

CBAC Seasonal Summary

John MacKinnon

2011/2012 Seasonal Snowpack Summary



Kirk Haskell

Remote Triggered Slide from Purple Ridge—1/10/12
SS-ASr-R1-D2-I/O 1/7 storm slab slid on 12/31 wind crust

OVERVIEW

Frustrating. Challenging. Confusing. Educational. Dangerous. These are some words that come to mind when describing the 2011/2012 winter in our corner of the Elk Mountains. A combination of long dry periods punctuated by modest storms, severe wind events and unseasonably warm temperatures led to a complex, dangerous and unpredictable snowpack. Snow totals were between 40-50% of the historical average for our forecast area. The town of Crested Butte reported 96.5" of snow from October through the end of March. This was the 4th driest winter on record in town since 1962. CBMR and Irwin reported 145" and 271" during their respective operating seasons. It was an unmemorable winter with regards to snow quantity and quality, but the backcountry snowpack offered endless challenges, debates and head-scratching for the Crested Butte Avalanche Center's staff.

The CBAC officially opened November 19th and operated through April 8th. We did put

out two early season advisories in mid-November. In total we issued 143 daily avalanche bulletins. We had High danger a total of 7 times on the danger rose and we met Avalanche Warning criteria 3 times. However, Considerable danger was present on the danger rose a grand total of 45 days this season (Fig.1).

