

SAFEGUARDING SUMMER

FROM CLIMATE THREATS TO ICONIC SUMMER EXPERIENCES



AUGUST 2018

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INTRODUCTION



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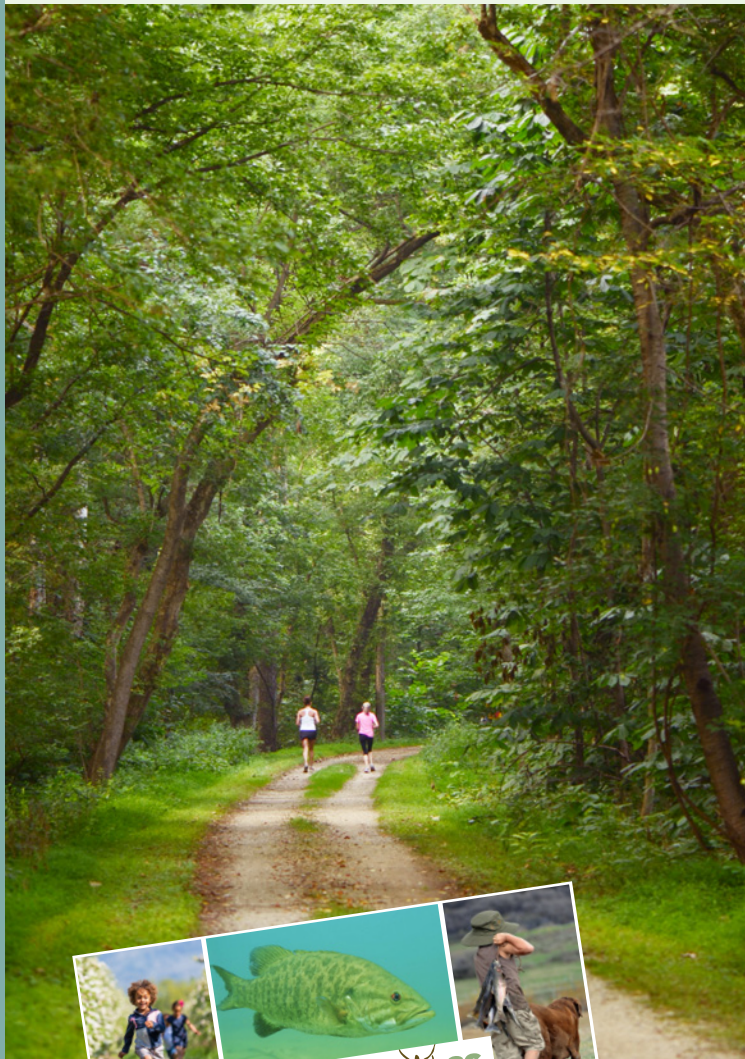
“Summers had a logic all their own and they always brought something out in me. Summer was supposed to be about freedom and youth and no school and possibilities and adventure and exploration. Summer was a book of hope. That’s why I loved and hated summers. Because they made me want to believe.” –Benjamin Alire Sáenz, Texan and author of popular children’s books

Summer in the United States is, for most of us, a distinct, time-bound season especially suited for enjoying time outdoors, swimming, fishing, hiking, cooking, boating, and spending hours with friends and family. We go to parks and baseball and softball games, let our children walk barefoot in the grass or on beaches, make lemonade, tend gardens and grills, and look for ways to cool off, either in a pool, sprinkler or in a lake, pond, bay, or ocean. And when we go outside, we remember what the experts have said and try not to forget the sunscreen and bug spray, and we bring along clean drinking water.

But what happens when, as a result of human-caused climate change, we load the dice and disrupt the rhythms of summer that we grew up experiencing? What happens when sea levels rise and changing ocean currents scrub away our favorite beaches? When forest

fires are supercharged by drought? When toxic algal outbreaks foul waterfronts, threaten drinking water, disrupt charter fishing, and pose fatal risks to our pets? When more ticks, mosquitoes, noxious weeds, and even allergens get a leg up and more frequently and intensely disrupt public health? When baseball games are increasingly rained out in the spring and unbearably hot in the middle of July? How do more ticks hurt iconic species like moose? When are people with low or fixed incomes forced to make tradeoffs to escape an increasing number of days of extreme heat?

Our summertime experiences are being impacted now by climate change, and if we don’t make the public policy and personal decisions that scientists have long advocated, wildlife, critical habitat, and many human activities will face even greater disruptions in the near and distant future.



Ticked Off, a 2014 report produced by NWF highlighting the effects of climate change on our outdoor experiences and what needs to be done to combat it.

*Photo above: The towpath in the Chesapeake & Ohio National Historical Park is a popular recreational trail.
Photo: Doug Inkley*

In this follow-up to our 2014 report, *Ticked Off*, we chronicle emerging science and present recent developments across the country that can help you connect the dots—and spur advocacy for the local, state and federal public policy needed to combat the drivers of climate change. We also present steps that you can take to reduce the emissions that spur climate change as well as help our communities, wildlife, and habitat adapt to some changes that have already occurred or are, at this point, simply unavoidable.

Now is the time to engage with this science, with these stories, and with decision-makers in business, education and in local, state, and federal government. Although the rate of change can make discussing climate change difficult, by connecting popular and time-honored outdoor summertime experiences with science, we think you will be motivated to join us in taking action to preserve the “great American summer” for our children and future generations.

WHAT'S AT STAKE

IMPACTS TO OUTDOOR RECREATION

Nearly half of the people in the U.S. spend time engaged in outdoor recreation including canoeing, fishing, hiking, camping, hunting, kayaking, swimming, bird and wildlife watching, and more.¹ Today, this outdoor economy is worth \$887 billion in the U.S. economy and supports 7.6 million jobs.² But a changing climate is negatively impacting these recreational activities because of rising temperatures, more frequent extreme weather events, and increases in the number of pests like ticks.

