THE SILENCE OF EXTINCTION: WHAT THE KAUA'I 'Ō'Ō'S FINAL SONG CAN TEACH US ABOUT CRITICAL HABITAT DESIGNATIONS UNDER THE ENDANGERED SPECIES ACT

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INTRODUCTION

A biodiverse ecosystem is a choir. The beetle's elytra click and buzz along the base line. Warblers and magpies serenade the melody to nearby mates. The tenor of a panther's purr pushes the harmony along. The leaves whistle a descant as the wind rips through the tree line. Below the surface, a network of root fungi conducts the chorus above. While ecosystems are diverse and distinct, biodiverse ecosystems share one commonality: They are loud. The erosion of ecosystems, and the many habitats within them, turns down the volume of life until nothing remains but the uncomfortable, blanketing silence of extinction.

In 1983, Kauai's natural choir lost a powerful voice when the last male ʻŌʻō sang out for a mate that would never come.[1] The song, intended as a duet between a mating pair, became the last solo of Kauai's ʻŌʻō.[2] The species has been listed as endangered under the Endangered Species Act (ESA) since 1967; however, it was last spotted in the wild in 1987 and presumed extinct by 2000.[3] As of 2023, the Fish & Wildlife Service (FWS) deemed the species extinct and subsequently removed it from the ESA.[4] This bird's song will never again be heard in the wild because its habitat was destroyed.[5]

As climate change worsens, the frequency and severity of habitat loss will increase, causing most species' ranges "to shrink profoundly."[6] As temperatures rise, species' ranges will shift to higher latitudes, higher elevations, and deeper waters.[7] Couple climate-induced habitat loss with anthropogenic biodiversity threats and the borders of species' ranges will constrict even tighter. For animals listed under the ESA, this poses a

1. Harriet Roden, *First, Rare and Only Sound Recordings from the British Library's Collections*, BRITISH LIBR., https://www.britishlibrary.cn/en/articles/first-rare-and-only-sound-recordings-from-the-british-librarys-collections/ (last visited Dec. 10, 2024).

2. *Id.*; *see also* Endangered and Threatened Wildlife and Plants; Removal of 21 Species From the List of Endangered and Threatened Wildlife, 88 Fed. Reg. 71644, 71655 (Oct. 17, 2023) (to be codified at 50 C.F.R. pt. 17) (describing ʻŌʻō 's call as "flute-like, echoing, and haunting").

3. *Id.*

4. *Id.* at 71656.

5. *See id.*

6. *UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating'*, UNITED NATIONS (May 6, 2023), https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report.

7. *Shifting Habitats*, 10 NATURE CLIMATE CHANGE 377, 377 (2020).

particular challenge: How can agencies confer long-term, climate-responsive habitat protections for listed species under the ESA if the statute fails to define what habitat *actually* is?

The ESA must be amended to include a habitat definition that reflects climate change's impact on listed species' habitat ranges. The definition should be designed to guard against extinction resulting from habitat loss driven by climate change. The proposed definition will include three important elements. First, the definition will be rooted in the widely accepted scientific definition of habitat. Second, it will include past, present, and future ranges of listed species. Third, it will encompass essential perspectives from landscape ecology and ecosystem management to ensure the definition encapsulates the best scientific practices to date.

This Article analyzes the habitat protections conferred to listed species under the ESA. Part I describes the ESA's ecological, historical, and legal background. Part II explains why the current legal framework of the ESA is insufficient because it inadequately reflects scientific principles in critical habitat designations which creates bad policy and exacerbates extinctions. In addition, Part II analyzes ecological and legal frameworks to support the development of a statutory habitat definition under the ESA. Part III provides a novel habitat definition, considers legal ramifications of the proposed definition, and dispels counterarguments.

I. THE IMPORTANCE OF SAFEGUARDING BIODIVERSITY THROUGH A STATUTORY DEFINITION OF HABITAT UNDER THE ENDANGERED SPECIES ACT

Biodiversity loss from land conversion is ever-present in the United States,[8] leading to the Fish & Wildlife Service (FWS) listing many plants and animals as endangered or threatened under the Endangered Species Act (ESA).[9] Notably, habitat loss is frequently cited as the driving force behind

8. See Philip Semenchuk et al., *Relative Effects of Land Conversion and Land-Use Intensity on Terrestrial Vertebrate Diversity*, 13 NATURE COMMC'NS 1, 2 (2022) for a discussion on land use conversion as "the most important driver of biodiversity loss on terrestrial envrionments, mainly because it shrinks, fragments and degrades natural ecosystems." Thus, land use conversion affects the persistence and abundance of species across natural terrestrial ecosystems. *See id.*

9. *See* 50 C.F.R. § 17.11(h) (2023). At the time of writing, there are 1,389 species in the United States that are listed under the Endangered Species Act. *Listed Species Summary (Boxscore)*, U.S. FISH & WILDLIFE SERV.: ECOS, https://ecos.fws.gov/ecp/report/boxscore (last updated Nov. 21, 2024). Many listed species are threatened or endangered because of habitat loss or degradation. *See generally USFWS Threatened & Endangered Species Active Critical Habitat Report*, U.S. FISH & WILDLIFE SERV.: ECOS, https://ecos.fws.gov/ecp/report/critical-habitat (last visited Dec. 10, 2024) (noting the number of species that require critical habitat designation to recover from endangered or threatened status).

a species' listing status.[10] First, this Part explains the relationship between habitat, biodiversity, and climate change. Then, this Part will explore the ESA's legislative history and intent to discern if reworking the statutory language of the ESA to safeguard biodiversity matches what the drafters intended. This Part will also delve into case law, giving context to the heavy-hitter cases of the past and then exploring *Weyerhaeuser* as well as pre- and post-*Weyerhaeuser* interpretations of critical habitat designations under the ESA.[11]

A. The Non-Negotiable Role of Biodiversity

There are approximately "8.7 million eukaryotic species" contributing to the natural diversity of this planet.[12] Biodiversity confers a wealth of benefits to both the planet and people.[13] Biodiversity buffers the impacts of climate change, provides genetic resources for medical and food innovation, and provides ecosystem services in the form of crop pollination and water filtration.[14] Moreover, biodiversity has deeply impacted people's lives spiritually, socially, and culturally for thousands of years.[15] Unfortunately, 25% of plants and animals—over 1 million species—are at risk of extinction.[16]

We are living in a biodiversity apocalypse. This rapid loss of life portends deleterious effects to human and non-human biota alike, making it the "single greatest problem our species faces."[17] Anthropocentric forces drive biodiversity loss through land conversion and other human-caused habitat loss.[18] Over one third of the planet is under intense human pressure,

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10. *Losing Their Homes Because of the Growing Needs of Humans*, WWF (Oct. 25, 2023), https://wwf.panda.org/discover/our_focus/wildlife_practice/problems/habitat_loss_degradation.

11. Weyerhaeuser Co. v. U.S. Fish & Wildlife Serv., 139 S.Ct. 361, 368–69 (2018) (considering parameters of critical habitat designations and finding critical habitat must be narrower definition of habitat, but without statutory habitat definition, the interpretation is ambiguous).

12. Camilo Mora et al., *How Many Species Are There on Earth and in the Ocean?*, PLOS BIOLOGY, Aug. 2011, at 1, 5. This number fails to account for the multitude of unnamed species that contribute to biodiversity globally, and excludes the vastly diverse Archaea and Bacteria domains. *Id.* As such, it is likely this number is much higher. *Id.*

13. *See generally* SANDRA DIAZ ET AL., IPBES, THE GLOBAL ASSESSMENT REPORT ON BIODIVERSITY AND ECOSYSTEM SERVICES: SUMMARY FOR POLICYMAKERS 10 (detailing biodiversity's many benefits).

