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**Nature or
Nurture?**

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Raccoons, though adorable to some, can carry rabies and roundworm. PHOTO/WADE SPEES



REST STOP. *In urban environments, non-native bird species such as house sparrows, starlings, and pigeons predominate at the expense of native birds. PHOTO/WADE SPEES*

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UNEXPECTED COMPANY. Alicia Kelly, holding her daughter, Patricia, recalls when a seven-point white-tailed deer burst into her suburban Charleston home. A WCSC-Channel 5 camera spotlighted the animal after it was sedated. PHOTO/WADE SPEES

Nature or Nurture?

What happens if we let wildlife go wild?

By John H. Tibbetts

Alicia Kelly was napping on her den couch in suburban Charleston one afternoon last October. Her three-month-old daughter, Patricia, was sitting awake, propped up and protected in the space between Kelly's prone body and the couch's back cushions.

"I was sound asleep, lying on my side, baby in front of me," says Kelly. "Then I felt something land on me. I thought it was my dog's front legs, like she does when she wants me to get up. But I looked and thought, that's not Serena. It was a deer; I saw the rack on him. Your mind cannot process that. He was right *there*, and he just stared at me, and I stared at him. I think he was as stunned as I was. I'm sure it was just a few seconds, but it felt like minutes. Then my baby screamed and that brought me into reality and I screamed too."

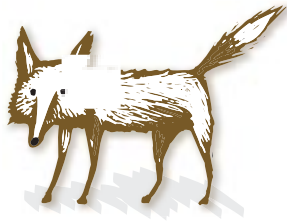
Panicking, the white-tailed deer leaped away and ran down a hallway, crashing into walls. "He didn't stop after that," says Kelly. "He ran all over the house," looking for

an escape route. Kelly grabbed her daughter and started for the back door.

"Then I saw him come down the hallway. The deer was heading for the back door too. He lowered his rack, and just bam! He hit that glass, but he didn't break it."

Kelly fled the house, and Charleston County deputies arrived and sedated the seven-point buck. Because the deer suffered internal injuries, a veterinarian later put the animal to sleep.

When the deer initially approached the Kelly home, he probably glimpsed himself in the glass back door. "It was mating season, and he saw another male deer in reflection," says Diane Duss, supervisor of animal control for Charleston County Sheriff Department. Responding to a competitor, he butted the door. When the lock and doorframe gave way, the buck skidded across the den rug to the couch and, rearing, threw his forelegs on Kelly. The glass door rebounded against the wall and closed



What to do

Follow a few simple rules to avoid conflicts with most nuisance species, says Priscilla M. Wright, S.C. Department of Natural Resources wildlife assistance coordinator.

First, don't put out food for wildlife. "I can't tell you how many people put out food for foxes," says Wright. "People think they're cute and that the poor things don't have anywhere to get food. But foxes do carry rabies." If you put out food, you're encouraging young animals to migrate to where people live, and that's cruel, she says. "You're taking away the animals' ability to take care of themselves."

Second, put garbage cans behind a locked door or strap down garbage lids with bungee cords, so raccoons can't get to them.

Third, landscape with native plants to discourage deer invasions. Consider using pine straw instead of planting peonies and other plants that deer prefer to eat.



behind the buck, cutting off his only escape route.

A bewildered deer rampaging through a suburban house is a rare occurrence, but it's just one example of increasing conflicts between people and wildlife around the country. Each year, more Americans complain about wild animals that have lost deep-country habitat and now search for food and shelter in cities and suburbs.

Many metro areas have planted trees and protected open spaces, creating habitat for wild creatures. Homeowners have built ponds and planted flower gardens that attract wildlife, and they have left out pet food and uncovered garbage containers. Some creatures have come to depend on us for handouts, adapting so successfully to human-made environments that they are no longer truly wild. In the parlance of wildlife biologists, these creatures are called "subsidized species," and their populations are growing much faster than our understanding of them.

Some common nuisance animals include opossum, crow, rat, squirrel, fox, muskrat, and skunk. Non-native birds such as house sparrows, street pigeons (also known as rock doves), and starlings prosper in huge numbers in every major city in the nation, regardless of climate. "Some species are enormously successful because they travel around on our coattails," says Stephen R. Palumbi, Stanford University biologist. "They tend to be species that take advantage of the disruptions we cause."

