Wildlife Legacy

Climate Change and the Next Generation of Wildlife

NATIONAL WILDLIFE FEDERATION®

Our Wildlife Legacy

Flickr/Doug Faulder

We need to protect the next generation of wildlife for our children's future.

Bigstockphoto

Our parents and previous generations inspired us to love wildlife and wild places, from taking us fishing to showing us our first caterpillar in the backyard, and they have made efforts to protect this outdoor heritage for us. We have a lot to be thankful for. Generations past and present have worked to raise awareness about threatened species and advocated for smart conservation policies and initiatives to help species like the North American river otter and the pronghorn, once threatened, be able to now thrive.

Climate change is threatening the wildlife legacy we leave for our children. Our changing climate has been impacting young wildlife, essential breeding habitat, and threatening the survival of future generations of wildlife. Puffins in the north are seeing a decreased food supply with the warming ocean temperatures. Monarch butterflies are experiencing disruptions in migratory patterns due to warmer weather. Sea turtles are struggling with rising sea levels. Many other species and their young are feeling the impacts of climate change.

We have an obligation to our children and future generations to address carbon pollution that causes climate change and threatens our wildlife and wild places. It is up to us to preserve our wildlife heritage – for our children's future.

We must move away from the current reliance on fossil fuels and invest in clean energy solutions that do not pollute. Fortunately, we have the tools and know-how to start making this transition today.

We can protect the next generation of wildlife, by:

- Implementing smart and effective policies that reduce carbon and other greenhouse gas pollution driving climate change and endangering the health of our communities and wildlife.

- Investing in clean, wildlife-friendly renewable energy sources, such as solar and wind power, to replace our dangerous dependence on dirty fossil fuels.

- Safeguarding wildlife and wildlife habitat by designing and carrying out Climate Smart Conservation strategies to reduce the level of negative climate change impacts and enhance the ability of wildlife and wildlife habitats to survive the changing climate.

People of all ages can get involved!
Visit www.nwf.org/wildlifelegacy.

Success Stories

National Wildlife Federation Photo Contest/Ronald Valentine

Previous Generations Protecting Wildlife: The River Otters Success Story

In the early 20th century, unregulated trapping, habitat destruction and water pollution nearly wiped out the North American river otter from U.S. habitats. But with revised management strategies and legislation focused on protecting waterways, the river otter was restored to much of its historic range. This "otterly" amazing comeback is an example of how smart conservation practices can save some of our most threatened species.

Flickr/rwarrin

Protecting Pronghorn for Future Generations

Common in many areas where it was once scarce, pronghorn are an example of a successfully restored species. Once numbering as high as 40 million, pronghorn suffered a steep decline in the mid-20th century due to habitat loss and unrestricted hunting, and were reduced to just 25,000, less than 1/1,000th of their original population. Through conservation efforts, the pronghorn has made a strong recovery in many areas, but they aren't immune to the effects of climate change. Climate change is predicted to fundamentally alter pronghorn's grassland and shrubland homes, once again threatening this iconic American species.

Puffins and Pufflings

Flickr/Jacob Spinks

Found in the Gulf of Maine, with their triangular clown-like eyes and colorful beaks – puffins and their young, affectionately called "pufflings," are notoriously captivating. Young Atlantic puffins must learn a variety of skills as pufflings, from walking (or waddling) to swimming, hunting, and flying. Now, these colorful "sea parrots" are facing a new challenge – climate change. As ocean temperatures continue to rise, we have seen a marked decline in the puffin population. The warming oceans have displaced fish populations, so puffin parents are having a harder and harder time finding herring, their main food source. This has dramatically depressed the survival rate of young pufflings. Many adult puffins have resorted to feeding their young a more accessible and abundant fish, called butterfish. However, butterfish are just too big for the young pufflings to swallow, and sadly, many die of starvation.

Previous Generations Protecting Wildlife: A Puffin Success Story

Early settlers hunted puffins in the late 1800s for food, eggs and feathers putting them in jeopardy of disappearing from Maine completely. In 1901, there was only one pair of puffins left on Maine's entire coast. However, with aggressive restoration efforts, this unique and striking sea bird became a proud example of how smart conservation can bring back important populations from the brink of extinction. Now, we need to employ that same philosophy again and protect puffins from climate change.

