

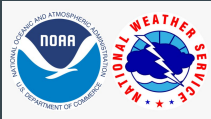


Avalanche Weather Initiatives

January 22, 2021

Mike Muccilli - NWS Winter Program Coordinator

Claudia Bell - NWS Western Region Meteorology Program Manager

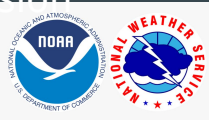


Outline

- Background
- NWS Offices Involved
- Current Operational Services
- Current Experimental Services
- Other Services Available to Users
- What's Next?
- Question & Answer

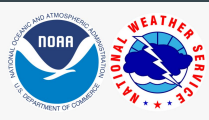
Background - History of WFO/Avalanche Center Partnerships

- **USFS (Forest Service) operates network of 14 Avalanche Centers & works closely with the Colorado Avalanche Information Center**
 - Local non-profit avalanche centers also operate in areas not supported by state or federal centers. The National Avalanche Center (NAC) formally recognizes reputable non-profit avalanche centers.
 - Mission of this network: to provide avalanche safety information for people recreating, working, or traveling in supported areas.
- **NWS provides forecast weather information critical to these centers & other partners & disseminates avalanche warning information from these centers.**
 - Partnerships have existed between NWS & avalanche centers since as early as the 1970s.
 - NWS provides weather information only; avalanche forecasting is outside the mission of the agency.



Background - Need for Standardization and Expansion

- **Need identified to strengthen partnerships and provide consistent service to all partners**
 - Positive feedback from survey on NWS provision of avalanche information in 2018.
 - Comments highlighted that the weather information provided is critical in assisting avalanche forecasters.
 - Desire for products & services to be more consistent from all forecast offices.
 - Services provided to partners & the maturity of the partnerships varied across NWS.
- **Effort ongoing to standardize, expand, and provide consistent service while elevating and helping partnerships mature between NWS, Avalanche Centers, and other core partners**
 - Within NWS, National Avalanche Coordination Team was formed, consisting of members from across the NWS.



Participating Offices - Avalanche Weather Support*

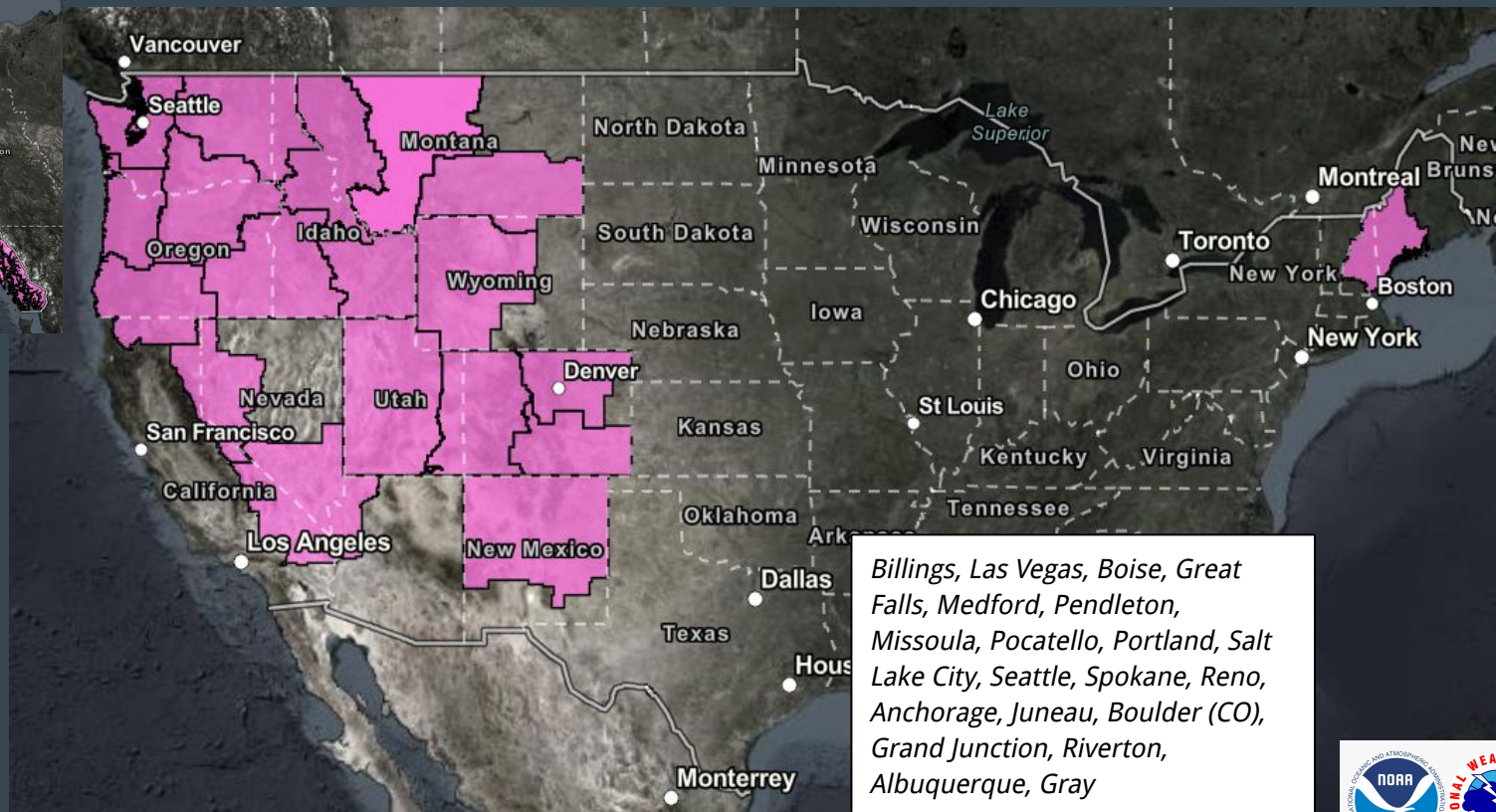
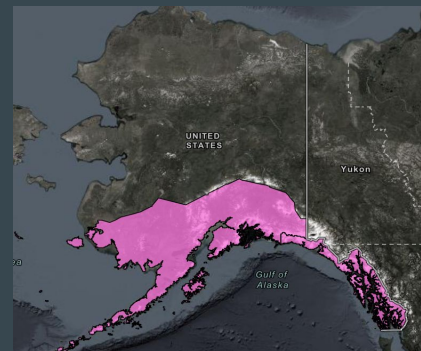