14. *Id.*

15. *Interlinked Diversity*, U.N. EDUC., SCI., & CULTURAL ORG., https://www.cbd.int/lbcd/step1 (last visited Dec. 10, 2024).

16. *See* DIAZ ET AL., *supra* note 13, at 11.

17. Inara Scott et al., *Environmental Law. Disrupted.*, 49 ENVTL. L. REP. 10038, 10040 (2019).

18. Sean L. Maxwell et al., *Biodiversity: The Ravages of Guns, Nets, and Bulldozers*, 563 NATURE 143, 144 (2016) (discussing how humans drive biodiversity loss through over-exploitation

and less than a quarter of the planet is free from human intervention.[19] Moreover, climate change exacerbates threats to biodiversity by forcing species to face novel pressures in an unpredictable environment that accelerates extinction rates.[20] Therefore, the status quo of static conservation methods will remain frozen in time "if we do not preserve or restore habitats that species will need in a climate-addled future."[21]

While some may refer to the biodiversity apocalypse as the Anthropocene, others have coined a more hopeful term: the Plastocene.[22] The Plastocene "speaks to the unprecedented degree of malleability"—or plasticity[23]—"of the Earth that new technologies are making possible."[24] The Plastocene perspective tells us that our planet and its people have never been more equipped to solve problems, leverage powerful technology, and reimagine solutions.

Applying the Plastocene perspective to habitat and biodiversity loss, lawmakers must reassess the utility of static conservation laws that are stuck in time and tradition. Instead of preserving or conserving species, perhaps we should shape, enhance, manipulate, cultivate, and garden both species and the habitats on which they depend.[25] We should recalibrate interventions that remedy species' extinction rates and improve ecosystem health and function to combat biodiversity loss.

The ESA has been the strongest protector of biodiversity in American history.[26] Last year marked its 50th anniversary of protecting the nation's most beloved species—from the bald eagle to the bumble bee. Unfortunately, 1973 serves as another important benchmark for biodiversity. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services found that the rate at which nature has changed over the last 50 years

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of species, through hunting and harvesting species, and destructive agricultural processes that destroy habitats and species diversity across terrestrial ecosystems); *see also* Bradley C. Karkkainen, *Biodiversity and Land*, 83 CORNELL L. REV. 1, 7 (1997) (footnotes omitted) ("[T]he principal cause of biodiversity loss is the fragmentation, degradation, and destruction of ecosystems and habitats through conversion of land to economically productive uses, especially agriculture, forestry, mineral and fossil fuel extraction, and urban development.").

19. *Global Biodiversity Continues to Decline, According to New Reports from IPBES*, INT'L SCI. COUNCIL (Mar. 23, 2018), https://council.science/current/news/global-biodiversity-continues-to-decline-according-to-new-reports-from-ipbes.

20. *See* Scott, *supra* note 17, at 10041.

21. *Id.*

22. CHRISTOPHER J. PRESTON, THE SYNTHETIC AGE: OUTDESIGNING EVOLUTION, RESURRECTING SPECIES, AND REENGINEERING OUR WORLD xviii (2018).

23. Plasticity is synonymous with malleability or the ability to adapt to change. *See id.*

24. *Id.*

25. *See generally* Scott, *supra* note 17.

26. Proclamation No. 10689, 89 Fed. Reg. 1, 1 (Dec. 27, 2023).

is "unprecedented in human history."[27] The leading drivers of this biodiversity loss are changes in land and water use, particularly resulting from agricultural land conversions and urban expansion.[28] Put simply, the global extinction of species is driven by habitat loss. While the ESA has demonstrated a long history of success, the threats to species and their habitats have changed significantly. Now is the time to reimagine the utility of this statute to confer stronger habitat protections that preserve biodiversity and combat climate change.

B. The Endangered Species Act

This Part first outlines the story of the ESA—from the loss of the passenger pigeon to the publication of *Silent Spring*, which ignited the nation behind environmental causes. Then, this Part outlines the overall intent and purpose of the ESA. Finally, this Part concludes by reviewing past and contemporary case law, demonstrating the statutory interpretation and judicial review of critical habitat designations to date.

1. The Endangered Species Act: Origin Story

The ESA's historical context demonstrates that the government took on an affirmative obligation to protect plants and animals from extinction. Congress's first attempt to protect an endangered species dates back to 1900 when it passed the Lacey Act.[29] The Lacey Act restored wild and game-bird populations in response to the American people's concern over the disappearing passenger pigeon.[30] Unfortunately, the passenger pigeon went extinct in 1914 when the last living individual, named Martha, died at the Cincinnati Zoo.[31] However, this failure ignited the nation to act and helped inspire the Migratory Bird Treaty Act of 1918.[32]

The 1960s marked the new wave of the environmental movement, largely flowing from Rachel Carson's *Silent Spring* in 1962.[33] In response to

27. DIAZ ET AL., *supra* note 13, at 12.

28. *Id.*

29. Lacey Act, ch. 417, 30 Stat. 1012 (1899) (codified as amended at 16 U.S.C. §§ 3371–3378).

30. *First Species Listed as Endangered*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/program/endangered-species/first-endangered-species.html (last visited Dec. 10, 2024).

31. Barry Yeoman, *Why the Passenger Pigeon Went Extinct*, AUDUBON MAG. (May–June 2014), https://www.audubon.org/magazine/may-june-2014/why-passenger-pigeon-went-extinct.

32. Migratory Bird Treaty Act, ch. 128, 40 Stat 755 (codified as amended at 16 U.S.C. §§ 703–712) (prohibiting taking of migratory birds and their feathers, eggs, and nests).

33. *The Story of Silent Spring*, NAT'L RES. DEF. COUNS. (Aug. 13, 2015), https://www.nrdc.org/stories/story-silent-spring (discussing Rachel Carson's book's role in stimulating

the growing bipartisan concern for environmental issues, the Nixon Administration established the Environmental Protection Agency.[34] The Administration passed a series of environmental legislation: the Clean Air Act, the Clean Water Act, the Endangered Species Act, and the National Environmental Policy Act.[35] The 93rd Congress passed the ESA in 1973 by a nearly unanimous vote of 355 to 4.[36] President Nixon recognized America's biodiversity as "an irreplaceable part of our national heritage" while urging agencies to "act quickly and thoroughly to save [plants and animals] from extinction."[37]

The ESA was developed in the early 1960s when the Department of the Interior established a committee to identify animals threatened by extinction.[38] The committee created the Redbook on Rare and Endangered Fish and Wildlife of the United States in 1964, which later evolved into the Endangered Species Protection Act of 1966.[39] This Act listed 78 species—including the bald eagle, which has served as a national symbol since 1782.[40]

Unlike the passenger pigeon, the bald eagle is the face of the ESA's soaring success. The bald eagle population started declining in the 1940s, which inspired the passing of the Bald Eagle Protection Act.[41] The bald eagle was further protected by the Migratory Bird Treaty Act (MBTA) and eventually was one of the first animals listed under the ESA. The bald eagle was predominantly threatened by hunters in the early 1900s until the FWS passed the MBTA, but the population continued to decline into the mid-1990s.[42] By the 1960s, the core threat was dichlorodiphenyltrichloroethane (DDT)[43] in the eagles' food supply which reduced the integrity of their

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public discourse, instigating litigation against the federal government, and ultimately inspiring the nationwide ban of Dichlorodiphenyltrichloroethane (DDT)).

