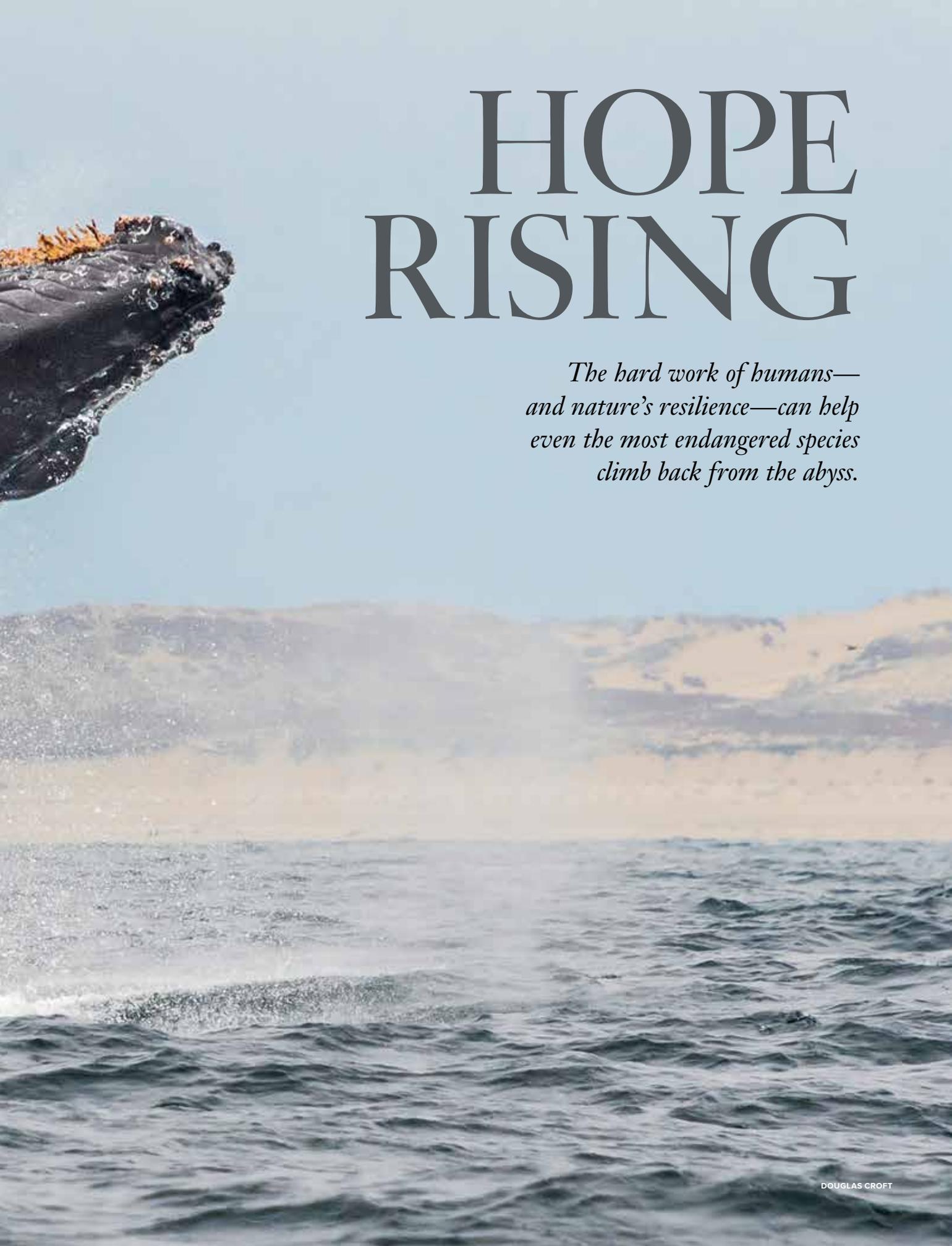


Like a living arch of triumph, a humpback whale bursts forth from California's Monterey Bay. Protected since the 1970s after nearly going extinct, most of the world's humpback populations, including California's, have recovered.