In 2016, over 103 million U.S. residents 16 years and older participated in wildlife-related recreation. This love of the outdoors is an important pastime for many Americans. Over 35.8 million people fished, 11.5 million hunted, and 86.0 million participated in at least one type of wildlife-watching activity.³

EXCESSIVE HEAT AND ENERGY POVERTY

Summer days and nights are turning deadly, as the number of consecutive days above 90 degrees Fahrenheit increasingly occur, especially across cities in the northern United States. According to the National Weather Service, excessive heat causes more U.S. deaths than any other natural disasters.⁴ The well-documented “urban heat island” effect—where over a period of days or weeks excessive daytime heat is retained by asphalt and buildings—is leading to more nights where overnight temperatures in some urban areas stay above 80 degrees Fahrenheit. In some cities, that warmer air is increasingly very humid, as warmer

air is able to retain more moisture. With increases in humidity, human’s natural defense to overheating—perspiration—is much less effective. In regions across North America where air conditioning wasn’t needed in the past, vulnerable citizens are disproportionately impacted by summer time heat.

Paying for air conditioning to cope with excessive heat costs poor and fixed-income Americans a much greater share of their monthly household income, forcing many to make difficult choices that may result in eviction and homelessness, hunger, forgoing healthcare, or enduring dangerous summer heat, a substantial risk to the elderly, infants, and those who already have serious health conditions.

U.S. cities with highest percentage of low and fixed income people paying high energy bills

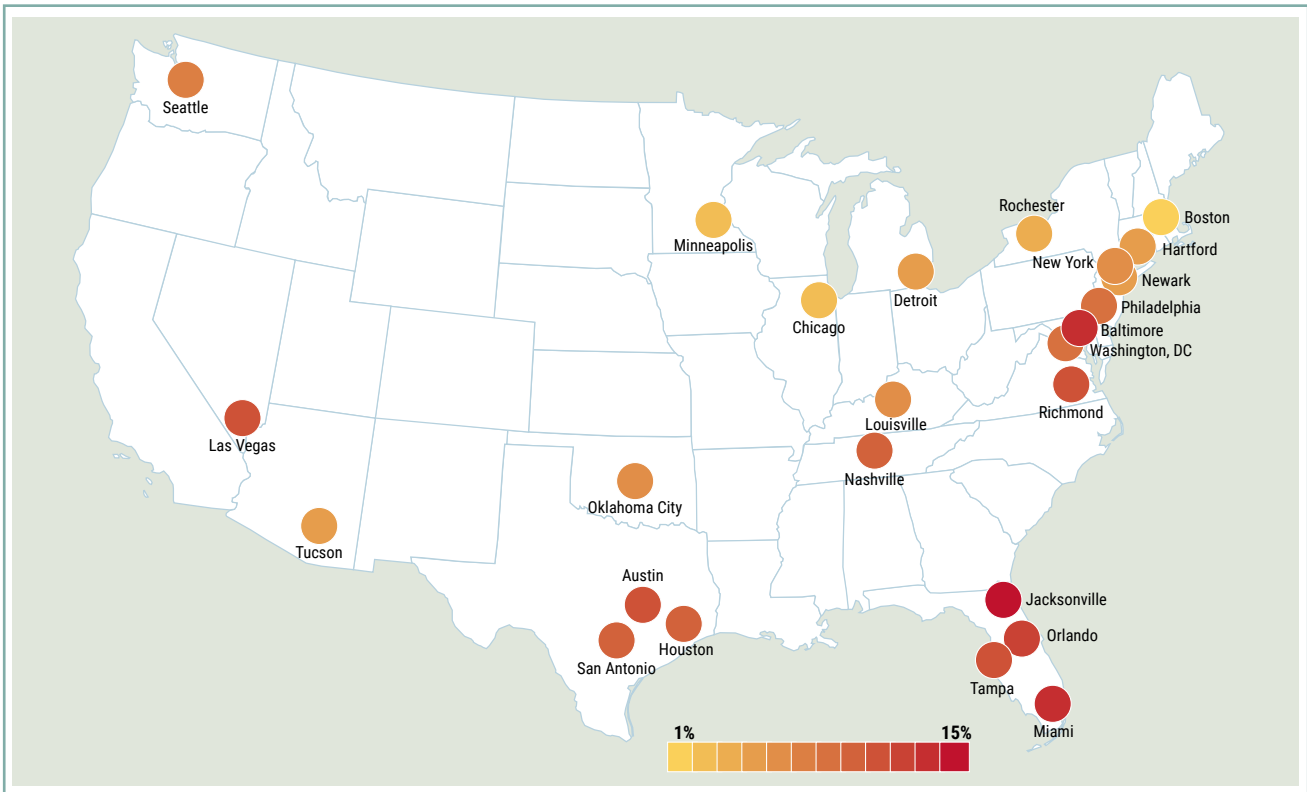


Figure 1: While the median electricity bill in the United States in 2013 was approximately \$114 a month, a large number of low income families pay more than \$200 a month on electricity. This is a serious burden for these households considering that a family of four living in poverty earns \$24,250 a year. There are five cities where over 10 percent of those living in poverty pay in excess of \$200 a month on their power bills: Jacksonville, Baltimore, Miami, Orlando, and Austin. Source: Groundswell Institute⁵



TICKS



NWF Photo Contest. Photo: Sandra Fijfield

In the spring of 2018, the U.S. Centers for Disease Control and Prevention (CDC) issued a warning that the risks from tick-borne diseases would increase as a result of warming winters across the United States. Lyme disease, spread by ticks, is being called the “first epidemic of climate change” in a new book by Mary Beth Pfeiffer.⁶ Lyme disease is now the most common vector-borne disease in the United States, making it a big problem for outdoor lovers.

