



Welcome to the NWS Spokane Spotter Training for the Inland NW – Fall 2019.

Before we get started.....

Audio
Questions
Polls
Handouts
Email & Survey



Agenda

- Role of National Weather Service
- Weather Spotter Program & Reporting
- Weather Hazards & Safety Rules
- Getting the Word Out
- Other Ways to Get Involved
- Winter Outlook



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www.weather.gov/spokane



Poll Time



- What is your main source of weather information?
- Do you understand the difference between a weather Watch, Warning or Advisory?
- When dealing with snow – what's important to you?
- How strong are severe winds?

National Weather Service

- Federal Government
- 126 offices across the country
- Works with local agencies
- Responsible for all weather/water Watches & Warnings
- Observe & Forecast
- "Behind the Scenes"
- Preparedness
- Education



National Weather Service Spokane, WA

www.weather.gov/Spokane





Staffed
24/7

- 24 Employees
 - Meteorologists
 - Technicians

Duties

- Observations - Weather Balloon
- Forecasts - Out to 7 days
- Weather Watches & Warnings

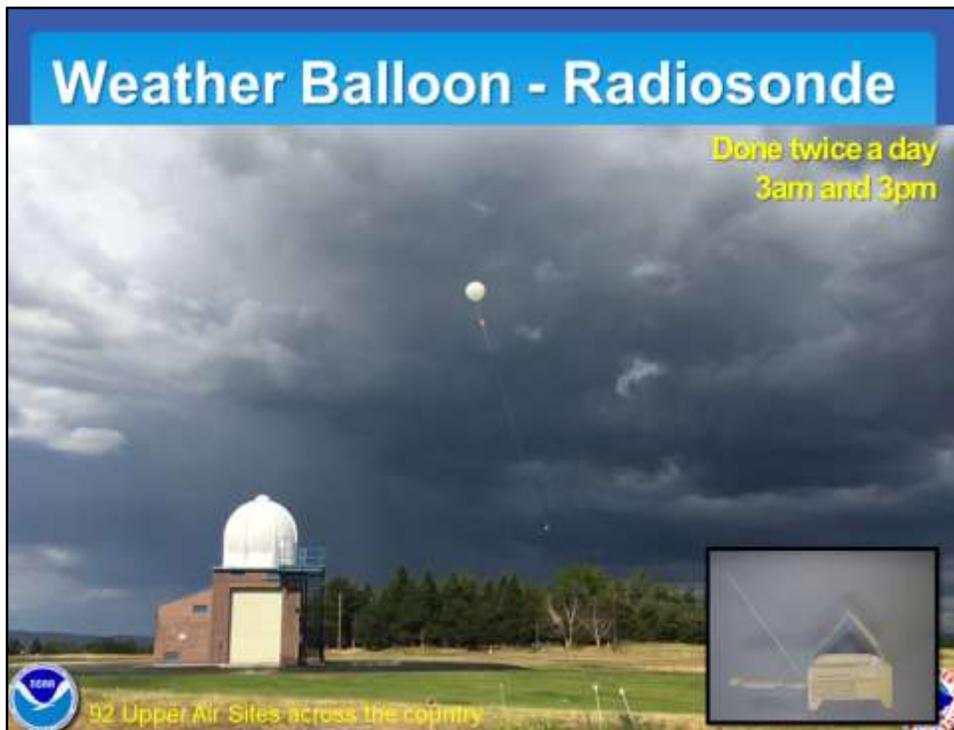
NWS Spokane



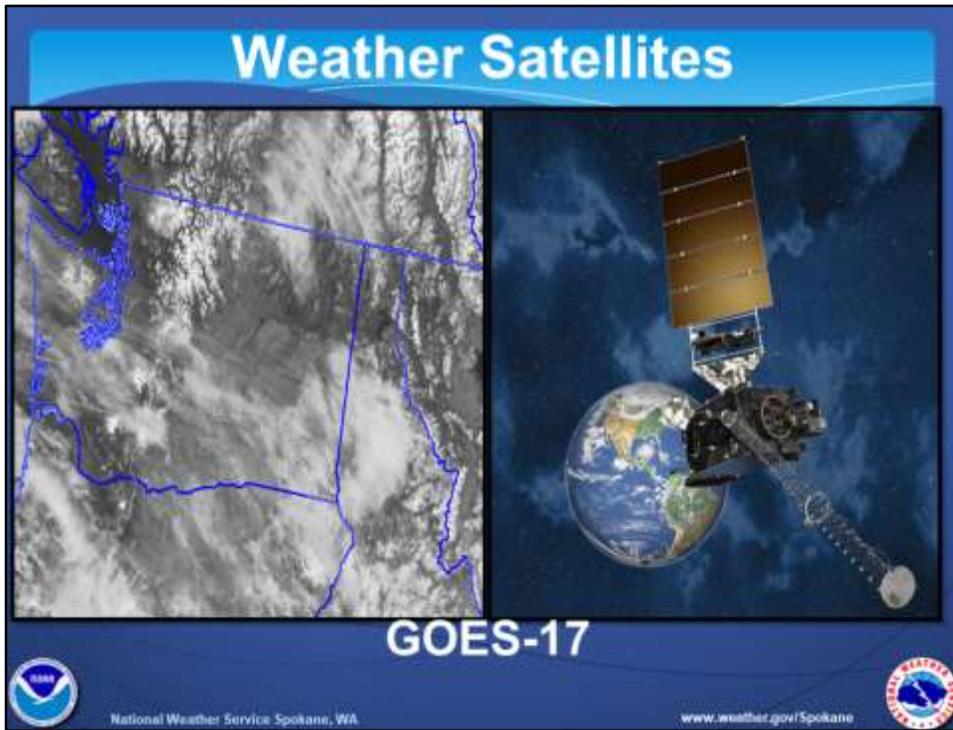




NWS observation program encompasses weather balloons, weather satellites, weather radar and surface observations.



NWS Spokane launches weather balloons – twice a day everyday.



Geostationary Weather Satellites

Weather Satellites Limitations



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Weather Radar - WSR-88D



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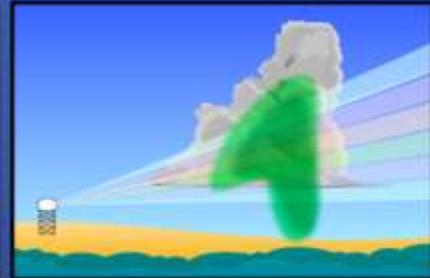
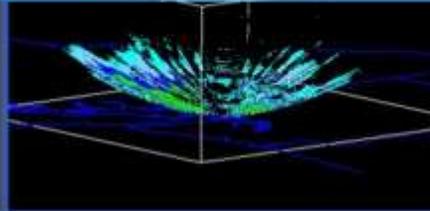
159 Radars across the country

www.weather.gov/Spokane



How the Weather Radar works

- * Radar sends a radio signal - pulse
- * Listens for a return signal
- * Rotates 360 degrees = "slice"
- * Multiple slices at higher elevations
- * Completes a "volume scan" 4-8 min



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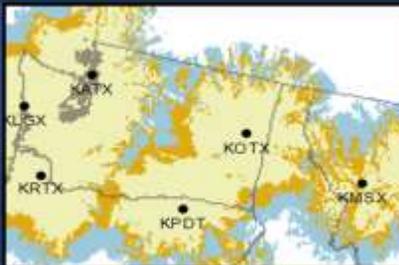
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Weather Radar Limitations

Near the radar, the beam is lower to the ground and "sees" low in the storms.

