

# Snow Travel, Avalanche Awareness, and Crevasse Rescue



Photo: Approach to Little Tahoma from Paradise, Mount  
Rainier National Park, May 7, 2018

Basic Alpine Climbing Course

Lecture #3

April 3, 2025

Peter Erickson

# Why do you [want to] climb snow?



Photo: Eldorado Peak, April 23, 2018

# Outline – (it's all about traveling safely)

- **Traveling on snow** – terrain, hazards, techniques, equipment
- **Snow anchors, belays** – when risk increases
- **Crevasse rescue** – made simple (ha)
- **Avalanches** – managing risk
- **Snow camping**

# Traveling on snow

Samples of terrain and snow conditions you will encounter on basic climbs





Photo: Sahale Peak, July 19, 2016  
(Photo by Michael Toyama)



Photo: Quien Sabe Glacier, June 30, 2013  
(Sahale Peak is behind us; Sharkfin Tower is off-screen in upper right)



Photo: Whitehorse Mountain, May 20, 2014







Photo: Mount Rainier, Emmons  
Glacier, June 21, 2014



Photo: Sloan Peak, July 24, 2016



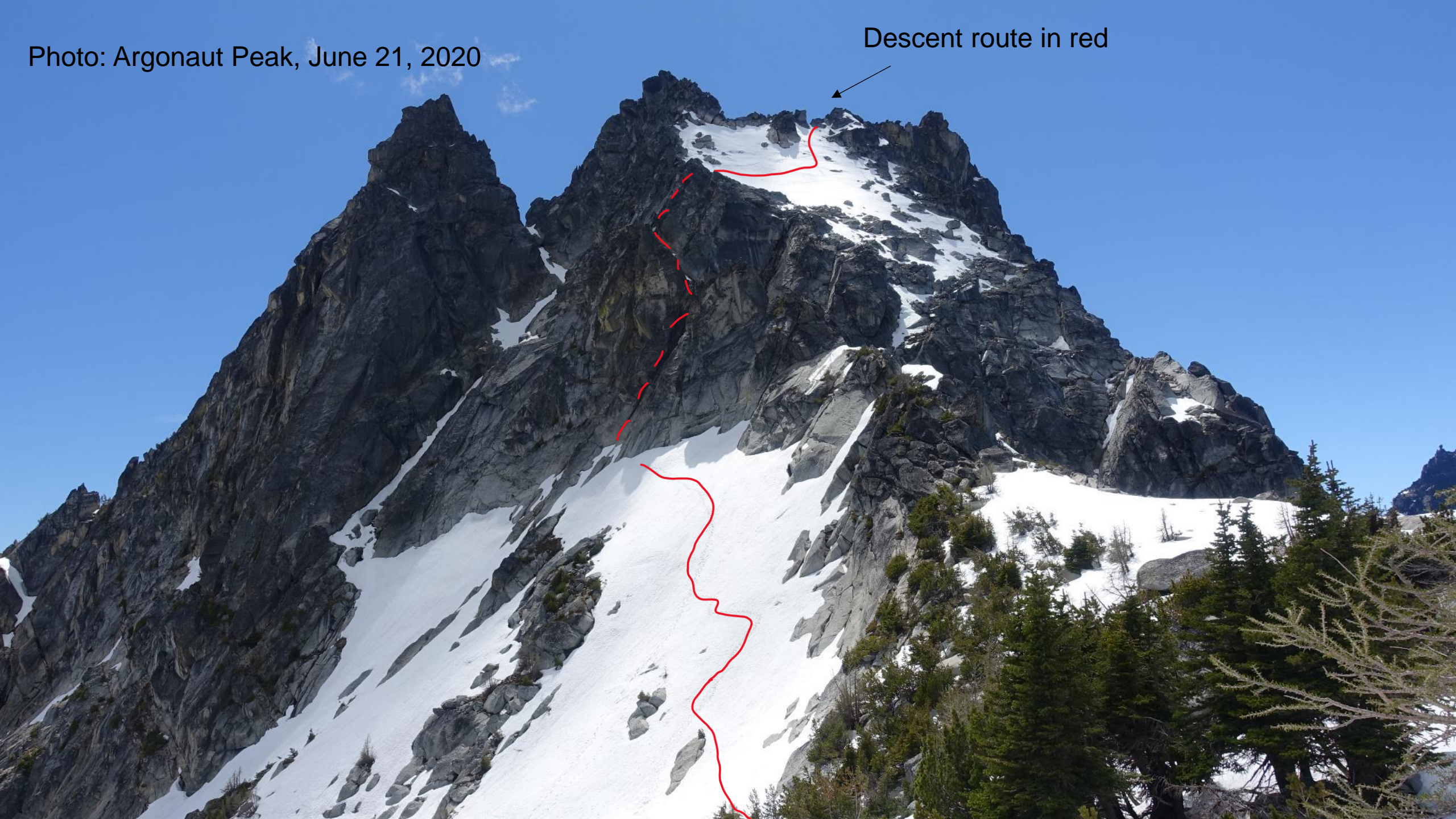
Photo: Returning from Black Peak, May 24, 2020  
(Cutthroat Peak and Whistler Mountain shown)





Photo: Argonaut Peak, June 21, 2020

Descent route in red





# What kind of hazards did you notice?

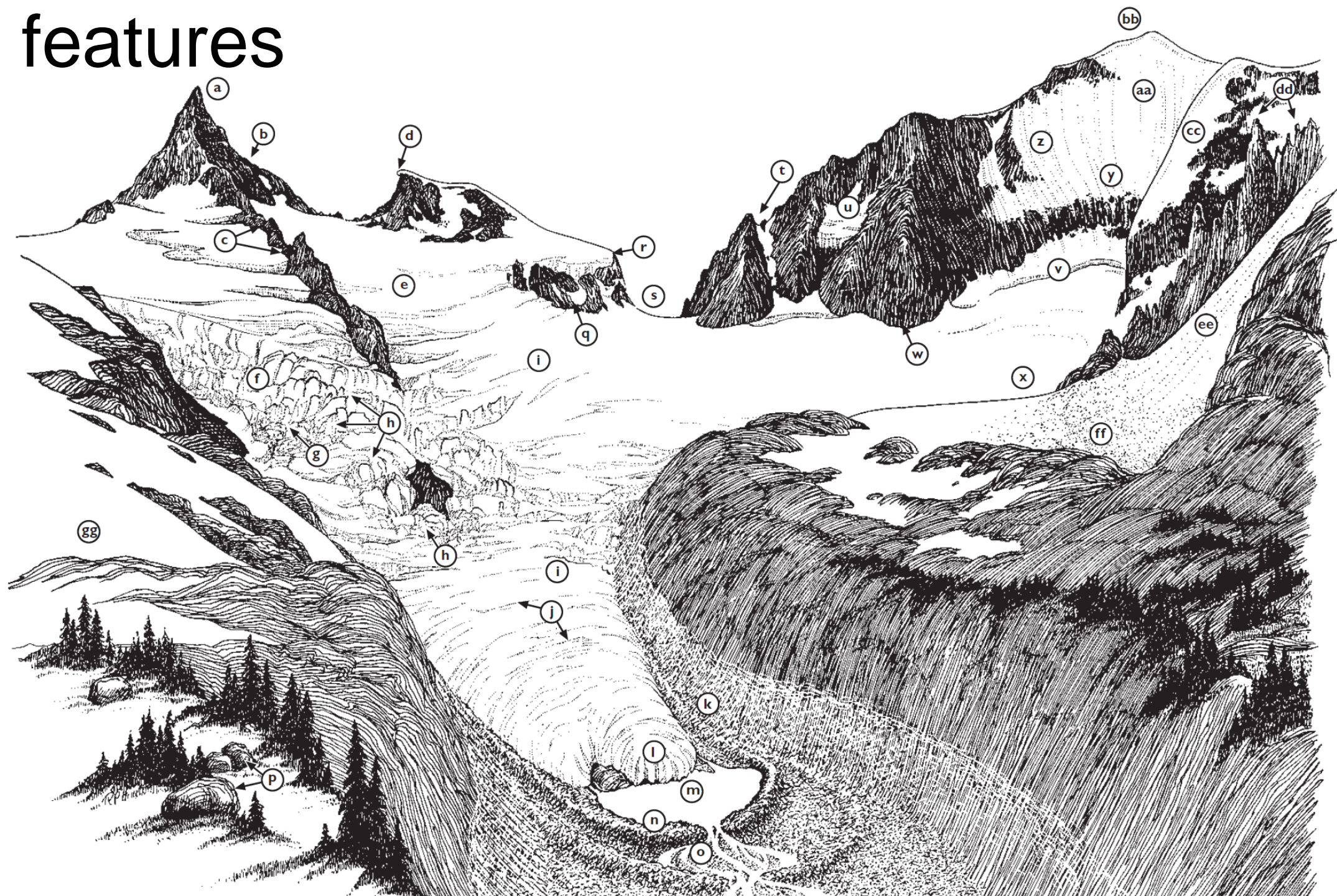
- Dangerous **runout** / exposure
- Crevasses
- Snow conditions – poor traction / sharp ice / crampon balling
- Snowbridges, Tree-wells
- Sun / UV (glacier glasses / sunscreen mandatory)
- Weather / visibility
- What else?





