

Winter Skills Adventure Program

Avalanche Awareness

- Recognize and avoid avalanche conditions for safe backcountry travel
- Seek professional instruction for more knowledge



Why should we be concerned about avalanches?

Where do avalanches occur?

What causes an avalanche?

Why should we be concerned about avalanches?

- Significant winter hazard
- Difficult to predict
- ONLY controlled in developed ski areas, snow play areas & highway corridors
- Summer trails do not consider avalanche risk
- Miscalculations have greater consequences

Where do avalanches occur?

- Outside controlled areas
- Slope angles of 30 to 50 degrees (most 38 to 42 degrees)
- Slopes with few natural anchors (trees, boulders, etc)
- Leeward slopes (wind deposits snow forming layers in the snowpack)

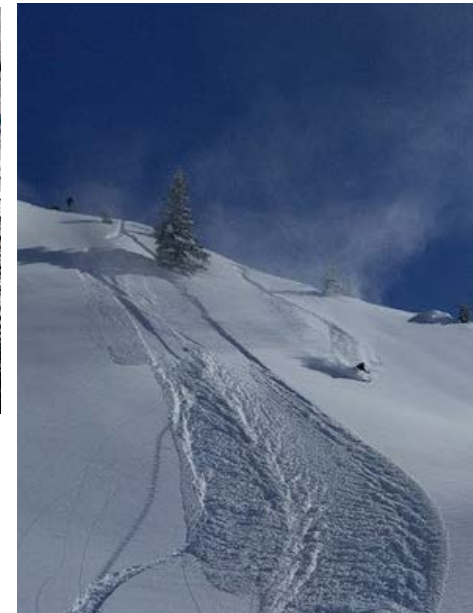
What causes an avalanche?

- A trigger releases tension force within the snowpack causing the bond between layers to fail resulting in a sudden snow slide

Common types of avalanches

Loose snow avalanches

- Start at a point
- Increase in size as it descends
- Affect the top layer
- Snow has little cohesion
- Occurs during/after storm and springtime
- Least common type



Slab avalanches

- Trigger point and fracture line
- Slides on the weak layer in the snowpack
- Can occur at any layer (shallow or deep)
- Snow has cohesion (blocks)
- Occurs all season
- Most common and lethal type



Three factors affect snowpack stability

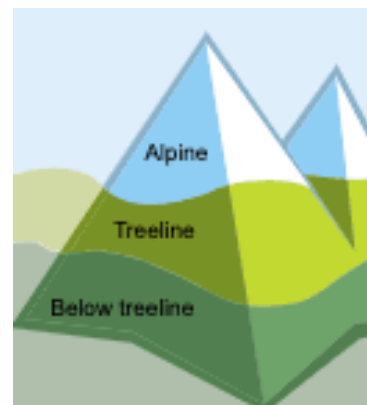
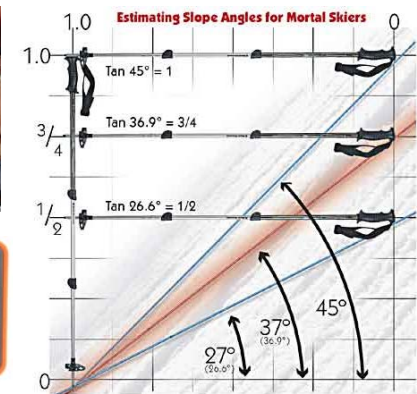
Terrain, Weather & Snowpack

- Snowpack stability is the interaction of these factors
- Weather events create the layers in the snowpack
- Snowpack reacts to changes in weather
- Snowpack does not like rapid changes



Terrain

- Angle
 - 30 – 50 degrees, (most 38 – 42)*
- Aspect
 - Direction the slope faces (N, S, E or W)*
 - Sun vs. shadow*
- Altitude/Elevation
 - Below treeline, Treeline & Alpine*
 - Natural anchors*



Weather

- Temperature

Above or below freezing

Rising or falling trend

- Precipitation

Snow vs. rain, amount

- Wind

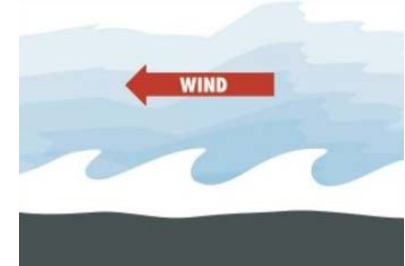
Direction and speed

Windward vs leeward

Wind can move/drift a lot snow (wind loading)

