https://trib.com/news/state-and-regional/the-yellowstone-flood-was-a-historic-disaster-climate-change-means-it-wont-be-the-last/article_78daa112-0ec9-11ed-a559-7b3f30a57cfc.html

Nicole Pollack

ALERT FEATURED TOP STORY TOPICAL

The Yellowstone flood was a historic disaster. Climate change means it won't be the last.

It was the park's most violent flood in at least a century. A disaster that eclipsed any flood [illegible] recorded, piggybacking on the confluence of worst-case scenarios so unlikely that they've occurred together as infrequently as once every thousand years.

Nicole Pollack
Jul 31, 2022

The next historic flood event in Yellowstone National Park is probably less than a millennium away.

If, until a few decades ago, it had a 0.1% chance of happening during any given year, those odds are higher now — maybe 0.2%, or 0.5%, or 1%. Whatever the number, it still isn't high. But climate change is pushing it higher.

"There's been floods throughout history," said Cathy Whitlock, a paleoecology professor at Montana State University. "They're natural. They recur. And so it's difficult to take any one and describe it to long-term climate change. But nonetheless, this type of flood is well-predicted by climate change, and quite likely to happen again in the future."

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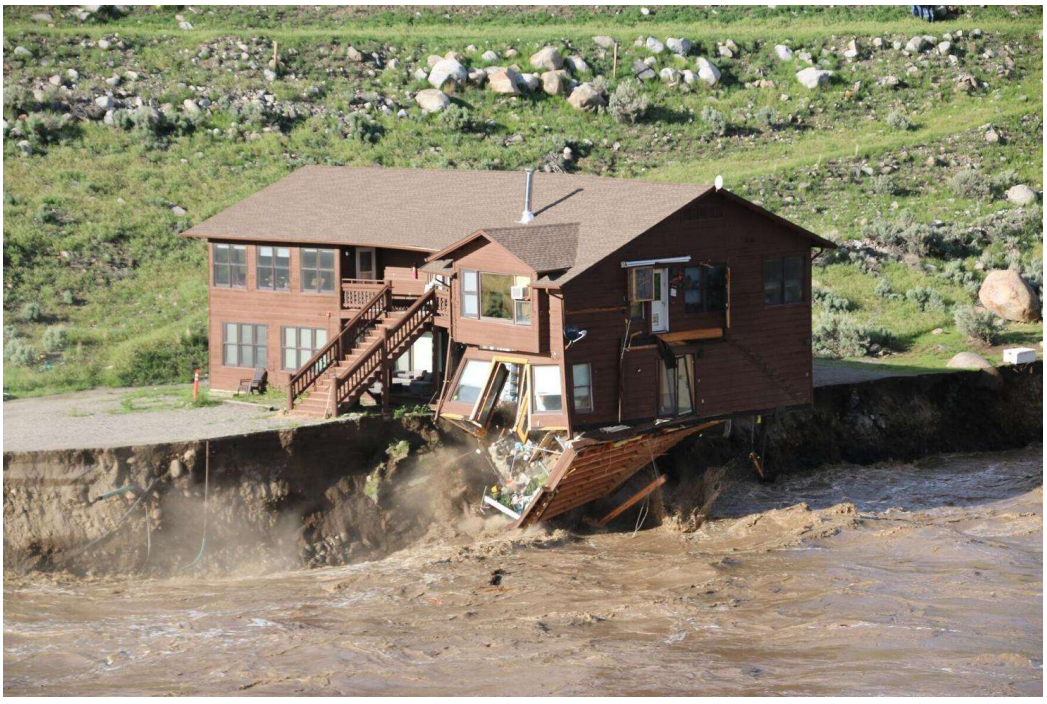
Whitlock co-authored the **Greater Yellowstone Climate Assessment**, an analysis published last year of the myriad ways that rising global temperatures will reshape the roughly 34,000-square-mile ecosystem, including the 3,472-square-mile national park.



Employee housing near the Yellowstone River crumbles into the stream as floodwaters erode the bank below the building. The flooding was the first disaster to close Yellowstone National Park since the 1988 wildfires.

Gina Riquier, Courtesy

Already, temperatures across the ecosystem have risen 2.3 degrees Fahrenheit since 1950, the assessment found. The rate of increase is expected to accelerate over the coming decades.

“From climate models, the projections are that it will be 5 to 6 degrees Fahrenheit warmer by 2040,” Whitlock said. “And possibly 10 to 11 degrees Fahrenheit warmer at the end of the century.”

The iconic landscape could look very different by then.

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Wyoming earned more than $1 billion last year from tourism at its two national parks. Both counted a record number of recreational visits in 2021, **according to the National Park Service**: Yellowstone with close to 5 million and Grand Teton National Park, also in the Greater Yellowstone Ecosystem, with nearly 4 million.