34. *Endangered Species Act Milestones: Pre 1973*, U.S. FISH & WILDLIFE SERV. (Oct. 25, 2023), https://www.fws.gov/esa50/our-history/pre-1973 [hereinafter *ESA Milestones*].

35. *Id.*

36. Eric Holst, *Maintaining Our Bipartisan Wildlife History*, ENVT'L DEF. FUND, https://web.archive.org/web/20240526063633/https://www.edf.org/ecosystems/maintaining-our-bipartisan-wildlife-history#expand (last updated Oct. 18, 2019).

37. President Nixon, *Statement on Signing the Endangered Species Act of 1973*, AM. PRESIDENCY PROJECT (Dec. 28, 1973), https://www.presidency.ucsb.edu/node/255904.

38. *ESA Milestones*, *supra* note 34.

39. *Id.*

40. *Bald Eagle*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/species/bald-eagle-haliaeetus-leucocephalus (last visited Dec. 10, 2024) [hereinafter *Bald Eagle*].

41. *Id.*

42. *Id.*

43. *Dichlorodiphenyltrichloroethane (DDT) Factsheet*, CTR. FOR DISEASE CONTROL AND PREVENTION (Aug. 16, 2021), https://web.archive.org/web/20220303182111/https://www.cdc.gov/biomonitoring/DDT_FactSheet.html (noting that Dichlorodiphenyltrichloroethane is commonly referred to as "DDT").

eggshells and thwarted the development of healthy offspring.[44] The ESA's passage enabled the species' recovery through captive-breeding programs and nest-site protection.[45] The bald eagle population in the contiguous United States went from only 417 nesting pairs in 1963 to 316,700 individuals by 2019.[46]

When the ESA was enacted in 1973,[47] the 93rd Congress was likely more concerned with overhunting and protecting the nation's beloved charismatic megafauna than it was about protecting biodiversity from the effects of climate change.[48] Congress intended the ESA to be dynamic to meet the changing threats to biodiversity in addition to prevent extinction.[49] This intent remains intact today: in 2008, the polar bear became the first species listed under the ESA because of climate change's effect on its dwindling habitat.[50] Further, in 2021, the FWS listed the Whitebark Pine as threatened because pine beetles were spreading into higher elevations due to the effects of climate change.[51] These listings demonstrate that the specific policy objectives of the ESA have shifted over time to meet the novel pressures that threaten our beloved species.[52]

Even with a shifting policy, the bipartisan support for the ESA has not wavered.[53] Fifty-one years ago, when the ESA was passed, environmental

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44. *See Bald Eagle*, *supra* note 40.

45. *Id.*

46. *Id.*

47. *See* PERVAZE A. SHEIKH & ERIN H. WARD, CONG. RSCH. SERV., R46677, THE ENDANGERED SPECIES ACT: OVERVIEW AND IMPLEMENTATION 1 (2021).

48. *See* S. REP. NO 93-307, at 2 (1973).

49. *See* SHEIKH & WARD, *supra* note 47, at 1.

50. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Polar Bear (Ursus maritimus) Throughout Its Range, 73 Fed. Reg. 28212 (May 15, 2008) (to be codified at 50 C.F.R. pt. 17); *see also* Ctr. for Biological Diversity v. Zinke, 900 F.3d 1053, 1073 (9th Cir. 2018) ("By failing to explain why the uncertainty of climate change favors not listing the arctic grayling when the 2014 Finding acknowledges the warming of water temperatures and decreasing water flow because of global warming, FWS acted in an arbitrary and capricious manner.").

51. Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Whitebark Pine (*Pinus albicaulis*), 87 Fed. Reg. 76882 (Dec. 15, 2022) (to be codified at 50 C.F.R. pt. 17); *see also* U.S. FISH & WILDLIFE SERV., SPECIES STATUS ASSESSMENT REPORT FOR THE WHITEBARK PINE, *PINUS ALBICAULIS* 52 (2021).

52. While specific policy objectives may be malleable to the changing threats to ESA candidate species, the legislative intent and purpose of the Act remain the same: protect plants and animals from extinction. *See* Sierra Club v. Marsh, 816 F.2d 1376, 1383, 1386 (9th Cir. 1987) ("Congress clearly intended that [agencies] give 'the highest of priorities' and 'the benefit of the doubt' to preserving endangered species.") (quoting TVA v. Hill, 437 U.S. 153, 174 (1978)).

53. Ben Tulchin et al., *Endangered Species Act National Survey Results*, TULCHIN RSCH., July 2015 at 4.

concern was not a partisan issue.[54] Now environmental debates sweep the nation, filling up airtime during elections and dividing families over dinner conversation.[55] Regardless, 96% of liberals and 82% of conservatives support the ESA today.[56] Collectively, the nation holds its support at 90%.[57] This is unlike any other domestic environmental legislation in our nation's history and demonstrates the unwavering importance this issue holds for the American people, regardless of political party.

2. The Endangered Species Act: Overview of Utility

The ESA creates an affirmative duty for federal agencies to conserve species listed as endangered or threatened under the Act.[58] Moreover, it mandates that federal agencies cooperate with state and local agencies to further this shared mission.[59] The FWS is responsible for conserving terrestrial species, while the National Marine Fisheries Service (NMFS) has purview over marine and freshwater species.[60] The ESA's purpose is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved."[61] This protection extends to both plants and animals.[62] As of October 2020, the ESA listed 2,363 species of plants and animals; however, this number fails to reflect the "backlog of species the Services have determined warrant listing" but are not yet listed.[63]

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54. *See* S. 1983 – Endangered Species Act of 1973 (last visited Dec. 10, 2024), https://www.congress.gov/bill/93rd-congress/senate-bill/1983/cosponsors (noting five Democratic sponsors and three Republic sponsors); *see also* President Nixon, *Statement on Signing the Endangered Species Act of 1973*, AM. PRESIDENCY PROJECT (Dec. 28, 1973), https://www.presidency.ucsb.edu/node/255904 (recognizing Republican President passed Act).

55. *See generally* Keith Smith et al., *Polarisation of Climate and Environmental Attitudes in the United States, 1973-2022*, 3 NPJ CLIMATE ACTION 1 (2024).

56. Tulchin et al., *supra* note 53, at 2.

57. *Id.*

58. *See* SHEIKH & WARD, *supra* note 47, at 2.

59. *Id.*

60. *Id.*

61. 16 U.S.C. § 1531(b).

