NATIONAL AVALANCHE CENTER

USDA FS Avalanche Forecast Guidance

1. Overview of the Conceptual Model of Avalanche Hazard (CMAH)

This section presents a brief overview of the Conceptual Model of Avalanche Hazard (CMAH) and how it relates to the use of avalanche problems and the danger scale in regional avalanche forecasts.

1.1. Background

Statham and others (2010) worked with the broader Canadian and U.S. avalanche communities to develop the most recent iteration of the North American Public Avalanche Danger Scale (NAPADS). They found that to describe all the pieces that go into danger ratings accurately, they had to deconstruct the processes involved in avalanche forecasting. This resulted in the development of CMAH (Statham et al. 2018). Although CMAH is not a definitive guide or step-by-step formula for assessing avalanche hazard, it provides a framework for how we think about avalanche forecasting. Notably, one strength of CMAH is that it can be used at a variety of spatial scales, from single slopes to regional forecasts and in a variety of forecasting contexts.

CMAH is utilized by the North American avalanche community to develop workflow, communication, and forecasting tools. It also provides the theoretical underpinnings for avalanche forecasts produced by Avalanche Canada, Parks Canada, the Colorado Avalanche Information Center, and the USDA FS. Additionally, CMAH is an integral part of professional avalanche courses and is used to guide the curriculum for many recreational courses.

1.2. Applying CMAH to Regional Forecasting

CMAH (Figure 1) is a probability-consequence framework illustrating a pathway from data to avalanche hazard assessment. It can represent many scales/types of avalanche forecasting and is easily applied to the regional scale applicable to most avalanche center operations. Notably, the framework naturally lends itself to technical development and consistent operational record-keeping.

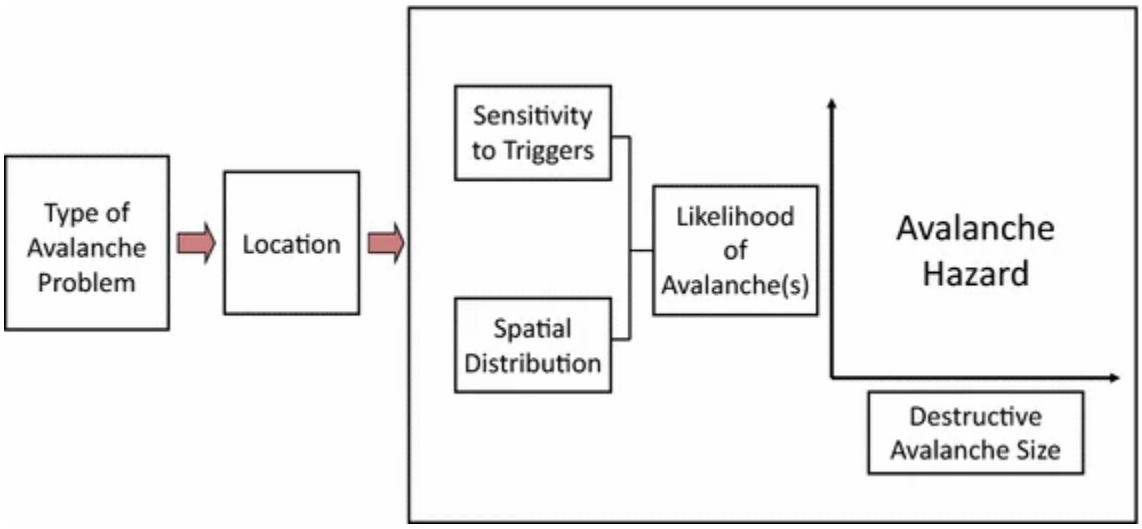


Figure 1. The Conceptual Model of Avalanche Hazard (CMAH) (Statham et al. 2018). Avalanche problems are defined as a set of four factors (type, location, likelihood, and size) whose combination defines the hazard.

1.2.1. Avalanche Problem Type

The CMAH defines nine distinct avalanche problem types (Statham et al. 2010, Statham et al. 2018):

1. Dry Loose
2. Storm Slab
3. Wind Slab
4. Persistent Slab
5. Deep Persistent Slab
6. Wet Loose
7. Wet Slab
8. Cornice
9. Glide Slab

Avalanche problems attempt to categorize a complex phenomenon into discrete boxes to provide a mental framework and facilitate communication. However, conditions cannot always be so easily pigeonholed, and the boundaries between problems can be fuzzy. In some cases, problems can transition from one type to another as the snowpack changes. Table 1 provides considerations when selecting the avalanche problem type.

Table 1: Criteria for selecting an avalanche problem type

Avalanche Type	Criteria for listing as an Avalanche Problem
Loose Dry	***Initiation*** Weak, dry surface snow with potential for ~D1.5 or larger avalanches or a widespread pattern of small avalanches. ***Termination/Transition*** Loose snow settles into or is buried by a cohesive slab -> Storm Slab Loose snow wetted and produces sluffs due to warming -> Loose Wet Activity diminishes to small and isolated to extreme terrain
Loose Wet	***Initiation*** Free water from melt or rain weakens surface snow and can produce more than small and isolated avalanches ***Termination/Transition*** Liquid water decreases, or snowpack drainage is established Activity diminishes to small and isolated to extreme terrain ***Considerations*** Don't pair with Wet Slab unless there is a significant difference in distribution, likelihood, and size
Wet Slab	***Initiation*** Potential for free water to cause failure at a buried weak layer or interface ***Termination/Transition*** Free water production or content decreases, or drainage past weak layers established ***Considerations*** Don't pair with Loose Wet unless there is a significant difference in distribution, likelihood, and size
Wind Slab	***Initiation*** Significant blowing snow within the past ~3 days ***Termination/Transition*** More than 3 days old and on a persistent weak layer -> consider Persistent Slab Likelihood decreases to unlikely ***Considerations*** Don't pair with Storm Slab unless there is a significant difference in distribution, likelihood, and size

