In Teton park, nights are becoming warmer

That's making early-season climbing easier, but increasing other risks.

By Billy Arnold

ENVIRONMENTAL REPORTER

Warming nights in the Tetons are causing high-elevation snowpack to melt faster, making it easier to climb the Grand but posing threats to cold-adapted species like whitebark pine. Warmer nights also could increase the risk of spring landslides in locations like Avalanche Canyon, shown here from the summit of Twenty-Five Short in Grand Teton National Park.

In the early summer, when snow and ice cover the high alpine in the Teton range, Exum Mountain Guides still take clients up the Grand Teton. Before doing so, guides teach climbers how to move on snow.

The process is called "snow camp." Clients learn how to kick steps into snow, walk with crampons and swing an ice axe. For decades, the rule of thumb was that Exum would teach snow camp until July 12.

But in the past few years — relatively deep snow years in the Tetons — Exum has stopped early. This year, guides stopped it on July 1. Last year, they stopped on July 7.

The reason? Snow is disappearing earlier and earlier. Higher-than-usual nighttime temperatures, which allow snow to melt around the clock, quickly clear the mountains of frozen material in the spring.

"We don't have it locked up in the night anymore. It's not freezing. It's just 24 hours of melt," Exum guide and co-owner Nat Patridge told the News& Guide last week. "The nighttime temperatures really slowed the melt and runoff in the past. Now, when it gets hot, it stays hot, even at higher elevations in the Tetons."

A less snowy mountain range might make for easier, less gear-intensive climbing. But overnight heat and quick snow melt will have consequences for the region. Higher nighttime temperatures may exacerbate runoff cycles, causing avalanches or other natural hazards like the mudslide and landslide that closed Teton Pass in a double whammy this spring. They may also prevent cold snaps that controls pests like mountain pine beetles, which are killing the range's whitebark pine.

This July at the Moran weather station, the lowest minimum temperature — a proxy for nighttime temps — was 34 degrees Fahrenheit, 2 degrees above the average for July in 100 years of data kept by the National Oceanic and Atmospheric Administration. Record-high minimums for June, July and August were all set in the last 10 years.

Those figures are all measurements of weather, short-term atmospheric conditions observed in Jackson Hole. But scientists with the National Park Service and universities across the Mountain West have observed a similar long-term trend: a climatic change in the Tetons and Greater Yellowstone Ecosystem. Average daily temperatures are rising. Not because of spiking daytime heat, but rather because of steady increases in overnight warmth. A study prepared for Grand Teton National Park this year put numbers to the trend: Between 1911 and 2022, daytime highs at

Moran didn't demonstrate a strong trend. But nighttime lows have increased between 3 and 4 degrees over the same 111-year period.

"There's been some recent press saying that we haven't seen that many effects of climate change locally," said Simeon Caskey, Teton park's branch chief of physical science. "Some of the facts in here refute that."

The park's climate assessment, attached to the online version of this article at JHNewsAndGuide.com, is one of many recent attempts to understand both how climate change is and isn't impacting the Greater Yellowstone Ecosystem — and how it will in the future. It largely focuses on the valley floor, for a handful of reasons: The overwhelming majority of the park's visitors stay in the valley, migratory wildlife predominantly use lower elevation habitat, and invasive species like cheatgrass have a leg up down low. Most of the park's aquatic ecosystems also are in Jackson Lake, the Snake River and its tributaries.

Previous studies conducted in Teton park have shown that plants are blooming earlier in the valley because of earlier snow melt. Research also has shown that glaciers are retreating, and the Teepe Glacier, which sits beneath the Grand Teton and is visible from the highway and Snake River, has all but disappeared.

Teton park's climate study builds on other climate research conducted in the Greater Yellowstone Ecosystem, like the 2021 Greater Yellowstone Climate Assessment, which took a regional view. In that study, researchers found that temperatures across the ecosystem climbed 2.3 degrees between 1950 to 2018, and that annual snowfall dropped 25%. They also predicted that, by the end of the

— *Nat Patridge*

EXUM MOUNTAIN GUIDES

21st century, temps will climb 5.3 degrees, snowpack will fall by 40% and there will be 35% less spring runoff.

