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NECESSARY

ENDANGERED SPECIES POLICIES FOR A RAPIDLY CHANGING CLIMATE

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Authors
Ya-Wei Li and Timothy Male

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For more information
Tmale@policyinnovation.org
Environmental Policy Innovation Center
700 K St, NW
Washington, D.C. 20001

Front cover
Hawaiian goose or nene were once extinct in the wild, but have now recovered to the point that they are proposed for downlisting, supported by translocations to establish new populations including through Safe Harbor Agreements. Photograph by Jack Jeffrey

Salt Marsh Harvest Mouse, whose habitat is threatened by sea level rise. USGS

Executive Summary

***NECESSARY ENDANGERED SPECIES POLICIES FOR A RAPIDLY CHANGING CLIMATE* is a new report from the Environmental Policy Innovation Center that provides a set of five recommendations for Congress and wildlife agencies to amend endangered species policies to preserve more biodiversity until global efforts are effective in stabilizing our climate.**

The Endangered Species Act was written and revised in decades before the threat of climate change was well-known. While managers, Congressional appropriators, states, conservation organizations and private landowners have made noteworthy efforts to work around the current limits of policy and the law to address climate-induced threats, much more significant and systematic changes are needed to conserve more of America's biodiversity in the face of inevitable changes in the next few decades, even if Paris Accord and Net Zero national and global goals are fully realized.

This report describes five changes that would provide a force multiplier for federal, state, and private efforts to preserve as many U.S. plants and animals as possible from climate change and other major threats over the next 50 years:

1. Issue new policies to make it much easier to move species through species' translocations and place more emphasis on and funding for plant translocations.

2. Many species will become climate refugees—their future range will be very distinct from their current one. A federal-state initiative should identify the species and habitats most likely to lose the majority of their current geographic distribution and significantly expand the incentives for states and others to introduce and reassemble them into new places where they can survive. The regulatory process for doing so has to be easier, as does the social acceptability of doing so within the conservation community. If we don't act quick enough, we will lose many opportunities to save species and ecological communities.

3. Dozens to hundreds of species now and in the future need support that is analogous to an emergency room full of the best medical experts available. The Biden Administration and state leaders should work with Congress to create and fund a rapid response team of the most experienced and creative conservationists within the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) paired with state wildlife managers. A creative, empowered team like this is necessary to implement strategies that aren't happening under business-as-usual conservation but have the best chance of saving rapidly declining species.

4. There are many species that we can save from extinction but not recover and delist at present time: recovery-limited species. We need better ways to recognize these species, create new incentives to conserve them even when delisting is impossible, and measure interim conservation success using benchmarks other than delisting and downlisting. We also need to develop new ways to think about funding the conservation of species facing intractable threats that cannot be adequately ameliorated through current conservation techniques.

5. Under any endangered species budgeting system it should be transparent how resource allocation is designed to maximize the amount of biodiversity conserved, especially the number of extinctions prevented. No one in or outside of government could say that about our system today. The agencies' endangered species budgets need to be rebuilt from scratch so the U.S. Fish and Wildlife Service and National Marine Fisheries Service endangered species budgets are focused on saving as much biodiversity as possible in the next 50 years.

We provide these recommendations to encourage a broader dialogue on the need to prioritize and create momentum for urgent ESA policy improvements in response to a rapidly changing world and to develop better strategies for threats that are beyond the ESA's current reach. Many changes in endangered species policies generally have wide support by conservationists but face partisan and acrimonious political conditions. In contrast, we believe these recommendations are much more likely to find political acceptance but face fragmented scientific and management perspectives. We believe the latter should be easier to resolve and therefore faster to enact.

Introduction

America's Endangered Species Act (ESA) was written in the 1970s and has not seen a major update since 1988. Although the law remains important and useful for wildlife conservation, some provisions only offer at best a dull tool to address climate change, drought, and other intractable threats to wildlife that are outpacing conservation efforts.

How can that be?

Much of the text of the law - and a large part of the budget dedicated to implementing it – is focused on changing or halting human actions that directly harm species. The law has few tools to incentivize or compel proactive management of threats like climate change and invasive species. Put differently, many species will move toward and past the brink of extinction not because of any direct human action but rather inaction. For example, the Hawaiian tree snail named 'George' (*Achatinella apexfulva*) died in 2019, the last of a species whose principle threats were an invasive, non-native wolfsnail introduced to Hawaii in 1955 and species of rat introduced even earlier. If George's kin had been threatened by a road, farming or chemicals, the law's provisions might have been able to help, but the strongest parts of the ESA can do little to stop an already-established invasive species.

This is not to say that conservationists, states and federal agencies have found no ways to begin addressing the effects of climate change on endangered biodiversity. For example, an increasing number of ESA recovery plans and conservation strategies recognize the threat and identify actions to mitigate its effects on species. Some federal agencies are leading landscape-scale planning efforts to help species adapt to climate change. And climate change is front and center in the habitat acquisition and management decisions of many conservation organizations.