*Offices included in National Initiative

Billings, Flagstaff, Las Vegas, Oxnard, Boise, Great Falls, Medford, Pendleton, Elko, Hanford, Missoula, Pocatello, Portland, Salt Lake City, Seattle, Spokane, Reno, Anchorage, Fairbanks, Juneau, Boulder, Grand Junction, Pueblo, Riverton, Albuquerque, Burlington, Gray



Participating Offices - WFO/Avalanche Center Partnerships*

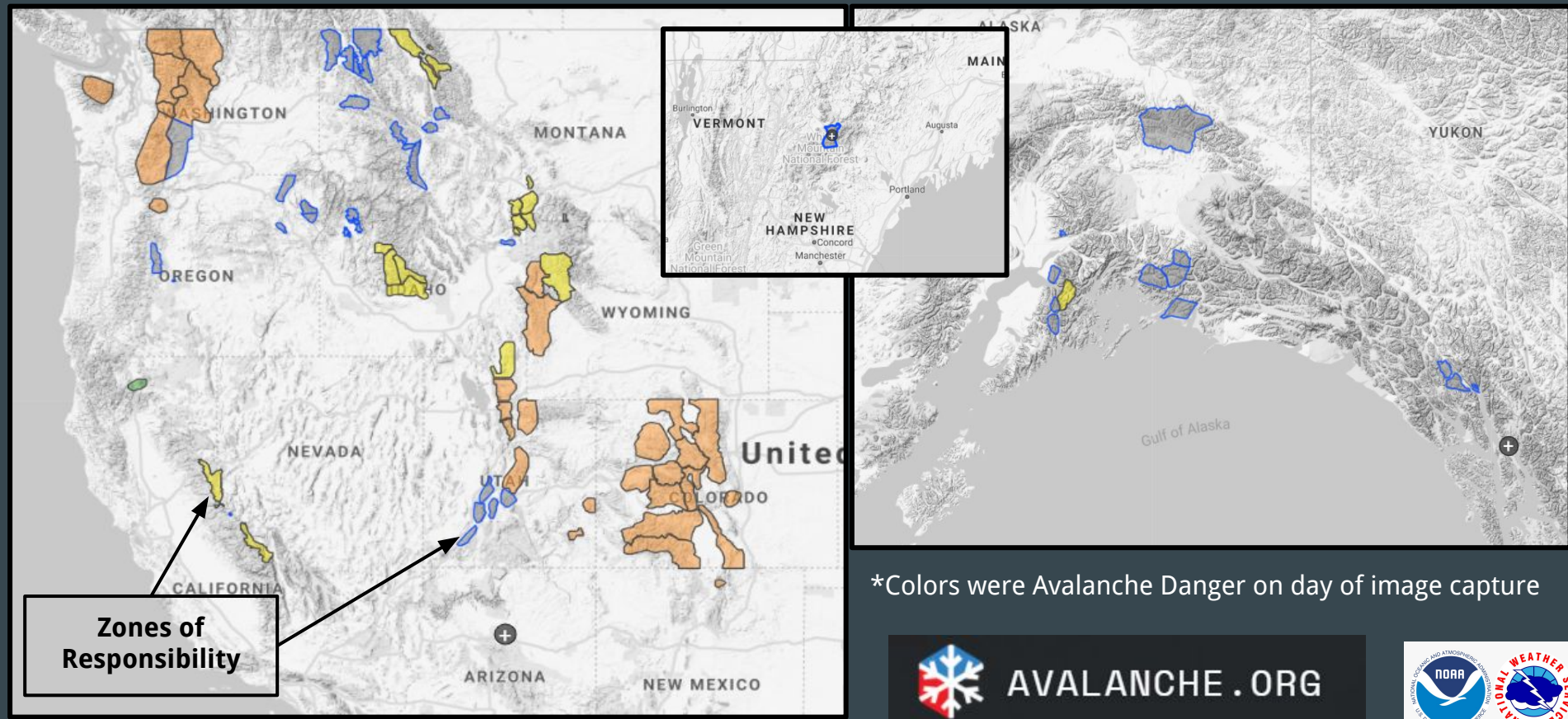


*Offices that directly support Avalanche Centers

Billings, Las Vegas, Boise, Great Falls, Medford, Pendleton, Missoula, Pocatello, Portland, Salt Lake City, Seattle, Spokane, Reno, Anchorage, Juneau, Boulder (CO), Grand Junction, Riverton, Albuquerque, Gray

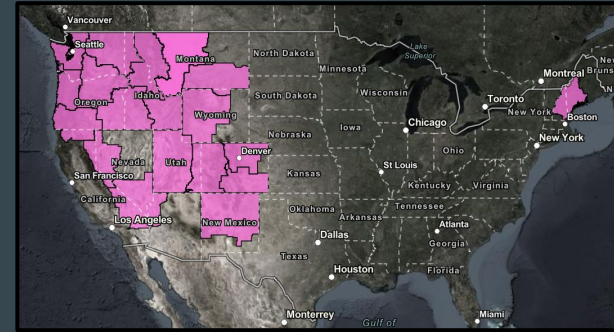


Avalanche Centers Zones of Responsibility



Current Operational Services - Avalanche Watches/Warnings

- **Avalanche Warnings:** High or Extreme Avalanche Danger is imminent or occurring over a large geographic area.
- **Avalanche Watches:** Conditions supporting High or Extreme Avalanche Danger are favorable or expected but not imminent
- **In the Contiguous US:**
 - All NWS offices (or state-liason offices for CO) in **pink** are authorized to relay & disseminate Avalanche Watches/Warnings when requested from the officially recognized Avalanche Centers in their Zones of Responsibility. This may include but may not be limited to iNWS*, NWR*, NWWs*, & through weather.gov.
 - Emergency Alert Services (EAS) plans are developed by each state. NWS offices are encouraged to work with their states to determine what is appropriate for alerting.
- **In Alaska:**
