

Defenders of Wildlife's Center for Conservation Innovation (CCI) identifies pressing conservation challenges and harnesses the power of science, technology, and policy to address them. The research discussed in this report required a unique combination of geospatial science and policy knowledge to advance understanding on how the five major drivers of biodiversity loss are affecting imperiled species in the U.S.

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Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native wild animals and plants in their natural communities.

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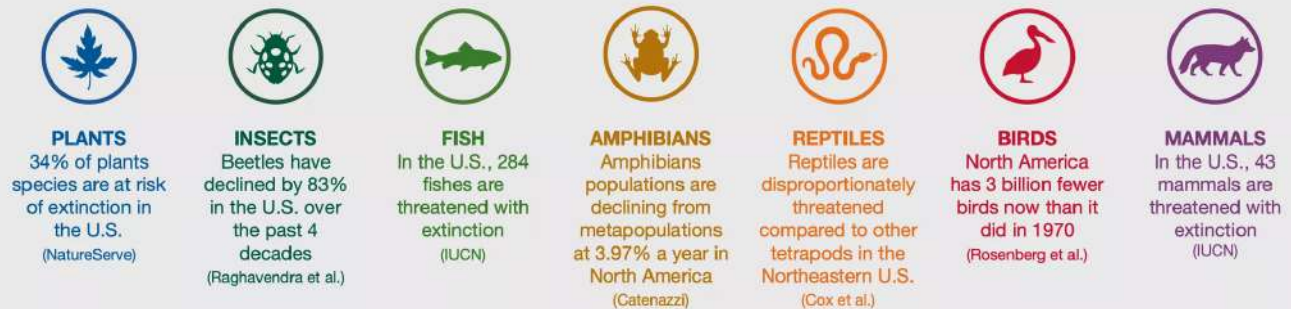
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BIODIVERSITY: THE FOUNDATION OF LIFE

Biological diversity – biodiversity for short – refers to the variety of life at all levels: genes, species, and ecosystems. It includes every lifeform from threatened vernal pool fairy shrimp to endangered blue whales. Biodiversity underpins the ecosystem services that our economy, food systems, water sources, and well-being are inextricably linked to. As such, there is no common interest more widely shared and inclusive than healthy natural systems founded on thriving, native biodiversity.



Since the term's emergence in the 1980s (1), it has gained widespread use and represents a burgeoning field of interest (2). As research in this field grows and deepens, it continues to increase our understanding of the importance of biodiversity for its own sake and for the benefits provided to people. Today, the concept of biodiversity is synonymous with a need to address the growing environmental crisis responsible for mounting extinctions. Threats to the diversity of life on earth have been accelerating since the onset of the industrial revolution, with significant implications for society through a degradation of nature's benefits to people (3–6), with marginalized groups often disproportionately affected (5, 7–9). **Today, we are witnessing extinction rates unprecedented in human history (10–12) and one million species are at risk in the coming decades (5).** Extinctions are irreversible, but only one part of biodiversity loss. We can take action to stem the decline of our imperiled species, the evolutionary history they represent, and the functions that they contribute to the complex ecosystems that we share. Without this diversity, we are all at risk.

The past few years have seen a stream of reports, research, and data demonstrating the challenges and opportunities in biodiversity conservation. Many of these focus on the worsening trends at global and

continental scales. However, there is enough information to indicate that the United States is included in the global trend of decline: 34% of our nation's plants and 40% of our animals are at risk of extinction (13). All ecosystems are impacted by the major threats of ongoing habitat loss, overexploitation, climate change, pollution, and invasive species. While there are still knowledge gaps on the status and trends specific to the U.S., efforts are underway that can help fill these gaps. Through an Executive Order in 2022 (14), the Biden Administration called for the development of the first-ever National Nature Assessment. In creating a more comprehensive understanding of the current and future state of the nation's wildlife and habitats, the assessment can help identify opportunities for tackling the crisis here at home.

A key piece of the puzzle lies in understanding the underlying drivers of biodiversity loss. This report brings together information from the best available science and data to explore the five main threats to global biodiversity and their influence in the U.S. This report and following work can help build the foundation for robust science-based policy and action to address the drivers of biodiversity loss and safeguard species in the U.S.

5 MAIN THREATS TO BIODIVERSITY:

Overwhelming evidence demonstrates that biodiversity loss is a result of human actions and explicitly addressing the anthropogenic threats is critical to stemming the crisis (11, 15). The world's 7.6 billion people represent just 0.01% of all living creatures, but humanity has already instigated the loss of 83% of all wild mammals and half of plants (16). The Living Planet Index, which tracks the abundance of almost 32,000 vertebrate populations around the world, indicates that populations are declining by 69% on average (6). As a cumulative result, the World Economic Forum listed biodiversity loss as one of the most significant global risks for the next decade: second to the inextricably-linked climate crisis (17). Identifying the specific mechanisms that are causing these declines is the first step in addressing them.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report reviewed about 15,000 scientific and government sources from the past five decades to identify the five main ways in which human activity continues to threaten biodiversity (5):

Climate change resulting from anthropogenic emissions of greenhouse gases, is altering our environments through shifts in temperatures and precipitation, leaving some habitats unsuitable for the species that reside there. In the contiguous U.S., the average annual temperature has risen 1.8 °F since the beginning of the 20th century, with the largest net increases occurring in western regions (18). Precipitation patterns are also shifting, with increases in the central and northern U.S. and large reductions in the Southeast and West (19). Extreme weather events such as heat waves, major storms, and regional droughts have become more frequent and intense during the past 50 to 70 years (20). Impacts to

multiple ecosystem types are already occurring, and these are expected to worsen with continued warming (21). Climate change is projected to become the fastest growing driver of biodiversity loss by 2050. In North America, nearly half of species are already undergoing local extinctions (22), which are, in part, due to climate change (23). The synergies between climate change and other drivers of biodiversity loss are still understudied but expected to contribute significantly to species declines in both terrestrial and aquatic ecosystem (5).

Invasive species, non-native animals or plants introduced to a new environment, can cause ecological damage, and outcompete native species for key resources (e.g., space, food, etc.). Globally, two hundred new invasive species are recorded every year, associated with increases in trade and human population (24). In the history of the U.S., more than 50,000 invasive species have been introduced (25). These introductions can come with a cost: invasive species management and damages are estimated at \$20 billion each year (26). Nearly 40% of the invasive plants now in the U.S. were originally introduced as ornamentals, and these species affect nearly every ecosystem of the country and continue to expand into new areas. Invasions are predicted to increase another 40% by 2050 (27). At least half of the species listed as threatened or endangered in the U.S. are threatened by invasive species. Some invasive species may pose a greater threat to wildlife and habitats than others. For example, cheatgrass negatively affects at least 14 listed species and 27 National Wildlife Refuges (Haines & Leu, forthcoming).