As distance increases, the beam's altitude also increases and can overshoot the core of heavier precipitation.



VCP12 Coverage

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

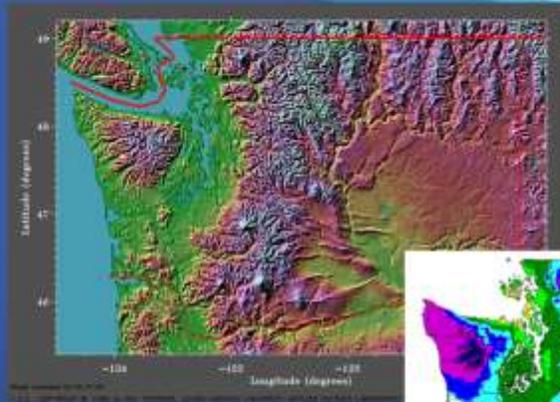


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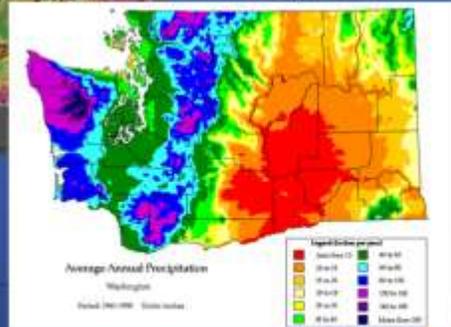


Terrain Makes All the Difference



Topographic map

Average Annual
Precipitation



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Surface Observations

Automated Surface Observation Station

Limitations - Can't report

- Snow depth
- Tornadoes
- Hail size



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Supercomputers & Models



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We need trained spotters! Why?

- Radar & Satellite Limitations
- Fill in the “holes” and reports not covered by observations
- Ground Truth
- Goal – maximize warning effectiveness and improve lead times



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(Coverage Below 10,000 ft)

Google



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Spotters are very important!



1,200+ Weather Spotters!!



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How to Report to Us



National Weather Service Spokane, WA

www.weather.gov/Spokane



Phone Call



Dial :
1-800-
483-4532



What:
Weather
You
Witnessed



Where:
It Was
Witnessed



What:
Time It as
Witnessed



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Online Spotter Reports



Storm Reports

Alerting the NWS to local weather

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

Please select a report type

Back

Next

[Privacy policy for weather reports](#)

www.weather.gov/Spokane



Local Radio



Satellite Images



Weather Maps



Geophysical Forecasts



Rivers and Lakes



Observations & Research



Fire Weather



Aviation Weather



Weather, Tides, Forecasts



Climate Graphics



Recent Information



Climate



Submit a Storm Report



View Storm Reports



Watch Status



Hourly Forecasts



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Social Media

Twitter

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



FaceBook

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



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mPING

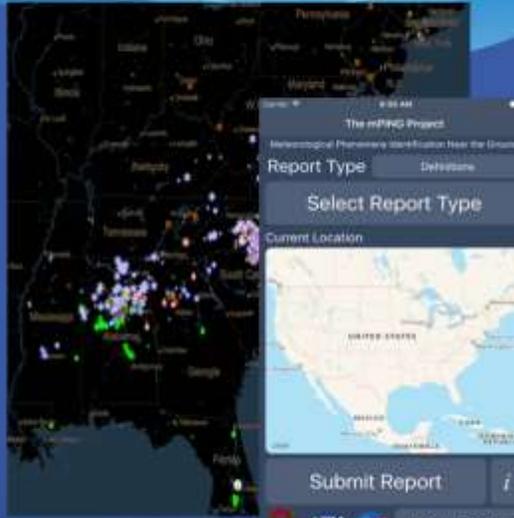
Available on iOS and Android

Reports sent to NWS

Reports are anonymous

Very easy to use

Website:
<https://mping.nssl.noaa.gov>



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www.weather.gov/Spokane



Email Reports & Photos

nws.spokane@noaa.gov



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

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Spotter Report

- **Specifics...Tell us the story!**
 - Who...What...and Where
 - When the event began and/or ended
 - Estimate of wind speed and/or hail size
 - Damage and injury reports
- **If unsure report your uncertainty**
- **Reports while traveling**
- **Delayed or second hand reports**



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**Inland Northwest
Weather Spotter
Checklist**



Tornado or Funnel Cloud: ANY Kind

Strong Winds: +30 mph/Damage (58mph severe)

Hail: +1/2" 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 (mtns)

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

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National Weather

er.gov/Spokane



Good Spotter Report

This is John Ceesall, Spotter Spokane 85 calling from my home on the South Hill. There is currently a heavy snow falling with about 1" on the ground. It began about 30 minutes ago.



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Good Spotter Report

This is Judy Sprinkles, Latah 33. I'm currently driving along Highway 95 south of town near Zeitler Rd. I see lots of standing water on the roadway and in the ditches. A car slid off the road. It's pouring out. I can send you a photo if you want.



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Not Good Spotter Report

Hi there, how are you doing? Who is this? ...Well hi Greg! I'm a spotter in Boundary County. I see lightning to the north and it rained a little bit ago. The news is saying it's much worse to the south. Are we going to get another storm?How long is it supposed to last?



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During Hazardous Weather

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)
Even for SNOW REPORTS



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Hello this is Kevin from the National Weather Service...is this Karl? Hi Karl, we're tracking a strong storm that looks like it just passed over your home. Was there any wind damage with that storm?



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Spotter Resources

www.weather.gov/spokane

- Latest radar and satellite images
- Current watches, warnings, forecasts
- Latest NWS Storm Reports
- NOAA Weather Radio frequencies
- Newsletter
- Spotter Guide



National Weather Service - Spokane, WA

Spotter Resource Page

[Home](#) > [Contact Us](#) > [Spokane Resource Page](#)

[Current Watches](#) | [Current Conditions](#) | [Radar](#) | [Forecasts](#) | [Streams and Lakes](#) | [Climate and Past Weather](#)

Spotter Resource Page

[Send Spotter Reports](#)

This website is an easy method to send spotter reports online through your computer! You have to be a registered weather spotter for the Inland Northwest to gain access to the system.