Avalanche Type	Criteria for listing as an Avalanche Problem
Storm Slab	***Initiation*** New snowfall within the last 24 hours with potential for ~D1.5 or larger soft slab avalanches in more than just wind-loaded features or a widespread pattern of small avalanches. New snow forms a slab through wind effect and or rapid settlement ***Termination/Transition*** Likelihood decreases to unlikely More than 3 days old on a persistent weak layer or demonstrated characteristics of Persistent Slab -> Persistent Slab ***Considerations*** The first storm on a persistent weak layer should be categorized as a Storm Slab unless you expect terrain management considerations associated with Persistent Slabs. Don't pair with Wind Slab unless there is a significant difference in distribution, likelihood, and size
Persistent Slab	***Initiation*** Buried persistent weak layer showing potential for instability Existing storm instability on buried persistent weak layer evolves to more challenging behavior (ex., remote triggering, wide propagation, unreliable feedback) ***Termination/Transition*** The problem becomes unreactive Average slab increases to ~1.5 meters thick, 1F or harder, stubborn to trigger, and capable of creating high consequence avalanches (D3+) -> consider Deep Persistent Slab ***Considerations*** May be initiated with new snow falling on a surface persistent weak layer if you expect terrain management considerations associated with Persistent Slabs.
Deep Persistent Slab	***Initiation*** Average slab increases to ~1.5 meters thick and at least 1F on a persistent weak layer Stubborn to triggers Capable of producing high consequence avalanches (D3+) ***Termination/Transition*** Liquid water production affects weak layer -> Wet Slab The problem becomes unreactive The problem is significantly less threatening than newly developing avalanche problems ***Considerations*** Reserved for low likelihood/high consequence, or high level of uncertainty scenarios. Temporary increases in Deep Persistent Slab likelihood are acceptable if the problem is expected to return to low likelihood. Only pair with Persistent Slab if a newer generation of Persistent Slab requires significant difference in risk management

Avalanche Type	Criteria for listing as an Avalanche Problem
Glide	***Initiation*** Glide cycle indicated or in progress Indicators present: warm ground with heavy snowfall, or heavy rainfall on unconsolidated, homogenous snowpack, or rapid onset of glide cracks ***Termination/Transition*** Adequate lag time since the driving mechanism (rainfall, melt at basal interface, rapid settlement) ended. See considerations. Observations indicate cycle has ended ***Considerations*** High level of uncertainty on timing; consider maintaining as a problem for at least 48 hours after onset of glide avalanches
Cornice	***Initiation*** Cornice fall cycle expected: Large overbuilt cornices with significant blowing snow and/or significant warming or rain Cornice fall potential is a controlling factor for avalanche hazard that day ***Termination/Transition*** Mechanism driving cycle or increased hazard (blowing snow, warming, rain) has ended. Newly developing avalanche problems become more threatening

1.2.2. Sensitivity, Distribution, and Likelihood

Assessing the likelihood of triggering an avalanche can be complicated. Without a reliable numerical model to predict avalanche activity, we have no way of quantifying likelihood. Therefore, we rely on qualitative descriptors to classify likelihood using a five-level scale: unlikely, possible, likely, very likely, and certain.

Although this scale is inherently ambiguous, we can communicate more consistently by assigning likelihood based on an assessment of the sensitivity to triggers and spatial distribution for a given avalanche problem (Figure 2). Sensitivity and distribution are defined in Tables 2 and 3.

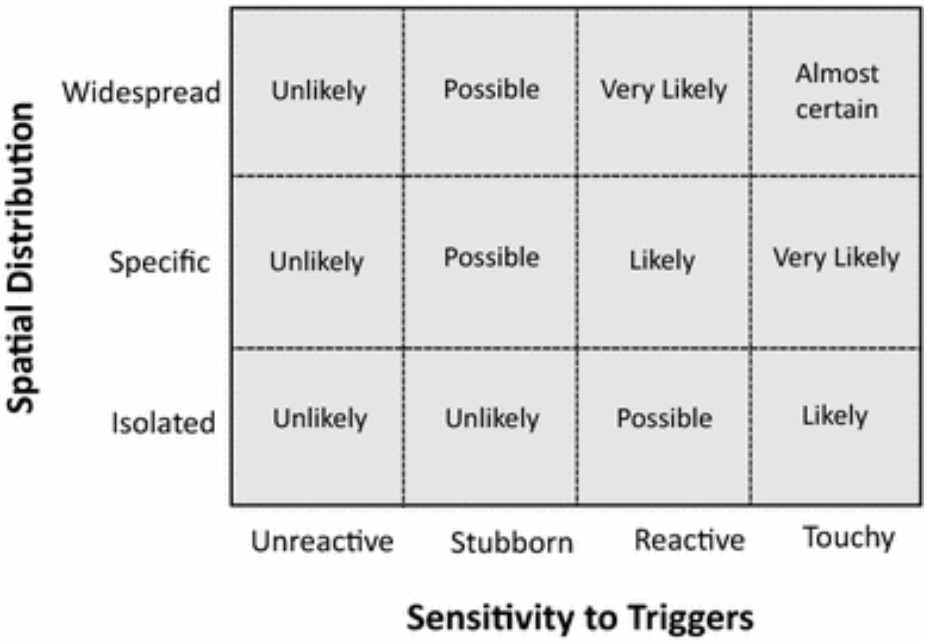


Figure 2: Framing likelihood in terms of Distribution and Sensitivity. From Statham et al. (2018).