62. SHEIKH & WARD, *supra* note 47, at 2. It is worth noting that the Endangered Species Act only protects plants and animals which excludes the remaining three biological kingdoms: Fungi, Protista, and Monera. *Id.* at 9. However, the habitat protections attached to listed species confer a wealth of benefits to species belonging to any of the five biological kingdoms that have a habitat that overlaps with the listed species' critical habitat designation. *Id.* This demonstrates that although critical habitat designations are specific to a listed species, they are instrumental in protecting overall biodiversity in a given area—from soil microbes and mycorrhizal fungi to invertebrates and old growth trees—and contribute to global biodiversity. *See id.*

63. *Id.* at 4

The ESA provides several tools to protect this nation's biodiversity. First, it conserves domestic and foreign species by prohibiting the illegal takings of a listed species.[64] That is, it makes it unlawful to kill, harm, or harass a listed species without a permit.[65] Second, the ESA mandates that the Secretary develop recovery plans for the listed species that help resolve "the threats to the species" and foster "self-sustaining populations in the wild."[66] Third, and important for this Article, the ESA confers critical habitat designations for listed species that prohibit federal agencies from modifying or destroying the habitat.[67]

While these tools confer well-rounded protections for listed species, the protections come with caveats. For example, the unlawful taking of a listed species can be remedied by the actor procuring a permit, cultivating a "pay to play" mindset for species takings.[68] Moreover, recovery plans are not actually binding but rather serve as guidelines for government actions.[69] Most importantly, critical habitat designations are an affirmative duty bestowed on the FWS and the NMFS. However, these designations are frequently litigated, or the agency delays for years before designating a critical habitat.[70] More recently, the FWS has been failing to designate critical habitat because of the risk of collection or poaching, even when the threat is negligible.[71]

Although the ESA defines "critical habitat" to include both occupied and unoccupied areas that are "essential to the conservation of the species," the ESA does not define "habitat."[72] The word "habitat" is used 37 times throughout the statute, 9 of which are independent from the critical habitat term, including terms such as "habitat acquisition."[73] Despite this high volume use of the term, and the frequent litigation over its meaning, Congress has yet to provide a definition. This statutory gap opens the door for political

64. 16 U.S.C. § 1539(a)(1)(B).

65. 16 U.S.C. § 1532(19).

66. NAT'L MARINE FISHERIES SERV., INTERIM ENDANGERED AND THREATENED SPECIES RECOVERY PLANNING GUIDANCE VERSION 1.4, at 5.1.6, July 2018 [hereinafter INTERIM GUIDANCE].

67. 16 U.S.C. §§ 1533(a)(3)(A), 1536(a)(2).

68. 16 U.S.C. § 1539. The Vermont statute places a fine of no more than $25,000 for the illegal taking of a listed or endangered species. 10 V.S.A. § 5408(i)(1). While $25,000 will likely deter many from intentionally taking a listed species, others may consider this a small price to pay for a trophy kill.

69. SHEIKH & WARD, *supra* note 47, at 24.

70. *See generally* James Salzman, *Evolution and Application of Critical Habitat Under the Endangered Species Act*, 14 HARV. ENVT. L. REV. 311, 318–19 (1990) (highlighting delays in critical habitat designations by the FWS).

71. *See* Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for the Silverspot Butterfly, 89 Fed. Reg. 11750, 11762, 11771 (Feb. 15, 2024) (to be codified at 50 C.F.R. pt. 17) (forgoing critical habitat designation for the silverspot butterfly even though the FWS stated throughout Final Rule that collection was not a major factor affecting subspecies).

72. 16 U.S.C. § 1532(5)(A)(i)–(ii).

73. 16 U.S.C. § 1532(3).

influence that threatens the integrity of critical habitat designations, particularly in the face of climate change. For example, the Trump Administration rolled back protections by limiting "habitat" only to the physical boundaries where the species is at the time of listing.[74] This policy would prohibit animals like the polar bear from receiving critical habitat protections because their habitat is rapidly melting away from climate change.[75] Then, the Biden Administration broadened Trump's definition to include historically occupied habitats.[76] Specifically, Biden's new definition includes areas that are not habitable at the time of listing, but those which could be restored into a habitable condition.[77] This demonstrates that without a statutory definition of habitat, critical habitat designations will mercurially ebb and flow with the political climate.

3. The Endangered Species Act: Statutory Interpretation Through Time

The ESA's most potent conservation tool is the power to designate critical habitat. Although critical habitat designations are obligatory, the FWS and the NMFS frequently forgo designating critical habitat because of political and economic concerns.[78] However, when a critical habitat designation does go into effect, the Supreme Court has moved mountains to ensure compliance.[79] The most exemplary case of this being *Tennessee Valley Authority v. Hill*, in which the Court upheld a critical habitat designation for the endangered snail darter, despite the severe economic loss left in its wake.[80] This big win for the small animal created an unfortunate externality: Congress amended the ESA in 1978 to include a critical habitat definition that "narrow[ed] the scope of the term as it is defined in the

74. *See* Darryl Fears, *New Trump Rules Weaken Wildlife Protections*, WASH. POST (Aug. 12, 2019), https://www.washingtonpost.com/climate-environment/2019/08/12/new-trump-rules-weaken-wildlife-protections.

75. *See id.*

76. *See* Catrin Einhorn, *Biden Administration Tosses Trump Definition of 'Habitat' for Endangered Species*, N.Y. TIMES (June 23, 2022), https://www.nytimes.com/2022/06/23/climate/biden-endangered-species-habitat.html.

77. *See id.*

78. *See* SHEIKH & WARD, *supra* note 47, at 2.

79. *See* TVA v. Hill, 437 U.S. 153, 185–86 (1978) (holding that the Tellico Dam could not continue construction after finding that operation of the dam would eradicate an endangered species); *see also* Sierra Club v. U.S. Fish & Wildlife Serv., 245 F.3d 434, 445 (5th Cir. 2001) (holding the Agency's failure to designate critical habitat as arbitrary and capricious, reasoning that the intention of Congress is that critical habitat designations are the rule, not the exception); *see also* Nat'l Wildlife Fed'n v. Coleman, 529 F.2d 359, 375 (5th Cir. 1976) (finding plaintiffs were entitled to enjoin the construction of a 5.7 mile section of an interstate highway for crossing the critical habitat of the Mississippi Sandhill Crane).

80. *TVA*, 437 U.S. at 185–88.

existing regulations."[81] This amended definition bottlenecked judicial interpretation in order to avoid outcomes like *TVA v. Hill*.[82]

In 2018, the Supreme Court considered the boundaries of "critical habitat" in *Weyerhaeuser Co. v. U.S. Fish & Wildlife Service*. In this case, the FWS listed the dusky gopher frog as endangered in 2001, primarily due to loss of its natural habitat; however, the FWS did not propose to designate it as critical habitat until 2010.[83] By 2010, the frog's habitat was severely degraded.[84] The FWS proposed to designate both the frog's current range and nearby historically occupied habitat, which is currently unoccupied and uninhabitable without restoration.[85]

The Supreme Court mirrored the Fifth Circuit's dissent by centering the issue around the definition of "habitat."[86] Because habitat was left undefined, the Court looked to the plain meaning of habitat and the structure of the statute.[87] By doing so, the Court held that "the statutory definition of 'critical habitat' tells us what makes habitat 'critical,' not what makes it 'habitat.'"[88] This implies a narrowing of the scope of what constitutes "critical habitat" to something that falls within the plain meaning of "habitat."[89] Therefore, critical habitat must have the basic quality of being habitable at the time of designation. Moreover, the Court limited critical habitats to areas that are "indispensable to the conservation of the endangered species."[90] This

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81. Norman D. James & Thomas J. Ward, *Critical Habitat's Limited Role Under the Endangered Species Act and Its Improper Transformation into "Recovery" Habitat*, 34 UCLA J. ENV'T. L. & POL'Y 1, 30 (2016) (quoting H.R. REP. NO. 95-1625, at 25 (1978), *reprinted in* 1978 U.S.C.C.A.N. 9453, 9475).

82. *Id.*

83. *Weyerhaeuser*,139 S.Ct. at 365–66.

84. *Id.* at 366.

85. *Id.*

86. Compare *Weyerhaeuser*, 139 S.Ct. at 368, with Markle Ints., LLC v. U.S. Fish & Wildlife Serv., 827 F. 3d 452, 480–94 (5th Cir. 2016) (Priscilla, J., dissenting).

87. *Weyerhaeuser*, 139 S.Ct. at 368.