Snowshoe Hares and Leverets & Canada Lynx and Cubs

Canada lynx and snowshoe hare both live in the northern U.S. and have large feet that help them travel in these snowy areas. In fact, the Canada lynx's primary prey is the snowshoe hare. Unfortunately, climate change is threatening both of these animals so well adapted to snow.

NPS/Tim Rains

Snowshoe hare babies, known as leverets, are born with a full coat of hair. Mother hares can give birth to as many as eight leverets in a single litter, and may have four litters a year! Snowshoe hares have a unique trait that helps them survive –in the snowy winter months their coats are white, and in the summer they molt to a brown coat. This seasonal camouflage makes hares vulnerable to climate change when their coat molts to white in the fall, but the snow is coming later. White-coated hares against a brown background are easy targets for predators like the lynx. The same happens in the spring, as the snow melts earlier and earlier, before their spring molt to a brown coat.

Snowshoe hares have a unique trait that helps them survive–in the snowy winter months their coats are white, and in the summer they molt to a brown coat.

Lynx give birth to one litter a year. The cubs stay with their mothers for a year after birth to learn to hunt and survive. Unfortunately, climate change can give other predators such as bobcats a competitive advantage over lynx, which are less abundant and especially dependent on areas with heavy snowfall, that are disappearing.

National Wildlife Federation Photo Contest/Larry Allan

Unfortunately, climate change can give other predators such as bobcats a competitive advantage over lynx, which are less abundant and especially dependent on areas with heavy snowfall, that are disappearing.

Polar Bears and Cubs

Polar bears and their cubs are enthralling animals to watch – with their long snouts, snow-white fur, and lumbering yet graceful gait, it is hard not to fall in love with these creatures. Sadly, polar bears are in serious danger from climate change, and cubs are at the greatest risk. Scientists estimate that as sea ice continues to melt, two-thirds of polar bears will be gone by 2050. In Canada's Hudson Bay, the population has already decreased by more than 20% over the last 20 years.