Land- and sea-use changes lead to the loss and degradation of natural habitats. Conversion of natural habitat to human-dominated land uses such as residential or agricultural areas can fragment habitats, isolate species, reduce the number of species, and more (28). Previous research points to habitat loss as the most prevalent cause of species endangerment in the U.S. (29–35). It is a main reason for listing over 1,250 species as threatened or endangered under the Endangered Species Act. From 2001 to 2017, the U.S. lost more than two football fields of natural area to development every minute (36), with rates and underlying causes varying across the country. In the U.S., imperiled species are currently most at risk of land-use change on private lands (37). Changes may be more prevalent in certain natural land covers than others. For example, between the time of European settlement and the 1970s, the contiguous U.S. lost over half of its original wetlands (38).





Overexploitation removes species from the wild at rates faster than they can recover. To feed and fuel our 21st century lifestyles, the U.S. is using over twice the renewable natural resources and services that can be regenerated within its borders (39). Although our population is 60% larger than it was in 1970, consumer spending has increased 400%. Overexploitation poses a threat to at least 26% of species listed under the Endangered Species Act. Some of these species were once overhunted but are now more protected against this threat due to increased regulation of harvest and trade (e.g., Game and Wild Birds Preservation and Disposition Act of 1900; Lacey Act of 1900; Magnuson-Stevens Fishery Conservation and Management Act). However, the threat may still persist for particular taxa or populations (40). For example, unsustainable hunting in some areas threatens the reintroduction and recovery of gray wolves. In marine ecosystems, direct exploitation of organisms (mainly fishing) has had the largest relative effect on species: 20% of U.S.-managed fish stocks are overfished and 8% are being harvested at a rate higher than sustainable yields (41).

Pollution from pesticides, heavy metals, plastics, noise and light pollution threatens the health of species and their habitats. Increased nutrient inputs from agricultural practices or atmospheric deposition is the leading type of pollution. Between 2007 and 2012, an assessment of U.S. lakes showed a 10% increase in the detection of algal blooms from increased nutrient levels (42). However, nutrients are just one type of pollutant running off into aquatic systems. For example, nearly 11% of plastics produced each year enter aquatic ecosystems (43). U.S. contribution to plastic waste in coastal environments was five times larger in 2016 than in 2010 and may continue to increase. Pesticides are another pollutant, their use being linked to declines in bird diversity (44). For other types of pollution there are still many serious gaps in knowledge, suggesting that the current best available science likely underestimates the effects on biodiversity and natural ecosystems (45).

IPBES: The Headlines

This Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reviewed ~15,000 scientific and government sources from the past five decades. They found that over 1 million species are threatened with extinction. Read the full report here.





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Ultimately, these threats to biodiversity are also threats to humanity, affecting our health, well-being, and livelihoods. According to the 2022 Global Risks Report, \$44 trillion of economic value generation - half of the world's total gross domestic product (GDP) – is at risk from biodiversity loss (17). Biodiversity losses also negatively affect access to food, medicine, and clean water, and lead to an increase in disease, air pollution, as well as other public health concerns (5). Communities that are most marginalized in society are often the most vulnerable to these environmental changes (5, 7, 9).

Although science has helped to identify the major drivers of global biodiversity loss, we are still refining our understanding of its impacts on our human and wildlife communities. The growing body of literature in the field suggests that scientists are recognizing the need to fill these knowledge gaps. The proportion of peer-reviewed papers on biodiversity that make mention of at least one of the five drivers has increased from roughly 20% to 40% over the past three decades (Figure 1). These five threats were recognized as the direct drivers of global biodiversity loss in the IPBES report (5), which leveraged a comprehensive synthesis of decades of best available science from around the world (35). As early as the 1990s, scientific studies mention overexploitation, land- and sea-use change, pollution, and invasive species as dominant threats to species and predicted that climate change would soon become one as well (35). More recent publications explore how this suite of threats has emerged as the dominant cause for biodiversity decline (46–48).

There is still more work to be done to understand what role these threats may play at the national scale (49). Almost no species or ecosystem in the U.S. goes unaffected by at least one of these threats. Improving our understanding of how these five global threats may contribute to biodiversity loss in the U.S. can inform a more strategic response to the crisis at hand.

