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26

SUNRISE OVER the Teton Range, a climbing mecca with eight peaks more than 12,000 feet high.

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COVER:

MEMBERS of Ancestral Lands Conservation Corps' Crew 642. From left to right: Jonathon Hannaweeke, Darian Seowtewa, Kendrick Nahohai and Mckenzie Niiha.

© STEVE ALBERTS

FEATURES

26

Lofty Heights

We were young, brown outsiders in the world of outdoor adventure. Climbing Grand Teton marked a turning point.

By Ernie Atencio

34

Full Circle

At Bears Ears National Monument, a crew of young men from the Pueblo of Zuni is caring for the cliff dwellings their ancestors built 800 years ago.

By Karuna Eberl

44

Obed Refuge

How a backyard national park helped heal a family in transition.

By David Brill

CONTENTS

CHARLEY HARPER'S depiction of a desert national park shows the many species of birds that nest in the saguaro cactus.



DEPARTMENTS
 SPRING 2022 / Vol. 96 No. 2

3 President's Outlook

4 Editor's Note

8 Echoes

10 Trail Mix

Charley Harper's national park art, the case of the disappearing ice on Lake Superior, a surprising find in the waters of St. Croix River.

22 Denizens

New research from Padre Island National Seashore highlights the toll that ingesting plastic is taking on green sea turtles.

By Julia Busiek

24 Findings

A Chicago-based company has created a new, Earth-friendly protein from a fungus that was accidentally discovered in Yellowstone.

By Jacob Baynham

62 Reflections

Remembering the lives of Thomas E. Lovejoy and Edward O. Wilson.

By Katherine DeGross

64 That Was Then



ON THE WEB

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Yellowstone at 150

March 1 marked the 150th anniversary of Yellowstone, the world's first national park. It was created to protect an unparalleled landscape full of geysers, bubbling pots, roaming bison, wolves and my favorites, bears. Millions and millions of people have visited to marvel at this place — including many in my own family.

But hot springs and wildlife are just a piece of Yellowstone's story. There is a rich cultural history here, and these lands are overflowing with tales that Indigenous people have been telling for centuries.

There are at least 27 Tribal nations with historic connections to what is now Yellowstone; their history in the "land of the geysers," as some called it, goes back more than 10,900 years. But these Indigenous peoples were pushed out of their traditional lands when the park was created in 1872, a move the Park Service and the nation continue to grapple with to this day. Many of those traditional stories have been long overlooked — and all too many visitors have come and gone without learning fully about the park's past.

The 150th anniversary of the park is a fitting moment for all of us, including the Park Service, to face the past as well as to recognize and honor the culture and history residing in these lands. It's time to listen, reflect and usher in a new era at the park and throughout the park system.

"To have Yellowstone acknowledged as homeland gives Indian people a connection to the park many didn't know they had," Shane Doyle, an environmental advocate and member of the Apsáalooke Nation, told Mountain Journal in October. "The discussions we need to have aren't all going to be easy. All of us belong to the land."

Yellowstone Superintendent Cameron Sholly is working to ensure these discussions happen and spur change, and that people who visit the park this year and long after will better understand the history of the land and all who still call it home. In the same Mountain Journal article, Sholly said, "The 150th cannot just be about Yellowstone as a park but must be about something much deeper."

With the leadership of Tribal nations as well as the Park Service — and support from allies including NPCA — indeed it will be. And we will all be better for it.

With gratitude,
Theresa Pierno



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Power of Nature

Canadian doctors have a new tool in their toolboxes: Health care professionals can now prescribe national park passes to patients to improve their mental and physical health, thanks to a collaboration between a new program, PaRx, and Parks Canada. “There’s almost no medical condition that nature doesn’t make better,” Dr. Melissa Lem, the PaRx director, told The Washington Post. Indeed, studies have repeatedly confirmed what many national parks lovers already know: Being in nature is good for you. It’s good for your body, your mind — and your heart.

In this issue, two contributors write movingly about how nature was a salve and savior at pivot points in their lives. In “Lofty Heights” (p. 26), Ernie Atencio, NPCA’s Southwest regional director, tells the story of an exhilarating climb to the top of Grand Teton National Park’s namesake peak. His essay is an adventure tale, but it’s also about how the mountains beckoned — and provided some answers — when he was young and uncertain about his future. And it’s about his struggle to find his way as a person of color in the overwhelmingly white world of conservation and outdoor recreation.

David Brill’s story begins with his search, after a divorce, for a “nature-infused” place to retreat and strengthen bonds with his young daughters. He ended up building a cabin on the edge of Obed Wild and Scenic River in Tennessee, and his essay, “Obed Refuge” (p. 44), is a meditation on how he and his family healed and grew with a helping hand from the wilderness around them.

These essays touch on some similar topics: the curative qualities of nature, of course, but also growth after struggle, resilience and perseverance. It’s comforting to read about the power of putting one foot in front of the other to get to the other side of a grueling passage. The moral is an apt one for these times: Whatever difficulties you face, there’s always another swimming hole or peak ahead.

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WHAT WE DO
NPCA protects and enhances America’s national parks for present and future generations by identifying problems and generating support to resolve them.

EDITORIAL MISSION
National Parks magazine fosters an appreciation for the natural and historic treasures found in the parks, educates readers about the need to preserve those resources, and illustrates how member contributions drive our organization’s park-protection efforts. The magazine uses the power of imagery and language to forge a lasting bond between NPCA and its members, while inspiring new readers to join the cause. National Parks magazine is among a member’s chief benefits. Of the \$25 membership dues, \$6 covers a one-year subscription to the magazine.

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Members can help defend America’s natural and cultural heritage. Activists alert Congress and the administration to park threats, comment on park planning and adjacent land-use decisions, assist NPCA in developing partnerships, and educate the public and the media. Sign up to receive Park Notes, our monthly email newsletter at npca.org/join.

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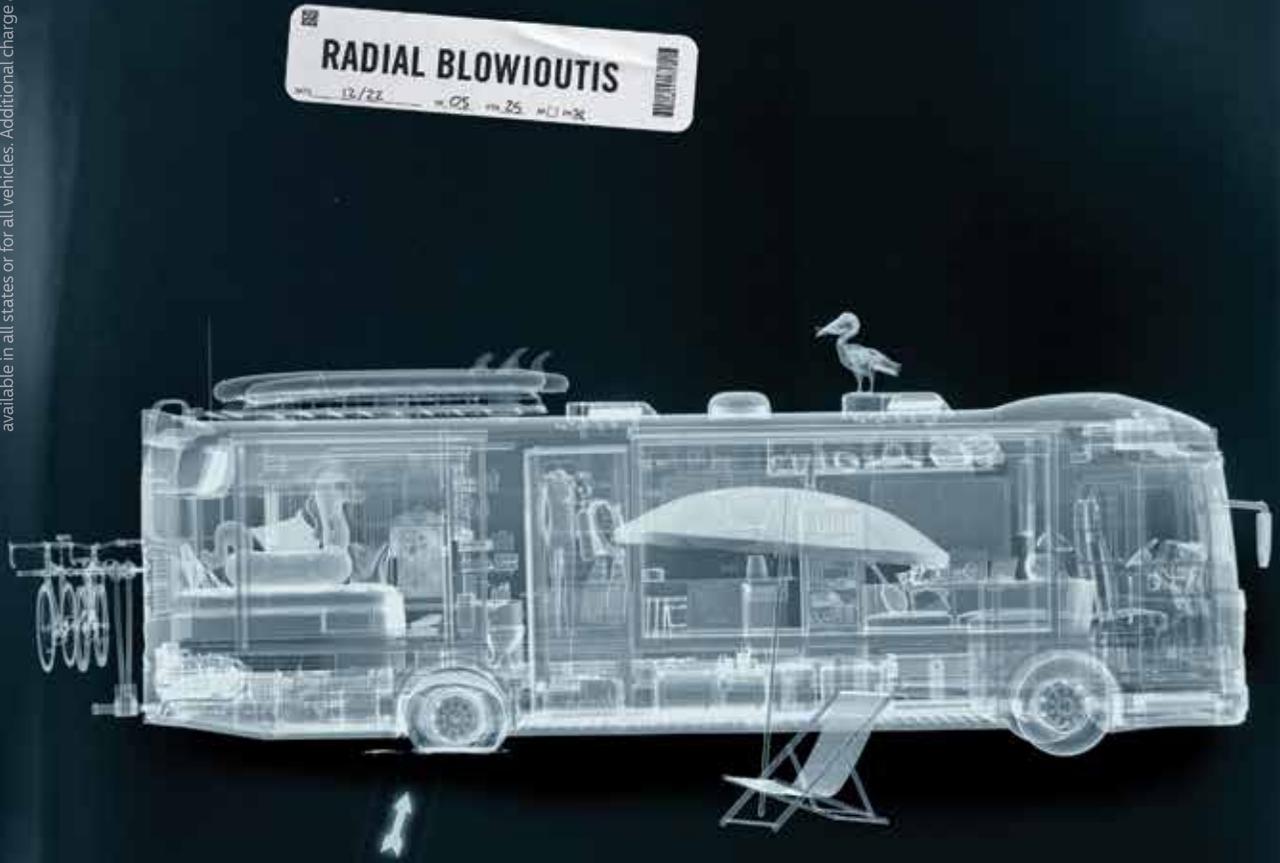


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Echoes

"Today's historic announcement that the Biden administration will invest more than \$1 billion in Everglades restoration marks a turning point in our journey to preserve this vibrant ecosystem."

NPCA President and CEO Theresa Pierno celebrating the Army Corps of Engineers' decision to fund Everglades restoration at an unprecedented level, as quoted in National Parks Traveler. The 1.5-million-acre national park and the larger "river of grass" landscape protect the drinking water supply of 8 million Floridians and support a \$90 billion tourism economy. The projects funded through the Infrastructure Investment and Jobs Act will improve the area's climate resiliency and water quality.

"These are our most special places. If we don't protect them, we could lose them."

NPCA Southeast Regional Director Emily Jones explaining to Audubon.org why NPCA remains concerned about the prospect of a commercial spaceport near Cumberland Island National Seashore. In December, the Federal Aviation Administration granted an operating license to Camden County, bringing the project one step closer to reality. Opponents say there could be falling debris and fuel leakage, and those issues, along with rocket launches and 24-hour lighting, would threaten migrating wildlife, pollute land and water, and degrade the visitor experience.

"We can recognize what they did, the circumstances they were under, and we can begin to heal by that understanding."

NPCA Senior Director for Cultural Resources Alan Spears detailing to E & E News how the creation of an Emmett Till and Mamie Till-Mobley national historical park would afford visitors the chance to learn about the Till family, reckon with this painful history and take strides toward a more just future. Conversations about a potential park site gained momentum after the U.S. Senate voted in January to award a posthumous congressional gold medal to Till, a teenager murdered by white supremacists in Mississippi in 1955.



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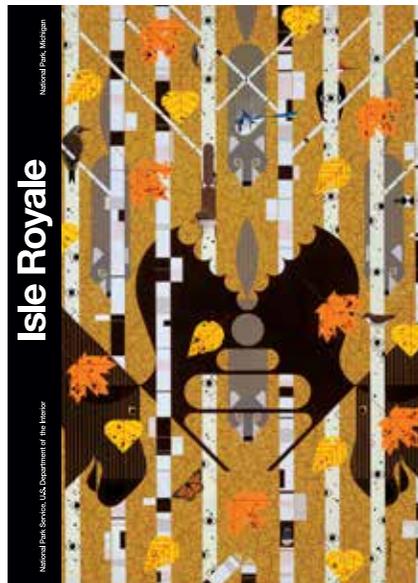
Charley Harper's World

Remembering the late artist — and his vibrant national park art — on the occasion of his 100th birthday.

In 2006, at age 84, artist Charley Harper discussed what he called “minimal realism” in a wide-ranging radio interview. “I work flat, hard-edged and simple,” he told designer Todd Oldham on WVXU, Cincinnati’s NPR station. “Instead of trying to put everything in, I try to leave everything out. And that works pretty well.”

This clear-eyed approach translated into bold, graphic compositions with an unmistakable style. Though his beloved ladybugs and jaunty cardinals may be the best known of his creations, his oeuvre spanned all the natural world. His works — commissioned by the Cornell Lab of Ornithology, Ford Motor Co., Hallmark and many others — were always meticulously designed and relentlessly researched. (He claimed to own more bird guides than anyone in the country.) Exhibited from Los Angeles to Germany, the artworks inspired devotion and today remain as popular as they are ubiquitous.

“He just had this way of getting you to look at things,” said Mary Yakush, a writer and editor at the National Park Service’s Harpers Ferry Center for Media Services in West Virginia. Hoping to draw attention to Harper’s artistic chops and lasting legacy, Yakush recently curated a virtual exhibition of the 10 national park posters Harper created in the 1970s and 80s, which were commissioned by the center’s then-director, Marc Sagan. The timing of Harper’s commission was key, she



WOLVES AND MOOSE roam through birch and aspen forests in Harper’s poster of Isle Royale National Park.

said, because people were looking to the relatively new Harpers Ferry Center to define the Park Service’s graphic identity. “And that’s really what Charley Harper did,” Yakush said.

For the assignment, the World War II veteran — accompanied by his wife and two other couples, including Sagan and his wife — crisscrossed the country visiting national parks from Hawai’i Volcanoes to Isle Royale. The resulting paintings, cherished by the Park Service and sold broadly as prints, are complex, vibrant and playful. A beaver, that dominant ecosystem engineer, reigns front-and-center in the poster for the

Rocky Mountain parks (encompassing the national parks from Glacier down to Rocky Mountain), and a panoply of briny sea creatures occupy their appropriate tidal zones in the depiction of the Atlantic barrier island parks (including Assateague Island, Cape Hatteras and Fire Island national seashores, among others).

“If anything, his works remind me of a tapestry,” Yakush said. Layers of tempera paint and sharp lines form a mesmerizing web of species, often challenging the viewer to find a focal point. Loath to paint a creature out of context, Harper, who graduated from the Art Academy of Cincinnati, took pains to place each species where it would naturally be found, often distilling the workings of an entire ecosystem into a single illustration. He attributed his ability to convey the breadth of a place in one painting to his multi-month honeymoon road trip with his wife and fellow artist, Edie Harper, in 1947. “That’s where I came to grips with the idea of simplifying,” he said in the 2006 interview with Oldham. “You have to simplify Rocky Mountain to get it on a piece of paper.”

