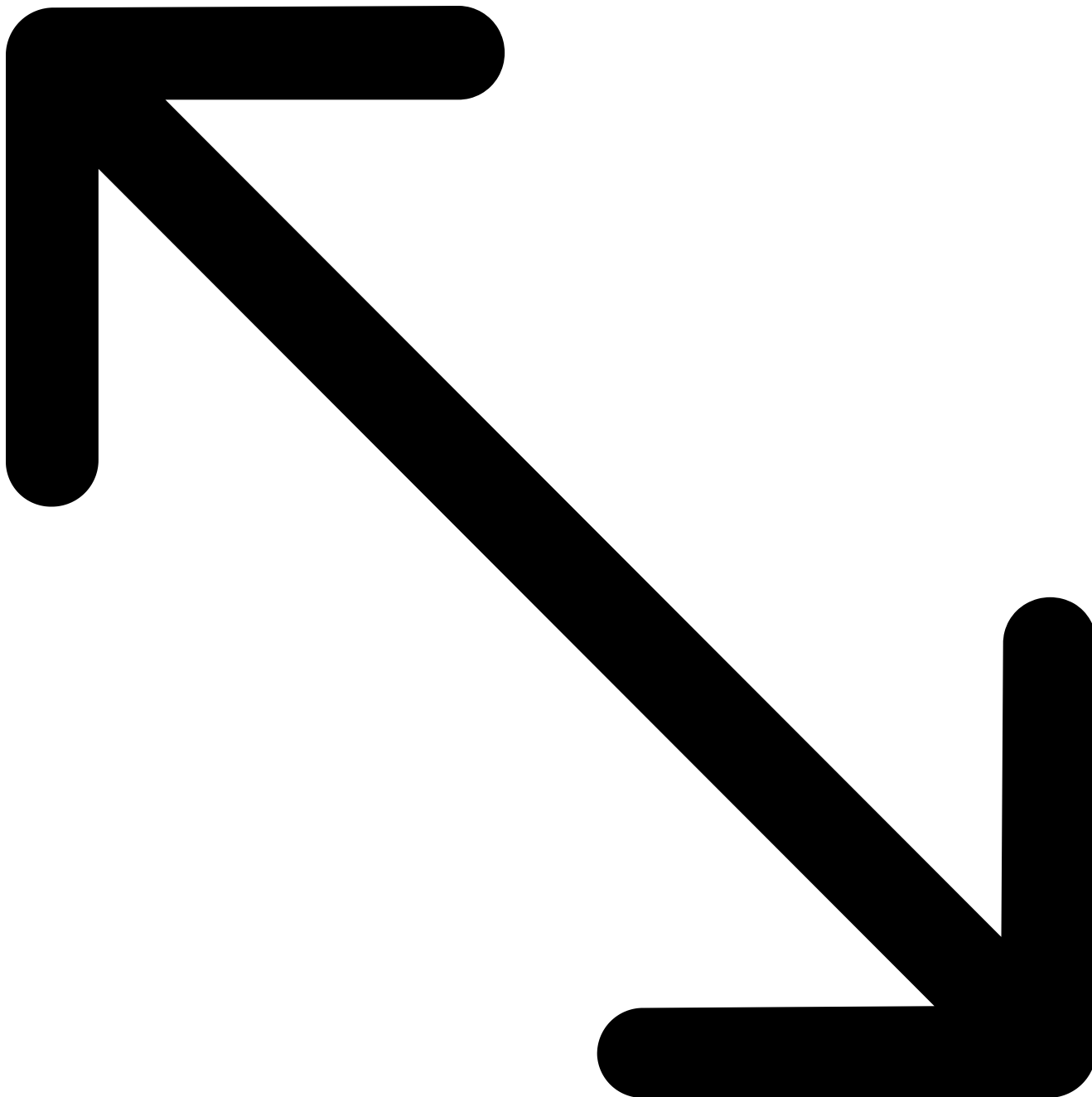


# 30 Years of Climbing Accident Data: An Investigative Report

**RI** [rockandice.com/climbing-accidents/30-years-of-climbing-accident-data-an-investigative-report/](https://rockandice.com/climbing-accidents/30-years-of-climbing-accident-data-an-investigative-report/)

September 30, 2020



Accident Prevention

**A comprehensive analysis of 30 years worth of data of climbing accidents recorded in Accidents in North American Climbing.**

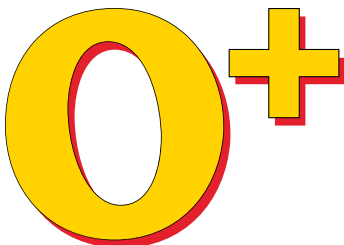
September 30, 2020 Eliot Caroom



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**For more than 70 years**, the American Alpine Club has published an annual collection of hard lessons learned, the *Accidents in North American Climbing* (ANAC). The periodical includes tables cataloging injuries, deaths, key causes and other relevant information.