BIODIVERSITY PUBLICATIONS

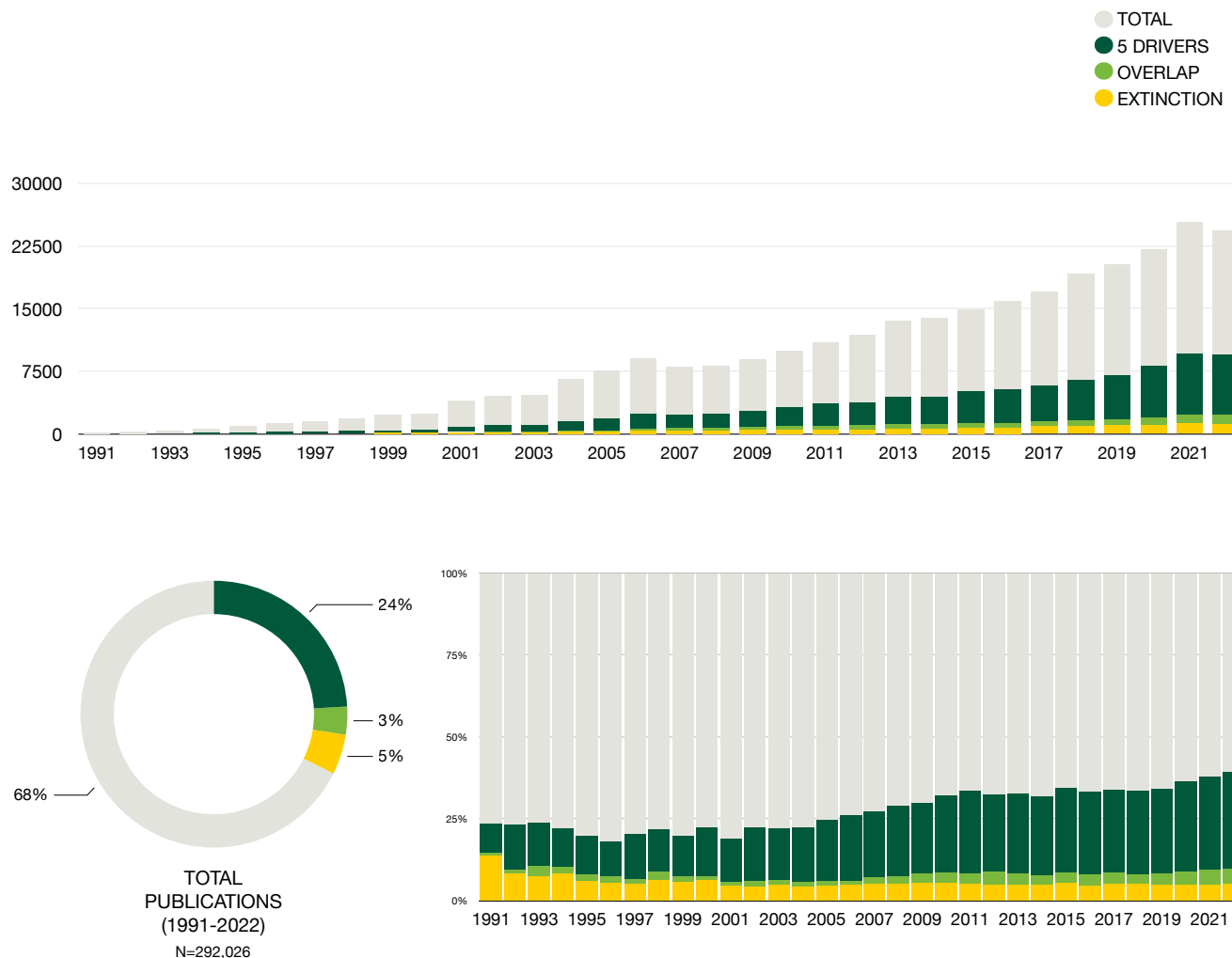


Figure 1: Increase in worldwide scientific papers published on biodiversity between 1991-2022 that mention at least one of the five main threats to global biodiversity (dark green), extinction (yellow) or both threats and extinction (light green). Proportions of papers mentioning the five underlying threats to global biodiversity loss also generally increase during this time (bars in lower left). Donut chart shows all years combined.

THE THREAT TO U.S. BIODIVERSITY:



To contribute to the best available science on the potential threat that land-use change, climate change, invasive species, pollution, and overexploitation pose in the U.S., we analyze spatial patterns and overlap between each threat and areas important to imperiled species. For this preliminary overview, we focus specifically on imperiled species because these are in greatest need of immediate conservation and resources.

WHAT WE ASKED:

How much of our nation's important biodiversity areas are at risk?

Which threat(s) are contributing most to species endangerment?

Which species groups face the greatest risks?

Where in the U.S. are these threats potentially having greater impacts on communities?

This report is the first to create a comprehensive national map of the five main threats to global biodiversity and builds on decades of research in identifying and quantifying threats to listed species (see methods). Most studies that have examined the spatial distributions of threats have done so only at the global scale (50–52). However, understanding these trends at the national or local scale can aid efforts in strategically siting and selecting conservation actions for stemming species endangerment and supporting recovery.

WHAT WE FOCUSED ON

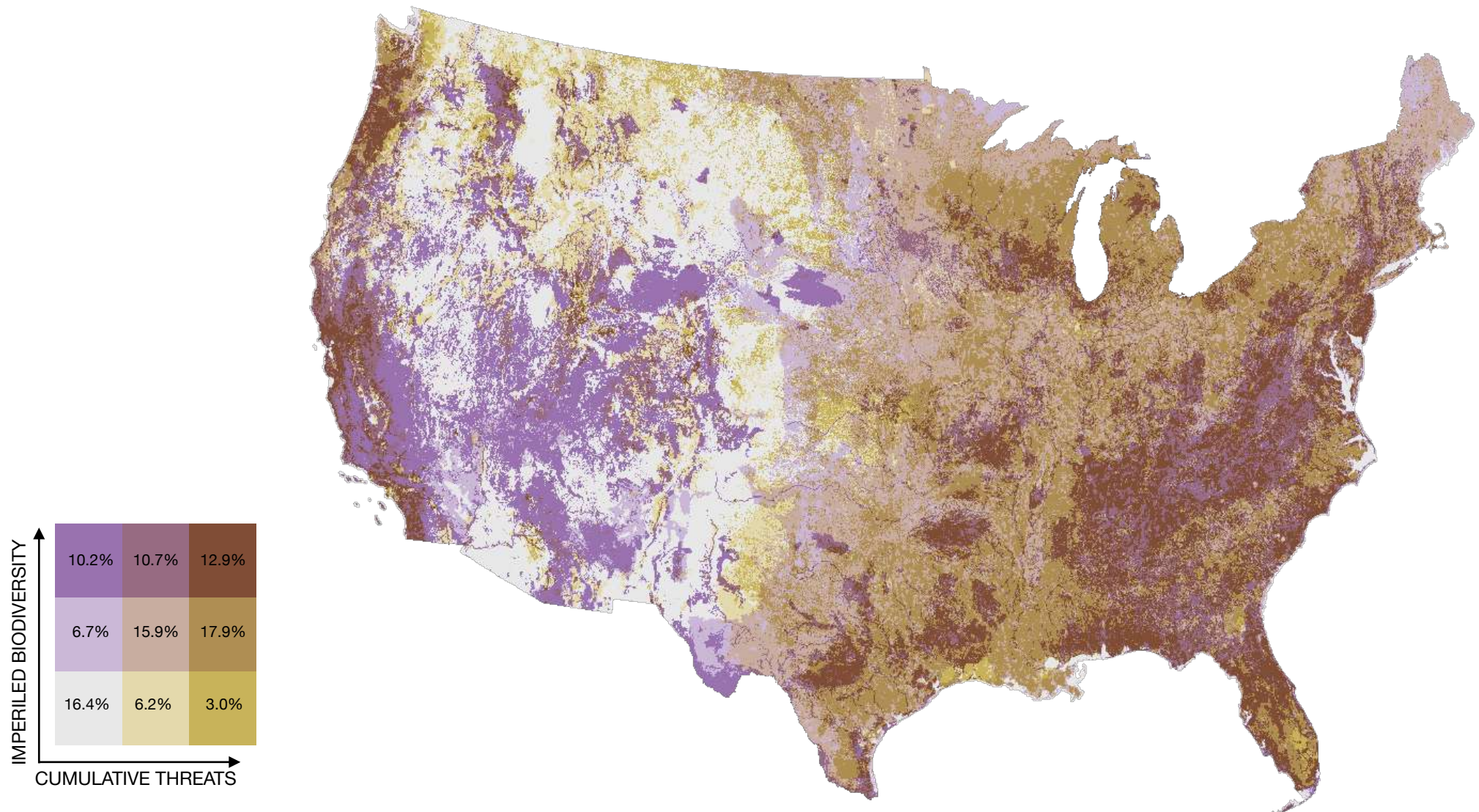
Areas of Biodiversity Importance: Locations where there are higher concentrations of species with limited conservation opportunities. We used locations with the highest values (top 10% of the contiguous U.S.) which indicate the presence of habitat for one or more imperiled species with restricted ranges. Values were based on habitat models for 2,216 species that are also grouped by vertebrates, pollinators, vascular plants, and freshwater invertebrates (see NatureServe's Map of Biodiversity Importance).