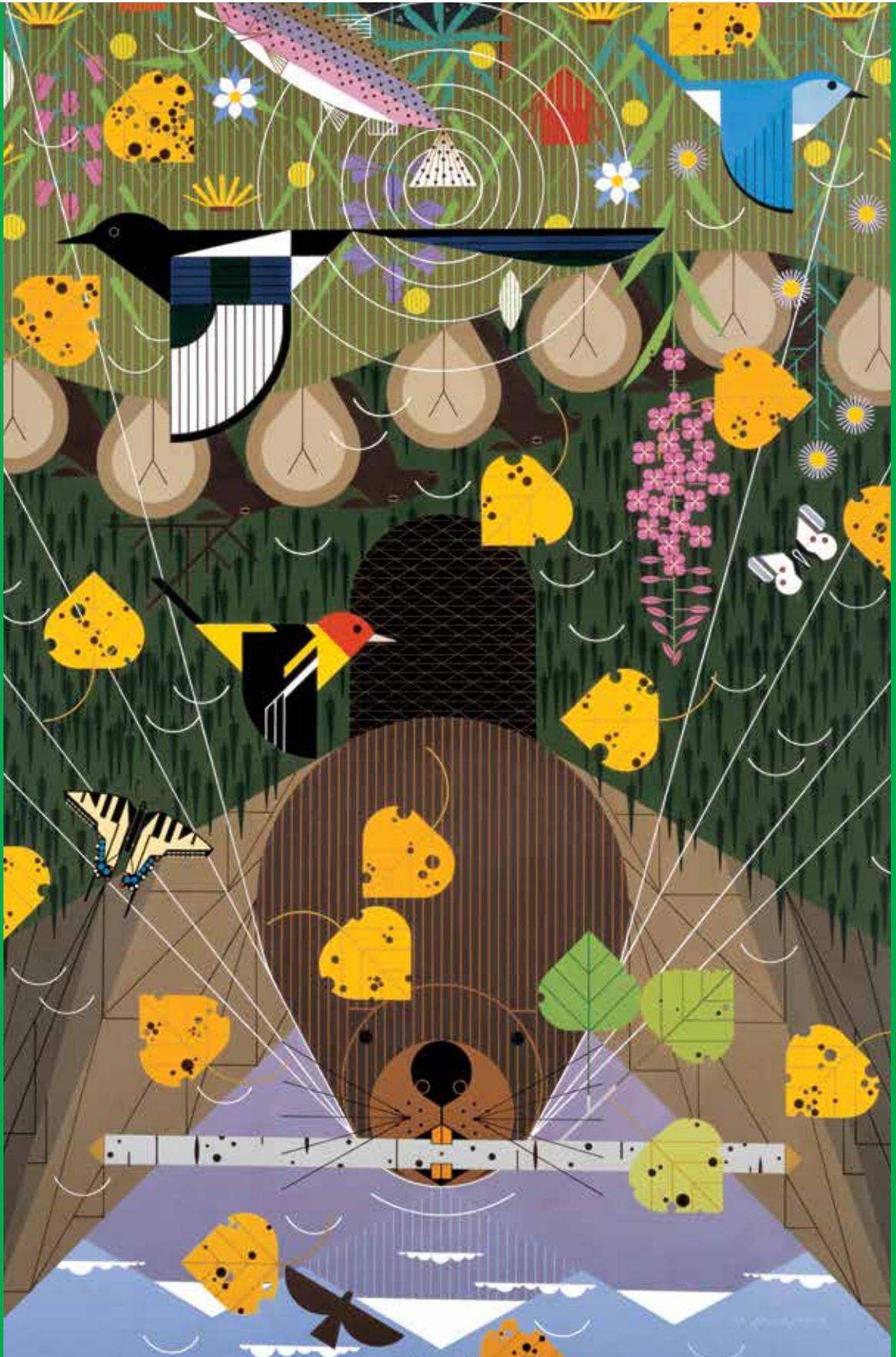
The artist’s son, Brett Harper, believes his father, who would have turned 100 this August, would be pleased that his paintings continue to inspire park visitors and remind them of the interconnectedness of the natural world. At heart, “he was an environmentalist,” Brett said, recounting how he found a letter his father penned in 1966, in which he wrote that he would have been a conservationist if he hadn’t been an artist. “In a sense,” Brett said, “he ended up doing both.”

—KATHERINE DEGROFF

The Rocky Mountains

National Park Service
U.S. Department of the Interior

A beaver pond reflects the landscape of the Rockies, a terrain shaped by glaciers, streams, and the beaver itself. Visit these wildlife-rich National Parks: Glacier, Yellowstone, Grand Teton, and Rocky Mountain.



© Charley Harper Art Studio 2017 Printed in U.S.A.

ARTWORK © CHARLEY HARPER ART STUDIO

A MONTANE ECOSYSTEM, complete with elk, fireweed and a black-billed magpie, is reflected in a beaver pond in Charley Harper's painting of the national parks in the Rocky Mountains.



AN OTHERWORLDLY EXPERIENCE awaits the hardy souls who hike to the ice caves at Apostle Islands National Lakeshore. Because of warming winters — and unstable ice — the caves haven't been accessible to the public since 2015.

©AP PHOTO/THE MINNEAPOLIS STAR TRIBUNE, BRIAN PETERSON

On Thin Ice

As the climate warms, Lake Superior's ice coverage shrinks — and opportunities to visit Apostle Islands' ice caves and experience other winter rites of passage along the shore are slowly disappearing.

Many national park sites boast some sort of fleeting natural phenomena: the way that sunlight hits the water cascading down Yosemite National Park's Horsetail Fall in February turning the flume into a flame; Kemp's ridley sea turtle hatchlings crawling to the ocean along Padre Island National Seashore in the summer; and the aurora borealis flickering overhead at Denali National Park and Preserve, to name a few. One of the most difficult to experience, however, may be the ice caves at Wisconsin's Apostle Islands National Lakeshore. Every winter, Lake Superior's fierce wind

and waves, coupled with water seepage and frigid temperatures, transform red sandstone sea caves into an otherworldly universe of snow and ice along a 2-mile stretch of mainland shoreline. But the last year they were accessible to the public was 2015.

During a nine-day window starting in late February of that year, 38,000 well-bundled visitors hiked from the national lakeshore's Meyers Beach up to 6 miles round trip over jagged shards of frozen lake ice in temperatures as low as minus 20 degrees Fahrenheit to catch a glimpse of the caves, their entrances

guarded by foreboding icicle jaws.

"It's a challenging adventure, but it can be breathtakingly beautiful, and very memorable," said Julie Van Stappen, the park's natural and cultural resource stewardship director. "If people are willing to brave brutally cold temperatures for a rare experience in nature — that's what makes it special."

The ice caves are hard to reach because the sole mainland path there, the Lakeshore Trail, leads hikers to the top of a precipitous cliff with no access to the caves 50 feet directly below. Though hikers can catch some views from the trail, the only way to enter the caves is by walking across the ice. With a warming climate, however, the ice on the world's largest freshwater lake by surface area is steadily receding.

According to the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory based in Ann Arbor, Michigan, the long-term average for annual maximum ice cover on Lake Superior is 62.3%. But graphs charting its recent history have risen and plunged like the stock market: The highest annual ice cover was 100% in 1996. The lowest was 8.5% in 2012. In general, Lake Superior's annual maximum ice cover is declining 7.3% per decade, almost twice the rate of decrease of any of the other Great Lakes.

This decline might seem relatively small, but it is an alarming shift, according to Jay Austin, a professor of physics and astronomy who is also a limnologist at the University of Minnesota Duluth's Large Lakes Observatory. "One of the things I find interesting about Lake Superior and ice cover specifically is that it's super sensitive to small changes in climate," Austin said.

In a study Austin published with colleague Steven M. Colman in 2007, he concluded that since 1980 Lake Superior's surface water has been warming by an average of 2 degrees Fahrenheit per decade, making it one of the fastest-warming lakes on the planet, a trajectory that has continued since the study was published. In this and further research, Austin and colleagues have also concluded that the lake's diminishing ice cover is one of the predictors of subsequent summer conditions, including higher lake temperatures. In short: Within decades, "the lake will be a fundamentally different place," he said.

Because studying Lake Superior in winter can be very dangerous, there is an enormous gap in real-time winter data. That combined with the changing climate means predicting near- or distant-future ice coverage on Lake Superior is still "an in-depth, million-dollar question," said Jia Wang, an

ice climatologist at the Great Lakes Environmental Research Laboratory.

To try to answer that question, NOAA has embarked on a five-year project called the Great Lakes Earth System Model. The multi-disciplinary lab study is designed to simulate the past and present regional climate in the Great Lakes, taking into account factors such as ice cover, lake levels and temperature. This data, when crunched together, will help scientists predict ice cover and other environmental scenarios into 2050.

"Given that we've been neglecting winter for decades, I suspect it will take many years to get a comprehensive idea of how Lake Superior 'works' in winter," Ted Ozersky, associate professor of biology at UMD's Large Lakes Observatory, said in an email. "We can think about ice cover as a 'master variable' that has impacts on many important physical, chemical and biological aspects of the way lake ecosystems work." For example, ice controls how much light is available to support the growth of phytoplankton, the tiny plants that make up the base of aquatic food webs. "We might be surprised by

how things we care about like water quality and fisheries change with changing winter conditions," he said.

But many consequences of the decreasing ice coverage and warming summer water temperatures are already apparent: a shrinking habitat for cold-water species; toxic blue-green algae blooms, which were documented for the first time in Lake Superior in 2012; increased damage to and erosion of shoreline because it is less protected by ice from powerful winter storms; and a significant reduction of ice bridges between the mainland and islands, important corridors for wildlife, especially American martens and wolves. At Isle Royale National Park, which sits roughly 18 miles off the Minnesota shoreline, ice bridges that allow wolves to travel to and from the archipelago are no longer consistently forming. The result has been a more isolated, inbred wolf population, a problem the National Park Service and collaborators have been working to mitigate through a wolf restoration plan.

All five U.S. national park sites in or bordering the lake — which has a shoreline that extends more than 2,700 miles across Minnesota, Wisconsin, Michigan and Ontario — are experiencing the environmental consequences of disappearing ice. At the same time, winter recreational opportunities, and a way of life, are also changing.

At Pictured Rocks National Lakeshore in Michigan's Upper Peninsula, the Michigan Ice Fest, a 30-year-old event that attracts world-class ice climbers, has moved from January to mid-February. "We used to start climbing in early December," said festival organizer Bill Thompson. "This year climbable ice has only been around since late December."

Grand Portage National Monument in northern Minnesota doesn't offer lake-related recreational programming in winter, said Anna Deschampe, the park's



SANDSTONE CLIFFS, plentiful water and sub-zero temperatures create Apostle Islands' shoreline ice formations.

©DAVID GUTTENFELDER



Trail Mix

chief of interpretation. But Deschampe, who is a member of the Grand Portage Band of Lake Superior Chippewa and a lifelong resident of the Grand Portage Reservation, remembers stories her father told her of ice skating to Pete's Island, as locals call it, at the entrance to Grand Portage Bay. "Activities like ice skating that used to happen aren't feasible now," Deschampe said.

"Ice is never safe," said Apostle Islands National Lakeshore ranger Mark McCool, "but it can be low risk." Before the park allows the public out on the lake to view the caves, McCool's Ice Rescue Team, a group of 10 park employees, needs to ensure the ice's relative safety. To do so, they use satellite imagery to find ice trigger points. If the ice looks solid enough, they travel out on it to drill holes and test its quality over a period of 10 days while simultaneously checking forecasts and future wind speed and direction. Since 2014 the team has classified the ice as "low risk" only twice.

"We commonly see over 16-inch-thick ice break apart and blow out to open water in as little as two hours," said McCool. "If the ice breaks apart with potentially thousands of people in Lake Superior without the resources to help them, the consequences could be disastrous."

Despite sporadic days with subzero temperatures in early winter, the opportunity to see the caves this year was looking increasingly unlikely as of January, when NOAA's predictions for maximum ice cover was 52.3%. "During years when we had ice caves, ice cover was over 90%," Van Stappen said.

Given the impossibility of Option A, my partner, Brian, and I went for Option B: On a balmy, 21-degree Saturday in January, we snowshoed 2 miles overland along the Lakeshore Trail. At Meyers Beach, just below the trailhead, a narrow ring of ice hugged the shoreline. A 25-mph wind was whipping up white caps on the lake, and small shards of ice bobbed in the rollers.

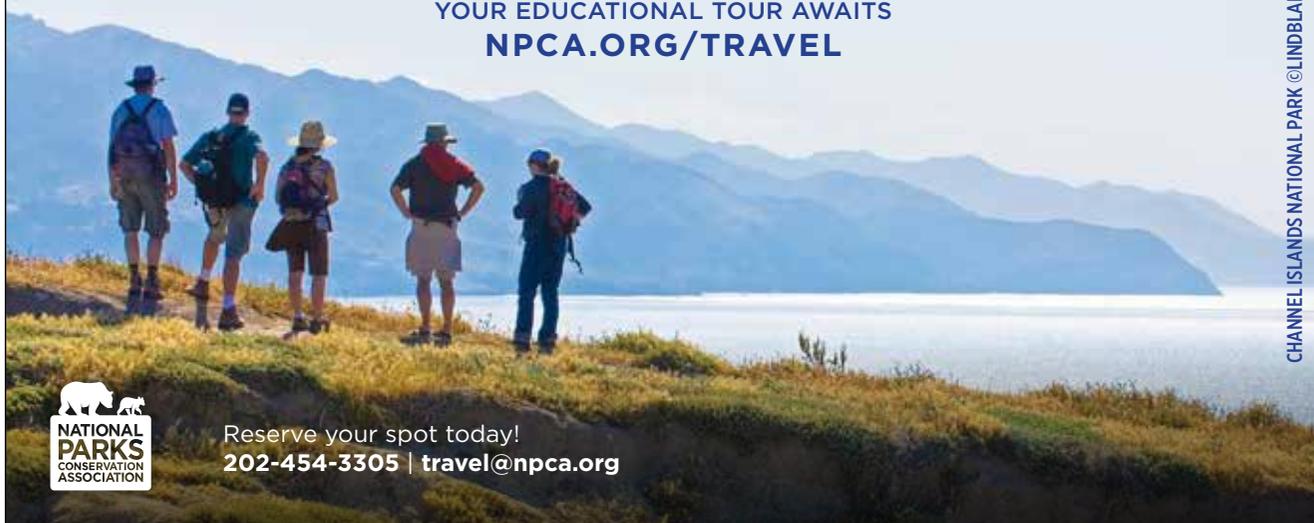
On the trail, we passed a handful of other hikers, most of them trekking through a foot of snow in the peaceful forest. At mile 1.8, we reached the Crevasse, a fracture that recedes 100 yards into the shoreline bedrock. Slipping off the icy edge could lead to a 50-foot freefall into the frigid abyss of Lake Superior. We trudged over to a safer position on the opposite side of the crevasse just in time to catch a ray of sun piercing through a gap in the red sandstone cliff below us. The gap lit up like a burning inferno, and the surrounding daggers of ice, suddenly backlit by the light, seemed to glow. Even from a distance it was stunning, but I couldn't help but wonder what it would have been like to stand inside the ethereal, crystalline caves as sunlight ricocheted through them.