Ecological generalists, tolerating a broad range of environmental conditions, thrive in urban centers. Opportunistic species can transfer from one kind of prey or

nesting site to another if they have to. And some creatures prefer "edges"—they're drawn to places like transitions between forests and meadows or subdivisions. Omnivores, which eat almost anything, adjust particularly well to cities. Certain species—the super-adapters—have most or all of these characteristics.

"There are only three choices a critter has to make (when faced with a human-dominated environment), and those are to adapt, move, or die," says Clark E. Adams, a Texas A&M urban wildlife researcher. "And those that are adapting cause us big problems."

The coyote, once unknown in the eastern United States, is one of the super-adapters, prowling from the tip of Florida

to Alaska, finding habitat in major metros, college campuses, and golf courses. This omnivorous animal "will go to our garbage cans or our pets for its food source," says Adams.

Packs of "coydogs"—coyotes interbred with dogs—have migrated from suburban Westchester County to the Bronx's

abandoned lots and even Manhattan's Central Park. In ranching areas, coyotes kill thousands of head of livestock, causing \$13.6 million annually in damages.

South Carolina had no coyotes in 1978; today the animals are ubiquitous, taking up residence in every county. "I've seen coyotes in just about every town in the South Carolina lowcountry," says Christian Agnew, a biologist and part-owner of Wildlife Solutions, Inc., an animal-control enterprise. A rabid coyote bit Agnew on Sullivan's Island in November 2000. "The coyote had to cross the bridge, because coyotes don't swim for the heck of it."

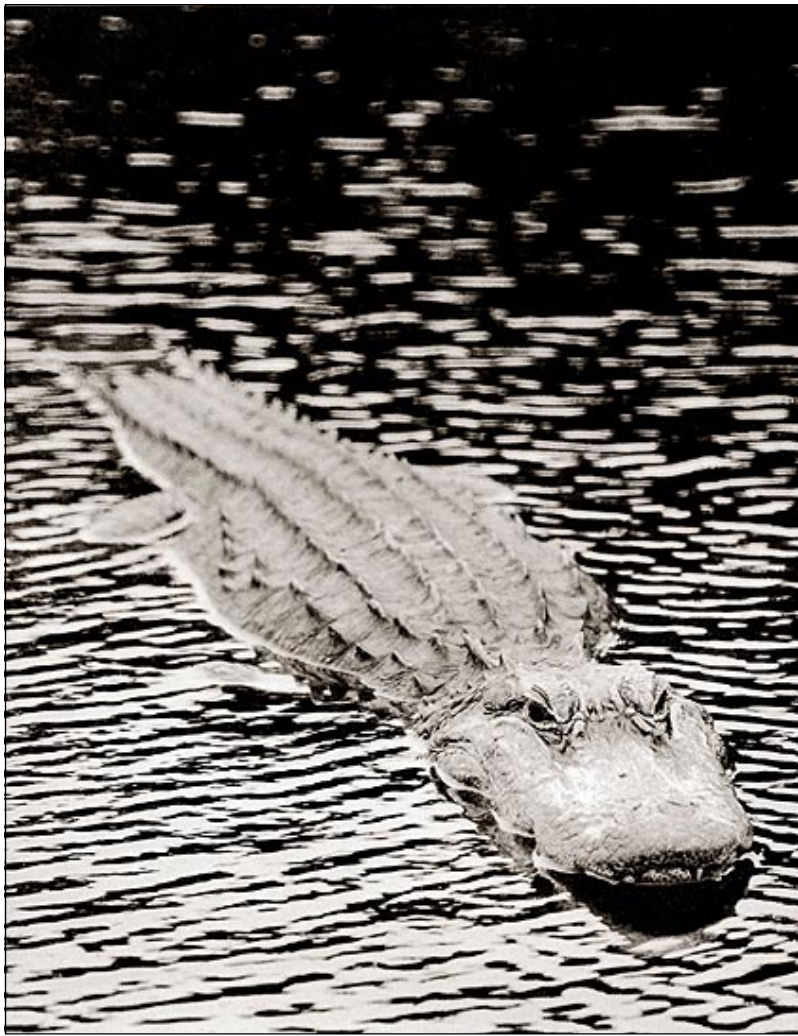
Instead of migrating north to breed in the Arctic, large numbers of Canada geese now summer in the United States,

STEPHEN R. PALUMBI

"Some species are enormously successful because they travel around on our coattails. They tend to be species that take advantage of the disruptions we cause."

