

TRAILS FORECAST: RESILIENCY AND REPAIR

BY SCOTT STARK



As natural disasters such as floods and tornados continue to increase across the country, trail managers are recognizing the need for new solutions to help mitigate the economic, environmental and infrastructural impacts and ensure long-term resiliency in their communities. •



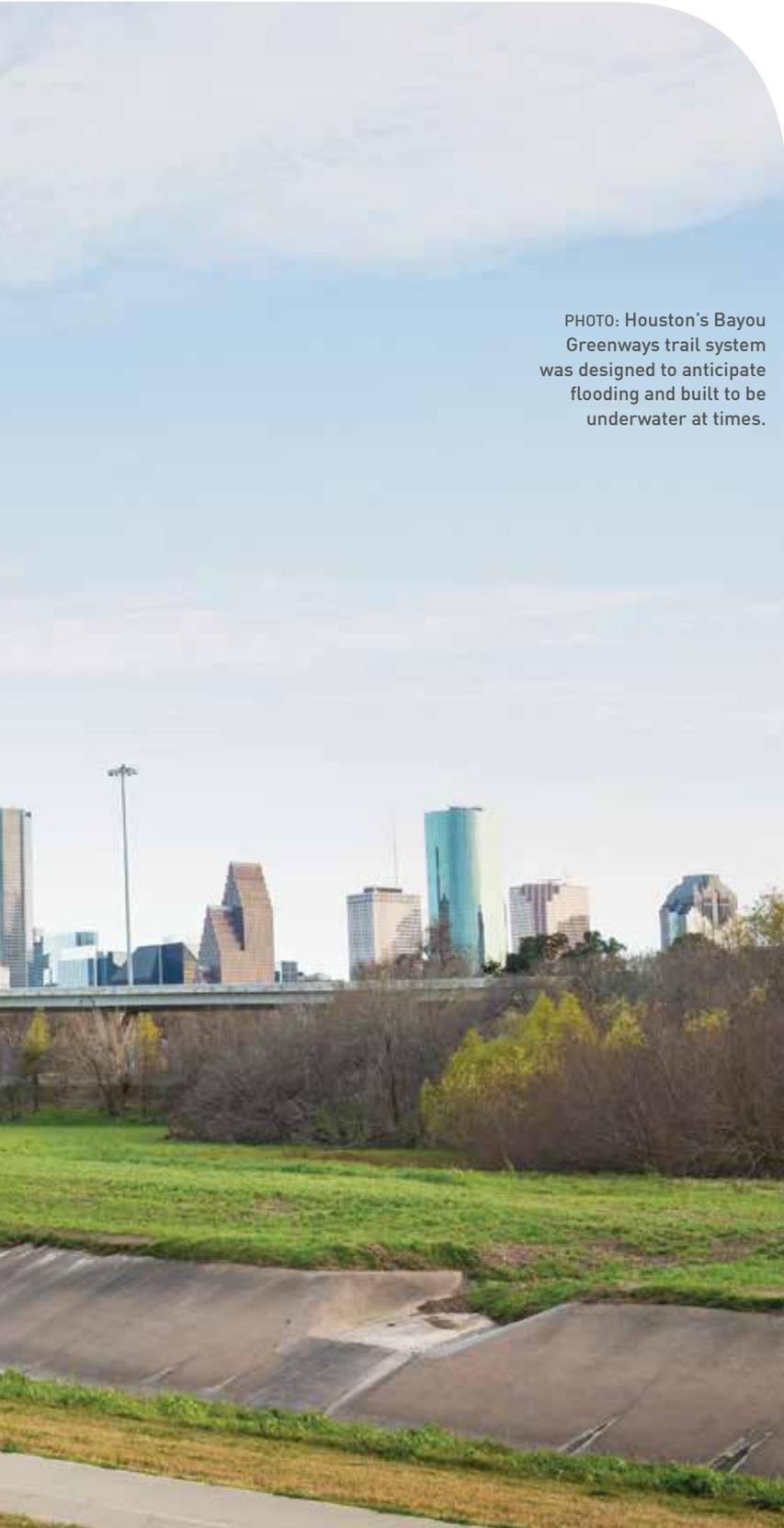


PHOTO: Houston's Bayou Greenways trail system was designed to anticipate flooding and built to be underwater at times.

In 2018, the most recent full-year picture, the United States suffered 14 separate \$1 billion-plus weather and climate disasters, the fourth-highest on record—and the top three all occurred within this decade.

Not all of these events impacted trails, of course, but to trail-goers and the businesses that rely on them, storm-related damage is a big—and perhaps growing—concern.