Threat Hotspot: Locations with higher exposure to one or more of the five human-induced biodiversity threats; climate change, land-use change, invasive species, pollution, and overexploitation (top 10% of the contiguous U.S. for each threat, separately).

Listed Species: Species and subspecies that are listed as threatened or endangered under the U.S. Endangered Species Act. Threats were determined for 1,662 species in the United States and territories from their time of listing onward. This data can be accessed through the IRIS dashboard. Spatial overlaps were analyzed for 958 listed species in the contiguous U.S., based on range data provided by U.S. Fish and Wildlife Service.

U.S. BIODIVERSITY UNDER THREAT

Biodiversity importance (purple gradient) and threat ranking (yellow gradient) for all areas of the contiguous United States. Nearly one quarter of the U.S. is categorized as having high biodiversity importance, but also faces medium-to-high threat (upper right section of grid).



WHAT WE FOUND:

How much of our nation's important biodiversity areas are at risk?

All areas of the contiguous U.S. are impacted by the human-induced threats driving the global biodiversity crisis (Figure 2), with nearly half (44%) of our nation's most important areas for biodiversity overlapping threat hotspots. For 82% of U.S. species listed under the Endangered Species Act, portions of their range don't just overlap the threats that have led to their endangerment, but the hotspots of those threats. On average, one fifth of a species range falls into threat hotspots. For at least 38 species, this coincidence may mean extinction: over 90% of their range is affected (see Appendix). These results highlight the alarming prevalence and magnitude of anthropogenic threats to imperiled species in the U.S. and the places where those threats may continue to persist if not for targeted conservation action. Given the high spatial variability in threat location and intensity, certain species groups and ecoregions may be at greater risk than others.