HOPE RISING

*The hard work of humans—
and nature's resilience—can help
even the most endangered species
climb back from the abyss.*



By Barry Yeoman

Last December brought a rare flash of celebratory news: The Guam rail, a ground-nesting bird from the United States' westernmost territory, came off a global list of species that are extinct in the wild. It was just the second bird, after the California condor, ever to be rescued from that purgatory—"a spark of hope in the midst of the biodiversity crisis," said Grethel Aguilar, acting director general of the International Union for Conservation of Nature (IUCN), which publishes the list.

Guam rails are tall and nearly flightless. They have black and white stripes that, according to an indigenous legend, were painted by an iguana that abandoned the job partway through. Native to Guam and nowhere else, the rails once were found in nearly all of the island's terrestrial habitats. Locals often spotted them along back roads, bathing in puddles and preening.

But shortly after World War II, a U.S. military vessel dropped off some accidental hitchhikers to the island: brown tree snakes, native to coastal Australia, whose progeny multiplied and threw Guam's human and natural systems into disarray. The snakes colonized utility lines, often knocking out electricity. They tunneled into houses and killed puppies. And they feasted on many bird species, including Guam rails, and their eggs. Though the rails had long coexisted with other predators, including monitor lizards, the snakes proved too aggressive and drove the rails' numbers down to double digits.

The invasive snakes completely wiped out populations of other birds, including the Guam flycatcher and the

Guam bridled white-eye. With most of the birds gone, the islands' forests fell quiet. Walking through the woods today, "you don't pick it up right away," says Haldre Rogers, an Iowa State University ecologist. "But over time, you notice this sense of silence, this sense of loneliness." Rogers' research suggests that the loss of so many native birds could be altering how seeds get scattered and, thus, how forests regenerate. It might also be causing widespread decline in the beloved wild chili pepper, which depends on birds for dispersing its seeds.

Daring rescue mission

To save the island's handful of surviving Guam rails, scientists made an audacious decision in the 1980s: They captured all 22 remaining birds. "We're talking about elbow-to-elbow lines of people walking through savannas, catching any rails, picking up any nests and eggs that they see along the way," says Laura Duenas, a wildlife biologist at the Guam Department of Agriculture. Her agency then partnered with U.S. mainland zoos to develop a captive breeding program that has persisted, both on and off the island, for decades.

Breeding the rails in captivity proved to be a complicated calculus that involved sorting birds by genetics and temperament. Meanwhile, scientists scouted out islands where they could release the rails they bred. They chose two, Rota and Cocos, which are near Guam and free of brown tree snakes.

The first releases were truly experimental. "These birds went extinct in the wild before we were able to learn anything about them," Duenas says. Believing that the rails favored

deep forest, for example, her predecessors hiked for hours into the jungle before setting them free. In fact, the species prefers edge habitats. “As soon as they released them,” she says, “the birds beat them back to the parking lot.”

Eventually, however, the wild populations took hold and grew to outnumber the captives. There are currently about 260 Guam rails in the wild. But that’s still a fragile figure: IUCN classifies the species as critically endangered. And it will take a major snake-eradication effort (including “pinky drops,” acetaminophen-laced dead mice shot from helicopters) before the birds can inhabit even limited parts of Guam.

Nevertheless, comeback stories such as this fuel conservationists with the energy to persevere—and they need all the

encouragement they can get. Saving endangered wildlife can feel Sisyphean. The IUCN’s Red List of Threatened Species now numbers more than 31,000 animals and plants. The same update that removed the Guam rail from the “extinct in the wild” category also noted declines in 73 other species.

“That’s why we try to celebrate these victories,” says Jenny Loda, an attorney at the Center for Biological Diversity. “It helps people hold up hope. It will take a lot of time. It will take a lot of money, a lot of dedication. But it really can be done.”

Bringing back imperiled wildlife is complicated. When a species is in trouble, it’s rarely possible to single out one cause. “A lot of times it’s multiple, interacting threats,” says Bruce Stein, chief scientist at the National Wildlife Federation.

