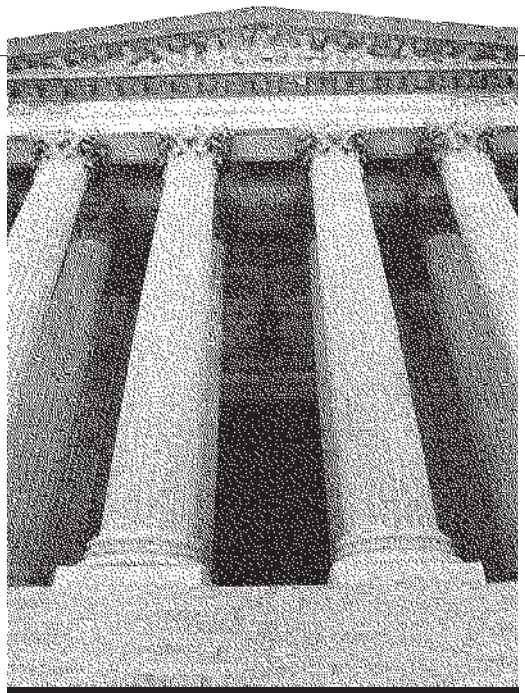

THE DEBATE

The Endangered Species Act at 50: Making the Statute More Effective

ALMOST immediately after enactment of the Endangered Species Act 50 years ago, it was engulfed in controversy that resulted in the Supreme Court enjoining completion of the Tennessee Valley Authority's Tellico Dam because of the expected impact on a recently discovered fish, the snail darter. Many observers believed that the statute would not survive the resulting political backlash. They were wrong. It endured not only that conflict but also other high stakes disputes pitting spotted owls against the logging industry in the Pacific Northwest, sea turtles against the shrimping industry in the Southeast, and still other species against still other formidable interests elsewhere.

While the ESA's political resilience has been remarkable, its record of accomplishment in recovering imperiled species is more checkered. On average, since the ESA's enactment, only about one species has been recovered and taken off the endangered and threatened list annually. Meanwhile, the number of species on that list has steadily grown and is now nearly 2,400. Recent studies have concluded that the number of species at risk of extinction dwarfs the number that are now protected or likely ever to be protected.

Though the ESA has withstood political attack, its implementation is frequently characterized by controversy. The designation of critical habitat, which must be done for every listed species, is almost always contentious, yet its impact is generally significant only on federal lands. On private and other non-federal lands, large-scale Habitat Conservation Plans have been effective in reconciling development and conservation objectives, but they have been costly to prepare and are spotty in their distribution.

Since the ESA's enactment, new threats have emerged that were unknown, or nearly so, a half century ago. The most dramatic of these, of course, is climate change. Novel diseases, like the white-nose syndrome that has decimated many bat species, represent another potent stressor that the act's authors did not anticipate.

In light of the experience gained over the past half century, the time seems right for an assessment of how well the ESA is working and how it might be made to work better.

Derb S. Carter Jr.
Senior Attorney
Southern Environmental Law Center

"If all federal agencies used their authorities to recover endangered and threatened species, it would dramatically advance species recovery"

Holly Doremus
Professor of Law
University of California Berkeley

"One key need is for a disciplinarily diverse group to produce consensus recommendations to update conservation goals"

David S. Wilcove
Professor of Ecology, Evolutionary Biology, and Public Affairs
Princeton University

"We should focus on saving full species, be realistic about their prospects for complete recovery, and commit the funds necessary to keep them alive and in the wild"

J.B. Ruhl
Co-director, Energy, Environment, and Land Use Program
Vanderbilt Law School

"Conflicts between the ESA and speeding up renewable energy infrastructure have been postulated for over a decade and now are becoming very real"

Melinda E. Taylor
Senior Lecturer
University of Texas School of Law

"Making the ESA more effective is an essential step. The act is due for a tune-up, so let's open the hood and get to work"

Sean Skaggs
Partner
Ebbin Moser + Skaggs LLP

"The regulatory reforms of the late 1990s have provided for important conservation gains and have stood the test of time"

Restoring Habitat Needs More Funding, Focus

By Derb S. Carter Jr.