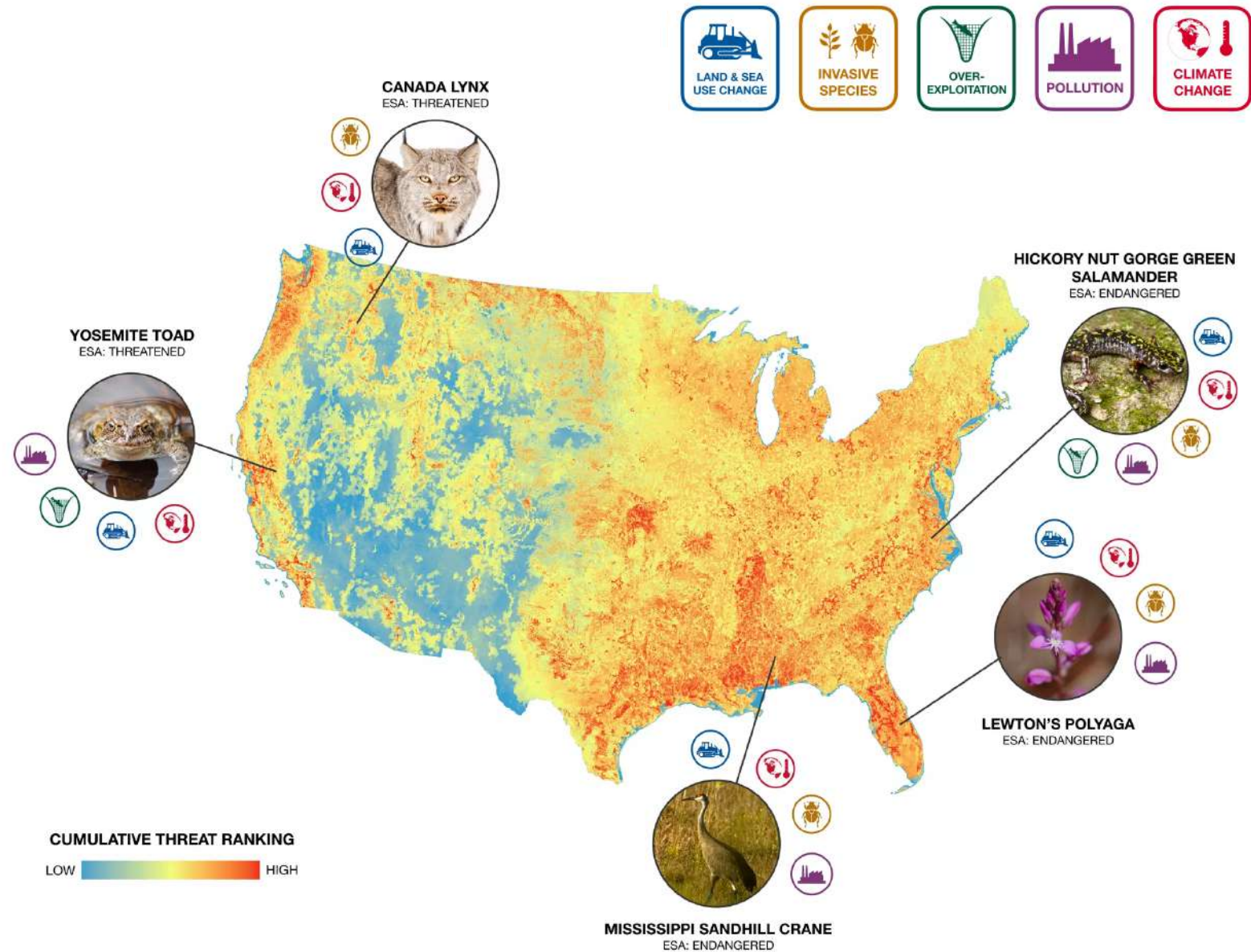


Figure 2: No place in the contiguous U.S. is left untouched by the biodiversity crisis. This map shows an index of threat exposure, taking into account all five main human-induced threats to biodiversity: climate change, pollution, invasive species, land- and sea-use change, and overexploitation. Exposure values for each threat were scaled from 0 to 1 prior to combining. Combined values range from low (0) to high (3.82). It is important to note that a value of zero does not indicate the absence of threat (see methods). Example listed species are included in surrounding circles. Colors and symbols in the circles around the photo correspond to the threats to that species (land and sea use change- blue, overexploitation- green, invasive species- mustard, climate change- red, pollution- purple; Images: Yosemite toad (Rick Kuyper USFWS), Canada Lynx (Lisa Hupp USFWS), Mississippi sandhill crane (Steve Hillebrand, USFWS), Lewton's Polyaga (Laurie Sullivan, USFWS), Hickory Nut Gorge green salamander (Todd Piersen)).



LAND USE CHANGE

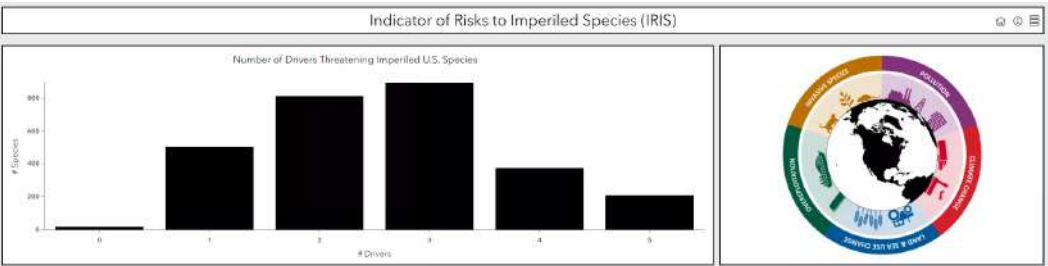
The ocelot is one of the nation's most endangered cats. Once spanning across at least four states in the southern U.S., the population is now down to about 120 cats that live in two small areas of Arizona and Texas. The biggest threat to the ocelot's survival is the loss of habitat caused by the expansion of agricultural lands, urbanization, and roads.

Nearly half of our nation's most important areas for biodiversity face the highest levels of threat. For over 80 percent of species listed under the Endangered Species Act, their habitat is in direct contact with the threats that have led to their endangerment.



Which threat(s) are contributing most to species endangerment?

Of all listed species, 99% are endangered by at least one of the five threats analyzed. On average, a listed species is threatened by 2.7 out of 5 threats. Contrary to previous research, our findings suggest that climate change, not land-use change, threatens the greatest number of listed species in the U.S. and territories (Figure 3). However, the difference is small, with climate change noted as a potential threat for 92% of listed species and land-use changes for 88%. Previous studies focused on threats serving as the basis for a species' listing under the Endangered Species Act: climate change is not explicitly described as one of the five threat factors upon which listing determinations are made. Our analyses leveraged the latest research investigating species-specific climate sensitivity and identifying climate change as an explicit threat. Threats varied by taxonomic group. For example, freshwater invertebrates and their habitats are also threatened by pollution (see Appendix).



Which species groups face the greatest risks?

Based on the listed species analyzed, reptiles and amphibians face a larger number of threats and have a greater amount of their range in threat hotspots (Figure 2). This is consistent with the alarming statistics on the decline of these groups globally: 40% of amphibians and 20% of reptiles threatened with extinction (53). For U.S. populations, the U.S. Geological Survey estimates that amphibians are declining by 3.7% a year, with regions like the West Coast and Rocky Mountains seeing steeper rates of loss (54). Conservative estimates show that over 230 species of amphibians and reptiles have gone extinct in the U.S. since the 1970s (55). Declines in these populations are complex and often the result of multiple threats (56). Our findings also suggest that species with relatively small ranges are at greater risk on average throughout their range, adding to the conservation challenge (57, 58). **To explore how the five drivers of biodiversity loss are affecting imperiled species through the U.S. and territories, visit our interactive dashboard: Indicator of Risks to Imperiled Species (IRIS) at <https://defenders-cci.org/publication/five-drivers/>**

ENDANGERED & THREATENED SPECIES (N= 1662)