Table 2: Sensitivity of an avalanche problem, taken from Statham et al. (2018).

Sensitivity	Natural Releases	Human Triggers	Explosive Triggers		Cornice Triggers
			Size	Result	
Unreactive	No avalanches	No avalanches	Very large explosives in several locations	No slab	No slab from very large cornice fall
Stubborn	Few	Difficult to trigger	Large explosive & air blasts, often in several locations	Some	Large
Reactive	Several	Easy to trigger with ski cuts	Single hand charge	Many	Medium
Touchy	Numerous	Triggering almost certain	Any size	Numerous	Any size
Description of Observation	*Natural avalanche occurrence*	*Ease of triggering by a single human*	*Size of explosive and effect*		*Size of cornice that will trigger a slab*

Table 3: Spatial distribution of an avalanche problem, from Statham et al. (2018)

Distribution	**Spatial density**	**Evidence**
Isolated	The avalanche problem is spotty and found in only a few terrain features	Evidence is rare and hard to find
Specific	The avalanche problem exists in terrain features with common characteristics	Evidence exists but is not always obvious
Widespread	The avalanche problem is found in many locations, and terrain features	Evidence is everywhere and easy to find
Comment	*How is the evidence distributed?*	*How hard is it to find?*

1.2.3. Size

NAPADS incorporates the destructive avalanche size (D-scale) to determine the danger rating. Table 4 defines the D-scale with signal words and simple descriptors.

Table 4: D-scale for avalanche size.

Signal Word	**Size (D scale)**	**Simple Descriptor**
Small	1	Unlikely to bury a person
Large	2	Can bury a person
Very Large	3	Can destroy a house
Historic	4 and 5	Can destroy part or all of a village

1.3. References

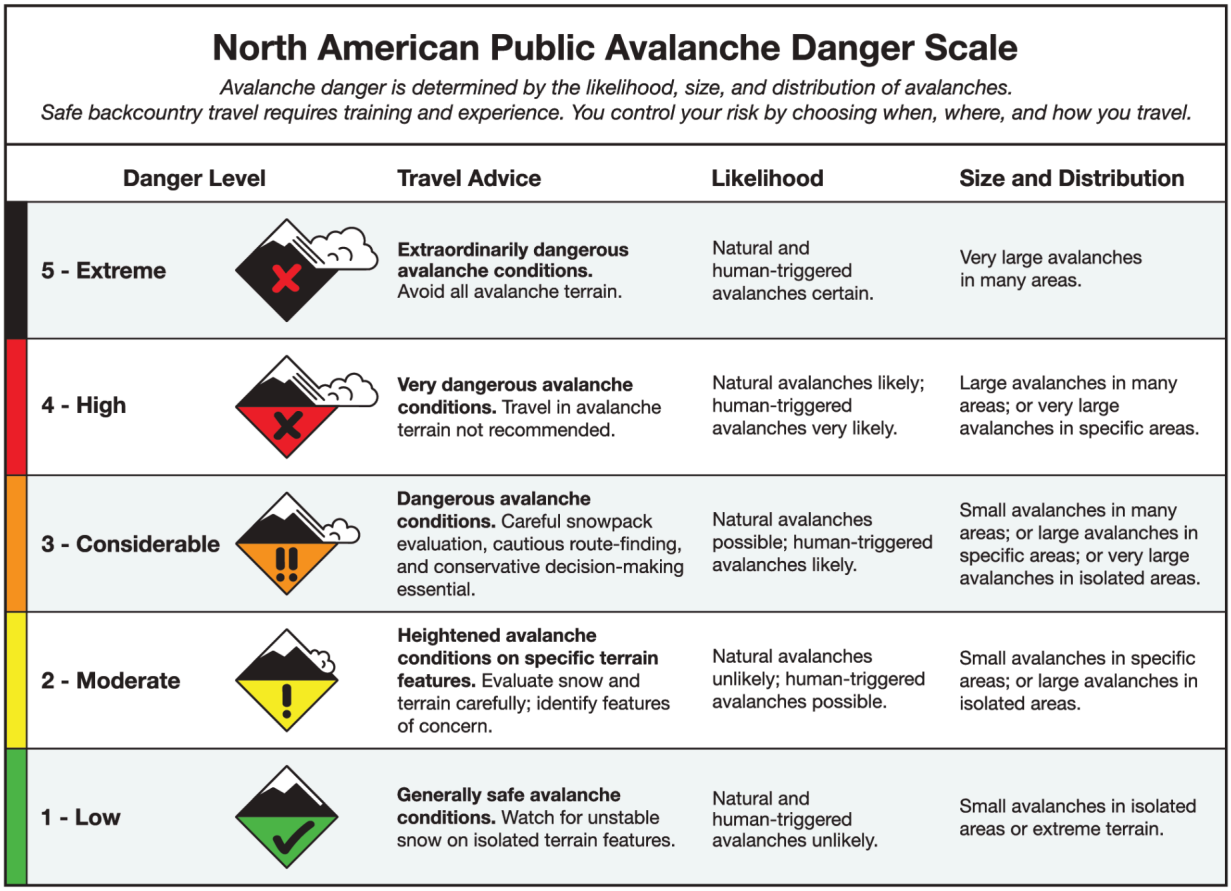
Statham, G., Haegeli, P., Greene, E., Birkeland, K., Israelson, C., Tremper, B., Stethem, C., McMahon, B., White, B., Kelly, J.: A conceptual model of avalanche hazard. *Natural Hazards, 90,* 663-691, 2018.