GOT TRASH? *Some animals rely on us for handouts, adapting so thoroughly to human society that they are no longer truly wild. Raccoons, like this one shown peeking out of a restaurant dumpster, are an example of a “subsidized species.” Populations of opossum, rat, squirrel, fox, skunk, and many other urban nuisance species are growing rapidly.* PHOTO/WADE SPEES





JAWS. Alligator attacks are rising in some southern communities since habitats have been disrupted by development. Alligators are turning up in backyard ponds, canals, and swimming pools.

PHOTO/WADE SPEES

dropping excrement mounds that foul golf courses, parks, and public beaches. Just 20 geese can leave a ton of feces each year.

Raccoons, sheltering in attics and eating out of garbage cans, not only carry rabies but also roundworm, which can infect humans and cause blindness; there is no known cure. In places where raccoons proliferate, they can degrade water quality.

As humans alter wildlife habitats, large predators are also changing their habits. Alligators routinely show up in southeastern back yards and swimming pools. Hardy and adaptable, alligators can live and breed in drainage ditches if driven out of

their habitat. Alligator populations—about 100,000 alligators in South Carolina and an estimated one million gators in Florida—have grown rapidly, as have alligator attacks. American saltwater crocodiles have found homes in the cooling canals of Florida's nuclear power plants.

Bears, it turns out, have a taste for pet rabbits, goats, and llamas. Two years ago, bears in New Jersey went on a rampage, killing livestock and pets and breaking into homes and cars. In South Carolina, bears have wandered out of wildlife refuges and been hit by cars.

Having grown accustomed to people in some western communities, mountain lions stroll fearlessly through back yards and urban paths

in the noonday sun. Mountain lions—also known as cougars, pumas, and panthers—have altered their diet to raid Alpo and Purina meals. Their populations and attacks are sharply on the rise. Various mountain-lion subspecies once ranged throughout the United States, but until recently they have been relegated to western states and a narrow range in South Florida.

The most dangerous and expensive fur-bearing animal is one of the mildest-mannered—Bambi. Deer, in fact, is the number-one vertebrate pest in the United States, according to the Jack H. Berryman Institute at Utah State University.

At least three-quarters of a million vehicles collide with white-tailed and mule deer annually in the United States, injuring about 29,000 people and killing another 200. That makes deer deadlier than sharks, alligators, bears, and rattlesnakes combined.

Wealthy suburbs and resort communities are ideal habitat for deer, which prefer forested places with small clearings and low-lying vegetation in early stages of growth. Applying copious doses of water and fertilizer on their lush gardens, prosperous suburbanites create tasty treats for deer safe from hunters exiled to distant forests. “Many of these places have wonderful deer habitat, but there is nothing but Cadillacs to kill them,” says Jay Butfiloski, furbearer project biologist with the South Carolina Department of Natural Resources (DNR). Some homeowners have installed eight-foot fences to keep out animals they call “rats with hooves.”

Deer menace forest ecology and wildlife habitat in dozens of states throughout the eastern third of United

States. When deer populations explode, they often strip woods of native vegetation and eliminate niches for other species. Deer eat wildflowers, small bushes, and seedlings, displacing smaller animals from their habitat. "Deer have a huge, huge impact on all the little components of a forest," says Steward Pickett, senior scientist at the Institute of Ecosystem Studies, based in Millbrook, New York.

By exterminating most large predators and creating edge habitat between forests and lawns, Americans have created ideal conditions for deer. "It's a simple fact that deer do not have the predators they use to have—the red wolf, the eastern cougar, and the Florida panther," says Larry Richardson, wildlife biologist at the U.S. Fish and Wildlife Service Florida Panther Refuge in Naples, Fla.

The heavily forested, urbanized Northeast has the most deer collisions, but the South has its share too. In South Carolina, four people died in deer collisions and 420 were injured during 2001. Last October, two Ohio residents were killed when their car struck a deer near Myrtle Beach.