 - Will transition from the use of the Public Information Statement (PNS) to the Special Avalanche Bulletin (SAB).



*iNWS - Interactive NWS, NWR - NOAA Weather Radio, NWWs - NOAA Weather Wire Service

New Format for Avalanche Watches/Warnings

THE FOLLOWING MESSAGE IS TRANSMITTED AT THE REQUEST OF THE COLORADO AVALANCHE INFORMATION CENTER.

AVALANCHE WARNING IS IN EFFECT FOR THE CAIC ASPEN...GRAND MESA... GUNNISON... SAWATCH...NORTH SAN JUAN...SOUTH SAN JUAN... AND SANGRE DE CRISTO FORECAST ZONES.

* TIMING...Beginning 5:00 AM Tuesday December 29. Expires at 8:00 AM Wednesday December 30.

* AFFECTED AREA...Elk Mountains...Hardscrabble Mountains...Grand Mesa...Red Table...Ruby Range...West Elk Mountains...Mosquito Range...Sawatch Range...Rico Mountains...San Miguel Mountains...San Juan Mountains...Dallas Divide...La Garita Mountains...La Plata Mountains...Needle Mountains...Grenadier Range...Sangre de Cristo Range.

* AVALANCHE DANGER...The avalanche danger is HIGH (Level 4 of 5). It will be very easy to trigger avalanches large enough to bury and kill a person through Wednesday morning. Avalanches will run naturally. You can trigger avalanches from the bottom of slopes or from a distance. If you trigger an avalanche it will be large and very dangerous.

* REASON... A large load of new snow overnight fell on a weak snowpack creating very dangerous avalanche conditions.

* PRECAUTIONARY/PREPAREDNESS ACTIONS...Travel in avalanche terrain is not recommended.

Consult www.colorado.gov/avalanche for detailed information.

THE FOLLOWING MESSAGE IS TRANSMITTED AT THE REQUEST OF THE COLORADO AVALANCHE INFORMATION CENTER.