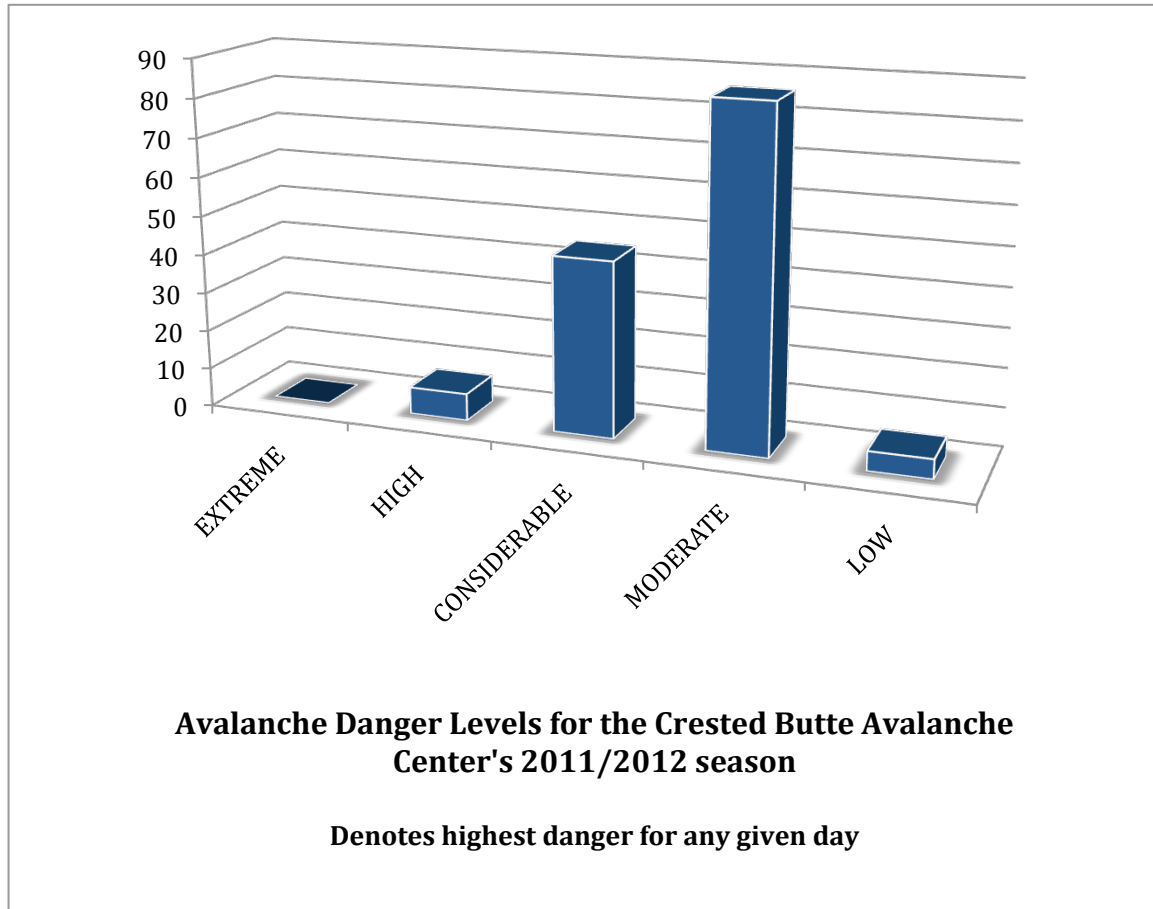


Figure 1

To give a better idea of the mid-winter snowpack, we issued some form of Considerable danger every day from 1/16-2/3 and everyday from 2/9-3/7 with the exception of 2/25 (Fig. 2). We did not forecast any High or Considerable danger for the entire month of December or after March 7th.

