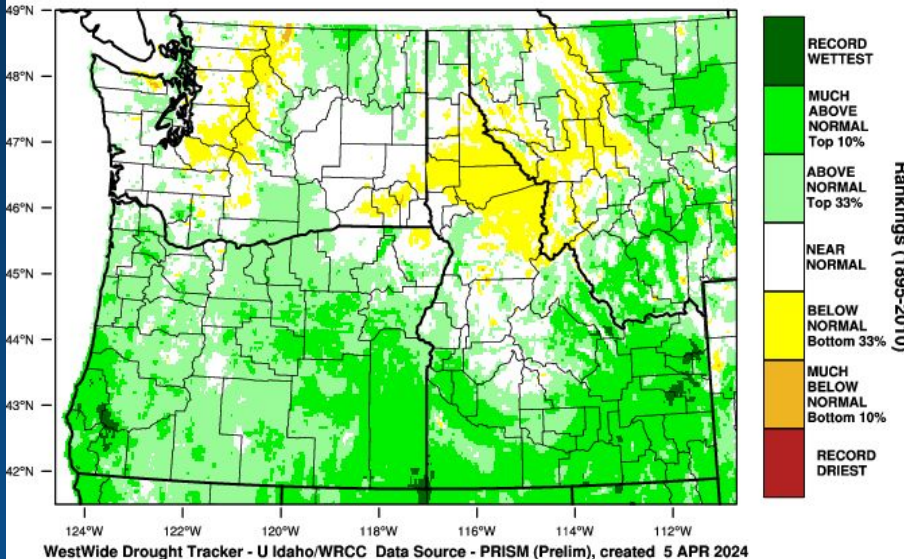
Seasonal Outlook 2024

wrcc.dri.edu/

Since the start of the Calendar Year...

