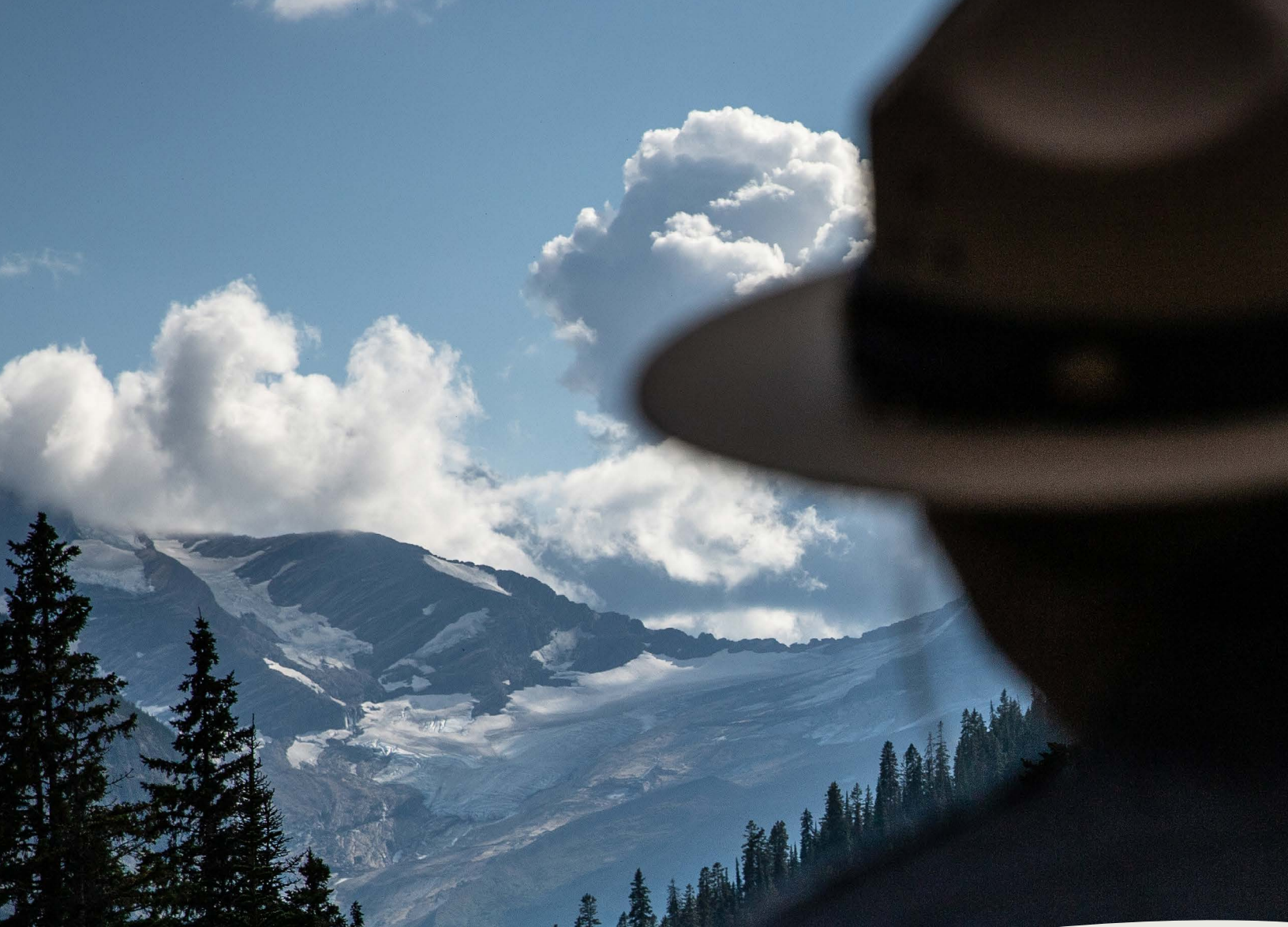


America's Best Idea in Peril:

Climate Change & the Future of Our National Parks

SEEC Institute
Sustainable Energy & Environment Coalition

THE COALITION TO PROTECT AMERICA'S NATIONAL PARKS
VOICES OF EXPERIENCE

The Sustainable Energy and Environment Coalition Institute, or SEEC Institute, convenes the private sector, Congress, leading climate and environmental advocates, and other experts to facilitate more formal and regular connections between interested parties and stakeholders to secure the **biggest climate and clean energy solutions possible.**

The Coalition to Protect America's National Parks educates, speaks, and advocates for the preservation and protection of the parks, places, and programs of the National Park Service. The Coalition is made up of **over 4,500 members**, all of whom are current, former, or retired employees and volunteers of the National Park Service.

Executive Summary

The way I see it, it's a straightforward proposition — either Congress acts, or our parks disappear.

— Congressman Mike Quigley (IL-05), Co-Chair of the Sustainable Energy and Environment Coalition (SEEC)

For nearly a decade, Congressman Mike Quigley (IL-05) has led delegations of members of the Sustainable Energy and Environment Coalition (SEEC) of the U.S. House of Representatives to national parks throughout the United States as a way to hear firsthand from the National Park Service how the National Park System is responding to climate change, and see those climate impacts for themselves.

On these trips, SEEC Members of Congress have seen how the coastlines are eroding in the Everglades and Acadia National Parks, how severe droughts are causing entire biomes to shift in Yellowstone National Park, and how wildfires are burning more intensely than ever before in Yosemite, Rocky Mountain, and Shenandoah National Parks.

National parks are bellwethers of climate change, indicating a much more widespread problem. The ecological integrity of almost every unit of the National Park System has been in some way eroded by human-caused climate change, and in the coming decades, further widespread system degradation is expected. It is happening slowly in some places and alarmingly fast in others, but as temperatures keep going up and precipitation continues to become more intense and unpredictable, America's "best idea" is being eroded away.

"We're in a race for time," said Rep. Quigley, "and if you go to these places and talk to the people who are on the ground trying to solve this problem, it's clear we're falling behind."

"They need resources. The way I see it, it's a straightforward proposition — either Congress acts, or our parks disappear."

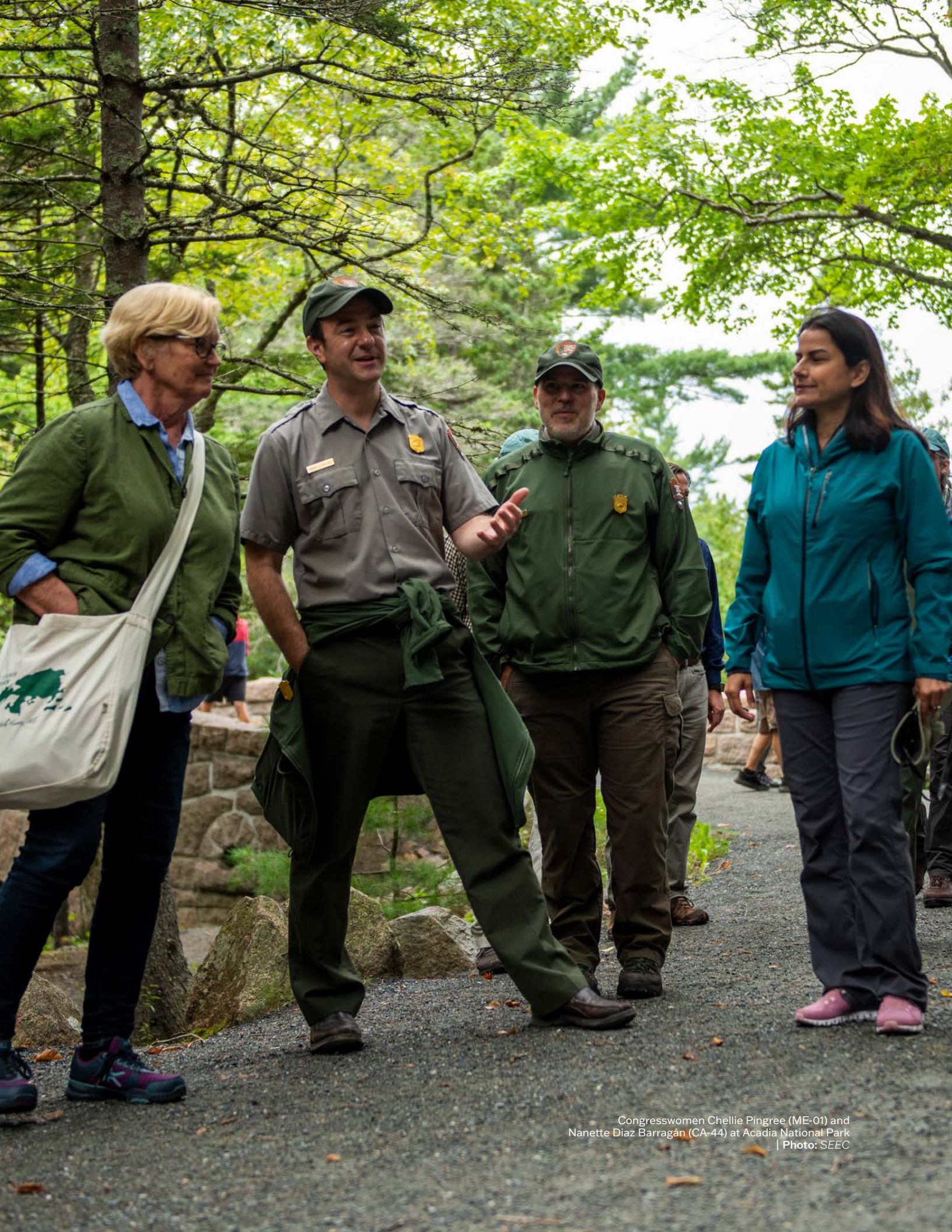
In addition to describing in detail how climate change is impacting specific parks, this report proposes the following solutions:

- ***Reduce carbon pollution, save our parks — that simple:*** The essential solution to protecting our national parks from climate change is to go after the cause of climate change – carbon emissions.

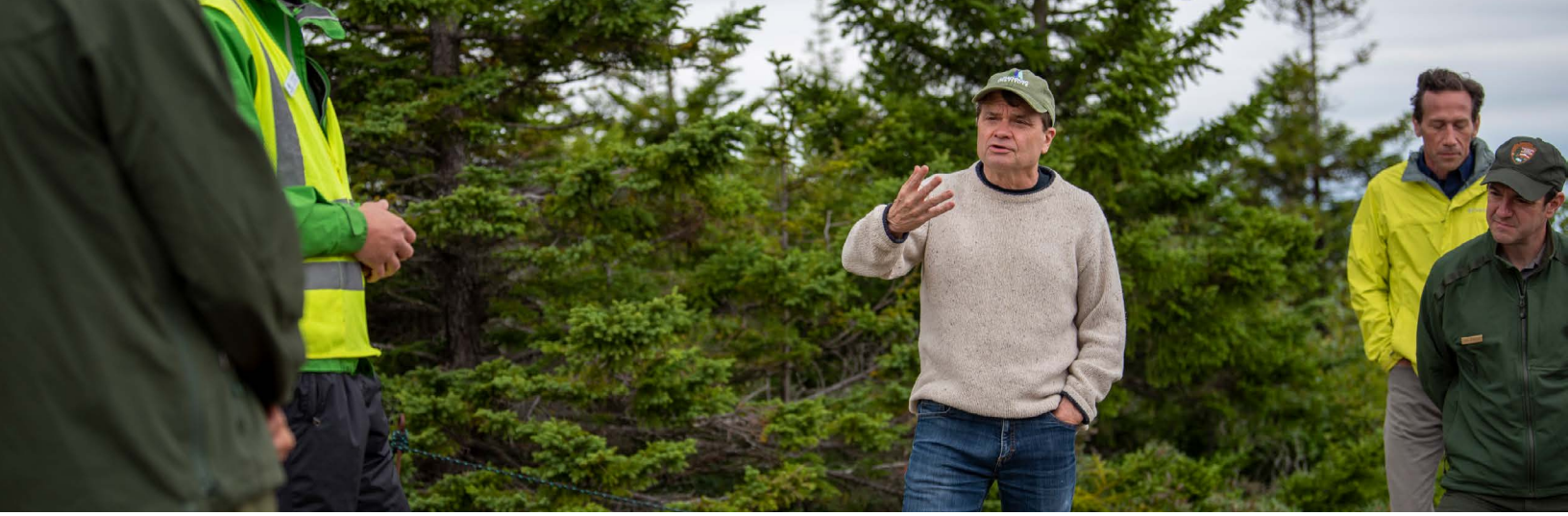
- ***Investing in sound science:*** Staffing shortages and inadequate funding prevent the National Park Service from conducting the research and resource management work necessary to ensure that, even in the face of a changing climate, our national parks remain "unimpaired for the enjoyment of future generations."