Even so, South Carolina's one million deer are a major economic asset to rural areas. Deer hunters annually spend \$200 million in retail sales during South Carolina's harvest season, which typically reduces herds by nearly a third. "The positive aspects of a deer population far exceed the negative aspects," says Charles Ruth, DNR deer project supervisor. "Rural counties really rely on the economics of deer hunting."

What's behind the growing drumbeat of conflict with wild creatures?

In a word, sprawl. Seeking the country life, Americans are building homes farther out in the

boondocks and commuting back to jobs at the metropolitan edge. "In the Southeast, conflicts are all due to urban encroachment," says Agnew. "Animals have run out of places to go."

Growing numbers of Americans flock to second homes, vacation hideaways, and gated retirement communities surrounded by woods. These low-density developments are connected to urban centers by road and highway networks, which break up and isolate habitat for most large mammals, particularly predators.

Americans with urban values are moving ever deeper into the countryside, extending the so-called "urban-wildland interface" or "suburban-rural interface."

"As that interface increases, we're going to have more conflicts between animals and people," says Johnny Stowe, DNR heritage preserve manager. "A lot of people can now afford to live in the country and commute into the city. But most of these people are urban, with urban values. They get upset when animals do what animals do

naturally, usually barging in to get something to eat. They are not willing to deal with the animals themselves and they expect the state or a private contractor to take care of it. Thirty-five years ago, the people who lived in the countryside were country people, and if they had a problem with an animal, they took care of it."

Vast wooded buffers once surrounded DNR's coastal wildlife preserves. But urban growth is squeezing the Lewis Ocean Bay Heritage Preserve near Myrtle Beach and the Victoria Bluff Heritage Preserve on Hilton Head Island. "Those preserves," says Stowe, "will be huge challenges because of the people around them."

Some city people reject measures to control wild animals. The problem is that large predators, unless they're hunted or managed wisely, can kill you. "When we populate an area that is typically (big) cat country," says Richardson, "animals get used to seeing us, and after a while they experiment and try to taste us. This is true of bears, alligators, and cougars. When animals lose their fear, they become dangerous."

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HABITAT RECOVERY

Many Americans believe that habitat and wildlife have steadily disappeared throughout the United States over the past century. But that's only partly true. In the eastern third of the United States, forested habitat and many wildlife populations have improved, but only because conditions were so dreadful to begin with.

By 1800, the eastern seaboard's forests were already aggressively converted to farms and timber lots. Most Americans were subsistence farmers who conducted "slash and burn" agriculture. They cut and burned the forest, grew crops for a few years until the fertility was exhausted, and abandoned the land. Forests were cleared for shipbuilding products and charcoal for home heating in towns and cities.

Americans already noticed wild-game declines by the 1830s. In England, the crown owned wildlife, but in the United States it was common property, and anyone was free to shoot wild animals for food or profit. Market hunters, who sold meat and feathers to urban markets, began decimating bird and mammal populations.

During the nineteenth century, agriculture for international markets intensified, particularly in the South. On the eve of the Civil War, there were tens of thousands of small farms and hundreds of giant cotton plantations in the Carolinas. King Cotton's reign continued long after Reconstruction, though southern farmers and planters drew lower profits. South Carolina's cotton agricultural output more than doubled between 1860 and 1890. Prices for cotton, however, fell. Northern railroad syndicates controlled transportation networks and price mechanisms for southern commodities.

To survive, farmers over-worked the land, using heavy doses

of fertilizer and tilling marginal soils, causing severe erosion. Meanwhile, farmers and logging companies cut down vast forests east of the Mississippi River, and commercial hunting flourished.

By 1900, many wildlife species neared extinction, including white-tailed deer, wild turkey, and black bear. In response, conservationists lobbied to outlaw hunting of threatened species and then slowly nurtured them back in some areas by restocking, setting bounties on predators, and catch-limits for hunters and trappers. Game-conservation laws aided some species but harmed others. Predators such as the coyote and cougar were hunted out of the South and East, and the red wolf was driven almost to extinction.

Then suddenly the southern agricultural economy fell apart. In the 1920s, the boll weevil and a long drought crushed U.S. cotton agriculture. About 40 percent of South Carolina's 19 million acres were so exhausted that they were declared "destroyed" in 1934. Hungry rural people killed wild creatures for food, and many game populations struggled.