AVALANCHE WARNING IS IN EFFECT FOR THE CAIC ASPEN...GRAND MESA... GUNNISON... SAWATCH...NORTH SAN JUAN...SOUTH SAN JUAN... AND SANGRE DE CRISTO FORECAST ZONES.

* WHAT...Avalanche Warning. The avalanche danger is HIGH (Level 4 of 5).

* WHERE...Elk Mountains...Hardscrabble Mountains...Grand Mesa...Red Table...Ruby Range...West Elk Mountains...Mosquito Range...Sawatch Range...Rico Mountains...San Miguel Mountains...San Juan Mountains...Dallas Divide...La Garita Mountains...La Plata Mountains...Needle Mountains...Grenadier Range...Sangre de Cristo Range.

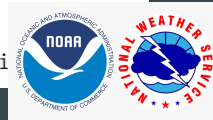
* WHEN...Beginning 5:00 AM Tuesday December 29. Expires at 8:00 AM Wednesday December 30.

* IMPACTS...It will be very easy to trigger avalanches large enough to bury and kill a person through Wednesday morning. Avalanches will run naturally. You can trigger avalanches from the bottom of slopes or from a distance. If you trigger an avalanche it will be large and very dangerous.

* ADDITIONAL DETAILS... A large load of new snow overnight fell on a weak snowpack creating very dangerous avalanche conditions.

* PRECAUTIONARY/PREPAREDNESS ACTIONS...
Travel in avalanche terrain is not recommended.

Consult www.colorado.gov/avalanche for detailed information.



Current Operational Services - SAB

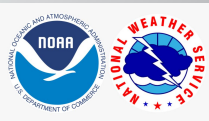
- **Special Avalanche Bulletin (SAB)**
 - All NWS offices (or state-liason offices for CO) in pink are authorized to relay & disseminate SABs when requested from officially recognized Avalanche Centers
 - In contiguous US, these contain high danger forecasts or sub-warning information
 - These will not currently display on weather.gov main page, but are available on text product web pages & may be available on WFO Avalanche Weather web pages

Available Locations & Examples:

https://forecast.weather.gov/product_sites.php?site=CRH&product=SAB

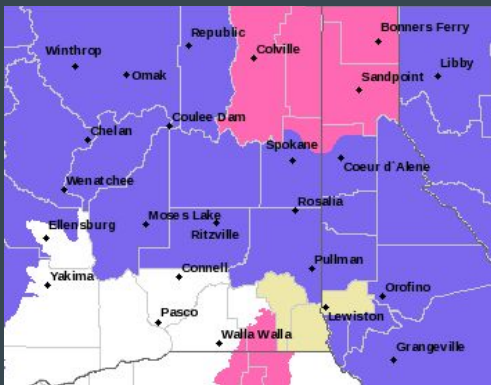
www.weather.gov/data/BOU/SABCO

Replace BOU and CO with your local office identifiers.



Current Operational Services - Other

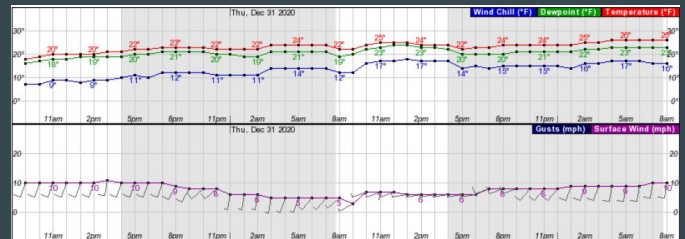
- Hazard Products/WWA Map
 - Winter Storm Warnings, Flood Watches, etc
- Point & Click Pages
- Hourly Weather Graph
- Forecast Discussion



Detailed Forecast

Today	Show. The snow could be heavy at times. High near 23. South wind around 11 mph. Chance of precipitation is 100%. Total daytime snow accumulation of 4 to 8 inches possible.
Tonight	Snow, mainly before 4am. Steady temperature around 23. South wind 5 to 9 mph. Chance of precipitation is 90%. New snow accumulation of 3 to 5 inches possible.
Thursday	A 40 percent chance of snow before 10am. Mostly cloudy, with a high near 25. West wind 3 to 7 mph. New snow accumulation of less than one inch possible.
Thursday Night	Mostly cloudy, with a low around 23. South wind around 9 mph.
New Year's Day	A 50 percent chance of snow. Mostly cloudy, with a high near 27. South wind around 11 mph. New snow accumulation of less than 2 inches possible.
Friday Night	Snow likely, mainly before 4am. Mostly cloudy, with a low around 24. Chance of precipitation is 70%. New snow accumulation of 2 to 4 inches possible.
Saturday	Snow, mainly after 10am. High near 28. Chance of precipitation is 60%. New snow accumulation of 3 to 5 inches possible.
Saturday Night	Show. The snow could be heavy at times. Low around 27. Breezy. Chance of precipitation is 90%.
Sunday	Show, mainly before 4pm. The snow could be heavy at times. High near 29. Breezy. Chance of precipitation is 80%.
Sunday Night	A 30 percent chance of snow, mainly before 10pm. Mostly cloudy, with a low around 26.
Monday	A 50 percent chance of snow. Mostly cloudy, with a high near 25.
Monday Night	A 50 percent chance of snow. Mostly cloudy, with a low around 21.
Tuesday	A 30 percent chance of snow. Mostly cloudy, with a high near 25.