- ***Maintain federal land designations:*** If units of the National Park System — such as national recreation areas, national seashores, national battlefields, national historical parks, or national monuments — are unilaterally removed from the National Park System, they are no longer able to benefit from the resources and dedicated efforts of the only federal agency required by its authorizing legislation to think in terms of "ecologically forever."

Climate change may be here, but the worst of the predictive models are not inevitable. The future integrity of our parks and our planet depends on what we do right now – in this very moment.



Congresswomen Chellie Pingree (ME-01) and Nanette Diaz Barragán (CA-44) at Acadia National Park | **Photo:** *SEEC*



Congressman Mike Quigley (IL-05) at Acadia National Park | **Photo:** *SEEC*

Introduction

Our changing parks.

When Theodore Roosevelt first visited the Grand Canyon in 1908, he was awestruck.

"You cannot improve on it," Roosevelt said of the canyon. "The ages have been at work on it, and man can only mar it. What you can do is to keep it for your children, your children's children and for all who come after you, as one of the great sights which every American, if he can travel at all, should see."

"Keep this great wonder of nature as it now is," he said to the crowd.

The National Park System, what novelist and historian Wallace Stegner would refer to as "America's best idea," puts Roosevelt's words into practice at scale, setting aside a vast breadth and diversity of places "for the enjoyment of future generations."

National parks are loved by people of all political persuasions. Of every service and function of our government, our parks, monuments, and the National Park Service that exists for their stewardship, consistently draws the most support and admiration of the public.[1]

Our national parks serve to remind us of where we came from and allow us to escape from the noise of the everyday.

But the continued protection of our national parks and public lands is not a given.

"People visit national parks, they see green vegetation, maybe some wildlife on the side of the road," said Jim Northup, former Superintendent of Shenandoah National Park, "and they think these places are pristine and haven't been impacted by us in any way."

"But nothing could be further from the truth," said Northup.

While it is true that our national parks have been largely protected thus far from the changes wrought by direct industrial use and development, parks are not islands — they are inevitably and profoundly impacted by the changing world around them, from development on adjacent lands, which impacts air quality, water quality, habitats, and migration corridors, to a globally changing climate.

"Human-caused climate change," as Patrick Gonzalez, the former Principal Climate Change Scientist for the National Park Service, says "has already increased wildfire, killed trees, melted glaciers, and caused other severe impacts in our national parks, as shown by published scientific research."

It is becoming hotter and drier just about everywhere in the United States but human-caused climate change has heated temperatures in the National Park System at twice the rate of the country as a whole and caused more severe aridity in the national parks.[2]

[1] Pew Research, 2024.
[2] Gonzalez et al. 2018 Environmental Research Letters.

This is because, as Gonzalez says, "the national parks are located in some of the most extreme environments in the United States."

Many well-known national parks — like Grand Canyon, Zion, and Joshua Tree — sit in the Intermountain Region between the Rockies to the east and the Cascade Range and Sierra Nevada Mountains to the west, where warming occurs more quickly because of the thin atmosphere, or in the Southwest, where even minor increases in temperature can seriously upset natural systems.

The effects of climate change are happening now. Our parks are absolutely being affected.

— Phil Francis, Chair of the Coalition to Protect America's National Parks Executive Council

"Each time I have visited our national parks, I am struck by their beauty and their incredible vulnerability," said Congressman Mike Quigley (IL-05), one of the Co-Chairs of the Sustainable Energy and Environment Coalition (SEEC), a caucus in the United States House of Representatives with a hundred members of Congress who advocate for durable and effective environmental policies.

"There is no better place to witness the impacts of climate change than in our national parks — land that has been protected and preserved," Rep. Quigley said, "yet is immensely susceptible to the changing climate."

For the better part of a decade, Rep. Quigley has been leading Congressional delegations to national parks throughout the United States as a way to bring attention to how they are impacted by climate change.

On these trips, the members of these delegations have seen how the coastlines are eroding in the Everglades and Acadia National Parks, how severe droughts are causing entire biomes to literally shift in Yellowstone National Park, and how wildfires are burning more intensely than ever before in Yosemite, Rocky Mountain, and Shenandoah National Parks.

"In an era when the science could not be clearer and yet climate denialism is on the rise, seeing the changes to these landmarks that have overwhelming bipartisan support can maybe move the dial," said Rep. Quigley.

This report places the experiences of these Members of Congress within the context of published research to develop a complete picture of the different ways the changing climate is affecting our national parks.

This report pulls from the expertise of retired National Park Service superintendents, scientists, and administrators, many of whom are members of the Coalition to Protect America's National Parks, a nonprofit, nonpartisan group that works to support the mission of the National Park Service and help ensure the protection of our national parks.

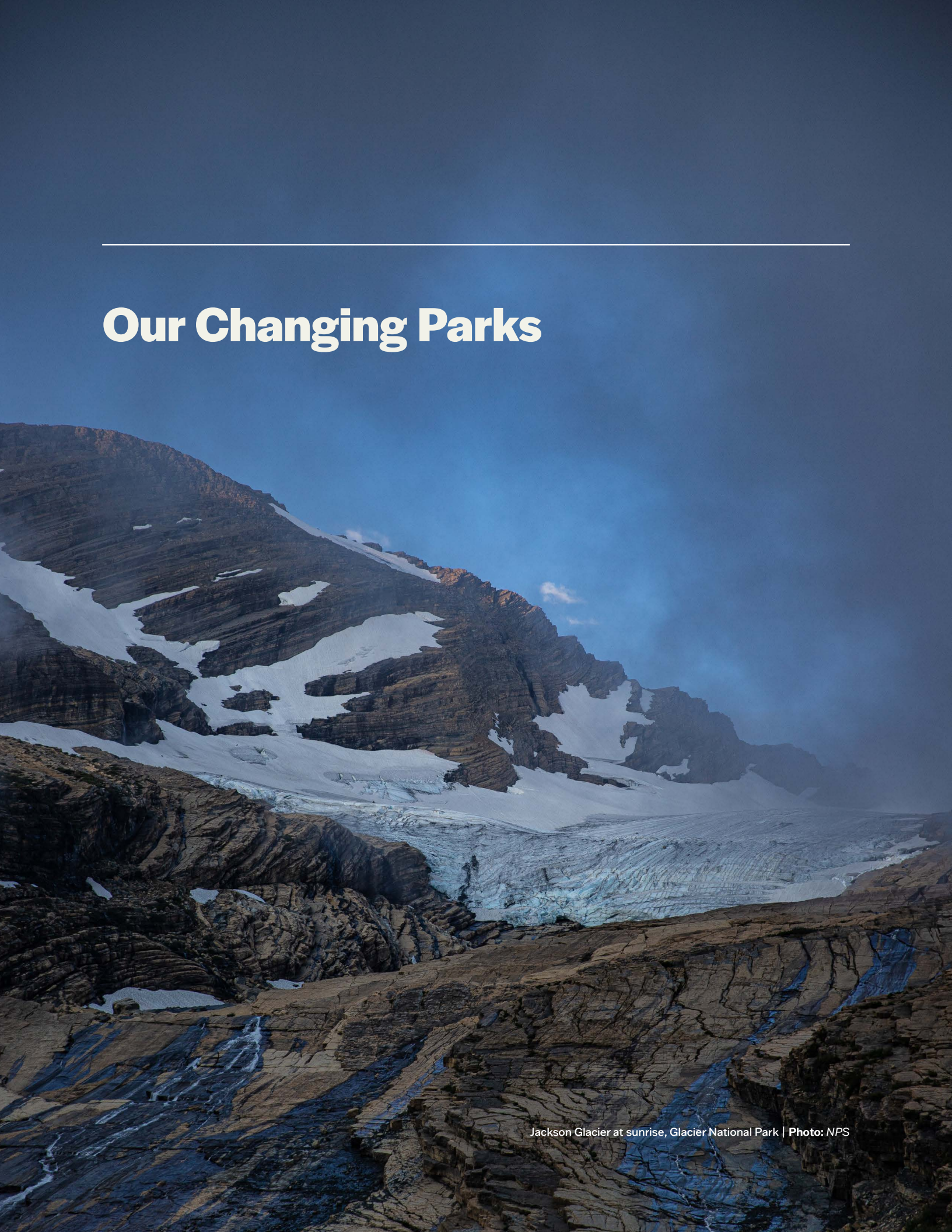
With tens of thousands of accumulated years of hands-on experience protecting America's most valuable natural, cultural, and historical resources, few others understand the realities of climate change on the ground more than the Coalition's members.

"The effects of climate change are happening now," said Phil Francis, Chair of the Coalition's Executive Council. "Our parks are absolutely being affected."

"We're in a race for time," said Rep. Quigley, "and if you go to these places and talk to the people who are on the ground trying to solve this problem, it's clear we're falling behind.

"They need resources. The way I see it, it's a straightforward proposition — either Congress acts, or our parks disappear."

Our Changing Parks



Jackson Glacier at sunrise, Glacier National Park | **Photo:** *NPS*

Drought and Water Availability

Yellowstone National Park

Yellowstone National Park, the first national park, remains one of the few places in the contiguous United States where ecological processes operate with minimal human interference.

Often referred to as the "Serengeti of North America," the park preserves more than 2 million acres of high-elevation wilderness in Idaho, Montana, and Wyoming — one of the largest remaining nearly intact temperate ecosystems anywhere.

Yet today, Yellowstone is facing something a national park designation was not designed for: human-caused climate change.

One of the warmest periods in Yellowstone, ever.

For decades, the National Park Service has been tracking the rise in average annual temperatures in both Yellowstone National Park and the greater Yellowstone region.

In 2021, average annual temperatures were 2.3 degrees F warmer than they were in 1950.

Though this may seem like a small change, this shift alone put average temperatures at or above where they were during any period in the last 20,000 years, and likely above anything the park experienced in the last 800,000 years.[3]

Warming is expected to not only continue but accelerate.

The region is projected to warm 5 to 6 degrees F between 2061 and 2080, compared with the average from 1986 to 2005, and by as much as 10 to 11 degrees F by 2100.[4]

The snowpack is declining.

As a consequence of the regional increase in temperatures, Yellowstone's reliable snow patterns are shifting. Though the amount of precipitation has remained mostly unchanged, the region sees 25 percent less snowfall during the winter months than it did 70 years ago.[5]

The decrease in snow is due to rising temperatures, which cause more precipitation to fall as rain instead of snow, reducing the extent and depth of the snowpack.[6]

This shift is expected to continue, with snowfall coverage in the region projected to decrease anywhere from from 53 to 70 percent by 2060 compared with the average from 1986 to 2005.[7]

Yellowstone's winter snowline — the elevation above which almost all winter precipitation falls as snow — is today at about 6,000 feet, but within the next 70 years warming is forecasted to raise it to at least 10,000 feet.

Changing snow patterns in Yellowstone

"We used to refer to August 25th as Christmas in Yellowstone.

"It goes back to this one year when a whole bunch of people got snowed-in on that day and someone thought everyone might get a kick out of throwing a Christmas party. So from then on, it became a tradition. Christmas in Yellowstone. Celebrations, a chorus — it was a whole thing.

"I say we used to, because these days, people haven't gotten anywhere close to snowed-in out there on August 25th for a long time now."

— Tim Hudson, Chief of Maintenance at Yellowstone National Park (1982-2002)

[3-7] Montana State University, 2021.

Snowpack is everything in Yellowstone.

Yellowstone's annual water cycle is characterized by snow accumulation during the winter and early-spring months and snowmelt during the late-spring and summer.

Though precipitation in the area usually exceeds water lost to evaporation, the reverse is true in the summer, particularly at lower elevations, reducing the availability of water during the season. This is called a 'water deficit.'

Snowpack is what makes up the difference in the form of a slow but constant drip of snowmelt runoff, just enough to keep groundwater and streamflow in Yellowstone at a minimum viable level before the wet season returns.

While a drop in the volume of water stored in the annual snowpack by itself would constitute a serious problem for the park, at the same time, rising temperatures are pushing the onset of the snowmelt up on the calendar. As a result, the length of the dry season is increasing.

This all considered together, the summer water deficit is expected to increase by a minimum of 25 percent (though it could increase by as much as 35 percent) by 2060, with significant consequences for Yellowstone's plants and wildlife.[8]

With an already dry summer season becoming even drier, the composition and distribution of Yellowstone's native species are expected to change.