However, despite these advances, many more conservation tools are needed to enhance our ability to conserve species and ecosystems from climate change and other intractable threats. Some of these changes are to the ESA itself and could be accomplished with bipartisan support. This paper synopsizes five crucial changes in ESA policy that would help our country preserve the greatest share of its biodiversity in the face of the coming storm.

Before discussing the changes, we need to state several assumptions this report makes.

1. **The worst effects of climate change and increased resource use from a growing population will happen in the next 50-100 years. Afterwards, progress on technological, socioeconomic, and other areas will make it easier to stabilize and recover the plants, animals, and ecosystems that remain.**

2. For many species, the best habitats of today will be strikingly different from those of tomorrow. Species that cannot move on their own won't survive without our help.

3. Climate change is happening too fast to plan and study every scenario for each species' future or to adequately analyze the effects of all conservation actions in an environmental impact analysis.

4. Unless we find repeatable processes that allow us to act on extremely limited information on how our actions affect wildlife, conservation will operate way too slowly to save many species. We will burn time collecting data and finding consensus. By the time we arrive at obvious decisions for some species, many more species and special places will have been lost through inaction.

5. Whenever species conservation depends not on stopping a harmful action but on encouraging a beneficial action, positive incentives are the only tools that will consistently deliver success.

Figure 1. The Shenandoah salamander is not listed under the ESA, but climate change is projected to drastically alter its habitat in the Appalachians. Even if listed in the future, the protections of the ESA are unlikely to significantly improve the species' status – its future depends on programs other than the ESA. Credit: USGS.

If incorporated into policy or law, the following five changes would provide a force multiplier for federal, state, and private efforts to preserve as many U.S. plants and animals as possible from climate change and other major threats over the next 50 years:

1. We need to make it much easier to translocate species through a national policy on translocations, standardized rules that facilitate translocations, and more emphasis on and funding for plant translocations.

2. Many species will become climate refugees—their future range will be very distinct from their current one. We need a federal-state initiative to identify the species most likely to lose the majority of their habitat and significantly expand the incentives for states and others to introduce them into new places where they can survive. The regulatory process for doing so has to be easier, as does the social acceptability within the conservation community. If we don't act quick enough, we will lose many opportunities to save populations or entire species.

3. Dozens to hundreds of species now and in the future need a real emergency room—a rapid response team of the most experienced and creative conservationists within the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) paired with state wildlife managers – with a dedicated budget and leadership support to implement strategies that aren't happening under business-as-usual conservation but have a chance of saving rapidly declining species.

4. There are many species that we can save from extinction but not recover and delist at present time. We need better ways to recognize these species, create new incentives to conserve them even when delisting is impossible, and measure interim conservation success using benchmarks other than delisting and downlisting. We also need to develop new ways to think about funding the conservation of species facing intractable threats that cannot be adequately ameliorated through current conservation techniques.

5. The FWS and NMFS endangered species budget process needs to be rebuilt from scratch, such that it becomes intentionally and transparently designed to maximize the amount of biodiversity conserved, especially the number of extinctions prevented. Continuing the current approach in which a minority of species get the majority of funding, regardless of their threat level or genetic uniqueness, will lead to more lost opportunities to increase the number of extinctions prevented, species stabilized, and recoveries achieved.

We provide these recommendations to encourage a broader dialogue on the need to prioritize urgent ESA policy improvements in response to a rapidly changing world and to develop better strategies for threats that are beyond the ESA's current reach.

Conservation groups have sued to list the Pacific walrus, which rely on sea ice. USFWS.

Moving Species Impacted by Climate Change

Climate change will redefine the range of an increasing number of imperiled species. A recent study underscores the importance of translocations, finding that they "have played and will play a vital and necessary role in conserving 70%" of the approximately 1,600 domestic ESA species.[1] Although some of those shifts might occur over decades, the best opportunities to help species adapt is often now, when options for translocation and other measures are still possible. Translocations can include (1) reinforcing existing populations of a species, (2) reintroducing a species to a portion of its native range, or (3) introducing a species outside of its native range.

Despite the importance of translocations to many ESA species, there is no national policy to encourage translocations and ensure their effectiveness. Instead, translocation policies often default to a risk-averse, precautionary approach that emphasizes the potential negative unintended consequences of translocations.[2] The concerns include outbreeding depression, introduction of diseases, and wasted resources from failed translocation attempts. For many years, the key question was whether these risks outweigh the benefits of translocation. The emerging evidence indicates that they generally do not. The study cited earlier carried out the most comprehensive review of this question for ESA species and found only one translocation that caused damaging unintended consequences. Indeed, the researchers found that "for hundreds of the 1,014 taxa for which conservation translocations have been performed, these interventions prevented extinctions and facilitated recovery from population bottlenecks and range contractions...." Often, however, translocations were successful only after multiple releases because of inadequate baseline knowledge of biological and ecological factors, and inadequate post-release monitoring.