Statham, G., Haegeli, P., Birkeland, K. W., Greene, E., Israelson, C., Tremper, B., Stethem, C., McMahon, B., White, B., and Kelly, J.: The North American Public Avalanche Danger Scale, Proceedings of the 2010 International Snow Science Work-shop, International Snow Science Workshop, 117–123, https://arc.lib.montana.edu/snow-science/item/353 (last access: 4 July 2023), 2010.

2. The North American Public Avalanche Danger Scale (NAPADS)

2.1. Overview

Avalanche danger ratings are assigned based on the appropriate travel advice given the combination of avalanche problems for a given day. NAPADS defines the likelihood, size, and distribution of the expected avalanche activity for each danger level (Figure 3).



North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size, and distribution of avalanches.
Safe backcountry travel requires training and experience. You control your risk by choosing when, where, and how you travel.

Danger Level	Travel Advice	Likelihood	Size and Distribution
5 - Extreme	**Extraordinarily dangerous avalanche conditions.** Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Very large avalanches in many areas.
4 - High	**Very dangerous avalanche conditions.** Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 - Considerable	**Dangerous avalanche conditions.** Careful snowpack evaluation, cautious route-finding, and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 - Moderate	**Heightened avalanche conditions on specific terrain features.** Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 - Low	**Generally safe avalanche conditions.** Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Figure 3: North American Public Avalanche Danger Scale.

Avalanche danger ratings are assigned when enough information exists to determine the rating. They are assigned to 24-hour periods. Use ‘No Rating - Information Available’ when information is scarce or your timeline exceeds 24 hours. The following logic generally applies:

LOW (L1) danger indicates avalanches large enough to injure or kill people would be surprising. However, there is a remote possibility (unlikely) of avalanches in isolated areas.

MODERATE (L2) danger allows for human-triggered avalanches on specific terrain features or in specific areas, and/or small (D1) natural avalanches on specific terrain features. MODERATE danger can cover a wide range of avalanche conditions, from small human-triggered storm slabs to stubborn but much larger persistent slabs.

CONSIDERABLE (L3) danger allows for some natural avalanches and/or an increased likelihood of human-triggered avalanches. During CONSIDERABLE danger, The odds are favorable that a person would trigger several of the steep slopes they cross, and/or some terrain will avalanche naturally.

HIGH (L4) danger indicates widespread natural avalanche activity D2-2.5+ in size, with the potential for some natural avalanches D3-D3.5 in size. HIGH danger should be assigned to all elevation bands when avalanches are D3 and larger unless there is a specific and explainable reason that these avalanches will not impact other elevations. HIGH danger may also be used when natural avalanches are not likely (e.g., possible), but human-triggered avalanches size D2-D4 are very likely or certain.

EXTREME (L5) danger indicates widespread natural avalanche activity size D3 or larger. These events are uncommon. Avalanches will run full path, sometimes resulting in the expansion of historic avalanche paths and/or the destruction of infrastructure. Because very large to historic avalanches are expected, EXTREME danger should be issued for all elevation bands unless there is a specific and explainable reason that these avalanches will not impact other elevations.

2.2. Guidance for Challenging Forecast Scenarios

This section offers guidance when faced with avalanche conditions that do not neatly fit into the criteria (Travel Advice, Likelihood, and Size and Distribution) for a single danger rating. The danger choice should be primarily based on the Travel Advice when inconsistencies or ambiguities arise. Challenging danger scale decisions generally fall into three broad categories:

On-the-line Situations: The danger is close to the line between 2 levels.
Temporal Considerations: Heightened danger for a short time during the forecast period.
Spatial Considerations: Heightened danger for a small portion of the forecast zone.

2.2.1. On-the-line Situations

The NAPADS structure focuses on the likelihood of avalanches (both natural and human-triggered), their potential size, and associated ‘travel-advice’ descriptors. Although these criteria typically provide a clear danger rating, there are situations where either conditions exist at the cusp between ratings, or create conflicting ratings.

In such cases, the forecaster should use the travel advice to help determine the most appropriate danger rating.

The following examples illustrate why this approach is effective with common on-the-line, and/or difficult forecasting scenarios.

LOW (L1) vs MODERATE (L2) - HUMAN-TRIGGERED AVALANCHES UNLIKELY, BUT POOR SNOWPACK STRUCTURE PERSISTS.

This situation arises when the likelihood of triggering a Persistent Slab Avalanche decreases. The decision between **LOW (L1)** and **MODERATE (L2)** depends on whether human-triggered avalanches are considered *unlikely* (L1) or *possible* (L2). If there is high uncertainty, consider the following:

- **Assign LOW (L1)** if people can generally travel in start zones, tracks, and runout zones without significant avalanche risk.
  Supporting evidence for LOW:
  - Seven or more days without avalanches, precipitation, or a significant wind event, coupled with unreactive snowpack test results.
  - If poor snowpack structure persists, but observations and/or backcountry traffic suggest that triggering avalanches is unlikely.
- **Assign MODERATE (L2)** if poor snowpack structure persists and you have concerns about a lingering risk of triggering an avalanche.
  Supporting evidence for MODERATE:
  - Poor snowpack structure remains, with limited observations and low backcountry traffic.

MODERATE (L2) vs CONSIDERABLE (L3) - PERSISTENT SLAB AND LIKELIHOOD OF HUMAN TRIGGER DECREASING.

This scenario occurs when the likelihood of triggering an avalanche of size **D2.5** or larger decreases from *likely* (L3) to *possible* (L2), while natural avalanche activity is expected to be unlikely. In such cases, assigning a **CONSIDERABLE (L3)** danger rating is appropriate, as the larger avalanche size and increased consequences should influence backcountry travelers' mindset and their terrain choices.

MODERATE (L2) vs CONSIDERABLE (L3) - LOOSE SNOW AVALANCHE CYCLES.