As a longtime climber expecting my first child, I took an interest in risk and accident data. But the official ANAC tables didn't show the most dangerous causes by type of climbing, or reveal relationships between factors.

**[\[Also Read Freak Accident in Wind Rivers: Rockfall Severs Anchor Slings\]](#)**

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Curious about those statistics, I analyzed the text of each *ANAC*-published accident from the past 30 years using a background in data-journalism and the natural-language-processing concepts I've acquired working in the field.

Here you can find the results—data from 2,770 accident narratives, starting in 1990. No data set is perfect, so these results should be taken with a grain of salt, not as definitive hard stats.

This is not an AAC project. With that said, I'm thankful to AAC editors Dougald MacDonald and Bryan Simon for consulting on the project, and also to my friend Nicholas Cohn-Martin, a data and research analyst and climber.

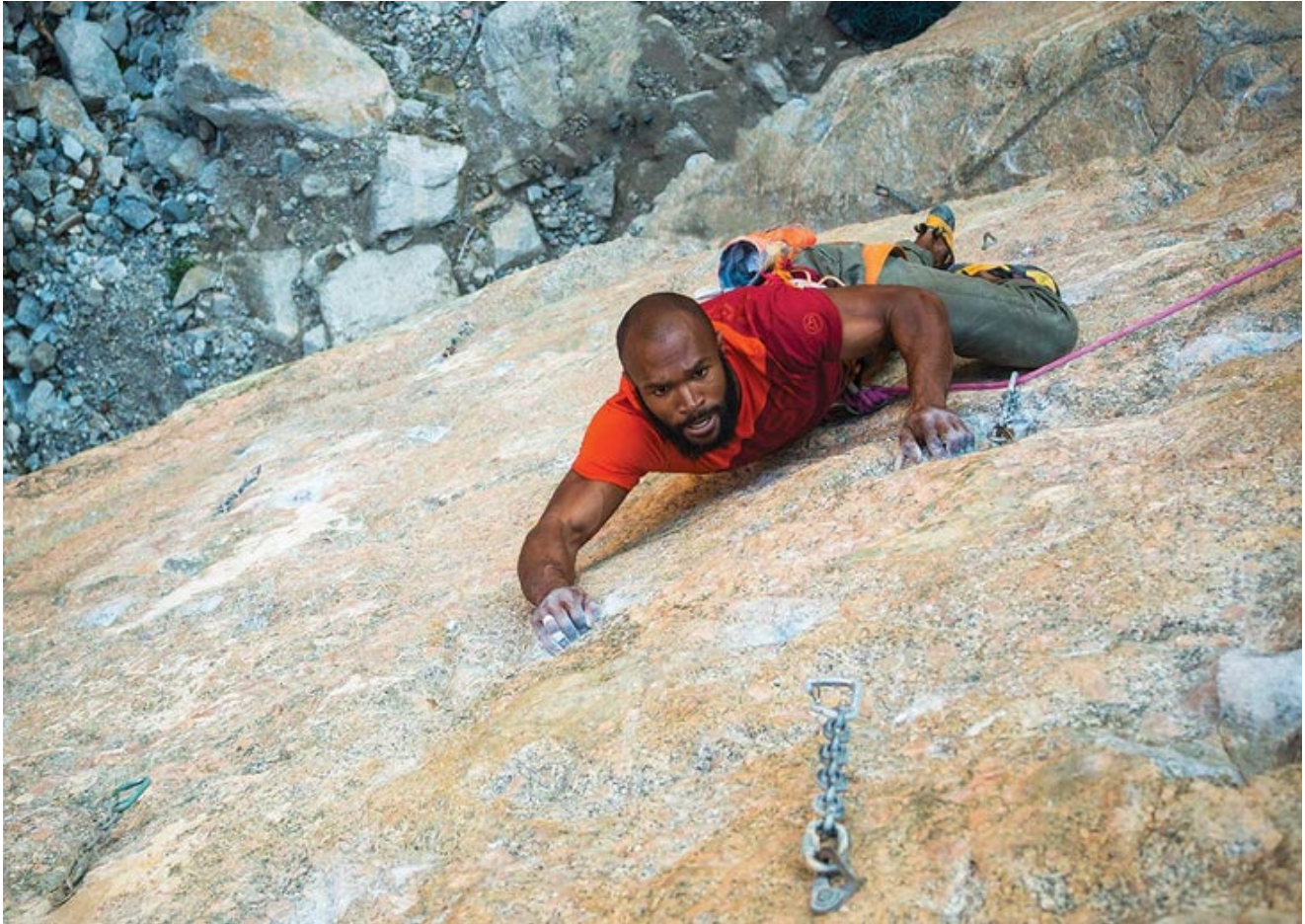
## A FEW NOTES AT THE OUTSET

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First, not all accidents counted in *ANAC* tables are published as reports, so this analysis uses the available subset, about 56 percent of the total for the time range.