[Weather Spotter Checklist](#)

[Training Schedule](#)

[MetEd Training module](#)

[VIRMI Training - August 2018](#)

[Weather Watcher Newsletter](#)

[Latest NWS Storm Reports](#)

Being a weather spotter is a **SNAP!** [Find out more!](#)

- **What is an NWS Weather Spotter?**
The National Weather Service in Spokane is constantly looking for volunteers who would like to become weather spotters. Weather spotters provide us with the spot weather reports – which cannot be replaced by other means. These weather reports greatly assist the National Weather Service in determining the strength of a storm and its effects on the surrounding area.
- **What Kind of Weather Do Spotters Report?**
Most people think weather spotters are only called to the National Weather Service during thunderstorm season. However, spotters are vital to the year-round operations of the National Weather Service. For example, reports of freezing rain and heavy snow and flooding are equally useful to forecasters.
[NWS Spokane - Spotter Checklist](#)
[Latest NWS Storm Reports](#)

MetEd

www.meted.ucar.edu

SKYWARN[®] Spotter Convective Basics



Begin »

Help Home

CONET Home

»

Find Version

Download Version

Match Doc

Print Survey

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Contributors

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- 300 FREE modules
- Skill Levels 0-5
- Wide range of topics
 - Spotter Basics
 - Convective Storms



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Email Notification

You will likely be notified by email when there is a WIDESPREAD Severe Weather Risk - **Wind, Snow, Flooding,**

We email quarterly on the Weather Watcher Newsletter



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Cold Season Hazards



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Heavy Snow



Heavy Snow!
4"+ in 12 hours

Please Report:

First Snow of the Season
Then at least 2" new snow



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What Criteria Must Be Met To Be Considered a BLIZZARD?

WIND

35 mph or greater

BLOWING SNOW

VISIBILITY

1/4 mile or less

TIME

At least 3 hours



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Wintry Mixed Precipitation

- Freezing rain or Freezing drizzle
- Sleet
- Snow to Rain OR Rain to Snow
- Ice accumulation over $\frac{1}{4}$ inch = Ice Storm Warning!



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Strong or Damaging Winds

- Report any winds estimated to be over 30 mph
- Winds that produce any damage
- Severe/high winds ≥ 58 mph



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Don't have a
weather station?

Not to worry...

Use the
Beaufort Wind
Chart to estimate
wind speeds



National Weather Service Spokane, WA

Beaufort Wind Chart – Estimating Winds Speeds

Beaufort Number	Range	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	4	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.



Heavy Rain

- Report heavy downpours or long periods of rain
- 0.50"+ in 1 hour - convective
- 1"+ in 12 hours or
- 1.5"+ in 24 hours - stratiform



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Flooding & Ice Jams

Rising water on rivers, streams & low lying areas



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Mud and Debris Flows

Water-saturated rock, mud & debris
moving down slopes



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Typical Winter Storm Scenario

- Cold air in place over the Inland Northwest, especially in the valleys
- Warm Pacific Air rides over the cold air
- Precipitation begins as snow, occasionally changes to rain with possible freezing rain

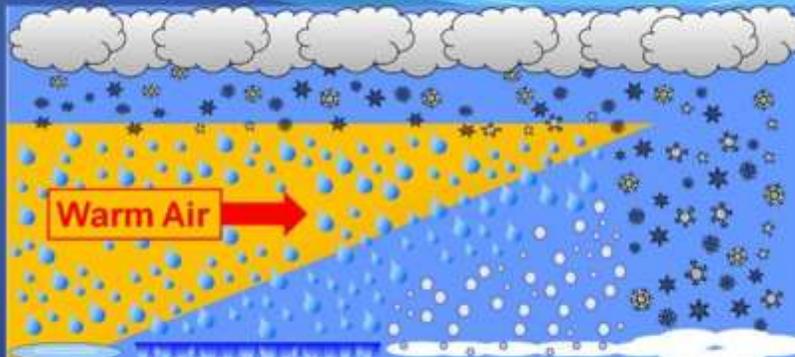


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The Vertical Temperature Profile is Critical!



Rain

Frozen precipitation melts and reaches the ground as rain.

Freezing Rain

Frozen precipitation melts in warm air. Rain falls and freezes on cold surfaces.

Sleet

Frozen precipitation melts in shallow warm air. Then refreezes into sleet before reaching the surface.

Snow

Snow falls through cold air and reaches the surface.



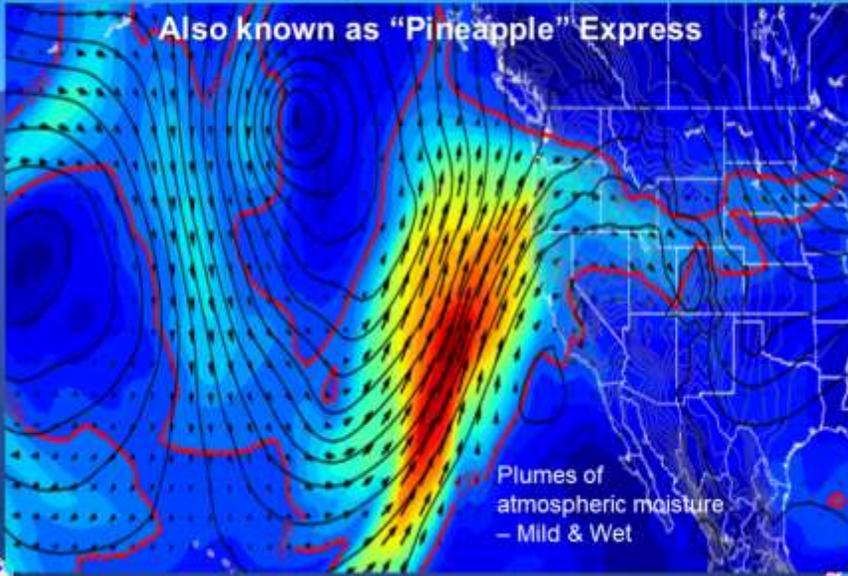
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Atmospheric Rivers

Also known as "Pineapple" Express



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Atmospheric River Events

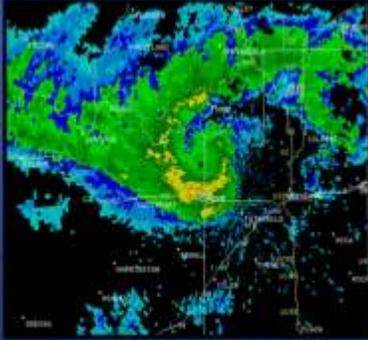


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Small Scale Unstable Low

- Form Behind Strong Cold Fronts
- Not well forecast by models
- Potential for ~1 ft of snow in a short time
- Spotter play a BIG role with reports