This scenario typically occurs during natural loose snow avalanche cycles, often on the first sunny day following a storm, and size D1 to D2 natural avalanches are likely. In this case, backcountry travel advice is based on the most likely avalanche size.

- **Assign CONSIDERABLE (L3)** if most avalanches are expected to be D2 or larger, the danger should be rated as CONSIDERABLE (L3).
- **Assign MODERATE (L2)** if most avalanches are expected to be D1.

CONSIDERABLE (L3) vs HIGH (L4) - NATURALS POSSIBLE, HUMAN TRIGGERED VERY LIKELY.

This scenario occurs following a storm when natural activity is not expected, but widespread human-triggered avalanches D2 or greater are very likely.

- **Assign HIGH (L4)** if travel in avalanche terrain is not recommended.

HIGH (L4) vs EXTREME (L5) – CONSIDERATIONS FOR ISSUING EXTREME

EXTREME (L5) danger reflects an “unusual” (~1 to 3-year return interval), but it doesn’t necessarily need to be rare.

- **Assign EXTREME (L5)** if you are advising people to avoid all avalanche terrain, including areas that are typically safe during **HIGH (L4)** danger.
- **Assign EXTREME (L5)** if you anticipate a cycle with widespread D3 avalanches and the potential for multiple D4 avalanches.
- **Consider EXTREME (L5)** if an incoming storm is expected to elevate the danger from **LOW (L1)** to **HIGH (L4)**, especially when it affects a snowpack with widespread buried weak layers.

2.2.2. Temporal Considerations

It’s not uncommon for the avalanche danger to increase significantly during a 24-hour forecast period due to a storm, warming trend, or other weather conditions. If the danger is expected to peak during daylight hours, issue a higher danger rating. Use the text to explain that the danger will rise through the day. Consider issuing a higher danger rating if danger peaks close to sundown, especially if the timing is uncertain. Use the text to explain that the danger will rise late in the day. If danger peaks well after dark, issue the lower danger rating. Use the text to explain that the danger will rise overnight.

2.2.3. Spatial Considerations

Avalanche forecasts cover a defined area. It’s common for the danger rating to vary within a forecast zone. In most situations, assign the higher danger rating and explain spatial patterns in the problem discussion. For example, using the higher danger rating is acceptable when a small percentage of the zone (e.g., a mountain pass that receives the majority of the traffic/use in that zone) is more dangerous than the rest of the zone. Consider using the lower rating and elaborating in the Bottom Line if the higher danger exists in small areas of remote terrain.

3. Writing an Avalanche Forecast

3.1. Overview

Public avalanche forecasts aim to distill complex information about snow conditions, weather, and terrain into clear, actionable advice. Keep the following guidelines in mind:

- Important information should be at the beginning. Users may only spend 10 seconds on your website; what do you want them to know?
- Keep it simple.
- Keep it short; be efficient with text.
- Avoid technical terms and jargon if possible, or define them as needed.
- Avoid passive voice.

3.2. Travel Advice

Considerations when giving travel advice to the public:

- Ensure travel advice included in the Bottom Line, Avalanche Danger, and Avalanche Problem sections is consistent.
- When appropriate, highlight types of terrain where people can look for generally safer conditions. Offer advice on terrain or timing considerations that help reduce risk.
- When the danger is LOW, do not tell people there is no chance of avalanches.
- When the danger is MODERATE or CONSIDERABLE, describe the hazard(s), where they can be found, and travel techniques that can reduce risk.
- When the danger is HIGH or EXTREME, it is acceptable to tell people to stay out of avalanche terrain.

3.3. Bottom Line

Remember, your target audience is all backcountry users, regardless of their education or training. This is the most basic component of the forecast product.

- Aim for three sentences or fewer.
- Address three basic questions: What is it? Where is It? What can readers do about it?
- Focus on the 1 or 2 key points you want readers to remember.
- Do not simply repeat the NAPADS travel advice; instead, provide more specific travel advice, such as slope type, i.e., avoid areas exposed to steep slopes above.
- Be especially careful to avoid jargon, such as wind drifts instead of wind slabs and sugary snow instead of facets.

3.4. Avalanche Problems

Avalanche problems (as communication tools) help provide nuance to the avalanche hazard and provide a foundation for travel management and decision-making in avalanche terrain (Figure 4). Communicate this information as accurately and concisely as possible.

Avalanche problems consist of:

- The avalanche problem type
- The location in the terrain
- The likelihood, or probability of a human triggering
- The size of expected avalanches

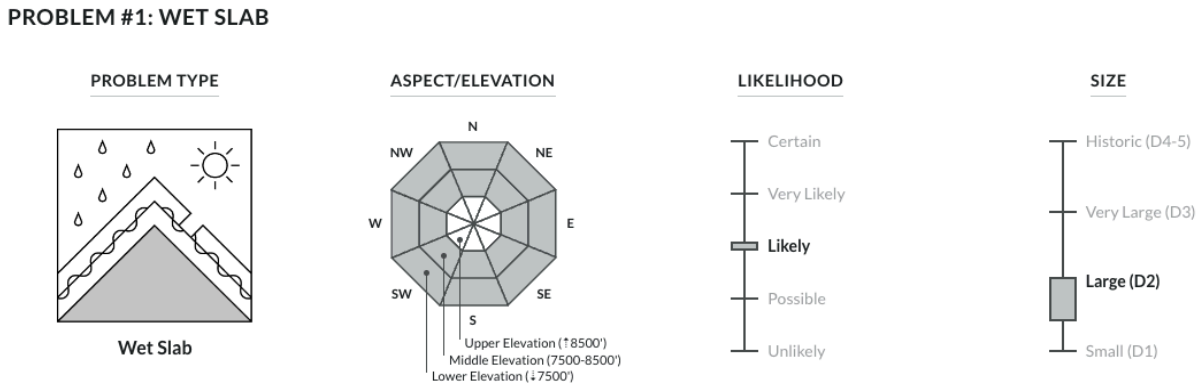


Figure 4: Avalanche Problem infographics.