Over the past two decades, the National Park Service has measured vegetation response to water deficit, and in a park like Yellowstone, where there is almost always a seasonal water deficit, flora largely rebounds once summer gives way to autumn.[9]

But as Yellowstone becomes more arid and the water deficit becomes larger, the opportunities for flora to rebound become less frequent. Already Yellowstone's subalpine conifer forests, which now cover more than 80 percent of the park, are expected to give way to the sort of desert scrub vegetation that now proliferates through central Wyoming.[10]

[8] Montana State University, 2021.
[9] Applied Vegetation Science, 2016.
[10] Montana State University, 2014.

The extent to which park's forests are going to recede is as of yet unknown, but the decline or total loss of some native species — in particular, high-elevation species like the whitebark pine — is inevitable under the current trajectory of climate change.

This is happening everywhere.

Yellowstone is not alone. Human-caused warming and record-high temperatures are disrupting ecosystems and reducing water availability all throughout the West and the region's iconic national parks, from the Grand Canyon in Arizona, to Zion and Arches in Utah, to Olympic in Washington.

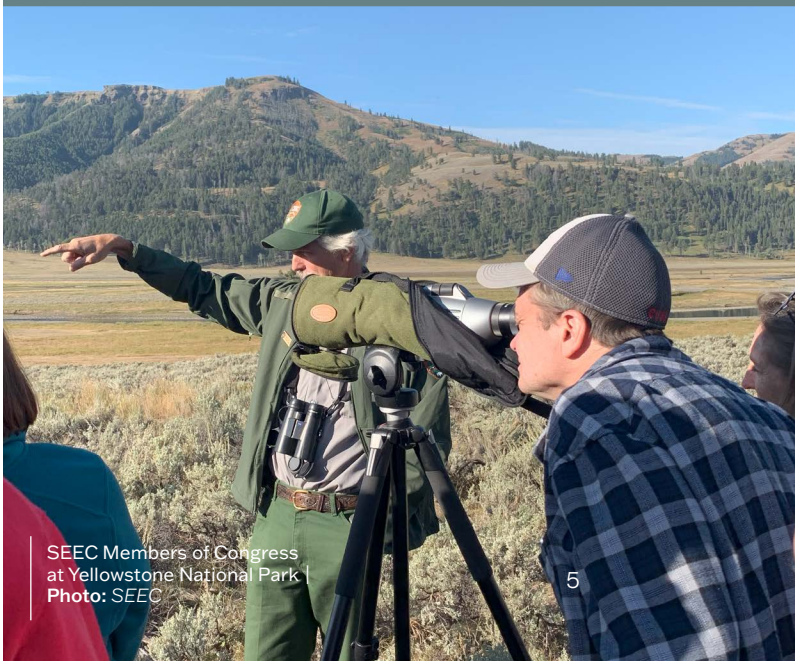
Global crisis with local consequences

"Climate change is a global crisis with local consequences — and we are seeing those consequences bear down on our country's most beloved natural treasures.

We owe it to our children and grandchildren to reverse course through urgent, transformative climate action.

National parks like Yellowstone are their inheritance, but right now, we are failing to preserve and protect them."

— Congresswoman Katherine Clark (MA-05), Democratic Whip



SEEC Members of Congress at Yellowstone National Park | **Photo:** *SEEC*

Wildfire

Yosemite National Park

Yosemite National Park, though not the first national park, is often considered to be the forebear of the entire National Park System.

With the passage of the Yosemite Grant Act in 1864, which gave California the Yosemite Valley and nearby Mariposa Grove "upon the express conditions that the premises shall be held for public use and recreation," Congress for the first time set aside a tract of federal land as a public park.

It set the precedent for Yellowstone National Park, which would in 1872 be set apart as the first in what would eventually become an expansive system of parks, monuments, and nature preserves protected not only for the benefit and enjoyment of people but, as the National Park Service's authorizing legislation states, "future generations."

Today, Yosemite is one of the most beloved national parks, attracting millions of visitors every year.

In the valley below its towering granite rock faces, the park is home to a diversity of flora, including groves of ancient sequoias and forests of cedar, fir, hemlock, oak, and pine.

Yet Yosemite's forests don't look like they did when the park was first established.

Yosemite's wildfire regime is changing.

Summer through fall used to be considered the fire season in the Sierra Nevadas.

The lifecycle of Yosemite's forests, for as long as they have stood, have relied on this regular process of renewal: wildfire clears out undergrowth, replenishes the soil, and signals some cornerstone species of flora (such as the iconic giant sequoia) to flower, release seeds, and sprout.[11]

Fires in Yosemite—this isn't political

"Over the past several years, we've seen an increase in wildfires across California.

These wildfires — from the August Complex fire up in the Coast Range to the Eaton and Palisades fires down in Los Angeles — have harmed residential communities and hurt wildlife throughout our state.

I've been fortunate enough to visit some of our nation's most iconic landscapes, including Yosemite, and I've seen firsthand how complicated and costly it can be to repair disaster-related damage.

It's clear that climate change is only making the fires more frequent and destructive.

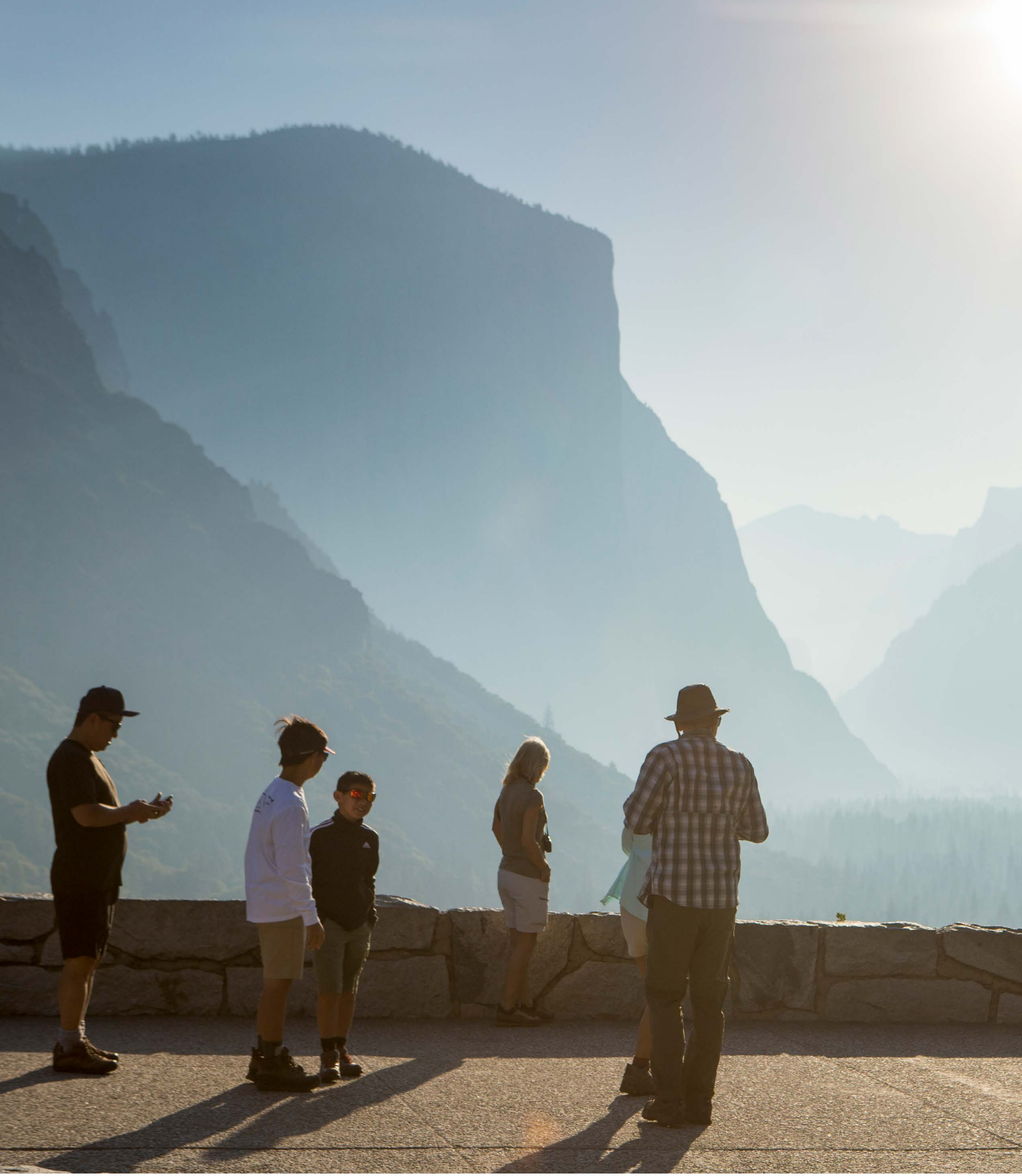
This isn't political, it's science. We must focus on long-term solutions that mitigate wildfire damage, protect our national parks, and fight back against climate change."

— Congressman Ted Lieu (CA-36)

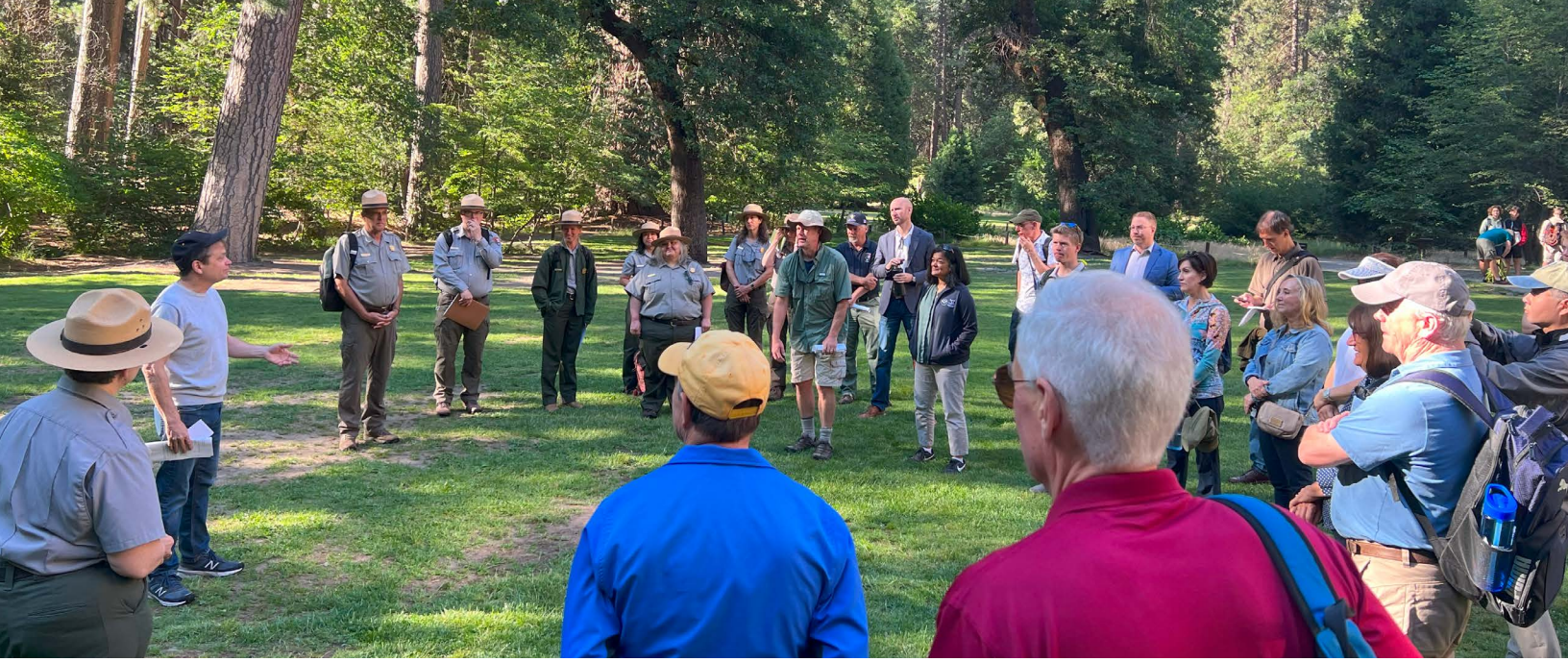
However, up until a few decades ago, wildfire management was driven by a policy of exclusion, with park and forest managers directed to extinguish any and all wildfires instead of allowing them to run their course.

Park and forest managers now use prescribed burns and managed wildfires to restore ecosystems, but by the time these practices began, Yosemite's forests had amassed more than a century's worth of dense overgrowth — excess fuel to burn.

[11] National Park Service, 2024.