This March, I watched palilas quietly feed on mamane flowers on the dry slope of Mauna Kea. The palila, one of Hawaii's 20 endangered or threatened birds, was the lead named plaintiff in an early Endangered Species Act case establishing that prohibited "taking" of an endangered species includes actions that harm the species by causing habitat degradation that could lead to its extinction. This decision affirmed that Congress enacted the ESA "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved."

Habitat degradation and loss remain the principal causes of species endangerment—and habitat protection and restoration should be the principal focus of recovering endangered and threatened species and halting the decline of plants and animals not yet listed under the ESA.

The palila's precarious existence continues. Invasive avian malaria is killing native Hawaiian forest birds, and several survive only at the cooler elevations of forests above the presence of the invasive mosquitoes that transmit malaria. As climate change warms the Earth, mosquitoes move higher, imperiling the palila and other native birds. Habitat protection and restoration, while essential, is not enough to save these species. And the challenges in saving Hawaii's native birds are a preview of challenges to protecting biodiversity and species across the country in response to loss of native habitats, altered ecosystems, invasive species, and climate change.

The ESA has largely been effective in preventing species extinctions and somewhat effective in recovering species. Generally, the status of a species improves the longer it is listed as endangered or threatened, affirming the act can work to recover species. A necessary step to maintaining the effectiveness of the ESA is for the Biden administration to restore longstanding ESA regulatory requirements repealed by the previous administration in 2019. Increased funding to address the backlog of species that warrant listing, to designate critical habitat, and to develop and revise recovery plans would significantly improve effectiveness of the statute in protecting and recovering species.

While the challenges are many, there is still the opportunity to restore representative areas of most of our major ecosystems and recover most imperiled species. The regulatory commands of the ESA have evolved over five decades to include incentives. Both regulatory prohibitions and more proactive landowner incentives are required to protect and recover imperiled species, combined with substantial federal and state investment in land protection and ecosystem restoration.

Nearly all the small fraction of once vast shortgrass prairie ecosystem is in private ownership, and ESA incentive programs like candidate conservation agreements for imperiled species can provide required conservation and more certainty for landowners. But these pacts must have explicit conservation objectives and rigorous implementation. When agreements fail to deliver, as with the lesser prairie-chicken, they must be quickly replaced with measures adequate to protect and recover the species.

If all federal agencies used their authorities to recover endangered and threatened species, as directed by Congress in the ESA, it would dramatically advance species recovery. The southeastern United States has among the richest aquatic biodiversity in the world, but hundreds of aquatic species are endangered, threatened, or otherwise warrant listing. Clean Water Act permitting programs pay scant attention to impacts on listed or imperiled species, creating a constant flow of newly listed aquatic species and rare recovery. EPA should use its CWA oversight authority to change that.

Federal land management agencies often approach endangered species recovery at best as one agency objective to be balanced against others. Yellowstone National Park is only a part of the federal lands that encompass the greater Yellowstone ecosystem, and the Yellowstone ecosystem and the grizzly bear and other species need all these lands and more for recovery. All federal land management agencies should use their authorities to prioritize species recovery.

Or Congress should clarify that the primary purpose of all the federal resource lands is restoration and protection of ecosystems, recovery of endangered and threatened species, and preservation of the nation's biodiversity. History would view this action as prescient as that of the leaders a century ago who had the foresight to reserve these public lands for future generations.

More focus and investment on the broader "ecosystem restoration" Congress envisioned in enacting the ESA would both hasten recovery of listed species and slow the cascade of species that warrant listing. The recently enacted infrastructure law appropriates billions of dollars for land protection and ecosystem restoration. While the Biden administration characterizes this as "once in a generation" funding for ecosystem restoration, this level of supplemental funding must be expanded and sustained if we are to preserve the nation's biodiversity for future generations.

Palila and many species still exist because as a nation we enacted the ESA fifty years ago. Our one planet is a better place to live with colorful palilas, dancing prairie-chickens, and grizzlies.

Derb S. Carter Jr. is senior attorney at the Southern Environmental Law Center.

