



Inmates propagate native prairie plants to restore habitat at Washington's Fort Lewis.

Green Rehab

Inmates Fuel a Prairie's Restoration

WHEN NATURE CONSERVANCY horticulturist Daeg Byrne began restoring prairies at Fort Lewis in southwest Washington, he didn't anticipate that his efforts might transform lives. But that was before he enlisted inmates from the Stafford Creek Corrections Center to help grow and supply the native plants he needed for his restoration efforts.

"We are cutting across cultural lines, bringing conservation to people we wouldn't normally think of as partners," says Byrne. The half-dozen inmates who nurture the plants in prison

greenhouses have heartily engaged in the restoration effort, he says. "The project has changed my ideas of what a prison is all about."

This unorthodox collaboration is part of a larger Sustainable Prisons Project that was started in 2004 by Nalini Nadkarni, an ecologist at The Evergreen State College and a board member for the Conservancy in Washington. When Nadkarni first contacted prison officials to see if there was any interest in helping cultivate moss for one of her experiments, she was surprised to find that

they were receptive to the idea. Since then, the project has grown to include a variety of programs at four Washington prisons.

Some aspects of the project, such as recycling and growing organic vegetables, aim to reduce the environmental impact and costs of operating a prison (the Cedar Creek facility alone produces 15,000 pounds of organic vegetables each summer). Under other parts of the project, inmates have cultivated plants, bred endangered frogs, and maintained and studied beehives.

For their part, inmates get technical training and a break from being inside stark prison buildings. Many are genuinely intrigued and excited by the science, as well as by the chance to connect with nature, says Nadkarni. "There's an assumption that unless you

are highly enlightened, you don't care about the environment. But many [inmates] do," says Department of Corrections spokesman Chad Lewis.

And there are other, less tangible benefits. "For some of these guys, it's the first time they've been trusted with any responsibility," says Lewis. Many are proud of their work in the greenhouse, he says.

In 2008, Nadkarni helped initiate conversations between prison officials and the botanists working with the Conservancy and the U.S. Army to restore prairies around Fort Lewis. The discussions blossomed into collaboration, and soon after, Byrne began working with the prison community, giving workshops and teaching inmates how to germinate plants and keep accurate records.

"Our partnership with The Nature Conservancy has been fabulous," says Nadkarni. With help from a Defense Department grant, Byrne's team has provided seeds, planting tubes, soil, and even a greenhouse for the inmates and the prison.

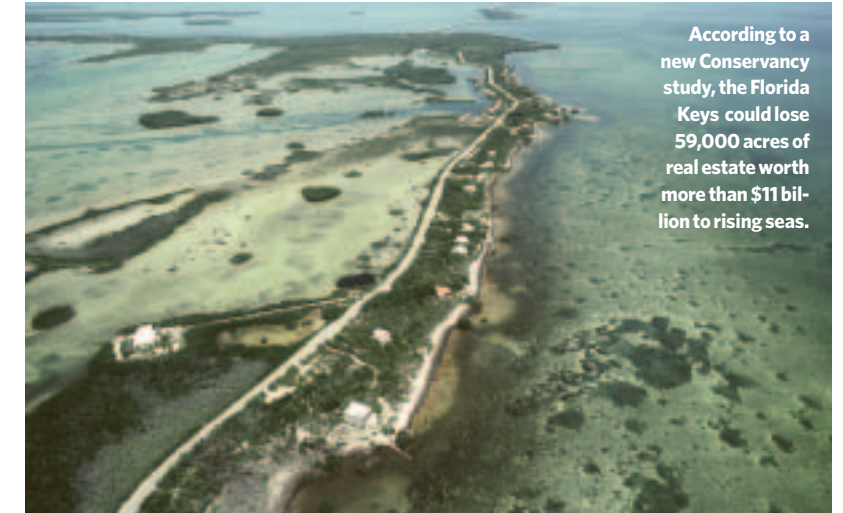
"When you watch these giant tattooed guys with shaved heads gently placing a single tiny seed in a planting tube, you can really believe in the transformational power of conservation," says Nadkarni. —Beth Geiger



As part of the Sustainable Prisons Project, inmates from Washington state prisons are studying bee colony collapse disorder, raising seedlings to help restore native prairies and captive-breeding the endangered Oregon spotted frog.

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According to a new Conservancy study, the Florida Keys could lose 59,000 acres of real estate worth more than \$11 billion to rising seas.

Keys Under Seas?