STEPHANIE PEARSON is a contributing editor at Outside magazine and author of "100 Great American Parks," which will be published by National Geographic in May.

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A River Spectacle

Endangered mussels live on (and on) in the St. Croix.

On a sun-spangled day last September, five scientists made an exciting find on the boulder-strewn bed of the upper St. Croix River. They'd been diving for several hours, surveying the depths for bivalves and scouting for the endangered spectaclecase mussel, which is found in only 20 streams from Minnesota to Alabama. After striking out at places that promised to be ideal spectaclecase habitat, the team — composed of biologists and researchers from the National Park Service, University of Minnesota and Wisconsin Department of Natural Resources — journeyed to a site where the mussels had been found in 1987. Given the mussels' advanced age at the time, "we didn't think they'd be there," said Marian Shaffer, aquatic biologist at Saint Croix National Scenic Riverway. "But then, to our wonderful surprise, they were."

Straddling the border of Minnesota and Wisconsin, the picturesque St. Croix River "has one of the most mussel-rich watersheds in the world," according to Shaffer. The river has retained all 41 mussel species



COURTESY OF MARIAN SHAFFER, NPS

NATIVE MUSSELS, such as the spectaclecase mussels these biologists found in the St. Croix River, are critical to a river's health. "They literally function as the lungs of the river," biologist Marian Shaffer said, as they purify the water by filtering out toxins and dissolved organic material.

present prior to European settlement, but the construction of the St. Croix Falls Dam interrupted the life cycle of the spectaclecase mussels upstream of the structure. The mussel, which bears an uncanny resemblance to its namesake, relies on two fish species, goldeye and mooneye, to host its larvae (called glochidia). These fish haven't inhabited the upper reaches of the St. Croix since the dam churned to life in 1907, meaning successful spectaclecase mussel recruitment there has been impossible for over a century, well beyond the mollusk's general life expectancy.

Time had clearly taken a toll on the mussels the researchers found that day.

The shells were so eroded as to make determining their ages onsite (by counting their rings) impossible. "I kid you

not, they looked like living skeletons," said Shaffer, who added that "it was quite the indescribable feeling to hold them." Taking great pains to minimize handling, the team collected data from the oblong animals and returned them to within inches of where they found them. A few empty shells were taken back to a lab where researchers will cross-section and stain them to determine their precise ages, though they undoubtedly exceed 100 years.

With the dam in place, the future of this particular spectaclecase mussel population appears bleak. But that won't keep park staff from monitoring their health, discussing conservation options and surveying other upstream sections of the river for similarly aged specimens. Plus, St. Croix boasts a healthy population below the dam, where the mussels' host fish flourish. "It's the best remaining population of spectaclecase in the country, or the world," Shaffer said. "And it's doing very well."

— KATHERINE DEGROFF



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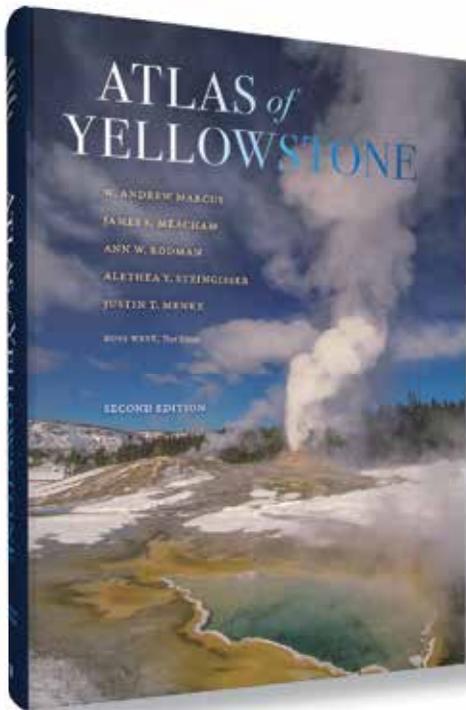
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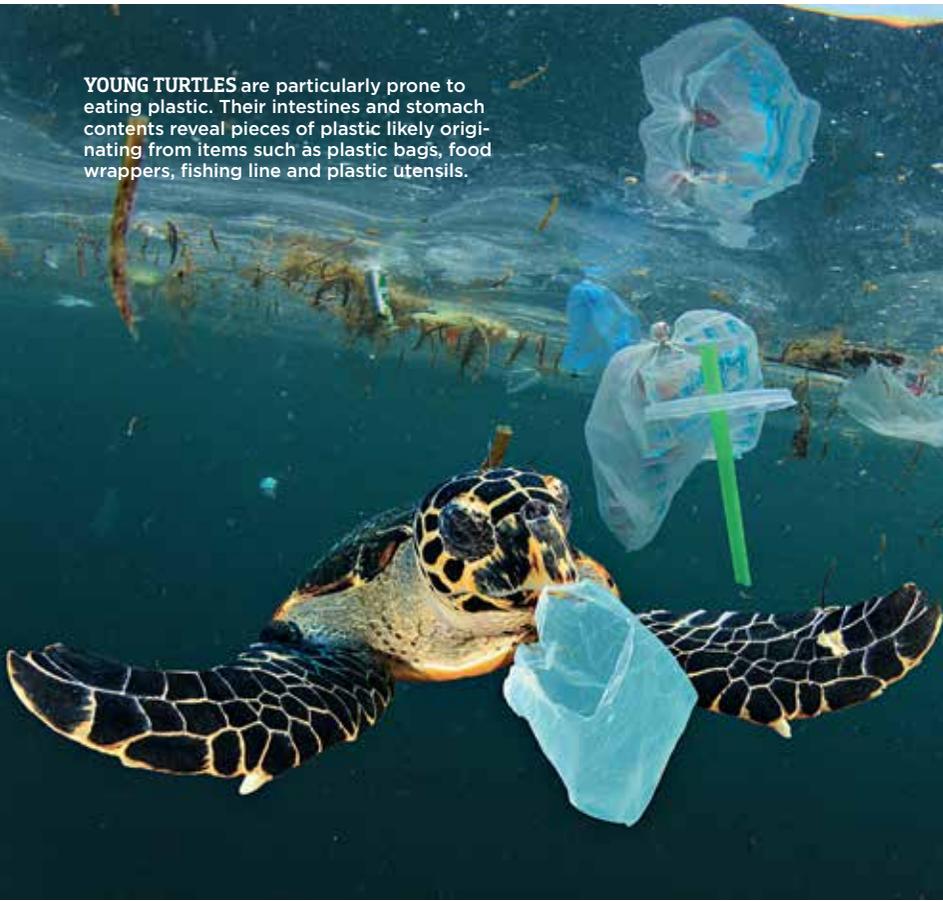
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YOUNG TURTLES are particularly prone to eating plastic. Their intestines and stomach contents reveal pieces of plastic likely originating from items such as plastic bags, food wrappers, fishing line and plastic utensils.



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Turtle Troubles

New research from Padre Island National Seashore highlights the toll that ingesting plastic is taking on green sea turtles.

PADRE ISLAND NATIONAL SEASHORE sits at the confluence of powerful currents that swirl around the Gulf of Mexico. It means that a lot of what's afloat out there eventually washes up on the long, lonesome beaches of this South Texas park, which stretches out along the coast for 66 miles. But while the unusual finds — a pygmy sperm whale, a deep-sea-dwelling eel, a golf cart, a kilo of cocaine — make headlines, the bigger concern for staff is a lot less exciting, and a lot harder to deal with. Every receding tide leaves behind a technicolor band of plastic trash.

“Marine debris has been a huge problem for the park since I arrived here in 1980,” said Donna Shaver, the longtime chief of the park’s sea turtle science and recovery program. “It was so prevalent that the park was known back then as much for the trash on the beach as for anything else.” The trash — more than 90% of it plastic — is an eyesore and a health hazard for visitors. Now, research from Shaver and her colleagues is painting a clearer picture of the toll all this debris is taking on green sea turtles, one of the five species of marine turtles that frequent the park’s beaches and nearshore waters. They found that nearly half of the green turtles recovered by the park’s biologists since the late 1980s have eaten plastic — and the problem seems to be getting worse.

Ailing or dead sea turtles regularly turn up on the beaches here, the victims of boat collisions, disease or natural causes. Park staff try to rescue and rehabilitate live turtles and otherwise dissect or at least collect the carcasses that aren’t too badly decomposed. For over 30 years, Shaver’s team has recorded detailed biological information about the animals’ health, diet and mortality, and has also kept the debris they found in the turtles’ entrails. Meanwhile, so much trash has ended up in the Gulf of Mexico that the coastal waters there now carry some of the highest concentrations of plastic in the world. This endless stream of plastic bottles, bags, buoys, fishing line, nets and crates will get smashed into smaller pieces over time, but may never completely decompose, said Caitlin Wessel, Gulf of Mexico regional coordinator for the National Oceanic and Atmospheric Administration’s Marine Debris Program.

Studies have shown that plastic has been ingested by more than 700 marine species worldwide, but “not a whole lot is known about plastic ingestion by species in the Gulf of Mexico. Are our

turtles eating plastic? Is it bad for them?” said Daniel Choi, a wildlife biologist who came to Padre Island on a grant in the summer of 2020 to try to answer these questions. Choi, Shaver and another Park Service biologist named Christian Gredzens recently published the results of that research in the journal *Marine Pollution Bulletin*, reporting on the prevalence of plastic in the intestinal tracts of green sea turtle carcasses from Padre Island dating back to 1987.

A couple of times, Choi got to help out with hatches, watching as hundreds of baby turtles scooted across the sand and hurled themselves into the pounding surf. But for every hour spent on the beach witnessing natural miracles unfold, Choi logged many more alone in a lab, staring intently at cold piles of turtle guts. Armed with scissors, tweezers and prodigious patience, he hunted for tiny bits of plastic among masses of decomposed tissue and partially digested seaweed. Once extracted from its surrounding goop, each plastic piece was rinsed, dried, weighed, measured in three dimensions, classified by type and color, logged, and stored for

possible future study.

While Choi did his fair share of dirty work for the project, he’s quick to point out the thousands of hours of collection, dissection and record-keeping by hundreds of people over more than three decades that made the study possible. Altogether he compiled data on 464 green turtles picked up over the span of 32 years, making this one of the largest studies of marine turtles and plastic debris ever conducted. Plastic sheets — likely bits of bags and plastic wrap — were the most commonly ingested type of plastic, but Choi also found fragments of bottles, foam and fishing line. One juvenile turtle had 114 pieces of plastic in its digestive tract, and another turtle was carrying around more than 11 grams of trash when it died.

The smallest turtles were likeliest to have plastic in their guts. This could be attributed in part to the fact that green turtles in the Gulf of Mexico spend their early years foraging in “convergence zones” far offshore. Dense mats of sargassum seaweed collect in these eddies, but the currents also bring in a lot of plastic. “Whether they mean to eat it or not, there’s so much of it in their environment that they can’t *help* but eat it,” Choi said.

By comparing plastic ingestion from turtles collected between 1987 and 2019, this study opens a window into how the plastic has affected the population over time. “Probably the most significant finding was that the number of turtles eating plastic has doubled since the 1980s,” Choi said, from 30% of the carcasses recovered in the late ’80s and ’90s to 65% of those collected in 2019. “We don’t have a super clear idea of why this number increased,” he said. “Is it because there’s twice the amount of plastic, or that today’s turtles have different foraging habits, or is it a difference in the currents and winds? Is it that the plastic from decades ago is now broken down to a size that turtles can eat?”

In marginally less bleak news, the researchers didn’t find evidence that any of the turtles in the study had succumbed to the plastic they’d eaten. “That’s huge, and not entirely expected, given that in a lot of other regions, scientists have found turtles killed by plastic,” Choi said. Elsewhere, turtles have turned up dead with gashes in their intestines from sharp plastic fragments, or fishing line tangled in their stomach. Or so much plastic can accumulate in a turtle’s system that it crowds out actual food, so it starves with a full belly.

Just because they don’t show signs of acute injuries doesn’t necessarily mean the Gulf’s green turtles are escaping unscathed, said Gredzens. Could eating plastic hamper their growth or slow down their reproduction? Are they absorbing the chemicals in the plastic they eat, and if so, is that making them sick? “Our study wasn’t designed to look at the effects of plastic,” he said, “but I would hope that it spurs someone to look into that.”

Shaver said research like this is essential to reforming environmental practices around the Gulf. Back in the ’80s and ’90s, for instance, she used data from a smaller study to convince local oil and gas producers to stop tossing hard hats, barrels and polyethylene sheets into the Gulf. She hopes the latest research will help change consumers’ plastic-buying habits and inform policymakers and manufacturers about the ongoing hazards these materials pose for marine wildlife.

“We need to keep working with industries, cruise vessels, fishing boats and the general public, as the young generation comes of age,” Shaver said. “Let’s all work a little bit harder on this problem, because our data shows we haven’t solved it yet.”

JULIA BUSIEK has worked at national parks in Colorado, Hawaii, Washington and California. She lives in Oakland.

NPCA at Work

In partnership with Subaru, NPCA is piloting a program to reduce landfill waste. By educating visitors, adding water refill stations, and working with park concessionaires and retailers in gateway communities to promote refillable bottles and find packaging alternatives, the program has reduced plastic waste at Grand Teton, Yosemite and Denali by about 40%. And last year, NPCA sent a letter cosigned by 300 organizations to Interior Secretary Deb Haaland urging the Biden administration to eliminate single-use plastics at every national park.