Clarify Conservation Goals

By Holly Doremus

The critical questions for the Endangered Species Act—which we've avoided addressing for 50 years—are what conservation goals we want the law to further, and how these goals should interact with other societal aims. These questions are logically prior to asking what it would take to meet our goals. Answering them is essential to crafting sensible, effective conservation policy for the Anthropocene. Given the record of the last 50 years, neither Congress nor the agencies are well-positioned to provide answers; academia is a logical place to start.

The ESA codifies a radically incomplete statement of purpose: to provide the means to conserve endangered and threatened species and the ecosystems upon which they depend, in order to safeguard their esthetic, ecological, educational, historical, recreational, and scientific value. Noble sentiments, but short on key details. What taxonomic entities deserve protection? If listing candidates must be prioritized, what principles apply? What conservation costs are justified, and how should they be distributed?

In 1973, those details could be glossed over. Biologists knew that species were difficult to define, but the law provided some wiggle room, covering subspecies and some vertebrate populations. Species were known to be dynamic entities, but the pace of change seemed slow enough to ignore. As for priorities and costs, most people seem to have assumed those would not be problematic. The new law was seen as following in the footsteps of its mild predecessors.

Fifty years later, we need to fill in the details, for both political and practical reasons.

Politically, although the most recent national surveys show strong public support, they are five years old, and political tribalism may be encroaching. Conservation advocates cannot assume the American public will remain firmly pro-ESA as local conflicts multiply. A closer look at goals would provide an opportunity to take the public pulse at a more granular level and to educate citizens on why certain goals should be pursued.

Practically, the scale of the conservation problem is orders of magnitude greater than it seemed in 1973. Climate change threatens to eliminate 20 percent of plant and animal species globally in the next 50 years, even if the Paris climate goals are achieved. We can no longer avoid the question of how to prioritize among many species in need of help.

Nor can we hide from other difficult questions. We must ask what efforts, at whose expense, we should put into protecting species that may be doomed regardless of anything we do, like the tiny Delta smelt, which has outsized impacts on operation of California's water delivery infrastructure. We need to think more deeply about what it means to deliberately move species across the map to places they never previously inhabited, a step the Department of the Interior now says it can take under the banner of "experimental populations."

We need to ask where species belong, and under what circumstances we should commit to perpetual active management. Should we plan to reintroduce wolves periodically to Isle Royale? Or instead to let nature take its course, whatever that means in the Anthropocene? Should hybridization with non-native species sometimes be welcomed as a path to new species suited to new conditions, or always fought as a threat to current species?

What we need is no less than a new vision for the future of conservation. How much room will we leave for nature, and at what cost? What do we mean by "nature" when the effects of human activity seem to have no limits?

How do we get there? In the end, congressional action will be needed; given the Supreme Court's hostility to agency creativity, any administrative approach would be fragile. But the modern Congress, which emphasizes performance over deliberation, is not the place to begin.

The conversation should start in academia, outside the political hothouse. Academic discussions can and should be self-organizing and plural. There is room for plenty of flowers to bloom. One key need is for a disciplinarily diverse group to engage in extended discussion with the goal of producing consensus recommendations to update conservation goals. Such a group should include broad expertise in natural science, social science, history, philosophy, policy, and governance, yet be small enough that participants can develop mutual trust. Members should be selected for their openness to multiple perspectives, their ability to listen across disciplinary lines, and their commitment to policy relevance.

The work of the group might directly inform new legislation. Or it might catalyze formation of a blue-ribbon commission or NGO effort on the model of the Joint Oceans Commission initiative of the early 2000s. This approach would not produce immediate change, but conservation policy is a long game. Even in this time of crisis, slow but durable may beat rapid but fleeting.

Holly Doremus teaches environmental and natural resources law at the University of California, Berkeley, where she is James H. House and Hiram H. Hurd Professor of Environmental Regulation. She has contributed to ESA debates for thirty years.