Second, this analysis makes significant changes to the traditional *ANAC* categories listed in their tables: For example, accidents are tagged to disciplines like Toprope, Sport, Trad and Ice Climbing, data not tabulated by the *ANAC*. Another example is that unlike *ANAC*, I didn't attempt to identify one immediate cause plus contributory causes: All tags are handled as factors that contributed to the accident outcome. Finding associations between factors was my goal. For more on the [methodology](#), and to analyze the open dataset yourself, visit <https://github.com/ecaroom/climbing-accidents>. This is the beginning of an analysis of the narratives, and by no means perfect or precise—hopefully other researchers dig in, find new insights, and improve the quality of the dataset.

Third, many accidents are not reported to the *ANAC*, including some where climbers were able to self-rescue, nor does it analyze likely the most common climbing ailments: overuse injuries. Likewise, outdoor bouldering and indoor gym accidents are rarely reported to *ANAC*, and so are underrepresented in the data. As explained by MacDonald: "This is largely because most injuries in gyms and bouldering are relatively minor .... I believe that a very large majority of people who have bouldering injuries self-evacuate and get themselves to a doctor, if necessary, and thus there is no search and rescue report to submit."



Dominique Barry with a try-hard face on Narcissist, (5.13a), Frustration Creek, California. In the mountains above Los Angeles, you can beat the heat, but you gotta fight the pump. When Barry is not sending, he is coaching the competition team at Sender One. Photo: Eric Fallecker.

## What Type of Climbing is Most Dangerous?

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**In an examination of all roped rock-climbing accidents**, trad climbers reported about three times the number of accidents as sport and top rope combined. The following analysis, and pie chart, exclude alpine and mountaineering incidents, which represent a separate climbing discipline with added dangers, and which deserve further study. We will call this category “Trad ex-ALP,” since it is for trad climbing but not alpine/mountaineering climbing.





Ryder Stroud on *Tibetan Cowboys in a Disco* (5.13a), Liming, China.

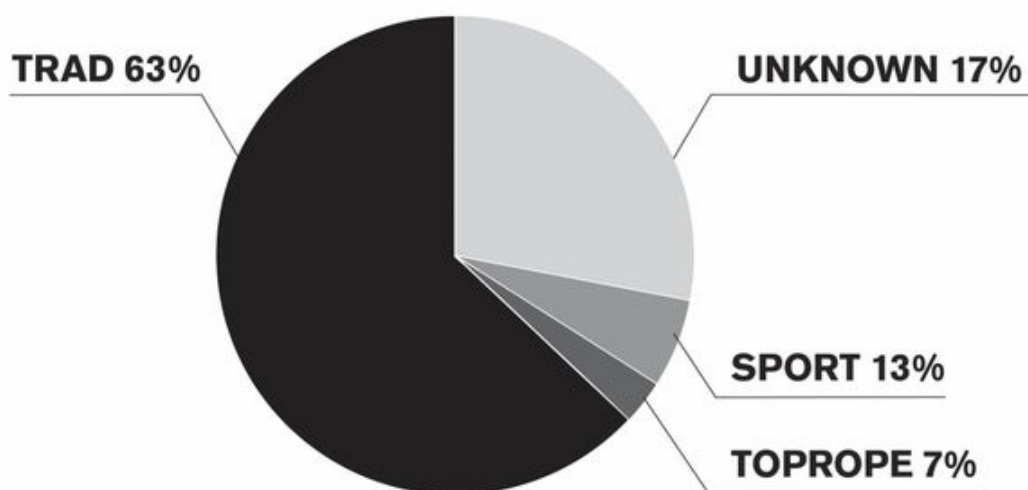
Photo: Irene Yee.

Trad ex-ALP accidents make up 63 percent of all roped accidents, with sport and top rope together making up 20 percent. There are “unknown” cases because accident reports aren’t always clear, and I aimed to be conservative in tagging, preferring false negatives to false positives.

It’s not definitive that trad is three times as dangerous—as stated earlier, this is not a truly random sample—only that it is three times more dangerous in the context of the published accidents. Other missing information includes the total number of climbing days that are spent on each discipline.

A trend worth noting is that in the first two decades of data, trad accidents were roughly five times as prevalent in the accident narratives as sport and toprope combined. Since the 2010 *Accidents*, they have been instead about twice as common—trad still has a much larger count.

That trend directionally lines up with data from the Outdoor Industry Association's latest reports, which estimate climbing activity within two large umbrella groups of styles by surveying thousands of people online. In 2017 and 2018, the first years that the OIA surveyed Americans about both sport/bouldering and trad/ice/mountaineering, the group found a larger amount of the trad group, with greater than 2.5 million participants each year, compared with greater than 2.1 million people each year participating in sport and bouldering. Both ranked below the estimate of indoor-climbing participants, at 5 million plus.