# Terrain features

- a. Horn or aiguille
- b. Ridge
- c. Rock arête
- d. Cornice
- e. Glacier basin
- f. Seracs
- g. Fallen seracs
- h. Icefall
- i. Glacier
- j. Crevasses
- k. Lateral moraine
- l. Snout
- m. Moraine lake
- n. Terminal moraine
- o. Glacial runoff
- p. Erratic blocks
- q. Rock band
- r. Shoulder
- s. Col
- t. Couloir or gully
- u. Hanging glacier
- v. Bergschrund
- w. Buttress
- x. Cirque or bowl
- y. Headwall
- z. Flutings
- aa. Ice wall
- bb. Summit
- cc. Ice arête
- dd. Towers or gendarmes
- ee. Avalanche chute
- ff. Avalanche debris
- gg. Snowfield





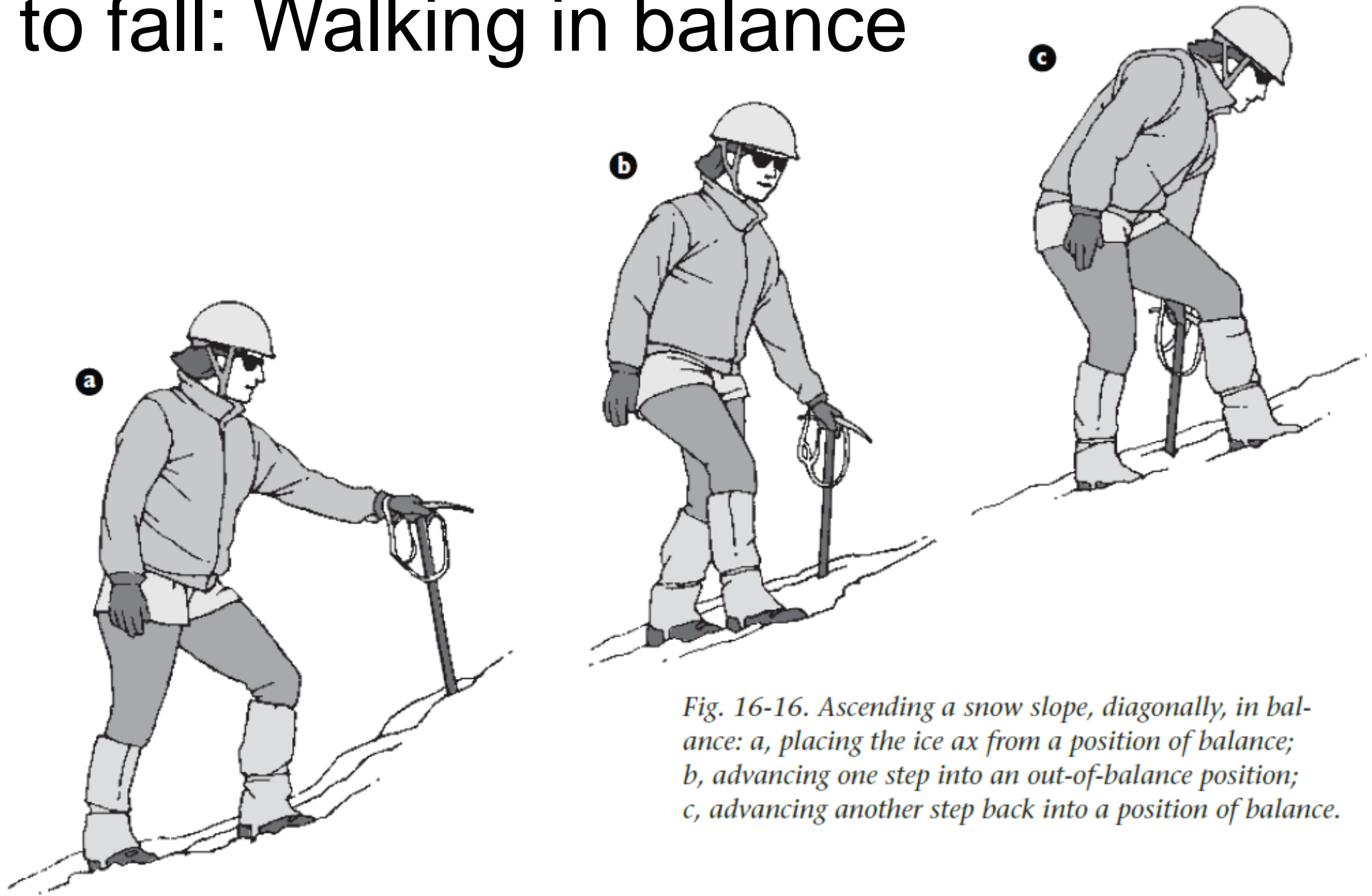
# “Discussion”

- What new terms / features did you learn?
- Why is it useful or important to have precise, shared terminology?
- Any other observations?
- Note all the dangerous runout situations

# Snow travel – techniques and equipment

- Assessing runout and consequence
- How not to fall
  - Walking in balance
  - Wear crampons
  - Self “belay”
- How to move efficiently (not just for snow)
  - Flotation (snowshoes...)
  - Rest step
  - Plunge step
  - Clothing systems (& packing systems)
  - Food and drink systems

# How not to fall: Walking in balance



*Fig. 16-16. Ascending a snow slope, diagonally, in balance: a, placing the ice ax from a position of balance; b, advancing one step into an out-of-balance position; c, advancing another step back into a position of balance.*