Figure 2. The Topeka shiner is a fish that FWS has successfully reintroduced through experimental populations under section 10(j) of the ESA. Reintroductions and other translocations will need to occur far more often to keep pace with changing habitat conditions in the future. Credit: USFWS.

Given the promising record of endangered species translocations and the growing importance of this tool, FWS and NMFS (collectively, "the Services") should take steps to increase the number of successful translocations for ESA species. This effort should include several components:

- ***Develop national policy that rebalances the likely benefits of translocation relative to the potential harms.*** Without national policy, decisions on whether to translocate a particular species will likely continue to default to a highly risk-averse approach that does not properly consider the consequences of inaction. One step is to develop a framework for assessing, managing, and communicating the risks associated with proposed translocations. The Services could even conduct this work as part of ESA recovery planning, when recovery actions such as translocations are identified. Another step is to identify the Services staff who have experience making good decisions on translocations, especially when data are limited, and make better use of their experience to inform future translocations.

- ***Legal authorities for translocations.*** The legal authorities for ESA translocations are varied, including through section 10(j) experimental populations, section 10 recovery permits, and safe harbor agreements. Further, the Services could develop section 4(d) rules for threatened species to authorize translocations, although the agencies appear never to have done this. Given the various approaches to translocations, Services guidance on the benefits and drawbacks of each approach would help agency staff and conservation partners identify the best approach to translocation in any particular situation.

- ***Lowering the barriers for conservation partners to pursue translocations.*** For many species, any translocations will be carried out on lands or waters owned by others, including private landowners and states. The Services could systematically identify the barriers to translocations that these partners face and lower them. This could include setting an expedited time frame for responding to proposed translocations through safe harbor agreements and section 10(a)(1)(A) recovery permits.

- ***The special case of plants. Plants make up 56% of U.S. listed species but are not protected by the section 9 take prohibition.*** Although this gap likely undercuts protections for plants, it also lowers the barriers to translocation by allowing a variety of translocation activities to occur without an ESA permit or section 10(j) reintroduction rule. Indeed, no section 10(j) rule has ever covered a plant species. The Services should clarify for their conservation partners that plant reintroductions can be considerably easier than wildlife reintroductions, and that ESA permits and section 10(j) rules are likely unnecessary.

- ***Tracking translocation approaches and effectiveness.*** The Services have never developed a system to track all ESA translocations, their outcomes, and the reasons for success or failure. Without this basic information, the agencies cannot identify the most effective translocation techniques using an evidence-based approach. One model the agencies could learn from is the Conservation Evidence Initiative in the United Kingdom, which assesses and provides synopses of evidence on the effectiveness of conservation actions.[3] A similar effort for ESA translocation actions—perhaps carried out in partnership with universities—would provide a far better foundation to inform translocations.

- ***Eliminating the "wholly separate" requirement for section 10(j) experimental populations.*** Experimental populations reintroduced under section 10(j) must be kept "wholly separate geographically" from non-experimental populations of the same species. This requirement, the result of a legislative compromise when the ESA was amended in 1982, creates several problems for species recovery, including encouraging isolation of experimental and non-experimental populations, thus undermining genetic exchange.[4] It also presupposes that reintroduced individuals will largely stay within the boundaries of the experimental population area. This assumption was never true and will only become less true with climate change. One solution, proposed by the late Frederico Cheever and partially adopted by FWS, is to eliminate the wholly separate requirement and instead adopt a "species zoning" approach.[5] Under this approach, FWS can still manage individual animals within a reintroduction area more flexibly than individuals outside of the area. No geographic separation is required, nor does the lineage of an individual matter. By eliminating these complications, experimental populations can play a larger role in recovery and become easier to manage. To formally abandon the "wholly separate" require, Congress will need to amend the ESA.

New Paradigms for Saving Climate Refugee Species

Recent research has found that almost all species listed as endangered are sensitive to climate change, but that management actions for climate change are lacking in the written ESA strategy documents targeted at most of those species (e.g. recovery plans).[6] This general failure to adequately address climate change becomes more acute for species whose entire range will be made unsuitable because of sea level rise or other climate change effects. An example is the Florida Key deer. In almost all climate change scenarios—even with successful Paris Accord-level greenhouse gas reductions and mitigation—climate change projections indicate that most of the deer's remaining habitat will become inundated by sea-level rise or made unsuitable by saltwater intrusion into the freshwater wetlands the deer requires. A complete translocation of the Key deer to mainland Florida is likely the only strategy to keep the subspecies alive. Spending resources on its current habitat has limited long-term value for conservation since climate change will most severely and permanently degrade it.