Report Finds Florida Keys Are Vulnerable to Climate Change

IF GEOLOGY IS FATE, then it is especially fateful in the Florida Keys, where no point on land is higher than 18 feet. In fact, across this 200-mile archipelago, the average elevation is only 3 or 4 feet above sea level. In a place this close to the edge, even the smallest change in sea levels will have profound effects.

To find out just how profound, a team of researchers in the Keys, led by Nature Conservancy scientist Chris Bergh, combined high-resolution elevation data of Big Pine Key with the various projections of sea-level rise prepared by the U.N. Intergovernmental Panel on Climate Change.

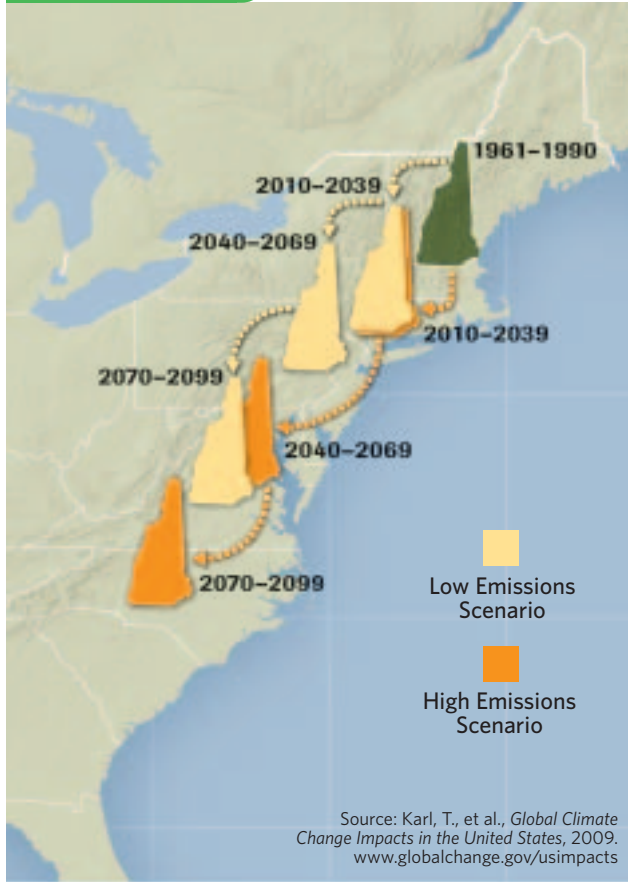
The results were startling: Even under the most conservative IPCC scenario of a 7-inch rise in sea level over the next 100 years, many areas on Big Pine Key would face significant ocean incursions by 2100. Extrapolated across the entire length of the Keys, the report finds, 7 inches of water could equate to catastrophic changes in habitat for plants and animals and an estimated \$11 billion in property losses.

Does Bergh, who lives on Big Pine Key with his family, think it's time to call the moving truck?

"Well, not quite," says Bergh. "We released [the report] to make people aware of the magnitude of the challenge and encourage them to action while we still have time to change the future."

Bergh has seen some success since the report's release earlier this year. During the summer the local county government directed a task force to begin planning to help the Keys minimize climate shifts and adapt to sea-level rise. —CARA BYINGTON

ONLINE: Speak out about the effects of climate change where you live at nature.org/change



Climate Matters

The United States and the Conservancy Take Steps to Address Climate Change

WITH A CLIMATE BILL passed by the House of Representatives in June, the United States sent a message to the world that it plans to help put the brakes on global warming. Similar legislation needs to weave its way through the Senate before President Barack Obama can fulfill his election promise and sign the nation's first law capping greenhouse-gas emissions.

For The Nature Conservancy's scientists and preserve managers, this progress couldn't have come a moment too soon. A new federal report issued in the summer finds the country is already feeling the heat from climate

change—from a decline in maple syrup production in New England to threatened salmon fisheries in the Northwest. And the Conservancy's preserves and protected areas are no exception.

"Climate change has the potential to undermine our

IN THE NEWS

"We need to be careful. Some of these folks are real sleuths."

—Joe Fehrer, manager of The Nature Conservancy's Nassawango Creek Preserve in Maryland, escorting a *Washington Post* reporter to the hidden site of a rare hybrid orchid amid concerns that an "orchid head" might uproot the plant for a personal collection.

In 2100, summer in New Hampshire could feel like today's summer in North Carolina, according to a U.S. government study.

work in places we thought were protected," says Conservancy climate program director Jonathan Hoekstra.

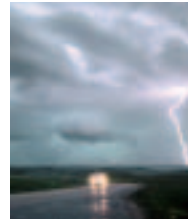
With longer, drier fire seasons already occurring in parts of the West, some preserves are vulnerable to larger-than-normal and more-frequent fires, which could open these areas up to invasive plants and insect pests, the new report finds.