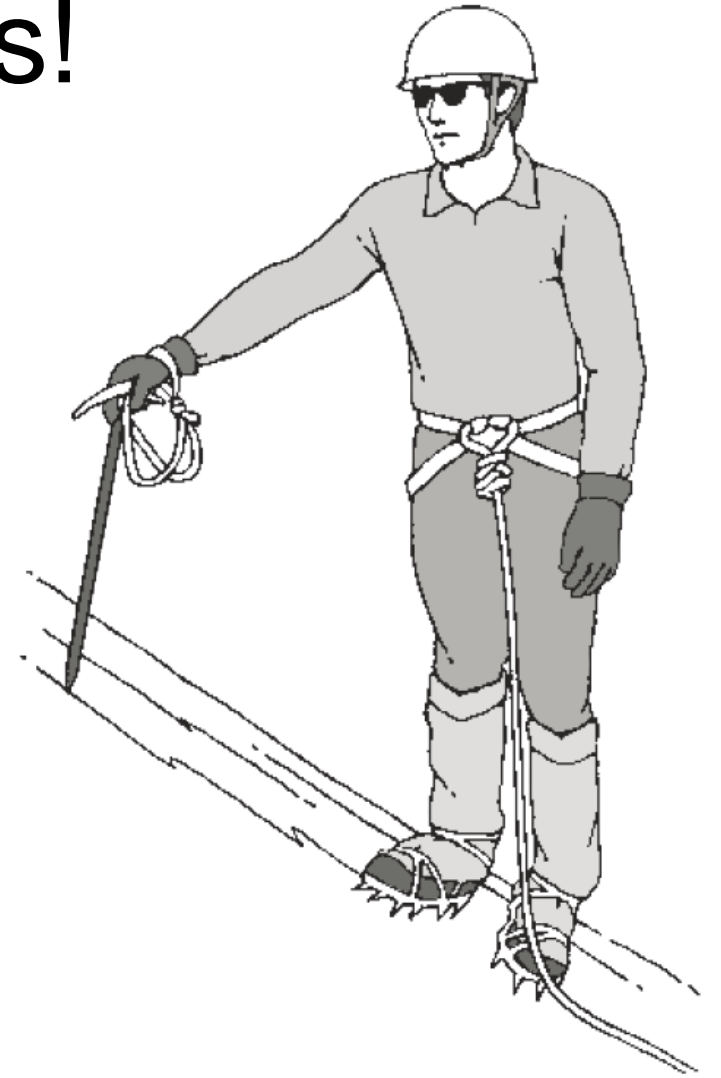
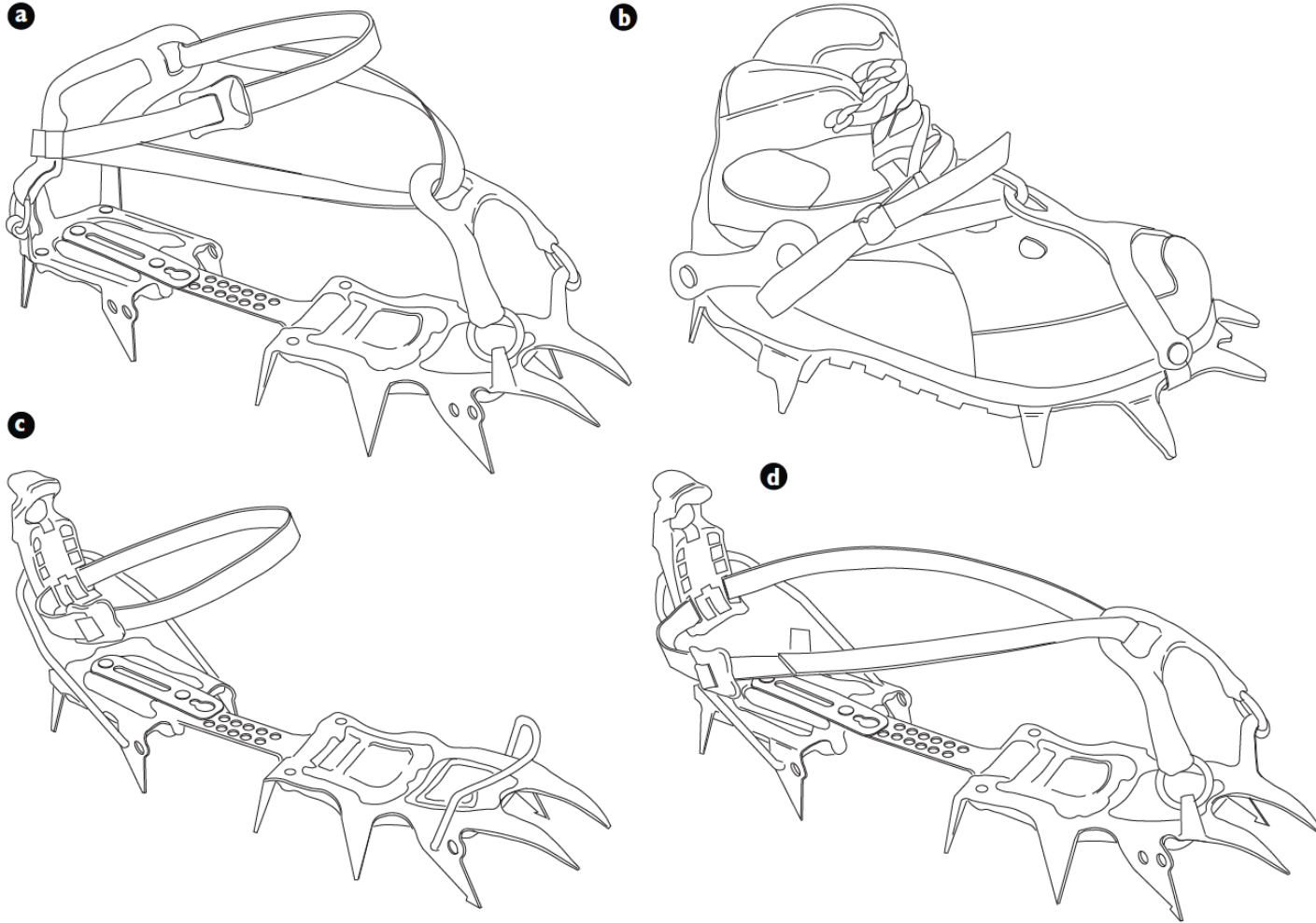




Photo: Silver Peak, Jan 3, 2015

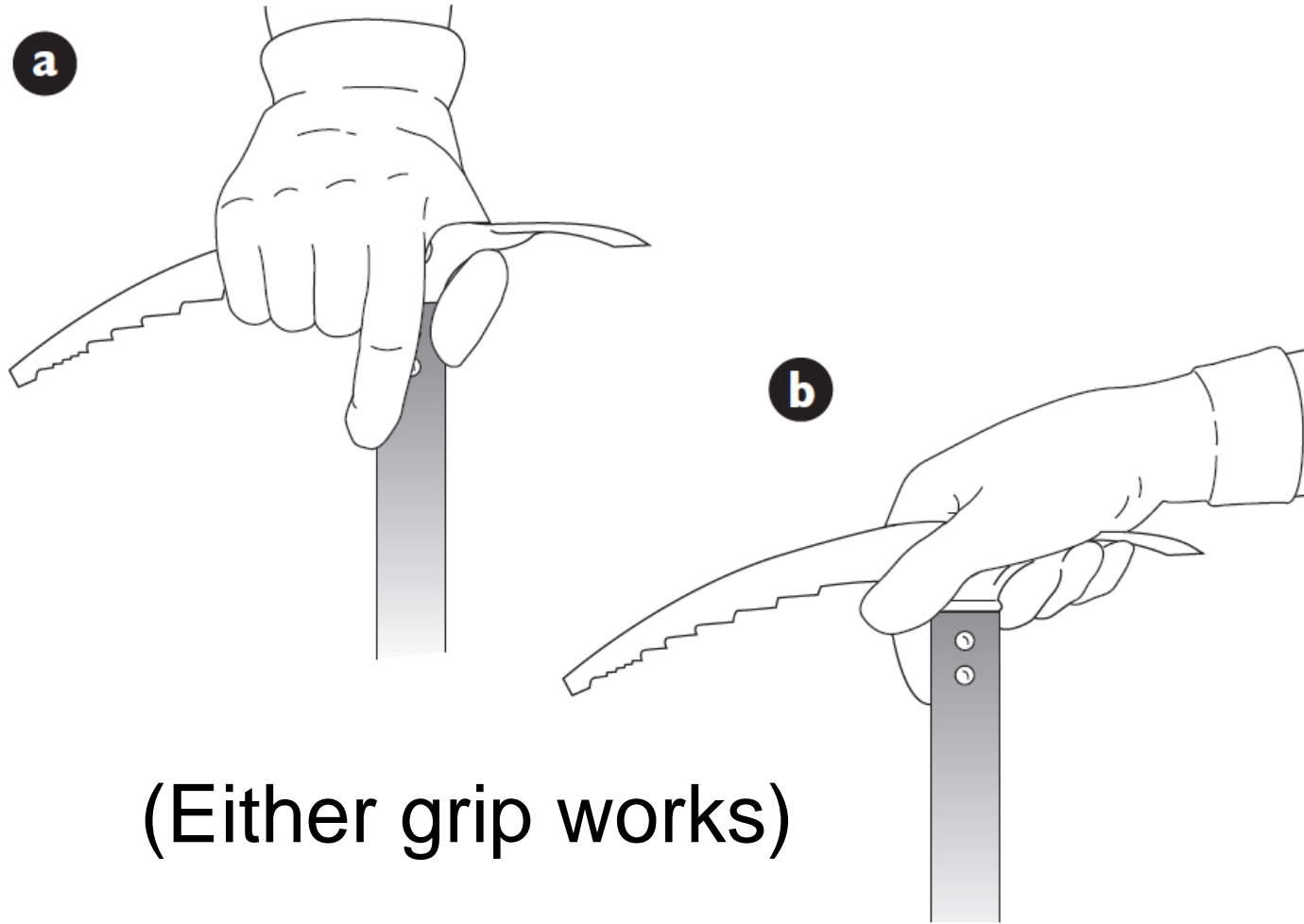


# How not to fall: wear crampons!



*Fig. 18-13. French technique on a moderate slope, flat-footing in a diagonal ascent combined with ice ax in cane position.*

# How not to fall: Self-belay



*Fig. 16-15. Grasping an ice ax: a, self-arrest grip; b, self-belay grip.*



*Fig. 16-23. Facing in (backing down): place ax low on the slope and don't lean in toward the slope.*



# Other ice axe considerations

- When to use it? (e.g., likelihood and consequence of fall)
- Leashed or un-leashed
- Length
- Shaft / pick shape and details (more advanced topic)
- Always wear gloves

# Other crampon considerations

- Too sharp (out of box) can be a hazard
- Gaiters help limit snagging too (if snugly fitted)...
- **Fit them to boots ahead of time** (double check!)
- Requires careful / attentive walking
- Aluminum v. steel (steel more versatile, preferred for first pair)
- Avoiding a fall with crampons is way better than counting on stopping a fall with self-arrest

