



## Saving the monarch

EDF is working with farmers  
to rescue the beleaguered  
butterfly.

Page 8

# Rebuilding the Gulf

Home to two million people, the Louisiana coast also provides vital wildlife habitat. But the state is rapidly losing its coastal wetlands. EDF helped ensure penalties from the BP oil spill are directed toward Gulf Coast restoration. In 2016, \$240 million was released to fund sediment diversions, a key component in the U.S.'s most ambitious coastal restoration program.

# The imperative to act



**S**HORTLY AFTER THE U.S. ELECTIONS, I met with some of the world's top business leaders at the Fortune-Time Global Forum in Rome. After a day spent discussing how business can help the global poor, we went to the Vatican for an audience with Pope Francis. There, we came to an agreement about the importance of protecting the world from the looming threat of climate change. More

than just saying they take climate change seriously, the CEOs committed to helping governments uphold the Paris climate agreement.

Despite today's conflicts, and the very real threat to the environment that the incoming administration represents, I agree with Pope Francis that we are living in a moment of hope as well as peril. He told us, "Your very presence here today is a sign of such hope, because it shows that you recognize the issues before us and the imperative to act decisively."

Here at EDF, we will fiercely resist any plans by the Trump administration to roll back our bedrock clean air, clean water and climate protections. I am reassured that whatever our government tries to do, corporations, states and many other countries will continue to advance the clean energy economy. In fact, since early November, companies as varied as Smithfield Foods and Walmart have announced far-reaching commitments to cut climate changing emissions. And with leadership from EDF, Illinois legislators passed the Future Energy Jobs Bill, which will help cut that state's carbon pollution by more than half. (*See story, p. 5.*)

As a candidate, Donald Trump took positions on climate that are contradicted by science and challenge everything we are fighting for. His pick to head EPA, Oklahoma's attorney general Scott Pruitt, has repeatedly sued the agency to block air and water safeguards, including measures that shield children from toxic mercury. The entire cabinet slights the environment in favor of an unprecedented overrepresentation of the oil and gas industry.

All this means we must protect and defend our air, water and precious lands. Our plan for doing so, coordinated with multiple allies, is described by EDF executive director Diane Regas on pages 6 and 7. I urge you to join our united front to defend the environment.

No one voted for dirty air and polluted water or for ignoring climate change, but many Americans fear for lost job opportunities and financial security. We must hear their concerns and work with them, demonstrating that a strong economy and a healthy environment go together.

Momentous and difficult challenges lie ahead. But every day brings new voices into the movement. I am confident that together, we can overcome these challenges.

*Fred Krupp*  
EDF President



Finding the ways that work

Environmental Defense Fund's mission is to preserve the natural systems on which all life depends. Guided by science and economics, we find practical and lasting solutions to the most serious environmental problems.

Our work is made possible by the support of our members.



### On the cover:

The monarch butterfly is one of America's best-loved species. But today, it's in trouble due to habitat loss. Solutions editor Peter

Klebnikov travelled with a group of scientists to the Midwestern grain belt to document a new project that seeks to enlist farmers who manage millions of acres of potential habitat for monarchs, bees and other pollinators.

Cover: Stocksy.com

## Solutions

**Editor** Peter Klebnikov  
**Art Director** Janice Caswell

Environmental Defense Fund  
257 Park Ave. South  
New York, NY 10010


**Main number** 212-505-2100  
**Membership questions** 800-684-3322  
or [members@edf.org](mailto:members@edf.org)

**WE WANT TO HEAR FROM YOU**  
Send feedback to address above or  
email [editor@edf.org](mailto:editor@edf.org)

### CONNECT WITH US ONLINE

 [edf.org](http://edf.org)

 [facebook.com/EnvDefenseFund](https://facebook.com/EnvDefenseFund)

 [twitter.com/envdefensefund](https://twitter.com/envdefensefund)

 [linkedin.com/company/environmental-defense](https://linkedin.com/company/environmental-defense)

©2017 Environmental Defense Fund.  
Published quarterly in New York, NY  
ASSN 0163-2566

New York / Austin / Bentonville, AR /  
Boston / Boulder / Raleigh / Sacramento /  
San Francisco / Washington, DC /  
Beijing, China / La Paz, Mexico / London

# FIELD NOTES



OFFSET

New rules cut methane emissions on public lands.

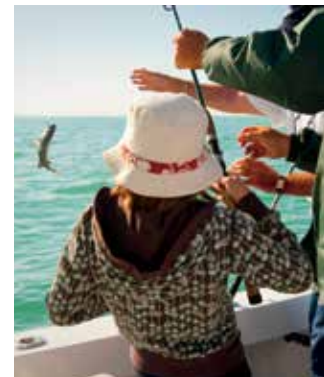
## Defending rules to clean up oil and gas

The U.S. Bureau of Land Management finalized new rules in November to curb methane emissions from new and existing oil and gas facilities on public and tribal lands. These lands cover 245 million acres, including iconic places like Utah's Red Rock Country. Fossil fuel interests moved swiftly to challenge the new rules, and EDF has joined with other groups to defend them in court.

With public lands and climate action under threat from the new administration, the stakes couldn't be higher. Methane is a potent greenhouse gas, accounting for a quarter of the warming we experience today. In the United States, oil and gas operations are the largest source of methane pollution. EDF led efforts to win the first-ever national limits on oil and gas methane emissions.

## SHOULDERING THE BURDEN

Millennials have been walloped by student debt and the Great Recession. But the impacts of unchecked warming will cost college-educated millennials even more in lost wealth over their lifetimes. Absent climate action, U.S. GDP is projected to take a hit of 5% by 2050, and 36% by 2100.



ISTOCK

## Progress on recreational fishing

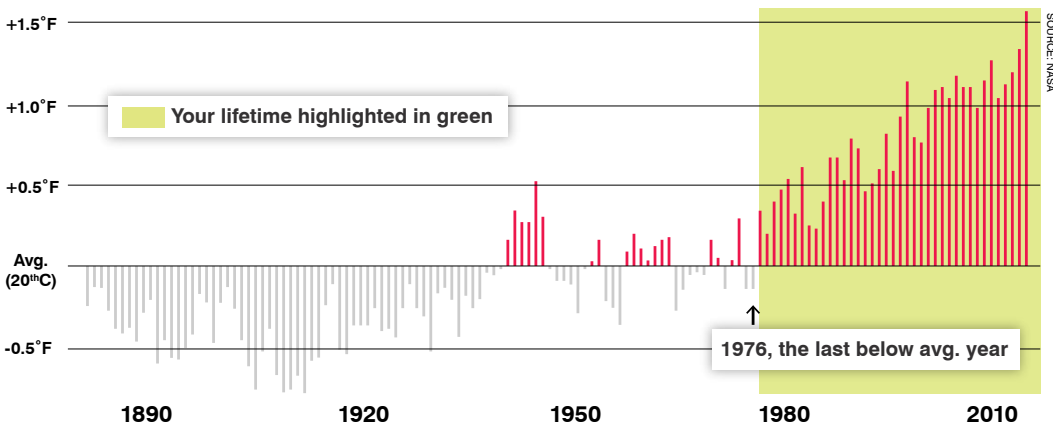
In the Gulf of Mexico, the secure fishing rights program for commercial red snapper, which EDF helped design, is a big success, having tripled the region's snapper population. But recreational fishing, which accounts for half the catch, is not part of the program and is poorly managed, leading to overfishing.