THE COLORFUL hydrothermal landscape of Yellowstone National Park has given rise to many astounding discoveries, including a fungus that can be turned into meatless breakfast patties (opposite page) and dairy-free cream cheese. Pictured: Norris Geyser Basin.

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Park Protein

A Chicago-based company has created a new, Earth-friendly protein from a fungus that was accidentally discovered in Yellowstone.

IN 2009, Mark Kozubal was a doctoral student at Montana State University, six years into his research of extremophiles — microorganisms that thrive in environments of unusual temperature, pH level or chemistry — in Yellowstone National Park. The research entailed annual excursions in which Kozubal, his fellow graduate students and their professors would lead a team of horses 20 miles to a backcountry base camp. From there, they would set out on foot, sometimes through waist-deep mud, carefully dodging unmapped fumaroles and geysers.

The barren land was painted in hues of red and yellow. Green and black algae grew out of sandy, acidic soil full of heavy metals. Bison filtered in and out of the steam.

“It’s just a magical place to work,” Kozubal said, “like the surface of Mars, but even more colorful.” The environment was so alien, in fact, that

NASA was one of several organizations funding Kozubal’s research in hopes of gaining a better understanding of where life might exist on other planets.

One summer day, Kozubal was in the park with a biology class from a Montana high school. Although his research focused on the primitive cellular life in the hottest zones of the hot springs, Kozubal wandered off to inspect an interesting-looking alga growing in the warm rhyolite sand of a geothermal floodplain. At the time, there was much scientific hype about using algae to produce biofuels, so Kozubal put a sample in a flask to take to his lab.

Back in Bozeman, Kozubal tried to cultivate it, but whenever he did, a white fungus took over instead. “I thought, this is kind of a unique-looking fungus,” Kozubal said. “It grows in a cool way. I decided to switch my focus to that.” The fungus grew quickly and robustly in acidic environments. Eventually, Kozubal dubbed it *Fusarium strain flavolapis*,

with “flavus” meaning “yellow” in Latin, and “lapis” meaning “stone.”

At first, Kozubal sought to use the fungus to make biofuels through a company he co-founded in 2012. But in 2015, Kozubal and his co-founders decided there was more promise in turning the fungus into protein.

Kozubal and his colleagues developed a new way to ferment the fungus in trays using a simple sugar substrate, nitrogen and acidic water. They grew the fungus into a mat of interconnected filaments akin to muscle that is 30% fiber and 50% dry mass protein with vitamins, minerals and all 20 amino acids. “It looked like food,” Kozubal said of the result. “There’s lots of precedent for people eating fungi, and it had the nutritional profile that was very desirable and the texture we like.” The team called it “Fy” and renamed the company Nature’s Fynd.

Fungi have a long history in alternative proteins. The meat alternative called Quorn has been made since 1985 using a fungus from the same genus as the one Kozubal discovered. Startups such as The Better Meat Co., Meati, ENOUGH and MyForest Foods are conjuring “steaks,” seafood substitutes and vegan bacon out of fungi-derived proteins.

Audrey Gyr, a startup innovation specialist with the Good Food Institute, a nonprofit promoting alternative foods, considers ingredients like Fy to be the proteins of the future. “The cost and ability to create proteins at scale is pretty unparalleled,” she said, “and it’s usually far more efficient than using an animal.”

According to the United Nations’ Food and Agriculture Organization, 26% of the planet’s ice-free land is used for animal grazing, and a third of cropland is used to grow livestock feed. Raising farm animals is one of the largest sources of

human-induced greenhouse gas emissions, which is why alternative proteins are drawing significant interest from environmentally minded investors.

“They’re moving beyond electric and solar to see food as a critical innovation,” Gyr said. “You can’t really solve climate if you don’t solve food.”

Last year, the Chicago-based Nature’s Fynd launched its first products — meatless breakfast patties in original and maple flavor, and dairy-free cream cheese, in original and chive and onion. For now, the products are available in Berkeley, California, Chicago and New York City. The company is mum about new products in the offing, but Anderson Cooper recently sampled a Fy yogurt on TV.

Nature’s Fynd is capitalizing on the Yellowstone origins of the fungus behind its protein, but Kozubal’s Ph.D. adviser, Bill Inskeep, who has been studying life forms in Yellowstone’s thermal features for almost 25 years, said fungi of the *Fusarium* strain can be found elsewhere. In any case, he said, the origin of the fungus has little bearing on the protein it makes.

“Protein’s protein,” Inskeep said. “It’s not like there’s little golden shamrocks in here that make us invincible. Bringing things to market has everything to do with how much perseverance and long-term commitment you have, and sometimes less about the uniqueness of the idea.”

According to Inskeep, many scientific discoveries happen in Yellowstone because the park offers a 2.2-million-acre natural laboratory and an organized permit system for scientists to conduct research. Perhaps the most famous application of Yellowstone research followed Thomas Brock’s discovery of the bacterium *Thermus aquaticus* in Mushroom Spring in the 1960s. That led to the isolation of the enzyme Taq polymerase,

which enables everything from COVID polymerase chain reaction (or PCR) tests to DNA analysis.

In the crowded but burgeoning alternative meat market, Nature’s Fynd has raised more than \$500 million from investors such as Jeff Bezos and Bill Gates by presenting its products as healthier and more Earth-friendly than plant-based proteins. Fy uses a fraction of the land, water and energy that traditional agriculture requires and can be made without sun, rain or soil. The company regenerates all the fungus it needs without having to collect more from Yellowstone.

Whether this fungus has the global impact of *Thermus aquaticus* or is merely a flash in the pan will depend on how Fy is received by consumers. “At the end of the day,” said Nature’s Fynd CEO Thomas Jonas, “if you’re making food, it better taste good.”

My family and I had the chance to find out when Nature’s Fynd mailed me a box of its products. One Saturday morning in January, I cooked up a hearty breakfast of eggs, maple and original breakfast patties, and bagels slathered with both original and chive and onion dairy-free cream cheese. Our disobedient dog begged at my feet, an endorsement tempered by the fact that he also eats mouth guards, used tissues and socks.

We gathered around the table and took our first bites. The cream cheese was soft and spreadable and tasted very much like cream cheese. The breakfast patties were a little dry, with a texture that reminded me of tempeh. The flavors were inoffensive, if not transcendent. Our 7-year-old, Theo, nibbled a breakfast patty and ventured a lukewarm opinion. “It tastes a bit vegetably,” he said. Later, though, when I brought our dishes into the kitchen, I could see he much preferred it to his eggs.

JACOB BAYNHAM is a freelance journalist based in Montana.

COURTESY OF NATURE'S FYND



We were
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in the world
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Climbing
Grand Teton
marked a
turning point.

LOFTY HEIGHTS

By Ernie Atencio

CLIMBERS AT the summit
of Grand Teton. The author
climbed the mountain, the
highest peak in the park, in
1979, when he was 23.



THE AUTHOR (with ice ax) and Mark Martinez Luna (in hood and blue helmet) on Pico de Orizaba in Mexico in 1979.

A week before summiting the Grand, we had driven from Denver to Wyoming in my ratty old patchwork Volkswagen Beetle, hoping the whole way it wouldn't overheat. As we pulled into Jackson Hole and got our first view of the legendary mountain range, "Whoa" was about all we were able to articulate. We had both already been bitten by the climbing bug. Knowing what we were in for, we looked at those enormous, jagged peaks with a mixture of dread and desire.

The trip was part of the Colorado Outward Bound School's Minority Field Staff Training Program. The trainees were all people of color who had been students on a full 23-day Outward Bound wilderness course, had shown their mettle and interest in outdoor work, and had been recruited to join the program to add some diversity to a mostly white staff.

My path to the program began a couple of months before graduating North High School in Denver, when I heard an announcement on the scratchy PA system about a full scholarship for an Outward Bound course. I had been in trouble with the law, dropped out of school twice and never expected to graduate, so just receiving a high school diploma was a monumental accomplishment, and I had no plans whatsoever for what came after that. I'm not completely sure what it

was about the announcement that caught my attention, only that I vaguely knew that Outward Bound had something to do with the outdoors, and I had a yearning for the kind of adventures in the wild that I had only read about. Outward Bound offered scholarships to one student in each underserved high school and Boys and Girls Club in Denver, under a program colloquially referred to as "hoods in the woods." I was one of those hoods.

I ended up being the token scholarship student on an Outward Bound trip with 18 others in the Sangre de Cristo Mountains of southern Colorado. Mountaineering with ice axes, technical rock climbing, crossing miles of sand dunes with a full pack, learning to navigate in the wilderness, and the simple pleasure of self-reliance — of carrying everything I needed to survive on my back — all blew my mind and my horizons wide open. And in that stripped-down version of life, class distinctions faded, and I discovered strengths, skills and leadership abilities I never

imagined I had. It very likely saved me from a dead-end life, or worse, in inner-city Denver.

After returning home, I worked whatever manual labor jobs I could find and started buying outdoor gear and talking my friends into backpacking trips and even some risky rock climbing using cheap rope from the hardware store. A year later, I learned about a program at a small community college in Leadville, Colorado, that trained outdoor leaders. I couldn't imagine anything better and enrolled immediately. I joined the Outward Bound minority training program soon after.

I had been in trouble with the law, dropped out of school twice and never expected to graduate, so just receiving a high school diploma was a monumental accomplishment.

Mark's story was similar — an uncertain future, some shady activities with friends, a conscious decision that he "didn't want to die in the city" and an Outward Bound scholarship

that required a month's worth of work in the organization's gear warehouse. Mark was an artist as well as a gifted athlete. Despite harassment he'd endured as a brown kid playing a white sport, he had become a champion tennis player in high school. He entered marathons spur of the moment, without training, and finished in respectable times. Here is a legendary story about Mark: The capstone of a standard 23-day Outward Bound course at the time was the challenge of a long trail run — sometimes a full 26.2-mile marathon. Sitting around a campfire the night before one of those Outward Bound marathons, students were talking about their reasons for running, saying they liked to push themselves or that it was good for their mental health. With a distant look in his eyes, Mark said, "I run for the colors." After a moment, someone asked, "You mean the colors of the landscape? The sky?" "No," he said, as if it were clear as day. "I see colors when I run." Any visit to Mark's house brought him to the front door splattered with paint from his latest project. Things others thought were mundane or gross he found beautiful. He saw art everywhere.

That's Mark — tapped into a liminal dimension that others only glimpse. He had a far more spiritual and inspired approach to outdoor adventure than some of our gearhead colleagues, who seemed most interested in acquiring the latest equipment and checking popular routes and summits off their punch lists. What both of us wanted, by contrast, was to use our gear and skills to escape to those wild places and precipitous edges where we felt most alive. He often talked about the warrior spirit from the Indian part of our Chicano blood and how, when traveling in the wilderness, we stood on the shoulders of centuries of ancestors in the Southwest.

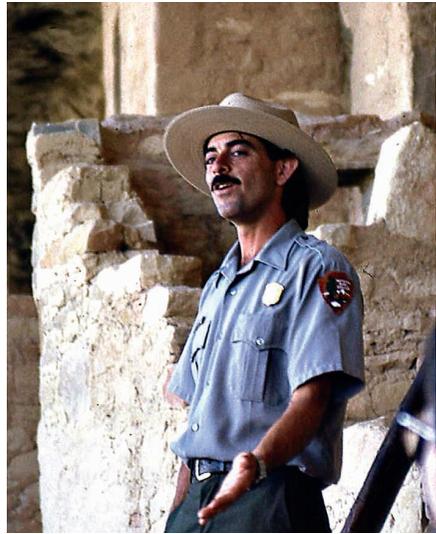
One September morning in 1979, I stood on the summit of Grand Teton with my friend, Mark Martinez Luna, ecstatic. The sun was shining, immense views stretched before us, and we were young, strong and fearless. A pair of 23-year-old Chicanos far from our normal lives and manual labor jobs back in Denver, we had just sprinted up the Grand in style and surprisingly good time. Mark and I had spent most of a week climbing other peaks in the Tetons backcountry, but the Grand was the climax. In every sense, we were on top of the world.

I have thought a lot about the climb over the years. Whenever I visit Grand Teton National Park, I can hardly take my eyes off that breathtaking crag. I stare up at the highest point of the

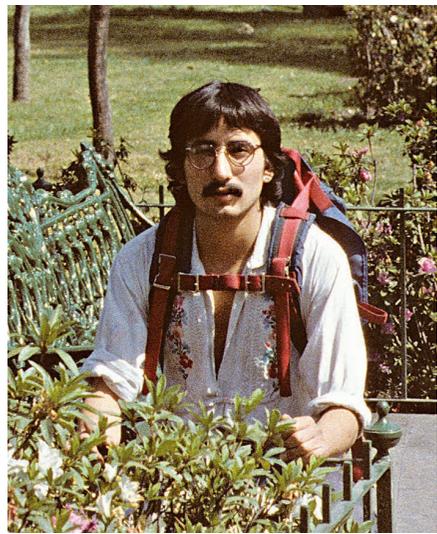
range, marveling that I once stood on its summit and boring my family again with the story. It was a pivotal experience at a time when I was just finding my way in the world of outdoor adventure — a world that was even less welcoming to people of color than it is today.

I don't know that we realized it at the time, but on some unconscious level, Mark and I felt we had something to prove, not just to ourselves, but to some of the people around us. The challenge was social as well as physical. In the last couple of years, as society has grappled more openly with complex issues of race and class, all this has come into sharper focus. I more clearly see the barriers I faced as a young brown man from an underprivileged background trying to find my place in a very white field — and how I made my way despite the obstacles. It was a lot like a successful climb: I had to choose the right line, make every move count and push my limits to get there.

COURTESY OF MARK MARTINEZ LUNA



COURTESY OF ELSEBETH ATENCIO



COURTESY OF MARK MARTINEZ LUNA

ERNIE ATENCIO in 1988 at Mesa Verde National Park, where he was then working as a ranger (above left). Above right: Mark Martinez Luna in Mexico City, 1979. Right: A harrowing stretch of the Owen-Spalding Route includes “the belly roll” followed by “the crawl,” pictured here. In another section of the crawl, climbers must wedge themselves into a horizontal crack and inch along while partially dangling over the sheer exposure.