# How to move efficiently:

- Soft snow (esp. Winter / early Spring): **Flotation** (snowshoes..., or skis)
- Hard snow (Late spring through autumn:)  
**Crampons**



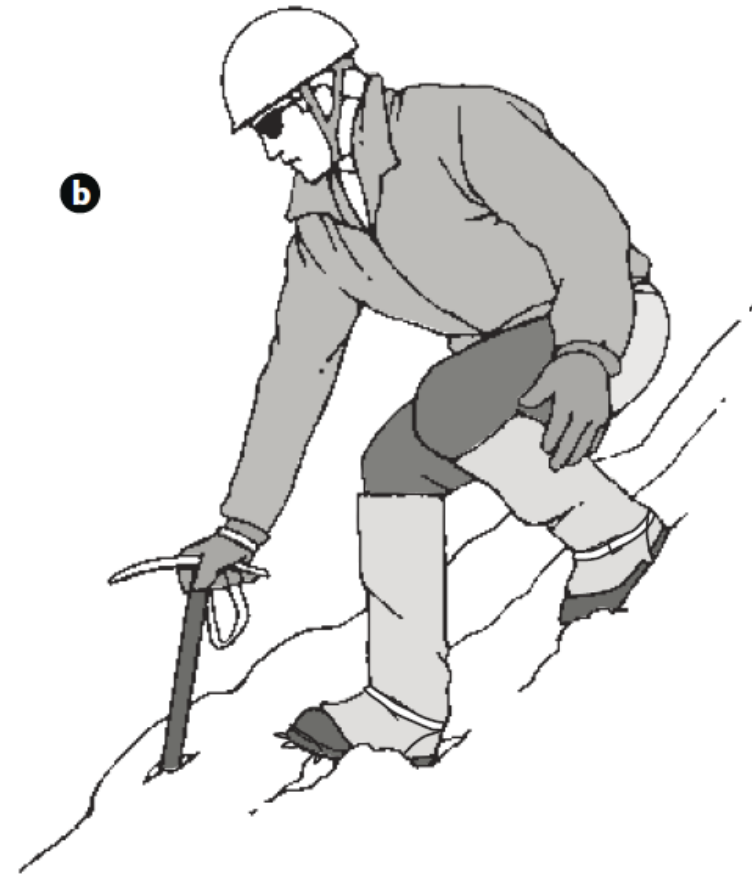
Photo: Mazama Ridge, snow overnight, March 2015



# How to move efficiently (kicking steps)

- Lead step-kicker should consider fitness and height of team
- How high each step?
- Straight up or traversing?
- Take turns in lead to spread step-kicking effort
- Reinforce steps as you go (2<sup>nd</sup>, 3<sup>rd</sup> person, etc.)
- Pacing important to maintain efficient cardio

# How to move efficiently (going down): plunge step (“nose over toes”)





# How to move efficiently (going down): can you glissade safely?



Fig. 16-24. Glissades: a, sitting; b, standing;

# How to move efficiently: other considerations

- Clothing and packing systems
  - Layers that can be added and subtracted
  - Start out cold (seriously – sweat is your enemy)
- Food and hydration
  - Keep eating; keep quick calories in your pocket
  - Keep drinking; hydration tube very helpful
- Clear, open communication (creates shared expectations)
  - Planned rest breaks (e.g. 5 minutes every hour) can help



# Last resort: self-arrest (may not work)

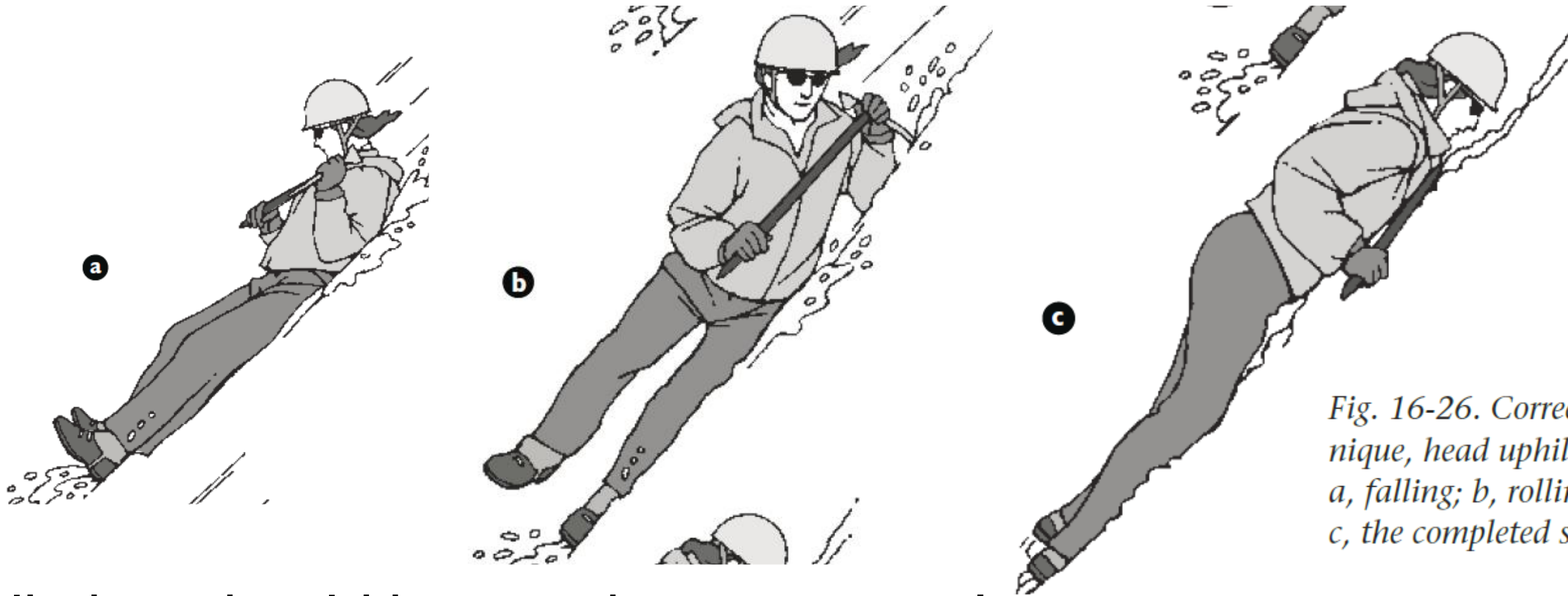


Fig. 16-26. Correct self-arrest technique, head uphill:  
a, falling; b, rolling; c, the completed stop.

Climber should be wearing crampons!

# How to move safely (here, quickly!!!)



Photo: Mount Rainier, Disappointment Cleaver, June 21, 2015

# Exercise – what gear to bring?

- You will be climbing Mt. Cruiser in Olympic National Park
  - In mid-July, over two or three days, depending on how long it takes
  - The approach is long: 7.5 miles one way from the trailhead to Flapjack lakes
  - Forecast: daytime highs in the 80s, night-time lows in the 50s; partly cloudy overnight, clearing by morning
  - Handout has route description and map
- In your breakout groups, imagine you are at the trailhead (**no cell coverage**, e.g. no googling past trip reports): **discuss pros and cons of bringing crampons and ice axe**
  - And, if and when you would use them, will you also put on harnesses / use the rope? (Which you are already planning on bringing because Cruiser is a rock climb)