Forecast Area
Point Forecast: 7 Miles SSE Lone WA
48.71°N 117.28°W (Elev. 5801 ft)
Last Update: 9:12 am PST Dec 30, 2020
Forecast Valid: 8am PST Dec 30, 2020-6pm PST Jan 5, 2021



Area Forecast Discussion

National Weather Service Spokane WA
424 AM PST Wed Dec 30 2020



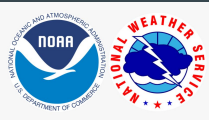
Current Experimental Services - Avalanche Weather Guidance

- This winter, NWS is experimentally producing the **Avalanche Weather Guidance (AVG)** product at **24 WFOs across the contiguous US (offices in blue)**.
 - Planned replacement, expansion, & standardization of the experimental SAG (Snow Avalanche Guidance) product that is being produced at a limited set of WFOs.
 - Available for public & partner feedback. Following experimental period, will be considered for operational implementation at all 27 WFOs in blue across the US.
 - Is available as a text product via NWS web pages & other NWS dissemination systems.
 - Provides avalanche centers with forecast weather parameters critical to the centers' forecasts of avalanche conditions.
 - Also for use by DOTs, EMs, SAR, commercial entities, recreation areas, & backcountry enthusiasts in helping them prepare for weather conditions that they should expect to encounter in avalanche prone areas.



Current Experimental Services - Avalanche Weather Guidance

- **Points/Areas for the Avalanche Weather Guidance product**
 - Work with your local WFO to select what points or areas will be included in the AVG
- **Product Issuance**
 - At least once per day for a period of 48 hours at 3 hour time-steps during the winter season.
- **Forecast Elements**
 - 3 Hour & Daytime Maximum/Nighttime Minimum Temperatures
 - Weather, Cloud Cover, & Probability of Precipitation
 - Snowfall
 - Liquid or snow-water equivalent
 - Wind Direction, Wind, & Wind gusts
 - Snow Levels (with the exception of the Northeast US)
 - Optional: Ice Accumulation
 - Offices can include forecast elements beyond the required minimum.
 - A narrative discussion at the top of the product is optional.



Current Experimental Services - Avalanche Weather Guidance

AVALANCHE WEATHER GUIDANCE

NATIONAL WEATHER SERVICE BOISE ID
234 AM MST WED DEC 30 2020

1

*****PAYETTE NF / MCCALL AREA***

2

...GRANITE MOUNTAIN (7804 FT)...

3

DATE	WEDNESDAY 12/30							THURSDAY 12/31									
TIME (LT)	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06

4

CLOUD COVER	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	SC	SC	SC
CLOUD COVER (%)	90	90	95	95	95	95	95	95	90	90	90	90	80	80	50	50	50
TEMPERATURE	17	17	17	18	17	19	20	19	18	19	19	21	20	20	20	19	20
MAX/MIN TEMP					19			16				21				18	
WIND DIR	S	SE	S	SW	SW	S	S	S	S	S	S	S	E	SE	SE	E	S
WIND (MPH)	5	6	6	8	8	9	9	5	5	5	4	4	2	4	4	4	4
WIND GUST (MPH)																	
PRECIP PROB (%)	60	60	90	90	90	90	90	80	80	70	70	60	60	20	20	0	0
PRECIP TYPE	S	S	S	S	S	S	S	S	S	S	S	S	S	S			
12 HOUR QPF					0.26			0.29				0.13				0.00	
12 HOUR SNOW					3.6			4.0				1.9				0.0	
SNOW LEVEL (KFT)	2	2	2	2	3	3	3	3	2	2	3	3	3	3	2	2	2

--- PRECIP TYPE CODES ---

CODE	TYPE
T	THUNDERSTORMS
R	RAIN
S	SNOW
I	SLEET
Z	FREEZING RAIN

5

- 1 - Office & Time of Issuance
- 2 - Separated by Broad Region
- 3 - Actual Location/Elevation
- 4 - Times in Local Time
- 5 - Precipitation Type Codes

Availability:

www.weather.gov/boi/avg

www.weather.gov/data/BTV/AVGBTV

These are 2 examples from local offices.
Replace BTV with local office identifier.
Contact your local NWS office for best location to obtain data.