We both had worked a couple of courses as “minority trainee” instructors — a notch below assistants — which gave us more outdoor access and experience, but it paid squat. And we did not always feel welcome. Many instructors could step right into jobs with Outward Bound because they came from privileged backgrounds and had access to outdoor gear and experiences. That was not the case for us, and our training program was intended to correct that. But labeled as minority trainees, we were marginalized and tokenized from the start. We had overheard white instructors talk about what a waste our training program was, making comments like, “If they can’t get the skills and experience and gear they need to be instructors on their own, they have no business here.” As part of one performance evaluation, a blond, blue-eyed senior instructor went so far as to grumble about the incredible free ride I was getting and lecture me about the fact that I still lived in a rough neighborhood and hung with the same sketchy friends I’d grown up with. She probably had her own challenges as a woman in the field and may have thought she was being helpful, but I was dumbfounded when she suggested that I move to Boulder or Aspen to live the proper life of an Outward Bound instructor. Not everyone was like her — plenty of good people and mentors lent a friendly hand along the way — but still, we were often reminded, in both subtle and not-so-subtle ways, that outdoor adventure was an exclusive club, and we didn’t belong.

It is a typical irony that diversity programs tend to assimilate recruits like us into the mainstream, rather than accept and embrace difference. The irony was particularly rich in this case. Outward Bound specifically wanted me to work with disadvantaged minority students because I could relate, but this woman thought I should turn myself into someone those students would

have no interest in talking to.

Looking back, I’m shocked at how passive I was in encounters like this — and there were a few. It was a survival mechanism I learned early on as I straddled two different worlds, and I usually didn’t feel the insult until a few days later. We have to pick our battles, Mark once advised. I’m proud to see people of color in the outdoors these days speaking their truth, but it was a different world for my generation.

Our original group of nine trainees all came into the program with basic skills, and the previous year, we had spent a week together honing our technical climbing on the Flatirons near Boulder and in Rocky Mountain National Park. A few months later, we applied for Outward Bound funding that allowed seven of us to travel across Mexico on a successful expedition to climb Pico de Orizaba, the third-highest peak in North America. But group participation was waning. The others had jobs they couldn’t get away from, kids to take care of, or other interests they were pursuing.

Mark and I were the only ones who showed for this trip in the Tetons. Even knowing that some folks looked down on us and that we had to get back to the daily grind and our real jobs right after the trip, we were drawn to be there. The summits called to us.

While organizing gear in a campground at the foot of the



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peaks with our two full-fledged Outward Bound instructors, we jointly decided that Mark and I would go it alone. We may not have had the technical skills of more experienced climbers, but we knew the basics, we were a good team, and we were certain that we could work through any problem.

Mark and I share the same birthday but, despite what astrology might say, we are radically different characters with divergent attitudes and skill sets. Mark provided the emotional strength, fierce stamina and spirit needed for a challenging climb. I added a practical mechanical aptitude, an intuitive understanding of the physics of climbing and placing safe anchors, and a knack for fixing broken things. I am more willing to take risks than Mark

— and more hotheaded. One time, some rich guy Mark knew stiffed us after a long day hauling his furniture, and my temper got the better of me. Mark pulled me away before the situation got out of control, explaining that this man had a black belt in karate. It would not have ended well.

We were the yin and the yang of a perfectly balanced climbing team — the spiritual and the practical, the inspired and the determined, the considered and the impetuous — and we shared the sheer irrational joy of pushing and punishing our bodies to reach a remote mountaintop.

Those Teton trails are damn steep and ropes and climbing gear heavy, but we headed out into the beautiful, wild mountains

SUNSET AT the Lower Saddle, where most climbers camp before ascending Grand Teton.

feeling the strength and optimism of youth and the anticipation of something unforgettable. By the time we reached the Grand five days later, we were in our synergistic groove, having worked out the kinks summiting Nez Perce and Middle Teton. We camped at a spot called the Lower Saddle for a head start up the mountain, hunkering in our sleeping bags behind stone windbreaks as the wind howled over the treeless, rocky pass.

When we rose before dawn the next morning, the wind had stopped, and the sky was clear — a perfect day. We looked up at the summit, around 2,100 feet above us, then started up the

Owen-Spalding Route, which is the easiest route to the top but still requires ropes and anchors for safety. Mark and I were tied in to either ends of our rope, and we began leapfrogging our way up, taking turns leading each pitch while the other remained stationary, ready to put the brakes on the rope in case of a fall. We were feeling sure of ourselves, so we didn't bother with

anchors. This approach was dangerous — the lead climber could fall a long distance and get injured or, worst case, pull the belayer down with him. We considered all this but continued without anchors anyway. Maybe that was lazy or cocky or plain reckless, but we did not want to break the rhythm and the grace of our fluid movement up the mountain. We were in the zone.

Our confidence held as we made our way upward without a hitch or a hiccup. The rare thrill of being totally laser-focused in the moment kept us aloft. No questions, no second-guessing. Just moving with instinct and faith and trust in each other, our fates bound by a length of rope. I've seldom felt such absolute certainty about anything.

A move called "the belly roll" did give us pause. It involved rolling around a bulge in the rock onto a face with 2,000 feet of sheer exposure that bottomed out onto a rocky talus slope. That was immediately followed by another section called "the crawl" where we wedged the right half of our bodies into an 18-inch-deep horizontal crack and carefully inched along for 40 or 50 feet while our left sides hung in thin air over the cliff.

Still no anchors. A slip here by either one of us would have taken us both down onto the talus.

After a few more pitches, we were on the top, breathing deeply as we looked out at the magnificent range of the Tetons stretching to the north and south. We didn't think to time ourselves, but the 2,100-foot ascent took two — maybe 2.5 — hours. We reached the summit by around 9:15 a.m.

On the descent back to the Lower Saddle (we did use anchors on the way down for a couple of rappels), we realized that we had not seen another soul on the mountain. Grand Teton is on

most climbers' bucket lists, but by some trick of timing, we had the mountain to ourselves that morning. Rather than spend another night in the backcountry, we had decided on the summit to head to Jackson that night for a beer, so we quickly packed and started the 6-mile march down a steep trail to the parking lot. It was a relentless, pounding descent with heavy packs, but we were brimming

with energy from the climb, our bodies resilient and knees and hips pumping like pistons.

I know we were not the first or the fastest or the best, but damn, what a climb. That day shines bright in my

memory all these years later, not just because it was such an epic and satisfying ascent, but because it was one of a handful of experiences that propelled me into full-time outdoor work and toward a different life. I felt sure that I had earned my place in that world, despite the naysayers and barriers. That confidence stayed with me as my life unfolded in ways that I could never have imagined in my wildest dreams on that spring day at North High School when I first heard about the hoods-in-the-woods scholarship. After a few years leading outdoor programs, I worked as a national park ranger throughout the Southwest, taught environmental education programs in Yosemite National Park, traveled and adventured around the world, earned a master's degree in applied cultural anthropology, spent a season doing grad school fieldwork on the Tibetan Plateau, published books about environmental justice, and ended up in leadership positions in the conservation community. Mark led a few more Outward Bound trips then went back to his roots to become a successful tennis coach — taking one high school team to the Montana state championships — and a tennis pro. He created programs to introduce underserved city kids to tennis and is still winning tournaments. Like that day on Grand Teton, life has been an unexpected journey and a hell of a ride for both of us.

Though I still often find that I'm the only brown face in the



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crowd and occasionally feel like a stowaway who snuck onto the boat when nobody was looking, I am dedicated to protecting the sorts of wild places and public lands that saved me. Those wide horizons broadened my own horizons and opened the door to so many meaningful relationships and opportunities. And they still keep me sane.

I did not get into outdoor adventure or conservation work to be a diversity advocate, but the lack of inclusion in this arena is hard to miss. Those of us in a position to make a difference have a responsibility to challenge the status quo and help provide access to places and experiences that can change lives. Mark and I may have paved the way for others, but the struggle is far from over, and we still have work to do.

But none of that was on my mind that day on Grand Teton. I wasn't thinking of the past or future, and I wasn't trying to shatter any glass ceilings — I was just engrossed in the moment. I will always remember in my bones the joy and certainty I felt. That morning, I never doubted that I belonged. Anything was possible.

ERNIE ATENCIO lives in his northern New Mexico homeland near Taos and still occasionally climbs a 14,000-foot peak or disappears into the wilderness for days at a time. He is currently Southwest regional director for NPCA, where he was the first person of color to be hired as a regional director. A skilled tennis professional, Mark Martinez Luna lives in Denver, where he continues to make award-winning art. He and Atencio remain good friends.



MCKENZIE NIIHA (wearing a yellow helmet), crew leader Kendrick Nahohai (with a blue helmet) and Kalton Tucson (partially obscured) use small rocks gathered nearby to fill in cracks in centuries-old structures.

FULL CIRCLE

At Bears Ears National Monument, a crew of young men from the Pueblo of Zuni is caring for the cliff dwellings their ancestors built 800 years ago.

By **Karuna Eberl**

“Uh-oh, I shouldn’t have looked down,” said Darian Seowtewa with a chuckle. The 20-year-old from the Pueblo of Zuni, New Mexico, was standing on a narrow patch of sandstone, perched between a 13th-century masonry wall and an 800-foot drop.

The archaeological site that he and his crew were working at stretched out for a quarter-mile along a ledge, overlooking Bears Ears National Monument’s sweeping landscape of petrified sand dunes and juniper-carpeted plateaus. It was a hot week in July in southeastern Utah, and laughter from Seowtewa and the crew echoed through the canyon.

They were working to stabilize Ancestral Puebloan structures built by their ancestors long ago. Thirty-year-old Kendrick Nahohai, the crew leader, laid on his belly with his feet pointed downslope toward the cliff. He rolled a bit of clay into a ball, squeezed it in his hand, then pressed it between stone blocks in the wall to replace missing mortar. With his thumb, he adjusted the texture so that it matched the look of the original mortar.

“See, it doesn’t look like any work has been done,” he said. “Less is more.”

Nahohai, Seowtewa and three other young men from the Pueblo of Zuni comprised Crew 642 of the Ancestral Lands Conservation Corps. The program, a modern incarnation of the 1930s-era Civilian Conservation Corps, helps connect young Native Americans with public lands — or, more precisely, with the homelands of their ancestors, who lived here

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KALTON TUCSON and the rest of the Ancestral Lands Conservation Corps crew hike from their work site in Bears Ears National Monument back to their camp for the night (above). Right: The 800-year-old cliff dwellings the crew worked to stabilize in July stretch out for a quarter-mile along a sandstone ledge.

long before the concepts of public and private lands existed.

The crew's project is part of a larger effort to increase the role Native Americans play in the protection and management of their ancestral lands, and it also reflects the government and nonprofits' greater willingness to incorporate Indigenous voices into that work. In recent years, this movement has celebrated significant achievements, from the designation of Bears Ears National Monument to the selection of Deb Haaland as secretary of the Interior Department and that of Chuck Sams as director of the National Park Service. Both are the first Native Americans in their respective positions.

This increased focus on collaboration has also paved the way for Tribes to bring their own perspectives and expertise into the fields of archaeology and archaeological restoration. Historically, white academics have conducted most of the studies and excavations of ancient sites in the Southwest. They have done important work, but often with a disregard for — and little understanding of — Indigenous culture, said independent Hopi archaeologist Lyle Balenquah.

"Many academics would come, study and leave and then build nice careers for themselves without any reciprocity back to the communities they were researching," said Balenquah. "We were the vanishing Indian, you know, and Western academics had the right and privilege to come and study us because we were on our way out, I guess. We're still trying to deal with those repercussions and misinformation."

Correcting misinformation and fostering Indigenous perspectives are at the heart of the corps's rationale. The program provides participants with a much-needed paycheck and aims to teach them hands-on skills and strengthen their connection to the land, their communities and each other. Perhaps it might even steer them toward a new, conservation-oriented career path.

"For many of these crews, this is the first time that they've ever had a safe space or felt appreciated or part of something larger than themselves," said Corps Director Chas Robles. "The entire country, and certainly Indigenous people, we have a lot of healing that needs to happen. Getting young people out on the land is one of the best ways I know to foster that."

In addition, many Native Americans have only heard about their ancestral lands through oral histories. "Being able to experience it firsthand and go back to your community and relate that these places really exist, this tangible proof, it helps the community as a whole," said Balenquah.

The Ancestral Lands Conservation Corps started in 2008 under the banner of the Southwest Conservation Corps, and it became an independent program in 2021. The organization has four offices in New Mexico and one in Arizona, and participants include Native Americans and Chicanos. In 2021, the corps counted more than 200 paid participants and 60 volunteers and offered a range of programs for 8-year-olds to 30-somethings, from hiking outings to Grand Canyon river trips. Still, much of the corps's work is centered around historic preservation and environmental conservation projects, such as trail maintenance and habitat improvement in the federal and Tribal lands of the Southwest.

Crew 642 worked for six months, with one-week deployments supervised by various professionals. Their assignments included projects at Grand Canyon National

Park, Glen Canyon National Recreation Area, El Morro National Monument and Pueblo of Zuni. At Bears Ears in July, they were working with Balenquah, archaeologist Shanna Diederichs and two members of her staff from Woods Canyon Archaeological Consultants Inc.

The site they were shoring up is one of the most fragile in the area. Despite its remote location, it gets damaged by visitors leaning on walls to peer through windows, backpacks scraping against doorways and foot traffic. National Parks magazine is keeping the description of the site intentionally vague so as not to attract additional visitors and exacerbate the existing damage.

Before any work could take place, the crew drove up and down a high-clearance rocky road at night during a rainstorm three times to haul in all their gear. They couldn't set up their base camp that night because of lightning and slept sitting up in the truck instead. The next morning, they hiked the 2-mile slickrock trail to the work site — an arduous trip they would make every day.

That first day, the crew sat in an alcove around a natu-

ral spring to cool off after the hike. Water seeped through the sandstone ceiling, nourishing some ferny green plants before trickling down to a little pool inhabited by a few water striders. The crew joked about their difficult “commute” and introduced themselves.

“Keshi Ko’don De:wa’nan A:deya:yeh? Ho’ Kya’bu:li leshina. Hom melikya shi’inneh Darian Seowtewa leshina. Hom Annode:weh Mu’bitchi:kwe deyan Dowa:kwe awan Cha’le,” said Seowtewa, who is fluent in Zuni.