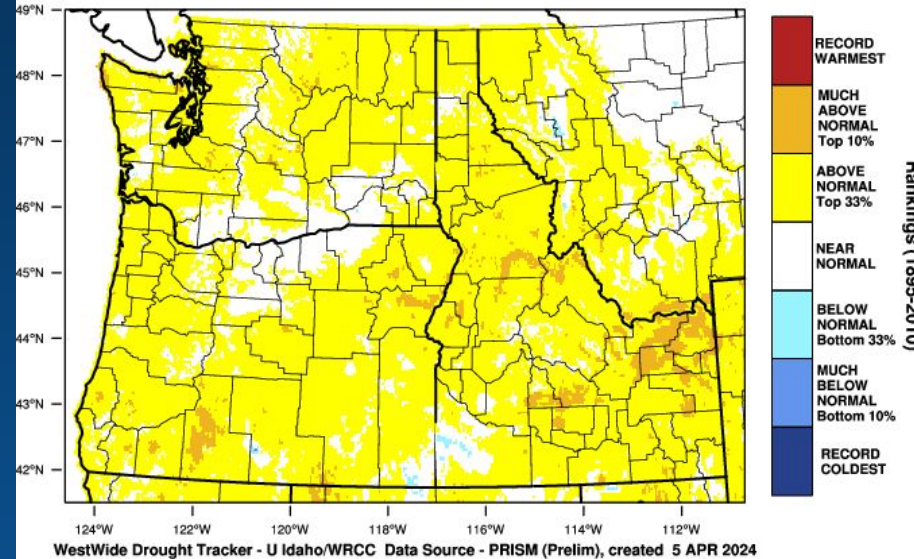
Precipitation

Pacific Northwest - Precipitation
January-March 2024 Percentile



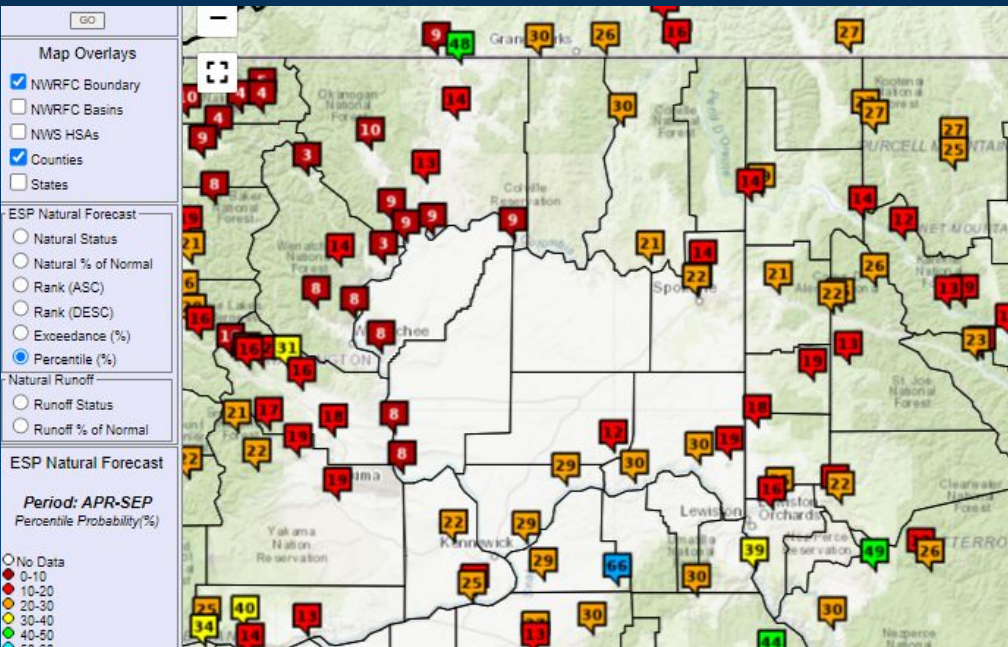
Temperature

Pacific Northwest - Mean Temperature
January-March 2024 Percentile