EDF helped recreational fishermen launch a two-year pilot program for large charter boats. Participating boats were able to take twice the number of customers fishing—an additional 60,000 people—for red snapper and gag grouper. They could also fish year-round under strict catch limits, while those not in the program saw their season shortened significantly. Discarded fish, typically dead or dying, dropped by nearly half. “We’ve stayed within our quota, made more money and have been totally sustainable,” says Capt. Randy Boggs, who participated in the program.

The new approach could be a model for managing recreational fishing nationwide. EDF now supports proposals to expand the approach to the entire Gulf for-hire fishing industry, which includes over 1,000 charter boats.

## HOTTER AND HOTTER

It's official: 2016 is the hottest year on record, breaking the record set by 2015. If you're younger than 40, you've never experienced a “normal” year. See our interactive at [edf.org/hotter](http://edf.org/hotter).



# States, businesses double down on climate goals

**E**VEN AS WE INAUGURATE a new president who challenges the science of climate change and has nominated an ardent foe of climate action to head EPA, many companies and states are moving ahead to cut climate pollution and create clean energy jobs. EDF is helping them.

## Clean energy in Illinois

In December, EDF helped win passage of a law that will double Illinois' renewable energy production by 2030 and help cut the state's power sector carbon pollution by 56%, well beyond the U.S. Clean Power Plan target of 34%.

The Future Energy Jobs Bill will reduce greenhouse gas emissions and save people money on their electric bills, while creating tens of thousands of new jobs and saving billions of dollars in wasted energy. Our analysis estimates the bill will lead to between \$12 and \$15 billion in private investment in Illinois, making it the most

significant clean energy package in the state's history.

The legislation will also invest \$750 million in programs, such as a new Solar for All initiative, that prioritize solar development and job training in economically disadvantaged communities.

## A corporation steps up

Buried under November's election coverage was a momentous announcement from Walmart, EDF's long-standing corporate partner. The company released its sustainability goals for 2025, goals that demonstrate how companies can maintain their momentum in the Trump era. They include: a pledge that 50% of the power needed to run Walmart stores and other operations will come from renewable energy; zero waste to landfills; zero net deforestation in key commodities such as palm oil and beef; and a cumulative one gigaton emissions reduction in the supply chain by 2030. The last goal is an industry



The retail giant unveils ambitious targets for sustainability.

landmark: one gigaton is greater than the annual emissions of Germany. EDF worked behind the scenes with Walmart to set the most ambitious goals possible.

## Food giant to cut GHGs


Smithfield Foods, the world's number one pork producer, announced it will cut greenhouse gas emissions 25% by 2025. Working with EDF, the company plans to reach the goal by better managing

fertilizer use on farms that supply its feed grain. This will reduce emissions of nitrous oxide, a powerful greenhouse gas. The company also plans to better manage manure at its farms, a source of the greenhouse gas methane. SmithfieldGro, the company's program to provide farmers with precision agriculture assistance and technology, has already helped over 200 farmers improve practices on nearly 100,000 acres.

## HEADING IN THE RIGHT DIRECTION

The nation's clean car standards are working—big time. By 2025, they'll have delivered these important benefits.

### Savings for consumers

 \$1.7 trillion saved at the gas pump\*

### Less climate pollution

 6 billion metric tons eliminated\*

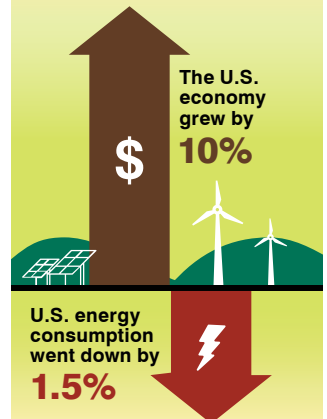
### Oil conserved

 2 million barrels of oil saved per day

\*OVER THE LIFETIME OF THE PROGRAM, WHICH BEGAN IN 2012. SOURCE: EPA

## ECONOMY UP, ENERGY USE DOWN

Over the last 8 years



SOURCE: THE ECONOMIST



The faces of commitment: Uniting to resist rollbacks of environmental policies.

# Protect and Defend: A call to action

By EDF Executive Director Diane Regas

In the U.S. election, Americans did not vote for dirty air, polluted water or more asthma. In fact, the vast majority of Americans—in red and blue states alike—support clean air, clean energy and climate progress. With our allies, EDF is fighting to defend the gains our nation has made over the last 50 years.

**B**Y NOMINATING OKLAHOMA attorney general Scott Pruitt as administrator of the Environmental Protection Agency, President Trump sent a clear signal that he intends to attack America's bedrock environmental protections. Pruitt, a close

ally of the worst elements of the fossil fuel industry, has rejected climate science and built his career on trying to tear down EPA limits on pollution. He's the wrong man for the job.

Every landmark environmental bill—including the Clean Air Act, Clean Water Act and Endangered Species Act—was passed with an overwhelming bipartisan majority. Thanks to these advances, Americans today are healthier and our environment is cleaner.

If, as expected, the new administration and Congress attempt to roll back fundamental health standards, they will run headlong into millions of mothers and fathers, millennials, business leaders and citizens of all stripes who are prepared to fight for clean air, clean water and a stable climate.

The environment is not a special interest—it is the foundation on which our lives depend. Together with our allies, EDF will resist any anti-environment moves at every turn. Here are some strategic priorities that will guide our work.

## Defend EPA

If Congress hobbles EPA, or the agency stops enforcing the law, the administration will face lawsuits and meet resistance from businesses that have already invested in compliance. Our legal team is strong and creative. To prevail in the coming battles, we will hire additional lawyers and stand up for the solid legal foundation underpinning EPA's actions.

"Their plan is: dismantle it all, get rid of it all," says Vickie Patton, EDF's general counsel, "but we're not going to let that happen. We have the law, our strong alliances and the facts on our side."

## Fight for the Clean Power Plan

During the campaign, President Trump vowed to scrap the Clean Power Plan, which sets the first national limits on carbon pollution from power plants. But any such action would first have to go through the same extensive public notice and comment process that EPA used in adopting the Clean Power Plan. EDF and its allies will be present every step of the

way, defending the rule from efforts to weaken or eradicate it.

History is on our side. Previous attempts to weaken the Clean Air Act and other environmental protections were ultimately abandoned in the face of overwhelming public opposition and defeats in the courts.

### **Uphold the Paris Agreement**

President Trump has said that his administration will pull out of the Paris agreement, imperiling U.S. global leadership. The landmark agreement, negotiated by 195 nations, marks the first time the world has committed itself to reducing carbon pollution.

The Trump presidency cannot kill the Paris process—too many other countries are too invested in its success. In addition, more than 450 companies have expressed support for the agreement. Still, the new administration could shift climate leadership from the United States to China, allowing that country to dominate the booming clean energy market. EDF will work with its global partners to maintain the momentum that put the historic accord into force years before expected.