- Sun

South facing slopes receive more sun exposure



Snowpack

- Composed of layers

From weather events

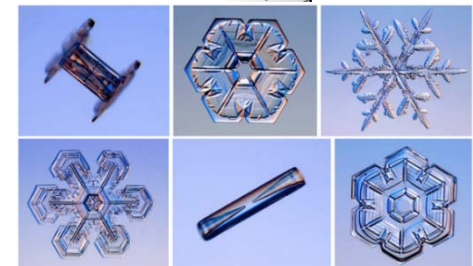
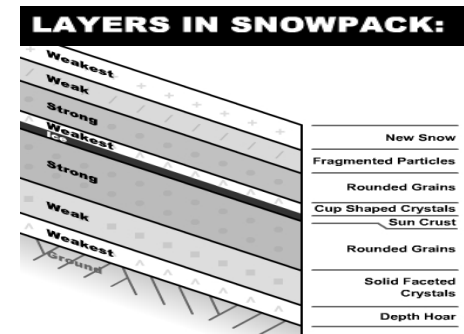
- Layers have different snow crystals

(stellar, needles/columns, fern, rimed, graupel, etc)

- Bond strength between layers varies

- Snow crystals metamorphose over time

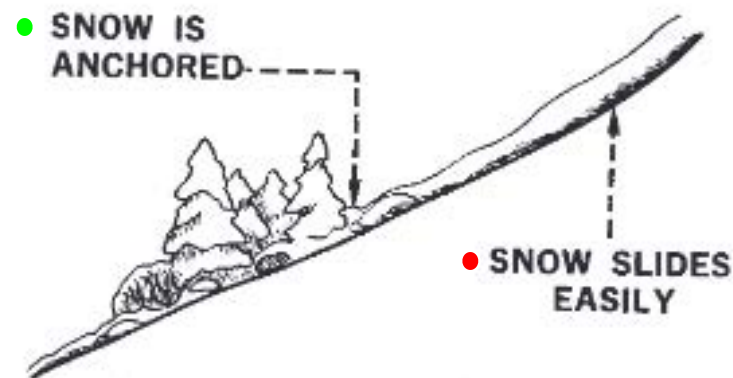
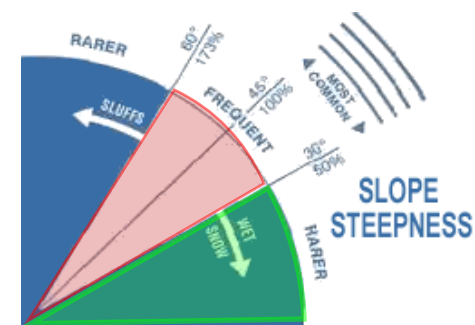
- Increasing temperature and/or precipitation reduces stability



Safe backcountry routes

Choose slopes ...

- <30 degrees
- Natural anchors (timber, boulders)
- On the windward side/slope
- Follow ridge lines (watch for cornices)
- Follow features even if not the direct route



Unsafe backcountry routes

Avoid slopes ...

- >30 degrees.
- No natural anchors
- Bowls & gullies
- Convex & concave slopes
- Cornices
- Leeward side
- Terrain Traps

Increase the consequences if caught in an avalanche.

(gullies, bottom of concave slopes, cliff bands, tree wells, streams)

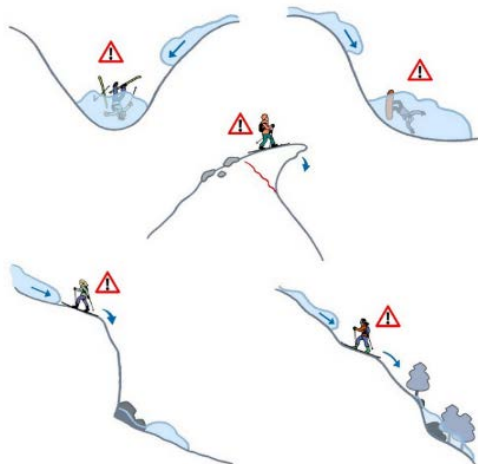
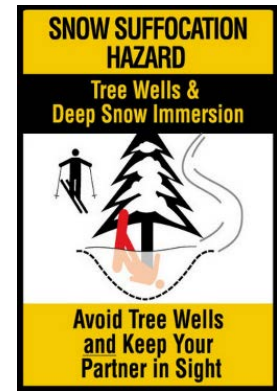


Photo by The Norwegian Avalanche Center



Stability tests (need shovel & snowsaw)

Choose a test area

- Safe location
- Same angle, aspect and altitude/elevation
- Dig snow pit ~48" w x 36-48" d

Identify layers

- Identify layers
- Layer density (fist, 4 fingers, 1 finger, pencil, knife)
- Any layers of concern?