The CDC estimates that about 300,000 Americans get Lyme disease each year, even though only about 35,000 diagnoses are reported.⁷ As the climate warms, ticks are both expanding their range and overwintering in greater numbers. According to the European Commission and others, climate change is enabling mosquitoes to expand the reach of human diseases such as dengue, chikungunya, Zika, West Nile, and yellow fever.⁸

Ticks, which are not insects but arachnids (like spiders), are pests that Americans are struggling to avoid. The ways in which temperature, humidity, and precipitation are affecting the spread of tick-borne illnesses is

complex, and scientists are continuing to learn more, but some general trends can be gleaned:

- The geographic areas in which ticks can survive and thrive are expanding as a result of climate change.
- Milder winters, which are becoming more frequent as a result of climate change, also result in more ticks surviving the cold season. This can lead to tick-population booms, which in turn can increase the risk of tick-borne illness.

Only a few species of ticks can transmit disease to people. Of these, different species transmit different diseases.⁹ According to the U.S. Centers for Disease Control and Prevention, the incidence of tick-borne diseases more than doubled between 2004 and 2016. Ticks were also responsible for three-quarters of all vector-borne disease reports (i.e. fleas, mosquitoes, ticks, etc.). The most prevalent disease carried by ticks was Lyme disease, which accounted for 82 percent of all tick-borne cases. However, spotted fever and other diseases are also on the rise.¹⁰

BLACKLEGGED TICKS MOVE INTO THE CITY, BRINGING LYME DISEASE

Many people assume that city living protects them from outdoor pests like ticks, but in a changing world this is no longer the case. In the Northeast, the primary host of blacklegged ticks is the white-footed mouse. Warming winters and displacement of natural habitats by development is leading to surging populations of these mice in many suburban and urban landscapes.¹¹ White-tailed deer, another tick host, are also increasing in density in many of these same areas. As a result, many cities and suburbs in the region are experiencing dramatic increases in the number of mice carrying ticks capable of transmitting Lyme disease.¹²

Lyme disease, caused by the bacterium *Borrelia burgdorferi*, can be a serious illness if not identified quickly and treated with antibiotics. Infected individuals will see a rash around the bite area that looks like a bullseye. If treated quickly, the negative effects of Lyme disease can usually be avoided. But for a small subset of people, antibiotics do not work. If the bite is not detected and treated, Lyme disease can turn into a debilitating illness that can cause joint stiffness, brain inflammation, and nerve pain. Ticks usually must be attached for 36-48 hours before they can transmit the disease, so early detection and removal is critical for preventing infection.¹³



Blacklegged tick, the vector for Lyme disease.
Photo: Jerzy Gorecki/Pixabay

“This spring I encountered numerous blacklegged deer ticks while outdoors. The doctor put me on antibiotics when a classic bull’s-eye rash characteristic of Lyme infection appeared. This is nothing like when I was a kid running around in the woods of central Vermont. We didn’t even think about ticks because there weren’t any here! Now, they seem to be everywhere, and I take appropriate precautions whenever I go outside.”

— Doug Inkley, NWF Senior Scientist (retired)

LONE STAR TICKS CAUSE MEAT ALLERGIES

Another summer tradition for millions of Americans is barbecue. The lone star tick—which is spreading throughout United States—is associated with a different suite of diseases, including allergies to meat in people. This allergy is caused by a small sugar molecule called alpha-gal that triggers the human immune system to create antibodies to attack the sugar molecule. This can be a problem for fans of barbecue and other meat eaters as meat has lots of alpha-gal, and human antibodies now trigger an allergic reaction in response.

There is a delay in the time it takes for the full reaction to be triggered, so people can have a challenging time connecting meat consumption to their symptoms.

These symptoms include hives, shortness of breath, vomiting, and diarrhea. In severe cases, patients have needed to seek emergency room treatment. There is no cure for the allergy once it develops.¹⁴

IMPACTS ON WILDLIFE

Winter ticks are a common parasite for large game in North America. During the fall, winter tick larvae transfer from vegetation to large mammals, such as moose, when they brush by them. A moose can be parasitized by thousands of ticks at a time, as they stay on their host throughout their winter lifecycle.¹⁵

Increasing winter temperatures are setting the stage for explosive increases in tick populations. Tick activity increases as temperatures increase, meaning they have more time to find a host during a warmer fall. A late onset of winter also means higher tick populations, since snow and cold normally help kill some of them off. With less snow on the ground in many locales across much of the United States, adult ticks are dropping off their host to lay eggs onto bare ground, greatly increasing their survival rate.¹⁶

Winter ticks can infest moose, elk, caribou, white-tailed deer, and mule deer, but moose appear to be the most susceptible to severe infestation. It is unclear why, but their vulnerability appears to be related to the fact that they are less effective at grooming the ticks off. Severe infestations can cause high moose mortality as the winter progresses. Heavily-infested moose lose body heat due to hair loss and suffer extensive blood loss from the ticks.¹⁷

Moose are in jeopardy across the continental U.S.—from New Hampshire, Vermont, and Maine, to Minnesota, Michigan, and Wyoming. Rising winter tick populations in Maine, New Hampshire, and Vermont have contributed to increased mortality, reduced productivity, and population decline. The New Hampshire moose population has plummeted by more than 40 percent in the last decade from over 7,500 moose to just 4,000 today. In 2014, tick overloads contributed to a 64 percent mortality rate of radio-collared moose calves in the state. As a result, the moose hunting season has been cut back, with about 80 percent fewer permits issued.¹⁸ In 2014, moose hunting permits in Maine were slashed by 25 percent because of an explosion in the winter tick population.¹⁹



Moose in Gaspésie National Park, Quebec, Canada. Photo by National Wildlife Photo Contest entrant Philippe Henry.

BEACHES



Pacific Ocean. Photo: OyeHaHa/Pixabay

According to the National Climate Assessment, 180 million tourists make a stop on one of our coasts every year, joining 160 million U.S. coastal residents.²⁰ That translates to a lot of trips to a beach to swim, fish, sunbathe, picnic, watch birds, or enjoy water sports. Beaches, composed largely of slender ribbons of sand, face disruptions from land use change and often punishing, extreme weather events. Climate impacts such as sea-level rise, flooding, and increasing severity and frequency of heavy storms are taking additional tolls, and experts are sounding the alarm that many popular beaches are at heightened risk from erosion, and in certain cases, to the point of some beaches disappearing completely.