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Thunderstorm Hazards

Occur in Every Season



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Thunderstorms



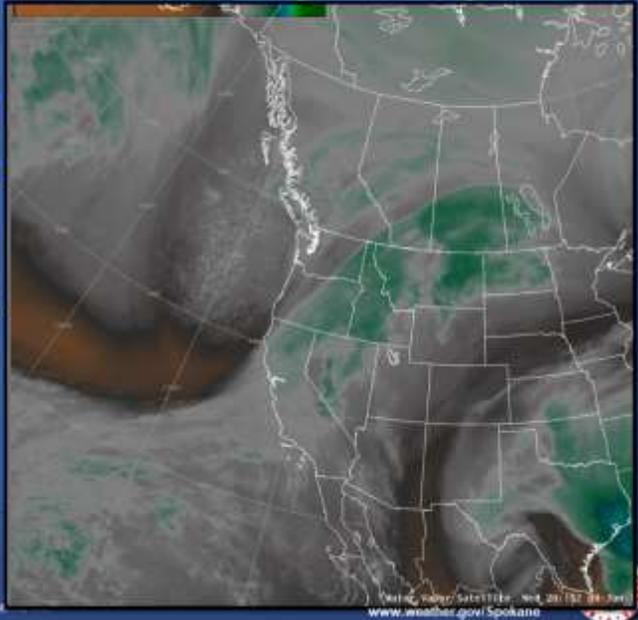
3 Ingredients

- Moisture
- Instability
- Lift



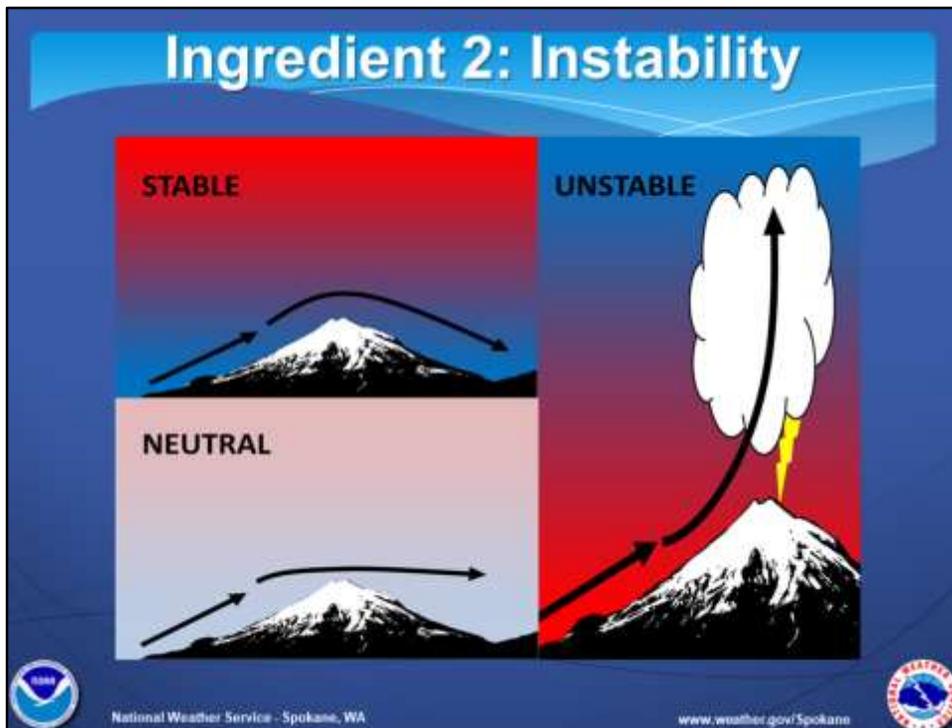
Ingredient 1: Moisture

Most often
our moisture
comes from
the Pacific



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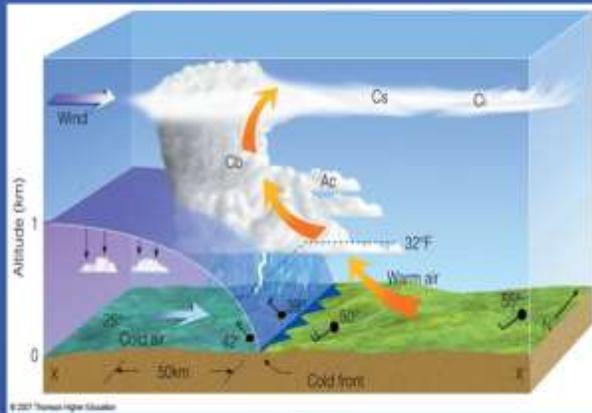


The greater the temperature difference, the greater the instability. Remember from last class the greater the environmental lapse rate the more a parcel will accelerate upward.

Ingredient 3: Lift

Lift from a Cold Front

- Colder, dense air pushes under warmer, moist air – forms clouds
- Air converges along the boundary – forces it to rise



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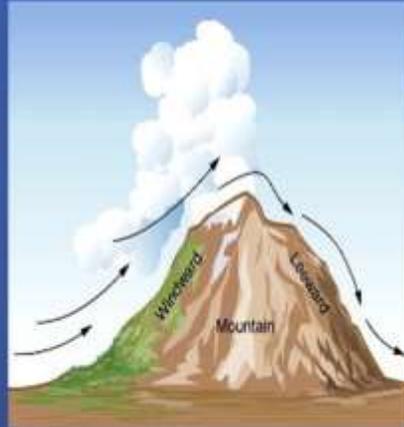


Cold fronts have a steeper and a round blunt end along the leading edge of the front, which helps push the surface air farther up and faster compared to a warm front.

Ingredient 3: Lift

Lift from Mountains

- Air rises on the WINDWARD side of a mountain – forming clouds
- Air descends on LEEWARD side of a mountain – drying & warming the air.
- Wind direction determines precipitation