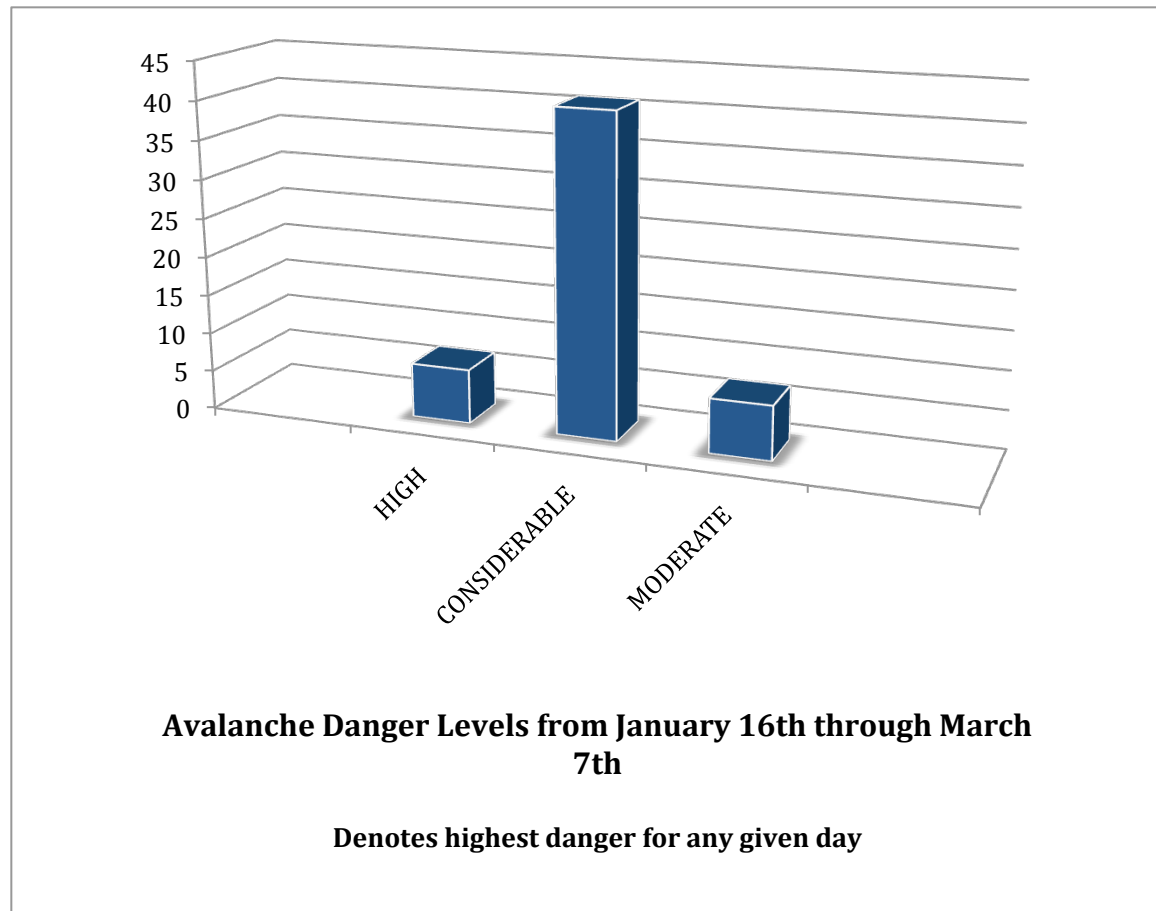


Figure 2

The 2011/2012 Winter Season

This winter began in typical Colorado fashion. Enough snow had fallen in the high-country by the end of October to set us up for a touchy early season. A major wind event coupled with two plus feet of snow in mid-November led to our first avalanche cycle. Wind speeds in excess of 80 mph were reported around the state from the weekend of November 12th and 13th. By November 14th we had observed two size 3 hard slab avalanches from Augusta and Purple mountains.



Ben Pritchett

Hard slab natural avalanche from Purple Mountain after mid-November Wind Event
HS-N-R3-D3-O/G from 11/13/11

Skiers had also triggered several size 1.5 and size 2 slides from the Irwin area and the Anthracites. Very strong winds formed hard wind slabs that were resting on a weak foundation of early season facets and advanced facets. The Irwin area reported 45" of snow for the month of November. As it turned out, November would be the third snowiest month of the winter!

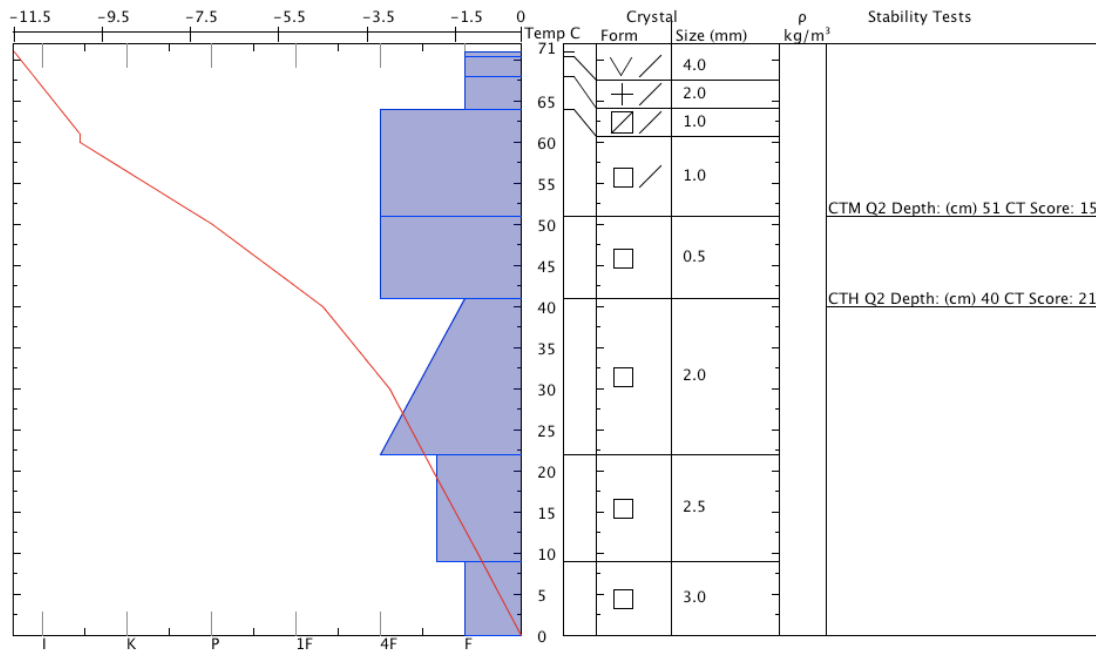
December brought a long dry spell. The snowpack began to facet from the top down and from the bottom up. Irwin reported 33" for the entire month of December, but the town of Crested Butte reported a mere 6" for the entire month. Below is a snow profile from the CBAC study plot on Snodgrass Mountain from 12/16/11:

Snow Pit Profile
Kebler
Elk Mountains, CO
 Elevation (ft) **9900**
 Aspect: **335**
 Activities:
 Notes:

Observer: **John MacKinnon**
Fri Dec 16 13:10:00 MST 2011
 Co-ord: **W N**
 Slope: **20**
 Wind loading:

Stability on similar slopes:
 Air Temperature: **11 C**
 Sky Cover: **Clear**
 Precipitation: **None**
 Wind: **Calm**

Stability Test Notes: Layer notes:



John MacKinnon

A low HS coupled with cold, short December days set us up for that scary and unpredictable mid-winter snowpack. On December 31st the state of Colorado experienced its second major wind event. The New Year's Eve Wind Storm brought 100+ mph winds. This created a layer of Pencil to Knife hard slabs around the backcountry. Localized blowing gravel was also reported from the Paradise Divide area.



Jayson Simons-Jones

12/31/11 Wind Event. Note the heavily eroded sastrugi with gravel deposits

Below treeline where there was snow, the snowpack had turned to weak facets and depth hoar. The upper snowpack turned into a F- layer of surface facets. Skiers began triggering facet sluffs on steep below treeline slopes. Stiff wind slabs and crusts capped the underlying facets on many near and above treeline, as well as in isolated areas below treeline.

A weather pattern change in January brought some much needed snow to our corner of the Elk Mountains. However, all incoming snow fell on a structurally weak snowpack. January 7th was the first snowfall of 2012. Schofield Pass Snotel reported 0.6" of water. Widespread facet sluffing on NW-N-NE-E aspects below treeline continued post storm.



Ben Pritchett

Widespread sluffing from Schuykill Mountain

The danger remained at Low on these aspects but there were many interesting debates and comments about Low vs. Moderate when dealing with loose snow. Loose snow/facet slides did not step down at higher elevations where the snowpack had more strength.

The next January storm arrived on January 16th—The MLK Storm. Schofield Pass Snotel reported 1.3" of water. Steady westerly winds led to the first avalanche cycle since mid-November. Wide-spread R1-D1 avalanches occurred from below treeline on NW-N-NE-E aspects. Nothing larger than size 2 was reported from near and above treeline.