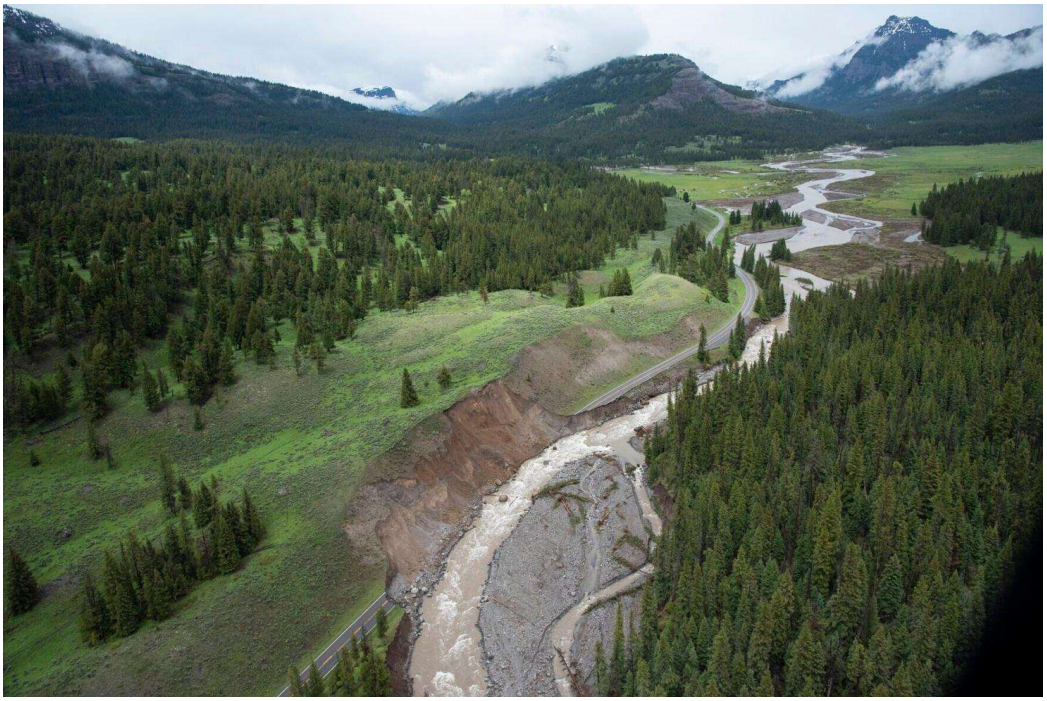
Before June of this year, the country’s first national park looked like it **might set another record** as park staff commemorated Yellowstone’s 150th birthday. Year-to-date visitation at the end of May was up 6.5% from 2021.

Then, on the night of June 12, an “**unseasonably strong**“ atmospheric river — a column of water vapor that traveled from the Pacific Ocean to Yellowstone — dumped several inches of rain on the northern reaches of the park and on the neighboring Montana towns. The rain washed snow that had accumulated during an unusually cool, damp spring into rivers already swollen with seasonal runoff. Elevated temperatures that weekend stayed above freezing, even at night. The snowmelt was unrelenting.

Officials evacuated more than 10,000 people and closed all five gates to tourists as the floodwaters churned upward, cleaving through roads and tearing bridges from their banks. It was the first natural disaster to shut down the entire park since 1988, when strong winds propelled flames across more than one-third of the drought-parched park and ignited the largest wildfire in its history.

Despite the devastation the flood left in its wake, no one died. But it soon became clear that repairs would be necessary, even in the largely intact southern half, to keep sightseers safe.

“These park roadways — they were constructed for horses and buggies,” said Stephanie Kodish, senior director of the clean air program at the National Parks Conservation Association.



Sections of Northeast Entrance Road are washed out due to flooding on Soda Butte Creek on June 19 in Yellowstone National Park. Samuel Wilson, Bozeman Chronicle, Report for America

With rising popularity straining its existing infrastructure, even before the flooding, she said, "the park has already been overburdened with a $929 million backlog of deferred repairs."

Funds authorized by the Great American Outdoors Act of 2020 and the trillion-dollar infrastructure law passed last year have helped Yellowstone and the rest of the country's national parks start to catch up.

"All of our deferred maintenance projects, whether they are parking lots or seawalls or new guardrails — all of those projects are being addressed and designed and conceived with climate resilience in mind," Shannon Estenoz, assistant secretary for fish and wildlife and parks in the Department of the Interior, said during a July 8 press event at Yellowstone.

For Yellowstone, though, the costs of rebuilding after the flood — a price tag that is still unknown — could derail other, less-urgent projects. Ongoing repairs near the northern entrances are being paid for by $65 million in emergency relief from the U.S. Department of Transportation. The park will likely need much, much more.

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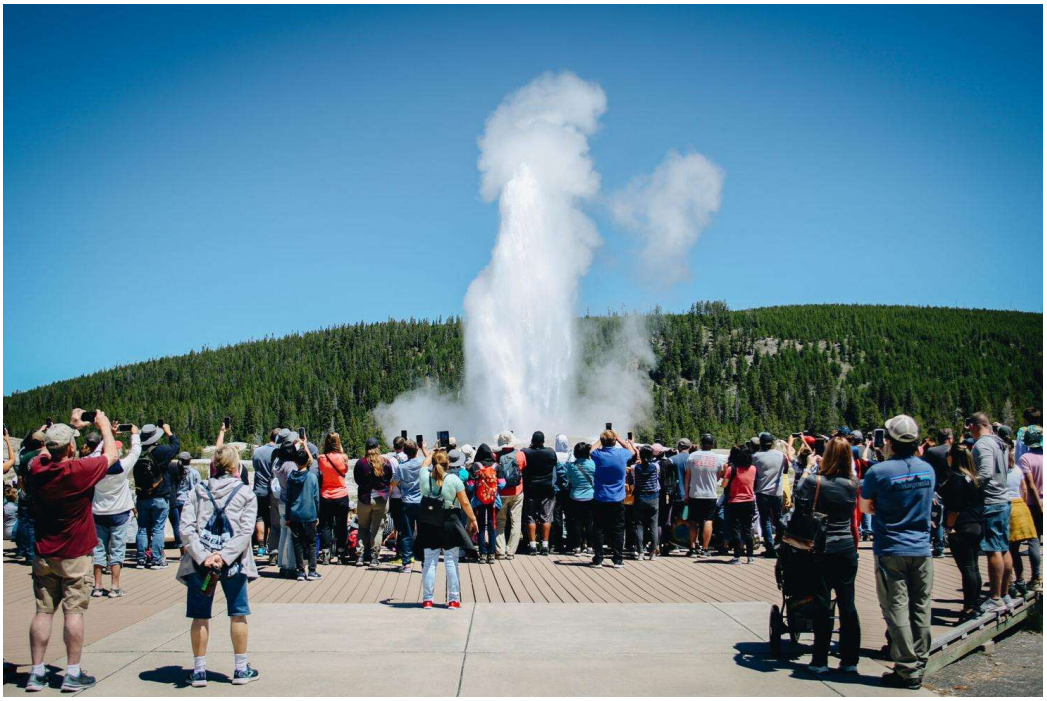
Yellowstone remained off-limits for nine days after the flood. During the closure, while construction was underway but before officials knew the extent of the damage, cancellations poured in.