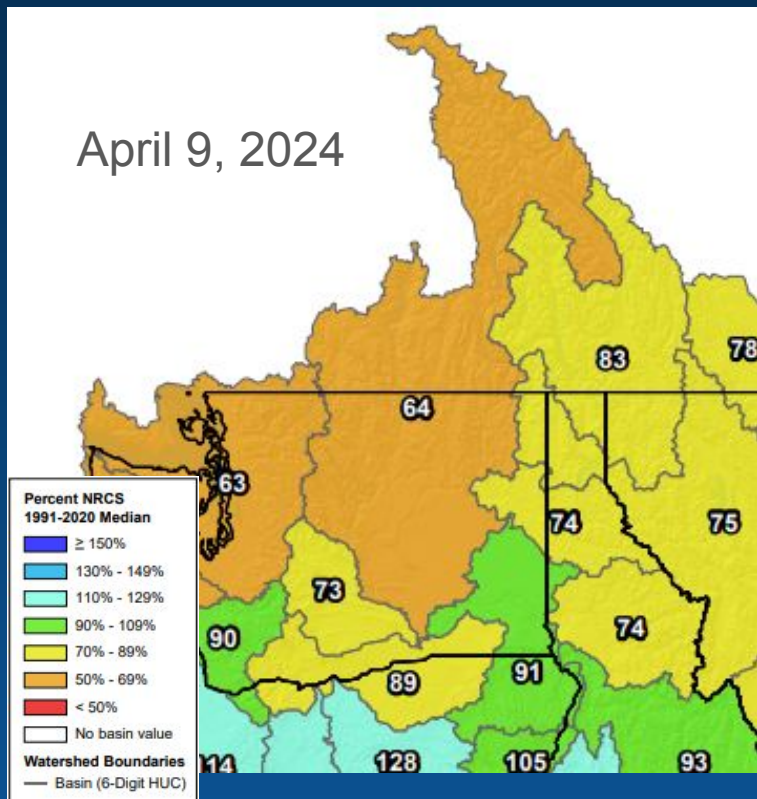
Seasonal Outlook 2024

Water Supply Outlook



Snow Water Equivalent

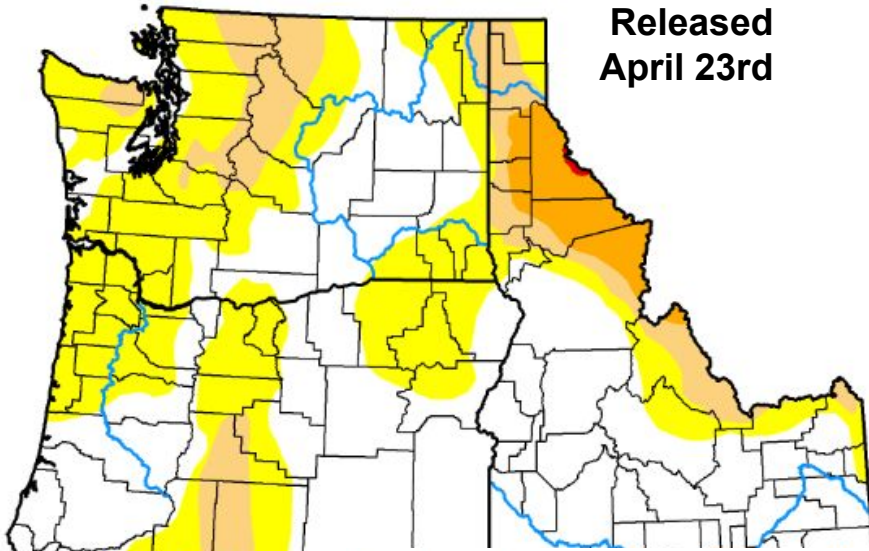
April 9, 2024



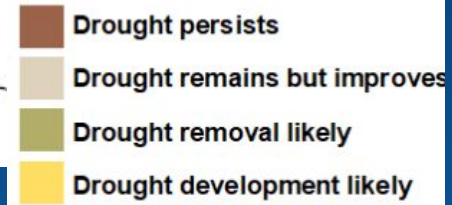
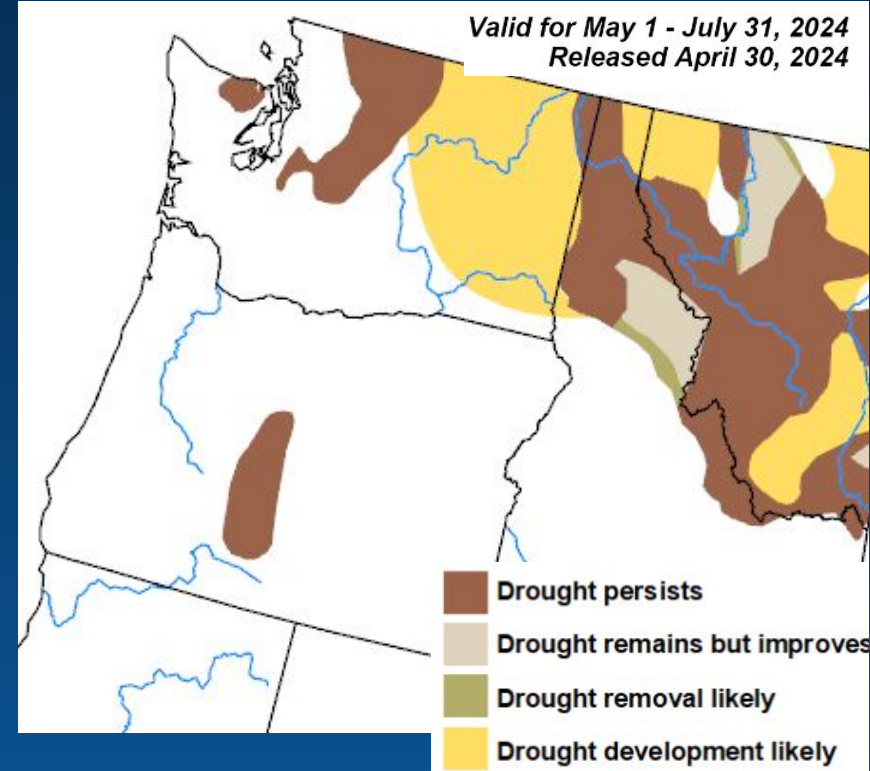
Seasonal Outlook 2024