Keep the following in mind when building an avalanche problem for a given forecast:

Use as few avalanche problems as possible to cover travel advice adequately.

Problem Type: Assign an avalanche problem if there is an associated avalanche hazard. Do not use them to describe snowpack structure.

> Examples: wind-drifted snow does not always mean you can trigger wind slab avalanches. Similarly, a buried persistent weak layer does not always mean you can trigger a persistent slab avalanche.

Aspect/Elevation: Use this diagram to communicate aspects and elevations where the avalanche problem is **most likely** to be encountered. Nuances or anomalies should be communicated in the avalanche problem description. (e.g., higher snow amounts make the problem more pronounced in the northern half of the zone.)

Likelihood: Likelihood is the chance of a human-triggering an avalanche, driven by the sensitivity to triggers and spatial distribution of the avalanche problem.

Size: Use the D Scale for public communication of avalanche size. Keep the range of sizes to two or less, and use the avalanche problem description to describe outliers.

3.4.1. Avalanche Problem Description

The problem description supports the infographics and media. Answer 'what is it, where is it, what should you do about it?' with more resolution than in the Bottom Line.

Examples of appropriate content include important recent avalanches, the amount of expected natural activity and its sensitivity to triggering, remote triggering, slab character (hard vs. soft), and expected slab thickness and width. You may also include specifics about where in the terrain the problem exists, the timing of increasing hazard, and areas and times when the danger is elevated.

Link to or use media whenever possible. Keep these products short and to the point. Include only pertinent information. In some cases, forecasters may use the Forecast Discussion (Section 3.5) to provide additional analysis that does not fit within the avalanche problem description.

3.5. Forecast Discussion

The Forecast Discussion is optional. Don't write a discussion when avalanche problem statements are sufficient. The target audience is people who have taken a Level 1 class.
You can use Forecast Discussion:

- When there are no avalanche problems (LOW for days)
- To highlight important observations or avalanches
- To highlight uncertainty (always explain why there is uncertainty)
- To highlight differences within the zone
- To provide nuance to the avalanche danger or avalanche problems
- To elaborate on decision-making or travel advice.

You may use stories, observations, or anecdotes to make this section educational and interesting. Be technically correct. If you aren't sure about the science, ask someone else or avoid writing about it.

4. Weather Product

Weather Products contain a Weather Discussion (Synopsis) and a Summary Table.
When writing the Weather Discussion, keep the following guidelines in mind:

- Use simple language (think nightly news)
- Keep it concise
- Phrases that describe the weather can be powerful and effective (e.g., “You’re going to want your raincoat today”), but use them sparingly and only to support the core weather information.
- Focus on the same time frame as the avalanche forecast
- Typical weather elements to include in your forecast are precipitation and snowfall, temperature, wind, rain/snow levels, and sky cover.
- Highlight regional differences/patterns, storm timing/trends, and uncertainty.
- For Daily Avalanche Forecast products with 24-hour expirations and optional 24-48 hour outlooks:
    - Cover the previous 24 hours, the 24-hour forecast, and the 24-48 hour forecast chronologically.
    - Break these periods into segments (e.g., yesterday, last night, today, tonight, tomorrow) that mimic the weather table data. The previous weather and the 24-48 hour forecast can be addressed solely in the Weather Tables.
    - Only address extended (3-5 day) forecasts when you have high confidence the weather will significantly impact the avalanche conditions. Keep this text general and brief.

5. Special Products: Using the NWS to disseminate Avalanche Warnings, Watches, and Special Avalanche Bulletins

5.1. Overview

Special Products, including Avalanche Warnings, Avalanche Watches, and Special Avalanche Bulletins, communicate critical avalanche information through the National Weather Service and its associated broadcast systems.

Avalanche Warnings (AVW): Alert the public when unusually dangerous avalanche conditions exist. You may use this product if you are anticipating avalanche activity that will impact the public beyond the realm of backcountry recreation.

Avalanche Watches (AVA): Warn the public that widespread natural avalanche activity will become certain or very likely in 24-48 hours.

Special Avalanche Bulletins (SAB): SABs are issued when you anticipate significant public backcountry use (e.g., holiday weekends), and dangerous avalanche conditions exist, but the

avalanche conditions do not meet the criteria necessary to issue an Avalanche Warning.

NWS coding is AVW – Avalanche Warning, AVA – Avalanche Watch, SAB – Special Avalanche Bulletin. **This is set up differently in Alaska. An 'Avalanche Warning' is issued as an SAB through the NWS, and a Special Avalanche Bulletin is issued as a Special Weather Statement (SPS).*

5.2. Dissemination

Special Products are communicated in the following ways:

- The National Weather Service
- Avalanche Center's webpage
- Social Media
- Local/Regional Media Outlets
- Forest Service Public Affairs Officer

The NWS disseminates an Avalanche Center's Special Product through publicly available information channels.