### **Reinforce state leadership**

If environmental progress stalls on the federal level, many states will step up. California, for example, is already a world leader in clean energy innovation and job creation, and has no plans to back off (*see story, p. 14*). EDF is advising more than 20 states and numerous power companies that are working to comply with the Clean Power Plan and investing in clean energy.

This December, in Illinois we played a lead role negotiating passage of the Future Energy Jobs Bill, which will contribute to a nearly 56% reduction in greenhouse gas



**Attorneys Sean Donahue and Vickie Patton have led EDF to landmark legal victories.**



**The future belongs to the clean energy economy.**

emissions from the power sector by 2030, well beyond what the Clean Power Plan will require.

EDF also has a strong presence in virtually all the big oil and gas states and a track record of winning important air pollution protections there. Indeed, shortly after the election, Wyoming adopted EPA's new source regulations backed by EDF. The new rules will require strict limits on methane emissions from new and modified oil and gas facilities statewide.

Clean energy is supported by virtually every demographic, region and party. The solar industry already employs three times more people than coal. The growth in renewable energy is particularly strong in red states that have a lot of wind and sun, such as Texas and North Carolina.

### **Expand corporate partnerships**

The markets and the American people are moving this nation beyond dirty fuels to clean energy, and the new president can't reverse that tide. With EDF's help, a group of 365 businesses sent a message to President Trump warning that "failure to build a low-carbon economy puts American prosperity at risk."

Companies like Apple and IKEA have shown that we can address climate change while growing jobs and competing around the world. And industry giants Walmart and Smithfield have made new commitments to cut greenhouse gases (*see story, p. 5*). EDF is redoubling its work to enlist corporate leaders nationwide.

### **Support sound science**

In a blatant assault on science, the Trump administration has recommended cuts in NASA's climate change research. The

administration has also asked for the names of any Department of Energy employees who have participated in meetings on climate.

In no sense did the voters grant the new president a mandate to turn back the clock on science. EDF's scientists will hold President Trump and Congress accountable, bringing to light egregious misrepresentation of scientific fact.

### **Inspire public engagement**

We are at a moment when citizen action is more important than ever. America has an opportunity for engagement not seen since the civil rights movement. EDF will work across traditional boundaries in Washington to build a national coalition dedicated to sustaining, and expanding, environmental protections. The more egregious the attacks, the more strength and resolve they'll bring out in millions of people, corporations and states. We're in for a tough struggle, but we're ready.

## **WHAT YOU CAN DO**

EDF launched our Protect and Defend campaign to mobilize citizens to action. Working alongside Moms Clean Air Force, Defend Our Future and allies from the American Lung Association to NRDC, we will stand against the fact-denying, science-bashing cohort in Washington.

Don't let the voices of fossil fuel lobbyists be the only voices that the new administration and Congress hear.

Join our campaign at [edf.org/pledge](https://www.edf.org/pledge).

# In the fight against extinction, an unlikely ally

By [Peter Klebnikov](#)

Battered by climate change and development, 130 species are waiting to be protected under the Endangered Species Act. We don't have time to wait for legal action to save them. Fortunately, new tools have emerged to put species on the path to recovery. One of the most promising projects is helping to save the vanishing monarch butterfly.



**I**F YOU GREW UP ON A FARM IN THE MIDWEST, one thing you could always count on was the arrival of monarch butterflies on their autumnal journey from Canada to winter breeding grounds in Mexico. “Everybody has a monarch story,” says Kristin Duncanson, a corn and soy farmer in Mapleton, MN. “Whether it’s when you were in second grade and had caterpillars, or when you’re out on the field doing tillage and suddenly there are all these monarch butterflies following you. There’s nothing more beautiful.”

Monarch butterflies are a miraculous species, the only butterfly that performs a two-way migration. Their range spans all of North America, touching three countries and the entire continental United States.

Until recently, it seemed monarchs would always be there. But in just two decades, monarch populations have declined a staggering 90%.

A key reason for the monarch’s decline is the extensive loss of its milkweed habitat, particularly in the Midwest. Milkweed is where monarchs lay their eggs, where caterpillars hatch and feed. The plant also provides monarchs with toxins that render them unappealing to predators.

The challenge is that farmers, who own much of the land along the species’ migration paths, prefer to keep their fields weed-free by using herbicides like glyphosate or by mowing the edges of fields. “My entire career has involved getting milkweed out,” says Pat Duncanson, Kristin’s husband and a fifth generation farmer. “It’s a pesky plant. As a young kid, I had to pull those things out by hand.”

The conversion of habitat to cropland, climate change and development have also taken their toll. In fact, monarch butterflies could become extinct in North America within 20 years if conservation efforts fail to reverse the loss of habitat, scientists warn.

“The message is clear: The monarch is in trouble, and we need to quickly engage the agricultural community if we are to save it. We can’t wait for protections under the Endangered Species Act,” says David Wolfe, director of EDF’s Conservation Strategy and Habitat Markets program. “Fortunately, it’s not too late to change the monarch’s downward spiral.”

In an extraordinary response to the monarch’s plight, Americans across the country have been replanting milkweed in backyards, in schoolyards and in rights-of-way. Among them is 16-year-old Rachel Drost. A member of Girl Scout Troop 51437, Drost and her fellow scouts planted milkweed this summer in Minnesota’s Lake Elmo Park. “I just started this project because the thought of not having my own children know what a monarch is made me upset,” Rachel says. “Their one source of food is being taken away.”

While these efforts are exemplary, they are not enough. “We need 1.4 billion milkweed stems returned to the environment to stabilize the monarch butterfly,” says EDF program specialist Audrey Archer. “We can’t get to 1.4 billion without the help of farmers.”

That’s why in 2016, EDF launched a nationwide campaign to save the monarch. And because farmers manage most of the



Minnesota grain farmer Kristin Duncanson: “We can do this.”

habitat appropriate for milkweed, the centerpiece of the effort is a partnership with large-scale farmers. We’re focusing on restoring the “superhighways” that monarchs use to reach their wintering grounds. Our ten-year goal is to restore two million acres of monarch habitat—enough to guarantee a future for the species.

### Enter conservation farmers

Reaching this goal will not be easy. Modern agriculture is a latter-day miracle, and farmers aren’t eager to change practices that work. Also, farmers have frequently found themselves at odds with environmentalists.

So how do we change this dynamic? EDF’s answer: make it more profitable for farmers to protect milkweed habitat than to eliminate it. To do that, we created the Monarch Butterfly Habitat Exchange, a conservation program that provides incentives for farmers and ranchers to create and conserve habitat.

Under the exchange, farmers can earn credits for growing milkweed. The credits can then be sold through an exchange to buyers or investors who have an interest in seeing the monarch survive.

“The exchange makes growing milkweed a part of the landowner’s business model, just like herding cattle or harvesting a crop,” says David Festa, EDF senior vice president for Ecosystems.