A recent U.S. Geological Survey study found—absent significant and costly resilience projects—as many as two-thirds of Southern California beaches are at risk of being washed away by 2100 from sea-level rise.²¹ In 2017, the iconic beach at Big Sur was closed from a massive mudslide on Highway 1, due to an abnormally wet spring.

Florida’s more than 1,200 miles of coastline—including barrier islands, beaches and inlets—are increasingly subjected to more intense storm surges and nuisance flooding. According to Florida SeaGrant, “almost half of

the state’s beaches are already experiencing critical erosion” and “local expectations of beach quality may have to be modified” as a result of a large deficit of nearshore, available sand in some Florida coastal areas.²² “Beach renourishment”—a process of importing vast quantities of sand and sediment to restore receding beaches—in Florida alone has cost \$2.17 billion, largely paid for by federal taxpayers.²³ Unfortunately, both beach erosion and beach renourishment are detrimental several species of sea turtles, contributing to their endangerment.²⁴



Sea Turtle. Photo: Pexels/Pixabay

THREATS TO OUR BEACHES AND COASTLINES

A National Wildlife Federation affiliate, Virginia Conservation Network, recently wrote to state officials:

Virginia's beaches and coastal waters also support five of the seven sea turtle species found worldwide. Every year between 5,000 and 10,000 sea turtles swim into the Chesapeake Bay. Most of these turtles are the threatened loggerhead and endangered Kemp's ridley, which depend on the bay for food and safety. The loggerhead sea turtle also depends on the bay's sandy beaches and dunes for nesting habitat. As the sea level rises and extreme weather events occur more frequently, these nesting habitats are being washed away.

Further, the gradual subsidence of coastal land in Virginia is magnifying the impacts of sea-level rise in the region. At Swells Point in Norfolk, water levels over the past 80 years have risen 14.5 inches — well above the global average.²⁵

Beaches are at risk from inundation in both the near- and long-term. Scientists with the U.S. National Oceanic and Atmospheric Administration project up to 2.1 feet (0.63 meters) of sea level rise by 2050, 8.2 feet (2.5 meters) by 2100.²⁶

An international study found that several U.S. coastal cities ranked in the top twenty for future assets exposed to coastal flooding by 2070. Miami, Florida is projected to have the most at-risk assets in the world—such as public and private property and infrastructure—totaling \$3.5 trillion. Other U.S. metropolitan areas include New York/Newark, with \$2.1 trillion, New Orleans, with \$1 trillion and Virginia Beach, with \$581 billion in exposed assets by 2070.²⁷



Kemp's ridley sea turtle hatchlings. Photo: skeeze/Pixabay

BASEBALL



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HOW WILL CLIMATE CHANGE AFFECT THE FUTURE OF BASEBALL?

Baseball is America's oldest pastime. But as climate change takes a greater toll all across America, the changes it will bring may have a lasting effect on the game—from hotter games to more rainfall, the wood that can be used for bats, and even how easy it is to hit home runs. There's a lot that may be different about the future of baseball.

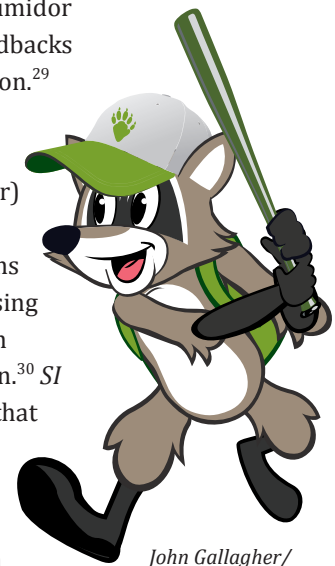
HUMIDITY AND HOME RUNS

Watching someone hit a huge home run is one of the biggest thrills in baseball. But did you know that humidity can play a big role in how easily the ball can fly through the air? When air is more humid, it means that there are more water molecules in the air. According to *Popular Science*,²⁸ gaseous water vapor displaces heavier gases like nitrogen and oxygen—decreasing the air density and making it easier to hit

balls further. Another factor is that the yarns in baseballs can actually absorb some of the water molecules in the air, which effects their flight.

This may seem like a minor issue, but Major League teams are concerned enough that they've started storing their baseballs in humidors to prevent this problem. *Sports Illustrated* reported that the Colorado Rockies have stored their balls in a humidor since 2002, with the Arizona Diamondbacks following their lead for the 2018 season.²⁹

Popular Science noted that, while Denver had an average Earned Run Average (runs scored against a pitcher) over two runs higher than other Major League Baseball (MLB) stadiums from 1995-2001, once they started using their humidor, the average earned run average (ERA) dropped by about a run.³⁰ *SI* also reports that MLB has mandated that all teams for 2018 store their balls in "an air conditioned and enclosed room" with a sensor so MLB can determine whether or not every team should be forced to have a humidor for the upcoming 2019 season. Everyone loves to see home runs, but climate change will mean that humidity



John Gallagher/
NWF Art Director

Number of U.S. participants in baseball in 2016:

14.76 million³¹

Pennsylvanians who participate in baseball:

846,800³²

Ohioans who participate in baseball:

657,000³³

As of April 25th, 2018, there were a record 28 MLB games postponed due to extreme weather³⁴

changes will affect teams differently depending on their stadiums' altitude and geography. As climate change makes some stadiums more humid while others become less, MLB will need to work to make the playing field as level as possible for hitters and pitchers alike.

INCREASING WEATHER EXTREMES FROM CLIMATE CHANGE

Rain. Baseball's mortal enemy. Thanks to climate change, extreme weather conditions are becoming the new normal. This season, the Weather Channel reported that rain and other extremes like ice/snow/cold had postponed 28 games by the end of April—breaking the MLB record for most “weather-related postponements” since they started keeping track in 1986.³⁵ (The Associated Press reported that the previous record was 26 games.³⁶)

These climate trends and shifting rainfall patterns are going to continue to affect baseball around the country. Only 7 of the 30 Major League

Baseball stadiums have roofs, so most teams are very vulnerable to weather-related issues. The remaining 23 MLB teams have 20 major cities that they call home (some cities have more than one team). *The Weather Channel's* Climate Disruption

Index looked at six factors to determine the top 25 U.S. cities most vulnerable to climate change: sea-level rise, extreme precipitation, extreme drought, urban heat islands, and changes in precipitation and temperature.³⁷ Of the 20 cities hosting roofless MLB teams, over half of them were among the 25 cities the Climate Disruption Index lists as most at-risk from climate change.