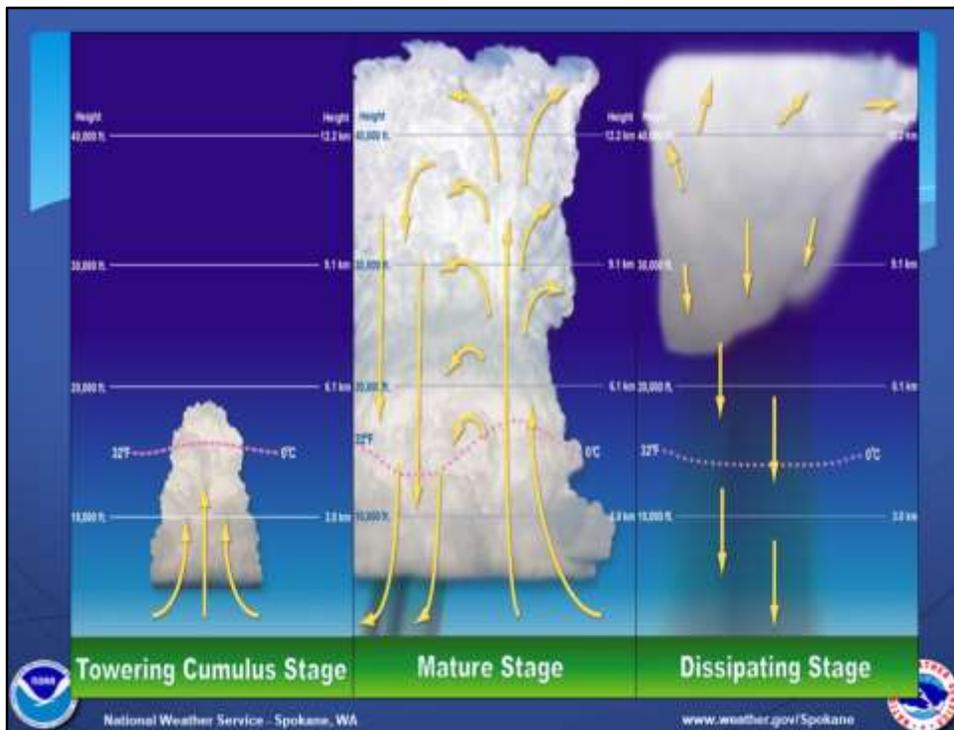


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Stable air being pushed up a mountain range will precipitate along the windward side, due to cooling as the air parcel expands. On the leeward side the air parcel sinks and warms due to compression. That is why Lowell Idaho gets around 40 inches of 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.



What is a Severe Thunderstorm?



WIND
≥58 mph



Or



HAIL
≥1" in diameter



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Supercells.....

Not your ordinary thunderstorms

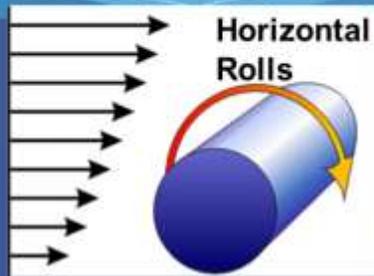
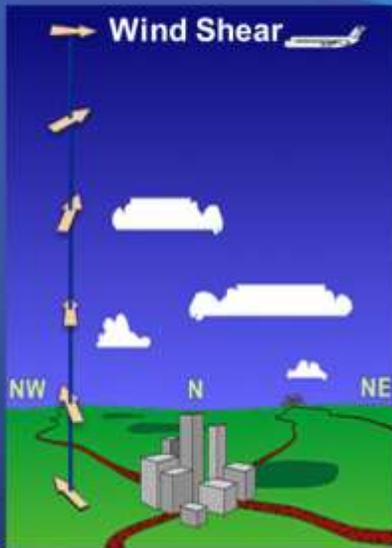


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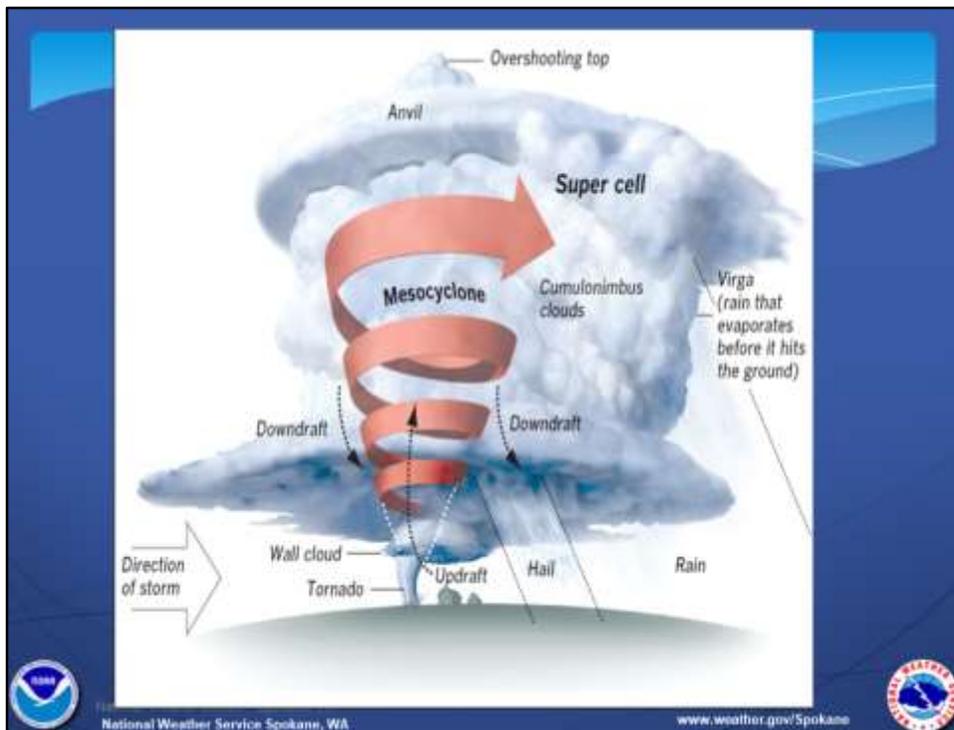
Supercell Thunderstorms



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Tornadoes



Tornado 5 miles NWW Mold WA
Douglas County, WA
Lic Weaver Facebook

Typical Inland Northwest Tornado

- Less than 5 minutes on the ground
- 100 yards in diameter
- $\frac{1}{4}$ mile track
- Wind speeds of 85-115 mph



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Are Funnel Clouds tornadoes?

- Funnel clouds stay aloft
- Tornadoes reach the ground

In doubt, check for debris



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Microbursts & Straight Line Winds

- A downdraft or rain can drag strong winds down
- Evaporation can cool a parcel of air causing it to become heavier (more dense)
- Accelerates at the speed of gravity



Remember - Severe winds ≥ 58 mph



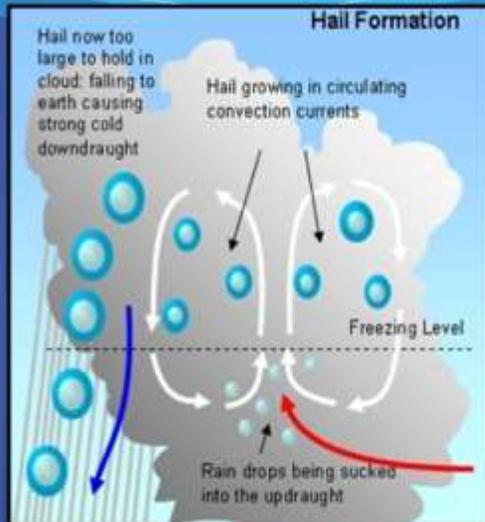
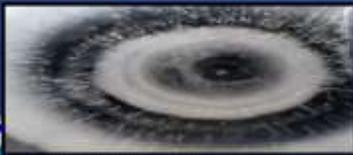
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Hail