Avalanche Weather Guidance - Area/Elevation Band Example

AVALANCHE WEATHER GUIDANCE
 NATIONAL WEATHER SERVICE ALBUQUERQUE NM
 505 AM MST MON JAN 25 2021

...NORTHERN SANGRE DE CRISTO MOUNTAINS BETWEEN 9KFT AND 10KFT...

DATE	MONDAY 01/25										TUESDAY 01/26									
TIME (LT)	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06			
CLOUD COVER	OV	BK	BK	BK	BK	BK	BK	OV	OV	OV	OV	OV	BK	BK	SC	SC	FW			
CLOUD COVER (%)	70	55	55	55	55	55	65	80	80	80	75	75	55	55	45	45	20			
TEMPERATURE	15	19	25	25	15	11	10	13	11	14	19	17	10	3	0	-1	-4			
MAX/MIN TEMP	26										9 20									
WIND CHILL	-1	6	13	13	2	1	4	5	0	0	6	4	-5	-13	-16	-14	-18			
WIND DIR	W	W	W	W	W	SW	S	SE	SW	W	W	W	W	W	W	W	W			
WIND (MPH)	17	14	12	13	10	5	3	4	8	11	12	13	13	11	9	8	6			
WIND GUST (MPH)	35 27										24									
PRECIP PROB (%)	50	20	20	20	20	10	30	60	80	80	80	60	60	20	20	5	5			
PRECIP TYPE	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S			
12 HOUR QPF	0.02										0.08 0.12 0.01									
12 HOUR SNOW	0.3										1.1 1.7 0.1									
SNOW LEVEL (KFT)	4	4	4	4	4	3	3	3	2	2	2	2	2	2	1	1	1			

...NORTHERN SANGRE DE CRISTO MOUNTAINS BETWEEN 10KFT AND 11KFT...

DATE	MONDAY 01/25										TUESDAY 01/26									
TIME (LT)	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06			
CLOUD COVER	OV	BK	BK	BK	BK	BK	BK	OV	OV	OV	OV	OV	BK	BK	SC	SC	FW			
CLOUD COVER (%)	75	55	55	60	60	55	65	80	80	80	75	75	60	60	45	45	25			
TEMPERATURE	13	16	21	21	13	9	9	11	10	11	15	14	8	2	-2	-2	-4			
MAX/MIN TEMP	22										7 16 -4									
WIND CHILL	-4	1	8	8	-1	-2	1	2	-3	-4	1	-1	-9	-15	-18	-17	-20			
WIND DIR	W	W	W	W	W	SW	S	SE	SW	SW	SW	W	W	W	W	W	W			
WIND (MPH)	18	14	12	13	11	5	4	5	9	12	12	14	14	12	10	8	8			
WIND GUST (MPH)	35 27										25									
PRECIP PROB (%)	50	20	20	20	20	10	30	60	80	80	80	60	60	20	20	5	5			
PRECIP TYPE	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S			
12 HOUR QPF	0.03										0.09 0.13 0.01									
12 HOUR SNOW	0.3										1.2 1.7 0.1									
SNOW LEVEL (KFT)	4	4	4	4	4	3	3	3	2	2	2	2	2	2	1	1	1			

There were several questions received regarding the desire to have areas or elevation bands instead of points...

The AVG has the ability to have point based forecasts or area and elevation band based forecasts.

Shown is an example from NWS Albuquerque using elevation bands.

Availability:

www.weather.gov/data/ABQ/AVGABQ



Current Experimental Services - Avalanche Weather Guidance

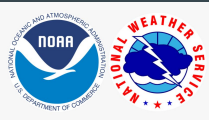
- Survey & Feedback

- Notice: <https://www.weather.gov/media/notification/pdf2/pns20-84avalancheaaa.pdf>
- Product Description Document:
https://nws.weather.gov/products/PDD/PDD_ExpAvalancheWeatherGuidance_2020.pdf
- It is crucial for the NWS to obtain partner and public feedback and comments to make a determination for the future of this product and any necessary changes.
 - This includes format, time intervals, weather forecast elements, time of issuance, availability, etc.
- Survey: https://www.surveymonkey.com/r/ExpAvalancheWeatherGuidance_2020
- Feedback can also be provided directly to:
 - Michael Muccilli (Michael.Muccilli@noaa.gov)
 - Claudia Bell (Claudia.Bell@noaa.gov)

Current Experimental Services - Web Pages In Existence Now

- Current WFO Avalanche Weather Web Pages

- As of September 2020, approximately ten offices host a local web page with avalanche weather information displayed. These vary considerably in design and content.
 - Anchorage: <https://www.weather.gov/afc/avalanche>
 - Albuquerque: <https://www.weather.gov/abq/backcountry>
 - Reno: <https://www.wrh.noaa.gov/rev/avalanche/>
 - Pocatello: <https://www.weather.gov/pih/winter#tab-3>
 - Missoula: <https://www.weather.gov/mso/backcountry>
 - Seattle: <https://www.weather.gov/sew/Mountainforecast>
 - Salt Lake City: <https://www.weather.gov/slc/snow>
 - Riverton: <https://www.weather.gov/riw/snowrec>
 - Portland: <https://www.wrh.noaa.gov/pqr/volcano/VolcanoForecast.php>
 - Grand Junction: <https://www.weather.gov/gjt/avalanche>
- There is one national avalanche safety page
 - <https://www.weather.gov/safety/winter-avalanche>