But these changes will not affect every part of the country in the same way. According to the third National Climate Assessment, incidences of very



heavy precipitation are up 71 percent from Maryland to Maine, up 37 percent in the Midwest, and 27 percent across southern states from Louisiana to Florida and Virginia.³⁸

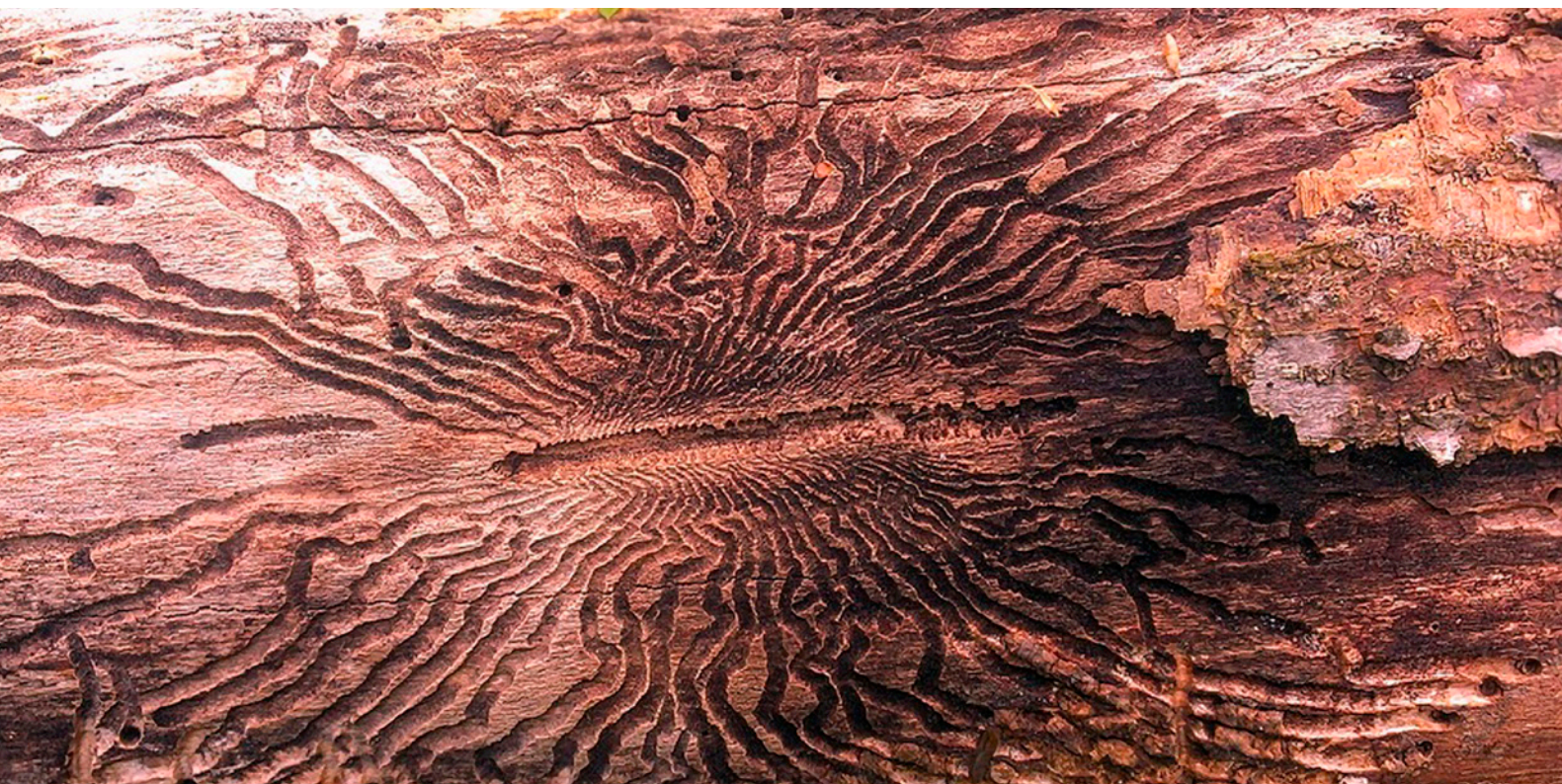
CLIMATE, ASH TREES, AND AN INVASIVE BEETLE

Ash is one of the most popular materials for baseball bats. Ash wood has a little bit more give than a harder wood like maple, which means that baseballs spring off the bat when hit, not unlike a trampoline. Maple bats are harder, with a denser grain so they don't flex as much as ash bats, but this extra flexibility gives ash bats a larger "sweet spot" than maple bats—making it a popular choice for baseball players.

Unfortunately, the number of ash trees has been decimated due to an invasive beetle with a shiny, green shell called the emerald ash borer. The beetle

lays eggs in ash trees and then its larvae burrow into the tree and eat away at the bark, disrupting the trees' nutrient systems and eventually killing them. Originally from northeastern Asia, the invasive beetle was first discovered near Detroit, Michigan in 2002. Since then, it has been discovered in 30 states and has killed hundreds of millions of ash trees and caused millions of dollars in damages. The U.S. Forest Service estimates costs to communities ranging from \$10 billion to \$20 billion through 2019.³⁹

Efforts are underway to contain the beetle, but researchers have discovered vast new tracks of ash trees at risk as warmer winters could expand the ash borers range deep into Canada.⁴⁰ The ash borer is also spread as infested wood, transported by hapless hikers and campers in bundles of firewood. More research and studies are underway to develop new methods to contain the emerald ash borer, but unless we can get this invasive beetle under control, and stem climate change and warmer winters, we may be kissing our ash goodbye.