The Services and state wildlife agencies have never dealt with such drastic translocations but must begin addressing the ethical, legal, policy, science, and financial issues that surround those translocations. For the Key deer, there is no process in place today that requires the State of Florida and FWS to start thinking about these challenging climate refugee issues and to decide on early strategic investments to make translocations cost-effective and successful.

Figure 3. Sea level rise will inundate or destroy most of the habitat of the Florida Key deer in the coming decades. The only way to preserve the species is likely to translocate it elsewhere, raising many challenging questions that federal agencies have yet to begin grappling with. Credit: CC BY 2.0 Big Pine Key Fishing Lodge.

Although the Key deer represents an extreme case of a climate refugee species, many other ESA species also appear to require unprecedented measures to remain extant in the wild, to say nothing of recovery. The American burying beetle presents a case study. Although FWS recently downlisted the species from endangered to threatened, the agency also acknowledged that the entire Southern Plains area of the species range (which accounts for 60% of all current suitable habitat for the species) is "expected to exceed threshold temperatures" by midcentury, "likely resulting in extirpation of the American burying beetle from these areas."[7] If extirpation of those populations is inevitable, a key issue is how FWS should manage the populations. The downlisting rule hints at the possibility that the main value of the populations is to provide beetles for translocation to other parts of the range that can sustain the species beyond midcentury:

> ***Active management and monitoring in these conservation lands is considered important to help support recovery by serving as source populations for relocation and reintroduction efforts of American burying beetle populations, for as long as they sustain beetle populations.[8]***

If this interpretation is correct, then FWS should manage the doomed 60% of the species' range differently from other areas. The species' recovery plan should address these issues too, but it was finalized in 1991 and is extremely outdated. At the moment, the public and wildlife managers appear to have little clue as to how to maximize the species' chances of survival in response to the likelihood that over 50% of all populations will become extirpated in the coming decades.

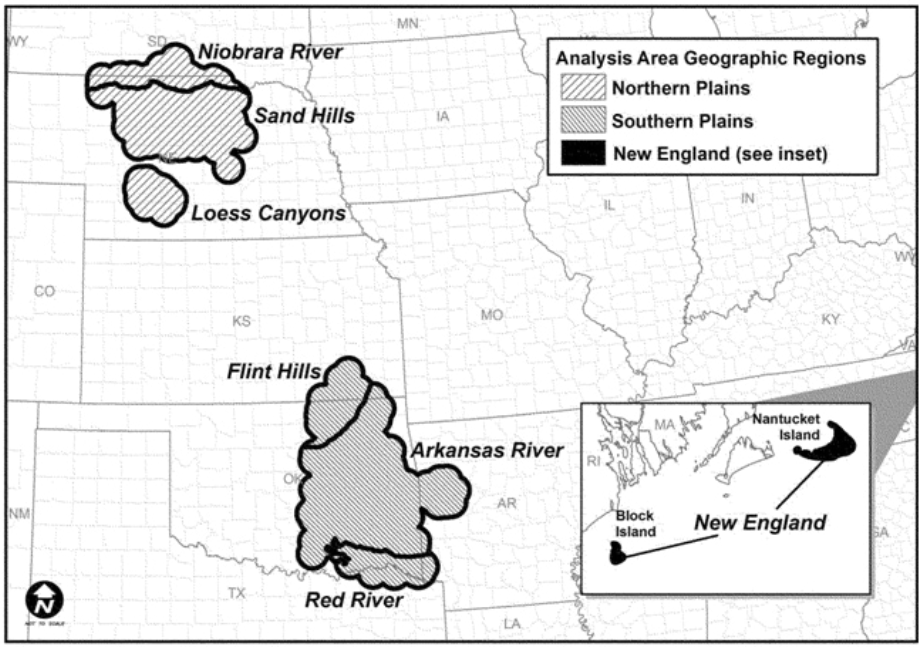

Figure 4. According to FWS, the American burying beetle Southern Plains populations are expected to become extirpated by mid-century because of increasing maximum summer temperatures in that portion of the species' range. Credit: USFWS.

The Key deer and burying beetle are two of many species that will require the Services to address very challenging questions related to climate adaptation.

The Biden administration should assemble a team of internal and external experts to begin systematically addressing these challenges for all ESA species. We have little confidence that the agencies will identify and implement the necessary climate adaptation strategies in a timely manner on a species-by-species basis, such as through individual recovery planning efforts. Many of the strategies are too controversial or difficult for individual recovery teams to address, without national guidance from agency leadership that creates political support and a path for those strategies.