88. *Id.*

89. *Habitat*, BLACK'S LAW DICTIONARY (2d ed. 1995) (defining "habitat" as "the environmental conditions of a place").

90. *See Weyerhaeuser*, 139 S.Ct. at 368–69; *see also* 84 Fed. Reg. 45020, 45021 (to be codified at 50 C.F.R. pt. 424) (Aug. 27, 2019) ("[T]he Secretary will designate as critical habitat, at a scale determined by the Secretary to be appropriate, specific areas outside the geographical area occupied by the species only upon a determination that such areas are *essential* for the conservation of the species.") (emphasis added). The Final Rule goes on to note that unoccupied critical habitat must also contain one or more of the physical or biological features deemed essential to the conservation of the species. *Id.* This makes it nearly impossible to designate critical habitat in unoccupied areas requiring some form of restoration, even if it is the species' historical range or is the predicted future range because of climate change. Moreover, the *Weyerhauser* Court made a subtle but significant change: requiring unoccupied critical habitat be "indispensable" carries a different weight, and creates a more limiting tone than "essential." *Weyerhauser*, 139 S.Ct. 361 at 368–69.

interpretation makes it nearly impossible to designate unoccupied critical habitat, particularly if it requires some form of restoration.

The *Weyerhaeuser* holding made it significantly harder for the FWS to designate unoccupied critical habitat, even where species' ranges have historically existed. In 2023, the Ninth Circuit considered whether the FWS adequately designated unoccupied critical habitat for the jaguar.[91] The Ninth Circuit harped on a 2016 regulatory amendment limiting agencies' determination of an unoccupied habitat designation.[92] The court further limited the agencies to consider only the "habitat occupied at the time of listing" when identifying a habitat that is essential to the species' continued survival.[93] Although the jaguar was only occupying less than 1% of its natural range in the United States, the court held that the FWS's unoccupied critical habitat designation was arbitrary and capricious.[94] Considering this recent interpretation post-*Weyerhaeuser*, the call to provide a statutory definition for habitat is louder than ever.

II. ECOLOGY AND THE LAW

This Part analyzes habitat protections from an ecological and legal perspective. From an ecological perspective, the framework from which we consider habitat fails to inosculate the essential mosaic of interactions found at the ecosystem and landscape levels. This failure leaves designated critical habitat vulnerable to the effects of climate change. Further, the current lack of a statutory "habitat" definition results in the unrealized potential to bolster larger biodiversity protections derived from species-level critical habitat designations. From a legal perspective, the failure to provide a habitat definition results in mercurial critical habitat protections that change between administrations and amongst circuits. This failure results in a gross departure from congressional intent and shared American values. The absence of a statutory habitat definition invites a narrowing of critical habitat analysis that ignores biodiversity's nonnegotiable role in our continued survival in the face of climate change. The Endangered Species Act (ESA) is the most powerful tool of its kind, but it operates at a legal handicap without a definition of habitat to contextualize statutory analysis and agency action review.

91. *See* Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv., 67 F.4th 1027 (9th Cir. 2023).

92. *See id.* at 1040.

93. *Id.* at 1043 (2023) (quoting Listing Endangered and Threatened Species and Designating Critical Habitat; Implementing Changed to the Regulations for Designating Critical Habitat, 81 Fed. Reg. 7414, 7415 (Feb. 11, 2016)).

94. *Id.* at 1033, 1049.

A. Ecological Analysis: Considering Fundamentals of Ecosystem Management and Landscape Ecology to Bolster Biodiversity in Critical Habitat Designations

At its core, the ESA protects plant and animal species from extinction. A species is not merely a static phenotype; rather, it is a reservoir of genetic diversity that reflects perseverance of genetic continuity through deep geologic time.[95] Therefore, a species extinction is not just the loss of an important piece of our shared natural history, but it is the irrevocable forfeiture of robust genetic material that contributes to the diversity of life. This contribution to the diversity of life provides instrumental value for food, medicine, and climate change mitigation.[96]

Habitat is essential to a species' survival. Within the scientific community, habitat has long been understood as the "physical and biological setting in which organisms live and in which the other components of the environment are encountered."[97] It is the spatial dimension of a species that integrates physical and biological interactions within a natural system.[98] While habitats are understood at a species-specific scale, the habitat of a single species often overlaps with the habitats of other species and broadly serves a multitude of unnamed organisms.[99] This is essential to understanding the ESA's profound role in protecting biodiversity across ecosystems through critical habitat designations.

The ESA's critical habitat protections not only protect the few listed species whose risks have been codified, but also serve as a preemptive tool for protecting all species whose habitats intersect with an endangered species' critical habitat.[100] This multi-species benefit aligns with Congress's intent to conserve endangered species and the ecosystems on which they depend while recognizing a species' broader role within a given ecosystem.[101] Moreover, a broad definition of habitat under the ESA could prevent triggering ESA provisions in the long run—saving time and resources in agency settings and promoting judicial economy.[102] Therefore, the ecological perspective of habitat demands a broad definition to support the continuance of the diversity of life, particularly in the context of climate-

95. NAT'L RSCH. COUNCIL COMM. ON SCIENTIFIC ISSUES IN THE ENDANGERED SPECIES ACT. SCIENCE AND THE ENDANGERED SPECIES ACT 6 (1995) [hereinafter ESA ISSUES].

96. *See* DIAZ ET AL., *supra* note 13, at 11–12.

97. *See* ESA ISSUES, *supra* note 95, at 7.

98. *See id.* at 112.

99. *Id.* at 71.

100. *Id.* at 72–73.

101. 16 U.S.C. § 1531(b).

102. *See* ESA ISSUES, *supra* note 95, at 71.

induced range shifts. Two ecological frameworks must be considered when developing a habitat definition that amplifies broad-based protections for biodiversity and supports human and non-human biota's continued existence: (1) ecosystem management and (2) landscape ecology.

1. An Ecosystem Management Framework to Inform a Habitat Definition for the Endangered Species Act

Ecosystem management is a perspective that centers on protecting natural environments to maintain biodiversity for biological ecosystems and landscapes.[103] The important distinction between ecosystems and species, or landscapes and habitats, is a matter of scale. An ecosystem management perspective recognizes that species and habitats exist within a larger framework. This perspective is rooted in the understanding that a species is a small piece of a larger puzzle. All biotic entities play an important role in the larger ecosystem—the loss of one species can throw the whole system off-balance, further exacerbating the vulnerability of other listed species. The use of an ecosystem management perspective has been permeating the agency realm for some time, even in more conservative sectors.[104] This demonstrates irrefutable evidence that ecosystem management is key in aiding federal agencies with successful conservation planning. Using an ecosystem management perspective to define habitat for the ESA offers several advantages that are in line with the statute's intent and purpose.

First, ecosystem management perspectives assess a species' needs within a larger context than the presently occupied habitat—namely, the entire ecosystem. This perspective underscores the impact of surrounding habitat on species' welfare and the role of ecosystem function on a singular habitat.[105] For the ESA, an ecosystem management perspective would allow agencies to consider future opportunities or limitations to a proposed critical habitat designation outside the four corners of the land parcel. Moreover, ecosystem management perspectives encourage critical habitat designations to be climate-sensitive, meaning designations could account for climate-induced habitat degradation, fragmentation, or loss. A habitat definition informed by ecosystem management would ensure that unoccupied critical habitat deemed essential for survival is protected for species' predicted

103. *See id.* at 200.