The Court's Anti-Innovation Doctrines

By J.B. Ruhl

I was in private practice representing public and private land development projects in Austin, Texas, during the early 1990s, when it became an epicenter of controversy under the Endangered Species Act. Between listings of migratory songbirds, karst invertebrates, salamanders, and plants, it became difficult not to bump into the ESA in any direction. The statute quickly became a tinderbox of conflict. But that local controversy, coupled with congressional sword-rattling threatening statutory reform, also led Austin to become a crucible of ESA innovation.

Bruce Babbitt, then secretary of the interior, recognized the need to take the pressure off by making the ESA less threatening to landowners. He and his advisors used Austin as one of the testing grounds for administrative reform initiatives leading to broader use of Habitat Conservation Plans and important refinements of Safe Harbors, Candidate Conservation Agreements, and other new programs aimed in that direction. It was policymaking at its finest. Not everyone was happy, but Congress took a pass on reform and Austin moved forward with a regional plan for ESA compliance.

The act soon after faced a threat far more daunting than Congress and landowner unrest—climate change. Wisely, successive administrations have declined to position the ESA as a regulator of greenhouse gas emissions, focusing instead on identifying and doing what can be done to help species threatened by climate change—what I have called "building bridges to the no-analog future." With policy falling far behind what is needed to slow climate change, we will need a lot of those bridges. It seems unlikely that the existing tools, including those Babbitt introduced, are up to the task. It is even more unlikely that Congress is up to the task—I long ago gave up on the fantasy of congressional reform of the ESA directed toward implementing modern conceptions of biodiversity conservation, much less in response to climate change.

That leads to administrative reform. We need another Bruce Babbitt, someone at the ESA helm willing to think outside the box, accept tradeoffs, and innovate around the goal of assisting species through the next decades of climate disruption.

Alas, this is not the 1990s. Bold administrative innovation like that Babbitt was able to pull off is today a target for attack. Consider two pathways such an initiative could take.

The first would be to strengthen regulatory protections for climate-threatened species, facilitate their climate-induced migration, secure habitat beyond the leading edge of range shifting so it's there when they get there, and similar measures. But nowhere in the ESA did Congress address climate change—and using the act to protect species from climate change would be a big undertaking and have widespread impacts. This approach, I fear, would run headfirst into the Supreme Court's three new anti-innovation doctrines of administrative law. First, after *West Virginia v EPA*, the role of the ESA in climate change policy could easily be branded a "major question." Second, after *Sackett v EPA*, the impact of these measures on property could easily run afoul of the Court's demand that Congress must use "exceedingly clear language" when it wishes to alter the federal power over private property. Third, after the inevitable and imminent demise of the *Chevron* doctrine, creative agency interpretations of the ESA would receive no deference.

As a thought experiment for how different the times are for ESA administrative innovation, consider if the *Sweet Home* litigation—in which the Court in 1995 upheld the agencies' definition of the statutory use of the term "harm" to include significant habitat modification—had not been brought until today. When compared to the narrow interpretation Justice Scalia advanced in his dissent, which would have functionally rendered the ESA a hunting statute, the habitat modification interpretation would easily be portrayed as a sweeping property regulation program inviting major question critique under *West Virginia*. Notwithstanding the agencies' long practice under that interpretation, as also in *Sackett,* that would count for little. Forget about deference. I foresee the same demise for any bold climate change administrative innovation initiatives going forward.

The other pathway is to assist climate-threatened species by facilitating renewable energy and other decarbonization infrastructure. Permitting reform is in the air these days, focused primarily on the National Environmental Policy Act. The potential conflicts between the ESA and speeding up renewable energy infrastructure have been postulated for over a decade, including by me, and now are becoming very real. Yet efforts to develop regional plans for the Midwest to facilitate wind power production have dragged on, and not much other innovation has bubbled up as of yet.

I would encourage the agencies to focus on this kind of innovation as a theme, which seems far less likely to be at risk under the Court's new anti-innovation doctrines. Like Babbitt's reforms, this may not be popular with environmental protection groups, but tradeoffs are inevitable, and this "green" infrastructure is urgently needed not only for humans, but for the species the ESA is intended to protect from threats like climate change. Many legal practitioners and scholars have offered suggested reforms. Maybe Bruce Babbitt has some ideas, too.