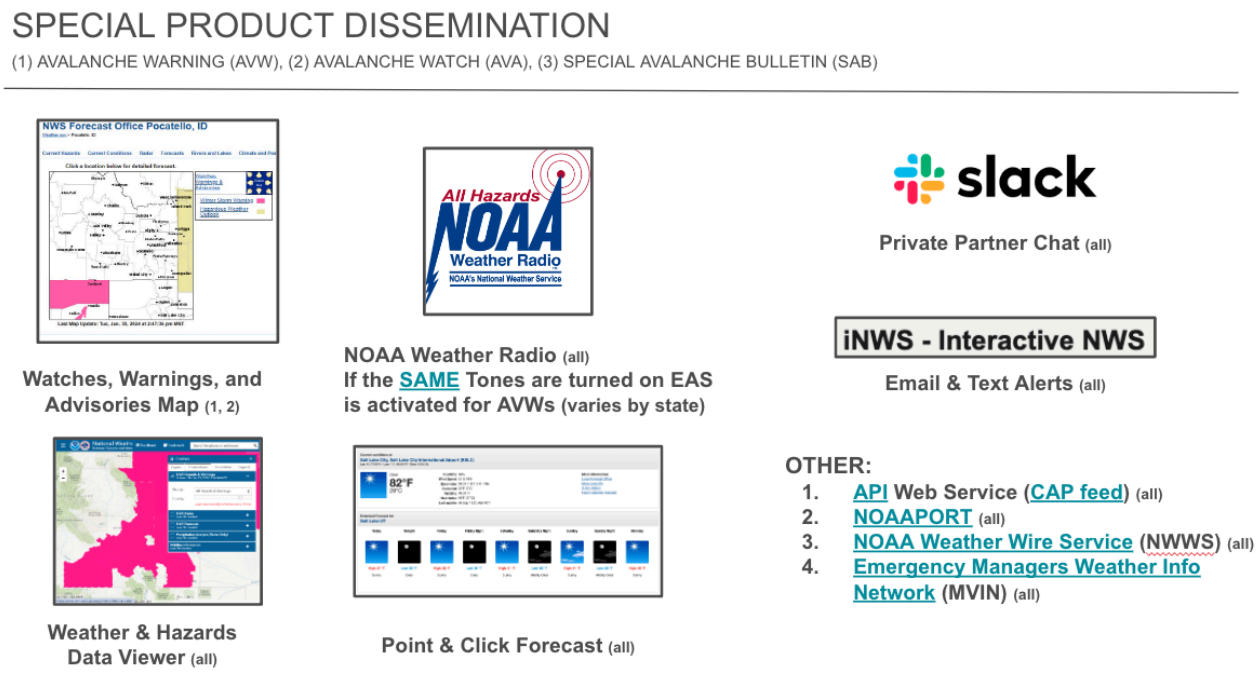


Figure 5: Special Product dissemination channels through the NWS. Click the image for links.

5.3. Coverage

US Avalanche Centers have defined areas or zones in which they issue danger ratings. Special Products are issued for all or part of these areas or, in rare circumstances, for adjoining regions. Issuing products outside the Avalanche Center zones requires a continuous record of data that ensures consistency and repeatability.

The NWS disseminates our Special Products via an aggregate of NWS Zones or counties that best match Avalanche Center zones. NWS Zones or counties only partially within the product area are highlighted. The NWS is working on Partial County Alerting, dividing counties into smaller chunks whose aggregate better represents an Avalanche Center's zone boundary. Until then, it is vital that the text of a Special Product clearly states its aerial coverage.

5.4. Content

Special Products are simple, clear, and concise (Figure 8). They reach a broad population, including people with no backcountry experience. Special Products include the following sections:

- WHAT: Avalanche danger and reason.
- WHERE: Area covered (use familiar place names)
- WHEN: Issuance and expiration times
- IMPACTS: Threat to the general public, structures, or roadways.
- PRECAUTIONARY / PREPAREDNESS ACTIONS: Travel advice. How can the public reduce their risk?
- How to get more information.

BACKCOUNTRY AVALANCHE WARNING

IMMEDIATE BROADCAST REQUESTED

05:00 MST Fri Feb 02 2024

The Sawtooth Avalanche Center in Ketchum has issued a BACKCOUNTRY AVALANCHE WARNING for the following areas:
NWS Boise ID - 25 (Camas County)
NWS Pocatello ID - 074 (Big Lost Highlands/Copper Basin)...072 (Sawtooth/Stanley Basin)...073 (Sun Valley Region)...075 (Wood River Foothills)

* WHAT...The avalanche danger is HIGH. Heavy snowfall and strong wind are overloading a very weak snowpack.

* WHERE...The southern Sawtooth, Soldier, Smoky, Boulder, Pioneer and White Cloud Mountains, including the mountains above the Wood River Valley and the mountains near Galena Summit, Trail Creek Summit, Smiley Creek and Ketchum, Hailey, Bellevue, Fairfield, and Carey.

* WHEN...In effect from Fri 05:00 MST to Sat 05:00 MST.

* IMPACTS...Natural and human-triggered avalanches large enough to bury people are very likely to occur. Very large avalanches large enough to destroy houses may occur.

* PRECAUTIONARY / PREPAREDNESS ACTIONS...Stay off of and out from below steep slopes—slopes steeper than about 30 degrees. Very dangerous avalanche conditions exist. Travel in avalanche terrain is not recommended. Avalanches may be triggered remotely—from flat terrain above, below, and to the sides of steep slopes. Natural and human-triggered avalanches may run long distances and can impact gentler terrain below.

Consult https://www.sawtoothavalanche.com/ or www.avalanche.org for more detailed information.

Similar avalanche danger may exist at locations outside the coverage area of this or any avalanche center.

Figure 8: Avalanche Warning Example.

5.5. Timing

Issue Special Products with a clear start and end time. The NWS cannot cancel or edit the end times of Special Products once published. For this reason, we recommend products be issued in 24-hour blocks, after which they may be re-issued or allowed to expire. Special Products should correspond with a forecast window (e.g., 7 a.m. to 7 a.m.) but can be issued at different times depending on the situation. For example, if you expect the main impact of a storm to be between 6 p.m. and 6 a.m., you can adjust the timing of the Avalanche Warning to fit the period of highest danger.