Smoke in Yosemite National Park | **Photo:** *Kari Greer, USFS*



SEEC Members of Congress at Yosemite National Park | **Photo:** *SEEC*

In today's climate, that's what they do — burn.

Over the course of many studies, climate scientists have established a causal relationship between the growing incidence and intensity of wildfires with rising global temperatures.[12]

The rise in average global temperatures has resulted in a rise in average temperatures during the spring and summer, and importantly, pushed the onset of spring up on the calendar.

With an earlier spring, winter snowpacks have been melting earlier, causing the dry season, which is usually restricted to the summer months, to start in the latter part of spring.

With a longer dry season, spring vegetation in the Yosemite Valley has more time to dry out, providing abundant fuel for wildfires as large as the Rim Fire in 2013 and Ferguson Fire in 2018, which together burned more than 350,000 acres.

Wildfire smoke and climate-stressed forests.

As the park's fire season continues to lengthen, visitors are more likely to encounter signs of wildfire: smoke and burn scars along roads and hiking trails.

Though such stands of charred trunks used to signify nothing more than one stage of a natural process, the capacity of an ecosystem to move through the subsequent stages of fire succession is compromised by warming and drought.

One study in Yosemite showed climate-stressed stands were more likely to die over the course of wildfire. Climate stress increases fire severity (number of trees burned), where most or all of the trees in a forest stand are killed. These high-severity events are called stand-replacing wildfires.

The Rocky Mountains — on fire.

Rocky Mountain National Park

Yosemite is not the only park that's burning. Throughout the western United States, the area burned by high-severity wildfires (e.g. stand-replacing wildfires) has gone up by about eightfold since 1985. By 2050, the annual area burned could rise by two to six times more (depending on the geographic area, ecosystem, and local climate).[13]

In the past fourteen years, Colorado's Rocky Mountain National Park has experienced more wildfires than it has in the entire rest of its 110-years designated as a park.

[12] Park Stewardship Forum, 2020.
[13] United States Global Change Research Program, 2023.

"Rocky Mountain National Park is truly a national treasure," said Congressman Joe Neguse (CO-02), Ranking Member of the House Subcommittee on Federal Lands, "and an essential part of the fabric of Colorado — serving as one of our nation's most iconic landscapes, and as a pillar of our state's tourism and outdoor recreation economy."

"But with wildfires and other natural disasters growing more frequent and severe in recent years, there are increasing threats to these beautiful lands," Neguse said.

For the wellbeing of our people and our parks, we must act.

— Congressman Joe Neguse (CO-02)

2020 was a watershed year. By the end of the fire season, the total area that had burned in the Rocky Mountain region was nearly twice what had burned every year since 1984.[14]

Cameron Peak and East Troublesome, the two most severe wildfires the region and state had ever seen, were alone responsible for more than 400,000 acres burned. While the bulk of these fires took place outside of the park, nearly 30,000 acres burned within its boundaries — more than 10 percent of the park.[15]

Recent studies have begun to document changes in the high-elevation regions — longer snow-free periods, increases in water lost to evaporation, and regional declines in rainfall during fire season.[16, 17]

As a result, in high-elevation regions previously too damp to burn, the conditions are becoming all the more conducive to wildfire activity, as recent fire seasons in the Rocky Mountains have shown.[18]

"For the wellbeing of our people and our parks," said Rep. Neguse, "we must act."

Wildfires in the southeast.

Shenandoah National Park

This upward shift in the severity and magnitude of wildfires extends beyond the western United States.

In the southeast, where wildfires have historically occurred with less regularity and intensity than out west, rising temperatures and diminishing relative humidity are increasing the frequency of wildfires, the length of the fire season, and the acreage burned by wildfires.[19]

Under even the most optimistic carbon reduction projections, the area in the southeast that is vulnerable to wildfire is expected to more than double by 2070, from 46 million to 96 million acres.[20]

"We cannot afford the costs of ignoring the science and refusing to act," said Congressman Don Beyer (VA-08), a Vice Chair of the Sustainable Energy and Environment Coalition (SEEC).

In Virginia, nearly 20,000 acres went up during the 2024 fire season, the largest area burned in the last 30 years and several times more than the 2,200 acres burned in 2023.[21]

"In the Shenandoah Valley alone, communities that depend on Virginia's irreplaceable natural resources for their homes, health, and jobs," said Rep. Beyer, "are being the worst impacted by this crisis."

Just three wildfires — 211 West, Brushy Run, and Rocky Branch — accounted for more than 13,500 acres of the total acreage burned in 2024, and each of them occurred in Shenandoah National Park.

Though these wildfires might seem minor in comparison to recent fires in the Sierra Nevada and Rocky Mountains, they far exceed the sort of fires Shenandoah's fire management program is built to handle.

[14] Proceedings of the National Academies of the Sciences, 2021.
[15] National Park Service, 2025.
[16] Science, 2006.
[17] Proceedings of the National Academy of the Sciences, 2016 and 2018.
[18] Proceedings of the National Academy of the Sciences, 2021.
[19] North Carolina Institute for Climate Studies, 2020.
[20] Resources for the Future, 2024.
[21] Virginia Mercury, 2024.

We cannot afford the costs of ignoring the science and refusing to act.

— Congressman Don Beyer (VA-08), Vice Chair of the Sustainable Energy and Environment Coalition (SEEC)

"In the parts of the park where we have wildfires," said Jim Schaberl, the former Chief of Natural and Cultural Resources at Shenandoah, "we have started to see stand-replacing fires, which is just something almost unheard of out here."

The first of these occurred in 2016, when the Rocky Mount Fire burned more than 10,300 acres in Shenandoah's southern district, making it the second largest wildfire in the park's 80-year existence.

"I would say the park's staff managed the fire very well," said Jim Northup, who was superintendent of Shenandoah National Park from 2013 to 2017, "but I should say, with that, we didn't manage it alone."

Containing the fire required the combined efforts of Shenandoah's red-card staff (federal employees certified to work on wildfire operations), the Virginia Department of Forestry, neighboring parks, and more than 350 wildland fire-fighters and fire management specialists from more than 30 states — many of them coming from National Park Service regional offices out west.

"There's simply no way we could have done it by ourselves," said Northup.

Eyes on the Rocky Mount Fire

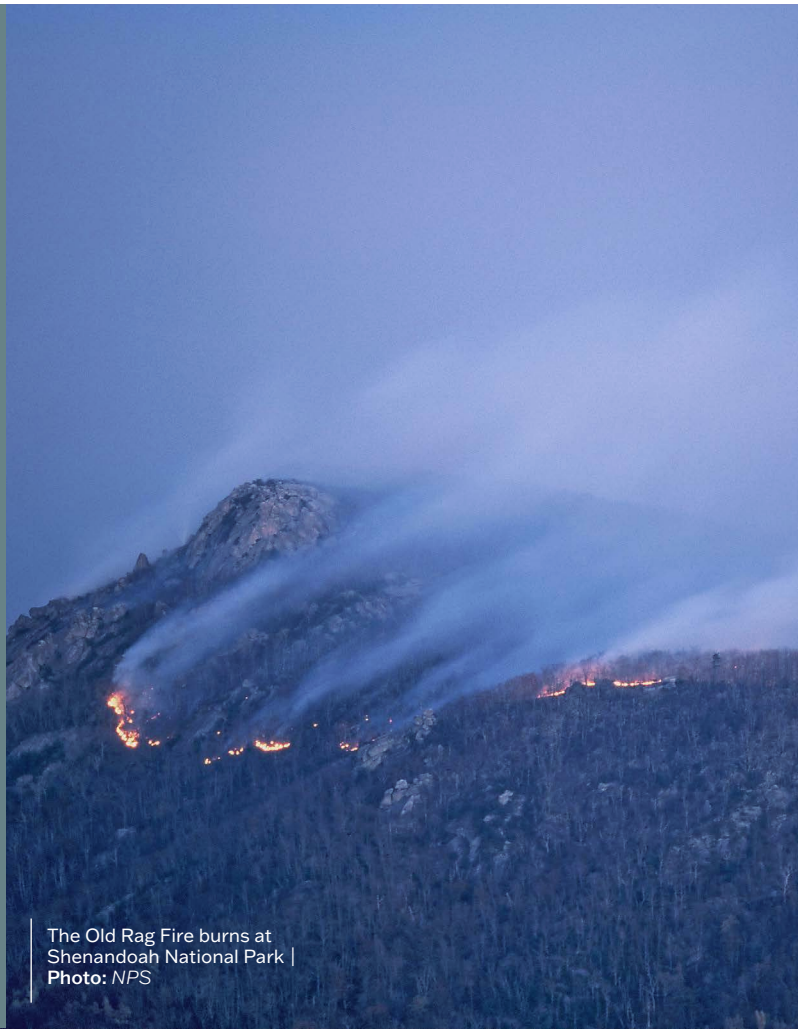
"I was at the park during the Rocky Mount Fire.

"Our fire management officer at the time, he had worked in California most of his life, dealing with those crazy fires out there, and he would always talk about the noise they'd make — like a freight train rolling up a hill.

"We were both standing there, looking out at this fire here in Virginia, and he turned to me and asked me if I could hear it — the freight train.

"He said he had never heard anything close to this in Virginia. Never even thought it was possible."

— James Schaberl, Chief of Natural and Cultural Resources at Shenandoah National Park (2008-2023)



The Old Rag Fire burns at Shenandoah National Park | **Photo:** *NPS*

Rising Sea Levels

Everglades National Park

Now at the very end of Florida's reach, the Everglades comprise a large network of marshes, coastal prairies, pineland, mangrove forests, and estuaries that once covered the entire length and breadth of south Florida.

The boundaries between these ecosystems are subtle and, in some areas, entirely absent — they shift, expand, contract, disappear, or reappear within years or decades.

Everglades National Park is an environment unlike anywhere else on Earth, and its health is dependent upon a very delicate balance of fresh-water and salt-water.

But without dramatic and immediate intervention, this region is one of many coastal areas that will soon be literally underwater.

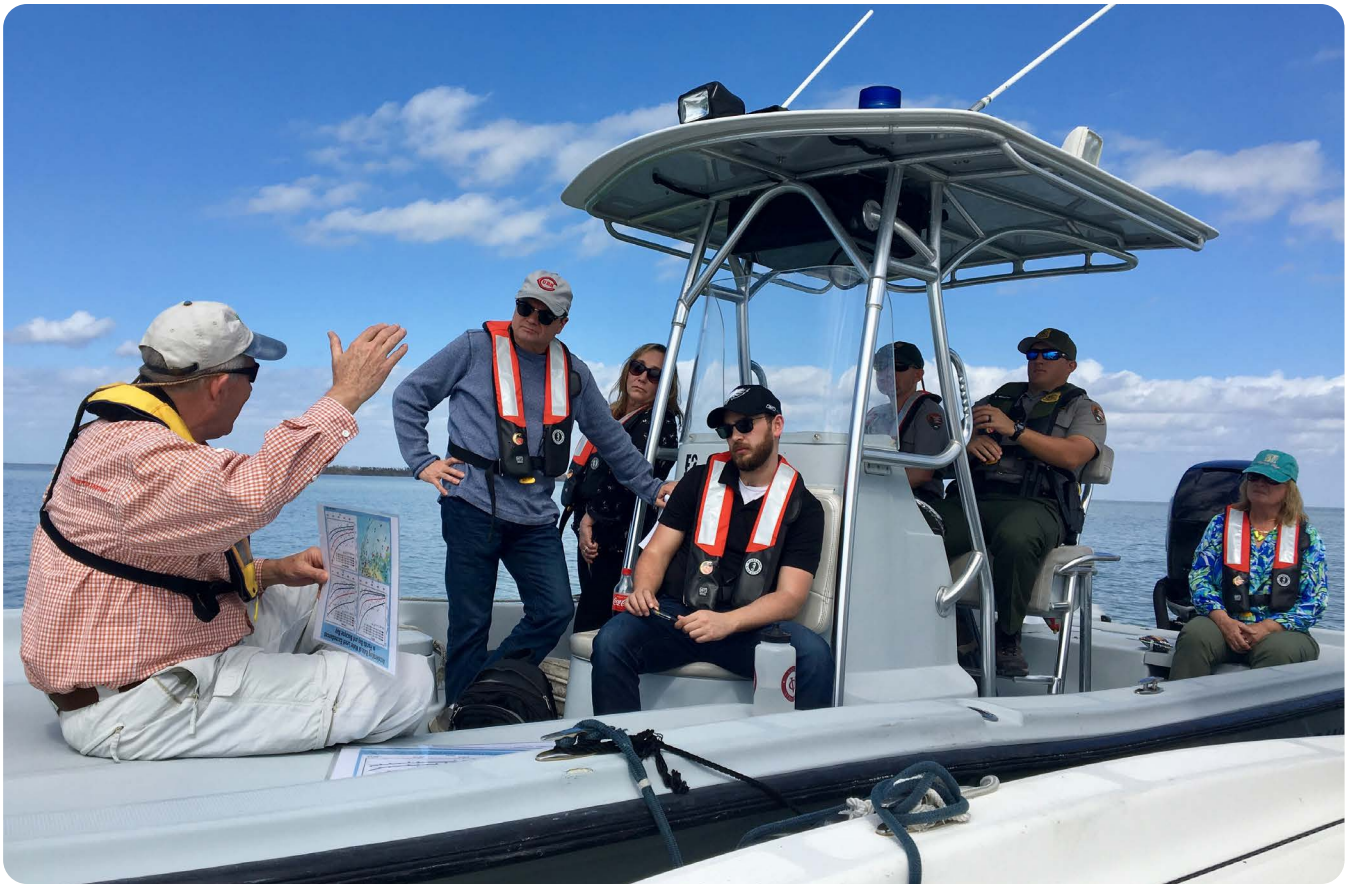
Enter sea level rise.