J. B. Ruhl is David Daniels Allen Distinguished Chair in Law, director, Program on Law & Innovation, co-director, Energy, Environment, and Land Use Program, Vanderbilt University Law School.

Adapting the Act to Meet Today's Challenges

By Sean Skaggs

Recent and pending revisions to the Endangered Species Act will help shape a response to the environmental stressors associated with climate change. Additional statutory or regulatory revisions would likely have minor conservation benefits compared with what could be achieved through a massive influx of funding to implement the ESA in its present form.

The ESA and implementing regulations already have elements that enable responses to new developments. For instance, Section 7 requires use of the best available scientific information during interagency consultations. And the courts have interpreted Section 7 to require consideration of the threats to species and habitat posed by climate change.

As part of the ESA regulatory reforms of the late 1990s, the innovative No Surprises Rule required that Section 10 Habitat Conservation Plans explicitly plan for changed circumstances in habitat preserves and also established a process for responding to events that could not be foreseen. From the outset, the requirement to address changed circumstances in HCPs has typically focused on threats to habitat preserves that are exacerbated by climate change, including fire, flood, drought, and invasive species. The concurrent development of the 5 Point HCP Policy required that such preserves have a program for monitoring and adaptive management to respond to new threats.

The pioneering effort to launch regional habitat conservation planning through regulatory reform has led to an unprecedented level of protection and adaptive management of habitat on non-public lands, totaling millions of acres.

Regulatory and policy innovations of the 1990s also led to creation of the Safe Harbor Agreement program, which has led to voluntary habitat enhancement actions that provide a net conservation benefit for species on more than 2 million acres of non-public land. The regulatory reforms of the late 1990s have provided for important conservation gains and have stood the test of time.

Notable in the recent and pending revisions to the ESA regulations is the Biden administration's decision to revise the Section 10 regulation on species reintroductions to remove language that restricted the introduction of experimental populations to areas within the species' historical range. The rationale is that it may be necessary to establish populations outside of the historical range if a species' habitat is undergoing irreversible decline because of the impacts of climate change or invasive species.

Currently proposed revisions to the Section 10 regulations would also codify the 5 Point HCP policy, which includes the requirement for HCP preserves to include monitoring and adaptive management. And currently proposed revisions to the Section 7 regulations would expand requirements for compensatory mitigation for incidental take of listed species.

In its current form, and assuming finalization of currently proposed revisions, the ESA can address what is within the act's scope. The causal standard under the ESA would not enable the effective regulation of GHG emissions nationally, much less globally. Rather than additional amendments to the ESA or regulations, the current focus should be on expanded use of existing authorities for habitat protection and adaptive management, species reintroduction, and other recovery and adaptation strategies. The administration should put greater emphasis on enrolling lands into the Safe Harbor program and to recommit to expansion of regional habitat conservation planning, which results in the conservation of listed and unlisted species and protects overall biodiversity. To date, regional habitat conservation planning remains predominantly a program in western states.

What is currently needed most is a substantial increase in funding. As many observers previously have noted, the ESA has been woefully underfunded over the years. It is time to fully fund implementation of actions identified in Section 4 recovery plans and to greatly increase Section 6 grant funding, both to support the development of regional habitat conservation plans and Safe Harbor Agreements, as well as for habitat acquisition to augment the size and resilience of existing HCP preserves.

We need to greatly increase funding for federal programs developed under Section 7(a)(1), which authorizes federal agencies to utilize their authorities to further endangered species conservation. It is also imperative to seek synergy through integration with other federal programs. For instance, funding in the Infrastructure Act for a pilot program to remove legacy barriers to wildlife movement should prioritize endangered species, as should the administration's "30 by 30" program to conserve open space.

We are at a critical juncture where the effects of climate change could wipe out decades of species conservation gains. In the face of such exigent circumstances, focusing on habitat protection and adaptation strategies seems akin to putting a finger in the dike. But the ESA has always been described as a safety net and it is a realistic role for the act to play while awaiting comprehensive laws addressing global emissions.