Some plans were rebooked over the next few weeks as the park restored public access, first to the south loop and then to 93% of roads and 94% of the backcountry. Many plans, however, were not, especially in June: Monthly attendance dropped by almost half compared with the year before.

A **National Parks Conservation Association poll** conducted in January found that 88% of Americans — including 95% of Democrats and 80% of Republicans — feel climate change is "having a negative impact" on national parks.



Park visitors watch as Old Faithful erupts on June 22 in Yellowstone National Park. Crowds were relatively light on the first day of the park's reopening after devastating flooding.

Madeline Carter

The parks, Kodish said, “are located in some of the country’s most sensitive ecosystems.”

That’s why they were protected — and what makes them especially vulnerable, on the whole, to the effects of climate change.

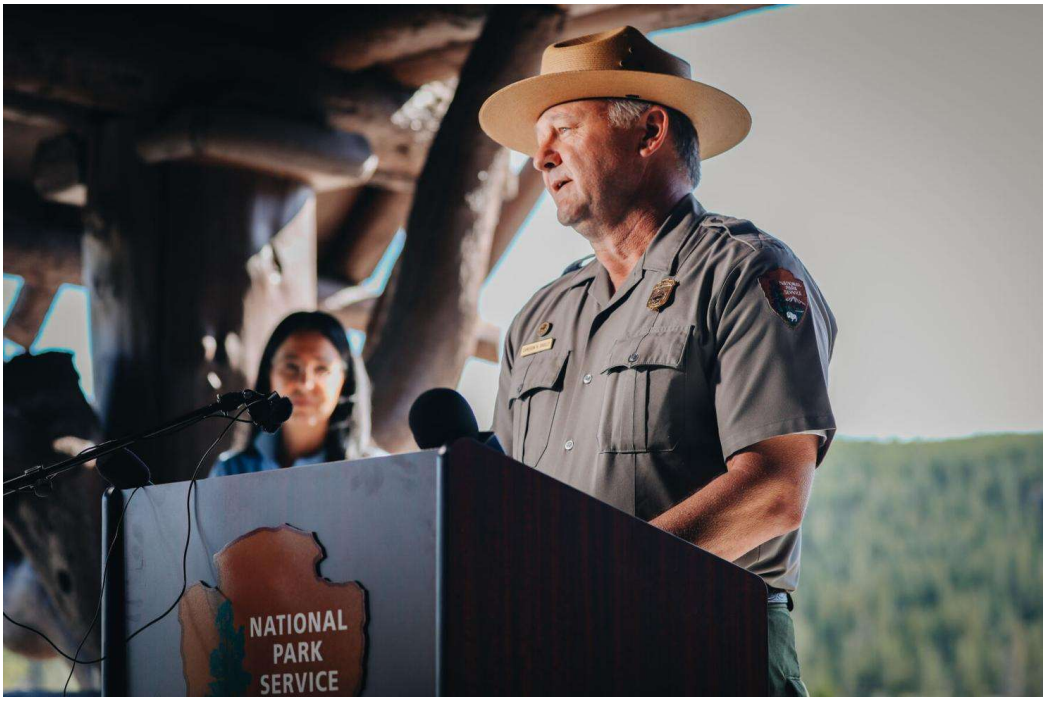
“Fires and floods deter people from visiting,” Kodish said.

Tourism is bouncing back now in Cody and Jackson, and West Yellowstone, Montana, where the park entrances opened along with the south loop on June 22.

Gardiner and Cooke City, on the park’s northern border with Montana, are still cut off except for bicyclists and pedestrians traveling short distances into the park. As highway repairs continue, Yellowstone has also begun upgrading and expanding an existing dirt road into Gardiner. Officials hope to restore access to both communities, particularly for commercial operators, before the end of the tourist season.

Temporary measures should be in place by winter, Yellowstone Superintendent Cam Sholly told reporters on July 8, but rebuilding fully could take three to five years. The northern highways are not only badly damaged but more susceptible to flooding than previously thought. So the park might move them to higher ground.

“Any investment that we make has to be looked at through the lens of what’s in the future,” Sholly said. “Should we build back where we were? Is there a better solution?”



Yellowstone Superintendent Cameron Sholly addresses the media on July 8 at the Old Faithful Inn in Yellowstone National Park. While most of the park has reopened since last month's flooding, he said officials are 'very focused' on addressing the parts that are not.

Madeline Carter

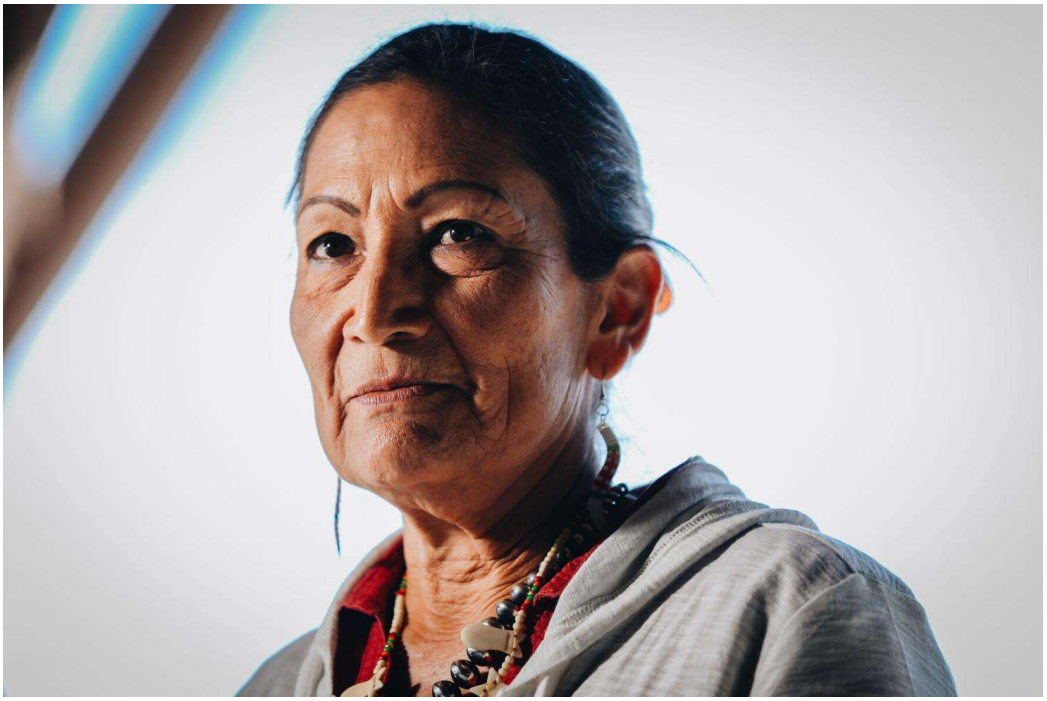
Funding and staffing are important, Kodish said, but there's only so much adaptation can do in the face of climate change.