Warmer winters are expanding the range of the emerald ash borer, which has already killed millions of the tree traditionally favored for wooden baseball bats. Photo: MaxPixel.net



ALGAE



One increasingly clear effect of climate change in some areas is very heavy precipitation. Heavy rains, especially in Spring, are contributing to an explosion of these toxic algal blooms, threatening drinking water, and carrying neurological agents that spark public health warnings. The blooms also kill family dogs, undercut outdoor recreation and local economies, and ruin summertime beach and boating experiences.⁴¹

According to an April 2018 report by the Environmental Working Group, 169 algal blooms were reported in 2017 across 40 U.S. states. (Figure 2)⁴²

Off the coasts of Maine, Massachusetts, and Rhode Island, shellfish were recalled from restaurants and wholesalers in 2017 after the neurotoxin domoic acid was discovered. Algal blooms had never been seen by fishermen before in these waters. Repeated toxic blooms prompted regulators to shut down shellfish harvests twice in 2017. While larger shellfish operations may be able to afford expensive testing and can continue to provide mussels, scallops, oysters, quahogs, and clams, smaller businesses have lost significant revenue.⁴³

In Pennsylvania, in a first for Presque Isle State Park in the City of Erie, swimmers were barred from beaches three times in 2017 because of toxic algal blooms. An annual triathlon had to cancel the swimming portion of the contest.⁴⁴ High levels of exposure to certain kinds of harmful algal blooms can cause liver damage in humans as well as disrupt the nervous system.

In Nevada, both Lake Tahoe and Lake Mead tributaries were hit with public health advisories in 2017 from toxic algal blooms, discouraging summertime activities. Warmer water helps toxic algae grow and contributes to other water quality problems. July 2018 was the hottest month recorded ever recorded in Reno, and a severe decline in Lake Tahoe's water clarity the previous year may have been an anomaly from a heavy snow year but was caused by premature snow melt—a direct impact of climate change.⁴⁵

Over Fourth of July weekend in 2016, city parks in Denver, Colorado scrambled to combat green slime—in some places 10 feet thick. As reported in the Denver Post:

“This is depressing. It is disgusting,” Polly Gibb, 68, said, walking golden retriever Maggie, worrying the slime might hurt birds. “It’s so unattractive... I won’t be coming back for a couple weeks.”⁴⁶

Major toxic algal bloom events occurred recently in Oregon, Utah, Florida, and Ohio. In June 2018, officials in Salem, Oregon issued “civil emergency” warnings over toxins in drinking water because of threats to sources of the region’s drinking water for families and businesses. The National Guard was activated to provide clean drinking water. Florida’s governor issued a state of emergency, as toxic algae covered more than 90 percent of Lake Okechobee, and the continuing “red tide” algal bloom on Florida’s Gulf Coast kills sea turtles and manatees. More than 100 outdoor recreationists were sickened by toxic algae in Utah Lake, resulting in

diarrhea, headaches, rashes, and vomiting. In Ohio, 2018 is shaping up to be another rough summer for Western Lake Erie, where just a few years before, residents and citizens in Toledo were without drinking water for three days as the toxin *microcystin* entered the city’s water supply.

The Calusa RiverKeeper, John Cassani, recently told the Tampa Bay Times:

“I’ve worked around this river for 40 years and I’ve never seen anything like it,” said Cassani, a retired Lee County biologist. “I’ve never seen an algae bloom of this magnitude or this toxic. It looks like another lost summer here.”⁴⁷