In coastal areas, such as North Carolina's Albemarle Peninsula, estuaries and historic farmland are threatened by rising sea levels and a likely increase in hurricane intensity. To protect the Albemarle from eroding storm surges and help lands adapt to saltwater intrusion from the rising seas, the Conservancy is planting salt-water-tolerant plants and cypress trees that act as natural storm barriers. It's proactive conservation—or, as Hoekstra calls it, "prestorage" the land.

The Conservancy is also working to protect habitat corridors to ensure that migration pathways remain open for species imperiled by climate change. In addition, Hoekstra says that half a dozen Conservancy projects around the world are directly fighting global warming, reducing emissions by protecting forests that would otherwise be logged or replanting vegetation in degraded areas.

—BRENDAN BORRELL

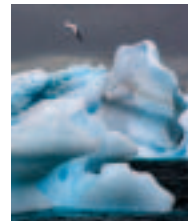
CLIMATE CHANGES



Stormy Weather
Heavier downpours and storms resulting in more rainfall are occurring between longer dry spells.



Corals at Risk
Bleaching from rising ocean temperatures has killed or severely damaged one-third of the world's corals.



Arctic Thaw
Rapid declines in sea ice have disrupted Arctic food webs by limiting ice-dependent algae and species that feed on it.



Closing Caves

Mysterious Bat Ailment Spreads Southward

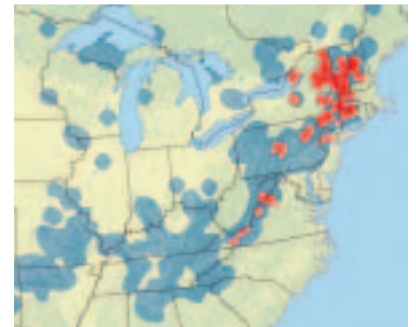
U.S. FEDERAL OFFICIALS called for a moratorium on caving in 17 eastern states earlier this year as part of an effort to slow the spread of white nose syndrome, a mysterious new ailment that has killed nearly half a million bats in the Northeast. Land managers at Nature Conservancy properties have followed suit, shutting off access to caves from Vermont to North Carolina, and as far west as Tennessee and Indiana.

The ailment, which is named after the white fungus often found growing on the faces of affected bats, causes the animals to starve to death during their winter hibernation period. The condition was discovered in New York in 2006 and has since spread to

bats in caves as far south as Virginia. According to scientists, the disease often kills more than 90 percent of bats in infected caves (see "In the Dark," spring 2009).

While the ailment is not thought to affect people, scientists with the U.S. Fish and Wildlife Service fear that people could be helping to spread the disease, carrying it on their clothing, shoes, flashlights or other gear. "But we just don't know," says Cory Holliday, the Conservancy's karst program director in Tennessee. "Closing these caves might be a knee-jerk reaction, but it is definitely the right move given the possibility of losing all of these bats."

Scientists fear a large decline in the bat population could lead to huge increases in mosquitoes and other insects that damage crops. "Bats eat 50 to 100 percent of their weight each night in insects," says Holliday. "Without that natural biological control, the potential for insect popula-



White nose syndrome has killed half a million bats in the Northeast (counties with affected caves are shown in red). The affliction has spread and stands to threaten major bat hibernacula to the south and west (blue).

tions to just explode is definitely there."

The cave closures are voluntary, except on federal lands, and they do not include private or commercially operated caves. "The closures will allow scientists and land managers time to work together to study the fungus, learn how it spreads and how to best address it," says Liz Agpaoa, a forester with the Forest Service.

—Curtis Runyan

ONLINE: See an audio slide show of biologists working to save bats at nature.org/magazine.

Having a Ball

National Pastime Connects Kids to Nature



Kids in Jamaica and Belize learn about conservation through “green” soccer tournaments.

HOW DO YOU get soccer-crazed boys interested in conservation? Just combine the two. In Belize, The Nature Conservancy's local partner has kicked off “green” soccer tournaments that require players to participate in local conservation projects.

“When I first heard the idea ... I thought it was crazy,” says Celia Mahung, executive director of the Toledo Institute for Development and Environment (TIDE). “I couldn't believe football players would want to do environmental work. But I was wrong.”

The forests in southern Belize have been hard-hit by local threats, such as logging and land clearing. TIDE is focusing on educating local youth about sustainable use of natural resources as part of a long-term conservation solution. A similar effort is under way in Jamaica, where the Conservancy helped organize a soccer tournament to raise awareness about the destructive practice of using poison to fish in local rivers.