"There is no question that if we are solely in reactive mode," she said, "what we'll see is increasing devastation to our parks and our communities and our resources."

Instead, she said, "there needs to be comprehensive and systemic shifts that move us away from fossil fuels and greenhouse gases, towards clean energy that can support and sustain a sustainable climate."

Interior Secretary Deb Haaland emphasized during the press event that adaptation is only one part of a broader solution.

"Fire resilience, adaptation, all of these things, go to the larger piece," Haaland said, "that the Department of the Interior is working very hard to address the climate crisis, because that isn't going away."



U.S. Secretary of Interior Deb Haaland speaks to the media about the Yellowstone flooding during a press conference on July 8 at the Old Faithful Inn in Yellowstone National Park.

Madeline Carter

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Climate change has been quietly transforming Yellowstone for years in ways that are imperceptible to most visitors but apparent to those who study the park.

“We’re seeing that winters and summers are getting drier,” Whitlock said. “And springs are getting wetter.”

As temperatures rise, snow is falling less and melting sooner. It becomes rain before it should and at progressively higher elevations. The mountain snowpack that releases snow gradually through the hottest months is shrinking, causing streamflow to peak earlier and decline faster.

“Climate change is the long-term trend,” Whitlock said. The weather is more fickle. A given day, month or year won’t necessarily adhere to that trend. There can still be hot, dry springs and cold, drizzly summers. But the averages are shifting.

Flood risk won’t rise uniformly, either, according to Yang Hong, a hydrology professor at the University of Oklahoma. It will still depend on the weather. The rain-on-snow phenomenon was a “recipe for flooding,” he said. Climate change makes bigger, faster floods more likely.

“We’re looking at the extreme years,” Hong said. “It’s not going to happen every year.”

A section of utility lines are exposed in a washout of Northeast Entrance Road next to Soda Butte Creek in Yellowstone National Park. Samuel Wilson, Bozeman Chronicle

Yellowstone wasn't built to withstand flooding that intense. Power lines were damaged. Water and wastewater systems failed. A park service house collapsed into the Yellowstone River.

"The infrastructure and the natural landscapes are kind of fragile," Hong said. Unless the park can shore up its structures, he added, the mounting flood risk "will cause similar, if not larger, damages."

Many of the park's native species are similarly ill-equipped for climate change.

At least 40 animal species, from eagles to otters to grizzlies, eat the Yellowstone cutthroat trout, according to Bob Gresswell, an emeritus research biologist at the U.S. Geological Survey. Populations of cutthroat, the most abundant native trout in the park, plummeted after the invasive lake trout was introduced in the 1980s or 1990s and began eating the cutthroat.

Lake trout have no natural predators in Yellowstone. They live deeper in the water, too far for the animals that eat cutthroat trout to reach. Park staff hang miles of gillnets and remove hundreds of thousands of lake trout as part of a multimillion-dollar yearly effort to restore cutthroat populations.

"The non-native lake trout have been reduced," Gresswell said. "Cutthroat are rebounding." But climate change, he said, "means that we'll have to continue that suppression program essentially forever."

Lake trout spawn in lakes, which are buffered by their size against rising temperatures. Cutthroat, however, spawn in the park's rivers and streams, where the flow will be lower and warmer when their eggs hatch.

The young fish, he said, will "have to move out very, very quickly" in order to make it downstream before water levels drop too far.

A broken culvert rolls out from underneath a washed out section of North Entrance Road on the Gardner River in Yellowstone National Park on June 19.

Samuel Wilson, Bozeman Chronicle, Report for America

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Hotter, drier summers are causing fires across the West to ignite more frequently, burn more intensely and reach higher altitudes. In the Greater Yellowstone Ecosystem, the vegetation that grows during the increasingly cool, wet springs will dry out in summer and turn to fuel.

“The mean fire return interval is getting shorter and shorter and shorter,” said Trevor Bloom, a community ecologist at the Nature Conservancy. “If you get reburn that happens too frequently, the trees aren’t going to regenerate, and it’s actually going to be converted to a grassland.”

More fires will start in those grasslands, then move into the remaining forest, accelerating their decline.

“There’s actually a lot of projections that even as soon as 2050, we’re going to lose the majority of forests in Yellowstone, and it’s going to become more of a grassland, which in many ways, might be a less desirable place to visit. There might be less wildlife because of that,” Bloom said.

Invasive annual grasses, like cheatgrass, that have infiltrated parts of the park are also contributing to the reburning. The grasses are quick to move into injured ecosystems, including areas that have recently burned.