5.6. Criteria for issuing Avalanche Warnings

Avalanche Warnings are ALWAYS issued when the avalanche danger is EXTREME.
Avalanche Warnings are issued when the avalanche danger is widespread, and HIGH in many areas. Many areas can mean very large geographic areas or several aspects and/or elevations in a specific geographic area. For example, widespread HIGH at two elevation bands.

Avalanche Warnings are typically NOT issued when the danger is HIGH in specific or isolated areas.

5.7. Criteria for issuing an Avalanche Watch

An Avalanche Watch may be issued when Avalanche Warning criteria are anticipated in the next 24-48 hours. It is preferable but not necessary to issue a Watch before a Warning.

5.8. Criteria for issuing a Special Avalanche Bulletin

A SAB may be issued when significant public use is expected and unusually dangerous avalanche conditions exist, but the avalanche conditions do not meet Avalanche Warning criteria. SABs are impact-based and may be issued when there is an increased likelihood of an avalanche accident. An SAB can be issued during CONSIDERABLE or HIGH danger. Examples of when to consider an SAB:

- A high-traffic weekend or holiday on the first sunny day after a significant storm.
- Springtime shed cycles that are exceptionally active.
- Avalanche cycles that may affect the non-recreating public.

5.9. Considerations for Type 2 Centers

Type 2 Avalanche Centers do not work seven days a week. These centers may issue Special Products only if resources allow full-time staffing and monitoring of the changing avalanche conditions for the duration of the product.

When a Type 2 Avalanche Center issues a Special Product, the most recent forecast, or general information product should be updated, or a new one should be issued to match and exceed the information contained in the Special Product.

5.10. Issuance

Most Avalanche Centers issue Special Products through the Avalanche Forecast Platform (AFP) Dashboard (forecasts.avalanche.org). Click Here for an AFP Avalanche Warning tutorial. Those ACs who use in-house systems should follow the template above (Figure 8).

Creating a Special Product on the AFP Dashboard allows forecasters to take two actions:

1. Once **published**, the product will populate the Avalanche.org National Danger Map, and Danger Maps and Avalanche Forecasts on individual AC websites. If a Special Product is published on the Dashboard and is valid when a user views one of these maps or forecasts, then the forecast zones specified in the product will flash (in the case of a Warning), and a banner will be shown.
2. When a Special Product is **emailed**, it will be sent to the NWS office(s) and then entered into their system. If an AC forecast area spans multiple NWS office forecast areas, the Product will be emailed to the appropriate office based on the NWS forecast zones and/or counties selected in the product. Once entered into the NWS system, Special

Products cannot be changed or canceled. For that reason, it's recommended that **warnings be issued for 24-hour blocks.**

If a Special Product needs to be extended, create a new product that covers the extended timeframe rather than editing the existing warning. If it needs to be ended early, edit the expiration time on the original product (keep in mind that the NWS cannot cancel or end a Special Product early). Special Products have important archival value; please do not delete a product once issued.

6. Accident Reports

6.1. Overview

'Avalanche Accidents' are typically defined as avalanche-related fatalities or critical injuries requiring hospitalization. In most cases, reporting by the US Forest Service is limited to fatal avalanches.

The Colorado Avalanche Information Center (CAIC) maintains the central archive for avalanche accidents in the United States. It has detailed records going back to 1950 and sparse records going back to the 1860s. The CAIC online database and Avalanche.org have displayed avalanche accident reports for events in the United States since 2009.

Forest Service Avalanche Centers are tasked with reporting on avalanche fatalities occurring within or reasonably close to Avalanche Center boundaries. Avalanche Centers should coordinate with one another when incidents occur along coverage margins, and the NAC will help coordinate reporting for incidents occurring well outside the margins.

Avalanche Accident reports provide a sound technical description and analysis of the physical and human parameters related to the accident. Reports are used to inform the community, to develop learning outcomes, as a research tool, and as a reference for local officials.

6.2. Media Best Practices

Our goal is to be a source of quality, objective information.

Key points for media and public relations:

1. Use careful messaging
    a. Consider designating a point person for each incident
    b. Develop talking points
    c. Coordinate information release with the designated local authority
2. Stick to verified information
    a. Avoid conjecture or judgment

b. Recognize that initial details are often wrong
c. Do not mention fatalities until announced by the designated local authority

6.3. Preliminary Reports

Preliminary reports are the initial release of accident information. This information is published quickly, sometimes within hours, often within 24 hours of the accident. They are short, contain specific and verified information, and are generally published via the AC website and social media. They can be updated as additional information is available. View Template Here.

6.4. Final Reports

Final Reports are intended to be the report of record. They compile data from field investigations, interviews, and other sources. They include detailed narratives, technical data, and photos and video. View Template Here.

6.5. Reporting Standards

- Coordinate with the designated local authority(s) and Public Affairs Officers.
- Collect and distribute preliminary information ASAP using the Preliminary Report template linked above.
- Send preliminary report to caic@state.co.us, with a cc to nac@avalanche.org
- Include lat/lon (WGS-84) of the site or nearby landmark if available.
- If possible, visit the incident site and conduct interviews. The goal is to collect enough information and photo and video documentation to tell the story of the accident.
- The final report compiles field data, snowpack and weather data, and information documented during witness interviews or other research. Use the Final Report template linked above.
- Send the final report to the CAIC/NAC **as soon as possible**, by 30 days at the latest.

Send final report to caic@state.co.us, with a cc to nac@avalanche.org

- Send narratives and text as a Word, google, or text file
- Send images as individual files
- Include captions in the narrative
- Include URL of published report