Photo: Mt. Cruiser, July 12, 2014



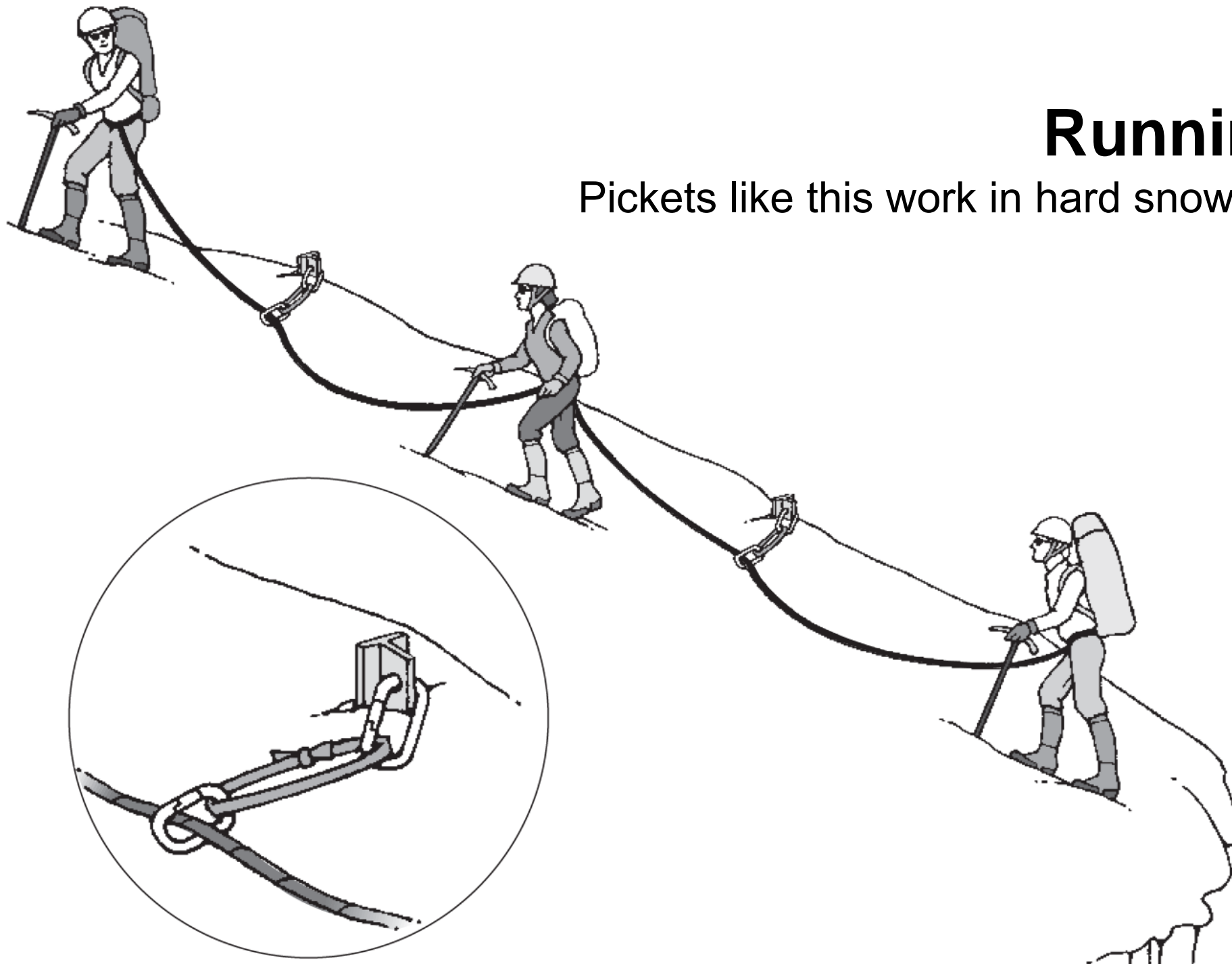
# Snow anchors and belays

When the risk of a fall increases in likelihood or consequence



Photo: Mount Rainier, Disappointment Cleaver, June 21, 2015



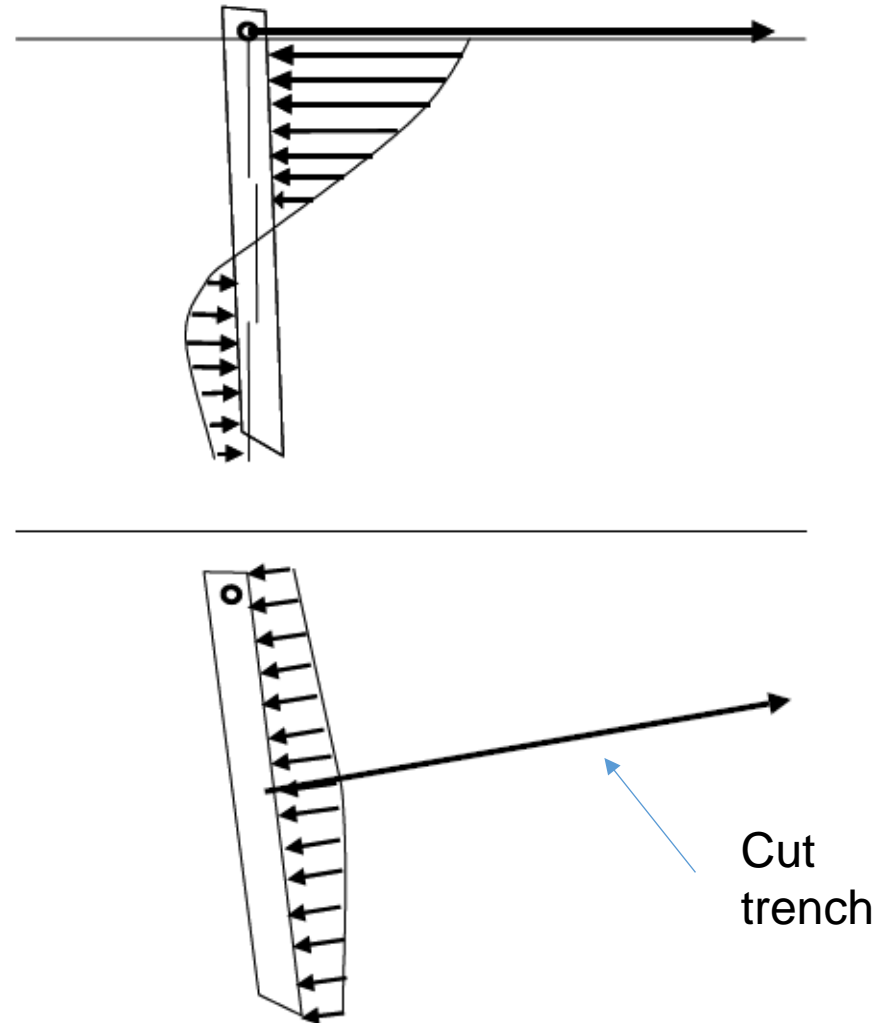


# Running belay

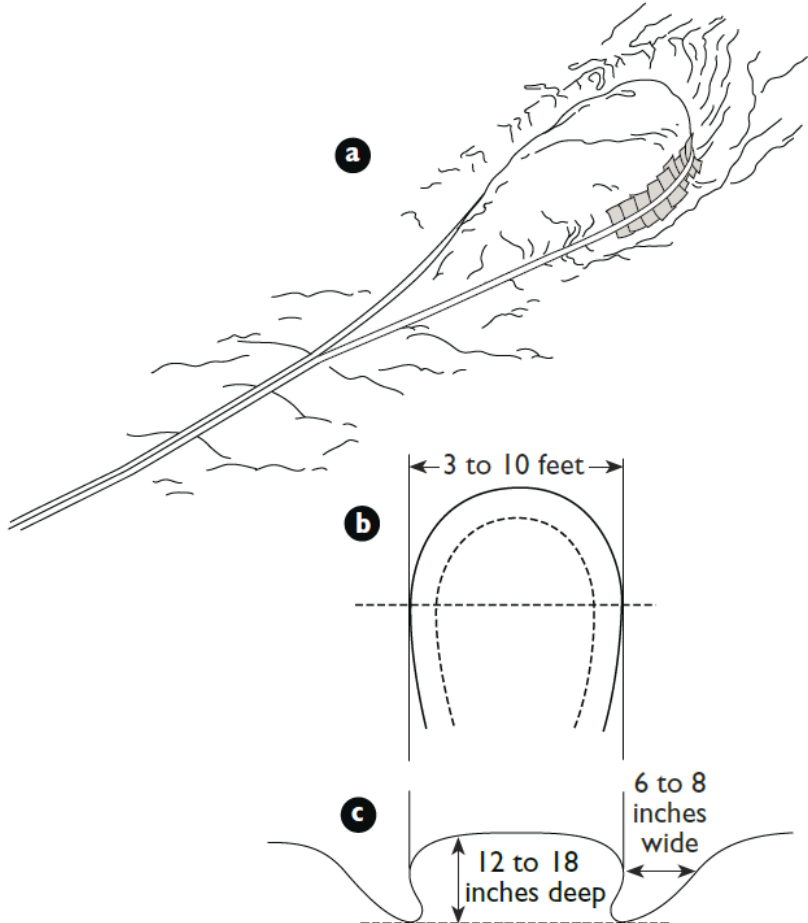
Pickets like this work in hard snow ("neve") only

# Pickets: Vertical, mid-clip usually best

- Snow has strong compressive strength, weak shear strength
- Vertical orientation easier to get a large area of compression
- Mid-clip best if feasible
- Exception when t-slot picket better: weak, dry snow that cannot be compressed



# Belaying & rappelling in snow



*Fig. 16-35. Snow bollard: a, in a rappel setup; b, viewed from above; c, cross section.*



*Fig. 16-39. Sitting hip belay.*





Photo:  
Mount Rainier, Emmons Glacier, June 21, 2014



Consider a belay?

Photo: Eldorado Peak, June 25, 2015



“Discussion”: Should you rope up on steep snow if you aren’t placing pickets or other protection?