104. Conservation and Landscape Health, 88 Fed. Reg. 19583, 19583 (proposed Apr. 3, 2023) (to be codified at 43 C.F.R. pts. 1600 and 6100) (discussing notoriously conservative Bureau of Land Management transitioning to include conservation as an essential function of BLM-managed land, including managing land for ecosystem function).

105. *See* ESA ISSUES, *supra* note 95, at 200.

climate-induced range shifts. Borrowing language from this perspective for a statutory "habitat" definition would enable agencies to leverage the best, cutting-edge technology in designating occupied or unoccupied critical habitat through predictive modeling,[106] Geographic Information Systems technology,[107] and machine learning.[108] This technology allows species conservation planning to predict when and where a species will land based on the climate change threats they face with a growing level of certainty. This approach strengthens the agency's ability to act quickly and thoroughly to save plants and animals from extinction.[109]

Second, the conservation of endangered species is becoming increasingly prevalent and complex, meaning the Fish & Wildlife Service (FWS) must designate and manage more critical habitat than ever before.[110] An ecosystem management perspective to species-specific conservation plans would require the agency to assess different species simultaneously, allowing the FWS to match the pace of new listings while reducing financial overhead and administrative bottleneck.[111] It would allow the agency to catch up on the backlog of species and critical habitat listings while preventing future litigation from citizens and public interest organizations.[112]

2. A Landscape Ecology Perspective to Inform a Habitat Definition for the Endangered Species Act

Landscape ecology studies the patterns and interactions between ecosystems within a given region, focusing on how the interactions affect larger ecological processes.[113] This perspective specifically addresses how climate change and other anthropogenic disturbances create heterogeneity in

106. *Climate Models*, NOAA, https://www.climate.gov/maps-data/climate-data-primer/predicting-climate/climate-models (last updated May 1, 2024) (discussing use of modeling to predict climate change patterns across globe).

107. *What Is a Geographic Information System (GIS)?*, USGS, https://www.usgs.gov/faqs/what-geographic-information-system-gis (last visited Dec. 10, 2024) ("A Geographic Information System (GIS) is a computer system that analyzes and displays geographically referenced information. It uses data that is attached to a unique location.").

108. Carissa Wong, *How AI Is Improving Climate Forecasts*, NATURE (Mar. 26, 2024), https://www.nature.com/articles/d41586-024-00780-8 (discussing how iterative algorithms produced by Artificial Intelligence tools could replace math-based models to create more robust and accurate climate models).

109. *See* Holst, *supra* note 36.

110. Joshua Rapp Learn, *The ESA Fails Due to Slow Listing Process* (Oct. 13, 2022), https://wildlife.org/the-esa-fails-due-to-slow-listing-process/.

111. *See id.*

112. *Id.*

113. William R. Clark, *Principles of Landscape Ecology*, NATURE EDUC. KNOWLEDGE (2010), https://www.nature.com/scitable/knowledge/library/principles-of-landscape-ecology-13260702.

landscapes.[114] Landscape ecology instructs that a landscape's spatial and temporal elements directly correlate with extinction probabilities.[115] Spatial and temporal elements of a landscape are essential to developing a habitat definition for the ESA that ensure when a species' range shifts because of climate change, it can receive continued protection through critical habitat designations.

A species' distribution changes dramatically through time and space.[116] In the context of critical habitat designations, this means a listed species may require more habitat over its lifespan than is apparent from their range at the time of listing. A "habitat" definition informed by landscape ecology would demand that the agency's designations can adapt to dynamic changes to habitat. For example, a species' range shift may be continuous or episodic, depending on the disturbance type and severity. The range shift may require the use of habitat stepping-stones, unbroken corridors, or a series of habitat patches within a fragmented landscape.[117] These patch dynamics are not currently reflected within the ESA and are essential to the long-term persistence of listed species. Moreover, these types of temporary but essential habitats are the first cut when administrations that value private land ownership over conservation inhabit the Oval Office.[118]

For disturbances caused by climate change, like the loss or degradation of habitat by sudden sea-level rise or increasingly severe and frequent forest fires, the dispersal dynamics of a given species are even more extreme. This results in species being extirpated from their historical habitat and either becoming extinct or reintroduced in refuge areas.[119] Refuge or recolonization habitat sources are essential to threatened or endangered species' continued survival. An effective "habitat" definition must explicitly include these areas. Therefore, a long-term perspective of species habitat that considers patch dynamics and refuge habitat types must inform the "habitat" definition in the ESA to protect species from extinction due to climate-induced habitat loss. Moreover, the definition must consider a larger time frame than merely the occupied habitat at the time of listing.[120]

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114. *Id.*

115. *See* ESA ISSUES, *supra* note 95, at 100.

116. *Id.* at 101.

117. *Id.*

118. *See* Einhorn, *supra* note 76.

119. *See* ESA ISSUES, *supra* note 95, at 101.

120. *Id.* at 39–40. The most serious threat to endangered species is habitat destruction; therefore, habitat conservation is the best single means to counter extinction. *Id.* at 40. Importantly, scientists understand the interaction between biotic and abiotic events as essential to predicting plant and animal reactions to climate change. *Id.* at 39. Therefore, when considering species conservation, agency actors

For example, the American pika joined the rankings of the polar bear as an unfortunate symbol of climate change. The American pika thrives in the cold temperatures of the high-elevation Rocky Mountains, rarely being spotted below the tree line.[121] As climate change continues to warm the globe, pikas must shift their habitat by migrating north or moving to higher latitudes.[122] Eventually, if they cannot disperse north, pikas will reach the peak of their native mountain habitat and become extirpated.[123] Pikas are not federally listed as endangered and maintain a relatively high abundance globally.[124]

However, the seven subspecies that compose the entire American West population are experiencing high rates of local extirpations because of climate change, particularly in the southern portion of their range.[125] As a result, pikas will vanish from the coterminous United States if the FWS fails to consider the temporal and spatial elements of the pika's habitat. Even though there is existing occupied habitat in the Great Basin region,[126] this habitat is rapidly disappearing as temperatures climb and pikas are precluded from northern migration.[127] Considering rising temperatures are the major factor affecting the species, pikas would be an excellent candidate for assisted relocation or reintroduction programs to unoccupied critical habitat in northern latitudes. However, this action will likely only come when it is too late unless lawmakers reform the ESA to mandate consideration of these elements.

B. Legal Analysis: How the Missing Habitat Definition Frustrates the Purpose of the ESA

The ESA is the federal government's only legal tool primarily and exclusively dedicated to preventing a species extinction in the United States.[128] While it serves as "the nation's principal species conservation program," it is also the strongest piece of legislation to protect biodiversity

must consider abiotic factors of habitat, such as time and space. *See generally id.* at 39. Failure to do so will result in less robust habitat conservation that fails to adequately protect species from extinction.

121. *See* Alexandra Peri, *Ochotona Princeps American Pika*, ANIMAL DIVERSITY WEB, https://animaldiversity.org/accounts/Ochotona_princeps (last visited Dec. 10, 2024).

122. *Id.*

123. *See id.* (discussing how pikas are notoriously bad dispersers and can die in under an hour from exposure to ambient temperatures of only 75°F—therefore, they are excellent candidates for assisted relocation programs).

124. *See id.*

125. *Id.*

126. *Id.*

127. *Id.* (discussing how pikas are bad dispersers).

128. *See* 16 U.S.C. §§ 1531–44.

from the deleterious effects of climate change.[129] In drafting the ESA, Congress recognized the importance of habitats and ecosystems because an endangered species cannot live without them.[130] Specifically, Section 2(b) of the ESA states that the purpose is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved."[131] While the ESA does not define "ecosystem," it clearly acknowledges the importance of ecosystems to meet the goal of preventing species extinctions. This reflects the inclination of Congress to include scientific underpinnings in the ESA and protections that extend beyond that of a single species.