Without a doubt, warming temperatures are causing sea levels to rise.

Rising sea levels inundate low-lying wetlands and drylands, erode shorelines, contribute to coastal flooding, and increase the flow of saltwater into estuaries and nearby ground aquifers.[22]

Sea levels have already risen an average of 10 to 12 inches over the past century, and over the last two decades, the average rate of sea level rise has picked up as temperatures continue to warm.[23]

With warming showing no signs of slowing down, the pace is expected to increase further. Scientists now widely expect sea levels to rise another 10 to 12 inches within



SEEC Members of Congress at Everglades National Park | **Photo:** *SEEC*

[22] Environmental Protection Agency, 2024.
[23] Environmental Protection Agency, 2025.

the next two decades, a century's worth of change in just a fifth of the time.

While sea level rise is a global problem, South Florida and, in particular, the Everglades are especially vulnerable to sea level rise due to the region's low elevation (no more than a few feet above sea level), flat topography, and shallow water table.

On top of this, the Everglades already experiences a shortage of freshwater.

A decades-long effort by the Army Corp of Engineers to rework water flows in the Everglades to provide flood control, establish a consistent water supply for municipal, industrial, and agricultural uses, and facilitate the growth of the Miami-Dade area has reduced the amount of freshwater that naturally flows south, exacerbating the imbalance and damaging sensitive ecosystems.[24]

Visible impact to the Everglades.

Geologists have been among the first scientists to sound the alarm, pointing to sea level rise in the sedimentary record.

Sea levels around the Everglades have been rising by a third of an inch a year, nearly twice the global average and close to the threshold beyond which geologists say coastal wetlands cannot exist.[25]

"I have seen firsthand the waters and islands that make the Everglades a truly unique and fragile ecosystem," said Congresswoman Debbie Wasserman Schultz (FL-25), "and unless we continue to act with urgency, saltwater intrusion and rising seas could drown this treasured national park that is one of the most biodiverse places in the United States."

This slow-drip advance of saltwater has already wrought visible changes to the Everglades' landscape, particularly within its sawgrass prairies.

Thick, organic peat soil is the literal bedrock of many wetland ecosystems, including the Everglades, but with the combination of dwindling freshwater and increasing saltwater in the water table, the soil's structure is collapsing. Scientists aren't entirely sure why this is occurring, but they know what follows — the soil's elevation drops, exposing the roots of the sawgrass, which eventually die off in the open air.

Overhead flights continue to reveal stretches of prairie where soil collapse has left a pockmark pattern of bare patches and brackish pools of water where sawgrass once stood.

Sea level creep

"While I was at the Everglades, sure — there was discussion of climate change and all of the implications of that and what that meant, but no one was talking at that point about what had become fairly obvious to all of us by the time I left.

"You see, back then, our chief worry was the nutrient-laden coming down from the agricultural area to the north of the Everglades.

"All of our attention was on not only how to clean that up but also restore the volumes of freshwater flow that historically meant the life of the Everglades as we knew it.

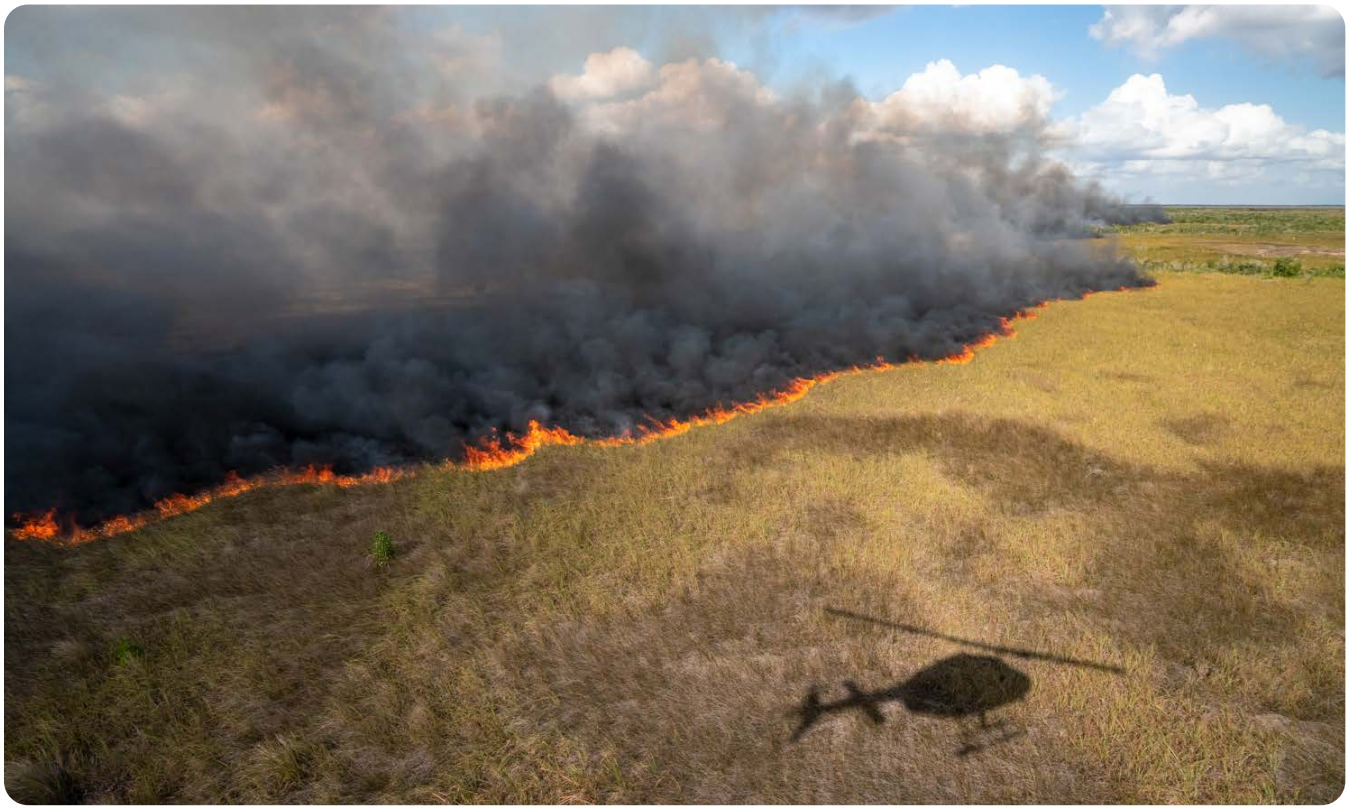
"We were so engaged in what was a vastly expensive and highly political process of trying to clean up and restore those flows that climate change and sea level rise was just this distant drumbeat we were only beginning to hear.

"Then, the science to pin down what exactly climate change would bring was still being formed.

"Now, we understand that, even if we were able to restore the Everglades, the sea level rise that's been predicted would mean there will be no Everglades — unless it's Everglades Bay."

— Richard Ring, Superintendent of the Everglades and Dry Tortugas National Parks (1992-2000)

[24] Science News, 2018.
[25] The Conversation, 2019.



Fire in Everglades National Park | **Photo:** *Ian Wilson, NPS*

While these bare patches and brackish pools serve as the most visible signs of the damage being done by saltwater intrusion, the extent goes beyond the landscape itself.

Peat-filled wetlands represent a vast carbon store, and so degradation of these regions, in turn, releases immense amounts of carbon.

Carbon emissions from degraded wetlands are estimated at 1.9 gigatons of CO2e annually, nearly 5 percent of global anthropogenic carbon emissions — a disproportionate amount considering damaged peatlands cover just 0.3 percent of landmass.[26]

Widespread collapse of the soil throughout the Everglades' wetlands would, in effect, take this important carbon sink and change it into a carbon emitter.

Everglades underwater — literally.

As the soil collapses and the wetlands are inundated with more and more saltwater, the mangrove forests, although more saltwater-tolerant than the park's sawgrass, are expected to be overtaken by 2050.[27]

The death of the Everglades' mangroves will mean a loss of the ecosystem benefits this cornerstone species provides, including, crucially, protecting the coastline from erosion.

If nothing is done to reduce carbon emissions, "the predicted sea level rise would have the Everglades," as Richard Ring, a former Superintendent of Everglades National Park, "disappear as any kind of an onshore land mass."

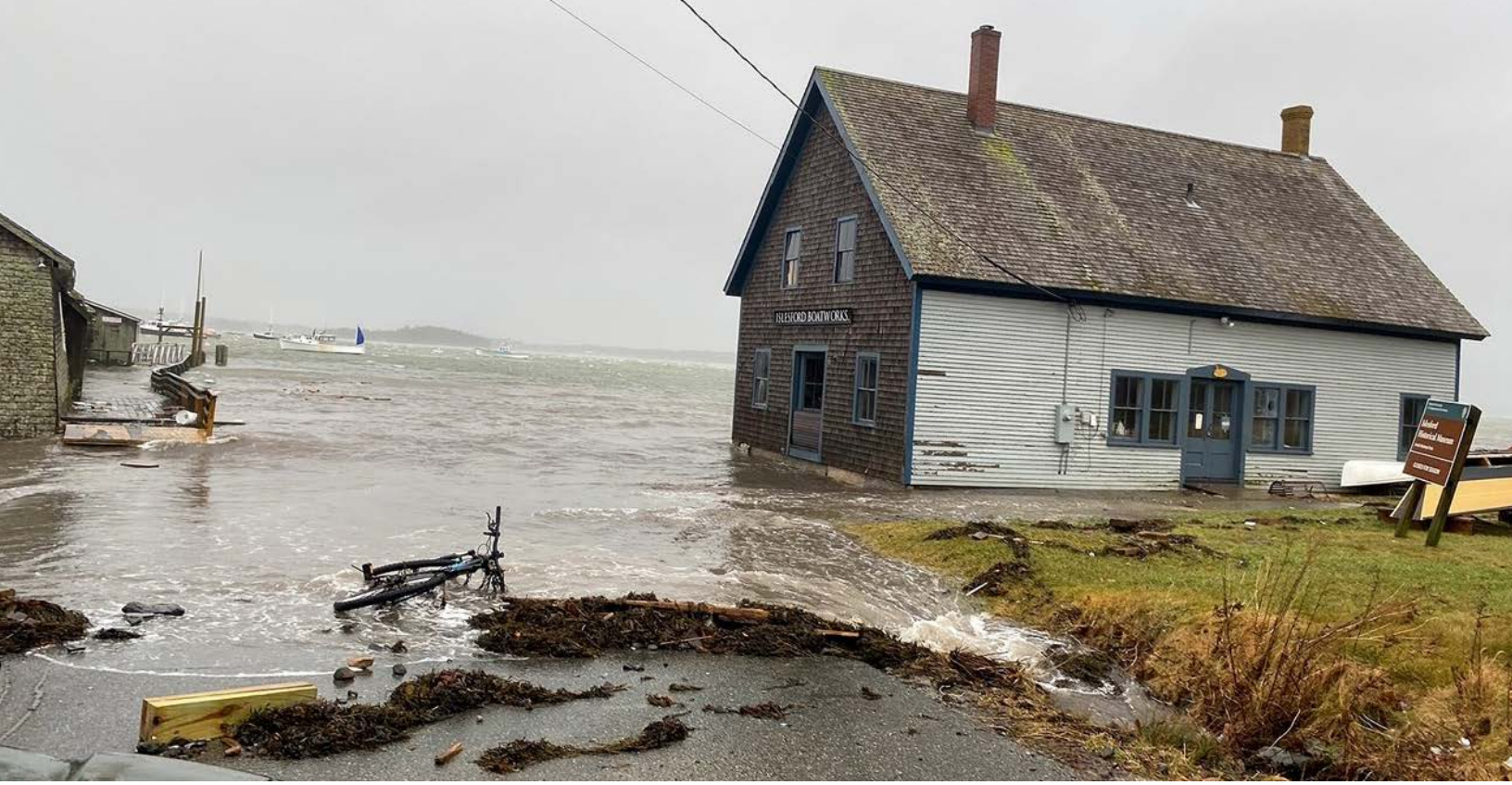
Up the coast, same problems.