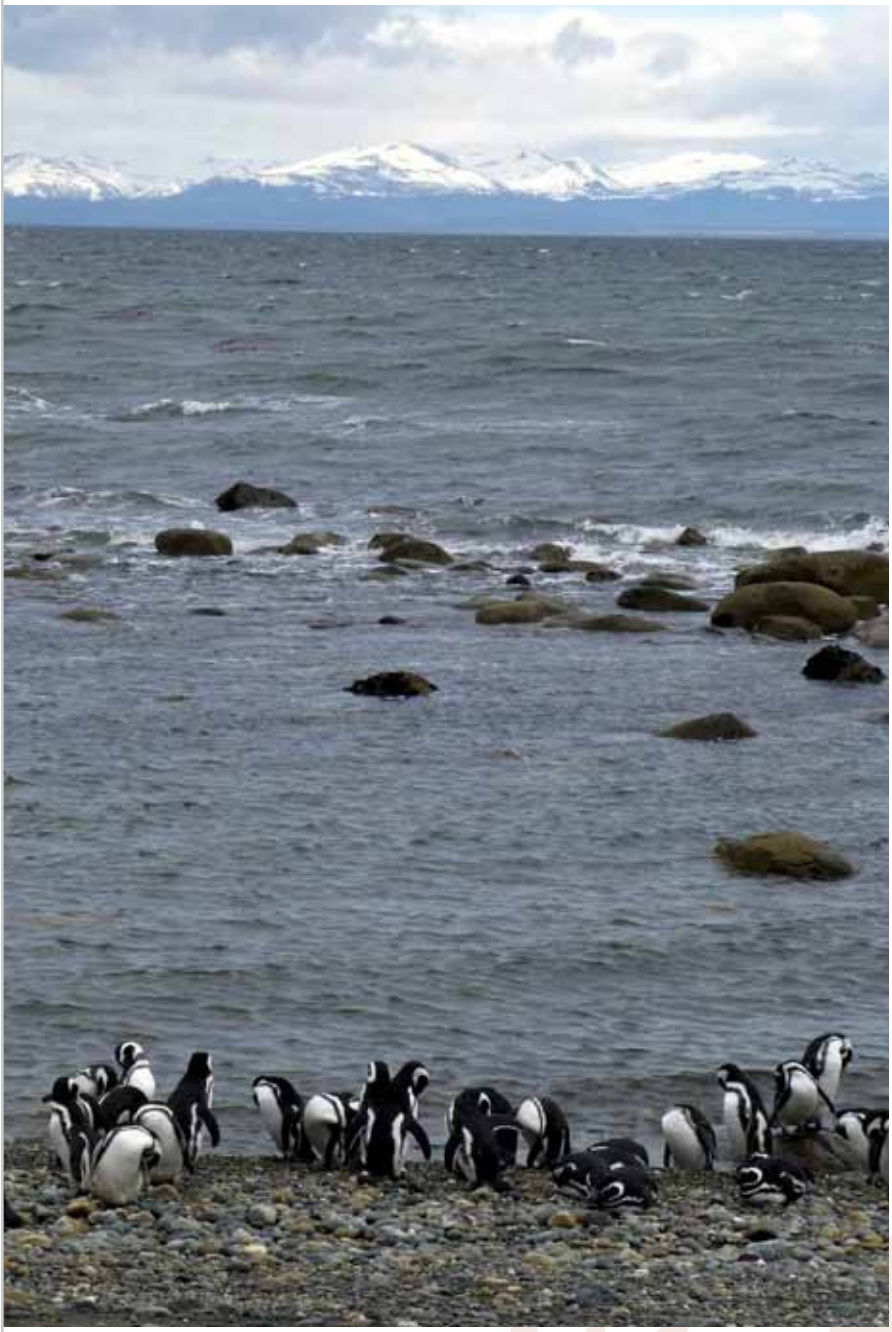
Polar bears are facing a triple threat from climate change in this region. In Hudson Bay, with the ice melting earlier in the summer season and forming later in the fall, polar bears have been forced to spend more time on shore, where they are not able to hunt seals. Overall, their hunting season has been reduced by nearly three weeks. Also in Hudson Bay, seals are suffering from the melting ice and their population has been depleted. As a result of these two factors, polar bear weight has dropped on average by 15% and they are having fewer cubs. When cubs are born, they have even more trouble getting the food necessary for survival. Further to the north in the Arctic region, the retreating ice and rougher seas that are brought on by our warming climate have led to increasing numbers of polar bears drowning at sea. The risk of drowning is even greater for the cubs, since they are smaller and weaker swimmers.

USFWS

Bigstockphoto

"We love polar bear cubs. Please help them from warming weather so they can live like us."

Penguins and Chicks



NASA/Maria-Jose Vinas

Penguins share the parenting responsibility for their baby chicks by taking turns at "incubation shifts" that can last days and even weeks as the other parent feeds at sea. Unfortunately, even the careful protection of these loving penguin moms and dads is not enough to shelter many penguin chicks from the impacts of climate change. Powerful weather events like rainstorms and extreme heat have become even more dramatic in recent years as climate change has increased their frequency and led to a rise in penguin chick mortality along the coast of Patagonia in Argentina. Too young to have fully developed their waterproof feathers, but too big to seek shelter under their parents' bodies, downy penguin chicks between 9 and 23 days old are left highly vulnerable during rainstorms. Torrential downpours compress their down feathers, causing a persistent chill which leads to hypothermia and, in some cases, death. Extreme heat waves can also have dire consequences. Without waterproof feathers, penguin-chicks are left struggling to survive when they are unable to take a dip in the cool water to regulate their temperature.

Unfortunately, even the careful protection of these loving penguin moms and dads is not enough to shelter many penguin chicks from the impacts of climate change.