Photo: Mount Shuksan (approaching summit pyramid), June 5, 2016  
(photo by Stephen Sugiyama)

# Intro to Crevasse Rescue



(See separate slides from Deling  
Ren)

# Managing risk from Avalanches

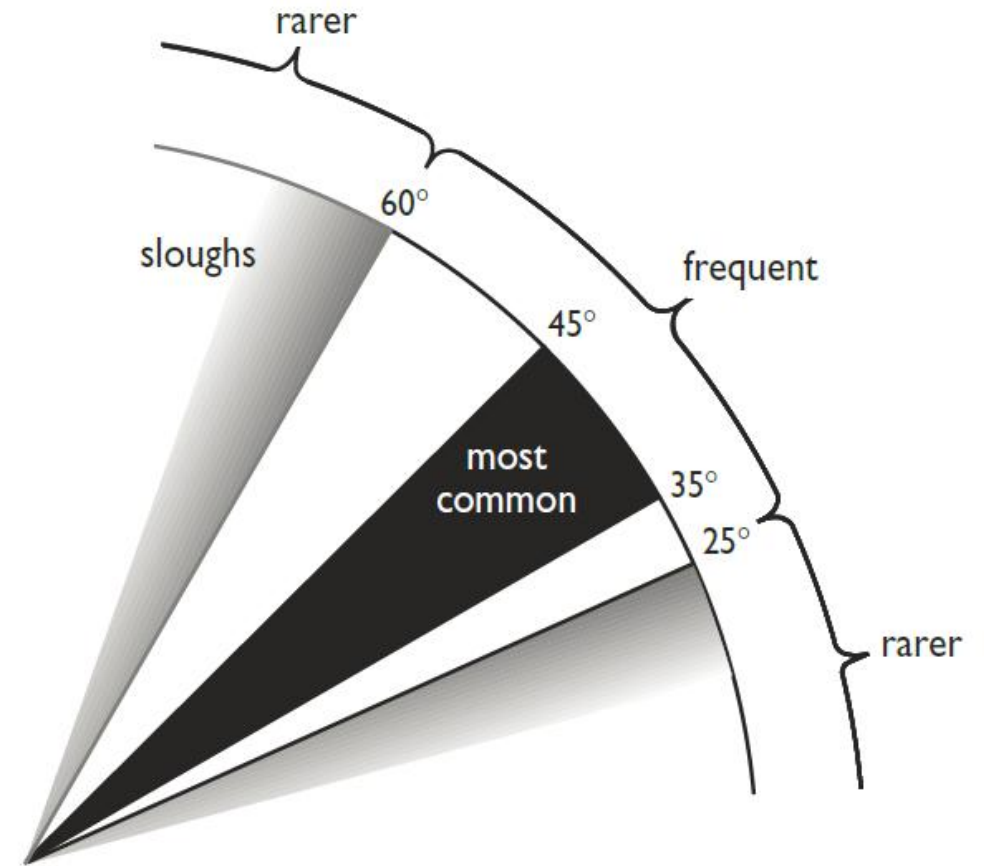
# Confirmation bias can be deadly

- “Well, they crossed it safely just an hour ago”
- “So-and-so has been here before”
- “I haven’t heard of any recent avalanches”
- “I don’t see any avalanches”
- How relevant are these observations?



# You can't learn all about avalanche safety in one evening

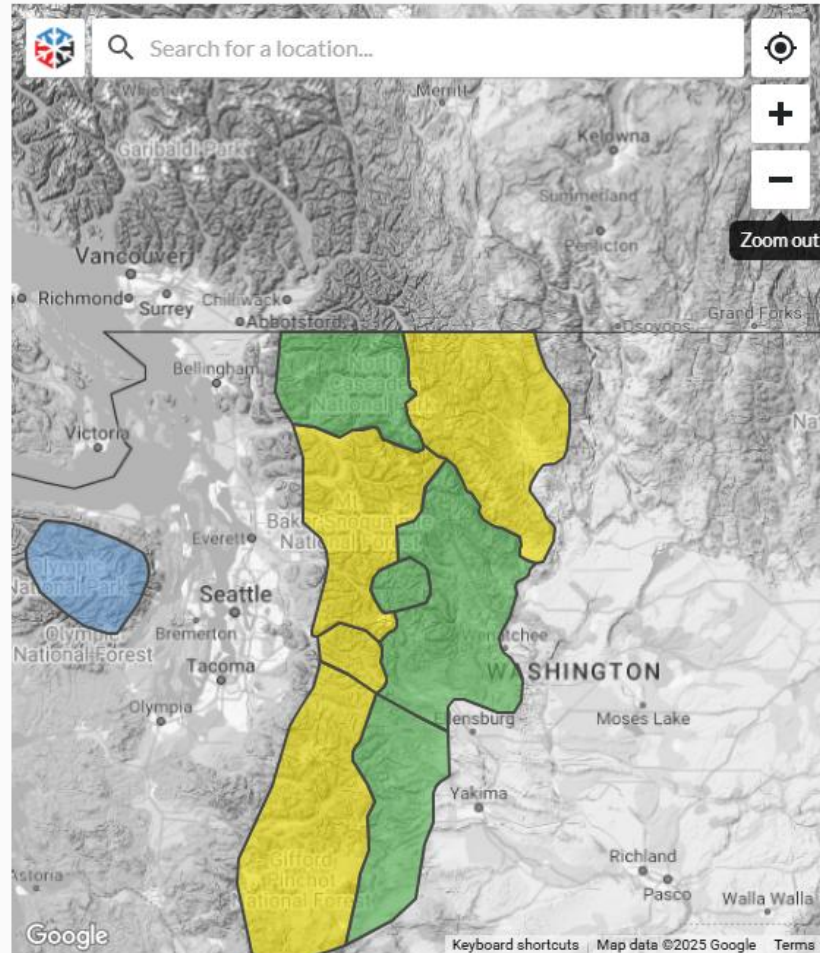
- But you can learn:
  - Terrain selection, e.g. avalanche angles.
  - Critical communication practice:
    - Agree to travel as a team, speak up
    - Challenge assumptions
    - Respect anyone's veto
  - Resources:
    - Northwest Avalanche Center (NWAC)
    - AIARE..(classes)
    - Mapping tools that shade slope angles
  - Some things to avoid



*Fig. 16-42. Frequency of avalanches on slopes of various angles.*

# Yesterday's Avalanche Forecast (NWAC)

## Avalanche Forecast By Zone



Avalanche Danger Scale ⓘ



## Get Involved

Become a Member

Become a Volunteer

## News

### Spring Forecast Schedule

- [Avalanche Forecasts](#) issued at 630pm through Sat, Apr 12th
  - Avalanche Forecast Morning Updates issued at 7:30am as needed
- [Mountain Weather Forecasts](#) issued at 7am & 230pm through Sun, Apr 13th
  - 230pm Mountain Weather Forecasts issued daily through Sun, Apr 27th
  - Limited Spring Operations after Sun, Apr 27th
- [Recent Public Observations](#)

### NWAC Community:

- Support your local community by [submitting an observation](#).
- We built an app! You can download here: [Apple](#) or [Android](#)
- Community Resources for Grief Support: [American Avalanche Association \(A3\)](#); [Resilience Project](#), [American Alpine Club: Climbing Grief Fund](#), [Survivors of Outdoor Adventures and Recovery \(SOAR\)](#)

### Recent Blogs

[Motorized Avalanche Awareness Classes](#)

[What will La Niña mean for the Pacific Northwest mountain snowpack?](#)

[NWAC's Volunteer Give-Back Program](#)

# Understand the potential problems

## BACKCOUNTRY AVALANCHE FORECAST

[Print](#)

### 📍 SNOQUALMIE PASS

#### ISSUED

Tuesday, April 1, 2025 - 6:30PM

#### EXPIRES

Wednesday, April 2, 2025 - 6:30PM

#### AUTHOR

Dallas Glass



#### THE BOTTOM LINE

A few inches of soft snow might hide firmer and thicker slabs on wind loaded slopes. Look for large drifts and sharp cornices to point toward potential slabs. At lower elevations, open creeks, exposed logs, and downed debris could make travel tricky.