Farmers during the nineteenth century fled New England's rocky soils for western farms or factory jobs in towns and cities. The South followed a similar pattern in the 1920s and '30s. Tens of thousands of black farmers left South Carolina, and many white farmers gave up too.

Worn-out farmland quickly returned to forest. Since then, the eastern third of the United States has





ON THE MOVE. *Some top predators—coyote, red wolf, gray wolf, bobcat, and cougar—should be further encouraged or reintroduced to prevent populations of smaller predators and herbivores from spinning out of control, some experts say. Red wolves, like this one at the Sewee Visitor and Environmental Education Center in Charleston County, were once extinct in the wild. But red wolves have been successfully reintroduced into northeastern North Carolina. And now a pair of red wolves—a young female and a more experienced male—share an enclosure in Cape Romain National Wildlife Refuge, where biologists hope the animals will produce a pup in the spring and then they can be returned to the wild.*

PHOTO/WADE SPEES

been home to one of the world's most remarkable reforestations. In a book reissued in 2002, Douglas MacCleery of the U.S. Forest Service describes the eastern woodlands' comeback: "By the 1960s and 1970s, the pattern of forest, field, and pastures (in the Appalachians and in many other areas of the South and the East) was similar to that prior to 1800."

That is, the extent of forest and agricultural land in many parts of the South and East in Vietnam War-era America was comparable to that when George Washington served as U.S. president.

During the twentieth century, rural population drain, agricultural stagnation, the modern conservation movement, and hunting

regulations set the stage for an extraordinary rebirth for some wildlife species in the eastern third of the United States. Several thousand white-tailed deer roamed South Carolina in 1900. This population grew to 30,000 to 40,000 by the 1960s—when it grew exponentially to a million by the late 1990s, says Ruth. The wild turkey was virtually extinct during the Depression; now four million inhabit eastern and southern forests.

Yet few modern forests provide the rich habitat they once did, Pickett points out. Many eastern and southern forests are immature in ecological function, lacking the complexity found in more mature woodlands. After logging, the forest canopy grows back fairly quickly.

But the intricate, complex groundcover—wildflowers, lichens, mushrooms, and small bushes—don't return for a much longer period. Nor do the animals that rely on specialized groundcover. This is particularly true of the South Carolina coastal plain's pine plantations, which replaced biodiversity-rich longleaf pine forests.

"The plantation forests may look great," says Pickett, "but they often have a very low biodiversity structure. Just because we have all these forests doesn't mean we have all this habitat."

WORLD'S DOMINANT FORCE

Humans today have unprecedented influence on the future of wild creatures. Either on purpose or by accident, we often determine which species survive and which fade into the background or face extinction. Our manipulations of the environment alter animals' behaviors and sometimes even their evolutionary tracks.

We could be the world's dominant evolutionary force, argues Palumbi, the Stanford University biologist. With applications of antibiotics and pesticides, intense commercial fishing, and species introductions, people have caused extremely swift evolutionary changes in bacteria, insects, and wild fish. Under intense harvesting pressure, for example, pink salmon have rapidly evolved smaller bodies. The larger fish were caught in nets, causing a genetic change so that new generations grow more slowly.

Bacteria, insects, and wild fish reproduce rapidly and in large numbers, so generations of change can be readily observed, and natural selection in the wild can be documented. These creatures rely on genetically based adaptation mechanisms to cope with new conditions.

Land animals, by contrast, have relatively large brains, which offer mechanisms other than genetics to confront challenges. Instead of

genetic evolution alone, terrestrial animals can evolve behaviorally. “Cultural behavior can be learned within a group,” says Palumbi, “and that behavior can be passed down like a cultural legacy from generation to generation.”

A raccoon routinely begging for food at someone’s back porch soon brings along her young, which learn to beg too. If this behavior is rewarded long enough, it is passed down culturally, says Palumbi.

Mountain lions and other large predators also learn quickly—too quickly—about friendly, curious humans fascinated by big cats. “We should never attempt to associate with them,” says Richardson. “Every time they see us, they should run. When they stop running and start walking toward us, we’re in trouble.”