Perform a compression test to assess stability

- Two 12" x 12" columns
- Cut on 3 sides
- 10 hits from the wrist, elbow and shoulder
- Look for failure(s)

Wrist failures = high danger (Red)

Elbow failures = moderate danger (Yellow)

Shoulder failures = low danger (Green)

- Repeat on next column
- Dig additional snow pits and repeat the tests



From your snow pit cut out a column measuring 90 cm wide and 30 cm deep (upslope)



How to stay safe

- Minimum group size = 3+
- Stay together
- Proper equipment & training
- Detailed trip planning
- You are the first line of defense (situational awareness)
- Recognize and avoid hazards (Red Flags)
- Risk based decision making (SLAM)

What will happen if...?

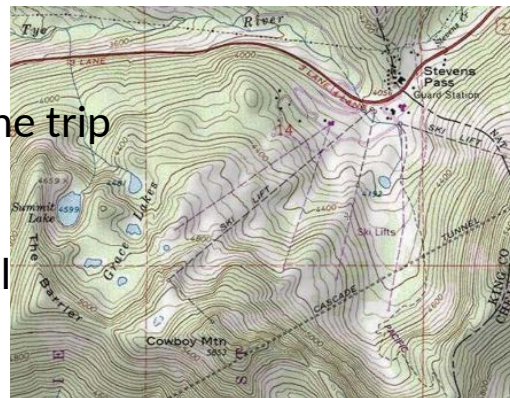


Pre-trip planning

- Research planned destination & route (online, printed, etc)
- Check recent trip reports (WTA, AllTrails, Mountaineers, etc)
- Review topographical maps (paper and/or online, contour line spacing, slope angle, coloring/shading (vegetation vs. no vegetation))
- Check the weather forecast
- Check the avalanche forecast
- Print the information and bring on the trip



- Vehicle is equipped for winter travel (*gasline antifreeze, chains that fit, jumper cables, shovel, etc*)



Grace Lakes

LENGTH

4.0 miles, roundtrip

GRACE LAKES

HIKE INFO

Grace Lakes

An easy 4 mile snowshoe trip along a road, gaining 500 feet and leading to an expansive basin with several lakes.

ELEVATION

Gain: 500 ft.

Highest Point: 4700 ft.

Navigation

- Look & plan ahead
- Recognize terrain features from trip planning
- Choose slopes/routes with least risk & consequences
- Identify islands of safety (natural anchors)
- Discuss conditions & options with your group

Crossing an avalanche slope

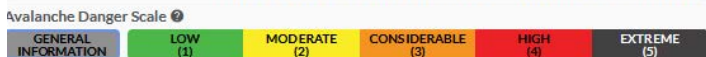
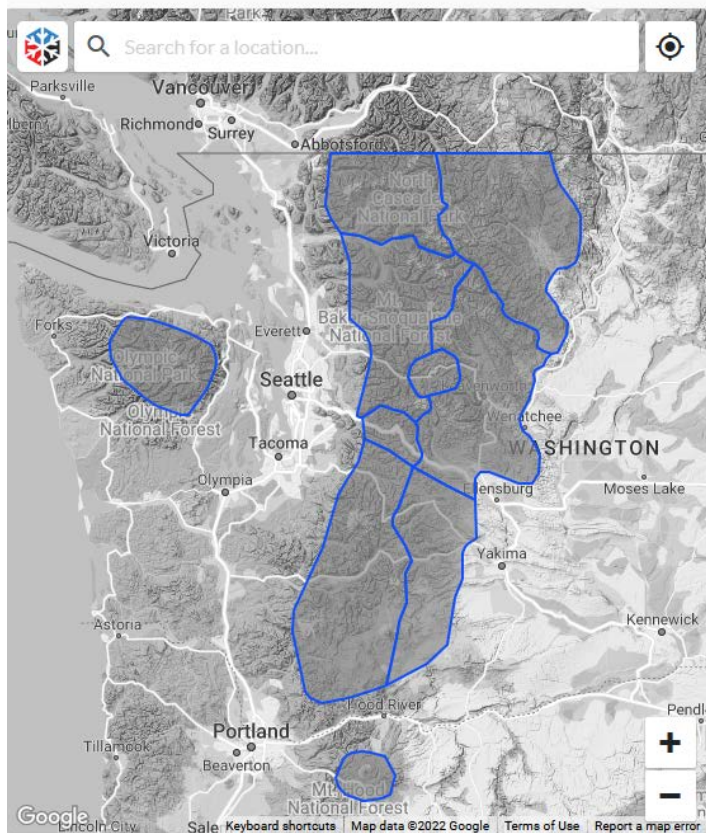
- Zip-up, Glove-up, Hat on
- Remove pole straps.
- Unclip hip belt and loosen shoulder straps
- Select the safest place to cross
- Cross one at a time (**follow the same path and don't stop**)
- Watch each person as they cross
- Have an escape plan