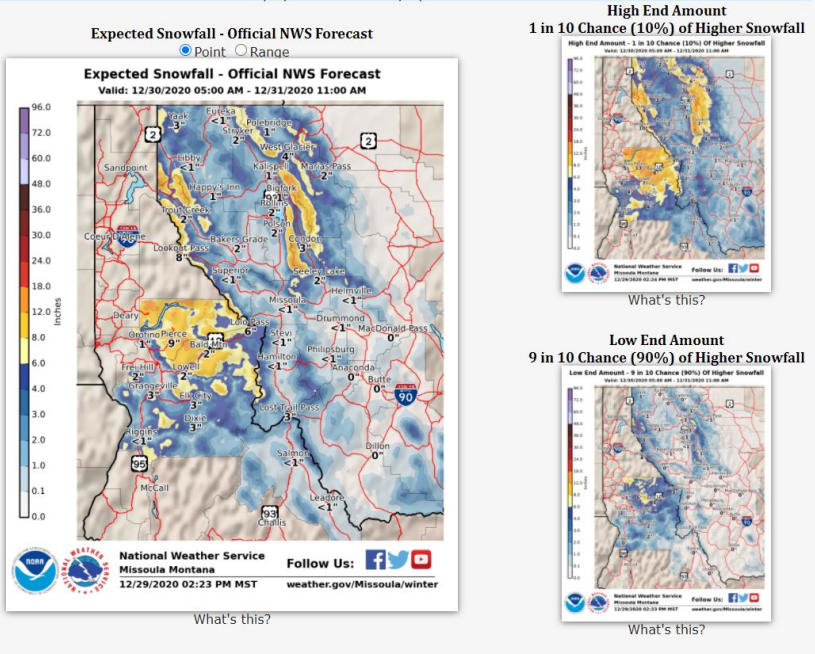
Current Experimental Services - Web Page Prototype

- **Given lack of consistency and identified need for more widespread use, a local Avalanche Weather Web Page Prototype is being developed**
 - Standardized version of this web page will make each local WFO avalanche weather web page consistent with one other, increasing the visibility & accessibility of both NWS avalanche weather information & avalanche center hazard information.
 - A prototype with minimum requirements will become available for comment & review.
 - If comments & feedback are favorable, this prototype will be considered for implementation on a wider scope.
 - The web page will display products such as the AVG, SAB, Avalanche Watches/Warnings, Avalanche Center Avalanche Risk Information, a 36 hour weather forecast, & links to officially recognized Avalanche Centers. The local office can also display additional information.

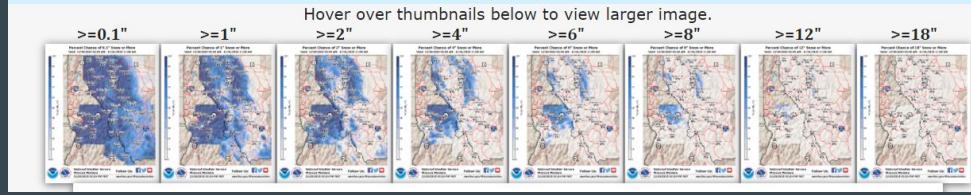
Other Services Available - Probabilistic Snow Forecasts

- Many offices in the contiguous United States produce Experimental Probabilistic Snowfall Forecasts

Snow Amount Potential
12/30/2020 0500AM to 12/31/2020 0500PM



Percent Chance That Snow Amounts Will Be Greater Than...
12/30/2020 0500AM to 12/31/2020 0500PM
What's this?



Great Falls Radar Satellite Current Observations Webcams Forecast Discussion Montana Weather

Fire Weather **Winter Weather Forecasts** Transportation Forecasts Weather Prediction Center Storm Prediction Center Aviation Weather

www.weather.gov/***/winter

- Use local office identifier for ***





Other Services Available - SPOT

- **Spot Forecast Requests**
 - Government Partners can request a Spot forecast for rescue and recovery efforts following avalanche events.
 - This allows the specific weather information to reach the necessary partners in a quick and timely manner.
 - Can be requested for any location in the US with forecast elements catered to the user.