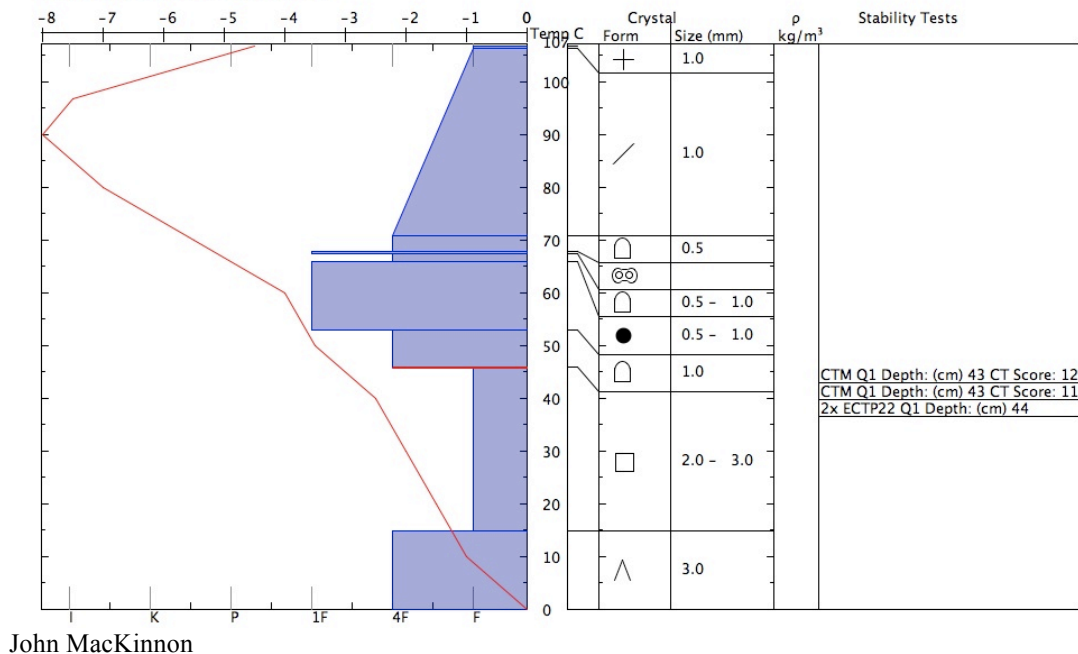
Billy Rankin

Natural avalanche from Mt. Afley' SE Face on 1/16/12
SS-N-R3-D2-I

The danger spiked to overall Considerable. Wide-spread cracking, collapsing and small remote triggered slides were reported from below treeline. Considerable or (Scary Considerable) was appropriate due to the “small in many” and “large in specific” avalanche cycle. Temperatures spiked later that week and resulted in the rapid settlement of the January 16th storm snow. Storm snow had settled into 1F storm slabs and grains even began showing rounding. Unfortunately, this freshly formed slab was perched on a very weak layer of facets and depth hoar.

January 21st through January 27th brought a series of storms and strong winds to the CB area. January 21st-22nd started off the stretch with 2.4” of water reported at Schofield Pass and steady westerly winds. This bumped the danger up to HIGH for January 22nd. Several Size 2.5 avalanches and one size 3 were reported. Storm snow settled rapidly. The snow profile below is from 1/23/12 at the Snodgrass Study Plot:

Snow Pit Profile Observer: John MacKinnon Stability on similar slopes: Stability Test Notes: Layer notes:
 Snodgrass Mon Jan 23 03:51:00 MST 2012 Air Temperature: 5 C 44: (SC) on 2 mm fct 71-106.5: 1/22 storm snow
 Elks, CO Co-ord: W N Sky Coversky 8/8 covered 44: (SC) on 2 mm fct 53-66: 1/16 storm snow
 Elevation (ft) 10200 Slope: 5 Precipitation: Snow < 0.5 cm/hr 43: (SC) on 2 mm fct 0-15: some rounding
 Aspect: 110 Wind loading: Wind: Calm 43: (SC) on 2 mm fct
 Activities: Collapsing, widespread. Cracking.
 Notes: Post storm profile at study plot



January 24th brought another 0.4" of water to Schofield. Strong NW winds shifted around the compass to the NE and created yet another layer of wind slabs. We saw the next round of High danger occur on January 27th after 0.75" water dropped over the last 48 hours. Strong NW and WNW winds persisted through the weekend. Control work at Irwin began showing larger avalanches with crown heights of 1.5 meters being reported. A large (size 2) skier triggered avalanche was reported from the saddle between Ruby and Owen on January 28th.



Billy Rankin

Natural Avalanche from Mt. Ruby on 1/26/12 from East aspect
SS-N-R3 D2-I, crown 18-24", 600' wide, ran 800'

February brought more snow and an increasingly complex and dangerous snowpack began developing. As the snow continued to pile up, the destructive potential of natural and human triggered avalanches continued to grow. There was a brief respite from the January storm cycles from the end of January into early February. It was during this lull in storm cycles that a group of skiers remote triggered a size 2 avalanche on the south side of Mt. Baldy. There were several snowmobile tracks already in the bowl, but the skiers found the thin spot.