Acadia National Park

Moving up along the Atlantic coastline to the rocky headlands of Acadia National Park in the Gulf of Maine, the problem is the same.

"In the years since my Congressional colleagues and I saw firsthand what climate change was doing to Acadia," said Congresswoman Chellie Pingree (ME-01), a Vice Chair of

[26] International Union for Conservation of Nature and Natural Resources, 2017.
[27] National Parks Traveler, 2023.



Storm damage to the Blue Duck Ships Store, Acadia National Park | **Photo:** *Melissa Amuso NPS*

the Sustainable Energy and Environment Coalition (SEEC), "it has only gotten worse."

In the winter of 2024, back-to-back storm systems swept up from the southeast into coastal Maine, bringing with them gale-force winds and a record-setting storm surge that repeatedly flooded seaside areas in Acadia.

At the storm's peak, water levels reached as high as nearly 14.5 feet (174 inches), more than 3.25 feet (39 inches) above the average monthly high tide around Acadia, providing a glimpse into future sea levels.[28]

Like the Everglades, sea level rise in the waters around Acadia are driven by increasingly warm surface temperatures, but in Acadia, the change is much more dramatic. The tide gauge at Bar Harbor shows that local sea level relative to the Gulf of Maine's shoreline has risen by 8 inches since 1950.[29]

Starting in 2004, surface temperatures in the Gulf began warming at a rate faster than almost any other body of water on Earth, and they have yet to slow down. This degree of warming is such that, by 2050, the tides around Acadia are projected to rise by 12 inches. [30, 31]

Acadia's future is much the same as the Everglades'. Flooding is going to reach farther inland. Storm waves are going to reach new heights. Entire sections of the coastline are going to be swallowed whole.

This is happening everywhere.

This story is not unique to the Everglades and Acadia.

Of the more than 25 percent of sites within the National Park System situated on or near the coast, the Park Service has determined 92 percent are going to experience the effects of sea level rise, if they have not already.[32]

On the Pacific side, the National Park Service has identified 24 park sites that are especially vulnerable to climate change, from California, Oregon, and Washington to Hawaii, American Samoa, the Northern Marianas Islands, and Guam.

Along the Atlantic, from Dry Tortugas in Florida to Assateague in Virginia, sea level rise is expected to put many park sites completely underwater.

[28,29] Schoodic Institute, 2024.
[30] National Park Service, 2021.
[31] Schoodic Institute, 2024.
[32] National Park Service, 2023.

Impacts on Recreation and Visitation

Great Smoky Mountains National Park

The Great Smoky Mountains — America's most biologically diverse national park — span the southern Appalachian Mountain range between eastern Tennessee and western North Carolina.

The park is, by a wide margin, the most visited site in the entire National Park System, averaging nearly 12.2 million visits per year over the past decade and contributing 3.4 billion dollars annually to the local economy.

The park is the largest driver of tourism in the region, generating significant economic activity in nearby gateway communities.

"I once asked a Gatlinburg official what he thought would happen if the park disappeared tomorrow," said Phil Francis, former Acting Superintendent of the Great Smoky Mountains National Park, "and he told me with no hesitation, 'We'd disappear along with it.'"

Extreme rainfall, flooding, and landslides.

Climate change, though more subtle in the Smokies than in many other parks, may slow visitation at the nation's most trafficked national park.

Though the park is not showing the sort of annual warming seen in parks like Yosemite and Yellowstone, records going back to 1976 indicate that the Smokies have warmed over the past five decades.[33]

Increasing temperatures cause high water evaporation from the plants and soil, which puts more moisture in the atmosphere, which in turn causes more intense storms and, because of the steep topography in the Smokies, more frequent flash flooding.

In recent years, flooding has affected most of the park's roads and trails, causing closures for extended periods of time.

In 2022, the Greenbrier area of the park in Tennessee was temporarily closed after the area received almost nine inches of rainfall within just a few hours and consequent flooding washed out multiple roads and trails. The area remained closed for almost a year.[34]

> **I once asked a Gatlinburg official what he thought would happen if the park disappeared tomorrow and he told me with no hesitation, 'We'd disappear along with it.'**
>
> — Phil Francis, former Acting Superintendent of the Great Smoky Mountains National Park

In addition to flooding, heavy rainfall events have caused landslides in the park.

One such event in 2020 resulted in an overnight landslide along the Spur, a part of the Foothills Parkway in the Smokies, connecting travelers from Pigeon Forge to Gatlinburg. The Spur was briefly shut down, with traffic detoured until the National Park Service could remove the roughly 500 cubic yards of debris spread out over both lanes in a pile 100 feet long and 70 feet high.[35]

[33] National Park Service, 2025.
[34] National Park Service, 2022.
[35] National Park Service, 2020.

Representatives Maxine Dexter (OR-03), Jared Huffman (CA-02), Sean Casten (IL-06) and Mike Quigley (IL-05) at Great Smoky Mountains National Park | **Photo:** *SEEC*

The frequency and intensity of such heavy rainfall events, which are already occurring with more regularity, are expected to increase further as temperatures continue to rise.[36]

Dying forests.

Rising temperatures are pushing the existence of the park's iconic high-elevation spruce-fir forests to the brink. The spruce-fir forests are only just starting to recover from near-extinction because of logging, acid rain, and the introduction of the balsam woolly adelgid — an invasive insect

Forests of red spruce and Fraser firs once covered Appalachia from Pennsylvania to Georgia, but by 1995, southern Appalachian spruce-fir forests had declined by more than 98 percent.[37]

The forests were considered America's second-most endangered ecosystem at the time.

Of the seven known surviving spruce-fir stands, the largest is located with the Smokies. Despite improvement over time, an inventory survey published by the National Park Service in 2023 shows that it remains in poor condition.[38]

As the region warms, high-elevation spruce-fir forests are expected to run out of habitat.

Unable to survive at lower elevations because of temperature and other climatic conditions, the spruce-fir forests now inhabit the tallest peaks in the southern Appalachians. There is nowhere higher in elevation for them to persist as temperatures increase.

If warming continues at its present rate, the number of spruce-fir in the Smokies is expected to dwindle further as they are pushed into an ever-smaller space.

Not the smoke they were named for.

Climate change puts into question the park's largest draw — the view.

More heat, more rainfall, and more reliance on fossil

[36] National Centers for Environmental Information, 2022.
[37] National Biological Service, 1995.
[38] National Park Service, 2023.

fuels means the Smokies, which have been dealing with a decades-long air quality problem, could backslide on recent progress to clear the air.

Nearly every national park suffers from some degree of air pollution, but the Smokies experience some of the highest measured air pollution of any park in the entire National Park System.

The use of fossil fuels — coal, oil, and natural gas — causes most of the pollution.

Pollutants from urban areas and industrial sites both near and far are swept toward the park by predominant weather patterns. Because of their height, the Smokies have the propensity to trap and distill those pollutants into a dense curtain of fine particulate matter, nitrogen oxides, and volatile organic compounds.[39]

This is far from the clouds of blue mist, or "smoke," the park was named for.

At its worst, pollutant levels in the park's air were high enough to exceed human health standards on most summer days — and obscure the views visitors come to the park for.

This not only harmed the health of visitors to the park but the health of the park itself. [40]

- *Sensitive flora in the park (like black cherry trees, cutleaf coneflowers, and milkweed) have shown signs of damage from ground-level ozone.*
- *Nitrogen and sulfur pollution have made their way into the soil and streams, diminishing water quality and harming aquatic species (like brook trout).*
- *Park managers are fairly sure the neurotoxin mercury, released from the burning of fossil fuels, has also made it into the park's streams and rivers, though the extent to which it may have traveled up the food chain is unclear.*

Visitors to the Smokies expect clean, clear air, and thanks to a dedicated effort by the National Park Service, that is what they have seen in recent years.

However, the rollback of air pollution regulations around the burning of fossil fuels alongside increasingly favorable conditions in the Smokies for smog as a result of climate change are set to reverse the progress made in the park.

The bottom line.

Without a dramatic effort to reduce carbon emissions, the Great Smoky Mountains National Park — America's most visited national park — is likely to lose what so many visitors are drawn to: scenic drives and trails, diverse flora and fauna, and iconic views.

But the Smokies are not alone here.

Beaches, sand dunes, and erosion.

Indiana Dunes National Park

Indiana Dunes follows closely behind the Smokies insofar as biodiversity is concerned.

One of the most flora-rich parks in the National Park System, the Indiana Dunes is perhaps the only place on the North American continent where one can find desert and arctic floral species growing side by side.

But the park is best known for its beaches, with 15 miles of Lake Michigan shoreline, where each year more than 1.8 million visitors come to sunbathe, swim, and climb atop its namesake dunes.

Over the past two decades, the park has become one of the largest drivers of tourism in Indiana (not to mention Illinois and Michigan), and yet here, as in the Smokies, climate change is already preventing visitors from enjoying what the park has to offer.

Like in the Smokies (and in most of the United States), rainfall events in the Indiana Dunes are less frequent, but heavier. The result is increasingly intense flooding and a dramatic increase in lake level — more than 6.5 feet since 2014 and rising.[41]

As the lake's water level increases, the park's beaches and dunes are more and more vulnerable to erosion.

[39] National Park Service, 2024.
[40] National Resources Defense Council, 2023.
[41] National Park Service, 2023.

Crescent Dune Beach, one stretch of coastline within the park, is among the most erosive beaches in the world. On its eastern end, Mount Baldy, one of tallest sand dunes on the southern shore of Lake Michigan, has been steadily retreating southward, increasing the possibility of inundation of the park's interior.[42]

At the Portage Lakefront, where most visitors access the park's beachfront and dunes, severe erosion has eaten away at the shoreline, submerged paths, and demolished overlooks popular with visitors. Record storm surges have damaged some of the park's dunes, causing them to breach.

But it is not just the rise and fall of water that is eroding the dunes. Warming temperatures mean less ice in the winter months.

Usually, when the temperatures drop, an unstable mass of "shelf ice" builds from the beach out onto the surface of the lake.[43]

That ice blunts the erosive tendencies of waves through the winter months.

Without it, however, there is nothing to protect the park's dunes from the intense winter storms the region is known for.

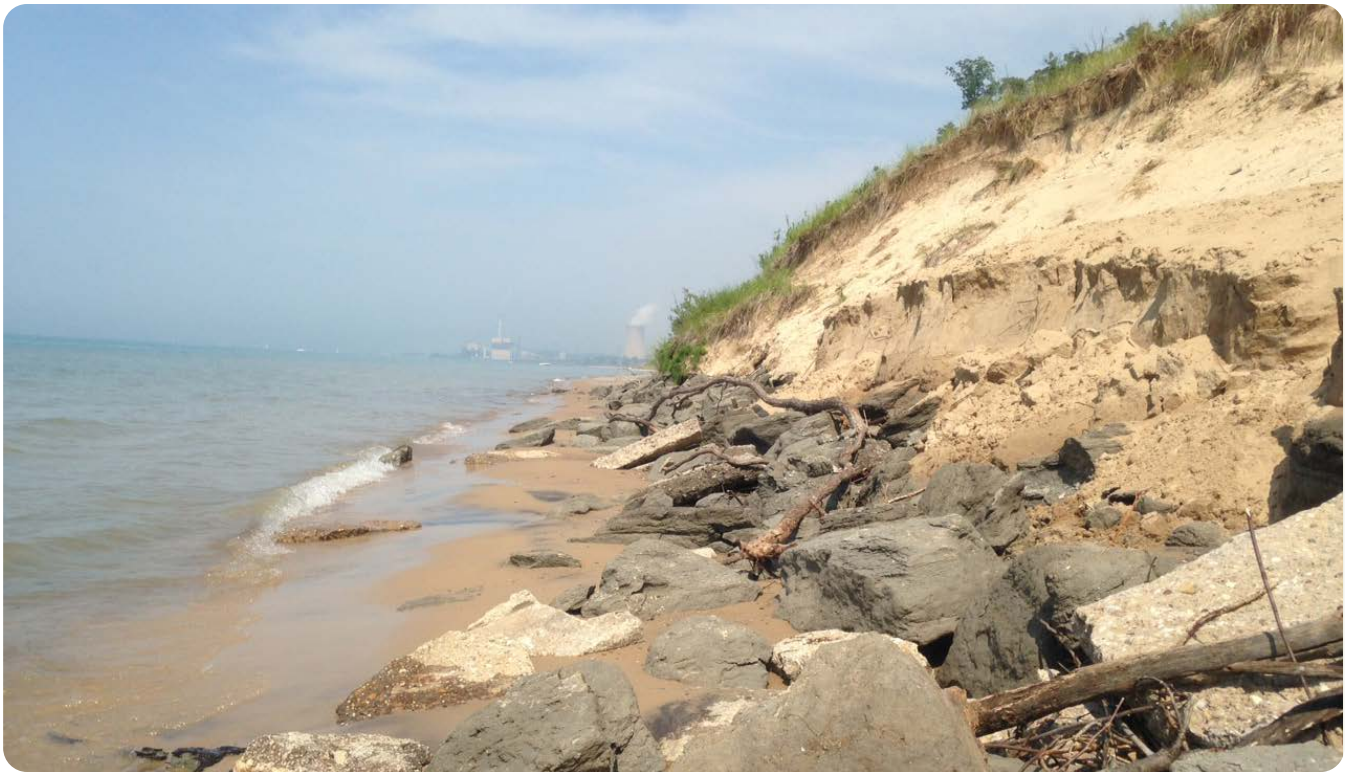
A problem everywhere.