#### Avalanche Forecast

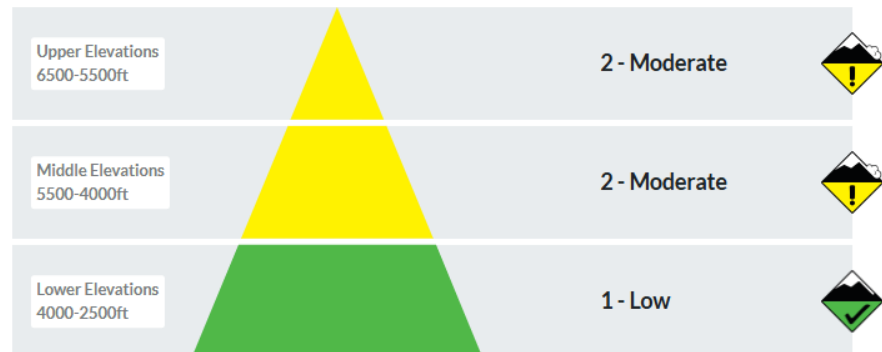
#### Observations

#### Avalanches

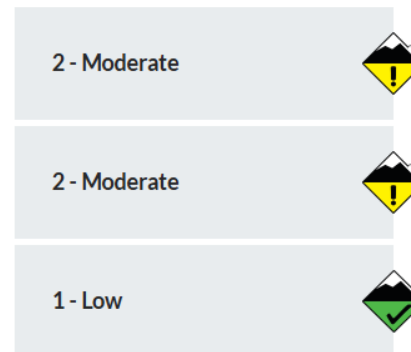
#### Weather Forecast

## AVALANCHE DANGER ?

Wednesday, April 2, 2025



Thursday, April 3, 2025

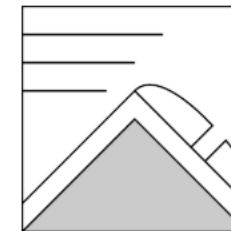


🔍 Elevation Band Descriptions

## AVALANCHE PROBLEMS (1) ?

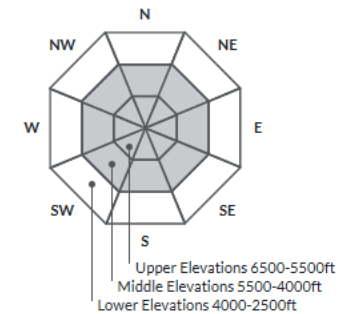
### PROBLEM #1: WIND SLAB

#### PROBLEM TYPE

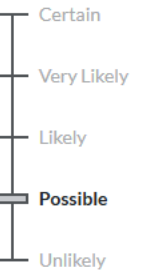


Wind Slab

#### ASPECT/ELEVATION



#### LIKELIHOOD



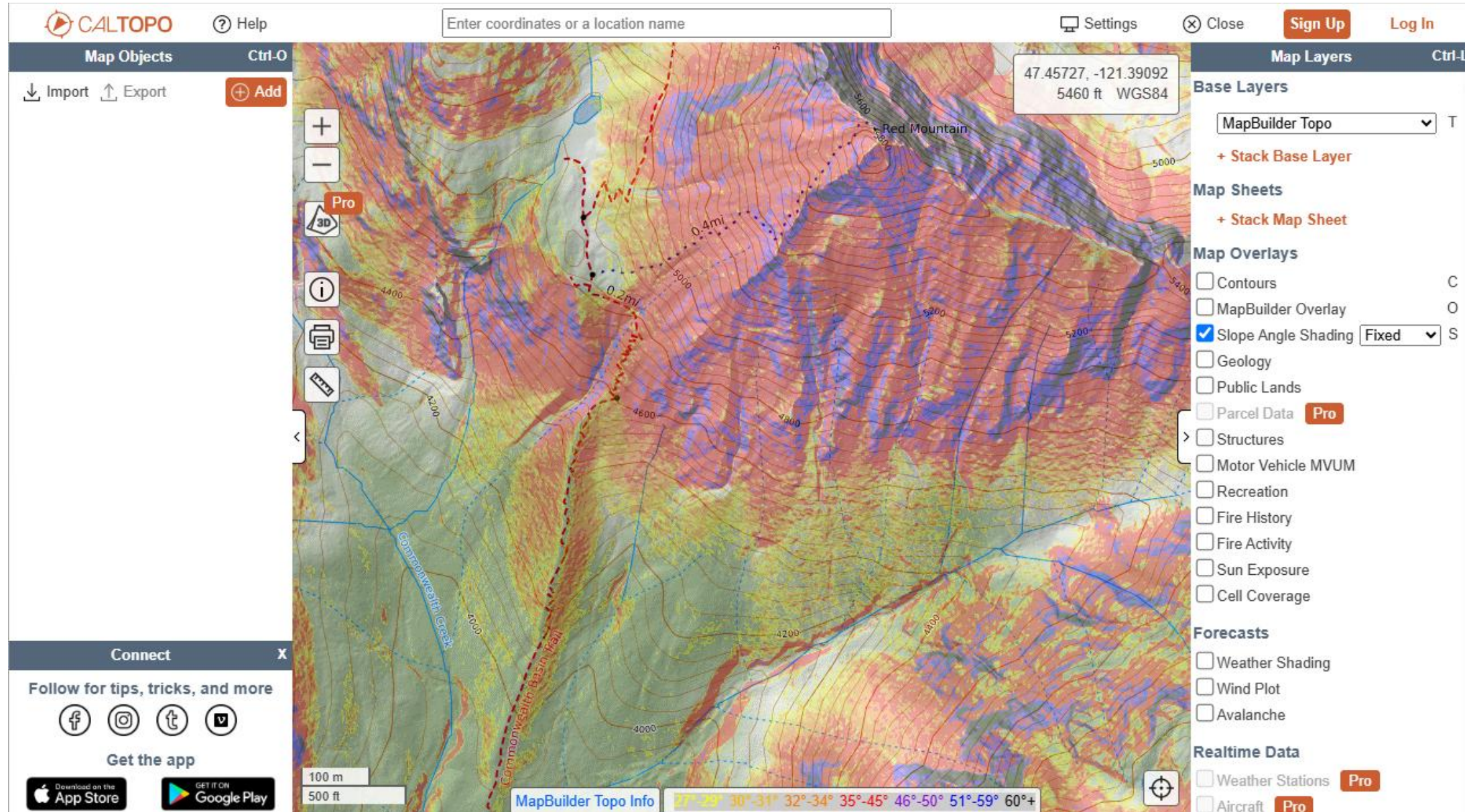
We don't know much about potential wind slabs at the Pass. What we do know is that it snowed and the wind blew. Set out expecting to find wind loaded slopes until you can prove otherwise. You're most likely to encounter wind slabs at higher elevations, below cornices, in the tops of chutes, and along the base of cliffs.

A few inches of new snow could make it a bit harder to spot these firm pillow-like slabs. Keep a keen eye out for signs of wind transported snow and pay attention to how the snow feels underneath you.

With the mild weather, this problem could heal quickly. However, very steep terrain, unsupported slopes, and convex rollovers often produce avalanches even when more planar slopes stop failing.