Moose and Calves

National Wildlife Federation Photo Contest/Gary Lackie

Standing at 6 feet tall and weighing more than 1,000 pounds, moose are a familiar species in parts of the northern U.S. and Alaska. Moose typically live anywhere from 10-12 years but have been known to live to be as old as 20 in the wild. Bull moose, with their awesome antlers, fight for females during the mating season. For those fortunate enough to see this, it is a breathtaking sight. Unfortunately, moose are being plagued by the impacts of climate change. Winter ticks, which are thriving due to warmer, shorter winters, are infesting moose in record numbers. In Minnesota, some moose have been found with 50,000 to 70,000 winter ticks on them. These ticks weaken the moose from blood loss and leave them more vulnerable to disease. As moose try to get rid of the ticks, they rub on trees and break off hair, leaving white "ghost" moose that are even more vulnerable to disease. Hotter temperatures also cause summer heat stress in moose which may cause a drop in pregnancy rates. Between the increase in winter ticks and the summer heat, moose are having a tough time hanging on in the face of climate change – and future generations of the species are at risk. Minnesota's northwestern population has plummeted from 4,000 to fewer than 100, while the northeastern population has dropped from 8,800 to fewer than 2,800 in just seven years.

Between the increase in winter ticks and the summer heat, moose are having a tough time hanging on in the face of climate change – and future generations of the species are at risk.

Ducks and Ducklings

Ducks are a favorite species for sportsmen, and for kids and families watching wildlife. A variety of duck species are found across America, such as the mallard and blue-winged teal. Duck parents pair up in the winter and fly together northward for breeding and to make their cozy downy nests. During incubation, the male "stands guard" on the pond while the female is incubating. Unfortunately, duck populations are suffering.

One of the most important waterfowl breeding areas in North America is the Prairie Pothole Region found on both sides of the U.S./ Canada border in the northern Great Plains. The Prairie Pothole Region contains millions of shallow depressions that fill with water in spring, and has rightfully been called the "duck factory for North America," as 50 percent of the Nation's waterfowl nest here. After fledging their young, the ducks spread to all parts of North America. Drought conditions brought on by climate change are expected to dry up many of the ponds, making them less suitable for breeding.

National Wildlife Federation Photo Contest/Peter Denness

Bigstockphoto

National Wildlife Federation Photo Contest//Pam Warburton

Flickr/RageZ

Ducks are a favorite species for sportsmen, and for kids and families watching wildlife.

Fish and Fingerlings

Fishing is an incredibly popular tradition that is passed down from generation to generation. Further, it represents commercial and recreational industries that generate $26 billion per year in the U.S. alone. Unfortunately, many crucial fish populations are at risk from climate change, and unless we act soon, this vital industry and cultural legacy may be lost forever.

USFWS, Southeast Region

Brook trout or "brookies" spawn in the fall. Males often have bright red sides during the breeding season. Female brookies can produce between 100-400 eggs depending on their age and size and after spawning the brook trout moms cover their eggs with gravel. Rising water temperatures caused by hotter weather poses a huge risk to brookies and their babies or "fingerlings" as they fight to seek out colder, cleaner water. Brook trout eggs are dependent on getting a continuous amount of oxygen for survival. Warm water can rob the trout of the oxygen they need to survive. In other places, droughts can reduce stream flow which kills off the vegetation that helps provide shade to keep the water and trout cool. Moreover, warmer winters have helped the Hemlock Wooly Adelgid, an invasive insect that is killing the Eastern hemlock to spread. Hemlocks provide important shade in brook trout streams that are already thermally stressed.

Smallmouth bass or "smallies" are typically brown, bronze, or tan in general color with dark vertical bars which are usually green or gray. Unlike brookies, smallmouth bass males are the nest builders. Once eggs are fertilized, "smallie" dads stand guard to protect their eggs and fingerlings. Good water quality is particularly important in the first 30 days after spawning. Unfortunately, smallmouth bass are also at risk from warming temperatures sometimes causing massive die-offs. Water temperatures in many important habitats for smallmouth bass like the Susquehanna River have reached more than 90 degrees Fahrenheit in some summers. Warm water holds less dissolved oxygen thereby stressing the fingerling bass, making them more susceptible to bacterial infection from a common soil and water bacteria called Columnaris.