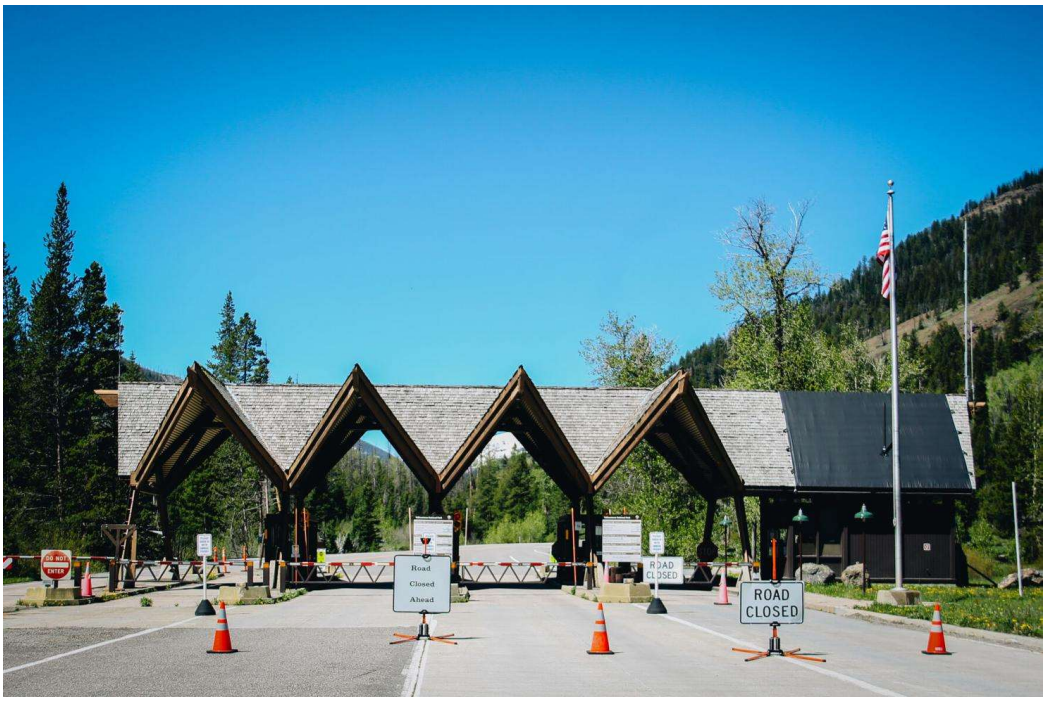
“Cheatgrass is very flammable,” Bloom said. Its arrival becomes cyclical, he added: “Where you then see more fires, you see more cheatgrass coming in those disturbances.”

Fires aren’t the only thing harming Yellowstone’s forests. Climate change has exacerbated the damage caused even by some native species, including the mountain pine beetle, which preys on Yellowstone’s whitebark pines.

“What’s happening now is, because it’s warmer, the beetles can go through two life cycles in a year,” Whitlock said. “They don’t get killed off by cold winter temperatures like they used to. And so as a result of that, they’re more persistent, and they also have moved to higher elevations.”

Whitebark pine seeds, a staple food for grizzly bears, are quickly disappearing. The trees are dying by the thousands to beetles, a non-native fungus, drought and wildfires. They live so high on the mountains that, unlike most plants in Yellowstone, they’re not adapted to fire. Because

of climate change, the flames are reaching them, too.



The East Entrance of Yellowstone National Park is blocked off to the public on June 17. The park's sudden closure due to flooding stranded tourists and sent shockwaves through Wyoming's gateway communities.

Madeline Carter

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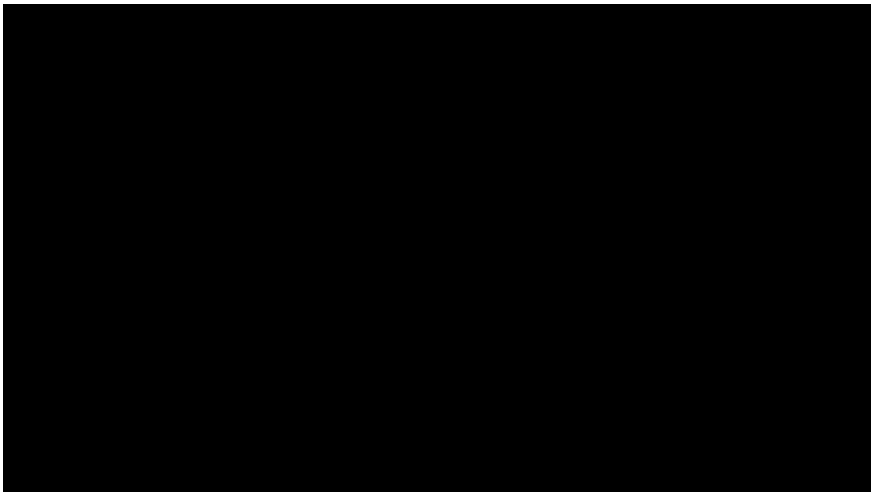
The same conditions that give rise to fires and floods can wreak all sorts of havoc in Yellowstone. Landslides. Avalanches. Severe snowstorms. Structure damage. Mass die-offs of plants and wildlife. Proliferation of species that shouldn't live there.

"Yellowstone is not creating climate change, but you're seeing the effects of climate change," Bloom said. "From a management standpoint, I think they're doing the best they can with all the pressures that they're facing."

Bloom owns Guides of Jackson Hole, a tour service that offers private trips in Yellowstone and Grand Teton. Yellowstone is his top seller, and June was tough. But he was stunned by how quickly the park reopened.



Closures aren't his only worry, though. He's already confronting impacts that are not only beyond Yellowstone's control, but originating outside its borders.

There were days last summer, as wildfires raged in the Pacific Northwest, when “even staring out at Old Faithful was obscured by smoke,” he said. “We would have clients, you know, complaining about that. And there were even days that we canceled trips.”

Bloom’s business, like many others, is still recovering from the drop-off, and this summer’s inflated travel costs aren’t helping. July was another slow month.

“The closures that occurred in Yellowstone could have potentially been a net positive for the ecosystem itself, seeing less traffic, seeing less people,” he said. “The wildlife probably had a little bit of a chance to recover. But from an economic standpoint, it feels like a disaster.”

He doubts it will be the last.

“I think having more park closures, due to extreme weather events that you can attribute to climate change, are going to become more and more common,” Bloom said. “It’s going to become a more volatile industry for everyone.”

For the communities that depend on the park, the short summer tourist season makes interruptions especially hard.