His formal introduction translates to, “Hello, how is your day going? My Zuni name is Kya’bu:li, and my gov-

backfill soil around the structures to stabilize those in danger of falling over the cliff. Visitors usually aren’t aware they are causing damage, but foot traffic pulverizes and softens the sediment along the trail, which quickly washes away, leaving new erosion channels that undercut the structures.

As the crew plugged away at their tasks, Diederichs worked on rerouting part of the trail, a project she started last year with another Zuni crew. They were called in to do emergency stabilization work when some of the structures were in imminent danger of collapse.

“People were walking over intact roofs, middens, and plastered floors and plazas,” said Diederichs. “People were demolishing it left and right.”

To fix the problem, they strategically placed rocks where they didn’t want people to walk, so visitors would naturally adjust their course to less vulnerable areas. So far, it’s working.

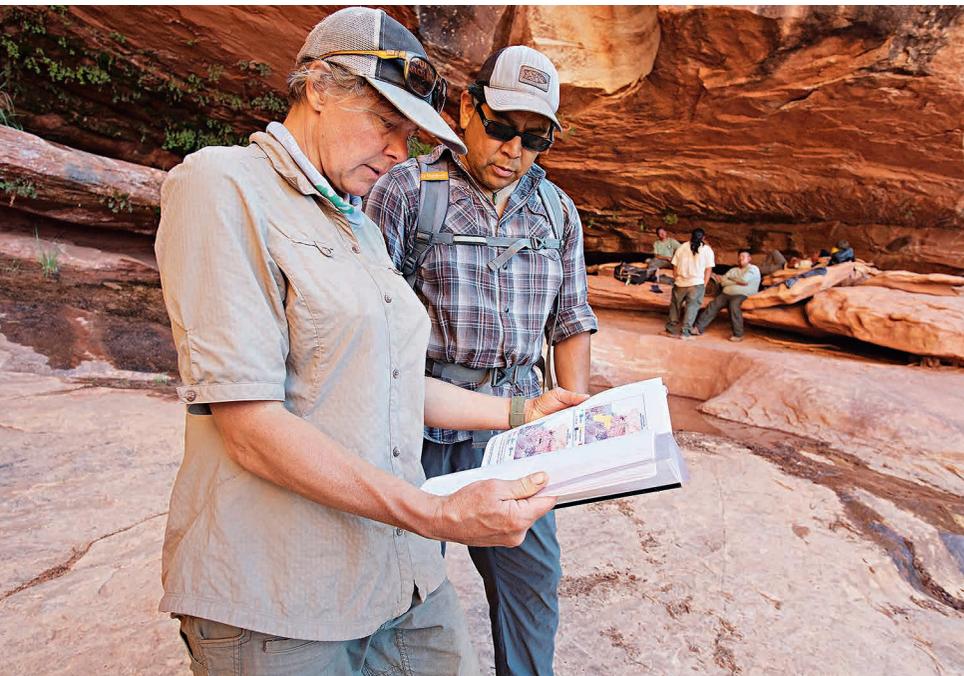
Nahohai said that it is important to him to see the site preserved, but that the Zuni also believe the structures are not meant to survive forever. “Eventually they’ll go back to where they were from, back to Mother Earth,” he said. “But for now, we want to have these ties from our [ancestral] homes. We’re the descendants of these people.”

This belief in impermanence is one reason the federal directive here is not to restore the dwellings to their original state, or even to stop the natural process of weathering and deterioration. In contrast with some well-known sites that have been extensively restored, such as Mesa Verde’s Cliff Palace, the main goal here

is to mitigate the damage caused by visitors.

Tribal consultation has also led to a change in the policy on the materials used to stabilize and restore sites. “Historically, preservation work was conducted mostly using foreign materials — steel rebar, wire mesh, cement — materials not compatible with the organic material that is born out of the earth,” Balenquah said. “From a Hopi perspective, the structure has a life cycle. It’s meant to serve a purpose, then when the inhabitants no longer require it, it’s allowed to turn back into the soil. The use of these materials is against that philosophy.”

Using the correct terminology also matters to Balenquah, who would like to drop terms such as “ruins” and “abandoned” because Zuni, Hopi and other Tribes believe their ancestors’ spirits still live at ancient sites. “Those are com-



SHANNA DIEDERICHS (left) and Lyle Balenquah (right) discuss an area of the site in need of masonry work. The two archaeologists provided professional guidance to the crew members during their July trip.

ernment name is Darian Seowtewa. My clans are Parrot and Child of a Corn.”

Each of the other men followed suit. Then before getting to work, they gathered around the pool, bowed their heads in silence and performed a brief ritual that ended with splashing the water four times.

The ritual “is Lu:wahleh’mak’kya,” said McKenzie Niiha, 21. “When we get to natural water sources, before we fill up our jugs and water bottles, we pray to it and ask it to bless other people with it in times of drought and bring rain where it’s needed. That’s just something that pretty much all of our grandfathers taught us, especially when we use water. Don’t just take it.”

It was Crew 642’s second trip to this site. The crew’s main objectives on both trips were to replace missing mortar and



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THE CREW’S GOAL at the site is not to restore the buildings to their original condition but to mitigate deterioration caused by visitors. Kalton Tucson (top), Jonathon Hannaweeke (above left) and Darian Seowtewa (above right) use small rocks, dirt and clay to patch up the buildings’ walls.

pletely derogatory terms for us, the descendants,” he said. “It implies they no longer have energy associated with them or they are no longer tied to a people.”

Zuni elder Octavius Seowtewa is also working to correct past missteps. For the last several years, he’s been visiting sites around the Four Corners region with the Zuni Cultural Resources Advisory Team to assess them and look for cultural clues that archaeologists might have missed. He sometimes also provides insight and guidance to the Friends of Cedar Mesa and World Monuments Fund, which advocates for the protection of historically significant sites around the world that are threatened by everything from natural forces to human conflict and mining. On the afternoon of the first day, he crossed paths at the site with his nephew, Darian Seowtewa, and the rest of the crew.

When he arrived, the crew enthusiastically showed off their workmanship, and the elder Seowtewa encouraged them and shared some spiritual history and construction know-how. He pointed out how the yucca strips between pillars added stability by reinforcing the mortar, and how each variety of wood used, from ponderosa pine to Douglas fir and aspen, had its own mechanical and spiritual purpose in the architecture.

To the elder Seowtewa, these aren’t just bits of archaeological trivia but matters of deep cultural significance. The Bears Ears region is part of the Zuni origin and migration story. According to Zuni history, it is where they came from after emerging from the Grand Canyon. To the Zuni, these dwellings and the area’s plants, animals, rocks, and thousands of petroglyphs and pictographs all contain connections to the past.

“This whole Bears Ears is a place to learn,” said Octavius Seowtewa. “Each little piece of information is important because they were people just like us. They never wanted to forget how they came out of the Fourth Underworld, so they left information for us, for their children, to come back and understand.”

The Zuni, or A:shiwi, crew live 240 miles away in New Mexico, but their roots in Bears Ears go back at least 1,000 years, and possibly back to Paleolithic hunter-gatherer times. There is a petroglyph of a mammoth in the area, and ceilings of some of the alcoves in the region have been blackened by at least 12,000 years of human campfires.

Corn agriculture began in southeastern Utah around 500 B.C., and in 700 A.D. local people started building masonry structures. Based on archaeological evidence and oral histories, it was a generally peaceful period.

But in the 1200s, something changed. The rains became weak, and the springs dried up. A long-lasting drought meant fewer crops and scarce resources, and the social fabric of the tight-knit Ancestral Puebloan cultures began to unravel. Dwellings became more fortified.

“Everything’s off kilter for their last 100 years,” said Diederichs. “People are fighting for territories and not stay-

ing very long. There’s no rock art. No structure modifications like you’d see in multi-generational living. There is very little big game left like deer and bighorn sheep. Even the turkeys were eaten out. In those last 30 years, it’s all about rabbits. I’d call it almost a refugee situation.”

So the Ancestral Puebloan peoples — whose descendants make up more than 20 Tribes today, including Hopi, Zuni, Acoma and Pueblos along the Rio Grande — migrated south to what we know now as New Mexico and Arizona.

Archaeologists think the Numic-speaking hunter-gatherer Utes (Nuchu) rolled in from the Great Basin a century later, and in the 1500s the Navajo (Diné) arrived (though some oral histories suggest both groups were here well before then), working their way down from the tundras of Canada. The Navajo found the dwellings and later named the departed people Anasazi, which has a disputed meaning that either translates to “ancestral others” or “enemy ancestors.” The term is now considered derogatory by some Tribes and is gradually being replaced with Ancestral Puebloan on interpretive signs, as well as in textbooks, academic papers and mainstream media articles.

In the 1600s, the dwellings were rediscovered by the Spanish (who renamed the Diné the Navajo), and then by English-speaking settlers in the 1800s. It wasn’t long afterward that those colonists and the U.S. government decided they wanted to own the land — and not share it. Meanwhile, the plundering of Ancestral Puebloan sites became aggressive. Collectors, universities and museums all had a hand in it.

“A real atrocity was the insatiable American appetite for curiosities in the late 1800s,” said Diederichs.

With more than 100,000 archaeological and cultural sites, Bears Ears, which is managed by the U.S. Forest Service and the Bureau of Land Management, remains vulnerable to looting and vandalism to this day. In addition, uranium mining, oil and gas drilling, cattle grazing, recreational off-roading, and construction of access roads and utility lines all have threatened culturally and environmentally sensitive sites, as well as the plants, minerals and water that are essential to Indigenous medicine, food and religious ceremonies.

To try to mitigate these threats, the Hopi Tribe, Navajo Nation, Ute Mountain Ute Tribe, Pueblo of Zuni and Ute Indian Tribe formed the Bears Ears Inter-Tribal Coalition



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in 2015. They petitioned the Obama administration to use the Antiquities Act to protect the region as a national monument. NPCA Southwest Regional Director Ernie Atencio first heard about the idea about a decade ago when the Southern Utah Wilderness Alliance asked its volunteers in New Mexico (including Atencio) to advocate for the new monument while meeting with decision-makers.

“The conservation community seemed a little dismissive about it,” Atencio said. “I don’t think anybody had seen Tribes make a proposal like that, much less a coalition of Tribes that have historically not always gotten along. It was a foreign concept in many ways. The Inter-Tribal Coalition took the Antiquities Act, a law of the nation that had been disenfranchising and repressing them for centuries, for their own benefit to protect their sacred places.”

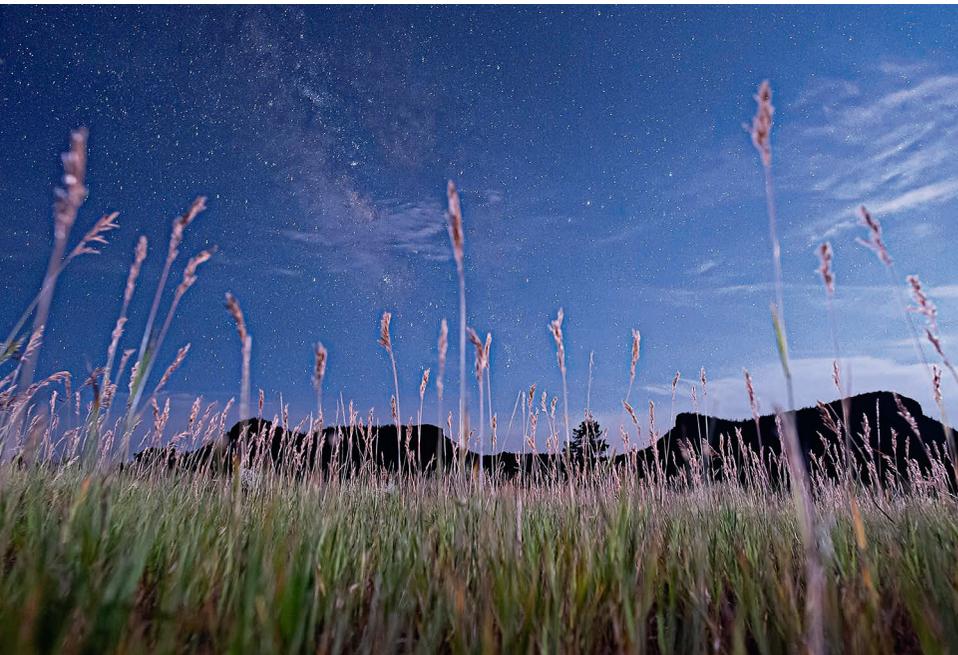
At the coalition’s urging, Obama created Bears Ears

National Monument during the last gasps of 2016. Less than a year later, the Trump administration slashed its size by 85%. Following a public outcry and dogged campaigning by the coalition and its allies — including NPCA — the Biden administration essentially restored the monument’s original boundaries in 2021.

“In the last five years, I’ve seen the conservation community really start to respect Tribal authority and wisdom,” Atencio said. “We look to them to lead our work in a lot of ways, and that’s part of what Bears Ears has created, that greater deference conservation organizations have for Tribes and Tribal sovereignty.”

Engaging young Indigenous people, such as those of Crew 642, in historic preservation and environmental conservation is another piece of the puzzle, said Robles. Some of the

FOR A WEEK, the crew made the arduous 2-mile hike to the site daily.



©DONOVAN QUINTERO

THE TWO BLUFFS that gave their name to the national monument created in 2016. The park in southeastern Utah includes more than 100,000 archaeological and cultural sites.

On one lunch break, as everyone sat in the alcove around the pool, Jonathon Hannaweeke, 20, said he hopes to start a psychology practice someday and open a clinic for children from broken homes, substance abusers and others who have fallen on hard times. Part of his approach would be taking them to sites like the one he worked on at Bears Ears, so they could feel the type of connectedness he feels.

“I want them to always remember our people are strong, and we’re still

here no matter what we go through,” he said.

Everyone nodded, then fell silent. We listened to the hummingbirds sampling flowers and the swallows chirping above on the cliff. A pair of ravens rode the updraft from the canyon floor. The water striders skipped on the surface of the pool.

Niiha broke the silence. He said he was worried that the younger kids in Zuni are growing more distant from their culture.

“Our prayers, our songs, our ceremonies, those are the three main things we want the kids to keep doing,” he said. “A lot of our youth, they’re switching over to electronics. That’s what saddens me. They don’t let their imagination take them places. Here, you can sit here for hours imagining what it would be like back then.”