Pete Sowar

Remote triggered slide on Mt. Baldy from 1/31/12

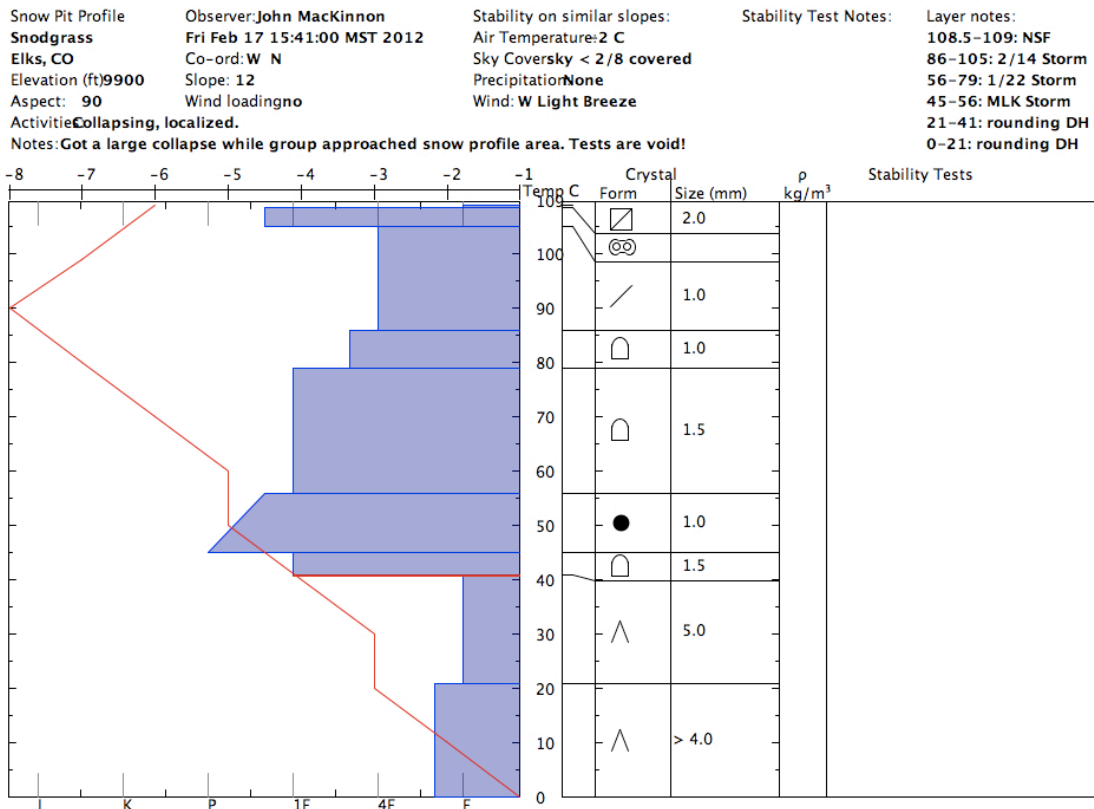
SS-ASr-R2-D2-I/O Observers estimated crown heights to be between 1 and over 6 feet deep.

It was not without serious language and much debate that the danger got dropped down to Moderate from February 4th through February 8th. Decreasing signs of instability and warm temperatures left us with some “Scary Moderate” avalanche conditions. The first ten days of February were marked with several smaller storms that gradually began adding extra weight to the fragile snowpack.

The next major storm system and subsequent avalanche cycle began affecting our area on February 12th. On the morning of the 13th Schofield Pass Snotel had reported 1” H2O in the last 24 hours and an HN24 of 15”. The danger remained at Considerable for February 13th due to the lack of large naturals. Observers continue to report smaller storm slabs and wide-spread sluffing in the new snow. Snow and winds continued through the day of the 13th and into the 14th.

We dubbed this storm/avalanche cycle the Valentine’s Day Storm due to the avalanche cycle that occurred on February 14th. The danger bumped up to High on N-NE-E aspects above treeline for February 14th after Schofield Pass Snotel had reported close to 2” H2O over the past 48 hours. Observations trickled in from around the valley over the next several days and a sizeable avalanche cycle did occur on the steep wind-loaded aspects near and above treeline. The East Face of Gothic finally slid (size 3) after hanging in there all season. It slid over 2,000 feet and debris was reported to have stopped 100 feet uphill of the East River. There were numerous natural avalanches reported from a variety of aspects and elevations—primarily NE-SE aspects but several west aspects slid naturally in the Irwin area. The West Face of Gothic slid too. Reports of remote triggered avalanches filtered into our office as well.