- Strong updraft keeps large chunks of ice aloft
- Circulated within a thunderstorm
- Collects layers of water and freezes
- Can fall to the ground at >100 mph



Remember-severe hail $\geq 1''$ diameter



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Flash Flooding

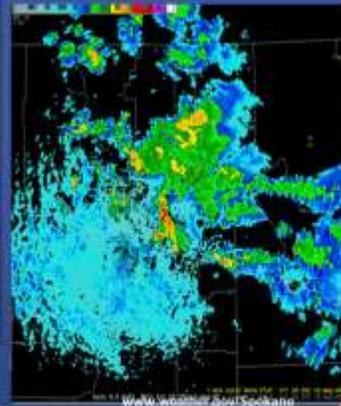


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Dust Storms



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Lightning



Spokane, WA April 2017



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Weather Spotter Safety

- **Personal Safety - #1 priority**
- **Adhere to ACES concept**
 - Awareness, Comms, Escape Route, & Safe Zone
- **Be extra careful at night**
- **Never put yourself in harm's way.**
 - Don't drive through flooded roadways
 - Don't travel through downed power lines
 - Don't be too near fallen objects or structures
- **Stay current on the weather**



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Getting the Word Out



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Weather Warnings

- Tornadoes
- Severe T-storms
- Flash Flooding
- Snow, Ice, & Cold
- Wind
- Fire
- Freeze



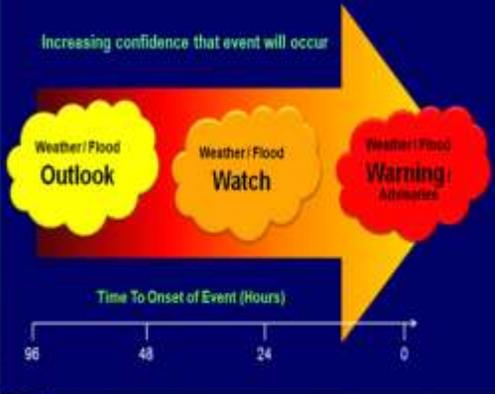
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NWS Terminology

National Weather Service Outlook / Watch / Warning Terminology

Increasing confidence that event will occur



- **Watch:** Severe Weather conditions are favorable, but not imminent.
- **Warning:** Severe weather or flooding is imminent or already occurring.
- **Advisory:** Inconvenient weather or minor nuisance flooding is expected or occurring.



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Staying Informed NOAA Weather Radio

Continuous operation.

Battery backup capable.

Handheld device great for
outdoor activities.

Can drive across the country and
get info anywhere along path.

Tone Alerts for Severe Wx



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Staying Informed NWS Spokane Web Page

NATIONAL WEATHER SERVICE

NWS Forecast Office Spokane, WA

Sunday's Highs

42°F
6°C

Detailed Forecast

Sunday	Partly fog between 7am and 8am. Otherwise, partly cloudy with a low around 25. Light rain showers.
Monday	Partly fog between 7am and 8am. Otherwise, partly sunny, then gradually becoming sunny with a high near 42. Light rain ends.
Monday Night	Partly fog. Otherwise, mostly cloudy with a low around 25. Clearward.
Wednesday Day	Partly fog before 6am. Otherwise, mostly sunny with a high near 40. Clearward.
Tuesday Night	Partly fog. Otherwise, partly cloudy with a low around 22. Light rain ends.
Monday	Partly fog before 6am. Otherwise, mostly sunny with a high near 40.
Monday Night	Partly cloudy with a low around 22.
Tuesday	Mostly sunny with a high near 40.
Tuesday Night	Mostly cloudy with a low around 22.
Wednesday	A slight chance of rain and snow before 6am. Then a slight chance of rain between 6am and 8am. Mostly cloudy with a high near 40. Chance of precipitation is 25%.
Wednesday Night	Mostly cloudy with a low around 26.
Thursday	Partly sunny with a high near 47.
Thursday Night	Mostly cloudy with a low around 31.
Friday	A 25 percent chance of rain. Partly sunny with a high near 50.

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Staying Informed On Your Phone!



mobile.weather.gov



Mobile Weather.gov
Smart Phone Enabled



Type in desired
location
Hit 'Go'



Up pops current
conditions, hazards,
and forecast



Can add this website
to your 'Home' screen
for quick access



Home Screen



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Staying Informed On Your Phone!

**WIRELESS
EMERGENCY
ALERTS
CAPABLE**



Weather Warnings

- Tornado Warnings
- Flash Flooding Warnings
- Extreme Wind Warnings
- Dust Storm Warnings
- Snow Squall Warnings

Alert Categories

Extreme Weather & Water Warnings
Local emergencies & Evacuations
AMBER Alerts
Presidential Alerts – National emergency



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Staying Informed

FEMA App



Receive alerts from the National Weather Service for up to five locations.



Get safety reminders, read tips to survive natural disasters, and customize your emergency checklist.



Locate open shelters and where to talk to FEMA in person (or on the phone).



Upload and share your disaster photos to help first responders.



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Other Ways to Get Involved

- Weather Spotter
- Join the Community Collaborative Rain, Hail, and Snow Network
- Join the Citizens Weather Observers Program



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Community Collaborative Rain, Hail and Snow Network (CoCoRaHS)

Community Collaborative Rain, Hail & Snow Network

Who uses CoCoRaHS Observations?

Reports received today 8/18/21 as of 4:00 PM EDT

Date	Rain	Hail	Snow	Total	Count
8/20	115	0	1	116	87

Map of the United States showing precipitation data. A legend indicates precipitation types: Rain (blue), Hail (red), Snow (green). A smaller map of the Pacific Northwest region is shown below.

Download CoCoRaHS Observations on your mobile device:

- Download on the App Store
- GET IT ON Google Play
- CoCoRaHS Observations Website

Volunteers report their daily observations & receive online training on the interactive website:

www.cocorahs.org



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Rain Measurements

- Getting a Rain Gauge – www.weatheryourway.com
- Set it up in an open area, preferably away from trees
- Reading a Rain Gauge



The surface of the water in the gauge looks curved. How do I know where to read?

As water fills up the measuring tube, a curved surface is formed called a **meniscus**. This meniscus is formed by the surface tension of a liquid in contact with the sides of the tube.



Always read the bottom of the **meniscus**, when the making your daily rain measurements.



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Snow Measurements

- **Snowfall:**
New snow in tenths of an inch
- **Snow water equivalent (SWE):**
Melted snow measured in gauge
- **Snow depth:**
Total of new & old
snow on the
ground



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Citizen Weather Observers Program (CWOP)



www.wxqa.com

Have a weather station and
want to share data online

Has a PC and Internet access

Register Online & Receive a
weather station ID

Transmits data every 15 mins



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Different programs - All useful to NWS

Spotter

Severe
Weather

No instruments
required

Event driven

Weather.gov

CoCoRaHS

Precipitation
only

Rain gauge
required

Daily
commitment

Cocorahs.org

CWOP

Weather data

Weather
station

Daily
commitment

Wxqa.com



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Winter Outlook 2019-20



National Weather Service



An aerial photograph of snow-covered sand dunes, likely in a desert region. The dunes are covered in a thick layer of snow, and the sky is a clear, pale blue. The text is overlaid on the image.