EDF has pioneered Habitat Exchanges to help restore populations of other at-risk wildlife, such as the greater sage grouse, which is threatened by energy development and overgrazing. In 2016, the U.S. Fish and Wildlife Service approved EDF’s habitat exchanges as a preferred option for preserving at-risk species.

A wide array of private and public entities from agribusinesses to the general public have indicated a strong interest in investing to help the monarch. The Monarch Butterfly Habitat Exchange promises to be an efficient way to implement large-scale conservation for this species.

The exchange could help avoid the need to list the monarch

**The monarch weighs less than a dollar bill and can fly 2,500 miles.**

under the Endangered Species Act. Farmers have an incentive to avoid such a listing, since it would potentially restrict their ability to farm. “We could also use the extra income,” says Pat Duncanson.

Similarly, conservationists also have an incentive to avoid a listing, since that would lead to years of expensive court battles during which the monarch would likely continue to decline.

EDF is partnering with federal and state agencies, scientists from the University of Minnesota and nonprofit groups like Monarch Joint Venture to develop the exchange. The goal is to launch it by the end of this year.

Over the past summer, EDF experts and scientists from the University of Minnesota crisscrossed the country, tracking the butterfly migration routes and meeting with farmers, local officials and other potential partners. It was a race against time. The team travelled many thousands of miles and visited farms and ranches from Minnesota to California to Texas. At every site, landowners were keen to learn more about the monarch and what they could do to help.

The EDF team’s mission was to develop a scientifically accurate way to measure the quality of milkweed and nectar habitat. Historically, conservation results have been measured in the number of acres conserved, but the system we



JOHN PALE

EDF’s David Wolfe and monarch expert Dr. Karen Oberhauser examine habitat at the edge of a cornfield.

developed goes far beyond this by incorporating a habitat quality measure. “Basically, our job is to figure out how many monarchs can be produced on a piece of land anywhere in the country,” says Dr. Karen Oberhauser of University of Minnesota’s Monarch Lab and one of the nation’s foremost monarch scientists. “One of the goals of this tool is to make it simple for laypeople to use.”

The information the researchers compile will help scientists understand what kind of farm management is needed to restore milkweed. The same data will show how many credits a farmer will receive through the Monarch Butterfly Habitat Exchange. Farmers will be rewarded for measurable improvements to habitat, while buyers of credits will know exactly how much benefit they are creating with their investments.

“You need to place a value on the habitat if you want to save it,” says Wolfe. “Until now, there wasn’t a good way to determine the relative value of monarch conservation efforts. Now we know exactly how to maximize each buck for the butterfly.”

“While a lot of habitat needs to be restored, it can come in the form of many relatively small patches across the agricultural landscape, such as ditches and areas alongside fields,” Dr. Oberhauser said, “It just needs to exist in the right places along the monarch’s flyways.”

One of the research sites was the Duncanson family farm, in the heart of the Central flyway. Scientists divided into teams and spread out across the

property. One team, standing in a field of wildflowers, laid out long transects with thin PVC pipe and counted the density and diversity of milkweed and flowering plants in each plot.

The first monarchs were spotted not long after the morning fog had lifted. As their wings dried, they lifted off from a field of goldenrod, heading south along the flat horizon. During the day the scientists also saw a multitude of monarch caterpillars in various stages of development in a single milkweed patch, meaning that multiple monarchs visited this site at different times.

Holding a milkweed leaf, Dr. Oberhauser examined the tiny caterpillar clinging to it. “This one will make the journey,” Oberhauser said. “If all goes well, it will become a butterfly that flies to Mexico, 2,000 miles away.” Gently, she let the leaf go.

With the habitat analysis now complete, EDF is developing a series of recommendations for farmers to bring the milkweed back. These include avoiding mowing during times of high monarch activity, spraying only when the wind is low, and planting native flowering plants as nectar sources. And because monarchs are considered the flagship for other pollinators, these changes will also benefit honeybees, which contribute to one-third of the food we eat. In the long run, creating more habitat across broad swaths of the country will also enable pollinators to better adapt to the impacts of climate change.

To get the word out about the Monarch



OFF-SET

## HELP THE MONARCH!

Find out what you can do for these beautiful creatures. Get details on how you can help at [edf.org/HelpMonarchs](http://edf.org/HelpMonarchs).

Butterfly Habitat Exchange, EDF is planning workshops in target states with crop advisors, and partners such as Iowa Pork Producers, state farm bureaus, cattlemen's associations and others. We'll then approach investors.

"Who delivers that message to farmers is very important," says Kristin Duncanson, who is a former president of

the Minnesota soybean growers' association. "EDF is good at building partnerships and has a solid reputation of working with the agricultural community.

"I have yet to meet a farmer who isn't receptive to this project," she adds.

The annual migration of monarchs is one of nature's great pageants, and

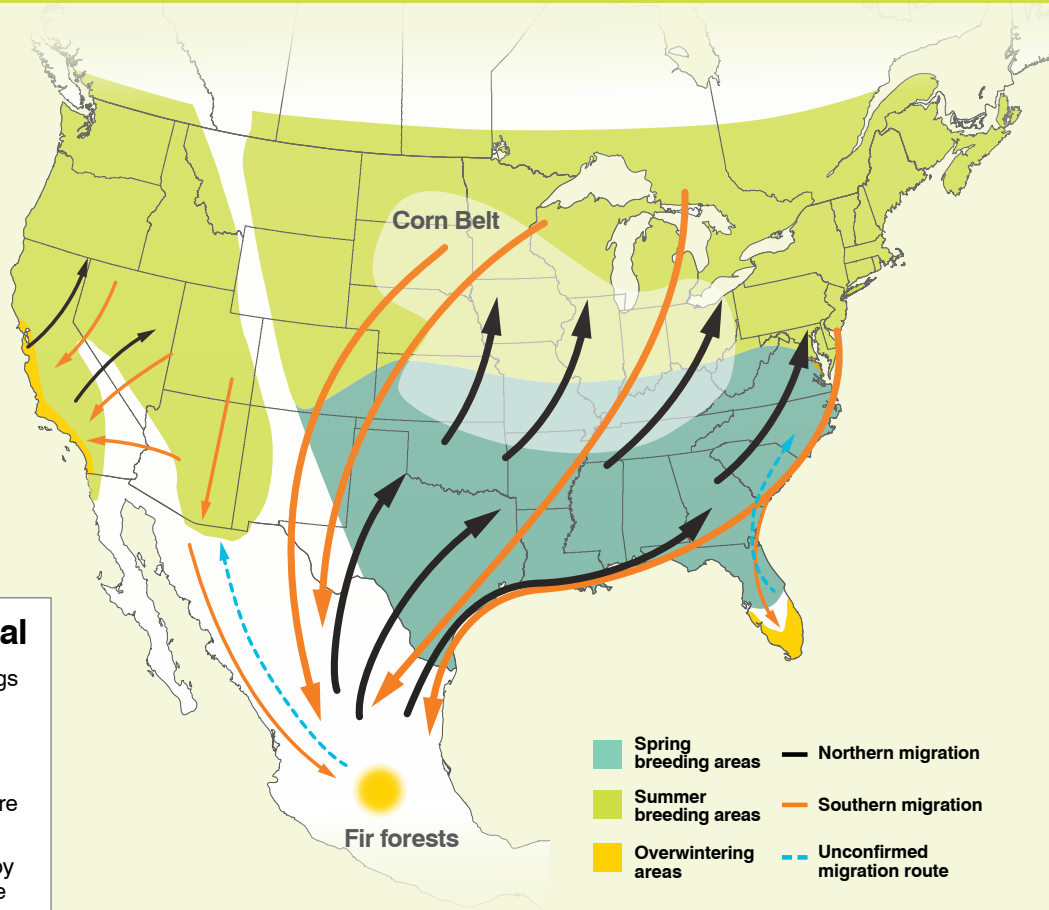
farmers must play the lead role in ensuring its survival. The Monarch Butterfly Habitat Exchange will give them the means to do this.