But as humans have continued dominion over the natural world, the creatures most likely to survive have been those attuned culturally to our habits and tastes. A few species, such as raccoon and opossum, may have even lost some of their feral—or wild—instincts. “Some of these animals are becoming more like commensals”—like rats and mice that rely on and live in close proximity to humans, says Greg Yarrow, a Clemson University wildlife biologist.

It’s not uncommon for such species to alter their behaviors to a degree that they begin adapting physiologically. “Some animals reproduce differently in urban environments, with more litters per year and larger litters,” says Adams.

TOP PREDATORS PROMOTED

Americans have encouraged booming populations of nuisance species, yet many of us feel uneasy taking steps to control them.

Beginning in the 1960s, some environmentalists began to view any human management of nature as destructive, and animal-rights groups condemned killing of animals for sport or to manage wildlife populations. In recent years, animal-rights activists have thwarted efforts by some localities to kill white-tailed deer in urban and suburban areas.

As a result, some wildlife managers have tried to control

nuisance deer using various types of fertility control. Some attempts at fertility control have shown promise, but these have generally focused on small numbers of deer in isolated settings. Until a researcher develops an effective long-term fertility-control method that is easy to use, hunters will continue to provide the best opportunity to control herds. “Killing deer is currently the best management tool,” says Ruth. “Yet some people say, ‘Don’t kill them.’”

South Carolina hunters have successfully controlled deer herds in rural parts of the state. South Carolina has one of the least restrictive deer-hunting regulatory structures in the nation, including seasons, bag limits, and methods.

But hunting isn’t practical in urbanized areas, particularly along the coast. Hunters don’t want to shoot guns near houses, and city ordinances prohibit discharging firearms. Now some coastal residents complain about abundant deer,

while their neighbors want to protect them. “In many coastal areas where there is development, we don’t hunt anymore, so the deer herds get tremendous,” says Priscilla M. Wright, DNR wildlife assistance coordinator.

After a protracted lawsuit by animal-welfare activists, DNR and the managers of the gated community Sea Pines on Hilton Head Island are proceeding with a deer-management program to kill some animals with sharpshooters.

Perhaps top predators—such as coyote, wolf, bobcat, and cougar—should be further encouraged or reintroduced to prevent small predators and herbivores from getting out of control, some experts say. Red wolves have been reintroduced in North Carolina, and gray wolves have been re-established in the Northern Rocky Mountains.

Coyotes, which proliferate without direct help from man, could already be culling deer herds along some suburban-rural edges. Human and coyote populations have grown rapidly during the past 15 years in New York’s Hudson Highlands 50 miles north of New York City, a popular second-home and weekend destination. But, surprisingly, deer populations have not increased in comparable numbers. Scientists theorize that coyotes are preying on very young deer, especially fawns less than a few months old.

“Now that deer are becoming a suburban problem, the coyotes might actually help to maintain ecological health,” says Fred Koontz, director of the New York Bioscape Initiative, a research and education project based in Palisades, New York. “The suburban-rural interface is where you’ll likely have bigger concentrations of coyote,” says Koontz, “and it’s at these interfaces where coyotes could play a role in balancing the deer populations.”

Mountain lions meanwhile are steadily migrating from western

CHARLES RUTH

“Killing deer is currently the best management tool. Yet some people say, ‘Don’t kill them.’”



WILDLIFE
CONTROL
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HOT PURSUIT. Doug Smith of Wildlife Solutions, Inc., a private company, puts traps on the roof of an abandoned building where raccoons have climbed into the attic through openings in the eaves. With their habitats disappearing under suburban sprawl, wildlife will find places to live in cities, causing economic losses and property damage.

PHOTO/WADE SPEES



Adaptable raptors

Many species of hawks, owls, eagles, and falcons are generalists, which means they can adapt quickly when one source of food disappears or when nesting sites are disrupted.

“Changes (to raptors’ habitat) don’t have to be fatally disruptive,” says James D. Elliott, Jr., executive director of the S.C. Center for Birds of Prey. “It’s a matter of understanding the ecology of the birds you’re dealing with. Raptors can adapt, but it’s a question of whether you’re making changes at a crucial time in their nesting and breeding cycle. The scale and pace of development can be too large and fast, shocking the population, so the birds don’t have a chance to modify their behavior. We often don’t allow time for them to adjust.”