## Top 10 Factors In Climbing Type

**These top-10 lists aim to show** the most frequently reported factors for a discipline. Because accidents receive multiple factor tags, the percentages of how often each factor is seen will not add up to 100. For example, imagine you count the most common vowels in the months of the year, like A, E, O, and U. A and E are each in 50% of month names, and with other vowels also on the list, the total of percentages will be more than 100.

To see full lists of all factors, and to filter accident reports to read reports of a certain type, please visit the [Github address](#) mentioned at the end of the article. All lists that follow exclude Alpine Climbing / Mountaineering incidents, except for the last two lists, Ice Climbing and Descents. In the vast majority of accident reports, a single climbing style is tagged. In a handful of cases, two climbing styles are associated with the accident, such as if someone leads a sport climb, sets a top rope, and has an accident.

## Toprope Accidents

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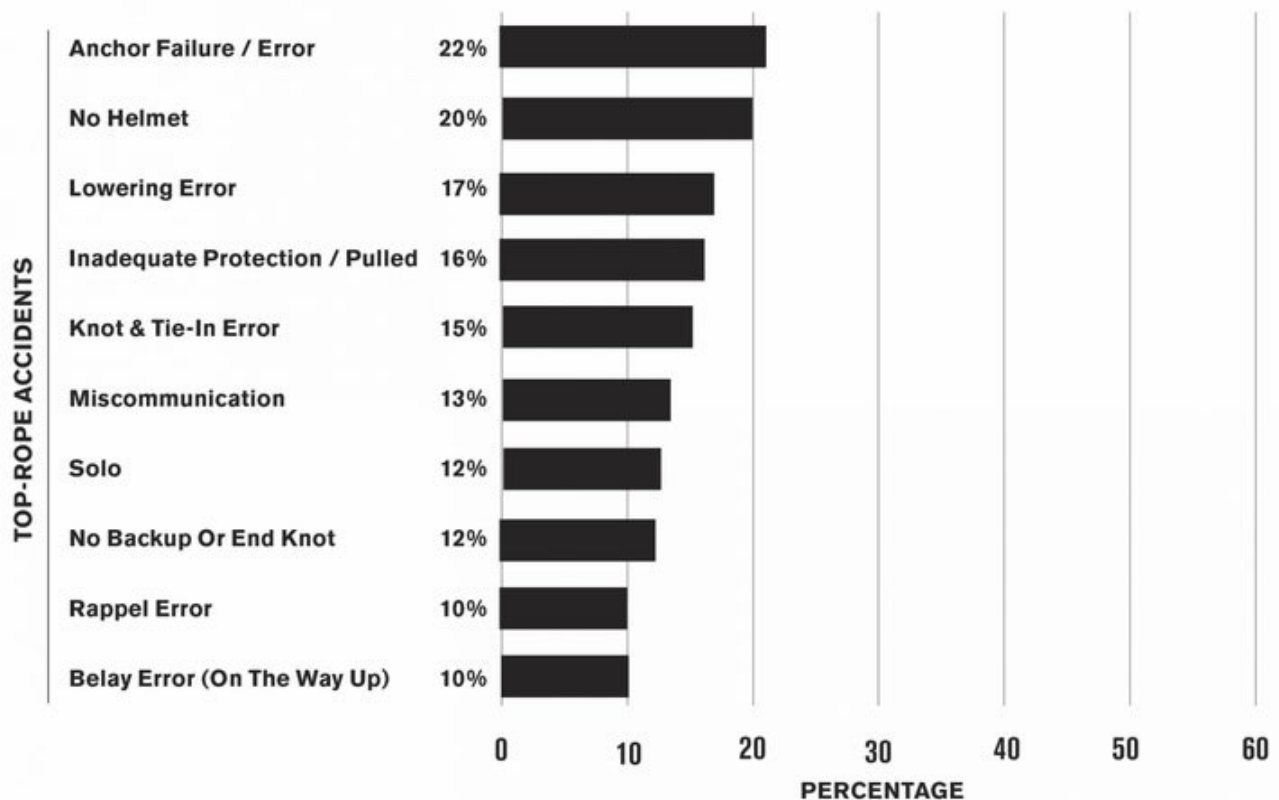
Anchor Failures top the list of factors for toprope climbers, unsurprisingly, since the safety of toprope climbing depends on a solid anchor. Beyond that, Belay Errors, Lowering Errors and Rappel Errors are key factors on the list.