"The first thing farmers have to realize is that the decisions we make go way beyond the farm," says Pat Duncanson. "We can change our practices. Tell us what to do and we will do it."

## A humble plant powers an epic migration

The migration of monarchs is one of nature's wonders. It's also shrouded in mystery. The Aztecs believed monarchs were the souls of dead warriors, returning to their homeland in full battle colors. Today we know that monarchs fly from the U.S. and Canada to Mexico and back, a trek that takes four generations to complete.

We also know that monarchs navigate by using their complex eyes to follow the sun and their antennae to track the time of day. This explains why off-course monarchs always "recalibrate" by turning full 360s in the air before they make course corrections. But we still have no clue why monarchs that fly south live longer than those flying north.



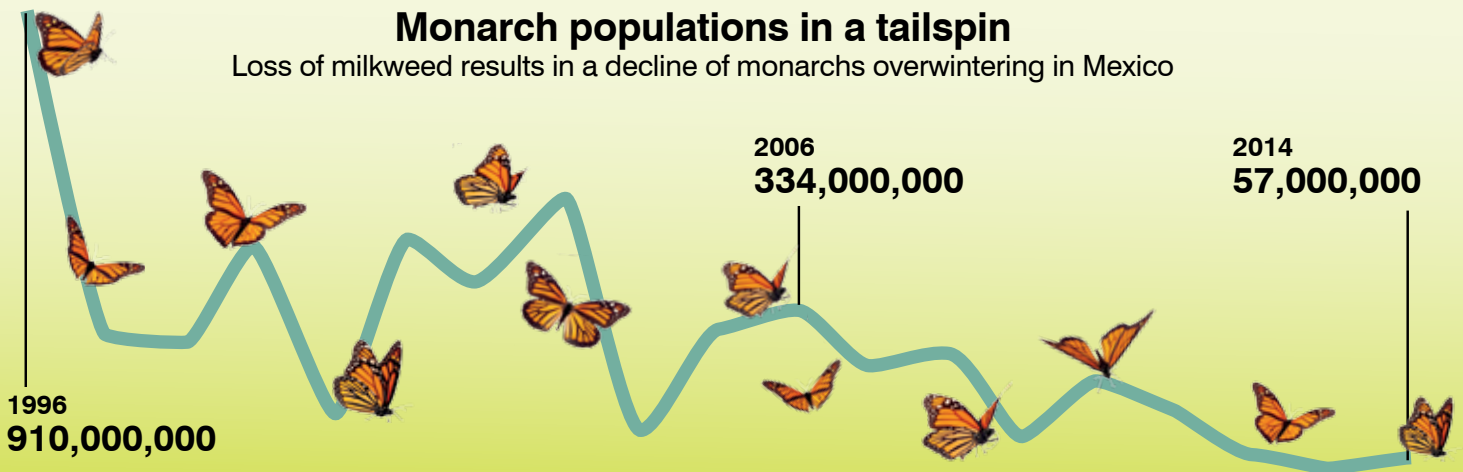
### Milkweed, the key to survival



- Female monarchs lay eggs only on milkweed leaves
- Monarch larvae eat only milkweed leaves
- 73 species of milkweed are native to the U.S.
- Milkweed is being killed by widespread herbicide use

### Monarch populations in a tailspin

Loss of milkweed results in a decline of monarchs overwintering in Mexico



# One summer, \$64 million in energy savings



DEREK LAPSELEY

With a boost from EDF Climate Corps Fellow Lillian Mirviss, Gap Inc. is setting ambitious goals to cut carbon emissions.

**S**INCE 2008, CLIMATE CORPS Fellows, recruited and trained by EDF, have been helping companies and other large organizations slash carbon emissions while saving money. The results have been remarkable.

As a captain in the Marine Corps Reserves, Donna Sanders relishes a challenge. In 2014, she kayaked 230 miles around Glacier Bay National Park in Alaska, an excursion that took 20 days. There she saw firsthand magnificent glaciers in retreat, increasing the risk of disastrous sea level rise.

"I've seen climate change up close," she says. "People after us will have no idea what these places looked like. That's irresponsible."

Last summer, Sanders took up a different challenge. She became an EDF Climate Corps Fellow, ferreting out significant energy savings at a Corning fiber optics plant in Wilmington, NC.

When EDF launched Climate Corps in 2008, we knew it was a powerful idea: pair trained graduate students with companies looking to reduce their environmental footprint. What we didn't know was how big the program's impact would be. Since 2008, EDF Climate Corps Fellows have identified projects that could reduce greenhouse gases equal to the emissions of 430,000 cars, while identifying \$1.5 billion in energy savings.

For companies, the experience can be

an eye-opener. Says a manager at Bloomberg BNA: "By day two of the job, our EDF Climate Corps fellow saved us \$100,000."

At Corning, Sanders recommended strategies that will help Corning save money for power outages lasting from a few seconds to a few minutes. For outages lasting longer, the savings could be substantially greater. She also recommended environmentally friendly alternative power sources.

The daughter of a California solar lobbyist, 2016 Climate Corps Fellow Lillian Mirviss became committed to protecting the environment after spending a semester abroad in China, which brought her face to face with the country's notoriously polluted air.

"I came back with a bad cough and a desire to make a difference," she says.

Last summer, Gap Inc., the clothing retailer, invited Mirviss to help develop its ambitious renewable energy strategy. Gap aims to cut its greenhouse gas emissions globally by 50% from 2015 levels by the end of 2020. Gap's managers didn't anticipate how far ahead of schedule Mirviss' work would put them. She identified three distribution centers as sites for solar power installations, and 15 solar companies are already interested.

All told, during the summer of 2016, our 125 fellows identified \$64 million in potential energy savings at companies

ranging from a winery in California to a Coca-Cola bottling plant in Shanghai.

Perhaps most significantly, almost 80% of EDF Climate Corps alumni are today working in the field of sustainability. One of them is Fatou Jabbie, a native of West Africa who came to the United States to study computer engineering and served in Climate Corps in 2014. She launched an energy consulting firm in New York City and now, with five employees, advises builders and architects on energy efficiency. Jabbie always pushes her clients to do better. "I don't know when meeting the minimum was ever a goal," she says. "If you can meet the minimum, you can do more."