- ▲ Use R-Y-G, 3 Clues or other assessment tool.
- ▲ Avoid midday and 24 - 48 hrs after storm.
- ▲ Seek routes that limit exposure.
- ▲ Take advantage of ridges but avoid cornices.
- ▲ Avoid gullies and chutes.
- ▲ Identify run out zones & avoid
- ▲ Stay in dense timber.
- ▲ Be suspicious of convex slopes.
- ▲ Be cautious of shaded slopes.
- ▲ Stay on windward side.
- ▲ Conduct slope [stability tests](#)



Northwest Avalanche Center (NWAC)

Avalanche Forecast By Zone



STEVENS PASS

ISSUED

Saturday, January 9, 2021 - 6:00PM

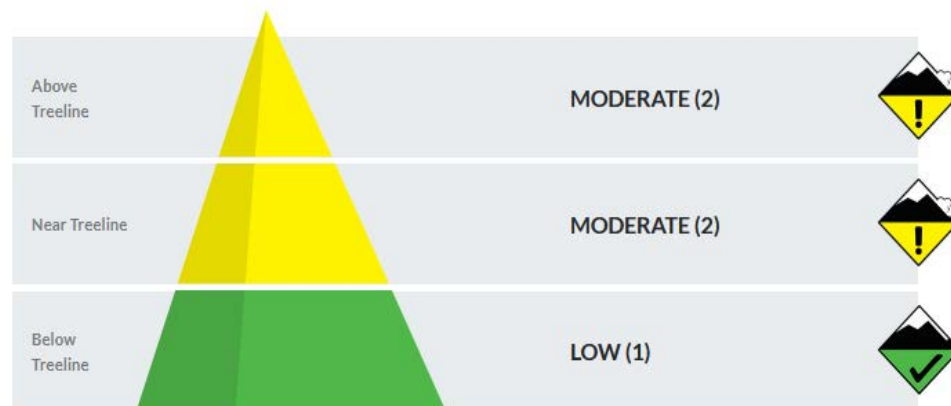


THE BOTTOM LINE

Easterly winds may create fresh, shallow slabs near and above treeline. Look for snow surface textures that indicate recently drifted snow, and use caution around these features on steep slopes. Cornices are large, keep away from these overhead hazards.

AVALANCHE DANGER 1

Sunday, January 10, 2021



DANGER SCALE



Full Forecast →

Trail Conditions & Trip Reports

Washington Trail Association (WTA)

AllTrails

Summit Post

The Mountaineers

Turns all year

Ski area conditions reports & cams

Online Maps

Acme Mapper

Gia

Avalanche forecast

Northwest Avalanche Center

Mountain Weather Forecasts:

NOAA.gov

NWAC.us

Windy.com

Weather.com

Accuweather.com

Wunderground.com

Road conditions

Washington DOT

Avalanche Education

BSA

Mountaineers

Local guide services

Be Safe and Have Fun

The End



Check In

- Name resources to check when planning your trip?
- What are the three stability factors?
- True or False: Snow likes rapid changes?
- What slope angle are avalanches most likely to occur?
- The safest wintertime route usually follows _____ and avoids _____?
- Current avalanche conditions and forecasts can be obtained from?

Check In

- Name resources to check when planning your trip?
 - Guidebooks, topographical maps, recent trip reports, avalanche conditions and weather forecast, etc.
- What are the three stability factors?
 - Terrain, Weather & Snowpack.
- True or False: Snow likes rapid changes?
 - False.
- What slope angle are avalanches most likely to occur?
 - 30 to 50 degrees range (most common on 38 to 42 degree slopes).
- The safest wintertime route usually follows ____ and avoids ____?
 - Windward sides, on ridges, with good anchors (trees & rocks). Avoiding large open slopes, leeward slopes, cornices, gully's, terrain traps, slopes in direct sunlight, etc
- Current avalanche conditions and forecasts can be obtained from?
 - Northwest Avalanche Center (<https://www.nwac.us/>)
 - NOAA (<https://www.weather.gov/>)
 - Windy (<https://www.windy.com/>)