

Backcountry Weekly Summary

Intern:	Zach Kinler
Week and Year	January 4-10, 2019
Backcountry zone:	Crested Butte Area

Notable Weather Events (snowfall, SWE, winds, temps, etc.)

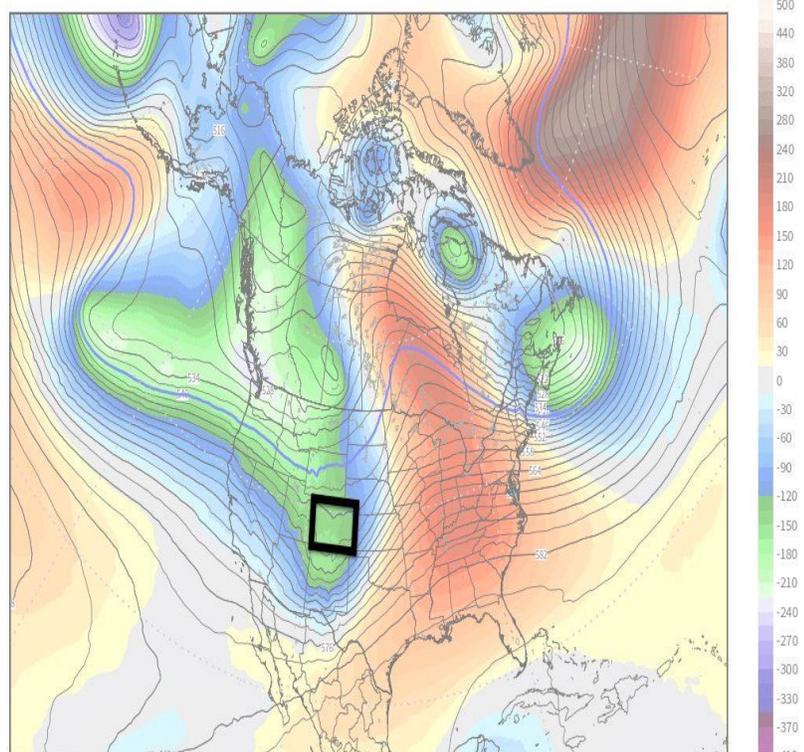
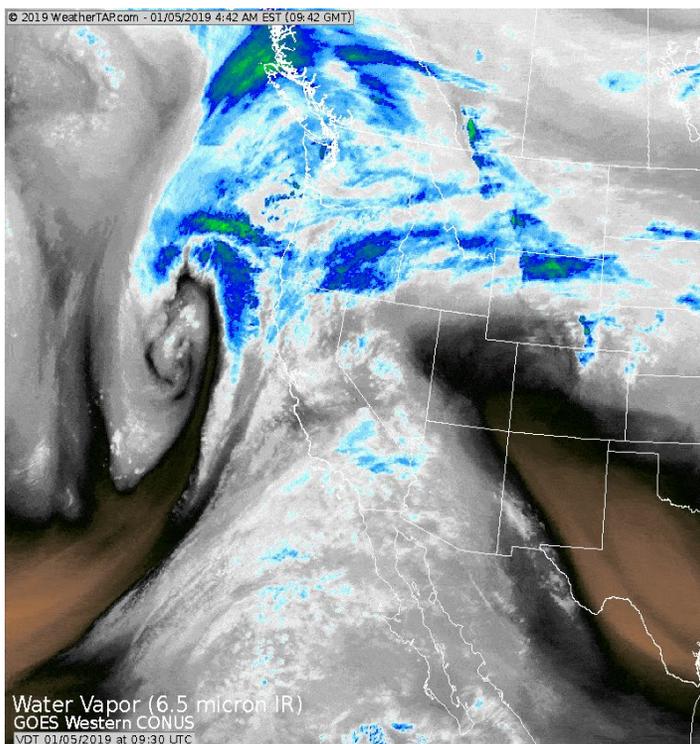
This week began with high pressure in control but a phased trough off the West Coast supported by a strong jet stream, ample moisture and cold air organized itself and marched into our area on 01/06-01/07. This system provided a 1-2 punch with the first wave riding a 140 kt jet. Snowfall started falling early on the 6th under calmer conditions but strong SW winds quickly followed along with moderate to heavy snow. After a brief break, the next phase of the storm moved in as a shortwave in W-WNW flow. This provided another shot of moisture with continued favorable orographics and it is no surprise we saw the snow totals go up. Winds were moderate to strong with the second wave riding a 120 kt jet. Below are snow totals as we saw 10"-20" in our favored zones.