For use at <https://www.weather.gov/spot/>

```
.WEDNESDAY...  
  
Sky/weather.....Mostly cloudy. Rain and snow mix in the morning,  
followed by snow through the day.  
Chance of pcpn.....90 percent.  
Max temperature.....Around 34 in the morning, falling to 30 through  
the day.  
Min humidity.....85 percent.  
Surface winds (mph).South winds 19 to 23 mph with gusts up to 35 mph in  
the morning. Southwest winds 15 to 20 mph in the  
afternoon.  
Snow amount.....2-5 inches.  
CEILING (KFT).....Less than 500 feet AGL.  
Visibility.....2-4 miles.
```



Other Services Available - Specialized

- **Other products and services may be available to match your need**
- **These may include:**
 - Lightning Detection
 - Current and Forecast Freezing & Snow Levels
 - High Resolution Satellite Imagery
 - High Resolution Wind Forecasts
 - SNOWPACK Model Outputs
- **Please contact your local Weather Forecast Office to determine what can be provided**



Other Services Available - Webinars, Briefings, Emails...



- **WFOs provide decision support services to their partners. If you would like to be included on any of these, please contact your local weather forecast office.**
 - Scheduled or Event-Specific Partner Weather Briefings
 - Will keep you and your agency or center aware of any potential weather events, any uncertainties in the forecast, any messaging issues that may arise, and allow for questions.
 - This can include email, recorded, and live webinar briefings

Other Services Available - Communication

- **Promote Regular & Open Communication Between NWS Staff & Avalanche Centers.**
 - Builds trust and deepens the relationship, with both entities understanding what is needed in terms of messaging, decision support services, and forecast parameters.
- **Multiple Communication Tools Exist & are Encouraged**
 - Including NWSSchat, Emails, Phone
 - Especially useful leading up to, during, and after a high-risk avalanche event
- **Coordinated Messaging**
 - In the event of a weather event that will create higher avalanche risk, efforts to coordinate messaging will ensure one consistent message will reach critical partners and the general public ahead of an event.

What's Next

- **Avalanche Awareness Week**
 - National effort to bring attention to avalanche safety
- **Messaging Risk Outside Zones of Responsibilities**
 - High avalanche risk occurs outside of avalanche centers' zones of responsibility. How can the NWS and avalanche centers coordinate on a way to raise awareness of avalanche conditions in these areas?
- **Adding Probabilistic Information**
 - Eventual inclusion of probabilistic precipitation, snowfall, and temperature information into avalanche weather forecasts.

Contributors

Primary Points of Contact:

Michael Muccilli, NWS Headquarters

Claudia Bell, NWS Western Region Headquarters

Other Contributors:

Stephen Baxter, NWS Headquarters

Margaret Curtis, NWS Gray

Michelle Hawkins, NWS Headquarters

David Kochevar, NWS Alaska Region Headquarters

Brett McDonald, NWS Riverton

Bernard Meier, NWS Boulder

Sarah Perfater, NWS Headquarters

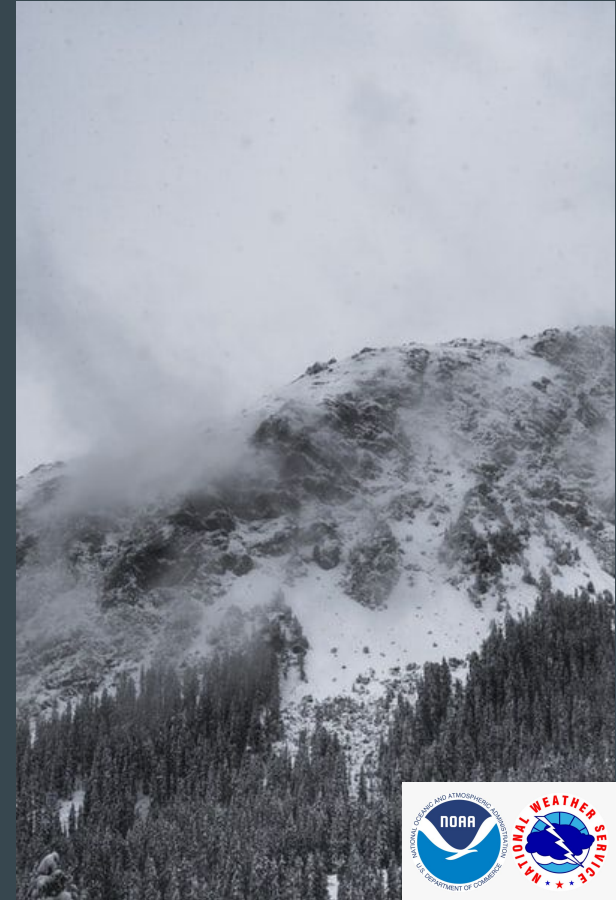
Kyle Van Peursem, NWS Alaska-Pacific River Forecast Center

Ed Plumb, NWS Fairbanks

Tim Schott, NWS Headquarters

Derek Schroeter, NWS Gray

Travis Wyatt, NWS Pocatello





Time for Q&A!