The conversation livened up, as everyone speculated about what life would have been like on the ledge 800 years ago. Grinding corn for food, playing games, trying to keep the children from running off the cliff.

“For sure they were not afraid of heights,” said Niiha. Laughter, once again, filled the canyon.

corps alumni may become leaders who will work not just for the betterment of their communities, “but toward the broader goal of trying to help us return to a healthy, balanced state that recognizes our place in the natural world,” he said.

Two members of Crew 642 are already planning to pursue outdoor or nature-oriented professions. Niiha wants to work as a falconry veterinarian, rehabilitating injured raptors. Because of his work on the corps, Kalton Tucson, 25, has decided to switch career paths from the culinary arts to natural resource management and environmental science.

On the ground, Diederichs has seen another benefit of employing Indigenous crews: Their presence often has a noticeable impact on visitors. “It was powerful to see the respect visitors showed them and the site after realizing they were likely talking to descendants of the people who lived here over 800 years ago,” she said. “I can recite backcountry ethics until I’m blue in my face, but once they hear it’s important to young descendants, it changes people’s attitudes instantly.”

Though Balenquah’s official duty is to teach the crew stabilization techniques, the conversation often wanders beyond the workings of mortar and trail erosion. “I try to combine the science with whatever cultural background they are coming from,” he said. “It’s about letting them know that the things we do within our cultures are a privilege and a responsibility. It took a lot of dedication and sacrifice of our ancestors for us to be able to call ourselves Hopi, Zuni, Navajo. So we owe it to them to continue this.”

Throughout the week, the five young men’s spiritual relationship to the site was often at the forefront of conversations. They talked about feeling the positive spirit of their ancestors, and how much it felt like home.

KARUNA EBERL writes about nature, history and adventure from the high country of Colorado and other places around the West. She learned that “elaquah” means “thank you” in Zuni. Elaquah Zuni Crew 642! Her partner, **STEVE ALBERTS**, is a photographer who accompanied her on this assignment. He is the co-author of their book, “Quixotic Key West & the Lower Keys Travel Guide.”

DONOVAN QUINTERO is a Diné (Navajo) photojournalist and reporter who has been covering stories about environmental issues affecting the Navajo Nation. He is currently on staff at the Navajo Times newspaper.



THE VIEW from Lilly Bluff Overlook at Obed Wild and Scenic River (left). Right: The blended Brill family, including dogs Zealand and Benton and Elle the cat.



OBED REFUGE

*How a Backyard National Park
Helped Heal a Family in Transition*

BY DAVID BRILL

In 1998, I was a stressed-out Knoxville suburban dad confronting the end of an 18-year marriage and desperately hoping to find a refuge where I could build a simple cabin and create a nature-infused space for strengthening bonds with my daughters, Challen, then 9, and Logan, 7.

I knew I didn't want to host my girls on their weekend visits in a nondescript apartment complex largely occupied by other downcast newly divorced fathers. Also, in my youth, I had spent nearly six months in the embrace of the Eastern wilderness along the Appalachian Trail, and I longed to regain that intimate connection with the natural world after having spent far too many years as a prisoner of tidy subdivisions with manicured lawns and cookie-cutter houses.

My search for land began with a stop at Obed Wild and Scenic River, which sits on the rugged, wind- and water-sculpted Cumberland Plateau of Tennessee. At the visitor center in Wartburg, I asked the ranger

NPS/IM FOSTER; TOP: ©RON BRILL; ALL OTHER FAMILY SNAPSHOTS COURTESY OF DAVID BRILL



CHALLEN, at age 10, during one of many summer afternoons spent swimming in Clear Creek with her friends and their families (above left). Above right: The author and his longtime friend, Kent Ernsting, with their children on the “Rock of Contemplation” in Clear Creek. Benton, post-swim, shakes the water from his fur.



©RYAN MCGILL/LALAMY STOCK PHOTO



LOGAN shows a box turtle to her sister and friends (above inset). Above: The Clear Creek gorge in autumn.

behind the counter if she knew of anyone with property for sale in the area. Her response suggested that my timing was not only perfect but perhaps even prescient. “Wow,” she said. “A guy stopped by here five minutes ago and left his business cards. He’s selling property on the boundary of the national park.”

Soon, I was walking down a recently cleared dirt road with the landowner, who was selling parcels of his 68-acre holding for \$1,800 per acre. As his first customer, I had dibs and chose 10 acres at the very end of the road and bordering on Clear Creek, one of the park site’s two main waterways.

Within a few days, my dad and I visited the property and staked out the cabin site, imposing the rigid lines of a 20-by-30-foot rectangle on an otherwise wild patch of forest. With the imbedded stakes in place and connected by pink surveyor’s tape, I could begin to visualize my new home rising from the earth.

Six months later, in January, a local builder handed the girls and me the keys to our snug dwelling set beneath a dense can-

opy of interlacing hemlocks, pines and hardwoods. An 18-foot cathedral ceiling made the relatively small main room seem more ample, a loft accessed by a 10-foot ladder would serve as my writing space, and a woodstove was our sole source of heat.

Obed, just 5,000 acres, is tiny by Park Service standards, but in the end, it seems, a national park’s size or renown has little to do with its powers to recompense earnest seekers intent on finding healing space and reorienting lives temporarily tipped out of balance. Ultimately, the park — and our backyard proximity to it — would help shepherd my daughters and me through a difficult transition and deliver us to a place of wholeness and peace.

At Home in the Woods

The cabin may have been new to Challen and Logan, but the outdoors decidedly was not. Starting when they were old enough to grip my hand and toddle down a trail, the girls had been immersed in the wilds. Predictably, within a few hours of cross-

ing the threshold of our new cabin, they were outside exploring the surrounding forest with the zeal of travelers newly arrived in a land of wonders, identifying familiar plants, overturning decaying logs to find blue-tailed skinks and spotted, crimson salamanders, pointing out hawks circling overhead and engineering the structures of a fanciful village — dubbed “Land of the Toads” by Logan — from sticks, leaves and stones.

I soon joined them, and together we walked a short distance to where a line of trees girded with surveyor’s tape defined the park’s boundary. Beyond, we reached a rocky crag on the rim of the Clear Creek gorge. The sheer sandstone walls on the far side reflected the erosion that had shaped them over eons. We could hear the roar of water as it thrashed against giant boulders on its downhill course, but the river, 60 feet below, remained obscured behind a dense screen of trees.

Our golden retriever, Benton, trailed us for a time before embarking on a more extensive reconnaissance and returned

an hour later soaking wet. He clearly had found his way to a body of water — presumably Clear Creek — offering proof of a rare cleft in the otherwise continuous gorge rim and one that might afford us access to the river. Benton’s frequent excursions inspired the girls and me to christen the cabin and grounds Benton’s Run in his honor.

Within a few weeks, our forays led us farther afield and into Obed, often following Benton’s lead. Of particular interest, with summer yet several months away, was whether the river at the base of the bluff would offer an inviting pool or a forbidding jumble of boulders. On a cold afternoon, with snowflakes swirling around us, we departed the cabin and crossed into the park.



COURTESY OF DAVID BRILL



THE SOUND of rushing water led Belinda and David Brill to a rhododendron-fringed cascade in the national park site just beyond their property line (top). Left inset: The Brill cabin under construction in 1998. Right inset: The author and fellow musicians stage a winter songfest in front of a fireplace on the cabin's deck.



A hundred yards beyond, Challen announced discovery of the fracture in the gorge rim. We slipped below the bluff line and descended past rock outcroppings as big as school buses, and soon Clear Creek came into view. In choosing our parcel of land, I had selected wisely.

Our future swimming hole extended 100 yards from mouth to mouth, spanned 75 feet from side to side and, as we would later find out, was more than 20 feet deep. A gray mass of sandstone, the size and shape of a sperm whale, began near the shore and tapered to a ledge at the waterline. We would later name the ersatz whale the “Rock of Contemplation,” owing to the mood of reflection that, in future months, seemed to settle over anyone who sat on it, with knees gathered to chest, peering out at the steep walls of forest.

Solitude's Downside

At first, the cabin's isolated setting an hour from the girls' home in West Knoxville served to sequester them from their friends at a time when they needed them most. But, by summer, we learned that the antidote to social isolation was as simple as extending invitations to the girls' friends and families to come visit, and soon, dozens of moms, dads and kids were showing up on weekends and following Challen and Logan along our well-worn paths into Obed.

The swimming hole became a prime destination, and I recall long, sun-drenched Saturday afternoons with children — some buoyed by inflatable floats, others secured in life vests — bobbing in the water under the approving eyes of parents perched on the Rock of Contemplation. Benton, sleek as an otter in the deep blue-green water, made his rounds, visiting with each swimmer in turn and on occasion offering his tail as a tow rope. Over the years, our access to the swimming hole has remained sole and exclusive, except for the occasional kayakers who drift through and invariably ask, somewhat mystified, “Where did you all come from?”

As the months passed, I cherished my weekends with the girls, but the intervening periods found me largely alone in my little cabin. Beset by restlessness, I often sought solace in Obed and followed the trail down to the creek. Perched on the rock,

I'd watch great blue herons glide the length of the gorge before skidding in for landings in shallow water where the scales of dozens of small darters glistened in the sun. Lush green ferns lined the shoreline and fringed the rocks that probed above the river's surface.

The beauty of the setting often filled my heart to bursting, but the experience was diminished by the absence of someone to



OBED WILD AND SCENIC RIVER is situated on Tennessee's Cumberland Plateau about two hours east of Nashville and 90 minutes west of Knoxville. A narrow, 5,000-acre park, Obed comprises segments of four waterways — Clear Creek, Obed River, Emory River and Daddys Creek — and adjoining bluff lines.

share it with. My hermitage — the embodiment of a fantasy I had first entertained along the Appalachian Trail's final miles — had become a place of self-imposed exile.

A Little Help from My Friends

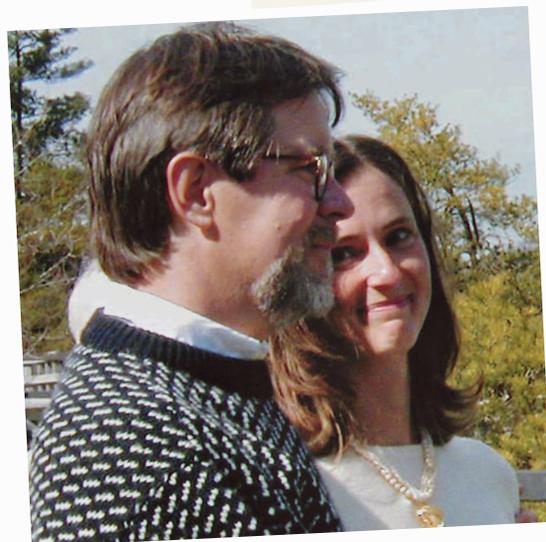
In a clear case of projection, I concluded that Benton was lonely and acquired a second golden retriever, a tiny fluff ball named Zealand, to keep him company. But ultimately, I realized that, much as the girls needed their companions, I also needed mine.

One Saturday evening, while I prepared dinner, Challen, sensing my frame of mind, approached and asked me if I was OK. Parents mistakenly assume that masking our occasional blue moods will somehow shield our children from them — a tactic that's entirely dismissive of our kids' ability to intuit the emotional spaces we occupy. In response to Challen's question, I came clean.

“I really miss you guys,” I said. “And this place can get pretty quiet when you're not here.” But in due time, the cabin began to exert its allure on friends who had never shed their childhood

EXCHANGING WEDDING VOWS

on Lilly Bluff Overlook, March 4, 2006 (inset). Right: Starry night skies over Lilly Bluff Overlook and the tranquil surface of Clear Creek.



love of stomping around in the woods. J.J. Rochelle, an old friend from nearby Oak Ridge, visited us so frequently that the girls began to call him their “second-place Dad.”

On a cold, rainy New Year’s Eve, J.J., the girls and I followed the beams of our headlamps downriver along the bluff line to where a faint trail cut below the gorge rim. After skirting along the base of a sandstone wall adorned with dripping icicles, we arrived at a gaping recess in the rock — a giant natural cathedral that had first been occupied by humans 12,500 years ago. I had previously explored the feature during daylight but never in darkness. A 30-foot ceiling capped the shelf cave and sheltered us from the elements. We had brought a dozen votive candles, which we carefully placed on tiny ledges in the wall. With the approach of midnight, while our friends back in civilization noshed on canapés, the four of us rang in the new year sipping hot cocoa in the flickering light.

Kent Ernsting, a Cincinnati I had known since grade school, and Russ Hirst, an English professor and purveyor of groan-worthy puns, also became regular fixtures at the cabin, often arriving with their families. Kent would eventually buy nearby property on Clear Creek and become a part-time neighbor. And Russ, who was never without his mask and snorkel, routinely entered Clear Creek regardless of the season or ambient air temperature, and he often emerged from the river enveloped in a cloud of steam. Dan Howe, my old AT hiking buddy, made the trip over from Raleigh once or twice a year, typically proffering a pot of chili and a bottle of fine bourbon. The latter, combined with a campfire, never failed to prompt a spate of old trail tales — most of them true.

While my friends’ visits were occasional and of short duration, I was about to welcome a companion who would arrive intent on staying.

The Wicked Stepmother

I had met Belinda Woodiel in 1992, while both of us worked for the University of Tennessee. Though I was married at the time, I’ll admit to being captivated by Belinda’s smarts, calm demeanor, bright brown eyes and curly chestnut hair.

After a couple of years, Belinda left the university for a new job, and we rarely saw each other, though she remained on my mind. Then, one day, a mutual friend mentioned that he had run into her and suggested that I give her a call. Notably, he referenced her by her maiden name.

By 2003, both of us had emerged from our first marriages, and we agreed to meet for a beer in a downtown Knoxville pub. After my first pint, I mustered the nerve to ask Belinda if she would consider dating me. She paused; I braced. “I’ve had a crush on you

for 10 years,” she answered, which I took to mean yes. Three years later, almost to the day, we were married. Our choice of venue, Obed, required little deliberation.

Through the years of our courtship, Belinda had come to love the park as much as I did. And while I, as tour guide, led her to some of my favorite destinations — the swimming hole, the shelf cave, hiking trails winding through dense forests or along open ridges — she, a self-professed nature nerd, schooled me in the names, both common and Latin, of Obed’s profusion of botanical specimens and taught me to identify bird species by their distinctive calls.