There is a model that endangered species programs and agencies can follow. The FWS's National Refuge System has already developed a framework for addressing ecological transformation.[9] The Resist-Accept-Direct framework allows refuge managers to choose to resist climate change, accept change, direct change, or any combination of the three (Figure X). The National Park Service has adopted the same framework, recognizing that "using baseline conditions to define goals for today's resource management is increasingly untenable, presenting practical and philosophical challenges for managers."[10] No similar response, however, has come from FWS's endangered species program, even though endangered species conservation faces similar challenges from ecological transformation. In fact, those challenges may be even greater because endangered species conservation interfaces far more with private, state, and other landowners than does the conservation of national parks and wildlife refuges.

We thus urge the Services to develop a national framework for how the agencies will work with partners to make early decisions to conserve ESA species in a changing world. Some of the issues the framework should address include:

- **Provide a clear policy statement that the agency would rather translocate a species outside its historic range than to lose the species altogether.**
- **Explain the agency's legal authorities to translocate species outside of their historic range and what ESA protections would apply in those areas.**
- **Explain how the agency will evaluate current and future funding allocation for species with significant anticipated range shifts.**
- **Develop a strategy for working with external partners to acquire, manage, and publicize the baseline biological and ecological information needed to maximize the likelihood of successful translocations and inform other climate adaptation measures.**
- **Explain whether and how existing downlisting and delisting criteria should be revised for species for which most or all populations have been translocated.**

Figure 5: Resist-Accept-Direct framework that the National Park Service and National Wildlife Refuge System recently began using to manage for ecological change. Credit: NPS.

To help translocate wide-ranging species or a group of species that inhabit a certain ecosystem, Congress should consider giving federal agencies direction or guidance on those efforts. Otherwise, translocations will likely occur on a very slow, species-by-species or location-by-location basis—one that is outpaced by the rate at which climate change and other threats are rendering habitats unsuitable. One approach is for Congress to create a new category of section 10(j) experimental populations for climate refugee species that need a vastly expanded or different range to survive or recover. Any such amendment should also address how sections 7 and 9 protections, and critical habitat designation, would apply to the experimental populations, with the goal of encouraging state agencies to support the creation and management of those experimental populations.

Although the number of recovered species is increasing, many other ESA species continue to decline to dangerously low levels despite having been listed for many years. For example, many Hawaiian plant and invertebrate species have struggled to meet their extinction prevention goals, much less downlisting goals. The St. John Kaala (*Phyllostegia kaalaensis*) is a Hawaiian flowering plant that is now extinct in the wild and for which all outplanted specimens have died. Other Hawaiian plant species in a similar predicament include *Cyanea superba, Pritchardia kaalae, Phyllostegia kaalaensis, Kadua parvula,* and *Euphorbia herbstii*--all of which have been listed as endangered since the 1990s but none of which has met the criteria established for extinction prevention (Table 1).

Species with dangerously low abundances are not limited to Hawaii. Throughout the continental U.S., highly imperiled species include the ring pink mussel (only 2 found in the last 15 years) and poweshiek skipperling butterfly (decline from 12 to 7 occupied sites since 2014 listing). These highly imperiled species should be the highest conservation priority under the ESA, because extinction prevention is arguably the law's most urgent goal. The recent delisting of over a dozen species is cause for much celebration but should not divert attention from the many other species on the other end of the conservation spectrum, many of which have sat there for over a decade.

Figure 6: Freshwater mussels are one of the most imperiled groups of ESA species, but receive far less public attention and funding than high-profile or controversial species. Credit: AP News.

For many of these species, merely stabilizing their condition will likely require a different approach than continuing to rely on the overworked, underfunded workforce of FWS regional and field offices and state wildlife agencies to lift species from the brink. Much of that workforce's time is already committed to listing, consultation, and other mandatory ESA responsibilities, leaving little room for species rescue efforts that have no legal deadlines.

FWS should create a new national team focused solely on stabilizing the condition of species that face the highest extinction risk. These are species likely to become extinct or lose most of their populations under a business-as-usual scenario and in need of dedicated intervention. The extinction prevention team would thus function as a true emergency room for species of greatest need, whose "primary care physicians" would be given more tools, resources, or bandwidth to stop further declines. We recommend the following considerations in creating the team:

- The team should be made up of several full-time FWS staff with no other responsibilities and part-time staff with other ESA responsibilities. All of those staff would coordinate closely with the lead biologist for a species.
- The team should develop criteria for identifying species that are sufficiently imperiled to require its attention. All FWS Ecological Service staff should use these criteria to refer species to the team.
- The team would focus on ensuring that the highest priority conservation measures to prevent extinction are implemented and to think creatively about unidentified strategies to prevent extinction. We imagine that much of this work will involve implementing on-the-ground recovery actions, but the team should also have the authority to become involved in ESA regulatory actions needed to prevent extinction. This includes working to ensure that the terms of biological opinions and incidental take permits are diligently implemented; prioritizing enforcement of potential ESA violations from activities that threaten the species; and negotiating for more effective conservation measures during ESA permitting.
- The team should develop criteria for transferring species out of the emergency room and provide guidance on how to conserve the species afterward. Thus, species should not stay in the emergency room indefinitely.
- The team would receive its own budget within FWS's Ecological Services annual budget. Filling the team's budget would be a high priority for FWS's annual budget and for other Department of the Interior agency budgets that help conserve species in the emergency room.
- The team would have independent authority to report directly to the FWS Director, the Assistant Secretary for Fish, Wildlife, and Parks, and the Assistant Secretary for the Office of Policy, Management and Budget. This eliminates the chain of command that can hamper full and honest information exchange when difficult or controversial conservation measures are necessary.

Congress can also help immensely by allocating new funds for urgent conservation actions needed to stabilize highly imperiled species. Already, Rep. Raúl Grijalva (D-Ariz.) and Sen. Richard Blumenthal (D-Conn.) have jointly introduced the Extinction Prevention Act of 2021, which would authorize $5 million annual for each of the following groups of highly vulnerable but low profile species: North American butterflies, Pacific Island plants, freshwater mussels, and Southwest desert fish.[11] The bill is likely the most important funding proposal in several decades to conserve these overlooked species, but could also be expanded to cover all species that face an extremely high extinction risk.

Four successive stages of recovery for Hawaiian plants

PREVENTING EXTINCTION STAGE

- Minimum of 3 populations, each with a minimum number of reproducing individuals (number depends on species lifespan).
- All major threats are controlled in the vicinity of the 3 populations.
- Each population shows some stage of natural reproduction.
- 50 individuals (if available) from each population are represented in an ex situ connection that is secure and well managed.

INTERIM STAGE

- Minimum of 3 populations, each with a minimum number of reproducing individuals (number depends on species lifespan) that is 4-6x higher than the preventing extinction stage, for a minimum of 5 years.
- All major threats are controlled in the vicinity of the 3 populations.
- Each population is naturally reproducing.
- Each population is represented in an ex situ connection that is secure and well managed.

DOWNLISTING STAGE

- Minimum number of populations (5-10) and reproducing individuals (1000-10,000) for a minimum of 10 years.
- All target populations are stable, secure, and naturally reproducing.
- Multi-island species should be represented by at least three populations on each island from which they were historically known.
- An adequate population viability analysis should be completed.

DELISTING STAGE

- Minimum number of populations (5-10) and reproducing individuals (1000-10,000) for a minimum of 20 years.
- All target populations are stable, secure, naturally reproducing, and within secure and viable habitats.
- Multi-island species should be represented by at least three populations on each island from which they were historically known.
- Species-specific management is no longer needed, but ecosystem level management is acceptable if long-term agreements exist to continue management.
- Genetic analyses should be completed to ensure adequate genetic representation.

Table 1. In 2011, the Hawaii and Pacific Plants Recovery Coordinating Committee revised its recovery objective guidelines for Hawaiian plants. The guidelines include preventing extinction and interim criteria, which precede downlisting. These two earlier stages are highly appropriate for many Hawaiian plants, considering that many of them are no longer viable as populations or are artificially distributed. Adopting a similar approach for certain other taxonomic groups can help the Services create more deliberate and effective approaches to conserving species facing very high extinction risks.

Palliative Care for Species Without a Current Path to Recovery

The most comprehensive review of ESA recovery plans found that delisting is not considered possible for 26% of the 1,173 species with recovery plans. This is not a flaw in the plans but in the state of our conservation knowledge – managers do not have sufficient knowledge and wisdom to recover these species. Many examples abound of species we do not understand well enough to recover and are discussed in ESA 5-year status reviews. The 2019 review for the northern riffleshell mussel states that it is "doubtful that [the two delisting criteria] could be met."[13] The assessment for the eastern indigo snake anticipates that even under the most optimistic "conservation-focused" future scenario for the species, its resiliency, redundancy, and representation are expected to continue declining and island populations are expected to become extirpated due to sea level rise and urbanization.[14] And the most recent 5-year review for the Anastasia Island beach mouse concludes that "it may not be possible to support five viable, self-sustaining populations [of the species] to meet the recovery criteria for reclassification to threatened status due to the lack of suitable habitat throughout the historic range of the [species]."[15] These are just several of many similar examples that we have seen in 5-year reviews.

Another reference point is the FWS recovery priority number (RPN) for all 1,232 species with a recovery plan. The RPN system categorizes species based on their degree of threat, recovery potential, and taxonomic uniqueness. Species with an RPN number of 4-6, 10-12, and 16-18 have a "low" recovery potential. More than 40% of all species are considered to have a low recovery potential. Although the Services should strive to recover all listed species, the reality is that many species currently lack any path to recovery and delisting.[16]

This does not mean these species are going to go extinct.