Expert consensus is that a warming planet will invariably lead to more extreme weather events, and Tom Sexton, northeast regional director for Rails-to-Trails Conservancy, notes that even setting aside big-picture climatic changes, modern trail engineers operate in a very different landscape, quite literally, than the railway engineers of yore. Every structure that water cannot penetrate—every road, parking lot, driveway and big-box store—in the entire watershed contributes to the amount of water that finds its way unchecked downhill. “The reason for these floods is likely based in climate change, but it’s exacerbated by water-impervious layers,” said Sexton. “It’s a two-part process.”

This one-two punch is putting trails and their infrastructure to the test. “What we used to think of as once-in-a-lifetime storms and floods are coming more often now, and trails are in the crosshairs,” said Sexton.

That’s true both across the country and in Sexton’s Northeast region. Referencing a recent federal study, Sexton noted that flooding is America’s most common disaster “and the crosshairs are pointing at trails.”

Half a country away, Trent Rondot of the Houston Parks Board said that even with his city’s efforts to promote green spaces and embrace the natural flood control abilities of its bayous, Houston experiences more frequent flooding these days. “As the city has grown and there’s more concrete and much less natural area to absorb water, we’re seeing more flooding now than we did 20 or 30 years ago. We basically have a 100-year flood every single year,” said Rondot.

From hurricane-induced flooding to rivers overflowing their banks following torrential rains, trails across the country have suffered damaging storm after storm. These are a few of their stories—tales of disaster, recovery and resiliency.

(SPREAD) ANTHONY RATHBUN, COURTESY HOUSTON PARKS BOARD; (INSET) COURTESY HOUSTON PARKS BOARD

TRAILS ACROSS THE COUNTRY ARE BEING IMPACTED BY INCREASED FLOODING BROUGHT ON BY GLOBAL ENVIRONMENTAL CHANGES.

Water, Water Everywhere: Nebraska's Cowboy Recreation and Nature Trail

Nebraska was in the middle of what was categorized as a 500-year flood this March. A winter's worth of heavy snowfall had blanketed the Wyoming and Montana watershed that feeds Nebraska's Elkhorn River. "It got warm really quick and started melting the snow," explained Alex Duryea, a recreational trails manager for the state of Nebraska. "That filled up our rivers, but we still had thick ice on them" that blocked the water from easily flowing downstream. Then came weeks of rain. "It was a perfect storm," Duryea said. "It just all came at once."

The Cowboy Trail, where it parallels the Elkhorn between the towns of O'Neill and Norfolk, was hard hit. "Limestone surfacing was washed away; deep cuts—two feet or so—were made in the trail down to the ballast. The water overwhelmed our drainages and culverts," said Duryea. In one area that had been built up by the former railroad above the surrounding land, a 4-foot diameter culvert was completely blown out. "Now there's a hole in our trail 100 feet long and 45 feet deep."

And the water kept coming. "We had three or four more floods after we got the original FEMA [Federal Emergency Management Agency] funding," said Duryea. "May through August we kept getting more damage. We'd fix something but then it would erode away again. Every time I went out, there was something new."

The flooding was a good test of the trail's infrastructure, though. An important segment of the Great American Rail-Trail™ (greatamericanrailtrail.org), the Cowboy Trail has more than 200 bridges along its entire length, many of which are repurposed railroad bridges and most of which are wooden. "They were built to take the load of a train," said Duryea. "They're pretty stout—but they're also a hundred years old."

Duryea was happy to report that while many bridges sustained damage by debris hurtling along in the floodwaters, none were lost. Bridge approaches didn't always fare so well, though: Duryea noted one span in particular where the sinuous Elkhorn shifted course, taking out the approach and necessitating a new river crossing. "We'll have to build a bridge to get back to our old bridge."

By late 2019, many lengths of the trail had been repaired to a usable condition, but most of the major repair work still lies ahead. Officials would like to permanently reroute parts of the trail particularly prone to flooding, but budget constraints render that more of a wish than a solid plan. With an estimated \$9 million of