MARGO WISEMAN

EDF Climate Corps alumna and energy entrepreneur Fatou Jabbie.



SHUTTERSTOCK

EDF's first win: a ban on DDT, which was decimating osprey populations.

## A half century of standing up for nature

IT ALL BEGAN WITH A SMALL GROUP of scientists and a lawyer. One evening in 1966, the group met in a Long Island, NY, living room. The scientists had amassed clear evidence that the pesticide DDT was harming magnificent birds like the osprey, but local officials were ignoring their appeals. So they decided to do something audacious: they went to court on behalf of wildlife—at a time when environmental law barely existed. Ultimately, they won a nationwide ban on DDT, helping birds of prey to recover.

When the attorney and scientists joined forces that day, it marked a turning point for conservation in America and led to the incorporation of EDF in 1967. Fifty years later, EDF is still committed to preserving wildlife. Today, the greatest risk to species is loss of habitat.

Our Safe Harbor program, launched in 1995, gave landowners incentives to save species by protecting the habitat they need to thrive. Today more than four million acres are enrolled, benefiting

more than 60 rare species, including the red-cockaded woodpecker and the black-capped vireo.

The challenge today—with energy development booming in once-remote places and climate change disrupting habitat—lies in saving habitat fast enough to protect the dozens of species slipping closer to extinction. First, we need to broaden our circle of allies. That's the point of EDF's new Habitat Exchange, a program to enlist ranchers, farmers and forest owners in conservation. They manage two-thirds of our nation's land, where 75% of endangered species are located. Under this program, landowners are paid to improve their land to host wildlife, while companies that degrade habitat are required to fund the creation of better-quality terrain to more than compensate for the damage.

As we prepare for political attacks on the Endangered Species Act under the new Trump administration, a host of new allies across the country has joined the battle to protect vanishing wildlife.



### We need your help now more than ever

The Trump administration wants to weaken the Endangered Species Act. Help us protect wildlife through partnerships with private landowners. Your gift may be some creature's last chance. Visit [edf.org/wildlife50years](http://edf.org/wildlife50years).

### THE WILSON LEGACY

## Economics and the monarch butterfly

By Frank Convery, EDF Chief Economist

In "Reality Demands," the poet Wislawa Szymborska captures the essence of human resilience:

*Life goes on.  
It continues at Cannae and Borodino,  
At Kosovo, Polje and Guernica.  
Where Hiroshima had been  
Hiroshima is again,  
Producing many products  
For every day use.*

Humans can and do recover from the stupidities and horrors we inflict on ourselves and one another. But some things, like the extinction of species, are irreversible. The threatened survival of the monarch butterfly (see cover story, page 8) is a case in point.

How can economics help? By taking the need to avoid extinction as a given, and finding the most efficient, least costly way of doing so. Take EDF's pioneering use of Habitat Exchange, which brings the magic of the marketplace to preserving species. It creates a market that brings together two sets of interests: businesses that need to offset the effects of their operations and landowners who can preserve habitat. The market is created by inviting landowners to take part in an auction, where they specify the minimum amount they'd accept from businesses to create each unit of habitat.

The result combines interests of both parties to create a common good: more people participating in species preservation, more funds to protect wildlife and an increased amount of habitat.

>>> READ MORE >>> [edf.org/wilson](http://edf.org/wilson)



SHUTTERSTOCK

This regular column honors the memory of Robert W. Wilson, a longtime EDF supporter and champion of harnessing market forces to drive environmental progress.

# California ratchets up climate action

**A** DECADE AGO, CRITICS OF California's ambitious climate policies grimly predicted disaster. They claimed that economic output would stall, jobs would leave the state and the cap-and-trade program to cut heat-trapping emissions would be a fiasco.

History has proved otherwise. Today, California is ahead of schedule in meeting its nation-leading climate goals—and the state's carbon market is proving to be resilient, cutting greenhouse gas emissions, generating new revenue and spurring innovation.

EDF cosponsored California's 2006 Global Warming Solutions Act, which committed the state to reduce its greenhouse gas emissions to 1990 levels by 2020. It's such a success that in August 2016, the legislature voted for an additional 40% cut by 2030, a move that solidifies California's role as a world leader in the effort to curb heat-trapping emissions. More than two-thirds of Californians favored expanding the state's climate program.

The law's centerpiece is a cap-and-trade program covering nearly 450 of the largest emitters. California also set rigorous environmental standards spurring changes in the way automakers design cars, utilities generate electricity and refineries make fuel.



OFFSET

**A myth demolished: California showed that economic progress doesn't have to result in more pollution.**

Even as these changes took effect, the Golden State has outpaced the national average in GDP and job growth. In the first two and a half years of California's carbon market, the state added 900,000 jobs, many of which are a direct result of investments in clean technology spurred by the state's climate policies.

The legislature approved the new emissions bill along with another measure intended to send more money to poorer communities that suffer from some of the worst pollution.

EDF played a key role working with allies and state regulators to develop a blueprint for the state's climate policies. We also helped enlist 150 partners in the business, faith and environmental

justice communities to sign a petition encouraging state legislators to support the additional 40% cut.

California, with the world's fifth-largest economy, is now partnering directly with several Canadian provinces to implement joint cap-and-trade programs, as it has already done with Quebec. It has also established agreements to share information and work with Mexico and China on their efforts to put a price on carbon.

"States, cities and countries are watching carefully and taking action—a race to the top that is good for the planet," says EDF attorney Erica Morehouse. "California's example is showing what can be done, even if federal climate policies stall."

## Charting your future with EDF

**Did you know there's a gift to EDF that returns payments for the rest of your life AND helps us fight for the environment in these challenging times?**

**A charitable gift annuity gives you secure, stable income. If you are over 65, please contact us for more information.**

Contact Cynthia DiLeo in our Planned Giving office today:  
Toll-free: 1-877-677-7397 | [legacy@edf.org](mailto:legacy@edf.org) | [edf.org/legacy](http://edf.org/legacy)



# Cleaner, friendlier skies



If aviation were a country, it would be a top-ten emitter of carbon dioxide, on par with Germany. Left unregulated, its carbon emissions could quadruple by 2050 as tens of thousands of new jets take wing.

**E**NVIRONMENTAL DEFENSE FUND has been deeply engaged in getting governments to cap the carbon pollution of international flights, which is not covered under the Paris climate agreement.

In October, the 191 member states in the UN International Civil Aviation Organization (ICAO) adopted a global market-based measure to limit the net carbon emissions of all flights between participating countries, at year 2020 levels. The commitment, which runs from 2021 to 2035, would require emissions cuts of about 2.5 billion tons—comparable to taking 35 million cars off the road.

“The agreement is a significant step in its own right,” says Dr. Nathaniel Keohane, EDF’s VP for global climate. “With robust implementation, it can serve as a springboard to even greater ambition.” EDF helped design key elements of the agreement.

The ICAO measure could spur airlines to improve the fuel economy of their routes and replace older, less-efficient aircraft with newer planes. The program gives airlines flexibility to meet the cap by investing in carbon credits outside the sector. The credits could come from alternative energy, forest conservation and other programs that achieve verified re-

ductions in greenhouse gas emissions.