Other national parks are seeing the same degree of flooding as the Smokies. In Olympic National Park in Washington, forest roads situated near streams and rivers in the park are regularly being washed out.

In Yellowstone National Park , which is mostly in Wyoming unprecedented amounts of rainfall has resulted in substantial flooding, rockslides, and mudslides, causing severe damage to access roads, water and wastewater systems, power lines, and other critical park infrastructure.

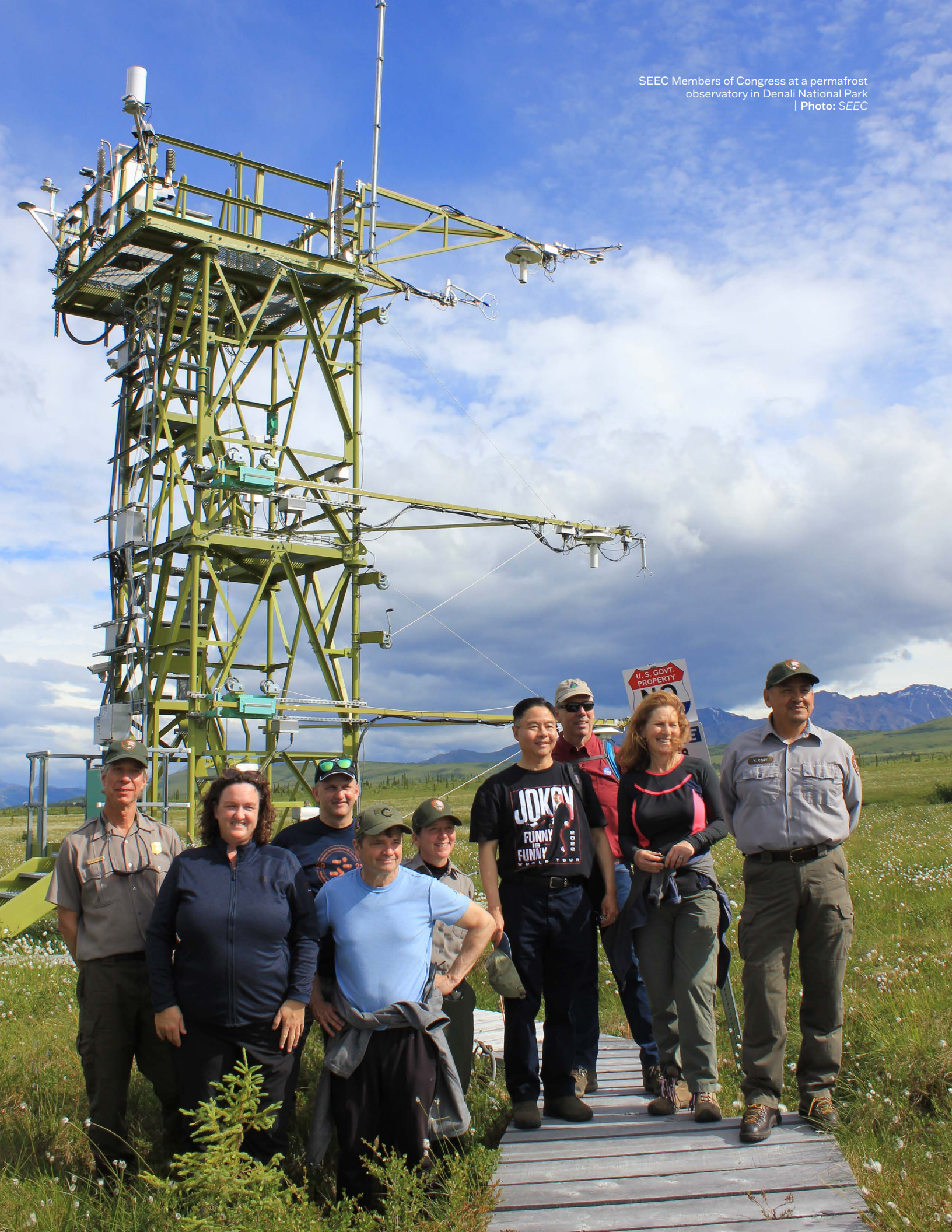
Many parks, like the Smokies with its blue mist and Indiana Dunes with its singing sand dunes, are losing the very physical aspects they were named for.

At Glacier National Park in Montana, the glaciers are melting, at Saguaro National Park in Arizona, the saguaros are dying, and at Sequoia National Park in California, the sequoias are burning.

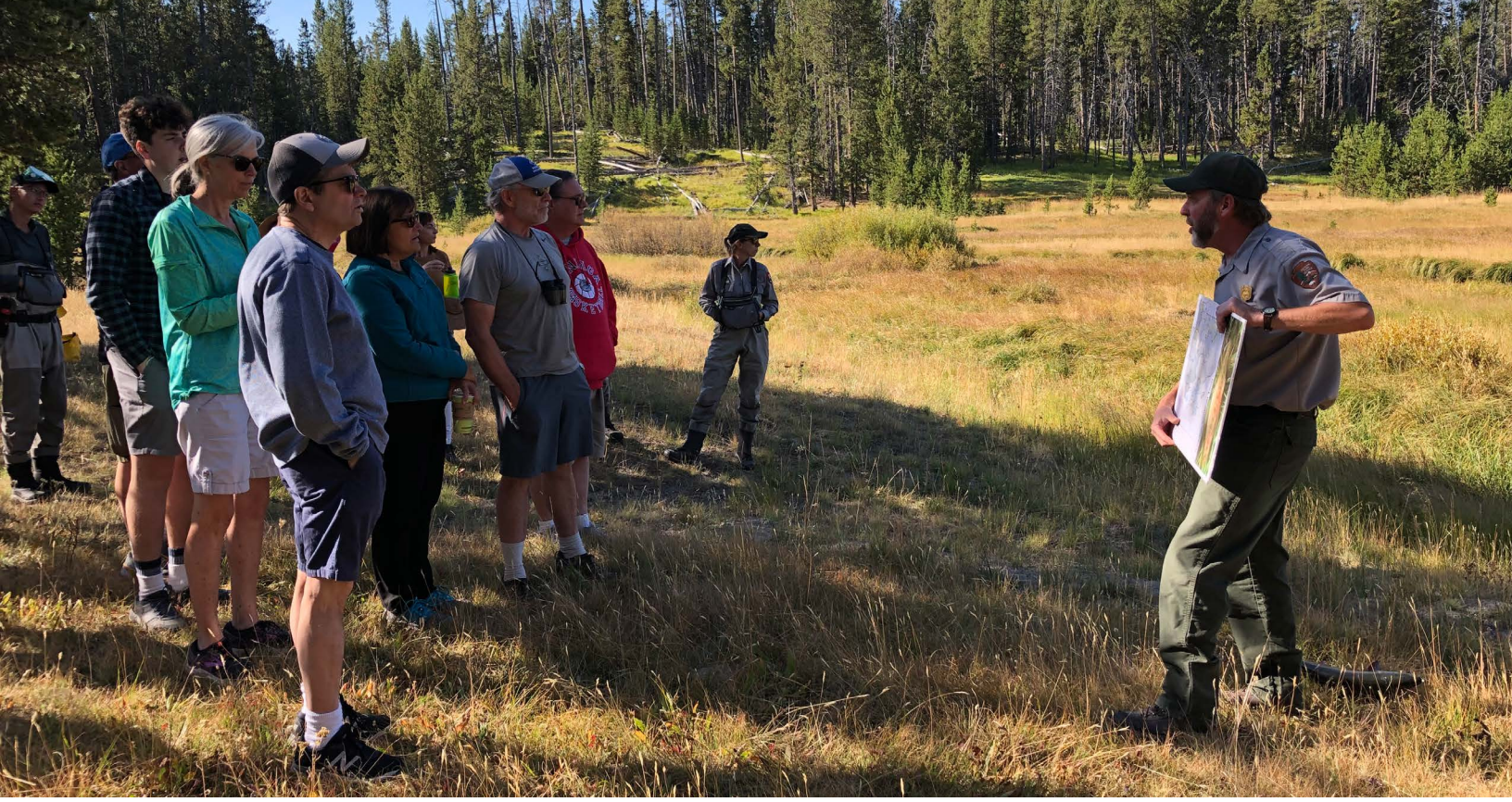


Central Beach erosion at Indiana Dunes National Park | **Photo:** *NPS*

[42] Purdue University, 2024.
[43] National Park Service, 2024.



SEEC Members of Congress at a permafrost observatory in Denali National Park | **Photo:** *SEEC*



SEEC Members of Congress at Yellowstone National Park | **Photo:** *SEEC*

Solutions

Reduce carbon pollution, save our parks — it's that simple.

The ecological integrity of almost every unit of the National Park System has been in some way eroded by human-caused climate change. Though further degradation is expected in the coming decades, the exact degree depends on how much we do in the near-future to address the principal cause of climate change: carbon pollution.

To date, climate change has increased global average surface temperature more than 1.9 degrees F above pre-industrial levels. Global warming must be limited to 2.7 to 3.6 degrees F above pre-industrial levels if we are to avoid the worst possible effects of climate change, and yet, considering current emission rates, global temperatures could easily slip above 2.7 degrees F by 2032 and 3.6 degrees F by 2050.[44]

"The essential solution to protecting our national parks," said Patrick Gonzalez, the former Principal Climate Change Scientist for the Park Service, "is cutting the carbon pollution from cars, power plants, deforestation, and other human sources that causes climate change."

This is, without a doubt, a formidable problem, but as recent results have shown, progress on carbon pollution is very possible.

In 2019, as a result of targeted public investments in the renewable energy sector, capacity in the United States for renewables exceeded that of coal for the time ever.[45]

The energy transition played a large part in bringing our carbon footprint down 14.4 percent from 2007 levels in 2019, and down 20.6 percent in 2024.[46] The National Park Service should also electrify its transportation fleets and facilities to reduce pollution and build more resilient infrastructure to better prepare parks for the future floods, fires, droughts, and storms.

Even so, there is more work to be done — in 2024, the global average surface concentration of carbon increased by 3.7 parts per million, the single largest increase on record.[47]

"Every gram of carbon," as Gonzalez reminds us, "pushes us closer to the limit."

[44] Intergovernmental Panel on Climate Change, 2021.
[45] United States Energy Information Administration, 2022.
[46] United States Environmental Protection Agency, 2025.
[47] Politico, 2025.

Investing in sound science.

Though "climate change might be caused by humans," as Leigh Welling, the first director of the National Park Service's Climate Change Response Program, says, "it's larger than our capacity to control."

While reducing carbon pollution must be foremost in any effort to preserve the parks, the National Park Service must at the same time manage them as adaptable spaces within limits shaped by future conditions.

"We're going to have to work with the changes we're already seeing," as Welling says, "along with those that are already on the way."

But this could be a challenge. As Phil Francis, the Chair of the Coalition to Protect America's National Parks, says, "parks have been made to do more with less for decades now."

Increased staff shortages and inadequate funding are putting our parks in jeopardy.