Temperatures warmed up post storm. This gave an allusion of springtime as the storm slabs settled, but basal weak layers remained very weak. This snow profile from the Snodgrass Mountain on 2/17/12 shows the top half of the snowpack gaining strength but persistent weak layers continue to live up to their name:



John MacKinnon

Between February 19th and February 26th over 20" of snow fell in the Crested Butte backcountry. Strong winds from the SW, W and NW accompanied all snowfall. This additional load pushed the current fragile snowpack to its tipping point on many aspects. The danger remained at Considerable through this "smaller" cycle. Observers reported natural avalanches on Gothic, Axtel, and Owen on NE-E-SE aspects near and above treeline and one snowshoer remote triggered a slide at the base of Coney's bowl on February 26th.

The end of February and the first couple days of March brought the final major avalanche cycle to our area. The February 28th Storm arrived later than forecasted but when it finally arrived it added extra stress to an over-burdened snowpack. On February 28th snow started at 5 am and by 2 pm over an inch of H2O accumulated at Schofield. Winds were strong to extreme with moderate to intense blowing snow---SSW winds shifting to WSW and eventually to W. The danger jumped up to HIGH on NW-N-NE-E aspects ATL and remained at Considerable at all other aspects and elevations. The next day was calm and clear and numerous larger avalanches were reported to the CBAC including a size 3 from

Mt. Owen and a size 2.5 from Mt. Emmons. March 1st and 2nd brought another inch of H2O and strong westerly winds. The total accumulation for that week was 2.5" H2O and close to three feet of snow.



Tom Kelly

Natural Avalanche off North Side of Scarp Ridge—3/2/12

2.5" H2O from Feb. 28th-March 2nd plus strong winds led to final avalanche cycle of the season

This was the “nail in the coffin” for our snowpack. Numerous natural slides occurred from all elevations. N-NE-E-SE aspects experienced the brunt of the cycle. Observers reported 4 size 3 avalanches and numerous size 2.5 avalanches on March 3rd when the skies cleared. The danger remained at High from February 28th through March 2nd. We reached Avalanche Warning criteria March 1st and March 2nd.

Temperatures sky-rocketed on March 4th and another shedding cycle occurred with numerous wet loose slides being reported from sunny aspects at all elevations and even two wet slabs were reported. The rest of March proved mostly uneventful and the danger dropped to Moderate on March 7th and Moderate and/or Low danger remained on the rose through closing day on April 8th. While temperatures warmed and the upper 2/3s of the snowpack gained strength, the threat of deep slab avalanches continued to dominate the forecast every day. The following snow profile from 3/12/12 on Snodgrass shows how real the deep slab threat was, despite the fact that no skier triggered a massive slide in our backyard.

Snow Pit Profile Observer: John MacKinnon Stability on similar slopes: Stability Test Notes: Layer notes:

Snodgrass Study Plot Mon Mar 12 15:00:00 MDT 2012 Air Temperature: 4.5 C 91: (SP) on FCxr 98-116: ice lens--100 cm