Sixty-six nations, including the United States, China and European countries, have signaled they will participate in the first voluntary phase of the program, which begins in 2021.

“While it could be better, the agreement provides a basis for moving forward,” says Annie Petsonk, EDF’s international counsel. The deal currently covers three-fourths of aviation’s anticipated emissions growth (small nations are initially exempt). “Now we need to ensure transparency and even broader participation,” she adds. Over the next two years, EDF will help write the detailed international rules to ensure the new market operates with integrity and, once it’s established, to ratchet the cap down in line with Paris goals for limiting warming.

At press time, it was unclear whether the new Trump administration would honor the deal. “We’re hopeful,” says Keohane. “America’s aircraft companies are among our country’s

biggest manufacturing exporters, and a market for cleaner planes means a larger market for them, so this package has industry support.”

If Trump were to back out, Europe would likely revert to its own plan to cut emissions of flights to and from European airports. And China, which is instituting a cap on emissions of domestic flights starting in 2017, could expand its program to cover flights in and out of China. A proliferation of regional programs would be a nightmare for airlines.

“If the United States stands by its commitment,” says Petsonk, “the agreement could serve as the backbone for broader carbon measures around the world. But if America reverses course, other nations could institute precisely the kind of regulatory patchwork that U.S. industry fears.”

## Flight plan: improving fuel efficiency

Fuel accounts for more than one-third of airline costs. Improving airplane design, fuel efficiency and flight operations could slow emissions growth significantly. Here are some innovations being studied:

- Use of more composite material than metal, to make next-generation aircraft significantly lighter.
- Wings that can quickly change shape to slice through turbulent air.
- Fuselages and wings painted with a coating that mimics sharkskin. The ribbed pattern reduces friction.

# The water warriors

By Leslie Valentine



Five years into a severe drought, California is depleting its groundwater—the state’s lifeblood—faster than it is being replenished. Nowhere is the system more broken than in the Central Valley, the nation’s food basket. With EDF’s help, a group of resourceful water heroes has emerged to fight for sustainable water use.

**D**RIVE ALONG THE BACK ROADS OF California’s Central Valley and you’ll pass farm stands piled high with lettuce, avocados, peaches and walnuts. Fields of tomatoes ripen in the hot sun. The Valley—which extends 450 miles down the middle of the state—is the nation’s richest agricultural region, producing 40% of our fruit, vegetables and nuts.

This area is also ground zero for California’s water problems. With nine million acres of irrigated farmland, most of it in the Valley, agriculture uses nearly 80% of the state’s water. Five years into the drought, water—or the lack of it—is on everyone’s mind, from farmworkers to teachers to truck drivers. Will there be enough?

As water levels in California’s rivers, lakes and reservoirs plummet, residents have turned to groundwater. Already, the Central Valley draws 20% of the groundwater pumped in the entire nation. With so many straws in the ground, aquifers are being depleted, causing wells to run dry or become contaminated and dam-

aging vital ecosystems.

The most critically overdrawn water basins are in the Central Valley. Here, thousands of people—many of them low-income—live without safe drinking water.

To tackle the crisis, the California legislature in 2014 passed the Sustainable Groundwater Management Act. The law requires local districts to maintain safe levels in their aquifers but offers little guidance on how to do so. “Communities have been left to their own devices,” says Ann Hayden, who directs EDF’s California water work. “It’s a free-for-all, and the poor lose out the most.”

The state’s water system today includes complex water rights that tend to benefit the wealthiest users. It is also bogged down by a crazy quilt of regulations that discourage conservation. As a result, small farmers, poor communities and the environment have borne the brunt of the drought.

The most vulnerable live in unincorporated communities, like Armona, population 4,150. They depend on one or two community wells unconnected to a larger

system. Some two million California residents are served by such unregulated private wells or small water systems.

“We have a lot of poor, underprivileged people working to do the best they can,” says Jim Maciel, formerly the manager of a farm equipment dealership and a long-time member of Armona’s community water board.

Compounding the problem, large, wealthy farms are pumping faster than ever. Biola, another small community near the San Joaquin River, is fortunate to have clean, plentiful water, but “big agribusinesses are coming in with huge pumps and drilling deep,” says Reyes

## THE HARDEST-HIT WATER BASINS IN CALIFORNIA





Lozano, a raisin inspector who serves on Biola's water board. "What happens to us if we have four more years of drought?"

We got a preview last year. On Fairfax Road in Kern County, just outside Bakersfield, six families were sharing a well that went hundreds of feet deep. That well went dry last year. EDF helped secure funds for the Fairfax Road community to drill a new one. But drilling new wells is not a long-term solution. "The impact of the drought on these people's lives is a textbook case of how global warming is disproportionately impacting America's poorest communities," says Ana Lucia Garcia Briones, EDF's project manager in California.

EDF is working with agencies such as the California Department of Water Resources to promote an equitable system of water sharing that encourages conservation statewide and allows this finite resource to go where it's most needed. We envision a system in which farmers use water more efficiently and

transfer conserved water to meet the unmet needs of both humans and environment under stress. This will help make disadvantaged communities more resilient to drought and climate change.

### On the front lines of the crisis

The task of managing small water systems falls to volunteer community leaders like Maciel, Lozano and Felipe Labrada, a maintenance worker in Lanare, 50 miles southwest of Fresno.

Like many rural communities in the Central Valley, Lanare attracted waves of farmworkers, first African Americans in the early 1900s and later Latinos, drawn to affordable land close to the fields where many worked. A third of Lanare's 589 residents live under the poverty line.

Today, one of Lanare's wells has run dry and another is contaminated with arsenic. The community is drilling two new wells and building a treatment plant, although the costs are high even with supplementary federal grants.

"My hope is for my community to have a well-functioning water system so we can live like human beings, united, and so we can raise up this little town that needs so much," says Labrada.

As of now, taps are still running. "We use the arsenic-tainted water for laundry but do not drink it," says Connie Hammond,

a board member. "I don't even give the water to my dogs. I'm spending \$65 a month on bottled water."

As communities move forward with short-term solutions, these local water managers are working hard to develop long-term plans under California's new groundwater law. To assist them, EDF has partnered with two grassroots groups, Self-Help Enterprises and Rural Community Assistance Corporation. Over the course of six months, we provided intensive leadership training workshops, the first of their kind, to managers of small rural water districts. Our aim is to extend the program to other hard-hit areas statewide.

"We want to make sure that state water agencies listen to and address the needs of rural communities," says Hayden.

"The goal of the workshops was to get water leaders in the region to work together and think of themselves as a family, not competing with one another," says Blanca Surgeon, a rural development specialist with Rural Community Assistance Corporation.

The workshops featured nuts-and-bolts lectures by experts on the groundwater sustainability law as well as problem-solving exercises. One session was devoted to the legislative process and how to get results in Sacramento.

"Empowering these local communities is vital if California is to overcome its water crisis and build resiliency to climate change," says Garcia Briones.

As Olivia Gomez, one of the workshop participants, puts it: "I've stepped out of my comfort zone to learn how you can better manage water. And I've learned how to better help my community."