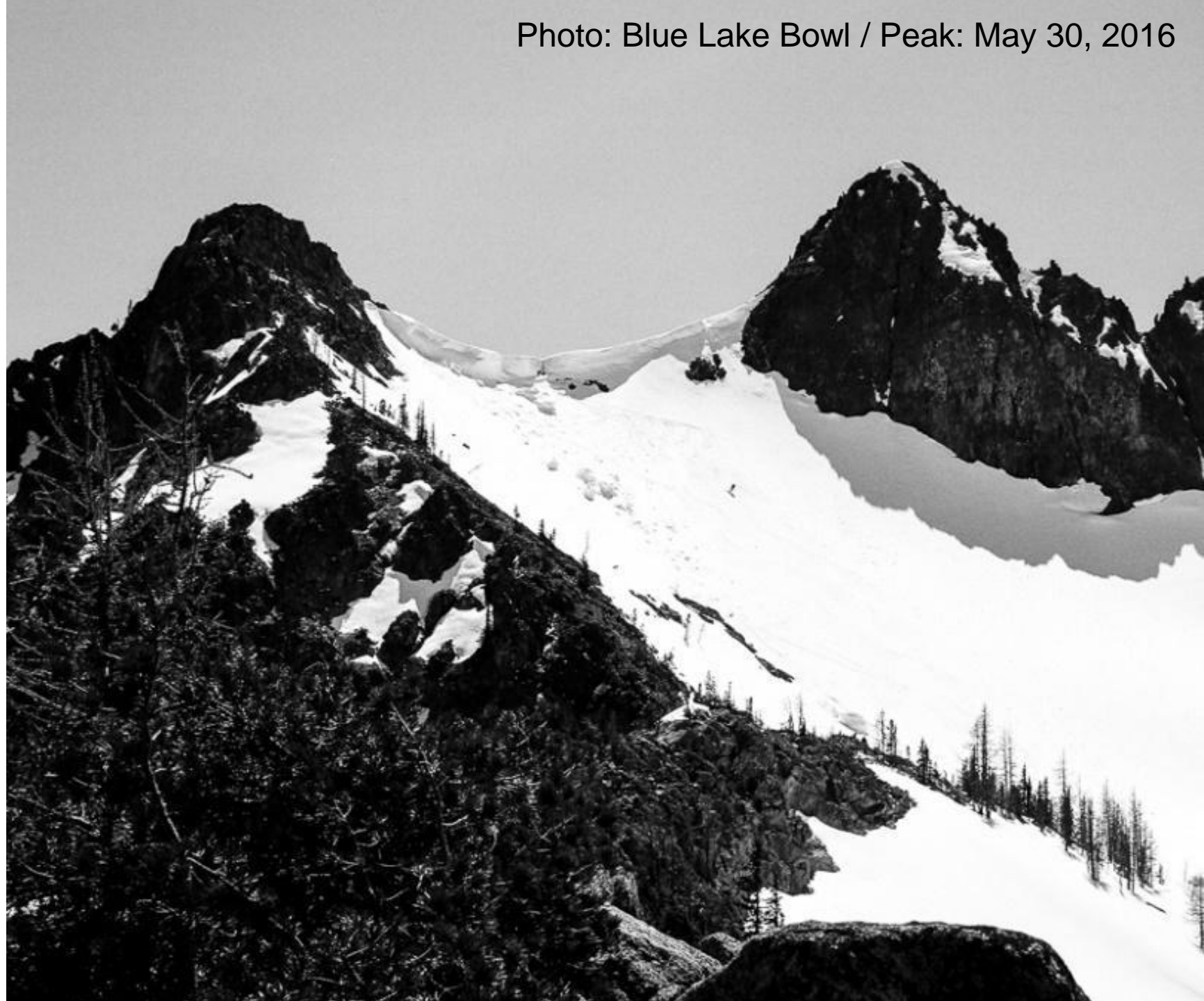
# Evaluate terrain risks, using maps



# Things to avoid:

## Cornices...

Photo: Blue Lake Bowl / Peak: May 30, 2016





# Things to avoid: pinwheels / roller balls





# Other avalanche considerations

- Slope / solar aspect matters a lot
- Avoid terrain “traps” / cliffs below possible avalanches
- Beware “whoompfing”, shooting cracks
- Beware rapidly warming temps, especially in spring
- Favor ridgelines in your travel (not bowls)
- If anybody isn’t “feeling it”, trust your instincts, come back another time

# Snow camping

Different than summer camping

# Snow camping –different than summer camping

- Obvious
  - Cold
  - Heavier / more gear
- Less Obvious
  - Snow is nice to camp on
  - Tents more difficult to set up
  - Site selection may be more critical
  - Wind may blow your tent away

Photo: Mount Baker, May, 2012





# Shelter selection for camping on snow

- Considerations include weight, comfort, protection, ease
- Need some sort of snow anchors
- Evaluate trade-offs in selecting shelter for each situation

	Weight	Comfort	Protection	Ease
Tarp	~1 lb	Low-Med	Low-Med	Low
Bivy	1-2 lbs	Low-Med	Low-Med	High
<b>3-season tent</b>	<b>2-4 lbs</b>	<b>Med</b>	<b>Med</b>	<b>Med</b>
Pyramid	2 lbs	Med-High	High	Med
4-season tent	5-7 lbs	High	High	Med



Photo: Snow kitchen,  
Mazama Ridge, snow overnight, March 2015

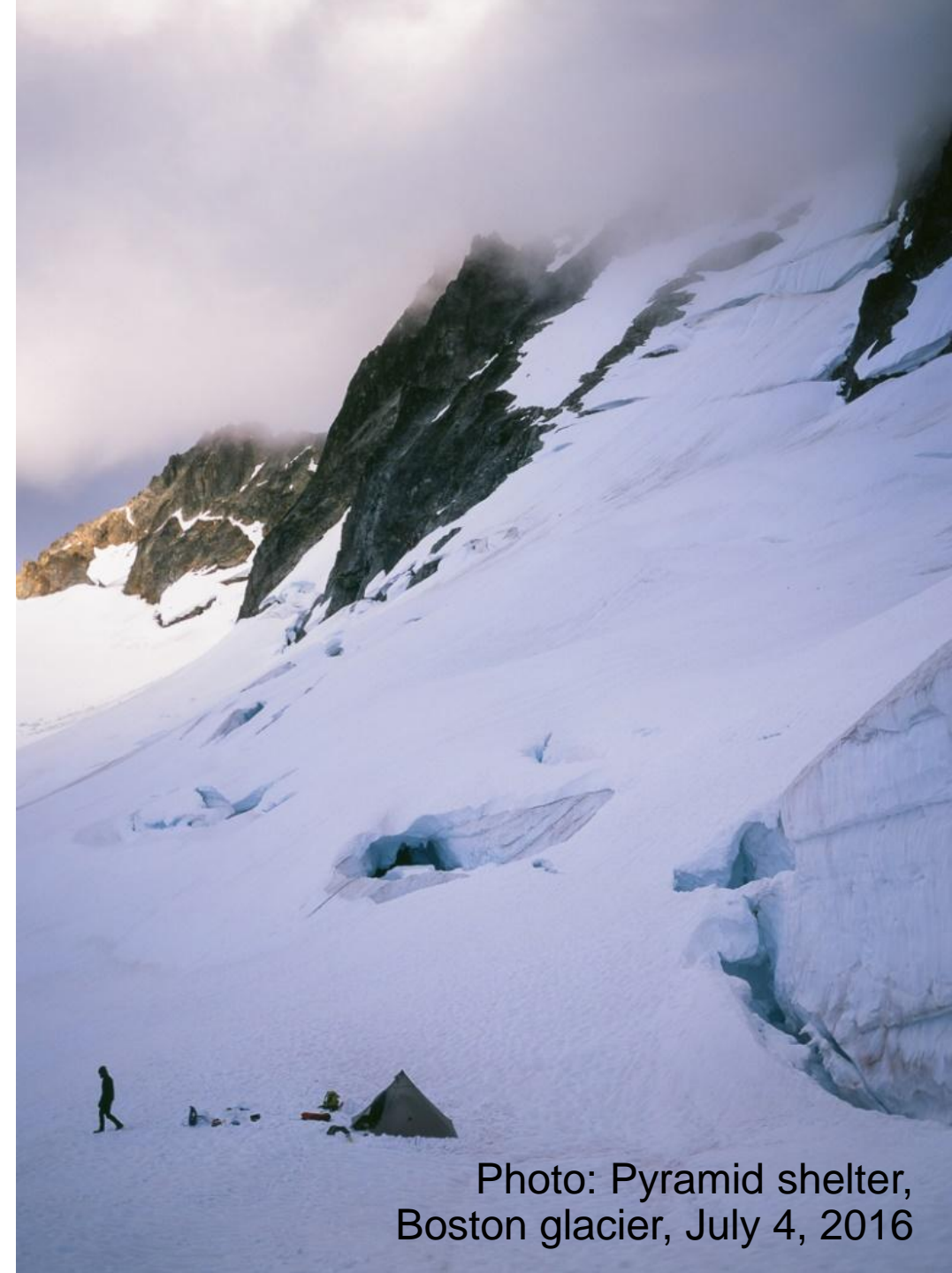


Photo: Pyramid shelter,  
Boston glacier, July 4, 2016



Photo: 4-Season tent  
Headlight Basin, below Ingalls Peak, May 15, 2020

Ingalls Peak, South Ridge (5.4)





# Snow and winter camping site selection

- Seek
  - Wind protection
  - Snow deep enough to dig out “built-in” features?
  - Flat platform (or can make flat)
  - Secure anchoring
- Avoid
  - Avalanche terrain or runout
  - Low spots (slush?)



Photo: Decker Glacier, Spearhead Traverse BC  
April 2017

# Other winter camping considerations

- Sleeping bag: ~15 degree usually suffices for three-season bag for Cascades
- Sleeping pad: need R-value 5 for snow
  - Often means two pads, e.g. closed cell foam + inflatable
  - Or... inflatable R-value 5+ pad (expensive, e.g. Therm-a-Rest X-therm)
- Clothing system
  - Base layer, windbreaker, puffy, & shell may be all you need
  - Can add and subtract each successive layer without needing to remove the prior one
- Extra fuel & time to melt water for snow
- Dedicated bathroom area and pack-it-in-pack-it-out



**Be safe, have fun, learn  
something, and maybe  
get to the summit!**

Photo: Eldorado Peak, June 25, 2015 (Forbidden peak in background)



# Thank you

- Pete Erickson
- [pugetgold@gmail.com](mailto:pugetgold@gmail.com)