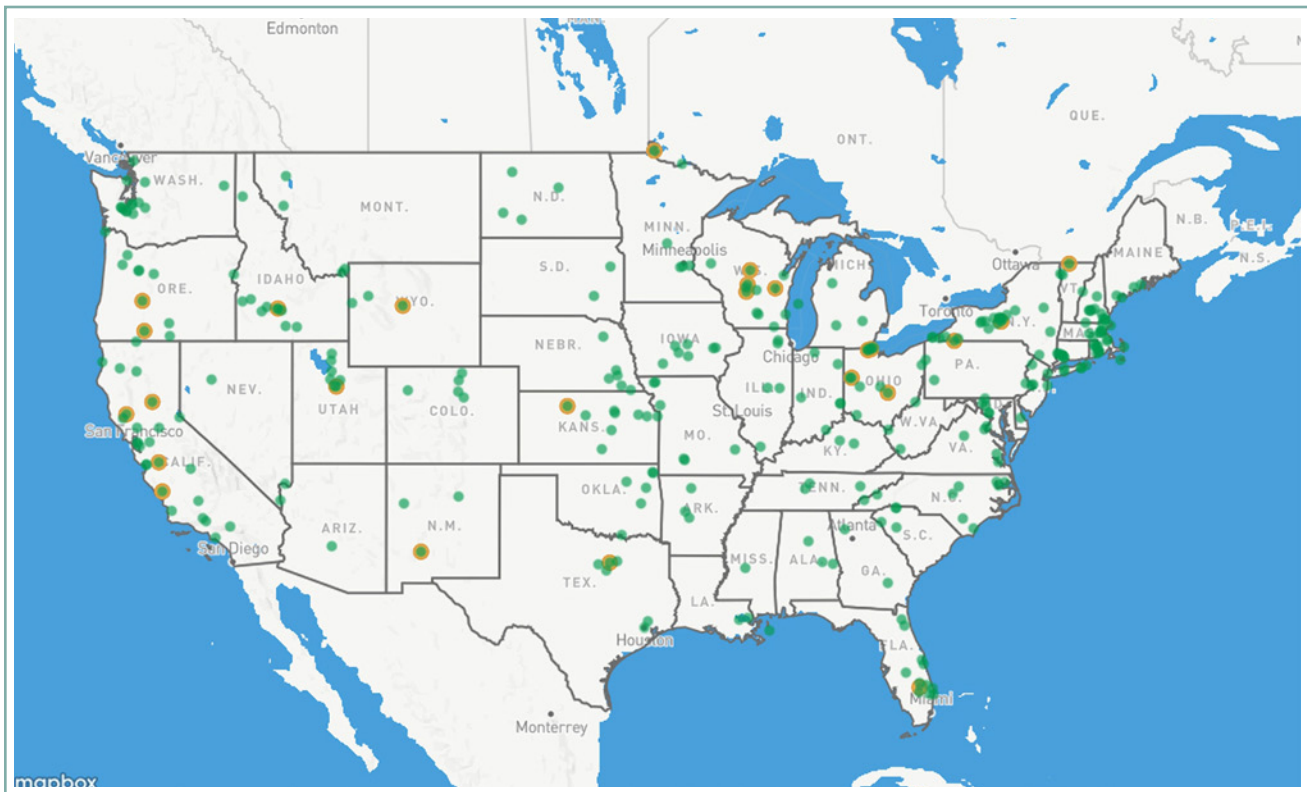


Figure 2: Environmental Working Group’s tracking of 2018 harmful algal blooms.⁴⁸



SOLUTIONS



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TAKING A STAND

Americans have a responsibility and opportunity to defend our outdoor heritage from the threat of climate change. There are ways to protect ourselves from the pests that climate change is helping to proliferate. Ticks should not stop you from enjoying activities like camping, hiking, and playing outdoors—but make sure to take steps to prevent tick bites. Also, we must take action as a nation to combat the root of the problem—carbon pollution. It is critical for Congress to enact federal climate policy, and for state and local governments to cut pollution and advance responsible clean energy solutions as well. The following examples highlight five ways in which our policymakers can take climate action:

REDUCE CARBON EMISSIONS FROM THE POWER SECTOR

The power sector is the second-largest source of climate pollution in the U.S. To minimize climate change risks such as the spread of tick-borne disease, the

federal government should take action to reduce these harmful emissions. The Clean Power Plan, currently being repealed by the Trump Administration, would have reduced power plant climate pollution by more than thirty percent if implemented. The plan is an example of the type of proactive policy we need. Our leaders at the national and state levels should adopt policies to require pollution cuts from power plants and adopt other policies to expand clean, wildlife-responsible renewable energy use, such as offshore wind and rooftop solar power.

REDUCE METHANE POLLUTION FROM OIL AND GAS INFRASTRUCTURE

Methane gas that leaks and is intentionally released from oil and gas facilities in the U.S. is a significant source of climate pollution. This climate-altering gas is a super pollutant, with 80 times the impact of carbon dioxide in the short term. This gas should be captured, not released freely to the air, providing not only environmental benefit but also economic gains for companies and local communities through resale of gas.

The Environmental Protection Agency and Bureau of Land Management have each developed cost-effective rules for minimizing methane emissions, though both rules are under threat due to rollback actions from the Trump Administration. Some states have implemented their own policies to cut down on methane pollution and waste; other states should follow suit.

REDUCE CARBON EMISSIONS FROM THE TRANSPORTATION SECTOR

The transportation sector is now the top source of harmful climate pollution in the U.S. Automakers had been working to continually improve fuel efficiency and reduce carbon pollution in their fleets over time, as required by federal rules. Recent actions by the Trump Administration to roll back clean car standards pose a serious threat to climate progress. This country needs stronger climate rules, not weaker ones. Americans should express support for continued federal fuel efficiency requirements, but also let their state lawmakers and transportation agency know that clean cars and electric vehicles should be supported by state policies as well.

ENACT AN ECONOMY-WIDE PRICE ON CARBON

One of the most cost-effective, far reaching, and quickest avenues for reducing climate pollution is a

federal price on carbon. By making polluters pay for what they emit, they receive a strong market signal to cut pollution. A federal price on carbon could take the form of either a cap-and-trade program or a carbon tax, or some combination of the two. Such policies could dramatically reduce carbon emissions while generating revenues for national priorities, such as protecting vulnerable people and wildlife from unavoidable climate impacts or developing wildlife-friendly renewable energy.

Federal action on climate is necessary, not only for America's wildlife, fish, and birds, but for the millions of sportsmen, wildlife watchers, and nature lovers who cherish America's outdoor heritage. In addition to the mitigation of carbon pollution, the United States must also invest in actions that increase the resiliency and adaptability of human communities, wildlife, and habitat.

SAFEGUARD PEOPLE AND WILDLIFE FROM CLIMATE IMPACTS

Healthy and resilient natural systems can help both wildlife and people cope with increasing impacts from climate change. Adopting climate-smart approaches to land and water management can reduce risks from flooding, drought, and other climate-related extreme events, while providing opportunities to better conserve and connect vital wildlife habitat.



Iconic species such as the horseshoe crab are at risk from climate impacts to water temperature, extreme weather and changes to beach habitat. Photo: Bill Shadel