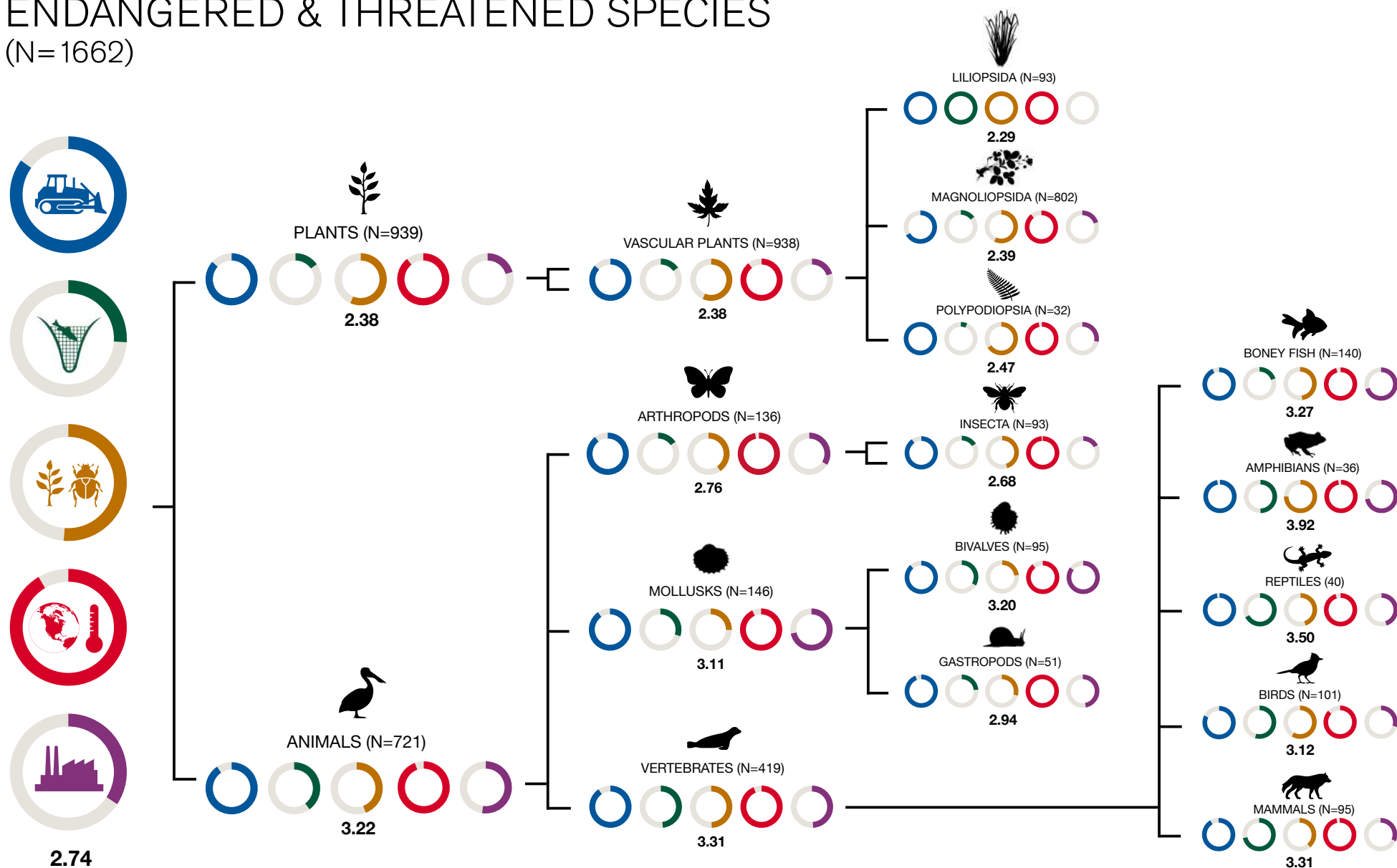


Figure 3: Amphibians face the largest number of threats on average, followed by reptiles. A summary of the number of species listed under the Endangered Species Act threatened by the five main drivers of the global biodiversity crisis. This includes all species listed in the United States and territories. Donut charts indicate the proportion of species (group totals in parentheses) for that group that are impacted by that specific threat (see methods for details related to threat determination). Under each set of circles is the average number of factors threatening a species in that group. Colors and symbols correspond to other figures in this report (from left to right: land and sea use change- blue, overexploitation- green, invasive species- mustard, climate change- red, pollution- purple). We have only included groups with over 30 species although all species are included in the totals.

Where in the U.S. are these threats potentially having greater impacts on communities?

No place in the U.S. is left unaffected by the underlying drivers of the global biodiversity crisis. When combined, threat hotspots cover 40% of the contiguous U.S. However, each threat has unique spatial patterns which can result in regional differences (Figure 4). For example, areas of biodiversity importance at risk of higher pollution exposure are located in the eastern U.S., particularly Appalachia. Over 220 species threatened by pollution (40% of those analyzed) are found in these regions (see Appendix). Areas with higher exposure to invasive species are more dispersed, including areas across California, Central Texas, and Florida (Figure 4). 12% of areas with high biodiversity importance face multiple threat hotspots, simultaneously. These are concentrated in Florida, San Francisco Bay region, southern California and in sprawling urban areas like Chicago and Houston. High spatial variability in threat exposures across the U.S. suggests a need for tailored conservation approaches at regional and local scales.

Our analyses are national in scope and intended to identify broad patterns to frame the national discussion; as such, local and domain-specific details are likely to vary. It should be noted that areas of high biodiversity importance and threat are not static and may shift over time (see Elsen et al., 2020). **Most importantly, this preliminary work likely underestimates the magnitude of these threats to U.S. biodiversity.** While we focus on the highest levels of human-induced threats (i.e., threat hotspots), these anthropogenic processes occur throughout the contiguous U.S. and some species are vulnerable to lower threat levels not captured in our analyses. For example, our analysis only considers areas of the contiguous U.S. that are projected to have the most severe changes in climate, but many listed species may be sensitive to more minor shifts (59-61). Our work is just the beginning when it comes to bridging our understanding of the global biodiversity crisis and the drivers of change affecting species and ecosystems in the U.S. Small-scale or ecosystem-specific analyses can dig even deeper into local threats and help inform management plans for native species. In addition to the primary focus on biodiversity, developing a National Nature Assessment relevant to robust conservation policy and action will require addressing issues related to economic, political, and social constraints. Future work should also help to more explicitly identify opportunities for improving human health, well-being, and equitable access to nature.