"Working with other communities with the same problems has made me feel much more powerful," says Jaquelin Gonzalez, with daughter Angelina. "We're making a difference."



Felipe Labrada at the Leadership Institute: "Water is everybody's problem. I'm learning hands-on how you actually manage it."



Jim Maciel shows EDF's Ana Lucia Garcia Briones how his town treats water that tested high for arsenic.

ALL PHOTOS THIS PAGE: NIKE ARNAL

# How to convince a skeptic that climate change is real

**W**E'VE ENTERED A NEW POLITICAL era, and emotions are raw. Still, it's more important than ever to convince your climate-skeptic neighbors, friends and relatives that climate change is real—and happening.

Today, in our country, where a person stands on climate change may have more to do with group identity than with factual information. But if approached in a friendly way, most people—and especially family—are willing to listen to other points of view.

The trick is to use patience and tolerance—along with your best understanding of your audience—to nudge listeners. You may find they're suddenly open to your views.

Here are five tips to make your conversation more productive.

## ■ Don't get angry

If you begin a sentence with, "That's really stupid," the conversation might as well end there. Above all, show respect for the other person's views. The goal is to build trust, not prove a point.

## ■ Leave the apocalypse to the movies

Avoid drawing a picture of planetary catastrophe. Instead, suggest that managing climate change means managing risk. Don't we want to take commonsense steps to reduce the risk to this and future generations, especially since those steps will also deliver clean energy jobs, greater social justice and improved public health? The conversation doesn't have to be about how the world ends.

## ■ Seek common ground

By expressing respect for peoples' religious or political views, you may be able to persuade them that climate action isn't at odds with their identity. People of faith, for example, might like to know that religious leaders from every major creed, including the Pope, have called



Let's talk.

for immediate action on climate.

Those concerned about the economy might be interested in hearing that the U.S. is already a leader in clean energy and is adding tens of thousands of jobs. If the refugee crisis keeps your listeners up at night, point out that climate change will render whole countries uninhabitable. If they are animal lovers, talk about the numerous species going extinct.

## ■ Tell your own stories

Large data sets may convince a scientist, but for the rest of us, shared personal experiences are the best persuaders. Has the beach you've visited since childhood been eroding? Do you have a relative whose business out West is failing because of drought? Has your town flooded unexpectedly? Share your stories.

## ■ Stick to the facts

Ninety-seven percent of climate scientists agree that climate change is happening now and humans are the main cause. Like gravity, our warming climate is a scientific fact. Step off a cliff, and you will go down, regardless of your beliefs.

In fact, irrefutable knowledge about climate change has been expanding for a long time, but the arguments against action haven't changed much. Luckily, you don't need a Ph.D. in atmospheric science to debunk them. Below are some excellent sources to help you give correct (and convincing) answers to many climate change falsehoods.

*By staff writer Tim Connor, who is retiring from EDF after 27 years. We thank him!*

## EXPLANATIONS AND TIPS

### skepticalscience.com

Hard-headed, specific rebuttals to the most common climate change myths.

### connectingonclimate.org

The Center for Research on Environmental Communications offers ten principles of climate communications.

### climateoutreach.org

Europe's leading climate change communicators translate academic knowledge into practical resources.

### epa.gov/climatechange

Written for laypeople, this site explains basic science on why and how the climate is changing. It also describes the impacts of climate change around the world.

### ipcc.ch

The Intergovernmental Panel on Climate Change site contains the history and science of the world's collaborative plan to halt climate change at a safe temperature level.

# Readers react to the election

Following Donald Trump's victory, EDF received an outpouring of support from members sharing their plans to defend the environment against expected threats. Some examples:

No matter what you do, don't back down. Teach as you do, demonstrate the economics as you do, and show what will work.  
—Peter G., OH

Our land and wildlife are part of who we are as a country. Destroy those and we destroy ourselves.  
—Ms. Brannin, NV

A planet with plenty of jobs for today but undrinkable water and unbreathable air for tomorrow is not a life we should have to accept. And a planet where we can afford every gadget for our homes today but leave nothing related to nature for the future is not an existence we should leave those who succeed us.  
—Mr. Arrington, VA

It might seem silly, but I have started emailing images of the carbon cycle to GOP members of Congress. Next week I'll explain photosynthesis and the role of phytoplankton.  
—Susan G.

I hope we will be looking for Republicans who share or are open to our concerns. We should be pushing forward against any crack in the ideological bulwark.  
—Marion T., IN

The work of EDF remains a shining star in the inky blackness of the American political landscape today. Thank you for all that you do on behalf of the environment, and for not giving up. I will continue to send



ISTOCK

donations—your newsletters are one of the few sources of hope for the future. We will prevail, the planet is on our side.  
—Susan A., AZ

## ACTIVIST PROFILE

# A force to be reckoned with



GRETCHEN DAHLKEMPER

Gretchen Dahlkemper combines activism and parenting.

With five decades of environmental progress in the crosshairs, EDF staff like Gretchen Dahlkemper are organizing. Activism comes naturally to Dahlkemper. Her mother was a member of Congress, and Gretchen herself has been active in political campaigns stretching back to seventh grade, when she worked a phone bank for a soon-to-be state senator.

"I grew up in a service-oriented family," she says, guided by the Catholic Church's teachings on social justice. Today, Dahlkemper is national field director for Moms Clean Air Force, an EDF-backed community of 900,000 moms (and dads) united to fight pollution and climate change ([see momscleanairforce.org](http://www.momscleanairforce.org)).

A hard-charging mother of three, Dahlkemper had her passion for the environment triggered one night when she was pregnant with her second child. Waking up at 3:00 am and unable to sleep, she went online and Googled "tuna" and "pregnancy." That's when she came across the Moms website and learned why her doctor told her to avoid tuna: coal-fired power plants spew toxic mercury into the environment, where it is taken up by fish. Eating those fish puts babies at risk. Shocked, Dahlkemper reached out to Moms co-founder Dominique Browning to volunteer for the group. Browning recognized her organizational talent—and her grit—and quickly promoted her to national field director.

Dahlkemper oversees a field staff ranging from attorneys to a Florida meteorologist. The Moms online action center makes it easy for busy parents to make their voices heard, and Dahlkemper encourages Naptime Activism—using a parent's precious free time for advocacy. Moms members take actions that include emailing and calling elected officials and writing letters to newspaper editors. Senator Tom Udall (D-NM) credited Moms with helping pass landmark chemical safety reform in 2016.

Dahlkemper spends her days on the road or on the phone, visiting lawmakers and organizing on-the-ground actions like a recent Moms "Play-In" in Washington. She speaks of "moving people up the ladder of engagement." Over Thanksgiving, she helped serve dinner to pipeline protesters at the Standing Rock Reservation. "Clean air and clean water are basic human rights," says Dahlkemper. "We won't let them be taken from our families."

# Nobody voted for more pollution

**“The American people will not stand for a rollback on clean air and clean water.**

**“We did not ask for this fight, but we will win it.”**

—Fred Krupp, EDF President

Take the pledge to protect and defend the environment at [edf.org/pledge](https://edf.org/pledge).