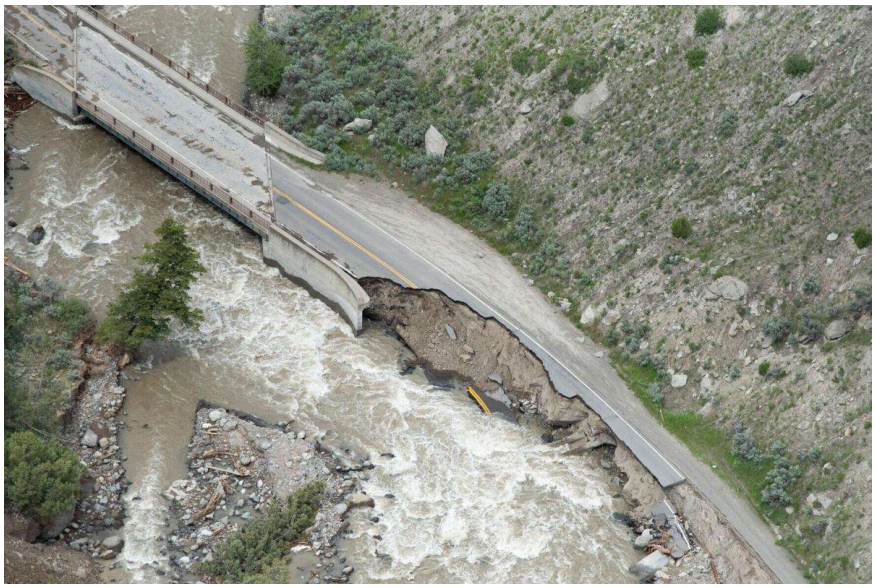
“I think everybody just kind of hopes it doesn’t happen this year,” Bloom said.

This year, it did.

This story was updated to correct the name of the tour company owned by Trevor Bloom. It is Guides of Jackson Hole.

Photos: Yellowstone flood aerials

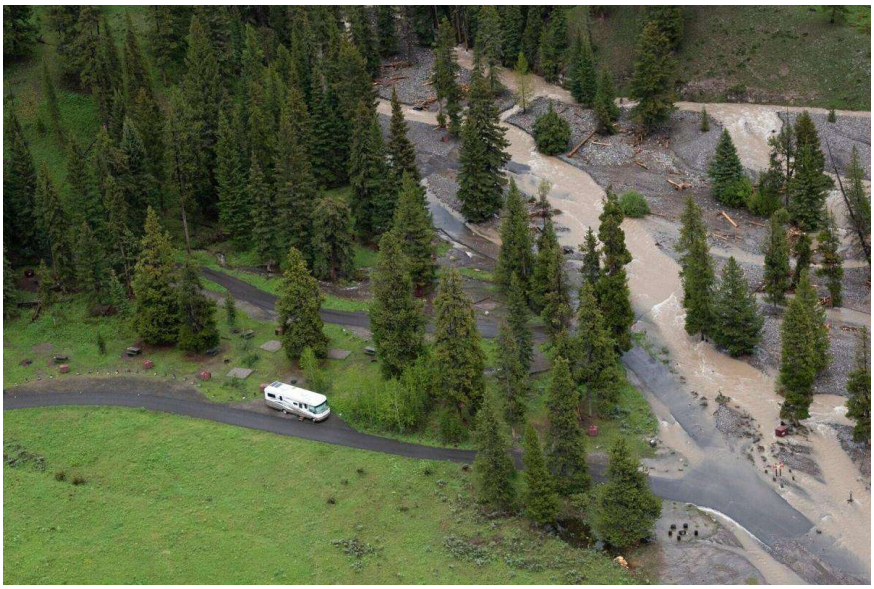
Yellowstone flood flyover



The Gardner River runs past washed out sections of North Entrance Road in Yellowstone National Park on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover



An abandoned motor home is left at Pebble Creek Campground in Yellowstone National Park as water levels remain high on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover

A cottonwood tree remains standing on an eroded bank of the Gardner River in Yellowstone National Park on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover

Work continues to fortify the underused Old Gardiner Road between the north entrance of Yellowstone National Park and Mammoth Hot Springs in anticipation of increased traffic on Sunday, June 19, 2022.

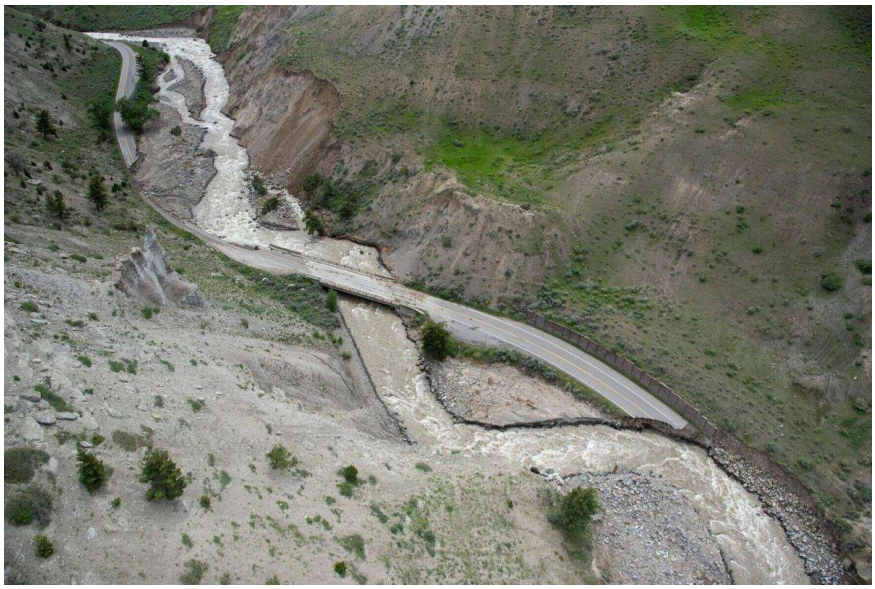
Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover

Gardiner, Mont. is photographed on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