Irwin: 19" snow/ 1.8" SWE
Schofield: 20" snow/ 1.7" SWE
Gothic: 16.5" snow/ 1.22" SWE
CBMR: 15" snow (Estimated)

Warm temperatures and sunny skies followed for a couple days and the week ended with a weak mid-level trough rotating through a ridge of high pressure over the Great Basin. This system lacks upper level support with the jet stream split to our north and south. Moisture is limited as well and thus snow totals are expected to be light with the best dynamics forming East of the divide.

Water Vapor Imagery from the 01/06 storm showing abundant moisture and strong dynamics moving towards Colorado.

Atmospheric Pressure for the same time period showing the 01/06 storm dropping down the West Coast on its way to Colorado.



Snowpack (weak layer date(s) and status, structure, stability trends)

11/22/2018 Interface: This interface was given several names, Gobbler interface, Turkey Day interface, Thanksgiving interface. Early November snowfall provided a mostly continuous snowpack in our snowbelt North and West of town, and continuous snowpack on N-E aspects near and above treeline in the Eastern/Southern zones. This snowpack faceted away during our mid November dry spell into well developed facets and early Depth Hoar. Once buried this layer was immediately reactive with modest loads and easy propagation. During the first week of December after continued snow and winds, several large (D2-D3) natural avalanches in the alpine and near tree line failed on this layer as well as a skier triggered D2 avalanche on a West aspect in an area where explosives had been used prior with no results. This highlights the tricky nature of this PWL. During the second week of December, this layer produced another small skier triggered slide on a West aspect BTL and two large (D2-D3) slides on E-SE aspects in the alpine after continued winds and snowfall.

In our Eastern zones, this layer was alive and well in early-mid December and has produced “plenty of old avalanches” as seen in this observation from the [Cement Creek](#) zone where the snowpack is much thinner. A visit this week to the Brush Creek zone following our recent avalanche cycle revealed the weak layers in the middle of the snowpack as the greatest concern however, a few of those avalanche were able to step down to this old snow near the ground.

Outside our Eastern zones, we have not seen a natural or human triggered avalanche on this layer since Dec. 13th. Reports of cracking and collapsing on this layer are non-existing and long column tests are continuing to consistently show no results on this layer. These facets and depth hoar are rounding and sintering and are at least 4F hardness in many places with deeper locations in the alpine at 1F hardness.

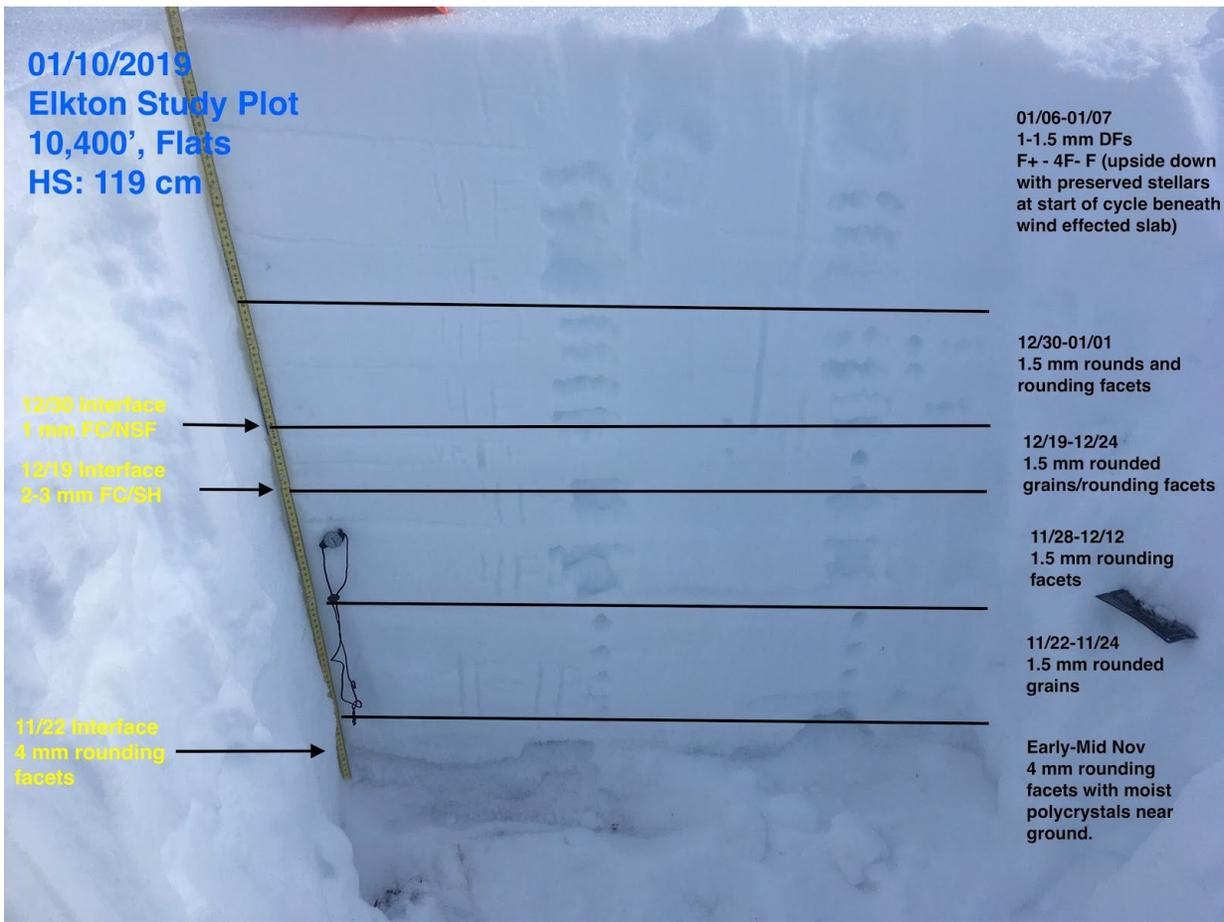
For the deeper parts of our zone, there is no doubt that this layer has been Stubborn-Unreactive for a couple weeks now but can it hold a large loading event or the weight of a large avalanche releasing in the upper snowpack? Will avalanches in our Eastern zones continue to step down? Still on the list.