Dedicated to the Future of Lake Sturgeon

The lake sturgeon can live to be more than 100 years old, grow to 8 feet in length and weigh more than 200 pounds – and they have a long history in the lakes and rivers of Michigan. In fact, sturgeon have been cruising lake waters since the time of the dinosaurs, about 136 million years ago, and were common fish in Great Lakes waters 120 years ago. However, many stresses, including climate change, threaten their survival. The lake sturgeon is now a state-listed threatened species. Thankfully, volunteers and staff with the Black Lake Chapter of Sturgeon for Tomorrow, staff from the Michigan Department of Natural Resources, Michigan State University, and Tower-Kleber Limited Partnership are stepping up to ensure there are healthy sturgeon populations for many generations to come. Egg collection and rearing facilities raise thousands of fingerlings to be stocked every year in lakes and rivers where there is little or no natural reproduction. Dozens of waters statewide get this help to assist in recovery efforts and to provide more fishing opportunities for anglers and their families.

Falcons and Eyases

Falcons are known for being fast flyers –at speeds of up to 200 miles per hour when diving on their prey, these birds are the fastest moving animals on the planet. However, what many do not know is that falcons mate for life. Both parents leave the nest to go and hunt for food to bring back to their chicks, called “eyases.” Falcon moms and dads travel up to 15 miles from the nest to make sure that their chicks have enough food to survive until they can learn to take care of themselves. Unfortunately, young peregrine falcons in Canada’s Arctic have been dying at higher rates in recent years due to the increases in heavy rainfall brought on by climate change. Sadly, these nestlings have been getting hypothermia and in some cases drowning in their nests during torrential downpours. In one study, one-third of chick deaths tracked in a given area were linked to heavy rain. As climate change continues to alter weather patterns and cause more extreme rain events, survival is going to become increasingly difficult for these vulnerable eyases.

USFWS

MTA of NY

Unfortunately, young peregrine falcons in Canada’s Arctic have been dying at higher rates in recent years due to the increases in heavy rainfall brought on by climate change.

Tigers and Cubs

Tigers, the largest feline on Earth, have thick orange-reddish coats with narrow black, brown or gray stripes. Tiger litters usually have 3-4 cubs that remain with their mother until they are independent, at around 2 ½ years old. Many tigers live in a coastal area of Bangladesh, the largest block of intact mangrove forest in the world and one of the only remaining forests big enough to hold several hundred tigers. Even though tigers are at the top of the food chain, a new danger now threatens them: climate change. An expected sea level rise this century of a foot above 2000 levels would cause a 96% decline in this tiger habitat.

Flickr/Nick Jewell

Alligators and Hatchlings

Even though they might be scary and intimidating as an adult, alligator hatchlings are reliant on their mothers for survival. Alligators are the largest reptiles in the U.S. and can grow to be more than 12 feet long. These awesome creatures with their strong jaws and powerful tails are an iconic species of the American Southeast. Alligators and their hatchlings are feeling the impacts of climate change in a variety of ways. Sea level rise is threatening nests built close to the shore–eggs can die in just 12 hours if they are submerged in water. Sea level rise is also inundating their fresh water habitat with brackish saltwater. But perhaps the most jeopardizing is the imbalance of sex ratio in gator hatchlings. As temperatures get warmer, there is a greater proportion of male offspring. This creates an imbalance in the population and puts the survival of the next generation at risk.

National Wildlife Federation Photo Contest/Garry Walter

Alligators and their hatchlings are feeling the impacts of climate change in a variety of ways. Sea level rise is threatening nests built close to the shore- eggs can die in just 12 hours if they are submerged in water.

Manatees and Calves

USFWS, Southeast Region/Gaylen Rathburn

Endangered manatees, also known as sea cows, live in warm waters along the Gulf of Mexico and Atlantic Coasts, feeding on sea grasses in the shallow warm waters. Gentle and non-threatening, manatees are a very popular species and tourist attraction. Female manatees are pregnant for a full year, and then nurse their calf for another 12 to 18 months. Newborns weigh a seemingly unbearable 60 to 70 pounds at birth and grow to weigh upwards of 1,000 pounds as an adult. The manatee's affinity for warm water suggests that climate change may help them, however, stronger hurricanes and sea level rise are expected to negatively affect the underwater grass beds where they feed. There is also concern that deadly red tides, unusual blooms of toxic algae that turn saltwater a rust color, could increase as coastal waters warm. In 2013, hundreds of manatees died as a result of red tide blooms.

The manatee's affinity for warm water suggests that climate change may help them, however, stronger hurricanes and sea level rise are expected to negatively affect the underwater grass beds where they feed.