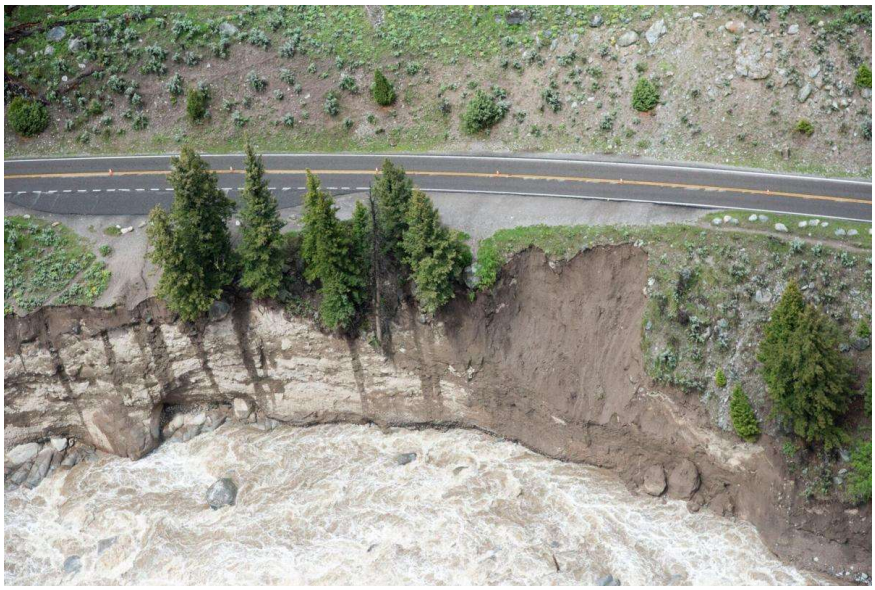
Yellowstone flood flyover



The Gardner River weaves a new channel through washed out sections of North Entrance Road in Yellowstone National Park on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

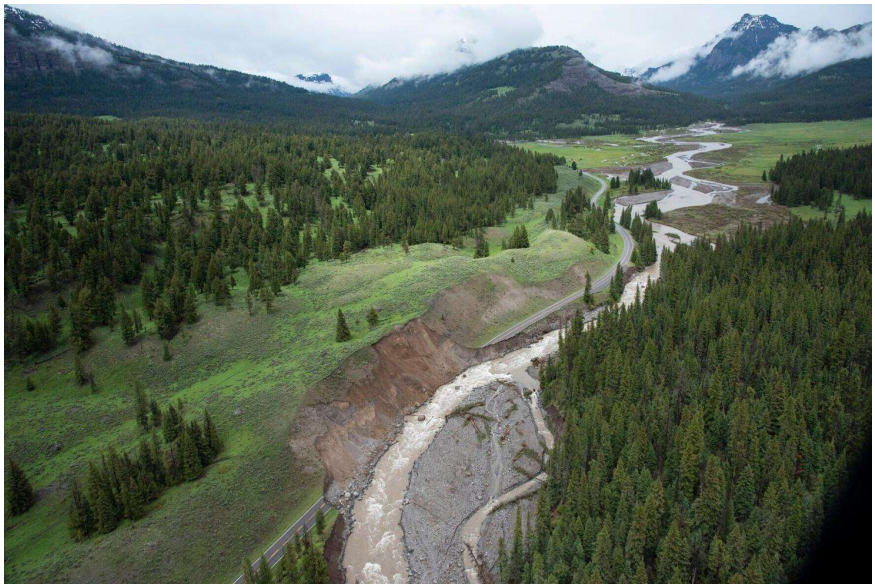
Yellowstone flood flyover



Erosion from flooding approaches a section of Northeast Entrance Road next the Lamar River in Yellowstone National Park on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover



Sections of Northeast Entrance Road are washed out due to flooding on Soda Butte Creek on June 19 in Yellowstone National Park.

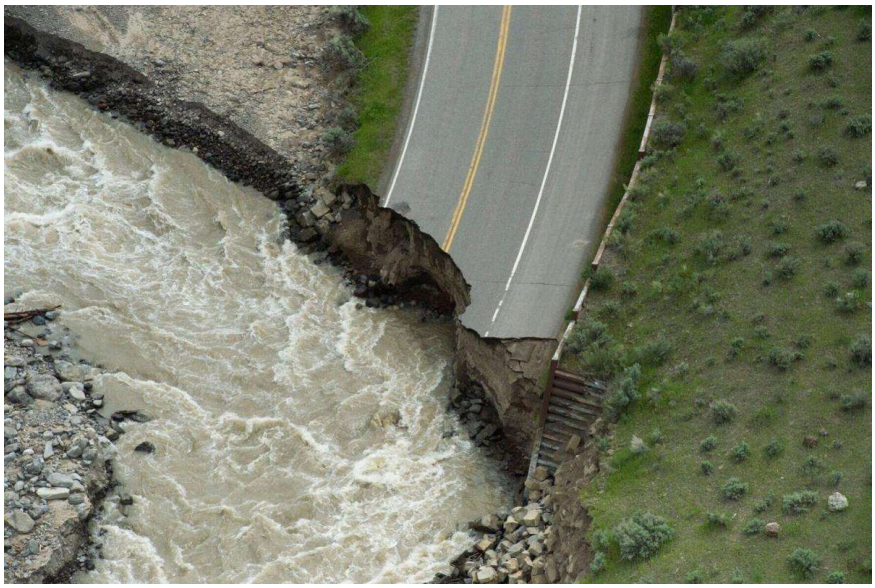
Samuel Wilson, Bozeman Chronicle, Report for America

Yellowstone flood flyover

Water running through a ditch overflows onto Northeast Entrance Road in Yellowstone National Park on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover



The Gardner River carves a new route after washing out a section of the North Entrance Road in Yellowstone National Park on June 19.