A factor on the list that may raise eyebrows is “inadequate protection.” It is on the list for toprope incidents because *ANAC* reports use the term to describe a variety of protection failures: including anchors that are dislodged or used improperly so they fail to protect the climber (ropes on slings that burn through, etc.). Also included are falls during toprope set-up, with no protection used, and falls taken when a climber fails to clip the anchor properly

## LESSON LEARNED

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**Toprope anchor checks. Snoqualmie Pass, Washington:** “Whichever theory explains the failure of this anchor, there are two primary takeaways: 1) toprope anchors should have redundancy throughout the system; and 2) anchors should be checked regularly when they are weighted and unweighted during a day of climbing”—*ANAC* report.



## Sport Climbing Accidents

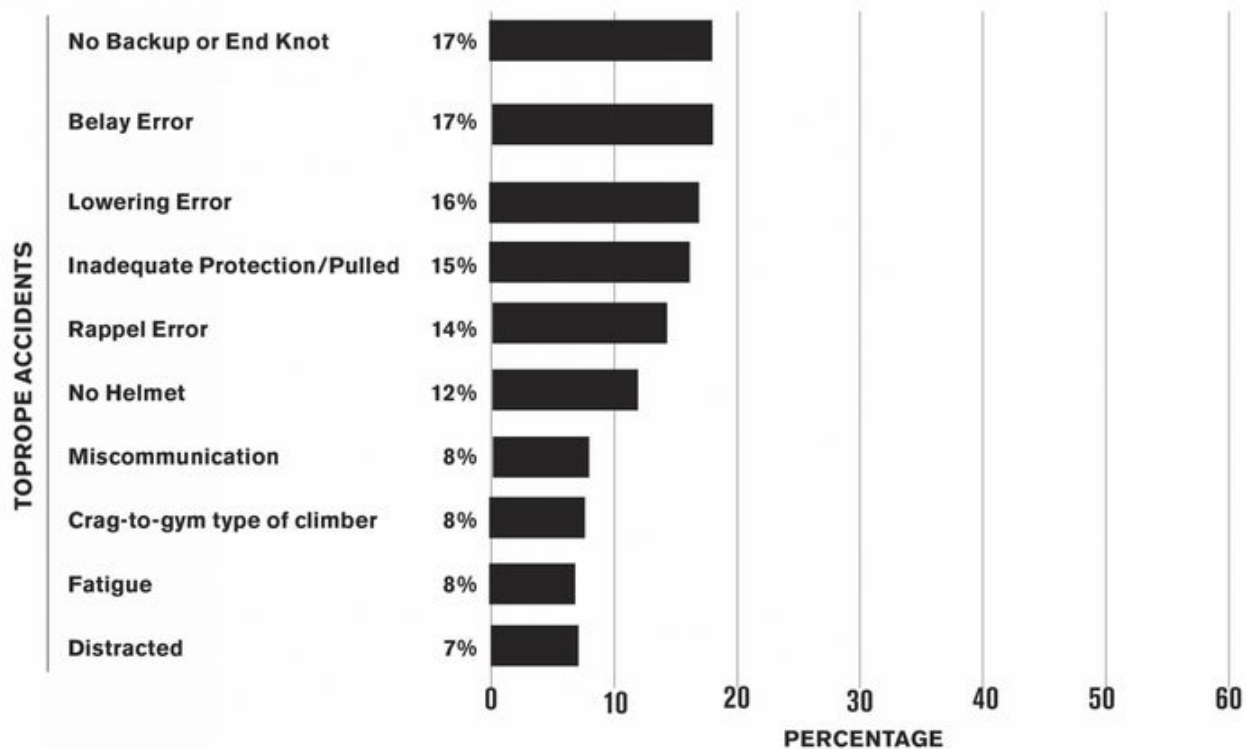
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**As with toproping**, sport climbers report miscommunication as a factor, in about 8 percent of accidents. Miscommunication is often associated with lowering errors: Regardless of experience, climbers who fail to clearly state a plan for getting down from a climb can die or be seriously hurt when assumptions are made, or the wind picks up and it's hard to be heard.

## LESSON LEARNED

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**Off-belay protocol. Lander, Wyoming:** “The climber (not the belayer) is the one who [should initiate] the belay being taken off, no matter what the belayer expects the climber to do”—ANAC report.



## Trad-Climbing Accidents

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**Again, for both trad** and the previous disciplines, the analysis is done minus accidents that are part of mountaineering and alpinism—that's in the interest of looking at these three common disciplines without including the added risks of alpinism.