US Drought Monitor & Seasonal Outlook

cpc.ncep.noaa.gov



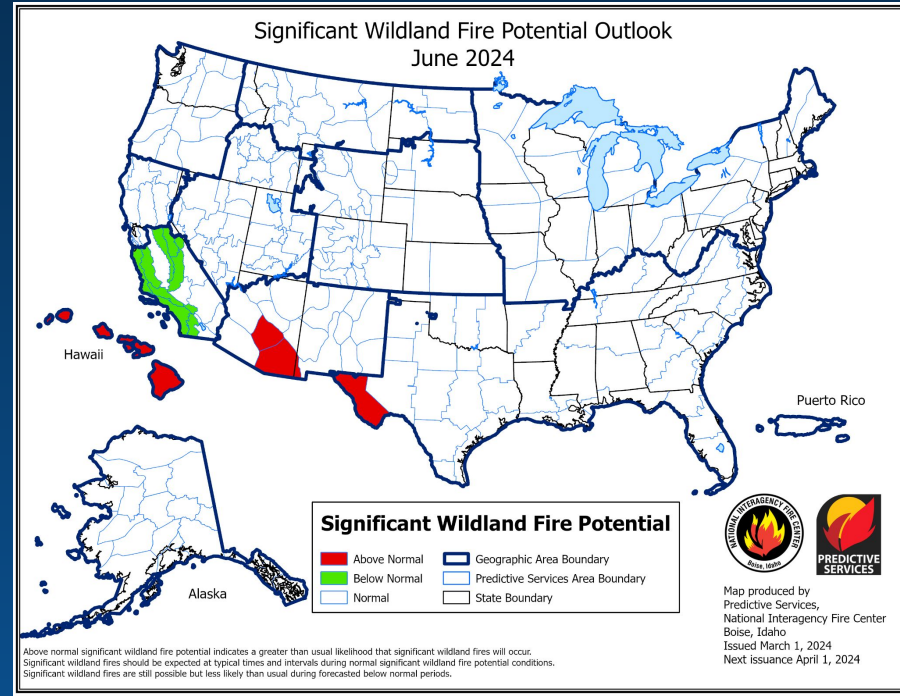
Intensity and Impacts



Seasonal Outlook 2024

Wildland Fire Potential

www.nifc.gov



Monthly Outlook 2024 - May

One Month Outlook