CUMULATIVE THREATS

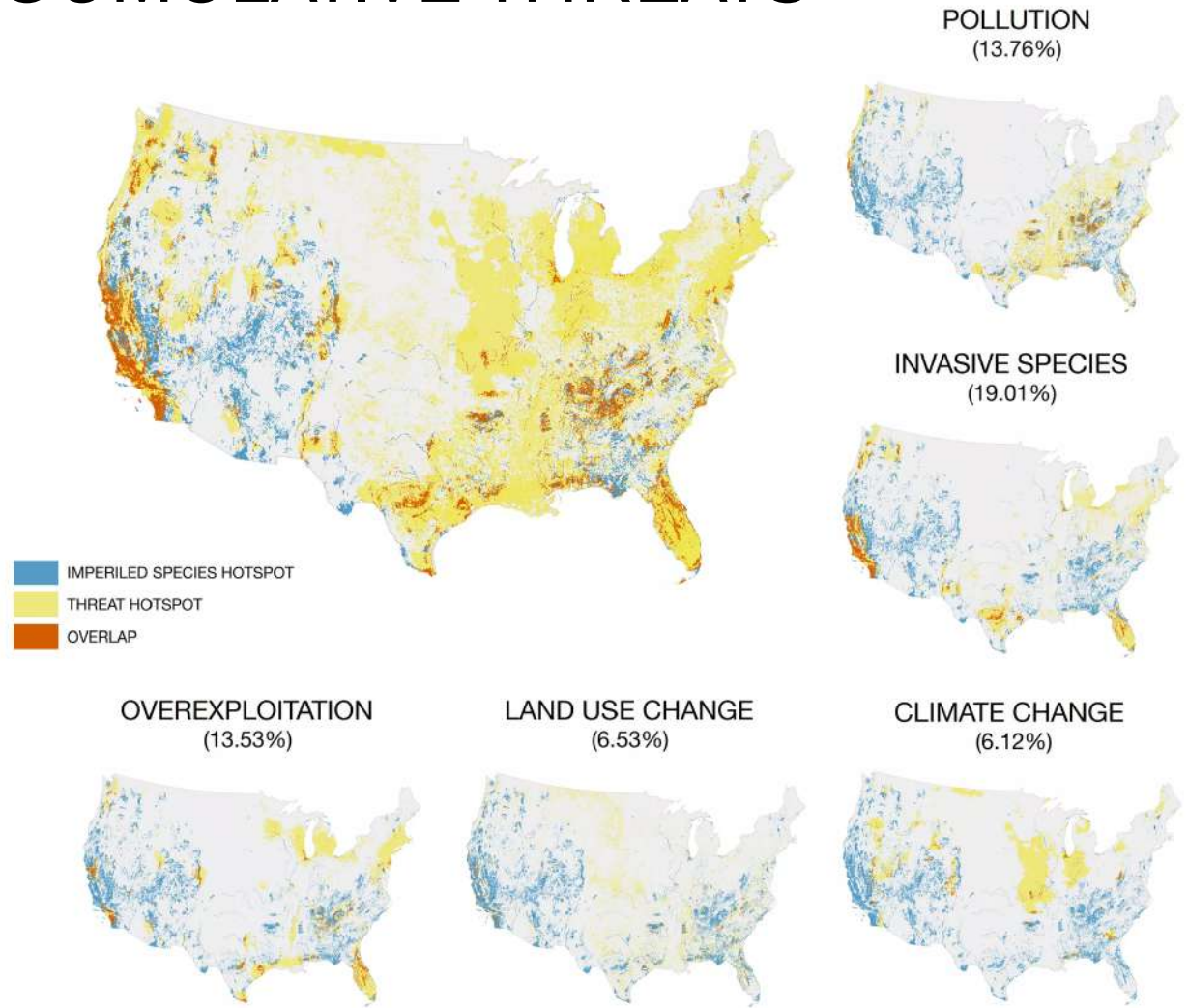


Figure 4: Nearly half of the nation's most important areas for imperiled species are threatened by the biodiversity crisis. Overlap (red) between areas of high biodiversity importance (blue; top 10% of the contiguous U.S.) and threat hotspots (yellow). Maps on the right and left break out threat hotspots by each of the five underlying drivers of global biodiversity loss: climate change, pollution, land-use change, overexploitation, and invasive species. Numbers in parentheses indicate percent of biodiversity areas that overlap with each threat. Areas of higher exposure (top 10% of the contiguous U.S. for each threat) to the individual threats are generally complementary, covering 40% of the contiguous U.S., suggesting a need for tailored conservation approaches at regional and local scales.

A sea turtle is swimming in the ocean. The water is dark blue, and there is a layer of brown oil slick on the surface. The turtle is in the center of the frame, swimming towards the viewer. The oil slick is visible as a thin, brown layer on the water's surface, reflecting light. The turtle's head and front flippers are visible, and it appears to be swimming gracefully. The background shows the ocean surface with some white foam from a wave.

POLLUTION

In the U.S., all six sea turtle species are listed under the Endangered Species Act in part due to pollution of both the beaches where they nest and the marine waters where they spend most of their lives. In a study analyzing what was inside the stomachs of stranded, diseased sea turtles in Florida, 93% of turtles had ingested high amounts of plastic (62). Sea turtles are also impacted by light pollution, as artificial lighting discourages females from nesting on nearby beaches.



PATHWAYS FORWARD

While scientific research and syntheses identify the major challenges that wildlife face, they also suggest that we can intervene effectively, pointing to pathways forward in achieving conservation goals and addressing the crisis at hand. Already, between 28 and 48 mammal and bird extinctions have been avoided since 1993, and extinction rates would have been 2.9–4.2 times greater without conservation action (63). Support, defense, and advocacy of strong environmental policy and its implementation are essential to protecting the nation's natural legacy and continuing to lead nature conservation on the global stage. Air pollution regulations designed to protect human health have provided substantial co-benefits to biodiversity, averting the loss of 1.5 billion birds in the U.S. (64). The U.S. already employs one of the world's strongest tools for combatting biodiversity loss: the Endangered Species Act. More than 95% of U.S. species listed under the Act are still with us – and hundreds of those species are on the road to recovery. However, it has yet to fully realize its intended goal of recovering imperiled species due to major obstacles such as severe underfunding, political interference, and the failure of many agencies to fulfill the government-wide mandate that they use their authorities to recover threatened and endangered species (65).