The lack of any current path to recovering certain species is parallel to various human health conditions and may provide conservationists with a useful comparison for thinking about long-term management. HIV/AIDS, Alzheimers, epilepsy, diabetes, and muscular dystrophy are just a few of the many diseases for which there is currently no cure. This does not mean that an afflicted person is doomed. To the contrary, uncurable diseases and conditions can be managed with palliative care through medication and other treatment.[17] The same is true for many ESA species: even though no path to delisting currently exists, the species' status can remain stable for decades if not centuries with managed care, while conservationists continue to find options for full recovery.

This distinction between extinction, prevention, and recovery is often conflated, leading to confusion on the subject even in peer-reviewed articles. For example, a recent article by an international group of conservationists argues, among other things, for the "recoverability of all species" and that the "concept of conservation triage suggests that some species

cannot be recovered at all."[18] Rather than provide evidence to support these claims about "recovery," the entire analysis focuses on why extinction is not inevitable, including for species with very low population sizes, and focuses on extinction-prevention concepts such as the 50/500 rule, "persist[ence]," and the need for an "explicit goal of avoiding extinctions." These concepts are a far cry from what recovery means under the ESA or from what some of the authors have proposed elsewhere as a definition of a fully recovered species under terminology.[19]

The reality is there is an enormous distinction between extinction prevention and recovery; in fact, they are on the opposite ends of the ESA extinction risk continuum. To say that a species is currently recovery-limited implies very little about whether it is doomed to extinction. For example, scattered and isolated bog turtle colonies with low abundances can persist for decades, but this says nothing about whether enough funding, private landowner support, and other measures exist to recover the species.[20]

Figure 8: Scientists cannot currently chart a recovery pathway for polar bears but that does not mean they are going to go extinct. Credit: CC-BY-2.0 Christopher Michel.

By identifying species without a current path to recovery, conservationists can not only avoid the type of confusion discussed above but also open new doors to enhance their work. The Services should take steps to better recognize and intentionally manage this type of species. This effort should include several components:

- ***Develop national policy on recovery planning and implementation for recovery-limited species.*** ESA recovery efforts for these species should be distinguished from those for species with a known path to recovery. Differences could include how the Services identify recovery strategies, allocate recovery funding, communicate with the public about the species' long-term prospects, and track conservation status. Without coordinated effort and more national visibility on species without a path to recovery, federal agencies are unlikely to secure the funding needed to develop solutions that may someday allow those species to recover. The Services should consider creating a separate budget for research on these solutions and explain to Congress the need to fund that budget for the ESA to achieve its recovery goal.

- ***Incentivize landowners to help achieve conservation milestones for currently recovery-limited species.*** If a group of landowners can manage a population for long-term viability, they should receive financial, regulatory, or other incentives for achieving that milestone, even if all other populations of the species currently have no path to achieving the same level of security. This is the scenario faced by certain species with some populations on Department of the Defense lands and other populations on private lands. An example is *Rhadine exilis,* a Texas cave invertebrate with no common name. Land development appears to have extirpated all populations of the species except those on Camp Bullis. Because the species' recovery plan requires multiple populations distributed throughout different landscapes, the species will likely never recover, even if the population on Camp Bullis is stable or secure. In situations like these, recognizing that recovery is likely impossible can prompt a dialogue about what ESA regulatory incentives--such as relaxed section 7 requirements or section 4(d) rules that reduce restrictions for recovered populations--are possible when each milestone is met.

- ***Set more realistic expectations about what the ESA can achieve in light of funding, political, and other constraints on its effectiveness.*** Because the ESA's goal is to recover listed species, many people take this as the primary goal by which to measure the law's effectiveness. This approach presupposes that recovery is within the control of the ESA and that the inability to achieve it signals a failure of the law. A careful review of recovery plans and five-year reviews, however, reveals that this assumption is misguided for many species. For example, there remains no mechanism within the ESA to address the primary threat to polar bears and many other species affected by rising levels of

greenhouse gas emissions. This is so even if the full amount of funding in those recovery plans were provided. That is, the sociopolitical and economic barriers to addressing climate change are not captured by the cost identified in recovery plans. Although the ESA can address other threats to these species (e.g., harassment through human-bear interactions), it currently lacks the ability to address the key barrier to recovery. The same is evident in 5-year reviews for many species affected by drought in the American southwest. Thus, the number of recovered species is a misleading metric by which to assess the ESA's overall effectiveness.