Many raptors can adapt to dramatic changes to their environment, but only if the changes occur outside nesting and breeding schedules. Thus a developer can cut down an historically favored nest site if this change happens when the birds are not breeding, so the birds have time to find another place, says Elliott.

Some raptors are so adaptable that they thrive in the nation’s biggest cities. In 1970, the peregrine falcon was an endangered species, with only 300 pairs nationwide. Now falcons nest and hunt in New York City, Baltimore, Chicago, Seattle, and other cities, swooping among high buildings to catch pigeons.

But raptors with specialized feeding or nesting requirements are struggling. Take the snail kite, which eats freshwater snails in Florida. When swamps are drained, the freshwater snails disappear, and the snail kite cannot switch to another food source, says Elliott. Now the snail kite is classified as endangered in Florida. Other raptors that have lost population due to habitat loss include the southeastern American kestrel, the spotted owl, and the burrowing owl.

states to the Midwest, attracted by vast numbers of deer. Confirmed lion sightings or their roadside carcasses have been found in Nebraska, Kansas, North Dakota, Iowa, and Minnesota.

“Eventually you will see puma in South Carolina,” says Paul Beier, a wildlife ecologist at Northern Arizona University, who has extensively studied mountain lions.

It might take 50 years or more for mountain lions to migrate naturally to South Carolina, or five to 10 years if the Florida panther is reintroduced into northern Florida under a proposed U.S. Fish and Wildlife plan. Environmentalists and resource managers have hoped to return the panther to its historic range in the South, which includes the coastal plain of South Carolina between Savannah and Charleston and the western third of the state.

More mountain lions in the South and East would diminish deer numbers, says Beier. “Most attempts to model the dynamics suggest that deer herds are probably 10 percent to 25 percent lower with the top predator in the system. There would still be a lot of deer left for hunters and wildlife viewers.”

Top predators help preserve ecosystem functions and contribute to richer biodiversity. Mountain lions not only limit overabundant herbivores, which can destroy native plants, but these large cats also devour smaller

predators like raccoons, which feast on songbird eggs and thus suppress some bird populations.

Mountain lions, of course, are dangerous if people are careless around them. As author Anne Matthews points out in a recent book: “For a hungry young mountain lion, humans and deer pose similar problems in hunting: same size, same weight, same tendency to bolt when confronted. But deer run faster.”

Richardson, the Florida panther expert, argues that big cats can be safely integrated into places in the South and the East where sufficient habitat has been preserved. The Florida panther lives without incident in South Florida’s remaining wild areas adjacent to densely populated cities.

Still, mountain lions must be hunted or otherwise managed to remind them that humans are dangerous. “We need to keep these animals wild,” says Richardson. “When they get used to us, we start having troubles. That’s why wild areas are so important. Wild areas are for our protection as much as for the animals’.”

That’s the paradox of the modern relationship between humans and wild creatures. For wildness to thrive, people must manage it intensively, recreating or sustaining natural processes and functions. Leaving wildness to its own devices usually means that it will disappear—or turn around and bite us. ✓

Web sites

Baltimore Long-Term Ecological Research Program: <http://beslter.org>

Central Arizona-Phoenix Long-Term Ecological Research Program: <http://caplter.asu.edu>

Clemson University Extension Wildlife Program: <http://www.clemson.edu/wildlife>

International Association of Fish and Wildlife Agencies: <http://www.iafwa.org/page2.htm>

S.C. Department of Natural Resources Wildlife and Freshwater Fisheries Division: <http://www.dnr.state.sc.us/wild/index.html>

Frontier of urban ecology

Wildlife ecologists once believed that the only environments worth studying were remote and “pristine,” untouched by human hands. Ecologists ignored urban areas except as places where people had destroyed nature.

But this began to change in the mid-1970s, when scientists began acknowledging that humans had altered virtually every environment in the continental United States by hunting, harvesting, ranching, and farming. “All of these landscapes were formed by fire, cattle, people of different cultures,” says Christine Alfsen-Norodom, the coordinator of Columbia University and UNESCO’s joint program on the biosphere and society. Today, the United States “is heavily impacted by humans from coast to coast.”