Sea Turtles and Hatchlings

Sea Turtles, some of the oldest animals on the planet, once coexisted with dinosaurs. Living to be as old as a many human grandparents, roughly 80 years old, sea turtle moms begin to reproduce between the ages of 17 and 33 and return to the beaches where they were hatched to nest. Unfortunately, despite surviving for millions of years, sea turtles are now threatened by climate change and habitat loss.

USFWS Endangered Species

With many sea turtle species already classified as endangered, the impacts of climate change could prove even more tragic. Rising temperatures threaten sea turtle eggs by creating a dramatic gender imbalance among hatchlings. When incubated above 88 degrees Fahrenheit, hatchlings are much more likely to be female than male. Global warming could result in almost all female hatchlings, reducing the ability of these sea turtles to breed. In particularly warm climates like South Florida, extremely high temperatures could also lead to increases in egg mortality among sea turtles. Perhaps the greatest threat to sea turtles from climate change, however, is sea level rise. Parts of the central Atlantic Coast could see a 50 to 80 percent decline in the area of ocean beach this century, devastating critical sea turtle nesting habitat. According to a study in the northwestern Hawaiian Islands, up to 40% of green turtle nesting beaches could be flooded with three feet of sea level rise.

Parts of the central Atlantic Coast could see a 50 to 80 percent decline in the area of ocean beach this century, devastating critical sea turtle nesting habitat.

National Wildlife Federation Photo Contest/Jacqueline Orsulak

Monarch Butterflies and Caterpillars

Arguably the most recognizable butterfly species in North America, monarch butterflies have beautiful orange and black patterns on their wings. These butterflies are found across most of the U.S. and are a favorite critter for garden and backyard explorers. Unfortunately, this iconic species is at risk. Climate change is impacting the monarch's annual migration patterns, wintering grounds in the south, and breeding grounds in the north. Colder, wetter winters could be dangerous to the butterflies and hotter, drier summers could shift suitable habitats north. In 2013, the number of monarchs wintering in Mexico was at a 20-year low. Abnormal patterns of drought and rainfall in the U.S. and Canada may have caused adult butterfly deaths and created less available milkweed, the primary food for monarch caterpillars.

You Can Help! Cater to Caterpillars

In general, caterpillars of all kinds are pickier eaters than nectar-feeding adults. Female butterflies lay eggs on plant species that their offspring will eat, so including favored host plants in your yard or garden can help ensure reproductive success. You can play a part in the monarch's recovery by planting milkweeds, which their larvae depend on for nourishment. Maintaining an inviting space also includes avoiding pesticides and herbicides, which may kill not only target species but also beneficial insects and the foods they rely on.

National Wildlife Federation Photo Contest/Martha Hitchiner

Colder, wetter winters could be dangerous to the butterflies and hotter, drier summers could shift suitable habitats north.

The Next Generation—Our Kids and Wildlife

Bigstockphoto

Parents work hard to provide for their young, to make sure they are well equipped for the day when they're on their own. And while it's true that they are resilient, the big changes that are in store for them if we don't reign in climate change, will be daunting. The good news is that there are many simple things that parents and children can do to make sure the animals we treasure continue to thrive for future generations to enjoy.

Our parents and previous generations inspired us to love wildlife and wild places, from taking us fishing to showing us our first caterpillar in the backyard…

Action Toolkit—Simple Things to Help Wildlife

- **Organize a tree planting.** Neighborhoods, schoolyards, and places of worship, are perfect places for tree plantings. Trees do more than provide shade. They provide food, water, shelter and places for wildlife to raise their young. Learn more by visiting www.nwf.org/trees-for-wildlife.aspx

- **Restore our shores.** From ducks to turtles, our beaches, dunes, and marshes are lifelines. They also are eroding due to extreme weather, and tend to catch a lot of trash. Organize a marsh planting or a trash clean-up. Start an "adopt a shoreline" project (like the well-known Adopt a Highway program) and encourage families and businesses to adopt their favorite shoreline.

- **Educate others.** Teach friends, neighbors, and classmates about what we can do together to help animals, near and far. Visit National Wildlife Federation's Climate Classroom at www.climateclassroom.org and Activity Finder at www.nwf.org/Activity-Finder for fun things that kids, parents, and teachers can do together.