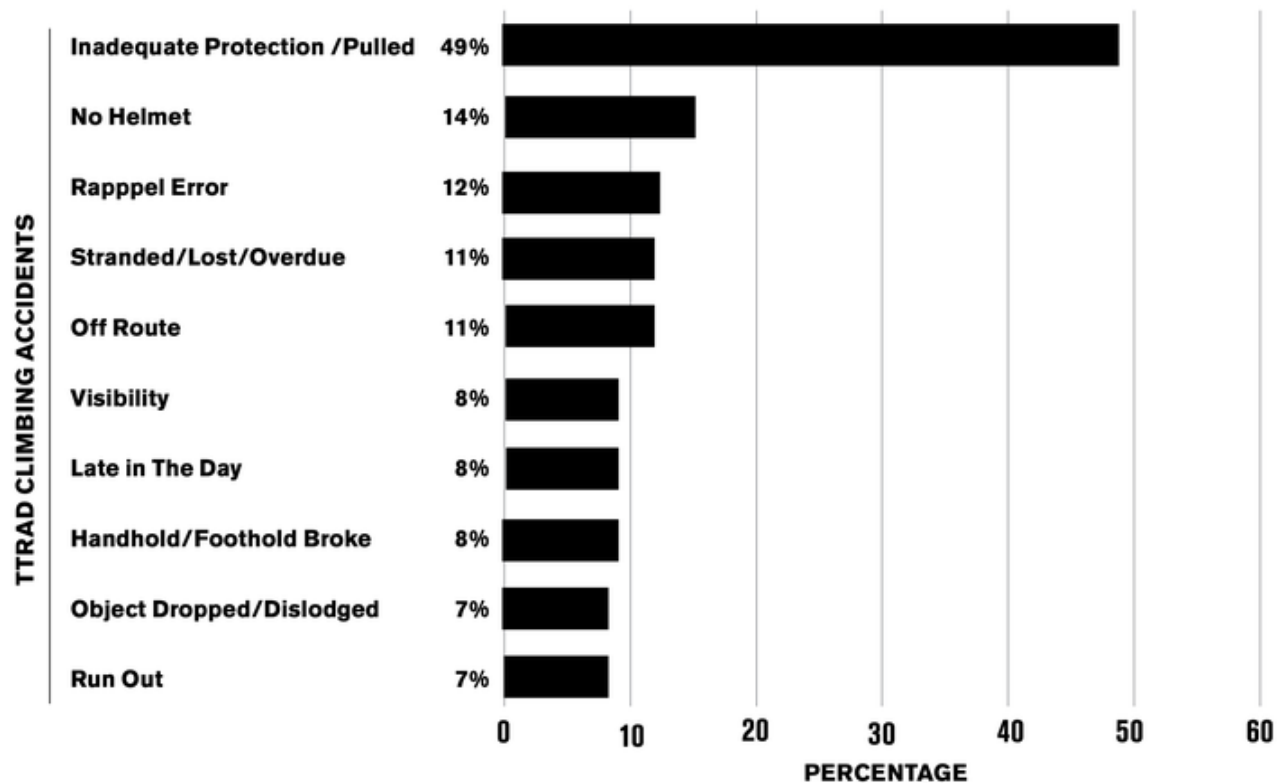
It's probably no surprise that inadequate protection/protection pulled is the top factor for trad climbing. But at 49 percent of trad incidents, it ranks as the most frequently tagged factor for any style of climbing in the data.

## LESSON LEARNED

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**Miscalculating protection. Sunnyside Bench, Yosemite:** “It’s easy to miscalculate your protection .... Here’s another way to look at it: If you wouldn’t rappel on that single piece, would you lead with it being your only protection against a groundfall?”—ANAC report.



## Ice-Climbing Accidents



Jake Hirschi on pitch five of the rare-to-form 10-pitch *Frozen Assets* (WI 5), North Creek Canyon, Utah.  
Photo: Nikki Smith.

**Though ice climbing** was not listed in the opening pie chart, as that was of rock climbing, ice-climbing statistics can be pulled from the ANAC. The top category related to ice climbing accidents is inadequate protection / protection pulled. When protection does pull out in ice