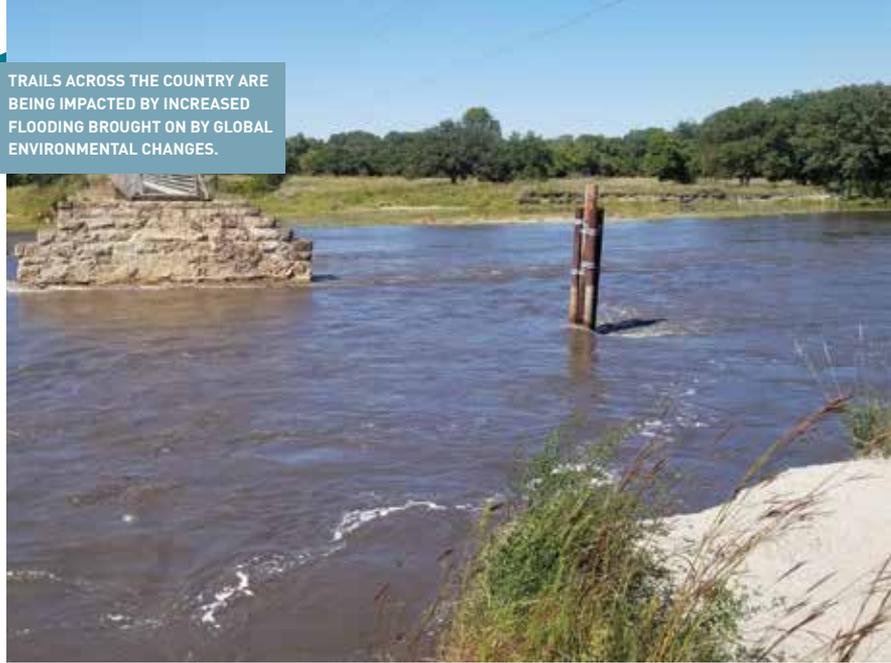


PHOTO: The Cowboy Trail fell victim to a 500-year flood in March 2019—a combination of melting snow in the Wyoming and Montana watershed and weeks of rain that washed out the approach to this bridge across the Elkhorn River.

damage, "It'll be a few years until the trail is all put back to rights," said Duryea.

Economics of Storms: Missouri's Katy Trail

At 240 miles, the Katy Trail in Missouri spans nearly the entire breadth of the state. Not only the longest developed rail-trail in the United States, the 2007 Rail-Trail Hall of Fame inductee (railstotrails.org/hof) is also one of the oldest and a significant economic driver. Wineries, restaurants, bed-and-breakfasts, hotels, bike shops and more line the route that draws an estimated 400,000 visitors a year. One study pegged the trail's economic impact to Missouri at nearly \$18.5 million a year, so when a third of the trail was left underwater this summer, it had a statewide effect.

According to the *St. Louis Post-Dispatch*, the impact of the Katy's flood-related closures was far-reaching, including businesses reporting significant financial losses, shops temporarily closing to mitigate the impact of the reduced number of trail users, and even the cancellation of a significant state-sponsored event, the Katy Ride, which is an economic driver for many small businesses along the route.

One of the thousands of businesses affected by the flooding was Kim's Cabins on the western end of the trail, where the Rock Island Spur meets the Katy. Since opening the first cabin four years ago, owner Kim Henderson has steadily grown her business. The Katy, Henderson said, has been an economic lifeline. "It shows what can happen to a small town when the shoe factory is gone, when rail is gone," she said. The message is one she's also brought to the state capitol.



WHAT ARE THE ODDS?

Floods are often described as 100-year floods or 500-year floods as a reflection of the expected likelihood of their occurrence. If each year carries a one-in-five hundred chance of the devastating event taking place, the cumulative expectation is that the event will happen once in a 500-year span. These figures were developed from centuries of weather data, and while they're meant to reflect statistical probabilities rather than calendar-based certainties, it's becoming increasingly clear that global environmental changes are forcing a reconsideration of these measurements.

A recent study by Princeton researchers found that 100-year floods could become annual occurrences in New England; along the southeast Atlantic and Gulf of Mexico shorelines, they may happen every 30 years. "The historical 100-year floods may change to one-year floods in Northern coastal towns in the U.S.," said Ning Lin, associate professor of civil and environmental engineering at Princeton University.

Marshall Shepherd, director of the atmospheric sciences program at the University of Georgia and a former president of the American Meteorological Society, said that 100-year floods are becoming frequent enough that the term "is pretty much useless now as a baseline for an extreme event."

Business was good enough, in fact, for Henderson to leave her job as a town administrator for Windsor and devote herself full time to Kim's Cabins. So when the Missouri River started overflowing its banks, Henderson took notice. Located a good 50 miles from where the trail takes its leave of the Missouri River and veers southwest, Henderson's cabins weren't in any direct danger from the floodwaters, "but as far as people visiting ... I had people staying in three cabins on a Saturday night. They were going to ride the whole trail, but a few days before they were supposed to arrive, they called up. 'There's just too much damage,' they said. 'We're not coming.' And bam! They're gone."

It was a story that repeated itself time and time again as overnight guests canceled their plans to ride the Katy. And yet, Henderson considers herself one of the fortunate ones, and did what she could to support business owners not so lucky. "Most businesses on the trail are small businesses. Supporting each other is what we do."

Affecting Locals and Visitors Alike: Mississippi's Tanglefoot Trail

One of Mississippi's longest rail-trails and a 2019 Rail-

Trail Hall of Fame inductee, the Tanglefoot meanders nearly 44 miles through the foothills of the Appalachian Mountains. Situated far enough inland that it's spared the worst of hurricanes barreling in from the Gulf of Mexico, it's nonetheless at the mercy of the local weather they often produce as a result. "When a hurricane comes in from the south, we get breakoff thunderstorms that produce tornados," said Randy Kelley, executive director of the Three Rivers Planning and Development District. "And we seem to be having more of them in recent years."