12/12/2018 Interface: There were multiple nights of Surface Hoar formation during this week which finally got completely buried on 12/12 across the zone by several inches of snow. Distribution is fairly widespread and has been found in the Kebler Pass, Paradise Divide and Crested Butte areas as seen in these obs([Wolverine Basin](#), [kebler-pass-buried-surface-hoar](#), [below-and-near-treeline-obs-out-slate-river-valley-and-buried-SH](#)). Recently, this layer has been less reactive in tests however it is very close to the 12/19 interface and it would be hard to rule it out on a few of the recent slab avalanches that have released in the middle-upper snowpack.

12/19/2018 Interface: This may be our most widespread weak layer which developed over the second week of December with high pressure, sunny skies and cold overnight temperatures. This layer is now buried ~50-70 cm with softer F-4F slabs in protected areas to 1F slabs on certain leeward features near and above tree line. On sunny aspects, we are dealing with a variety of crust/facet combos; shady aspects have surface hoar down low and near surface facets as you get near and above treeline as seen here: [se-s-sw-ntl](#) and [afternoon-lap-skook](#). After the X-mas storm and with SWE amounts on this layer exceeding 1”, several D2 avalanches were observed here ([p-divide-shaded-treeline-structure](#) and [north-below-treeline](#)). Last week, we saw many a small avalanche releasing on this layer, especially in the Cement Creek zone. On 12/29, a small wind slab on an open South aspect was more than likely on this layer. This layer has been clearly visible in profile walls and continues to get results in small and long column tests. This week, many of the avalanches observed broke very near this layer and test results continue to point to this as our most concerning layer.

12/21/2018 Interface: This ob from [Irwin](#) highlights this layer as a crust and small and long column tests from the Elkton Study Plot last week had failures on this layer which now sits 5 cm above the 12/19 interface at this site. Last week, observations from Irwin highlight a layer of facets between the 12/19 and 12/21 crust keeping this on the radar for now. This layer has not been reactive at the Elkton Plot the last 2 weeks.

12/30/2018 Interface: This is the most recent interface to join the party and is another Surface Hoar layer on shady aspects as seen here ([Dec 30 interface](#)). In this report ([here](#)), this Surface Hoar was observed to remain preserved on South aspects which is rare however, a cold night on Dec 29th was followed by clouds moving in early on the 30th which may have prevented this layer from cooking off on the southerlies. This is another interesting layer in our upper snowpack Persistent layer cake and will continue to be monitored for activity.