One of the core mechanisms of the ESA to protect species from extinction is the critical habitat designation, for both occupied and unoccupied habitats. The statutory definition of critical habitat is as follows:

> [T]he specific areas within the geographical area occupied by the species, at the time it is listed . . . on which are found those physical or biological features . . . essential to the conservation of the species and . . . which may require special management considerations or protection; and . . . specific areas outside the geographical area occupied by the species at the time it is listed . . . upon a determination . . . that such areas are essential for the conservation of the species.[132]

The definition creates an affirmative duty for the FWS and the National Marine Fisheries Service (NMFS) to designate critical habitat for listed species that is either occupied or unoccupied at the time of listing.[133] However, without a broader definition of "habitat" to contextualize critical habitat within, the parameters of these designations vary with administrations and between circuits.[134]

As written, this definition poses several problems toward sensical statutory interpretation. First, this definition fails to recognize Congress's broader intent to protect species and the ecosystems on which they depend.[135]

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129. J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 13 (2008).

130. ESA ISSUES, *supra* note 95, at 193.

131. 16 U.S.C. § 1531(b).

132. 16 U.S.C. at §§ 1532(5)(A)(i)–(ii).

133. *See id.*

134. *See generally* Craig Manson, *The Designation of Critical Habitat Under the Endangered Species Act*, U.S. FISH & WILDLIFE SERV. (Apr. 10, 2003), https://www.fws.gov/testimony/designation-critical-habitat-under-endangered-species-act (discussing stress on both courts and various administrations and noting that power to resolve this issue lies in Congress's hands).

135. 16 U.S.C. § 1531(b).

This intent will never be manifested without language that necessarily contextualizes critical habitat within a broader ecosystem. Second, agencies are limited to the "physical or biological features" of the habitat when designating critical habitat.[136] This precludes agencies from considering temporal elements, such as range shifting due to climate change, that directly impacts the efficacy of species recovery plans. Third, wildlife advocates are limited to arguing the plain meaning or leaning on case law for interpretations of habitat that the judiciary has yet to calcify into binding precedent.[137] Finally, advocates must challenge the FWS's interpretation of the physical and biological elements which often do not align with the advocates' goals to protect wildlife and the habitats on which they depend. This further clogs the courts' dockets and diverts agency resources from action that *actually* supports listed species.[138]

The Supreme Court acknowledged that habitat is a broader construction than critical habitat based on the plain and dictionary meanings of the word.[139] However, without a statutory definition, the Court cannot interpret critical habitat within any sort of framework that enables it to consider the habitability of the proposed critical habitat designation.[140] Therefore, Congress must define "habitat" to aid agency review of critical habitat designations.[141] Congress has yet to do so, leaving the definition in the hands of whatever political party is in fashion at the time of designation.

Despite the affirmative duty on agencies to designate critical habitat, recalcitrant agencies demonstrate a long history of haulting or delaying critical habitat designations or not designating the breadth of habitat required to conserve or recover the listed species.[142] Moreover, Congress put limits on

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136. 16 U.S.C. § 1532(5)(A)(i) (defining "critical habitat" as "the specific areas within the geographical area occupied by the species . . . which are found those physical or biological features").

137. *See, e.g.*, Weyerhaeuser Co. v. U.S. Fish & Wildlife Serv., 139 S.Ct. 361, 369 (2018) (noting failure to provide a definition of habitat).

138. Anne C. Mulkern, Allison Winter, Robin Bravender, *Brazen Environmental Upstart Brings Legal Muscle, Nerve to Climate Debate*, NY TIMES (Mar. 30, 2010), https://www.biologicaldiversity.org/news/media-archive/NYT_Gwire_BrazenEnvrioUpstartsCBDProfile_3-30-10.pdf (discussing the Center for Biological Diversity's strategy of "relentless lawsuits" to which critics claim "clogs up the courts."); *see also Endangered Species Act 'Broken'—Flood of Litigation Over Critical Habitat Hinders Species Conservation*, DEP'T OF INTERIOR (May 28, 2003), https://www.doi.gov/sites/default/files/archive/news/archive/03_News_Releases/030528a.htm ("[T]he flood of court orders requiring critical habitat designations is undermining endangered species conservation by compromising the Service's ability to protect new species and to work with states, tribes, landowners and others to recover those already listed under the Act[.]") *Id.*

139. *Weyerhaeuser*, 139 S.Ct at 368–69.

140. *Id.*

141. *See id.*

142. *See* Einhorn, *supra* note 76.

the designation of critical habitat.[143] The designation must consider "the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impact . . . ."[144] Essentially, this provision functions as a cost-benefit analysis that the courts have used to reject critical habitat designations, asserting that agencies fail to consider something that falls patently outside agency expertise.[145] Moreover, since *Tennesse Valley Authority v. Hill*, the ESA has been amended to restrict the agencies' abilities to designate critical habitat.[146]

Additionally, the timing of critical habitat designations has posed a problem in both the agency and judicial realms. The FWS often fails to designate critical habitat in a timely manner, making the designation's legitimacy that much easier to discredit or coming all too late for the imperiled species.[147] Moreover, the courts have held that unoccupied critical habitat designation must only occur if it is indispensable to the species' continued survival and if occupied habitat is insufficient to meet this need.[148] That is to say, *unoccupied* critical habitat can only be designated subsequent to *occupied* critical habitat. Ultimately, this undercuts the utility of the entire provision by ignoring the urgency of extirpation and range shifting because of climate change. Moreover, it overlooks the utility of unoccupied critical

143. *See* 16 U.S.C.§ 1532(5)(A)(i).

144. 16 U.S.C. § 1533(b)(2). It is important to note that the listing decision cannot consider economic considerations. The consideration of economic impacts is unique to the critical habitat designation.

145. Any significant regulatory action involving an environmental statute is subject to a cost-benefit analysis. Exec. Order No. 12866, 58 Fed. Reg. 51735 (Oct. 4, 1993). The FWS is subject to Executive Order 12866, which mandates regulatory action that supports "health, safety, environment, and well-being" of the American people without "unacceptable or unreasonable costs on society." *Id.* However, there has been a movement to monetize environmental assets, such as biodiversity, and consider ecosystem services when conducting cost-benefit analyses—something far more aligned with the FWS's expertise. Exec. Order No. 14072, 87 Fed. Reg. 24851 (Apr. 22, 2022). The Biden Administration published guidance in Executive Order 14072 that requires agencies to fiscally account for ecosystem services in cost-benefit analyses. *Id.* (directing agencies to consider costs outside commercial or private sector impacts). This mandate serves to mitigate the decades of the government "[f]ailing to fully account for nature's bounty" which has led to a gross undervaluation of nature's services and the "erosion of our nation's natural assets." Richard L. Revesz & Arati Prabhakar, *Accounting for Ecosystem Services in Benefit-Cost Analysis*, THE WHITE HOUSE (Aug. 1, 2023), https://www.whitehouse.gov/omb/briefing-room/2023/08/01/accounting-for-ecosystem-services-in-benefit-cost-analysis.

146. *See Tennessee Valley Authority v. Hill: The Snail Darter Case*, U.S. DEP'T OF JUST., https://web.archive.org/web/20231121180920/https://www.justice.gov/enrd/tennessee-valley-authority-v-hill (last updated May 9, 2023) (noting establishment of ESA, Section 7 "God Committee" in response to *TVA v. Hill* to grant exemptions to critical habitat designations and consider economic implications).