CITATIONS

- 1 Outdoor Industry Association 2016. <https://outdoorindustry.org/resource/outdoor-participation-report-2016/>
- 2 Outdoor Industries Association 2017. https://outdoorindustry.org/wp-content/uploads/2017/04/OIA_RecEconomy_FINAL_Single.pdf
- 3 U.S. Fish and Wildlife Service and U.S. Census Bureau 2016. https://wsfrprograms.fws.gov/Subpages/NationalSurvey/nat_survey2016.pdf
- 4 <http://www.nws.noaa.gov/om/hazstats.shtml>
- 5 https://groundswell.org/assets/documents/frompower_to_empowerment.pdf
- 6 <https://aeon.co/essays/how-lyme-disease-became-the-first-epidemic-of-climate-change>
- 7 Kuehn B. M., 2013. CDC Estimates 300 000 US Cases of Lyme Disease Annually. JAMA. 310(11)
<https://jamanetwork.com/journals/jama/article-abstract/1738891?redirect=true>
- 8 <https://www.sciencedaily.com/releases/2018/03/180316111311.htm>
- 9 CDC 2018. https://www.cdc.gov/ticks/geographic_distribution.html
- 10 CDC 2018. https://www.cdc.gov/mmwr/volumes/67/wr/mm6717e1.htm?s_cid=mm6717e1_x
- 11 <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0080724>
- 12 https://www.washingtonpost.com/national/health-science/why-you-need-to-know-about-mice-ticks-warm-temperatures-and-lyme-disease/2017/06/16/cd7a4ab8-4aef-11e7-9669-250d0b15f83b_story.html?utm_term=.92f5e0b12518
- 13 Northeastern University 2018. <https://news.northeastern.edu/2018/05/10/ticks-creep-into-the-city-bringing-lyme-disease-with-them/>
- 14 National Geographic 2017. <https://news.nationalgeographic.com/2017/06/tick-bite-meat-allergy-spreading-spd/>
- 15 University of Minnesota. Winter Ticks. <http://www.nrri.umn.edu/moose/information/wintertick.html>
- 16 Ibid.
- 17 Cusick. 2012. <https://www.scientificamerican.com/article/rapid-climate-changes-turn-north-woods-into-moose-graveyard/>
- 18 Wilson, Iain. 2015. With Few Permits issued, closing moose hunt wouldn't result in rebound of N.H. Moose population.
<http://www.concordmonitor.com/community/town-by-town/concord/16351240-95/with-few-permits-issued-closing-moose-hunt-wouldnt-result-in-rebound-of-nh-moose>
- 19 [xiii] Gagnon, Dawn. 2014. Maine to Reduce Moose Hunt Permits 25 percent because winter ticks have toll on herd.
<http://bangordailynews.com/2014/05/09/news/maine-to-reduce-moose-hunt-permits-by-25-percent-because-winter-ticks-take-toll-on-herd/>
- 20 NCA: <https://nca2014.globalchange.gov/report/regions/coasts>
- 21 Disappearing Beaches, USGS 2017: <https://www.usgs.gov/news/disappearing-beaches-modeling-shoreline-change-southern-california>
- 22 https://www.flseagrant.org/wp-content/uploads/Climate_Change_and_Sea_Level_Rise.pdf pp. 15-16
- 23 <https://abcnews.go.com/US/deepdive/disappearing-beaches-sea-level-rise-39427567>
- 24 <https://conserveturtles.org/information-sea-turtles-threats-beach-erosion/>
- 25 <https://www.deq.virginia.gov/Portals/0/DEQ/Air/GHG/nwf.pdf>
- 26 "Global and regional sea level rise scenarios for the United States," NOAA Technical Report NOS CO-OPS 083, January 2017, p. 23,
https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf
- 27 OECD Environment Working Paper No. 1 (ENV/WKP(2007)1) accessed via
https://forms2.rms.com/rs/729-DJX-565/images/fl_cities_coastal_flooding.pdf
- 28 Boddy, J. March 12, 2018. "The best weather for hitting a home run, according to scientists," Popular Science
<https://www.popsci.com/best-weather-for-hitting-home-run-baseball>
- 29 Verducci, T. February 23, 2018. "MLB to Mandate that Baseballs are Stored in Air Conditioned Room for 2018," Sports Illustrated. <https://www.si.com/mlb/2018/02/23/mlb-mandate-teams-store-baseballs>
- 30 Fox, S. November 7, 2008. "Why Do the Colorado Rockies Keep their Baseballs in a Humidor?" Popular Science.
<https://www.popsci.com/entertainment-amp-gaming/article/2008-11/why-do-colorado-rockies-keep-their-baseballs-humidor>
- 31 <https://www.statista.com/statistics/191626/participants-in-baseball-in-the-us-since-2006/>
- 32 <http://www.activenetworkrewards.com/Assets/AMG+2009/Baseball.pdf>
- 33 Ibid
- 34 <https://weather.com/news/news/2018-04-23-major-league-baseball-mlb-postponements-break-april-record>
- 35 Donegan, B. April 25, 2018. "Rainouts Tuesday in Baltimore, Pittsburgh Push Record for Weather-Related Major League Baseball Postponements Through April to 28," The Weather Channel.
<https://weather.com/news/news/2018-04-23-major-league-baseball-mlb-postponements-break-april-record>
- 36 April 22, 2018. "Mets-Braves series finale postponed due to rain," Associated Press.
- 37 The Weather Channel, "Climate Disruption Index," <http://stories.weather.com/disruptionindex>
- 38 <https://nca2014.globalchange.gov/report/our-changing-climate/heavy-downpours-increasing>
- 39 https://www.nrs.fs.fed.us/disturbance/invasive_species/eab/effects_impacts/cost_of_infestation/
- 40 Kim Cuddington, Stephanie Sobek-Swant, Jill C. Crosthwaite, D. Barry Lyons, Brent J. Sinclair. Probability of emerald ash borer impact for Canadian cities and North America: a mechanistic model. Biological Invasions, 2018; DOI: 10.1007/s10530-018-1725-0
- 41 <https://nca2014.globalchange.gov/report/our-changing-climate/heavy-downpours-increasing>
- 42 <https://www.ewg.org/toxicalgalblossoms/>
- 43 <https://www.npr.org/sections/thesalt/2018/01/04/575345282/shellfish-industry-scientists-wrestle-with-potentially-deadly-toxic-algae-bloom>
- 44 <http://www.goerie.com/news/20170922/harmful-algal-blossoms-remain-concern-for-presque-isle>
- 45 Tahoe State of the Lake Report written by UC Davis. https://protect-us.mimecast.com/s/Zn_9CrkEvvI8VrYvF70EIV?domain=terc.ucdavis.edu
<http://terc.ucdavis.edu/stateofthelake/>
- 46 <https://www.denverpost.com/2016/06/30/denvers-city-park-lake-getting-choked-by-green-slime-invasion/>
- 47 http://www.tampabay.com/news/environment/Florida-s-summertime-slime-fueled-by-climate-change-as-well-as-pollution_169758168
- 48 <https://www.ewg.org/toxicalgalblossoms/>



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