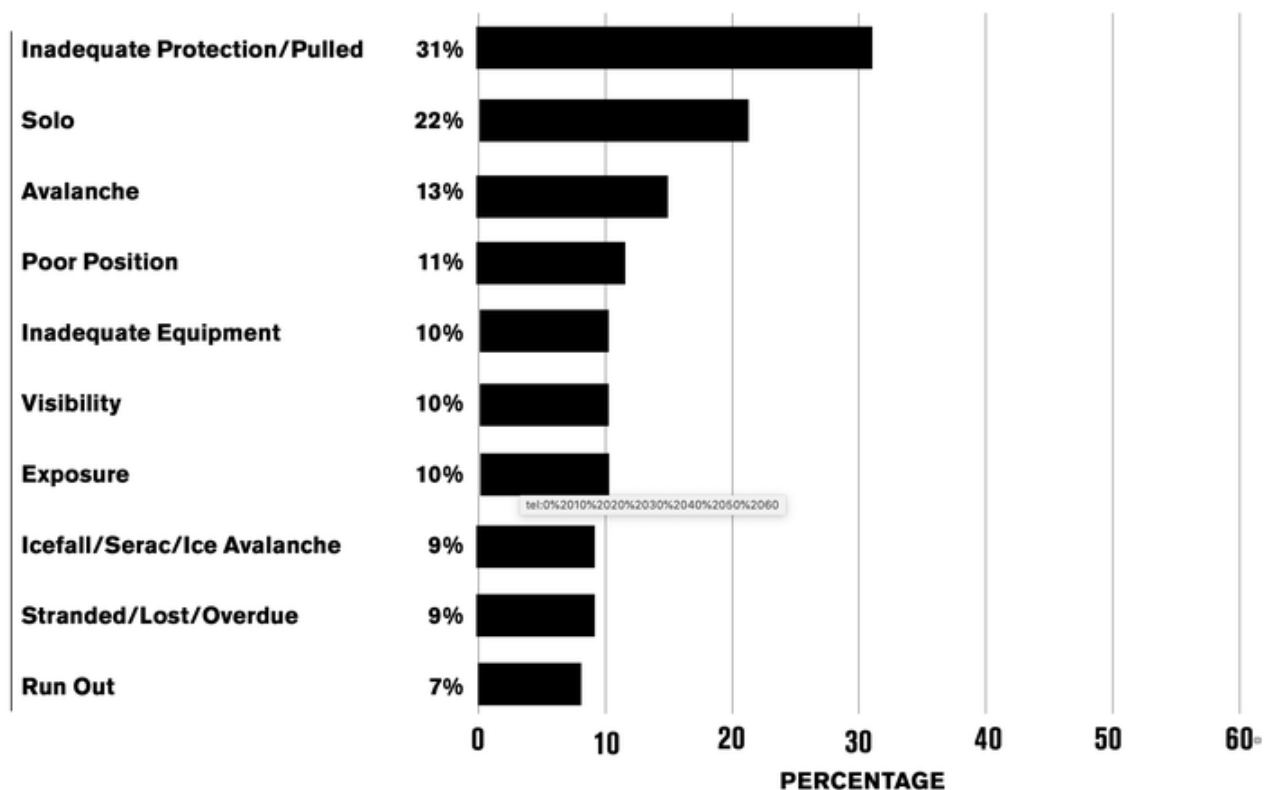
climbing, running it out is the most common factor (20 percent) with poor conditions or seasonal risk also a factor (6 percent).

Interestingly, avalanches are more common (by a somewhat narrow margin: at 13 percent and 10 percent, respectively) when we sort accidents by ice climbing than by alpine / mountaineering. In some cases, accidents received both tags (explicit descriptions of ice climbing while mountaineering). In this analysis, unlike that of the top 10 list for trad, these few cases of overlap weren't excluded from this list.

## LESSON LEARNED

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**Risks of gear failure. Mount Rundle, Alberta:** “The dependability of protection in ice is sometimes (suspect), occasionally to the point that apparently good screws will hold little better than body weight in poor ice. The possibility of gear failure needs to be factored into decisions about frequency and location of screw placements”—ANAC report.



## Analyzing the Data Across Disciplines

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### DESCENTS

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A trail of blood and chalk line the edges of this widening crack. Knee securely jammed, Birttany Goris pauses as she prepares for the full-body battle ahead on Big Guy (5.11-), Indian Creek, Utah. Photo: Tony Kim.