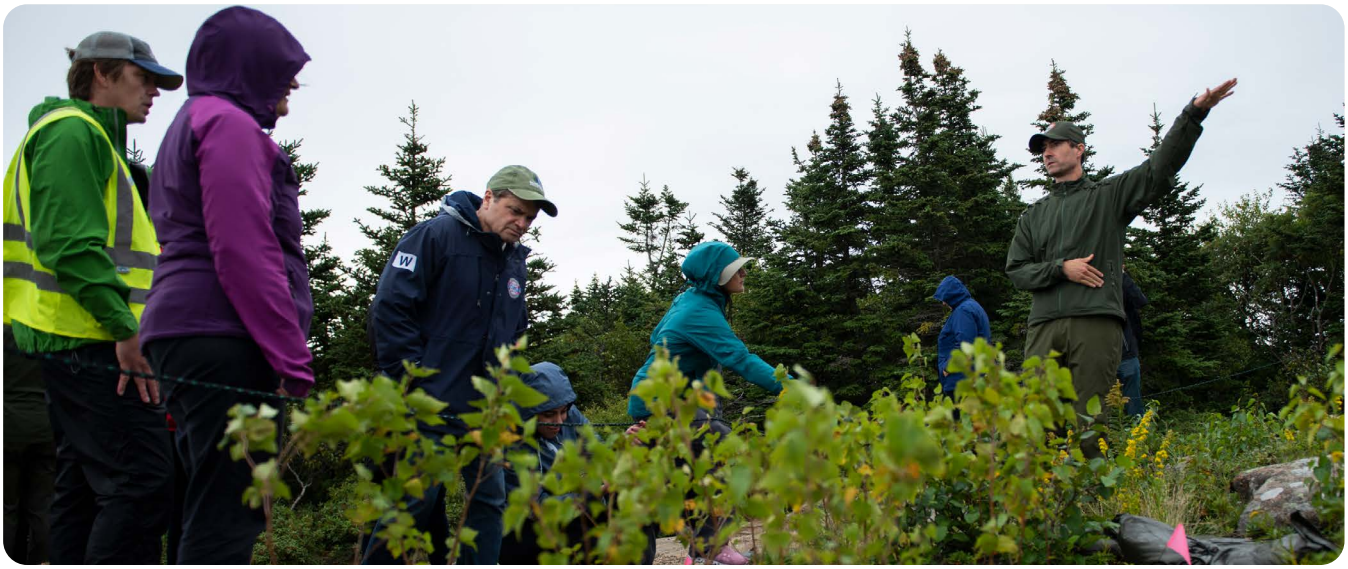
The fact of the matter is, as Michael Soukup, the former Chief Scientist of the National Park Service, has said, "there isn't anyone doing the work to mitigate climate change in national parks if it's not the National Park Service."

"National parks are limited in terms of who has the expertise and time and funding to do much other than visitor services, which, sure, are the backbone of public popularity," Soukoup continued, "but that popularity is based on, I think, the long-term health of the parks themselves."

Visitor services, though important, represent only a small part of the work the National Park Service is responsible for. Within most park sites and every regional office, there are subject matter experts at work conducting the research and data-monitoring necessary to allow park managers to make informed decisions in response to the changing climate. Scientists monitor water and air quality, track wildlife populations, and conduct other ecosystem studies. Data helps inform decisions about wildfire risks, prevent coastlines from eroding, keep waterways clean, and protects wildlife.

In addition, resource divisions under the Natural Resource Stewardship and Science Directorate, and the Cultural Resources Stewardship, Partnerships, and Science Directorate provide critical services and support to help the NPS fulfill its core mission: the protection of park resources and values.

Conservation relies on sound science. But sound science, and the work necessary to put it into practice, requires adequate funding and staffing. If the National Park Service is to fulfill its mission and ensure that our national parks remain "unimpaired for the enjoyment of future generations," even in the face of a changing climate, funding shortfalls must be made a thing of the past.



SEEC Members of Congress at Acadia National Park | **Photo:** *SEEC*

Maintain federal land designations.

When Congress established the National Park Service through the passage of the Organic Act in 1916, it gave the agency very specific directions: "Conserve the scenery and the natural and historic objects and the wildlife therein and to provide for their enjoyment in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

"That language is something that most of the public isn't very familiar with," said Jim Northup, the former Superintendent of Shenandoah National Park.

This is because the public usually only ever sees the National Park System's surface — the parks themselves.

It is largely by design, but the public is typically unaware of the infrastructure that has been put in place to ensure the system remains "unimpaired for the enjoyment of future generations."

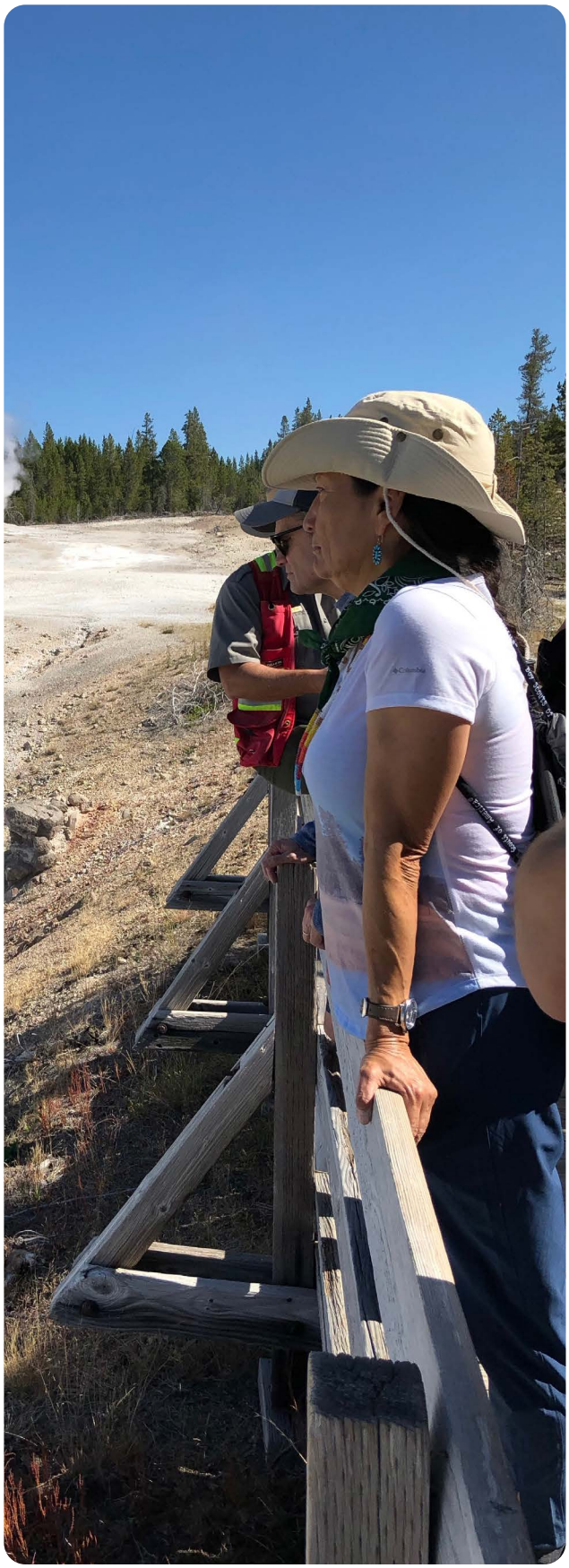
As James Schaberl, the former Chief of Natural and Cultural Resources at Shenandoah, said, "We're supposed to be thinking, you know, ecologically forever."

But "you can't leave that up to each individual park to address and think about and actually mitigate," Soukup continued.

As a part of the National Park System, each park site has a direct line to "regional and central offices staffed with the sort of subject matter experts and specialists," Soukoup said, "who can think about these things at a regional and national level."

If units of the National Park System — such as national seashores, national recreation areas, national battlefields, national historical parks, or national monuments — are unilaterally removed from the National Park System, they are no longer able to benefit from the resources and dedicated efforts of the only federal agency required by its authorizing legislation to be thinking in terms of "ecologically forever."

The integrity of the National Park System, and the legislative tools used to maintain it, must be protected.



Congressman Mike Quigley (IL-05) and former Congresswoman Deb Haaland at Yellowston National Park | **Photo:** *SEEC*

Conclusion

As it stands, most of the units in the National Park System — from the iconic Grand Canyon National Park to Katahdin Woods and Waters National Monument and hundreds of other sites across the country — are seeing ecological decline, year over year.

It is happening slowly in some places and alarmingly fast in others, but as temperatures keep going up and precipitation continues to become more intense and unpredictable, America's "best idea" is being eroded away.

"Our national parks welcome millions of visitors every year, including myself," said Congressman Jared Huffman (CA-02), the Ranking Member of the House Committee on Natural Resources, "and through my visits, one thing has become clear: we urgently need to take big steps to preserve the ecological integrity of our public lands to keep up with worsening impacts of climate change and growing numbers of parks visitors."

We can accomplish this goal by pursuing science-based policies, reducing carbon emissions, and continuing to meet the moment.

— Congressman Jared Huffman (CA-02)

Our national parks are adapting to the current impacts and changes, but further changes are not inevitable.

Continued climate change does not have to be a certainty.

Let's work together to build a future where members of Congress will go and hear from Park Service employees about the progress being made instead of the damage being done.

"We can accomplish this goal," said Rep. Huffman, "by pursuing science-based policies, reducing carbon emissions, and continuing to meet the moment."

A rapidly evolving problem

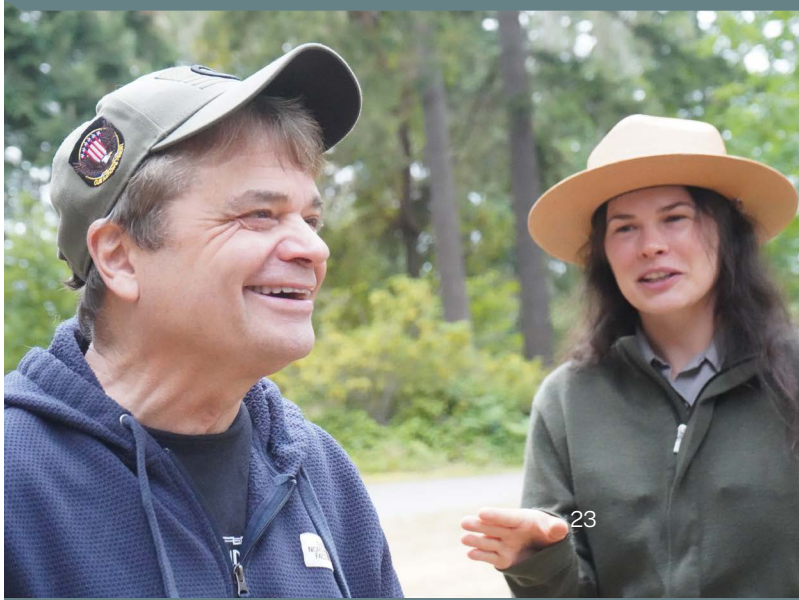
"Our first national park trip was to the Rockies, and even then, the National Park Service made it clear that they were already bearing the brunt of man-made climate change — an earlier fire season, above-average temperatures, and below-average precipitation. That visit was only eight years ago but those eight years have made a difference. In that time, two wildfires destroyed more than a tenth of the entire park.

With the temperatures going up and rainfall going down, we knew it was only a matter of time before something like this happened — the Park Service warned us. What's worse — those two wildfires are just the beginning. As long as we continue walking on this path and refusing to truly tackle climate change, wildfires will go from the exception to the expectation.

It's not just the Rockies. It's everywhere.

If we don't act, generations of Americans after us will be left wondering why we failed them and why we failed to protect our national treasures from climate change."

—Congressman Mike Quigley (IL-05), Co-Chair of the Sustainable Energy and Environment Coalition (SEEC)



SEEC Institute

THE COALITION TO PROTECT AMERICA'S NATIONAL PARKS
VOICES OF EXPERIENCE

The **Sustainable Energy and Environment Coalition Institute**, or SEEC Institute, convenes the private sector, Congress, leading climate and environmental advocates, and other experts to facilitate more formal and regular connections between interested parties and stakeholders to secure the biggest climate and clean energy solutions possible.

Visit SEECinstitute.org for more information.

The **Coalition to Protect America's National Parks** educates, speaks, and advocates for the preservation and protection of the parks, places, and programs of the National Park Service. The Coalition is made up of over 4,500 members, all of whom are current, former, or retired employees and volunteers of the National Park Service.

Visit protectNPS.org for more information.