Winter forecasting tools

- * Long term climate trends

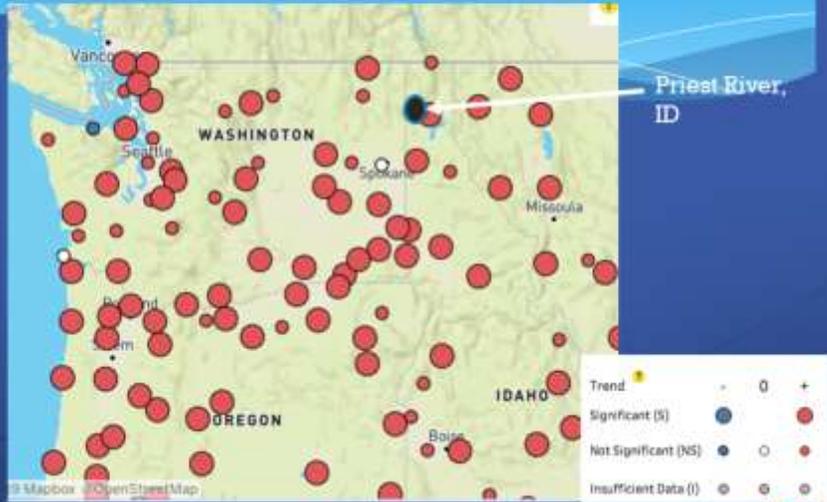
- * ENSO

- * Climate Models

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Warmer winters



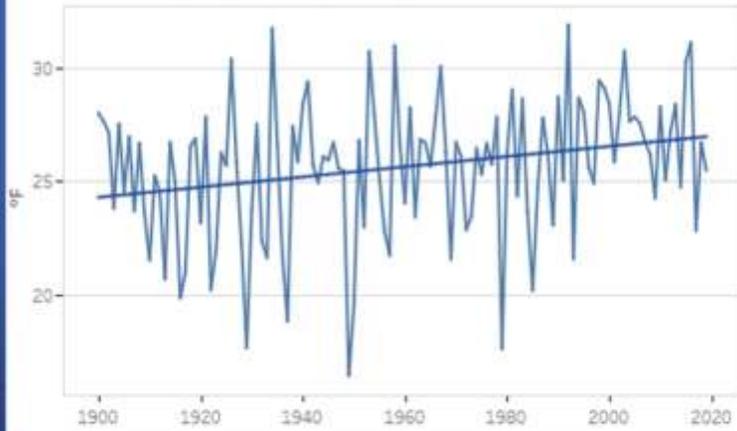
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Priest River, Idaho

Winter (DJF) Average Temperature 1900-2019



National Weather Service Spokane, WA

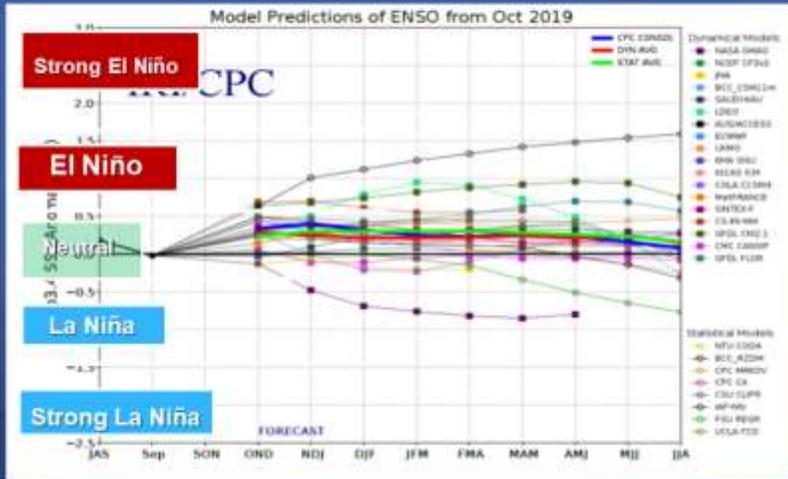
www.weather.gov/Spokane



ENSO Seasonal Forecasts

Looking at Sea Surface Temperatures trends in the central Pacific Ocean

ENSO Neutral is favored



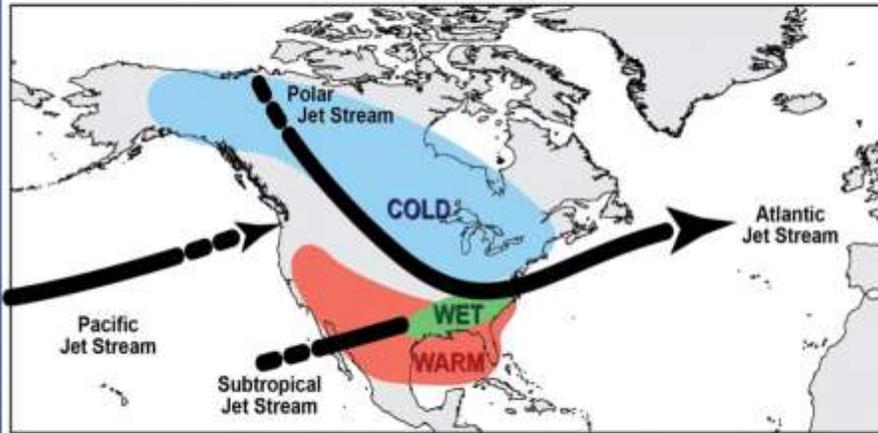
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ENSO - Neutral

ENSO-Neutral Winter Pattern



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Neutral Year Winter composite maps since 1980

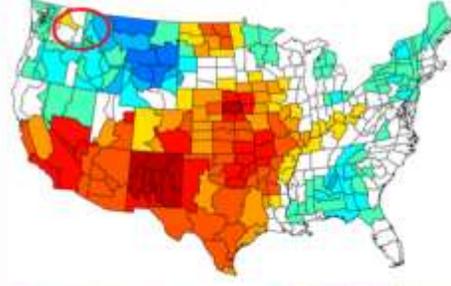
Temperature

Precipitation

NOAA/NCDC Climate Division Composite Temperature Anomalies (F)
Versus 1981-2010 Longterm Average
Dec to Feb 1980-81,1981-82,1983-84,1985-86,1988-89,1990-91,1992-93,1993-94,
1995-97,2001-02,2003-04,2005-06,2012-13,2013-14.



NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies
Versus 1981-2010 Longterm Average
Dec to Feb 1980-81,1981-82,1983-84,1985-86,1988-89,1990-91,1992-93,1993-94,
1995-97,2001-02,2003-04,2005-06,2012-13,2013-14.



Last one was 2013-2014

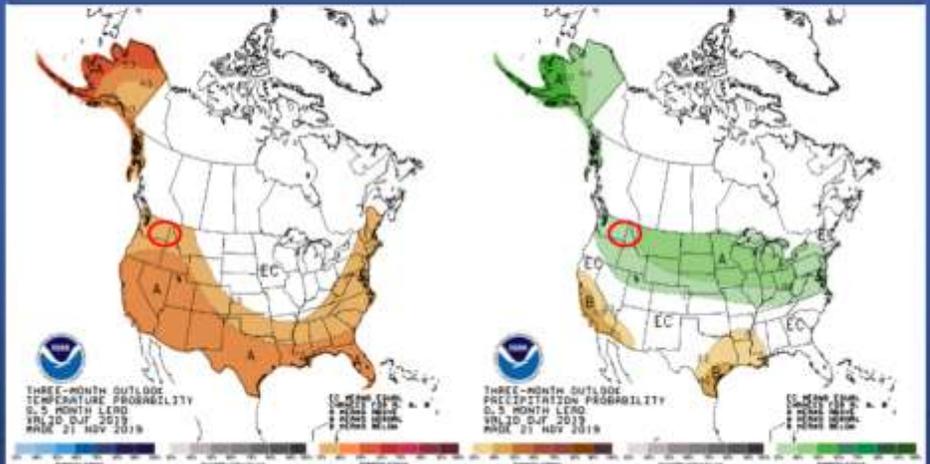


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CPC Winter Outlook Dec – Jan - Feb



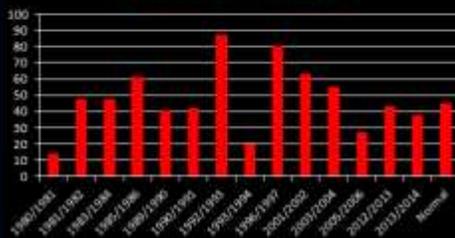
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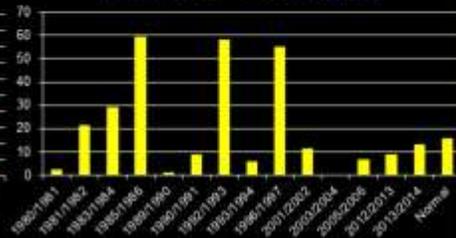


NEUTRAL YEARS SNOW TOTALS SINCE 1980

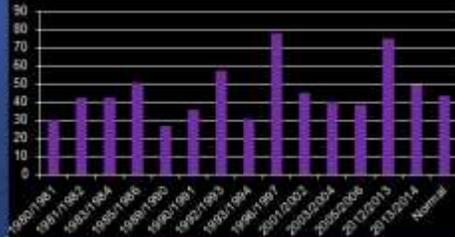
Spokane - Snowfall (in)



Wenatchee - Snowfall (in)



Republic - Snowfall (in)



Bonnerr Ferry - Snowfall (in)



www.weather.gov/spokane



What to expect

At least a couple significant weather events

- * Common winter hazards
 - * **Snow**
 - * **Ice**
 - * **Wind**
 - * **Fog**

Neutral year (2013-14)



Cold (River Ice North Fork Coeur d'Alene)



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Neutral year (2013-14)

Palouse



Chewelah Peak



Strong winds - Jan 10-12, 2014



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Neutral year (2013-14)



Rime Ice – NWS Spokane Jan 23, 2014



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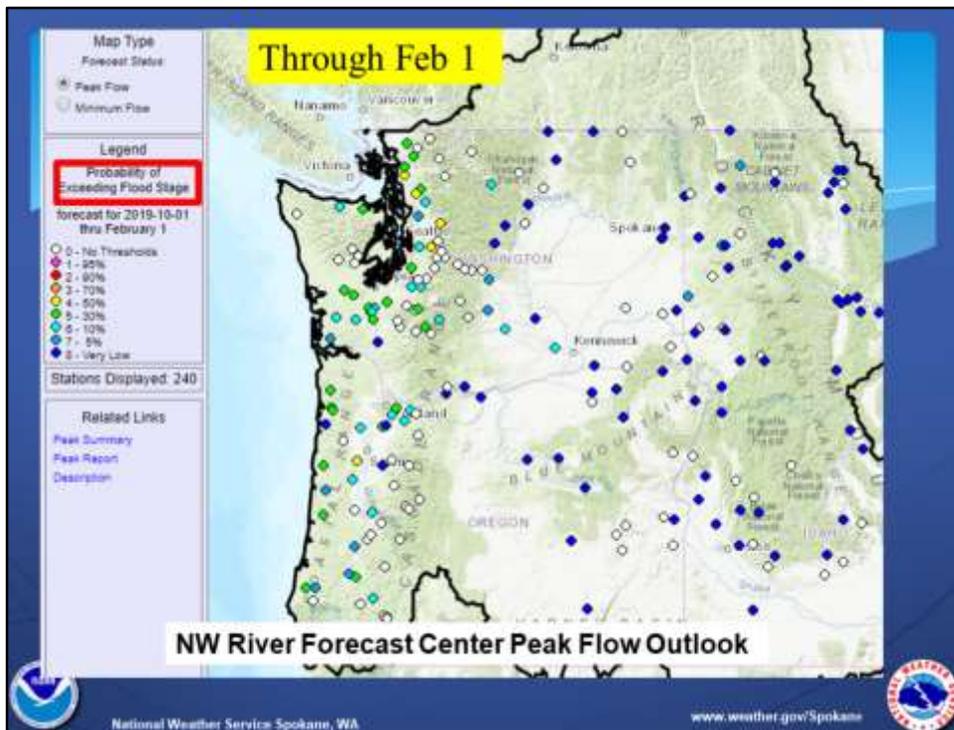
Neutral year (2013-14)



Palouse Flooding - Feb 12 2014

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Any questions? Here's my email if you would like to contact me. Thank you!

Congratulations!!!

You have now completed Basic Weather Spotting

CERTIFICATE OF ACHIEVEMENT



SKYWARN

This certificate is awarded to

Your Name
Whitman #123

In recognition for the valuable contributions made to the severe weather Warning Program at National Weather Service Spokane as a weather spotter and for successfully completing BASIC SKYWARN Training

April 29, 2015



Robert Lee
Robert Lee
National Weather Service, Spokane, WA
2015 Spokane, WA

Andrew Brown
Andrew Brown
National Weather Service, Spokane, WA
2015 Spokane, WA



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The End

*NWS + Weather Spotters = **Saved Lives***

1-800-483-4532

robin.fox@noaa.gov

Thank You!



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