In other words, human influences on nature are a matter of degree, and people are embedded in all natural processes. Such ideas led some scientists to explore a new frontier of research: urban ecology.

“A few of these urban specialists are very efficient at using resources of the city,” says Madhusudan Katti, a post-doctoral research associate at Arizona State University. “They are more flexible and can out-compete native species.”

City environments are surprisingly rich biologically. For example, bird diversity in the Phoenix metro area is actually higher than that in the surrounding desert, as is total bird abundance. Many bird species are attracted to the city where water and other resources are more consistently available than in the desert. Birds especially prefer sewage treatment plants and detention basins, where plant productivity flourishes.

Still, “knowing the number of species (in a given place) is not that instructive,” says Steward Pickett, senior scientist at the Institute of Ecosystem Studies, based in Millbrook, New York, and project director of the National Science

Foundation’s Long Term Ecological Research Program (LTER) in Baltimore. The agency is supporting the nation’s two major, interdisciplinary urban-ecology studies in Phoenix and Baltimore.

“Biodiversity by itself doesn’t mean all that much,” says Pickett. “You really have to know what the species are and what the species do, and that’s the hard part of ecology.”

In both the Baltimore and Phoenix metro areas, non-native nuisance species predominate, according to LTER research. Two hundred bird species have been documented in Phoenix, but one-quarter of them are exotics like house sparrows, starlings, and rock doves. “A few of these urban specialists are very efficient at using resources of the city,” says Madhusudan Katti, a post-doctoral research associate at Arizona State University. “They are more flexible and can out-compete native species.”

Resource-rich urban environments are altering many birds’ physiology. A bird’s hormonal clock coincides breeding with warmer weather and longer spring days so that newborns arrive at times of greater food availability. The urban environment, however, is altering these hormonal clocks. Fossil-fuel burning increases local temperatures in large metro areas, creating microclimates where spring starts sooner. Some bird species have begun their spring breeding earlier in the city than in the desert, and their breeding seems to last longer. Some species breed more than once each year in urbanized places, so they build up higher densities there.

But “not all bird species are capable of altering their reproductive systems” to accommodate urban living, says Katti. “Some birds have hormonal systems that are very tightly coupled with day length,” so they are less flexible and therefore have difficulty competing in the city. “The ones that do well are more flexible.” Meanwhile, the birds that lack flexibility fade in population, at least in urban places. ♡

EBBS & FLOWS

South Carolina Clear Water Contractor Workshop

Charleston, South Carolina
May 28, 2003

General contractors, paving and grading contractors, bulldozer operators, excavators, and all others involved in land disturbance will learn how to reduce sediment and erosion into South Carolina waterways. Upon completion of the one-day course, which includes a final exam, each graduating attendee will have the status of a South Carolina Clear Water Contractor. The workshop helps kick off the new South Carolina Clear Water Contractor Program, a partnership of Clemson Extension Service, DHEC's Office of Ocean and Coastal Resource Management, and the South Carolina Sea Grant Consortium. The program will soon expand across the state. For more information, contact Cal Sawyer at (843) 722-5940 or calvins@clemson.edu

SouthEast COSEE Ocean Education Leadership Institute

Wilmington, North Carolina
June 22-27, 2003

The SouthEast Center for Ocean Sciences Education Excellence (COSEE) will be hosting its first Ocean Education Leadership Institute for middle- and high-school educators at the University of North Carolina at Wilmington. The institute's participants will consist of 30 educators from North Carolina, South Carolina, and Georgia. Eight educators and two media specialists from each state will be chosen to participate. For inquiries and electronic applications, contact Margaret Olsen at margo@mindspring.com

Coastal Zone '03

Baltimore, Maryland
July 13-17, 2003

The Coastal Zone conference series is the premier international gathering of ocean and coastal-management professionals. This biennial symposium attracts more than 1,200 participants from around the world. Attend Coastal Zone '03 to explore coastal-zone management through time—yesterday, today, and tomorrow. Through concurrent plenaries, panels, roundtables, and discussions, participants will gain knowledge they can use to guide future coastal-management decisions. For general information, contact Gale Peek, conference manager, at Gale.Peek@noaa.gov or (843) 740-1231.

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