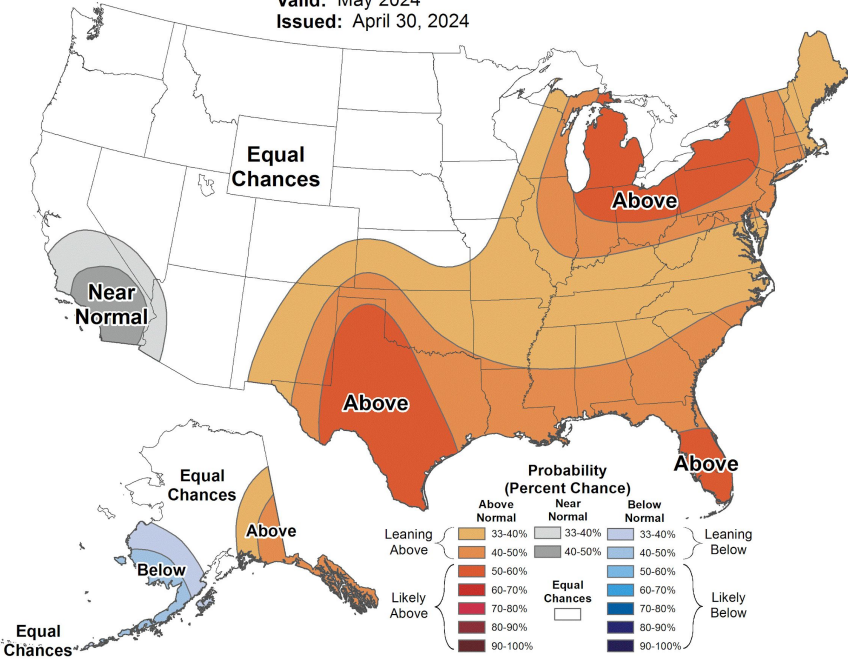
www.cpc.noaa.gov



Monthly Temperature Outlook



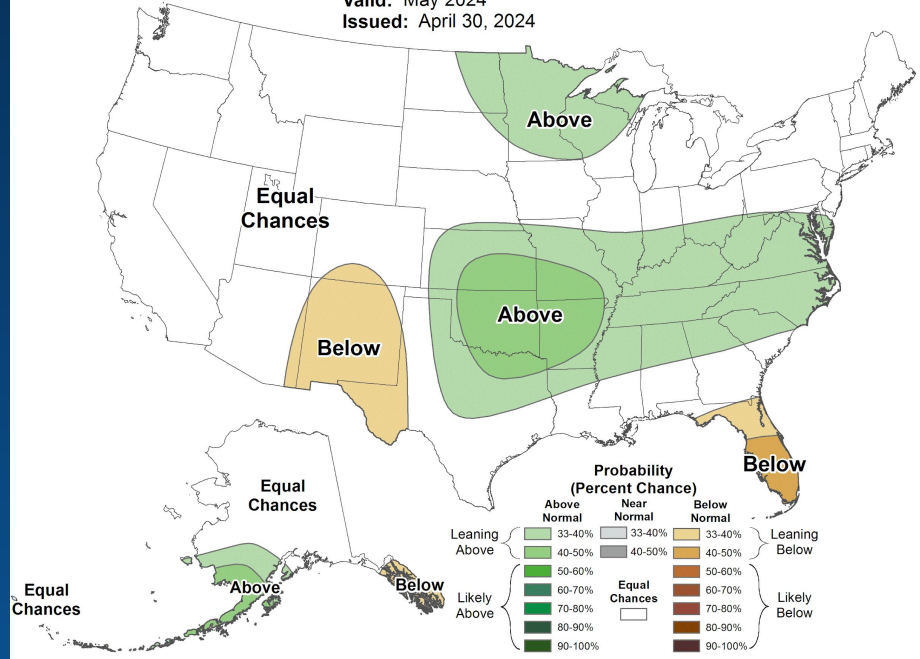
Valid: May 2024
Issued: April 30, 2024



Monthly Precipitation Outlook



Valid: May 2024
Issued: April 30, 2024

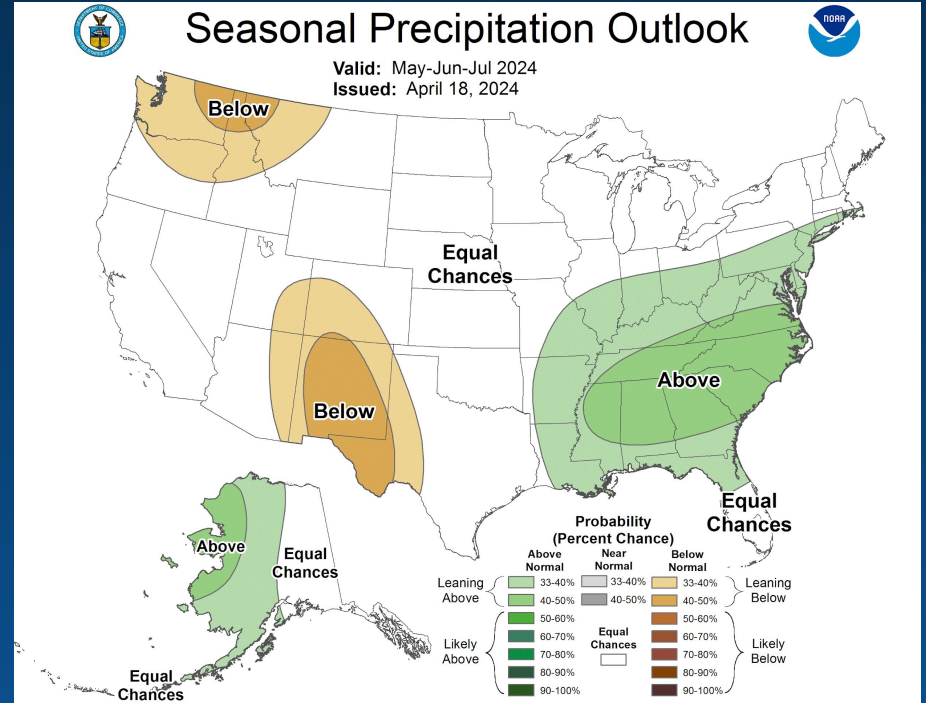