Protecting Wildlife for Our Children's Future

Bigstockphoto

Bigstockphoto

Bigstockphoto

For nearly 80 years, National Wildlife Federation has strived to protect wildlife and our outdoor places for generations to come, standing by our mission to inspire Americans to protect wildlife for our children's future. With your help, we can implement smart conservation policies in this country that will help protect our communities and beloved wildlife species from the impacts of a changing climate, such as:

- **Using and protecting the proven, existing laws to tackle carbon pollution.** The Clean Air Act was put in place to protect people and wildlife from pollution. Under this law, the U.S. Environmental Protection Agency has the authority and obligation to limit carbon pollution from the largest sources, most notably coal-fired power plants.

- **Reducing fossil fuel use and rejecting expansion of dirty fuels.** Oil, gas, coal, and other fossil fuel development degrade and fragment big game habitat, exacerbating climate stressors for wildlife. We must move towards cleaner, less-polluting forms of energy. Reducing fossil fuel use and embracing responsible clean energy development are essential for protecting people and wildlife from the dangers of climate change while spurring economic development.

- **Investing in clean energy development.** A serious effort to reduce carbon pollution must include investing in clean energy options such as geothermal, wind, solar, sustainable bioenergy, and efficiency measures that will reduce our dependence on carbon-polluting fuels like coal, oil, tar sands and natural gas, which are driving climate change.

- **Safeguarding Wildlife and Wildlife Habitat.** We need to reduce the level of negative climate change impacts to wildlife and their habitats. This can be done by designing and carrying out conservation plans that take into account the changing climate. As we continue to feel the effects of climate change, focusing on helping wildlife and their habitat will help save them for the enjoyment of generations to come.

Help protect wildlife and wild places for future generations–
www.nwf.org/wildlifelegacy

Success Story

Nurturing Black Bear Cubs and the Next Generation of Wildlife

Ben Kilham of Lyme New Hampshire, often called “Mother Bear Man” based on his nationally known figure in National Geographic films by that name, has been successfully raising orphaned bears cubs and reintroducing them back to the forests for decades. But nothing prepared him for the results of the extremely high temperatures in 2012 that caused fruit trees and shrubs to burst into life more than a month early, only to be blighted by the following normally freezing temperatures. As a result wild foods were practically absent that next summer. Mother bears desperately searching for food for their families were killed in chicken coops or while crossing highways in their frantic efforts. Ben ended up raising thirty orphaned cubs that year, far more than his usual three or four. But Ben happily nurtured the cubs and soon introduced them to his five acre pen where the cubs learned how to be bears and not pets. By the next summer the cubs were ready to be let go in the wilds of New Hampshire and Vermont leaving Ben with memories of “the summer it poured cubs.”

Ben Kilham

Bigstockphoto

Lead Authors:

Mollie Simon, National Wildlife Federation, Samantha Lockhart, National Wildlife Federation
Tara Losoff, National Wildlife Federation, Doug Inkley, Ph.D., National Wildlife Federation,
Felice Stadler, National Wildlife Federation

Acknowledgements:

We are grateful for the assistance from many National Wildlife Federation staff, including Miles Grant, Jennifer Janssen, Sandra Kota, Debbie Anderson, Claudia Malloy, Lena Moffitt, Michael Page, Kelly Senser, and Bruce Stein, Ph.D.

Front Cover Photo Credits:

Clockwise starting in the upper left: family hiking, Bigstockphoto; Alligator mother and hatchling, National Wildlife Federation Photo Contest/Jonathan Burket; grandson and grandfather fishing, Bigstockphoto; Penguin mother and chick, Flickr/Doug Faulder; mother and child, Bigstockphoto; Butterfly on child's hand, Flickr/Cees Hek; Pronghorn calf, National Wildlife Federation Photo Contest/Jeanette Tasey; boy with binoculars, Bigstockphoto; Monarch caterpillar, National Wildlife Federation Photo Contest/Deborah Cottrell; mother and baby at sunset, Bigstockphoto; Moose calves, Flickr/Barbar Fleming.

Graphic Design by MajaDesign, Inc.

For more information, please visit www.nwf.org/wildlifelegacy.