Our first weddings had been large, traditional ceremonies marked more by pomp and formality than intimacy, and we wanted this occasion to be largely unadorned and ornamented by nature. On a crisp, clear March Saturday, surrounded by immediate family and one wedding crasher — my ever-supportive friend Kent, who insisted on being there for me, invited or not — Belinda and I exchanged our vows on Lilly Bluff Overlook, a large observation deck positioned on the rim of the Clear Creek gorge. The minister of Belinda’s Methodist church officiated; Logan played “Simple Gifts” on her fiddle. And with that, our blended family — including Benton, Zealand and a cat named Elle — was complete.

From the beginning, Belinda served as ally, friend and confidant to Challen and Logan, and her attention to the physical and emotional needs of young girls transitioning into adolescence



supplanted my own well-intentioned but sometimes awkward efforts to lend support. Out of love, deference and a surfeit of irony, the girls soon began calling her their “wicked stepmother,” as in wicked awesome.

After eight years in the cabin, the girls and I assumed we had discovered all — or at least most — of Obed’s nearby hidden gems, but Belinda, acutely attuned to nature’s varied sights and sounds, soon proved us wrong. After a heavy winter rain, Belinda, standing on the deck, heard Clear Creek’s dominant roar rising from the gorge, but she also discerned a more subtle sound of rushing water to the cabin’s south, an area the girls and I had yet to explore fully.

Equipped with my chainsaw, I cut a path through a tangle of trees brought down by a recent ice storm. We soon crossed the park boundary and arrived at a sloping 50-foot whitewater cascade beneath towering hemlocks and edged by a lush rhododendron thicket. Afterward, it would become a favorite spot for lolling in hammocks and a new natural wonder to share with visiting friends, who often seemed reluctant to leave the cataract’s soothing presence.

Exploring Obed’s Epicenter

The area surrounding Lilly Bridge, a 10-minute drive from the cabin, serves as Obed’s epicenter, where numerous notable features converge. The overlook where Belinda and I were married is situated at the upper reaches of more than a dozen bolted rock-climbing routes. Lilly Bridge itself provides the perfect vantage point for watching kayakers navigate Clear Creek’s rapids. And the Point Trail, a 3.8-mile out-and-back route, culminates on a narrow rocky ridge that affords views of Clear Creek on one side and Obed River, the park’s namesake and other main waterway, on the other. The trail’s terminus is poised 100 feet above where the two rivers merge.

As the girls grew and developed sturdy hiking legs, the Point Trail became a frequent weekend destination, and though we’ve hiked it dozens of times over the years, the expression that one never steps into the same stream twice likewise applies to mountain pathways. In spring, ephemeral wildflowers — dwarf crested irises, spring beauties, foam-flowers, bird’s foot violets, lady’s slippers — blanketed entire hillsides and were soon succeeded by the pink, softball-sized



THREE GENERATIONS of Brills at Obed Wild and Scenic River. From left: David, Ron, Nancy, Challen, Logan and Belinda.

blossoms of rhododendron and the cream-white florets of mountain laurel. After rains, scores of mushrooms sprouted trailside, and the gnarled ledges of bright orange shelf fungi emerged on downed trees. Fall foliage burnished the mountainsides in reds and golds, and in winter, when snow blanketed the trail, tiny footprints betrayed the movement of foxes, raccoons, rabbits and field mice. At trail's end, hot cocoa from a thermos warmed us as we watched snowflakes waft down into the river gorge and gather on hemlocks' outstretched branches.

A Starry Night Affirmation

The Cumberland Plateau's ancient landscape imparts a useful lesson on the impermanence of things, whether they be geologic formations under relentless erosive assault or transient human-scale problems that amount to mere blips in the context of the long-elated eons.

When I reflect on my family's early years along Obed's margins — years tinged by worry and doubt — they seem distant and remote, as if elements of someone else's life. The two young girls who first crossed the cabin's threshold 24 years ago are now adults and live two hours away in Nashville. Logan and her partner, Grant, have been an item since high school, and Challen and her husband, Adler, who married in 2019, now are parents to an 18-month-old son, Norris, Belinda's and my first grandchild.

In a perfect world, pets would enjoy the same lifespan as their human companions, but Benton, Zealand and Elle are now gone, interred in a special plot not far off the back deck. Zebulon, a lovable but frenetic Labrador and Tater Tot, a tiny kitten who wandered out of the forest one night, have assumed their predecessors' nurturing roles, though they will never take their places.

When the four generations of my family gather at the cabin these days, we nearly always venture into the park, lured by the promise of thundering waterfalls, mountain trails hemmed by wildflowers, open ledges affording views of wild rivers. And then there are the star-flecked night skies. When darkness descends over the plateau and the nocturnal denizens of the forest begin to stir, a primordial urge overtakes us humans and unflinchingly

compels our attention toward the spectacle that sprawls above us.

Over the years, I have become accustomed to hearing city folk audibly gasp when they first behold the cabin's night sky, absent the intrusion of artificial light. Stargazing in designated International Dark Sky Parks like Obed — one of only around 80 in the United States — provides a portal into the infinite reaches of space and reminds us that our tiny blue marble is in good cosmic company. Our visitors frequently have lain swaddled in sleeping bags, staring reverently upward, as meteors streaked across the heavens, trailing golden glitter in their wakes.

That same night sky is what finally persuaded my mother that building a cabin in the middle of nowhere wasn't the imprudent folly she had once believed it to be. Initially, she had been concerned that my choosing to live more than an hour away from my daughters would somehow erode our closeness rather than strengthen it.

But on a clear, moonless fall night, she began to fathom fully my unwavering affection for our wooded refuge. Following an evening meal, the family had walked to an open meadow a few hundred yards down the gravel drive and gazed upward at a sky dense with stars and planets.

Frost had stiffened the blades of grass, and the broad, phosphorescent sash of the Milky Way, clearly visible, bestowed sufficient light to cast us in silhouette. Mom gripped my hand.

"I've never seen stars like this," she said. "I finally understand why you love this place so much."

In January 2019, near midnight, an overcast sky cleared just in time to reveal a moon transitioning to blood red as it passed into Earth's shadow. And two years prior, daylight slowly descended into darkness during a total solar eclipse, with Obed on the prime viewing pathway. As Belinda and I watched the moon blot out the sun, darkening all but the thin shimmering ring of the corona, we heard the call of a bewildered barred owl issue from the forest.

The solar and lunar eclipses were singular and marvelous events that Belinda and I will never forget. But in the course of our lives here, it's the more commonplace observations and experiences — turkeys scattering through the forest, deer bending to graze in open meadows, wisps of morning fog wafting through stands of hemlock and pine, dogwood blossoms unfurling in the warmth of spring sunshine — that impart an abiding sense of belonging, of being more residents of, than visitors to, a wild, untamed world of beauty and wonder.

DAVID BRILL'S writing has appeared in dozens of publications, and he is the author of five nonfiction books including "Into the Mist: Tales of Death and Disaster, Mishaps and Misdeeds, Misfortune and Mayhem in Great Smoky Mountains National Park" and "As Far as the Eye Can See: Reflections of an Appalachian Trail Hiker," now in its eighth (30th anniversary) printing.

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Near Fort Union, visitors will find a monument to the Buffalo Soldiers at Fort Buford State Historic Site. A mile away, the Missouri-Yellowstone Confluence Interpretive Center offers the same magnificent views



Courtesy Williston CVB

enjoyed by the Corps of Discovery. East of Williston at Lewis and Clark State Park, visitors walk interpretive trails showing what the famous explorers saw.

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GOOD FRIENDS Edward O. Wilson (left) and Thomas E. Lovejoy (right) in 2014.

COURTESY OF THE NEW YORK BOTANICAL GARDEN

Loss & Legacy

On the lives of two science luminaries.

THIS WINTER, the national park family and the broader environmental world lost two champions: Thomas E. Lovejoy and Edward O. Wilson. Both pioneered new fields, furthered the understanding of the natural world and inspired people to act boldly in pursuit of conservation.

Lovejoy, a longtime NPCA member, is perhaps best known for coining the term biological diversity (later shortened to biodiversity) in 1980. The concept has become all but synonymous with the health and resilience of ecosystems and arises frequently in the context of national parks, which are often lauded as bastions of biodiversity. Lovejoy encouraged a much wider vision, however, one in which humanity values and protects species well beyond park boundaries. If we do that, he wrote in the spring 2019 issue of this magazine, “parks will no longer be isolated treasures set in the midst of human-dominated landscapes. Instead, we will have a vast natural web connecting these jewels we love so much.”

Originally fascinated by East Africa, Lovejoy turned his attention to the Amazon around the time he started his doctoral work at Yale University in the late 1960s under the guidance of famed British ecologist G. Evelyn Hutchinson. His Camp 41 field site north of Manaus, Brazil, “turned into this center for ecological research with massive impact,” said Ryan Valdez, NPCA’s director of conservation science and policy. The studies conducted at Camp 41 continue today and have revolutionized

scientific understanding of forest fragmentation and the importance of large landscape preservation.

The site also proved to be an incomparable asset for the politically savvy Lovejoy. Roughly twice a year, the bowtie-wearing biologist would bring decision-makers, media and celebrities into the jungle to see firsthand what would be lost should this unique ecosystem be entirely carved up and destroyed. Valdez, who worked with Lovejoy on a Smithsonian-affiliated project in the Amazon for nearly a decade and credits him with securing significant protections for the area over the years, compared these trips to Stephen Mather’s 1915 excursion into Yosemite National Park to sell congressmen, magazine editors, business magnates and scientists on the need for a national park agency. “Exactly the same concept,” Valdez said. Guide influential folks to a little-seen, little-known wonder, “and then the magic will happen.” Visiting Camp 41 with Lovejoy “was such a transformative experience for his guests,” Valdez added. “They went back home ready to help him.”

Lovejoy’s impressive resume includes stints at the World Bank, World Wildlife Fund and Smithsonian Institution, among others, as well as posts on countless boards and in five U.S. administrations. The Blue Planet Prize recipient also helped create the popular television series “Nature.” Most recently, Lovejoy taught in the Environmental Science and Policy department at George Mason University and served as senior advisor at the United Nations Foundation.

“He adored mentoring people, whether it was his students at George Mason or students throughout his career,” said his daughter Betsy Lovejoy. His methods — maintaining an open-door policy and chatting with them around drinks after class — produced an ever-growing orbit of disciples. “More

than anything, he wanted to get back to his students,” she said. “That was what was driving him to get better.”

Lovejoy, who died of pancreatic cancer in December at the age of 80, is remembered by those who knew him best as humble, kind, generous and not above a little harmless mischief. He couldn't resist planting fake tarantulas in hammocks at Camp 41, recalled his daughter, who harbors fond memories of bantering with her father in Portuguese and bird-watching with him in Rock Creek Park near her home in Washington, D.C. Because his knowledge of avian life mostly centered on the Amazon, she relished the chance to share what she knew of Mid-Atlantic species. “He would always send texts, ‘I just heard a great horned owl in the backyard,’ or ‘I heard a barred owl,’ or ‘What bird sounds like this?’” she said.

Wilson, too, had a soft spot for the capital's rambling national park site, having lived within walking distance for a couple years as a boy. “It's where I did my first entomology expedition,” he told *National Parks* magazine in a 2008 interview.

Restricted from a young age to the use of a single eye after a fishing accident, Wilson found that this disability uniquely prepared him to peer intently at insects, which he did with abandon, eventually earning the sobriquet “ant man.” In due course, the two-time Pulitzer Prize winner shifted that laser focus to the wider world, studying human nature as closely as anything else.

But those formative experiences in Rock Creek Park and the woods near his childhood home in Alabama, turning over every rock and stick to find “the little things that run the world,” as he called them, impressed upon him the value of early exposure to the outdoors. “He fundamentally understood how important it was to have these transformative moments of discovery in nature,”

said Paula J. Ehrlich, CEO and president of the E.O. Wilson Biodiversity Foundation.

To that end, Wilson — who died on December 26 at the age of 92 — enthusiastically promoted citizen science efforts, such as biodiversity surveys, with the dual goal of inspiring wonder and advancing science. He believed we couldn't hope to be effective in our conservation efforts, halt species extinctions or fend off “that great, wrathful demon” of climate change, if we didn't ramp up our identification and understanding of species. The more people involved, the better.

It was this faith in his fellow humans, as well as a firm grasp of the data, that led Wilson to dive headlong into the Half-Earth Project in his later years. When people would ask him if conserving 50% of all lands and waters to protect biodiversity and ensure a habitable future for humanity was an achievable goal, Ehrlich said she remembers him “just leaning back and looking out and saying, ‘Of course we can, if we want to.’” Though critics decried the effort as an attempt to fence people out from half the planet,



THOMAS LOVEJOY holds a broad-winged hawk in a photo commissioned by the Academy of Natural Sciences in the early 1970s.



E.O. WILSON was known for his study of ants, among many other subjects. Paula J. Ehrlich described him as the epitome of a gentleman — “a kind, grandfatherly one, who always knew what to say to make you feel better.”

Walter Jetz, director of the Yale Center for Biodiversity and Global Change, said that nothing could be further from Wilson's true hope. “He was very cognizant of the people dynamics,” said Jetz, who spent the last four-and-a-half years collaborating with the naturalist on the project. Wilson encouraged “approaching sustainable development for this planet in a way that is equitable and fair and just,” Jetz said.

The 30 by 30 movement, which has been endorsed by roughly 100 nations, including the U.S., takes its cues from Wilson's Half-Earth Project and calls for the protection of a third of the world's lands and waters by 2030. As national parks serve as vital conservation puzzle pieces, NPCA staff and allies are working on the ground and in the offices of decision-makers to identify and protect this country's critical landscapes.

Wilson laid it on the line during a 2015 keynote address at a University of California, Berkeley conference in the lead-up to the Park Service's centennial: “The only way to save the rest of life, if we want to save the rest of life — and heavens to Betsy, we do — the only way is to increase the area of protected and inviolable habitat around the world to a safe level.”

KATHERINE DEGROFF is associate editor of *National Parks* magazine.



That Was Then



U.S. GEOLOGICAL SURVEY

TIE SING, head chef with the U.S. Geological Survey, pictured in Yosemite National Park in 1909. Sing contributed to the success of Stephen Mather's 1915 expedition to the park, providing hearty backcountry meals to the men who would push Congress to establish the National Park Service the following year.

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