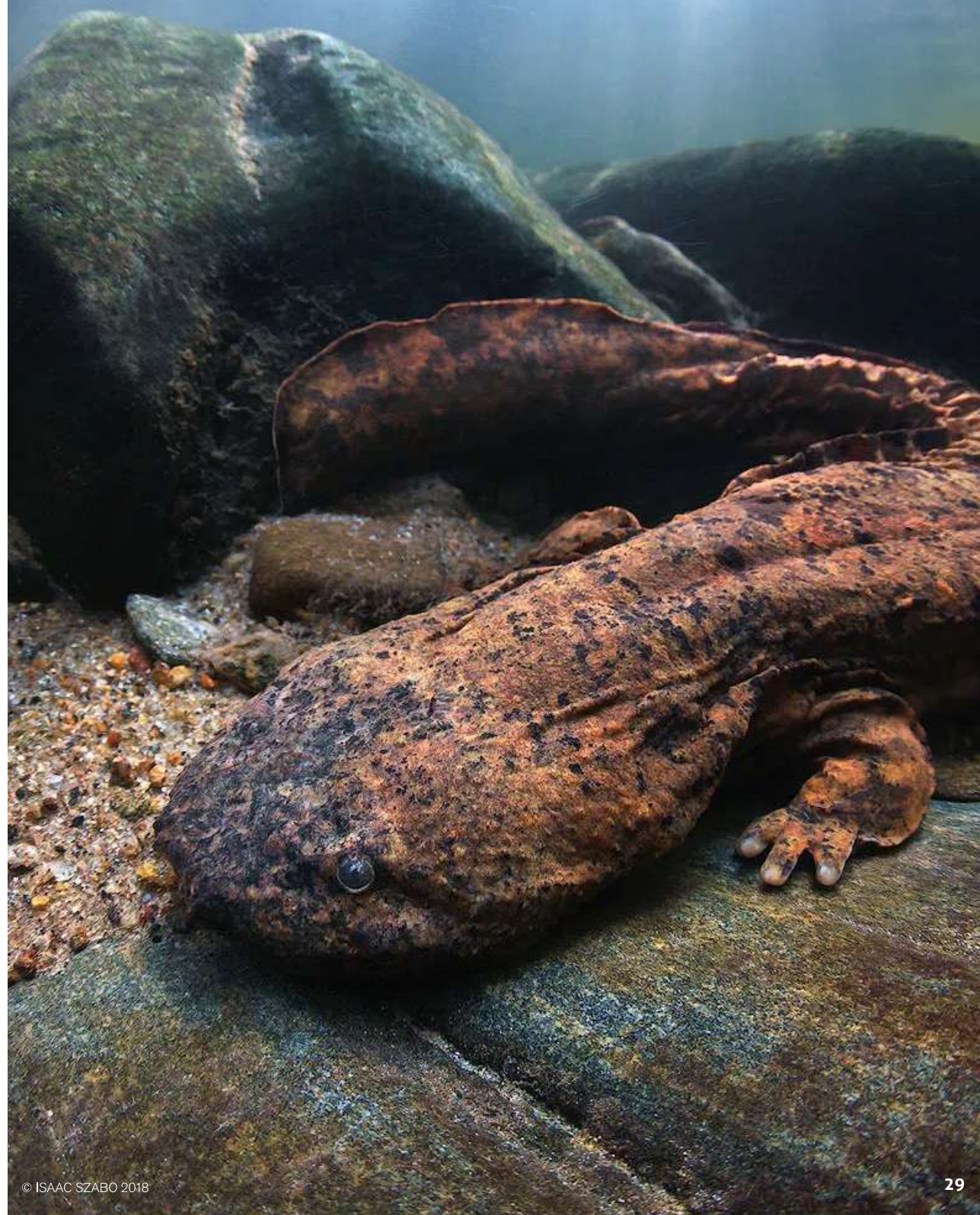


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We have access to some critical tools, but immediate, ambitious, and well-coordinated conservation action is key. Models demonstrate that we can feed a growing human population while reversing the global terrestrial biodiversity trends caused by habitat conversion (66). Increasing the extent of conserved land, restoring degraded land, and planning across scales could result in positive biodiversity trends by 2050 and more than two-thirds of future biodiversity losses avoided. Additionally, strategic expansion of nature conservation can help address major threats: the world's most rare and imperiled species could be conserved if additional protections and proper management were focused on the right 2.3% of land (67). However, more research is needed to understand and refine pathways for achieving similar biodiversity outcomes in the U.S.

We currently have a critical opportunity to address these threats and provide protection for species. The Biden administration has already announced several important building blocks that could help address the biodiversity crisis at home and abroad, most notably the commitment to conserve at least 30% of our nation's lands and waters by 2030. Now part of the Global Biodiversity Framework developed by the UN Convention on Biological Diversity, these efforts provide an opportunity to integrate biodiversity and climate agendas in an equitable way and promote land protections that can maximize biodiversity conservation and alleviate some of the threats of land-use change and climate change. However, national efforts generally only address two of the major threats to biodiversity; climate change and habitat loss. According to our data, this approach would still leave 77% of listed species with threats unaddressed, emphasizing the need to take a more comprehensive approach to addressing the threats and their synergies. Our analysis suggests the need for a regionally-tailored approach that comprehensively addresses all five threats to biodiversity.

Unprotected U.S. areas important to imperiled species biodiversity will continue to face challenges posed by the main drivers of biodiversity loss. Establishing a well-connected network of protected areas is one well-recognized option for mitigating some of these risks by slowing habitat loss (68, 69) and securing opportunities for climate adaptation (70, 71) in comparison to unprotected areas. Further analyses may help demonstrate where such investments may add biodiversity value given the higher risk of loss. While protected areas are not exempt from all risks (e.g., climate change (72, 73), pollution (74), and introduced species (75), a focus on conservation planning opportunities adjacent to higher risk areas can serve to maximize returns on investments for conservation outcomes. However, protected areas are just one tool in the conservation toolbox. Most federal lands managed by the Bureau of Land Management and the U.S. Forest Service (roughly 22% of the contiguous U.S.) are subject to a multiple use mandate, where the agencies responsible for managing those lands have wide discretion to how they can be used. Managing more of these lands in a way that benefits wildlife conservation, even if they are not formally designated as protected areas, lies squarely within the authorities of these agencies (76). Furthermore, agencies like the U.S. Fish and Wildlife Service and the Natural Resource Conservation Service offer incentives for private landowners to implement conservation measures to protect threatened and endangered species (77). Governments can work with private landowners to facilitate transfers of interest in land to Land Trusts and similar conservation organizations through favorable tax treatment (78). Moving forward, conservation action will need to engage all sectors of American society across all scales in a continuum of conservation actions.





"Nature can be conserved, restored and used sustainably while other global societal goals are simultaneously met through urgent and concerted efforts fostering transformative change." (IPBES Summary for Policymakers)

Local action and national direction are both needed to address the threats to biodiversity and achieve positive, durable outcomes. Absence of an explicit national priority and a strategy for a comprehensive, well-coordinated and inclusive biodiversity conservation means that the laws and actions for nature stewardship will continue to be underinformed and inept at tackling the crisis at hand. A National Biodiversity Strategy offers a way forward. This approach, already employed by 194 countries, would provide a blueprint for addressing the drivers of biodiversity loss and guide a collaborative approach across government agencies, Tribes, NGOs and other sectors of society in taking action.

The science is clear - with every day that passes, it becomes more important than ever to take immediate, transformative action. The U.S. must make substantial progress in ensuring the conservation of the nation's biodiversity for its own sake, for our immediate well-being, and for future generations. Further research should provide information sufficient for policymakers at all levels of government to understand the dimensions of the U.S. biodiversity loss and take policy action to mitigate its systemic causes.



Acknowledgements

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Data, Methods & Literature Cited

For a more comprehensive reporting of the data and methods used in our analyses along with additional figures and appendices:
https://defenders-cci.org/files/DefendersReport_Supplemental.pdf.

To explore the data on threats to U.S. listed species, visit our interactive dashboard: Indicator of Risks to Imperiled Species (IRIS) at
<https://defenders-cci.org/publication/five-drivers/>



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