Precipitation, however, is expected to increase across the ecosystem by 9%.

While that may be counterintuitive, Cathy Whitlock, a co-author of the larger assessment and a paleoecologist at Montana State University, said there is an explanation: A warmer atmosphere holds more moisture.

"When you get precipitation, you tend to get more of it," Whitlock told the News& Guide.

Rather than a regional perspective, Grand Teton's more localized climate study takes a specific look at how climate change will impact the valley floor. Its findings are consistent with the earlier, more expansive study. The study relies on two models representing two extremes — the park's wettest future and the park's driest future — to capture a wide view of what might happen as climate change progresses.

"It really demonstrates that even if you come from a different approach,

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“Nighttime temperatures really slowed the melt and runoff in the past. Now, when it gets hot, it stays hot.”

CLIMATE

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you come to the same conclusions,” said Bryan Shuman, a climate scientist at the University of Wyoming and another co-author of the Greater Yellowstone Climate Assessment. “This is something where we can pretty well agree on.’

Teton park’s models predict that by the end of the 21st century the park will be anywhere from 6 to 14 degrees warmer and experience anywhere from a seven- to 14-week reduction in sub-zero days The model that predicts a drier, hotter future also predicts that more precipitation will fall from the sky. But that additional moisture, which could fall as rain or snow, isn’t expected to stick around long. If it falls as snow, the snow is expected to melt faster. If it falls as rain, it’s expected to evaporate faster.

Both results are expected to cause a drier climate.

“We can expect maybe as much or more precipitation in the winter, but we can expect drier summers,” said Dave Thoma, a Park Service landscape ecologist who co-authored the brief for Teton park. “And that has consequences that are fairly obvious, like a longer fire season and plant stress.”

In the long-term, ecologists and climatologists expect there to be consequences from higher temperatures and a drier climate in the park. More forest fires could cause animals like elk and deer to migrate or could decimate stands of whitebark pine. Lower stream flows and higher stream temperatures could impact both cutthroat trout that rely on cold water to survive and farmers who rely on river flows for their crops. Shriveling snowpacks could degrade skiing quality and erode habitat for species like wolverines.

In general, Gregg Servheen, a retired wildlife biologist with the Idaho Department of Fish and Game and a board member of the Jackson Hole Wildlife Foundation, expects temperature shifts to cause animals to move.

But humans, who are causing climate change, are making that movement harder for wildlife.

“The ability for these animals to move and distribute themselves on the landscape as the ecological climates demand is incredibly bumping up against the limits that human growth and development is putting on them,” Servheen said, pointing to record visitation in and development around Teton park.

In the nearer term, the higher nightly temperatures documented in the park and around the region could also impact the stability of the snow that people ski and the earth that people drive on and walk across.

Above-freezing temperatures can leave more moisture in the snowpack and cause avalanches.

A lack of overnight freezing during spring runoff can create conditions that cause debris flows and landslides like those that caused Teton Pass to close this spring, said Ben Leschinsky, a geotechnical engineer and landslide expert at Oregon State University.

There's nuance there — drier soil can actually make it harder for earth to become saturated and move — but warmer snow is both prone to melt more rapidly with rainfall, and more likely to melt quickly, producing ground-saturating, rapid runoff.

Leschinsky said there hasn't been a large-scale study evaluating whether climate change makes natural hazards like landslides more common. But all signs indicate that's likely.

"I think there's an expectation that most elements of climate change are not a good thing in terms of landslides," Leschinsky said. "I think it's the elephant in the room."

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Officials have said the Big Fill slide and a mudslide that closed Teton Pass resulted from a combination of hot days and warm nights, which accelerated spring run off. National Park Service researchers say that weather pattern is becoming more common as the climate warms.

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