In northern Michigan, a Kirtland’s warbler (right) has something to sing about: Down to some 167 breeding males in the 1970s, the species’ population has bounced back to nearly 2,400 males. Once extinct in the wild, the Guam rail (top left) now numbers about 260 wild birds.



ROBERT ROYSE



COMEBACKS— AND CONTROVERSY

While most revivals earn accolades, some draw fire, complicating recovery efforts.

NORTHERN ROCKIES GRAY WOLF

Virtually eliminated from the Lower 48 by the 1940s, gray wolves were listed as endangered in 1978. In 1994, Canadian gray wolves were reintroduced to Yellowstone National Park and central Idaho, sparking fears over livestock and game predation and decades of lawsuits. Largely recovered, the region's wolves were delisted in 2017.

DELMARVA PENINSULA FOX SQUIRREL

Nearly wiped out by habitat loss, predation and hunting, this plump squirrel species benefited from rigorous efforts to protect its forest habitat on both public and private lands—mainly in Maryland and Virginia—and to relocate and track individual animals. With its numbers up and stable, the species was delisted in 2015.



CINDY GOEDEL

STELLER SEA LION

The world's largest sea lion was once abundant in coastal waters from Japan to California. Following steep declines, it was listed as endangered in 1990, with habitat protected around rookeries. Recovery of populations from Southeast Alaska to California, delisted in 2013, may yield clues as to why some other groups are still struggling.



D. TROZZO (ALAMY STOCK PHOTO)



MICHIO HOSHINO (MINDEN PICTURES)

NWF PRIORITY

Recovering imperiled species

The National Wildlife Federation has long worked to protect this nation's most imperiled species, which include more than 1,600 plants and animals listed as endangered or threatened under the Endangered Species Act (ESA). Priority actions range from defending and strengthening the ESA to reducing threats to wildlife and advocating for increased funding for wildlife conservation. Toward that end, the Federation is promoting passage of the Recovering America's Wildlife Act, which offers a new approach for funding State Wildlife Action Plans. See nwf.org/ESA.

A recovery plan needs to address all the problems, and it needs to be collaborative. During the past 35 years, such well-executed efforts have lifted dozens of species off the U.S. government's list of endangered species.

One example is the Kirtland's warbler, a Midwestern songbird with a distinctive yellow breast that was removed from the list last fall. The birds, which winter in The Bahamas, thrive during the breeding season in only one habitat: young jack pine forests, particularly near the top of Michigan's Lower Peninsula. The low, dense foliage of these immature pines creates ideal conditions for foraging, nesting and predator protection. Until the turn of the 20th century, wildfires took care of forest regeneration by burning old trees, opening their cones and releasing the seeds that became new trees. That cycle continued until humans living in the warblers' range decided they no longer wanted fires and began suppressing them.

Meanwhile, forest clearing during Michigan's lumber boom opened a migration path for a new threat: brown-headed cowbirds. Known as "brood parasites," cowbirds evolved to lay their eggs in other species' nests. After hatching, the loud, fast-growing cowbird nestlings easily outcompete the host species' chicks.

"The vast timber harvest that put food on plates for people from the late 1800s through about 1920 was basically an invitation to cowbirds," says Carol Bocetti, a conservation biologist at California University of Pennsylvania. "Kirtland's warblers, who had never met a brown-headed cowbird in their evolutionary history, were completely unprepared to handle that level of parasitism."

By the 1970s, the warbler population was down to 167 singing males (a proxy for the number of breeding pairs)—or "really, really close to the brink of extinction," says Scott Hicks, field supervisor at the U.S. Fish and Wildlife Service (FWS) Michigan Ecological Services Field Office. Even before Congress passed the Endangered Species Act in 1973, the federal government categorized the Kirtland's warbler as endangered.