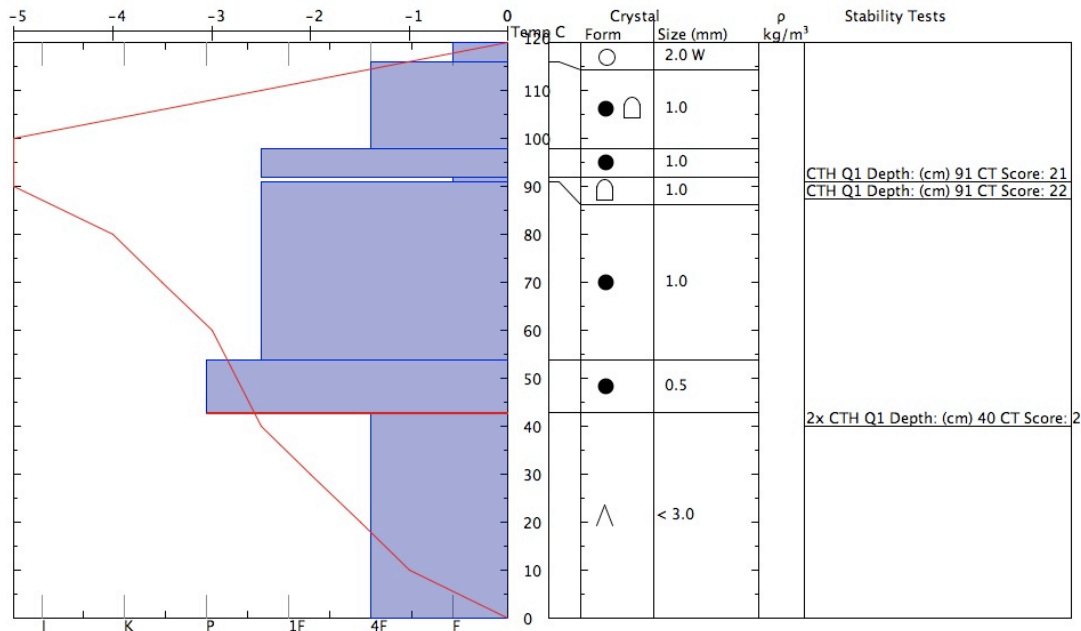
Elks, CO Co-ord: W N Sky Coversky < 2/8 covered 91: (SP) on FCxr 91-92: old NSF layer

Elevation (ft): 10200 Slope: 0 Precipitation: None 40: (SC) on DHxr 43-54: ice lens--46 cm

Aspect: 100 Wind loading: Wind: W Light Breeze 40: (SC) on DHxr 0-43: rounding DH

Activities:

Notes:



The end of March brought unseasonably warm temperatures but no major wet slab activity was observed or reported in the Crested Butte Zone. Small and isolated wet loose slides occurred as day-time temperatures soared but chilly clear nights kept things mostly locked up.

The Challenges Surrounding the 2011/2012 Winter Season

A major forecasting challenge we dealt with this season was relaying the various definitions and quantifiers of Moderate, Considerable and High danger to the public. A very tricky mid-winter snowpack with a daily persistent slab/deep slab problem forced a strict interpretation of the danger scale. As forecasters, we read and re-read the 2010/2011 North American Danger Scale each morning. Although we became very intimate with the “Likelihood of Avalanches” and “Avalanche Size and Distribution” columns, conveying the subtleties of the danger scale to the public became one of the season’s greatest challenges.

With so much Considerable danger present this season, we were often left attempting to answer the question, “What does today’s Considerable danger mean?” in our snowpack discussions. Is it a “Scary Considerable” day, a “small in many or large in specific” day? Are “natural avalanches possible”, or has the natural cycle stopped but triggers are still “likely”—as they were most of mid-January through early March.

Having Considerable danger on the rise almost every day mid-winter led to another

issue: we would often have some form of Considerable danger before a storm, during a storm, and for days or weeks after a storm. This may have unintentionally diluted some of the specific hazards Considerable danger connotes. With Considerable danger present for 40 days in mid-winter, many of our users probably got fairly accustomed to riding regularly in Considerable danger.

A final crux this season was reporting on persistent slab/deep slab instability; this avalanche concern was the main reason for a season chocked full of Considerable danger. And once the probability of triggering a persistent slab or deep slab tapered off from “likely” to “possible,” we were left with some very scary Moderate danger.

A dry December left the mountain snowpack faceting from the bottom up and from the top down. A series of storms and mild temperatures in mid to late January left a dense slab resting on very weak base. As storm systems stacked up through mid February the persistent slab problem became a deep slab problem. It was hard not sounding like a broken record reporting on basal weak layers and the “lingering threat of deep slab avalanches” from mid February through the end of March. However, while riders did trigger deep slab avalanches around the state this winter, we did not have a single deep slab avalanche in the Crested Butte backcountry.

The lack of deep slab avalanches here does leave us with some open-ended questions: How real was the threat of triggering a deep slab avalanche in the Crested Butte backcountry? Did less riders commit to serious terrain? Do we need a better understanding of deep slab instability? Or, did we just get lucky? Either way, we are VERY thankful to have finished up the 2011/2012 season here with no serious injuries and no full burials in our forecast area.