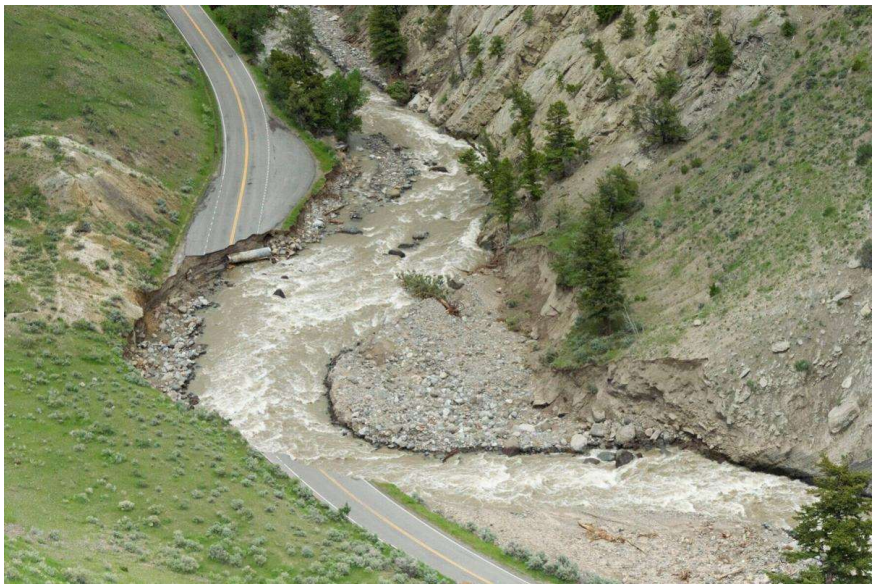
Samuel Wilson, Bozeman Chronicle

Yellowstone flood flyover

A broken culvert rolls out from underneath a washed out section of North Entrance Road on the Gardner River in Yellowstone National Park on June 19.

Samuel Wilson, Bozeman Chronicle, Report for America

Yellowstone flood flyover



The Gardner River carves a new route after washing out a section of the North Entrance Road in Yellowstone National Park on Sunday, June 19, 2022.

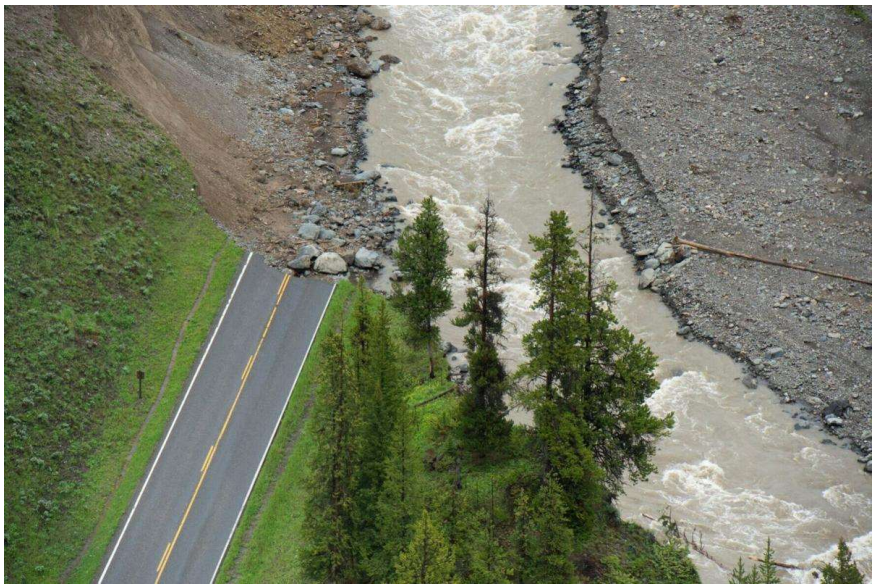
Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover

An earth moving machine is parked at a pullout of North Entrance Road, stranded by washouts caused by flooding on the Gardner River, in Yellowstone National Park on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover



Northeast Entrance Road disappears into Soda Butte Creek in Yellowstone National Park on Sunday, June 19, 2022.

Samuel Wilson/Chronicle/Report for America

Yellowstone flood flyover

A section of utility lines are exposed in a washout of Northeast Entrance Road next to Soda Butte Creek in Yellowstone National Park.

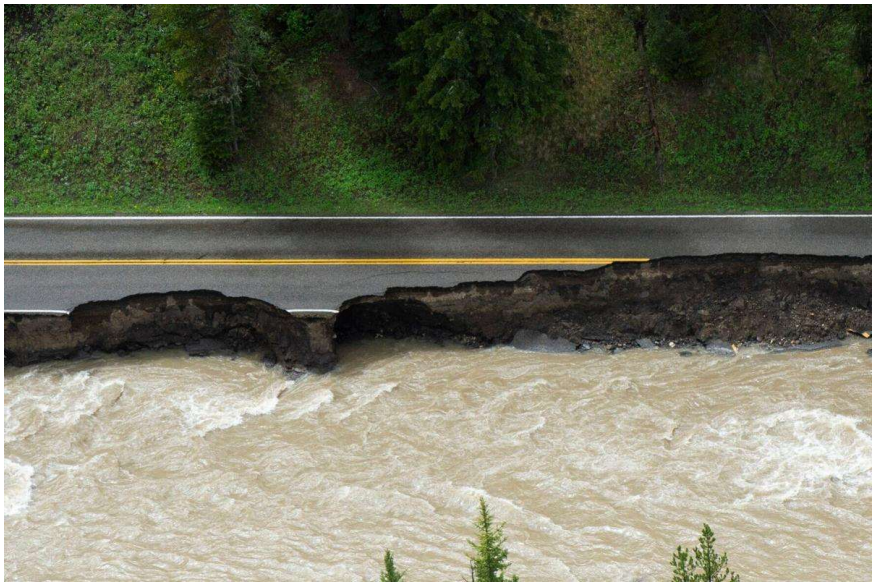
Samuel Wilson, Bozeman Chronicle

Yellowstone flood flyover

Soda Butte Creek runs high in Yellowstone National on Sunday.

Samuel Wilson, Bozeman Chronicle

Yellowstone flood flyover



Northeast Entrance Road in Yellowstone National Park appears to have had a bite taken out of it by flooding on Soda Butte Creek, photographed on Sunday.

Samuel Wilson, Bozeman Chronicle