Prizes were awarded to the winners at the Belize soccer tournament, and the team with the best conservation project received an award as well.

— MARGARET SOUTHERN



Bivalve Blues

Report Reveals Global Risks for Oyster Reefs

BAYMEN HARVEST an average of roughly 99,000 tons of oysters each year from the warm waters of the Gulf of Mexico. But that kind of bounty is now uncommon: Around the world, 85 percent of shellfish reefs have been lost to overfishing and habitat destruction, according to a new Nature Conservancy report, *Shellfish Reefs at Risk*.

“Shellfish reefs are the single most impacted marine habitat globally,” says Mike Beck, a Conservancy marine scientist and lead author of the report. Beck and his team of scientists compiled status reports from more than 144 estuaries and found that reefs were in significant decline worldwide.

While records show that even the ancient Romans exploited shellfish reefs, the pressure on oysters, mussels and clams today is unprecedented. Overharvesting has led to the functional extinction of many oyster reefs throughout Europe, North America and other continents. In fact, most of the oysters we eat now come from aquaculture.

Other major threats include disease and parasite outbreaks; the introduction of non-native species; pollution from the filling and dredging of coastal areas; and runoff from urban development, industry and agriculture.

Most countries tend to manage oyster reefs as harvesting fields and not much more, Beck says. We underappreciate and undervalue the “ecosystem services” that shellfish reefs provide, he says, such as filtering and purifying water, controlling erosion and supporting scores of other marine species.

While providing a global assessment of the threats facing shellfish, the report also outlines steps to help protect and restore threatened reefs. The scientists recommend that governments protect some of the best remaining reefs in places like the Gulf of Mexico and Georges Bay in Australia.

Beck also calls for new and existing funding to focus on the long-term restoring of reefs, not just on oyster harvesting; many restoration projects now allow harvesting only a year or two after oysters have been replanted. “We should allow reefs to rebuild themselves. And then we should allow harvesting of just the interest, not the principal,” says Beck. “We need to see the reefs return, not just the oysters.” —JOSHUA ZAFFOS



Shellfish reefs are the No. 1 most threatened marine habitat. The Conservancy is working to restore clams in New York (above) and oyster reefs at the Virginia Coast Reserve (top).

Science Castaway

Looking for Answers on a Remote Atoll

ONE THOUSAND MILES south of Hawaii and roughly a million miles from everywhere else is the 1 square mile ring of an island paradise called Palmyra Atoll. Just about nobody has ever lived there, save a naval air refueling crew during World War II. Practically the only way to get there is a bumpy four-hour ride on a turbo-prop plane from Honolulu to the surviving crushed-coral runway. The remoteness means this place and its reefs still teem with ocean wildlife: tens of thousands of sharks, flocks of nesting boobies and even coconut-eating crabs.

Of course, no inch on Earth is completely clear of

human influence these days. About the time The Nature Conservancy purchased Palmyra in 2000, the first signs of global warming appeared in the form of coral bleaching. Oh, and there's also a new satellite Internet link in the small research station there. That's how we caught up with Eric Conklin, a marine scientist with the Conservancy, after a day of diving and research in this underwater wilderness.

What are you looking at right now? I'm looking through rain [Palmyra gets 175 inches a year] across three small islets to the broad, blue ocean.

And the evening entertainment is the manta rays? If the lights are on down on our boat dock, you'll have—I think the record is seven—huge rays swimming around an area the size of a large back yard, feeding on the plankton attracted to the light. It's pretty cool, and there are just boatloads of manta rays here.

What are you seeking on this trip? We're beginning to look at how reefs respond to these “bleaching” events. The most important thing we can learn from a place like Palmyra is how it will respond to global warming, without getting confused by all the additional stressors typical to tropical places—overfishing, tourism, pollution, sedimentation. That gives us a benchmark for measuring global warming's absolute effect.

You're out every day—is it a bit foreboding swimming with all the sharks? Nah, it's fun. Nobody's looking at you as a meal. It is quite different to jump in the water and not always be the biggest thing in the water. The most sharks I've seen on one dive is about 40. And there are spots I haven't been to where scientists can see over 100, just on an instantaneous count. I'm personally dying to get to those spots.

Do you feel like a lucky man out there? I never thought in my wildest dreams I'd get to spend time in a place like Palmyra. It's a great scientific opportunity. With it comes responsibility. We're constantly asking, What can we do to be better stewards? What can we learn here in order to better manage elsewhere? —Oakley Brooks



Scientists are studying Palmyra Atoll's reefs as a benchmark for less healthy reefs elsewhere.

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