Sean Skaggs is a partner with Ebbin Moser + Skaggs LLP, where he focuses on natural resources law.

Act's Many Flaws Point Clear Path to Improvements

By Melinda E. Taylor

Hanging in my office at the University of Texas is a black and white portrait of an ocelot, photographed by David Littschwager and Susan Middleton in 1991 and part of their collection titled *Witness: Endangered Species of North America*. The picture was a gift from the staff of the Environmental Defense Fund when I left my job there in 2006, a reminder of the advocacy work we did on behalf of endangered species. The ocelot gazes into the lens, unfazed by the people behind the camera, but clearly alert and watchful. The cat is beautiful, charismatic, mysterious, and dangerous. It is also extremely rare. The last breeding population of ocelots lives in South Texas, where the loss of habitat to agricultural conversion and urbanization, along with car strikes, have reduced the number of cats there to fewer than 60.

The U.S. population of ocelots has been protected by the Endangered Species Act since 1982 and has had a recovery plan in place since 2010. But the ocelot, like many species listed as endangered or threatened under the act, continues to decline. The so-called pit bull of environmental statutes, hailed and emulated by nations around the world as an inspiring model to protect biodiversity, has not lived up to its fierce reputation.

Supporters of the law point out that 95 percent of listed species have been saved from extinction, which is important, of course, but only a handful have fully recovered. The number of high-profile successes, like the bald eagle and the brown pelican, are dwarfed by the hundreds of other species, like the Florida panther, black-footed ferret, lesser prairie chicken, Northern right whale, and the ocelot, for which success means precariously hanging on.

The ocelot is not alone. We are living through a well-documented biodiversity crisis. The global populations of mammals, birds, amphibians, reptiles, and fish have dropped almost 70 percent since 1970, according to the World Wildlife Fund. NatureServe reports that 34 percent of plants and 40 percent of animals in the United States are at risk of extinction.

Notwithstanding the important safety net that the law provides for some species at risk of extinction, the act has done little to stem the tide of biodiversity loss. The problems are understood—insufficient funding, inconsistent enforcement, and few incentives for private landowners, among other things—and well-meaning regulators and advocates have tried to devise solutions, but the law's track record remains unimpressive. The statute's focus on punishing harm caused to individual species, rather than protecting whole ecosystems, has led to a complicated labyrinth of regulations and policies that are difficult to understand, expensive to follow, and, increasingly, politically polarizing as well.

Historically, efforts to meaningfully reform the statute and rethink its approach to conservation have been dead on arrival in Congress. Environmental advocates and business lobbyists alike resist comprehensive efforts to amend the law, because neither side trusts the other's motives. The result is a stalemate. We are stuck with a law that was written decades before many of the most significant modern threats to biodiversity were identified—climate change, ocean acidification, and invasive species, to name three—and it was simply not designed to address those challenges.

It is time for a bold new vision to reimagine the goals of the ESA and rethink the mechanisms to achieve them. An improved law would still provide a backstop for species on the brink of extinction, but it would focus squarely on protecting the nation's disappearing natural ecosystems: short grass prairies, coastal wetlands and freshwater springs. Focusing on large-scale ecosystems would make it easier to address the particular threats those ecosystems face—urbanization, energy development, climate change, and others—and ensure that the species that depend on those ecosystems have a chance to recover and thrive.

An ecosystem approach would complement the Biden administration's America the Beautiful initiative, which aims to conserve 30 percent of America's land and water by 2030. The presence of endangered and threatened species could be used to set priorities for conservation, and the needs of the species used to define management plans for the protected lands. And in addition to conserving biodiversity, an ecosystem strategy would yield enormous other natural services: carbon sequestration, flood control, and water quality preservation.

The new and improved act would provide meaningful financial incentives for private landowners to participate in large-scale conservation. Countless species would benefit if private individuals were paid real money to protect them. Expanding the use of conservation banking, which taps into market forces to encourage transactions between private actors that result in conservation, would be a cornerstone.

As we grapple with the momentous implications of the extinction crisis, and look for tools to save what's left, making the Endangered Species Act more effective is an essential step. The act is due for a tune-up, so let's open the hood and get to work.