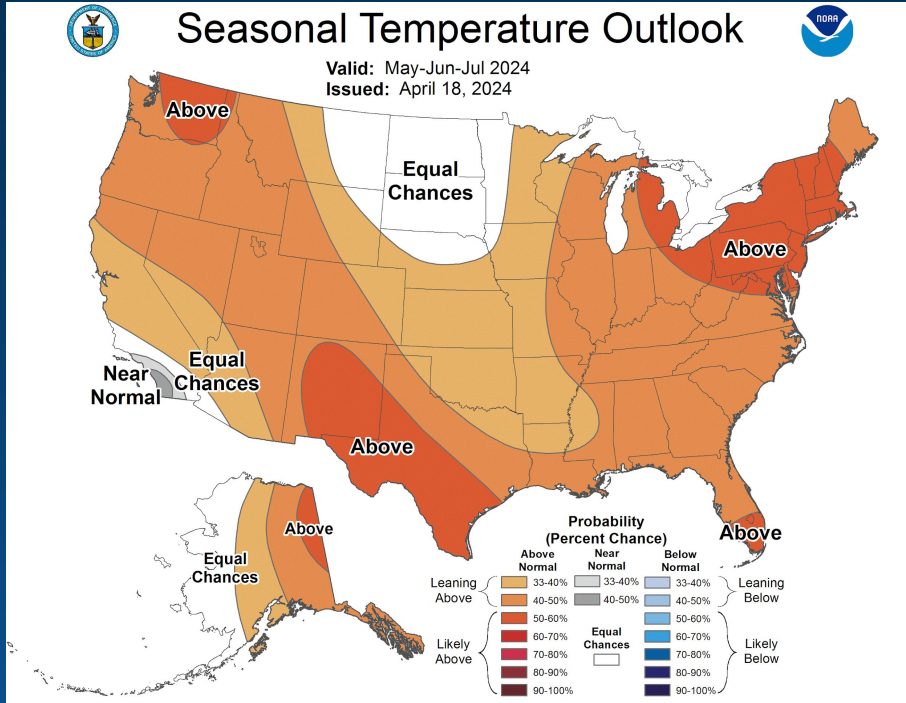


Seasonal Outlook 2024 - May thru July

3 Month Outlook

www.cpc.noaa.gov

**La Niña
coming!**



NWS + Weather Spotters = Saved Lives

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