The 1973 law triggered the formation of a Kirtland's warbler recovery team and a plan. Cowbirds were trapped and euthanized. But how to create young jack pine forests? Minor controlled burns didn't help; the forest patches they created were too small. Large burns caused too much havoc. (One burn in 1980 blazed out of control. It helped the warblers but at the cost of 44 homes and a biologist's life.) Instead, the team needed to safely simulate the effect of large wildfires. They did this by cutting down mature growth and mechanically planting seedlings. "By the time the habitat is five, six, seven years old, Kirtland's warblers start using it pretty much without fail," says Nathan Cooper, a conservation biologist at the Smithsonian Migratory Bird Center.

By 2015, the warbler population had grown to almost 2,400 singing males, more than double the recovery goal. The

birds spread into Wisconsin and Ontario, part of their historic breeding range. The cowbirds were so fully vanquished that, even without traps, nest parasitism fell to near zero.

Delisting does not put Kirtland's warbler in the clear, however. The species is considered "conservation reliant," meaning it needs ongoing help from humans. Michigan's Department of Natural Resources says it spends between \$300,000 and \$500,000 annually on habitat management, and the U.S. Forest Service's Huron-Manistee National Forests spend about the same. Timber sales from public lands help offset this cost.

"The population has recovered. It is likely stable. But it's not self-sustaining because the habitat that they need is no longer created naturally," says Cooper. "Without fairly con-

WHEN A SPECIES IS IN TROUBLE, IT'S RARELY POSSIBLE TO SINGLE OUT ONE CAUSE.

stant human intervention, this species will eventually be back on the endangered species list."

Rebuilding battered habitat

Sometimes a species benefits not from surgical targeting, but from a broader effort to restore a battered ecosystem. That's what saved island night lizards, which grow up to eight inches long and were listed as threatened in 1977.

When the lizards first colonized three of California's Channel Islands, the land likely sat off the coast of what is now Mexico. "They've basically been riding those islands north for millions of years," says Ryan O'Donnell, a research biologist at the Arizona Game and Fish Department. Separated from their mainland cousins, the reptiles evolved into relative giants. But they were no match for the nonnative mammals—including goats, sheep and feral cats—that were imported for farming and rodent control. The herbivores grazed down lizard habitat. Cats killed the reptiles directly.

The lizards were fortunate, however. The U.S. Navy and the National Park Service own and manage the three islands, so the species' recovery effort tapped the resources of two large federal agencies. The first step was to remove all invasive mammals from the lizards' territory. The costliest piece—\$3 million on San Nicolas Island alone—involved capturing cats in catnip-laced live traps rigged to send computer alerts to researchers. "The cat-removal effort was motivated by broad concerns for the island's natural resources," says Charles Drost, a research zoologist with the U.S. Geological Survey. "The lizard population was one of many beneficiaries."

Federal agencies also replanted native vegetation, including the cacti and boxthorn that lizards need for shelter. Today, indigenous plants have been restored, invasive animals removed—and the lizards are returning. San Clemente Island alone is home to 21 million. In 2014, the species was delisted.

Beyond much-needed hope, these comebacks also provide instructive lessons. First, the Endangered Species Act works, notwithstanding criticism by those who compare it to “a hospital where patients are admitted but don’t get discharged.” Although only 44 U.S. species have been recovered and delisted and more than 1,600 remain, FWS officials say the act has prevented the extinction of 99 percent of all listed species. “We usually wait so long before we list a species and provide

protection that, for most of them, success has been achieved by stabilizing and keeping them from going extinct,” says Stein.

Equally important: Recovery takes patience. “Sometimes we feel like everything has to have instant results,” says Hicks. “We’re looking for home runs.” But saving the Kirtland’s warbler, Guam rail and island night lizard each required generations of professionals nudging the effort forward. “Often-times, it’s about getting somebody on first base. Then the next generation comes along, and they get to second or third. And then the next generation finally brings it home.” **W**

Barry Yeoman wrote about long-distance bird migration in the October–November 2019 issue.



CHRIS MATTISON (NPL/MINDEN PICTURES)

Restoring native plants and removing nonnative mammals, including sheep, goats and feral cats, helped bring back the island night lizard (above) while benefitting other Channel Islands species, from endemic snails to the island fox.