Melinda E. Taylor is a senior lecturer at the University of Texas School of Law. She cofounded the Kay Bailey Hutchison Center for Energy, Law, and Business in 2013.

More Money, Focus Needed to Meet Act's Goals

By David S. Wilcove

Imagine that a community built a hospital, filled it with the necessary equipment to treat patients, and then allocated only enough money to staff it for two days per week. Health care outcomes would be disappointing. I think that's where we have been with the Endangered Species Act for the past half century. The tasks are expensive: identifying species at risk, protecting their habitats, properly managing those habitats, controlling additional threats such as invasive species, and restoring landscapes where needed to bring species back to healthy population levels. But the United States has never made the financial commitment necessary to realize the ambitions of the ESA.

To the contrary, a study my colleagues and I published last year showed that appropriations for the recovery of endangered and threatened plants and animals, when measured on a per-species basis, have dropped by 50 percent since 1985. Moreover, there are thousands of additional species that deserve protection under the statute but have yet to receive it due to a lack of funding. Solving these financial shortfalls is the single most important step that can be taken to fix the ESA and to protect America's biodiversity.

That said, there are at least two other fundamental challenges facing the act, especially if funding remains inadequate. The first relates to having a more realistic set of expectations for what can be accomplished. The development of the country has so altered its natural ecosystems that many rare species cannot persist without active management of their habitats. This can range from relatively simple steps like maintaining a fence that protects a rare plant from livestock, to major undertakings like water releases from dams to benefit rare fish.

In 2010, J. Michael Scott and colleagues estimated that fully 84 percent of U.S. endangered plants and animals fall into the category of "conservation-reliant" species; to paraphrase Blanche DuBois, they will always depend on the kindness of strangers to maintain and restore their habitats. In addition, there are many endangered species hanging on in remnant patches of suitable habitat in heavily developed regions like the Bay Area or southern Florida, where land is costly and there are few opportunities to restore habitats.

Thus, some species will always need our attention, whether because we must actively manage their habitats or because we have no realistic options for restoring enough of their habitats to support viable populations. If we judge the ESA solely by the number of species that are recovered, we will be ignoring the reality of how dire the situation is for most of our imperiled plants and animals.

The second fundamental challenge relates to how we prioritize which plants and animals to save. While entitled the Endangered Species Act, the statute permits the listing of not only full (biological) species, but also subspecies and, for vertebrates only, distinct populations. There are plenty of good reasons to protect vanishing subspecies and vertebrate populations, ranging from the genetic diversity they hold to the cultural and ecosystem benefits they provide. Think of wolves in the Rocky Mountains or bald eagles in the coterminous United States. But, in the context of saving the evolutionary history of life on earth, the focus is better placed on full species rather than subspecies and populations.

If the ESA were richly funded, this wouldn't be an issue, but given that funding is likely to remain inadequate for some time, the Fish and Wildlife Service must make painful decisions as to which plants and animals to save and recover.

Here, I believe, the Service has overvalued subspecies and populations relative to full species. The FWS periodically compiles data on federal and state expenditures for the recovery of listed species, subspecies, and vertebrate populations. It is by no means a perfect accounting, but it nonetheless provides important insights into how we allocate money to save biodiversity.

The most recent report, covering fiscal year 2020, shows that, of 1,599 listed species, subspecies, and populations for which data were available, the top 10 received 38 percent of the total recovery funds (federal and state) for that year. These lucky 10 consisted of three full species (pallid sturgeon, delta smelt, bull trout) and seven populations of chinook salmon and rainbow trout. Neither chinook nor rainbow trout as a species is at risk of extinction because each has plenty of other populations. Meanwhile, the bottom one hundred plants and animals collectively received less than one percent of recovery dollars, even though 74 of them were full species.

Moving forward, we should focus on saving full species, be realistic about their prospects for complete recovery, and commit the funds necessary to keep them alive and in the wild.

David S. Wilcove is a professor of ecology, evolutionary biology, and public affairs at Princeton University. He has devoted his career to the conservation of biodiversity, with a particular focus on rare and declining species.