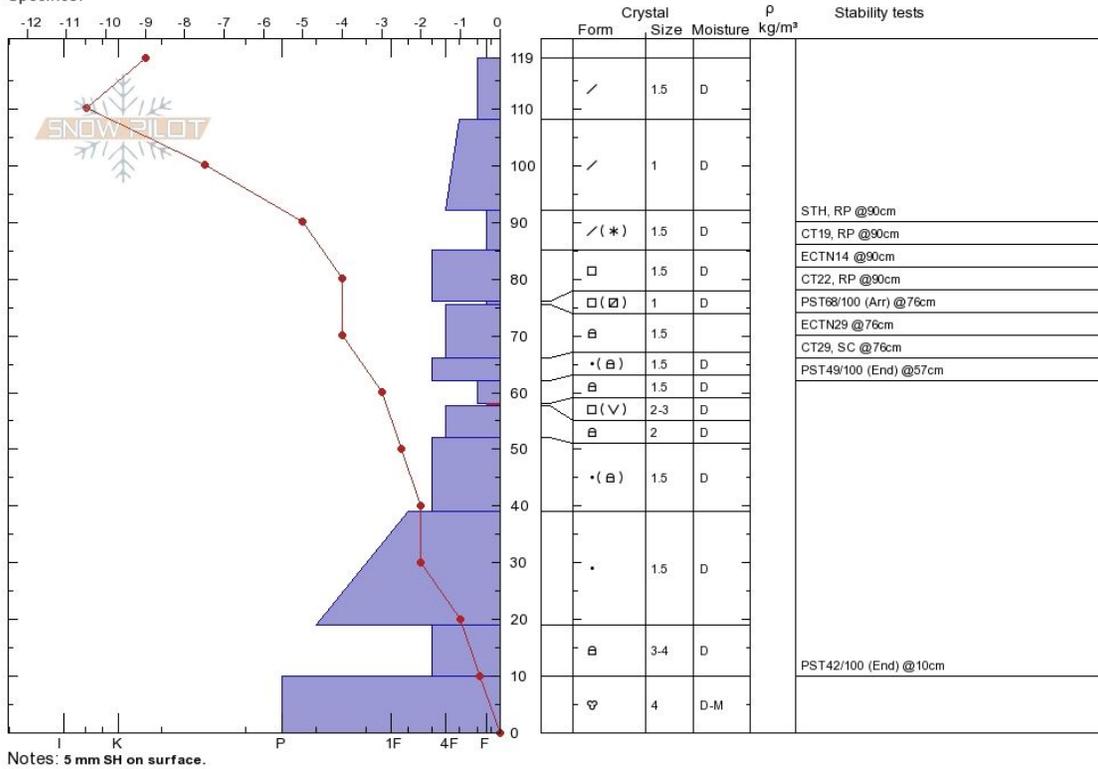
Elkton Study Plot
Elk Mountains
CO
Elevation: 10400 ft
Aspect: 225°
Specifics:

Zach Kinler
Thu Jan 10 09:00 2019
Co-ord:
Slope Angle: 5°
Wind Loading: no

Stability:
Air Temperature: -5°C
Sky Cover: FEW
Precipitation: NO
Wind: Calm

HS119 PF55
Stability Test Notes

Layer Notes
57.5-58: Problematic layer



Avalanches

The 01/06 cycle fell on a variety of weak interfaces as seen in the 'Snowpack' section which promised many avalanches if the forecast verified which it did with 1.0-1.8" of SWE across our zones. Before skies cleared and the snow stopped, reports of very sensitive storm slabs with remote triggers started coming in as seen [here](#). Once the storm cleared out and visibility came back we got to see the widespread avalanche cycle we thought would occur. This observation from the [CAIC](#) and this [Avalanche Observation](#) from the CBAC document the many D1-D2.5 avalanches in the Crested Butte, Paradise Divide and Kebler Pass zones. These occurred on multiple aspects and elevations and all appeared to run in the mid-upper snowpack, depending on which zone.

In our Eastern Zones, we finally got enough of a slab to overload the plethora of weak layers leading to very touchy conditions with remote and sympathetic triggers as see in this [Brush Creek](#) ob. Because the Eastern zones are much shallower, some of the avalanches in the mid-upper snowpack were stepping down and entraining much older snow.

We did not see this pattern in our deeper zones with our midpack weak layers breaking with modest loading, unable to overload any weak snow left at the base of our snowpack. See picture below for a sampling of the distribution and size of this recent cycle.

Remote triggered D2 slab avalanche which broke on weak layers from mid December. We finally have enough load on these layers to create our next Persistent Slab problem.



Widespread Avalanching on the East Face of Gothic. Most of the terrain in this zone slid but it appears it occurred as multiple smaller scale slides releasing snow throughout the storm rather than one big event.



Incidents, accidents, close calls

On 01/05 a snowmobile triggered the slide pictured below and narrowly escaped the debris which was enough to injure, bury or kill a person. This slide released days after our last snowfall and last natural or human triggered avalanche. This highlights the type of terrain that holds the greatest risk at this point.

This small [remote ski triggered](#) avalanche collapsed a crust with little to no slab on top but managed to propagate into an area with enough slab to pull out. Another sign that our Persistent Slab problem is alive and well and may behave unpredictably.

Unfortunately this week we saw our first avalanche death in Colorado on a South aspect in the alpine near Red Mountain Pass. A preliminary report can be seen [here](#). This was a persistent slab avalanche that sympathetically released a second avalanche burying one victim in debris from both slides. There is a lot to learn from this accident.