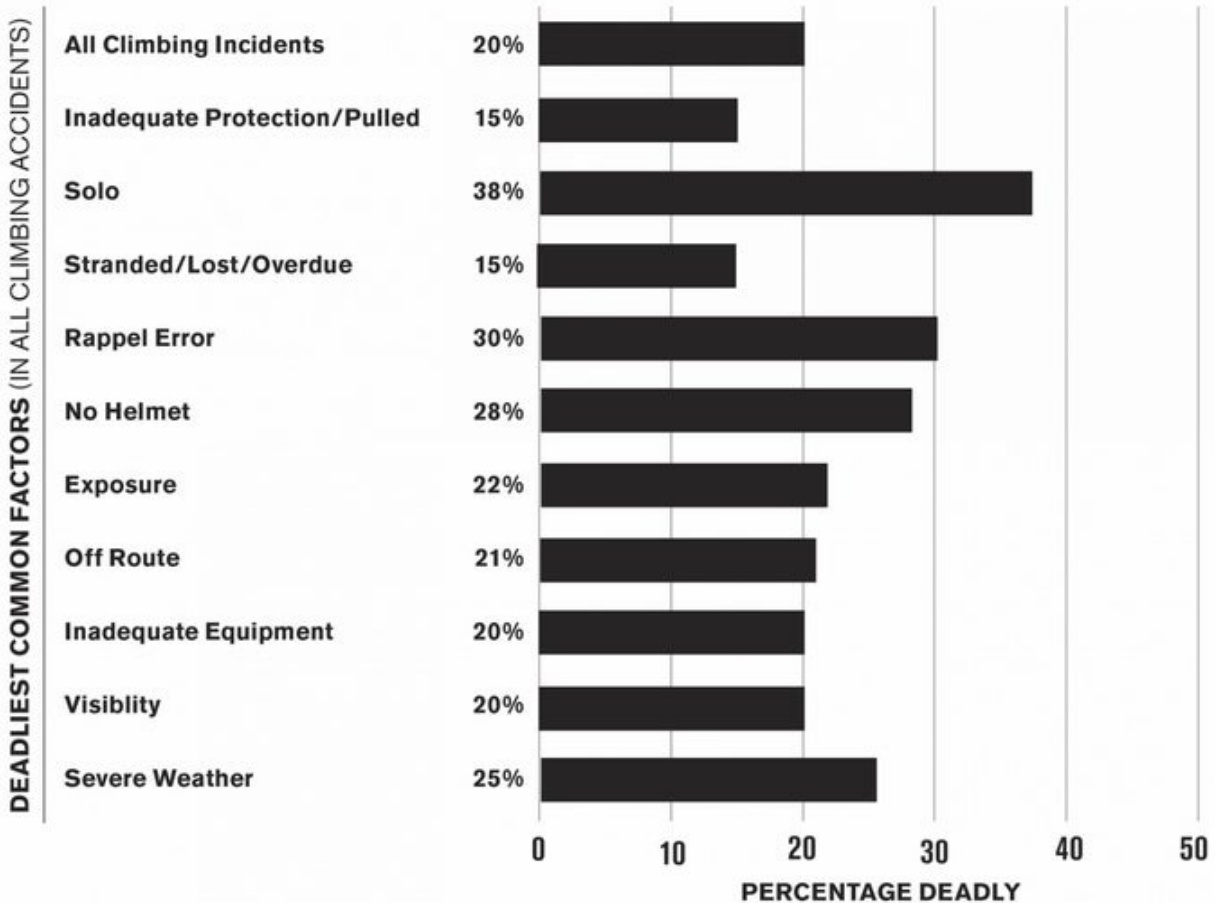
**Descent incidents make up 865** out of the 2,724 climbing incidents studied here, and around 32 percent of the total accidents analyzed. That's roughly in line with 26 percent in the larger sample size of ANAC's yearly tables.

Rappel errors are the most common factor in descent-related accident reports, at 29 percent, and other factors in the top five relate to rappelling in many cases.

Stranded, another top tag for descents (14 percent of the total), is often due to rappels gone wrong, and/or a climber reaching a position where he or she is unable to climb a necessary amount higher in order to be able to retreat.

Visibility (14 percent) can relate to rappelling without being able to see if ropes reach the ground; no backup or end knot (12 percent) comes up for rappel error and lowering error incidents alike.

As shown below, rappel errors are one of the deadliest factors within the top 10 most common factors for all accidents—not just descents. Additionally, rappel errors are one of the most common factors, tagged in 251 incidents, and 76 of those, nearly 30 percent, were deadly.



## LEARNING FROM THE PROS

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Charlotte Ballantine going for it on *Nitro* (V3), Redneck Dynamite boulder, Ortega Mountains, New Mexico. Photo: Evan Green.

**Looking back 30 years produces** a long list of notable climbers, guides and safety advocates who prove the point that no matter your experience level, all climbers should stay vigilant about safety basics and should try, if anything, to overcommunicate with partners. The *ANAC* accident tables likewise show that experienced climbers report more accidents than those with no or little experience or moderate experience, who may never think to report theirs for documentation.

Reading the *ANAC* reports, you can't avoid a terrifying truth: You don't need summit fever, terrible conditions, or an R-rated runout to die.

Accident after accident tells the story of climbers who were meticulous, were prepared, and aimed for the utmost safety. Climbers who fell short of perfection, with tragic results.

The *ANAC* accident reports can be difficult reading. These are heartbreaking accidents that touch all members in the climbing party. Each has a lesson.

The good news is, if you're reading this and racking up, you can take action.

— To keep up with the latest from the experts, join the American Alpine Club. Besides the annual accident reports in *ANAC*, you get trip reports for inspiration and some great climbing-emergency insurance.

— For key incidents, read *Rock & Ice* Accident Prevention columns in print and online.

— To read the 30 years of AAC accidents, sorted by discipline or experience, or do your own analysis, go to <https://github.com/ecaroom/climbing-accidents>.



When you're climbing, tie back-up knots. Double-check your anchors. Talk about descent plans with your belayer. Place an extra piece of protection. Watch for rockfall when you're pulling a rope. If a little voice says something is wrong, listen to it, and speak up to your partners.

It's all worth it, because in the words of Andrew Bajardi, chief range at the Mohonk Preserve, from an accident report: "Unlike us, gravity never takes a rest day."

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