Having avoided any hurricane-induced storms in 2019, major springtime rainstorms wreaked havoc along the trail nonetheless. Culverts were destroyed, a bridge was washed out, sections of the trail collapsed, and waterlogged soil led to entire trees crashing down across the path. "Sycamores will hold up to anything," said Kelley. "Oak trees, not so much. And the trail? It's surrounded by oaks."

Ronnie Bell, Three Rivers' division director, explained it was a 22-mile stretch around the trail's midpoint that took the brunt of the damage, including a section between Pontotoc and New Albany that's heavily used by locals and visitors alike. "Two out-of-state bike clubs canceled their visits since they couldn't access the entire length of the trail," said Bell. "We took phone calls and social media inquiries from all over," he continued. "The Tanglefoot is really popular, and people were eager to get back on it." Bell lamented the impact its closure undoubtedly had on the local economy with the loss of business from would-be trail users.

"We basically have a 100-year flood every single year."

Trent Rondot,
Conservation
and Maintenance
Director, Houston
Parks Board

PHOTO: The Houston Parks Board provides green spaces along the Bayou Greenways that provide complementary flood control by keeping the land water-permeable.





Executive Director Kelley stated that the local government has been supportive of rebuilding, “but we operate on a limited budget. A shoestring budget.” He’s looking forward to receiving FEMA funding, but says that the work done as part of a prison release program by inmates that demonstrate good behavior has been the saving grace of the trail. “If not for their support, we wouldn’t have a functional trail,” said Kelley.

Key to Resiliency: Texas’ Bayou Greenways

Flooding isn’t the exception at the Bayou Greenways—it’s the rule; the trail system lining Houston’s bayous was built to be underwater at times. “We design our projects to anticipate flooding,” said Chip Place, managing director of capital programs for the Houston Parks Board. “Accommodating floodwater is a natural function of a bayou,” he explained, saying that Houston’s Harris County Flood Control District has added to and upgraded that functionality. “They’re engineered to serve a flood protection purpose.” And the trails that make up the Bayou Greenways are all part of the plan.

“Runners may prefer a softer crushed-stone trail, but those surfaces just don’t hold up in floods,” said Place. “Our typical surface is a 10-foot-wide concrete trail six inches deep with a substantial subgrade. It’s built to anticipate storms.”

Listening to Place, one comes to understand that the history of Houston is a history of fighting against water. “Houston has always flooded—it’s a continuing saga,” said Place. We had major floods back in the 1920s and 1930s that resulted in retention reservoirs west of town.” Hurricane Harvey, the Memorial Day Flood, the Tax Day Flood, Hurricane Imelda—they all serve as soggy city milestones. “The water comes up and deposits silt. We clean it up and we’re back in business.”

Trent Rondot, conservation and maintenance direc-

tor for the Houston Parks Board, waxes enthusiastic about how well the Bayou Greenways was designed and engineered. Flood after flood, he said, “We’ve had no structural failures of trails or bridges. There’s mountains of silt and debris left behind. There are shopping carts and even cars. We lose trash can lids—but there have been no structural failures.”

Rondot said that the widely varying nature of floods can make accurate budgeting difficult. “In an average year without a significant event, we spend \$100,000–\$200,000 in cleanup. When [Hurricane] Harvey hit, we spent \$1.3 million.” The solution for Houston has been two different funding pools: There’s the usual spending fund for routine cleanup after run-of-the-mill flooding, and a special reserve set aside each year and used to recover from catastrophic events. “But we’ve done enough flood cleanup by now that they are somewhat predictable,” said Rondot.

Neither building nor maintaining Houston’s bayou-hugging trail network is cheap, concedes Place. “We’re spending \$220 million to complete the Greenway,” he said. “That could buy you 1 mile of freeway in Texas, but we’re getting 80 miles of trail finished with the money. When you do those kinds of cost comparisons, it’s not as expensive.”

In addition to its trails mission, Place explained that the Houston Parks Board also works to purchase green space along its pathways. “We think of these as linear parks. They provide complementary flood control that keeps the land from becoming impervious to water.” Place generally takes a less adversarial approach to managing storms, emphasizing the need to work with the land and let the bayous perform their natural sponge-like function. “We need to make room for the river, as the Dutch say. We think that’s a direction we should be going.” •

PHOTO: One of Mississippi’s longest rail-trails, the Tanglefoot Trail was damaged by major springtime rainstorms that destroyed culverts, washed out a bridge and collapsed sections of the trail.



A writer and a rider, Colorado native Scott Stark enjoys combining the two as he explores trails across the country.