- ***Develop metrics to track how a species' biological and threat statuses change.*** As mentioned earlier, recognizing the lack of current paths to recovery could prompt a dialogue about how else to measure the law's effectiveness. One way is for the Services to develop a standardized system to track significant but incremental changes in species status. With this system in place, the agencies can measure and report conservation progress even if it does not trigger downlisting or delisting. Working with FWS, we have already tested and proposed a system that we hope the agency will adopt promptly.[21] Doing so will move our nation toward a more meaningful dialogue on the ESA's effectiveness, rather than the binary extinction-or-recovered debate that has dominated public discourse and which ignores the over 95% of ESA species that fall between these two extremes.

Recognizing barriers to recovery could also underscore the need for lawmakers to develop new conservation programs to address those barriers. For example, if the absence of a take prohibition for plant species is impeding their recovery, a public dialogue is needed on this problem, considering that plants make up 56% of all domestic ESA species. Similarly, if drought and water extraction will prevent the recovery of many southwestern fish and invertebrate species, then conservationists need to discuss solutions. At the moment, no such dialogue is occurring at a national scale—all--all while options to recover certain species continue to disappear.

Budget Prioritization to Save More Species

It is difficult for any member of the public and many Services staff to understand what national conservation goals the agencies and Congress are trying to achieve through their current ESA budgeting approaches. The absence of unified, coherent ESA budgeting goals is one reason that many ESA species have not received adequate support and are in decline or near extinction. Budget prioritization can become a key tool to fight this problem and to maximize the number of species conserved.

Current ESA budget allocations result in a small percentage of species receiving most of the federal and state funding for conservation. For example, a comprehensive review of ESA implementation found that "from 1998 to 2012, over 80 percent of all government spending went to support 5 percent of species, whereas 80 percent of all listed species shared less than 5 percent of all funds."[22] That same study found that 52% of the 1,292 listed species with recovery plans were in decline, based on government reports to Congress from 1990 to 2010.

> ***It is inconceivable that better allocation of conservation funds would fail to prevent more extinctions and achieve more recoveries.***

One way to improve budgeting is by reallocating some of the funding for improving species to those in decline that have been underfunded (so called "injurious neglect" species).[23]

Figure 9: The endangered Hickman's cinquefoil has been categorized by scientists as being in "injurious neglect" by managers, meaning that it is in obvious decline yet barely receiving any funding. Credit: CC-BY-2.0 John Game.

Doing so increases the number of species conserved and lifts species facing a high extinction risk, allowing the country to preserve the option to continue conserving those species in the future, when more funding or novel conservation techniques become available. Put differently, prioritization that emphasizes extinction prevention can stabilize a species until resources or techniques become available to improve its status. No such approach is occurring today.

More broadly, a national conversation is needed to identify specific endangered species conservation goals over the coming decades—especially in light of climate change, drought, wildfire, infrastructure development, and other impacts on species--and how to allocate funding to advance those goals. For example, if certain major threats are expected to increase in the future and block paths to recovery, dedicated funding to address those threats is needed. The funding from FWS's Ecological Services budget is vastly inadequate to address those threats, yet for many species no other source of funding is available.

Scientist searches for spruce-fir moss spider, a species threatened by climate change. USFWS.

The ESA will turn 50 years old in 2023. Considering how much the law has been underfunded and the political obstacles it has faced, it has accomplished a remarkable amount for biodiversity. This includes not only the approximately 60 species and populations delisted because of recovery, but also the many species that are stable or incrementally moving toward recovery. But if we extrapolate this trend to the next 50 years, the picture looks grim. Too many currently listed species—to say nothing of the many species that will require listing—are still in decline and face very challenging odds on the path to recovery. When the full brunt of climate change, drought, urbanization, and other threats becomes evident, the prospects for recovering many of those species will have been lost.

To preserve as many conservation options as possible, the Services need to act with urgency to develop new and different strategies focused on losing as few species as possible. Our five recommendations are a starting point. Some of the recommendations are undoubtedly controversial because they presuppose a different reality than the one that some conservationists are used to thinking about. For example, we assume that some species are recovery-limited because the ESA has never had the tools or capability to recover those species, even if extinction prevention is feasible. Recognizing this reality allows the conservation community to identify and advocate for new tools to fill critical gaps in conservation. We hope this report has inspired you to think pragmatically but ambitiously about how to preserve America's biodiversity in the coming decades.

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[5] Id.
[6] Aimee Delach et al., *Agency plans are inadequate to conserve US endangered species under climate change,* 9 Nature Climate Change 999 (2019).
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[8] Id.
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[11] Extinction Prevention Act of 2021.
[12]Maile Neel et al., *By the Numbers: How is Recovery Defined by the US Endangered Species Act?,* 62 Bioscience 646 (2012).
[13] U.S. Fish and Wildlife Service. 5-Year Review for Northern Riffleshell (*Epioblasma torulosa rangiana*) (2019).
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[16] Holly Doremus & Joel Pagel, *Why Listing May Be Forever: Perspectives on Delisting under the U.S. Endangered Species Act,* 15 Conservation Biology 1258 (2001).
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