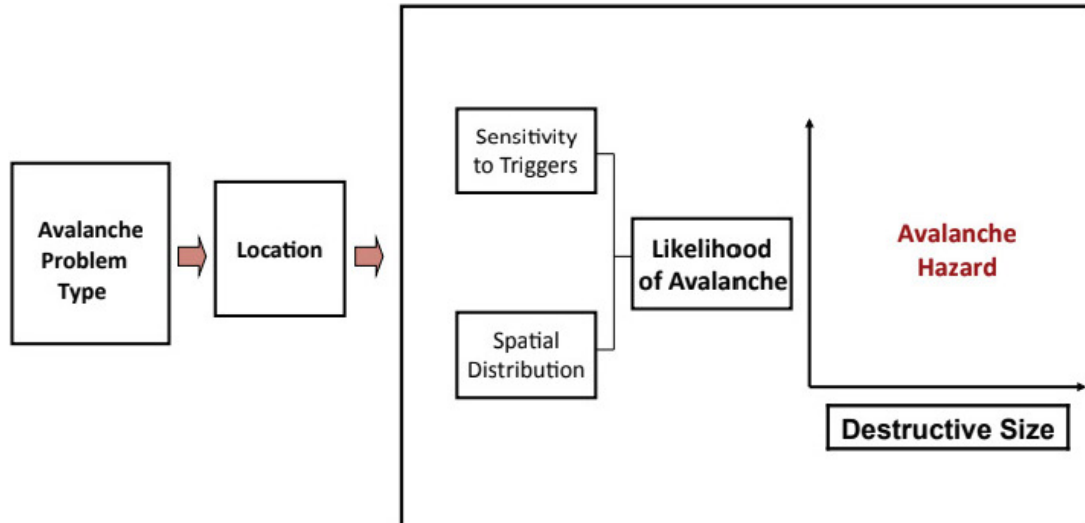


AVALANCHE FORECASTING

Conceptual Model of Avalanche Hazard



FORECAST CONTEXT

Operation – who are you forecasting for?

Spatial scale – path, mountain, drainage, range?

Temporal scale – forecasting for the next day? Next two days?

LEVEL 2 WORKBOOK



Avalanche Character/Concern

Avalanche Character	Weak Layer Interface	Slab Properties	Persistence	Weak Layer Location	Propagation Potential	Relative Size Potential
Loose Dry	No cohesion	None	Hours/Days	Near Surface	Down slope entrainment	R 1-2
Storm Slab	PP, DF	F- P Soft to stiff	Hours/Days	In or just below storm snow	Path	R 1-4
Wind Slab	DF, PP	4F – K Wind Transported	Hours/Days	Upper pack	Terrain Feature	R 1-3
Persistent Slab	PWLs	4F – P Stiff to Hard	Weeks/Months	Upper to mid Pack	Path to adjacent paths	R 2-4
Deep Persistent Slab	PWLs	1F – K Hard	Weeks/Months	Deep or Basal	Path to adjacent paths	R 3-5 (climax)
Wet Slab	Various	4F – P Wet Grains	Hours/Days	Mid Pack to Deep	Path	R 1-5 (climax)
Wet Loose	No cohesion	None	Hours/Days	Any Level	Significant down slope entrainment	R 1-3
Cornice	---	---	Months w/ short peaks	---	---	---
Comment	Typical Failure plane	Typical kind of slab	Typical duration of instability	Relative to HS	Typical Expectation	Typ. Size Relative to Path

Sensitivity To Triggers (Likelihood)

Sensitivity	Natural Triggers	Human Triggers	Explosive Size	Explosive Result	Cornice Triggers
Unreactive	No Avalanches	No Avalanches	Very large in several locations	No Slab	No slab from very large C
Stubborn	Few	Difficult to Trigger	Large and AB in several locations	Some	Large
Touchy	Several	Easy to Trigger with ski cuts	Single Hand Charge	Many	Medium
Very Touchy	Numerous	Trigger Almost certain	Any size	Numerous	Any size
Desc. Of OBS	Nat. Aval. occurring	Trigg. by single human	Size of Explosive	Effect of Explosive	Sz. Of Corn. Fall to Trigg.

Spatial Distribution (Likelihood)

Distribution	Density	Evidence
Isolated	Instability is spotty and hard to find	Evidence rare and hard to find
Specific	Instability exists in terrain features with common characteristics	Evidence exists but not always obvious
Widespread	Instability exists in many locations and terrain features	Evidence everywhere and easy to find
Comment	How is instability distributed in location identified?	How hard is it to find?

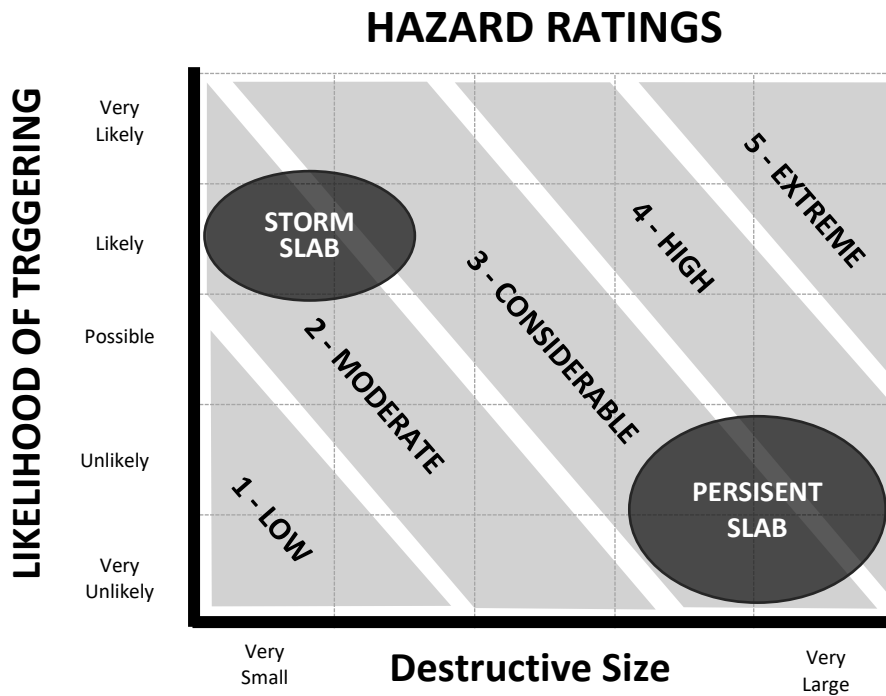
Likelihood of Triggering

SPATIAL DISTRIBUTION

WIDESPREAD	Very Unlikely	Unlikely	Likely	Very Likely
SPECIFIC	Very Unlikely	Unlikely	Possible	Likely
ISOLATED	Very Unlikely	Very Unlikely	Unlikely	Possible
	UNREACTIVE	STUBBORN	REACTIVE	TOUCHY

SENSITIVITY TO TRIGGERS

Adapted from *A Conceptual Model for Avalanche Hazard* (Figure 2). Statham et al, 2017 *Natural Hazards*



Additional Forecasting Terminology

Depth and Destructive Size

This should reflect the full range of possible avalanches for this avalanche concern.

Uncertainty Rating

How much data do you have? When was the last time you had eyes on the terrain? Was the weak layer spatially variable, or spatially uniform, prior to its burial?

Low: Well understood situation, abundant data, clear patterns and trends.

Medium: Sufficient data, but insufficient “field truthing” to confirm or deny hypothesis. Variable patterns, but identifiable trends.

High: Insufficient data, highly variable pattern, or new situation for the evaluator. Larger ranges of likelihood and avalanche sizes.

Predictability/Detectability

Easy: Easy to find and assess

Medium/Moderate: May take some digging to find and assess, but fairly well-known patterns and distribution.

Difficult: Hard to find the instability (too deep, too old, too variable)

Manageability

Easy: Easy to mitigate (slope cut/explosive) or avoid. Well known habitat

Medium/Moderate: Fairly well-known habitat, but harder to trigger.

Difficult: Hard to trigger intentionally. Typically triggered unintentionally from shallow areas. Often large and not survivable.