147. *See* Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv., 67 F.4th 1027, 1049 (9th Cir. 2023) (shooting down designation of unoccupied critical habitat that was designated ten years after species was listed).

148. *Id.*

habitat and inaccurately assumes that habitat requiring restoration is biologically depauperate.

Without a statutory definition for "habitat," the ESA is not sufficiently protecting critical habitat for listed species in the context of climate change, nor is it actualizing its fullest potential to protect biodiversity. Moreover, the statutory interpretation of critical habitat varies by circuits and political administrations. To combat this, Congress must amend the ESA to include a "habitat" definition that reflects an ecosystem and landscape perspective. Specifically, the definition must include listed species' historical, current, and predicted future ranges based on the best practices of ecosystem management and landscape ecology.

III. A DEFINING MOMENT FOR THE ENDANGERED SPECIES ACT

This Part proposes a statutory definition of habitat that accounts for species range shifting due to climate change. Part III.A offers a new definition. Part III.B will illustrate what the future could look like if Congress adopted the proposed definition. Finally, Part III.C acknowledges and dispels three counterarguments to the proposed solution.

A. A Statutory Definition of Habitat

The Endangered Species Act (ESA) must include a statutory definition of "habitat" to contextualize critical habitat designations for statutory analysis and agency action review. The following definition is structured around the widely accepted scientific definition of "habitat."[149] Moreover, the proposed definition includes key perspectives from landscape ecology and ecosystem management, while offering a broad timeframe to account for climate-induced range shifts. The definition should be inserted prior to the critical habitat definition, as definition (5) under Section 3 of the ESA.[150] The proposed statutory definition is as follows:

149. *See* ESA ISSUES, *supra* note 95, at 7. Importantly, this definition is borne out of a "report [that] was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine." *Id.* at iv. While there may be variation in the precise verbiage of habitat between disciplines, the definition used for purposes of this Note's analysis is the definition approved by the National Research Council.

150. 16 U.S.C. § 1532(3).

> (5) The term "habitat" means the biotic and abiotic[151] setting in which organisms live and in which the other components of the environment are encountered, considering three essential elements of habitat: time, space, and context.
>
> (i) Time: the habitat must encompass past, present, and future ranges of the listed species, including impermanent habitat occupations critical for species survival, such as temporary migration routes, climate-induced range shifts, future extirpation routes, and restored or restorable habitat.
>
> (ii) Space: the habitat must encompass physical features critical for species survival, such as corridors, patches, buffer zones, refuge areas, and recolonization habitat sources.
>
> (iii) Context: the habitat must encompass an ecosystem perspective, including considerations such as physical and biological inputs, shared habitat ranges, and assessing the habitat's role within the broader system.

The definition should be interpreted broadly to ensure long-term habitat protections adequately support the recovery of listed species over space and time. In particular, the language guards against the narrowing of critical habitat designations and allows for species recovery in the climate change context. Within the definition, the language "including" and "such as" indicate non-exhaustive lists to illustrate what agencies must consider when designating critical habitat.

This definition will require agencies to designate critical habitat under new parameters, but it will not necessarily increase administrative costs. By damming the flood of pro-ESA litigation, agency designations may become less resource-intensive. More effective critical habitat designations will bolster successful species recovery plans.[152] As a result, wildlife advocates' litigation will reduce significantly. Currently, the ESA is heavily litigated because litigation is the main driver of effective ESA implementation: "petitions and litigation 'are beneficial [in] ensuring that the species most at

151. Biotic factors relate to the living things that make up an ecosystem, whereas abiotic factors are the non-living parts of the ecosystem. *Biotic and Abiotic Factors*, BIOLOGY DICTIONARY (June 1, 2020), https://biologydictionary.net/biotic-abiotic-factors. Both are essential components of a functioning ecosystem. *Id.*

152. *See supra* Part I.B.2.

threat are protected.'"[153] Many wildlife advocates view litigation as the only way to enforce the ESA provisions effectively.[154] For example, Kieran Suckling, Executive Director of the Center for Biological Diversity, estimates that the organization has over 70 ongoing lawsuits to enforce the ESA.[155] These lawsuits stem from what wildlife advocacy groups believe to be ineffective recovery plans to inadequate critical habitat designations.[156] If agencies must construe critical habitat within a "habitat" definition that binds them to consider broader spatial and temporal elements, litigation against inadequate critical habitat designations will reduce. As a result, agency resources will be diverted to effectively conserve the species and the habitat on which it depends.

B. Statutory Interpretation Under the New Definition and Ecological Consequences

By providing a definition that includes past and future ranges, each administration will be limited in its ability to narrow the definition of critical habitat.[157] As a result, species will experience strong, long-term critical habitat protections that are not subject to mercurial political climates.[158] A "habitat" definition will also aid in instructing the Fish & Wildlife Service (FWS) to designate critical habitat beyond a species' range at the time of listing. This definition will allow the agency to protect future habitats of particularly vulnerable species and broaden the parameters of unoccupied critical habitat designations.[159] It will enable the FWS to promulgate scientific regulations showing that science recognizes habitat is key to a species' survival.[160]

Moreover, the definition will remove ambiguity for courts interpreting critical habitat designations. Specifically, the definition will remove the need to designate *occupied* critical habitat before *unoccupied* critical habitat. Removing this step from unoccupied critical habitat designations is essential to safeguard listed species' long-term survival. For example, under this definition, the *Weyerhaeuser* Court would have been required to reject the

153. Michael Doyle & Pamela King, *How the Courthouse Came to Be a Major Habitat for the ESA*, E&E NEWS (June 20, 2023), https://www.eenews.net/articles/how-the-courthouse-came-to-be-a-major-habitat-for-the-esa/.

154. *Id.*

155. *Id.*

156. *Id.*

157. *See supra* Part II.A.

158. *Id.*

159. *Id.*

160. *See* ESA ISSUES, *supra* note 95, at 94.

landowning petitioners' claims that the habitat in dispute could not be critical habitat because it was currently unoccupied and unhabitable without restoration. While the critical habitat designation in *Weyerhaeuser* could have been rejected for economic reasons,[161] it could not be rejected under the statutory interpretation of critical habitat because of the ecological principles reflected in the broader habitat definition.[162] Importantly, this definition in no way defeats the cost-benefit analysis required by regulatory action, it merely strengthens the argument for critical habitat designations. Had this definition been codified before *Weyerhaeuser*, the few remaining dusky gopher frogs may have had a shot at recovery, ensuring their snore-like call could continue to contribute to the choir of life.[163]

This definition will also yield more consistent application of the law and stave off meritless claims from anti-ESA litigants. For example, the Ninth Circuit considered a critical habitat designation of the migratory jaguar.[164] The court held that the FWS's designation of *unoccupied* critical habitat was arbitrary and capricious because the FWS failed first to determine that the *occupied* critical habitat was inadequate to support the conservation of the species.[165] Wildlife advocates emphasized the importance of the unoccupied critical habitat designation for bolstering habitat connectivity and genetic diversity, both of which are essential to the jaguars' long-term survival.[166] However, the Ninth Circuit determined that unoccupied critical habitat must meet a stricter standard than occupied critical habitat.[167] Moreover, the court determined that the FWS failed to demonstrate how promoting connectivity or genetic diversity was essential to the jaguar's survival to warrant the unoccupied critical habitat designation.[168]

Under the proposed "habitat" definition, the suitable occupied critical habitat in this case would not foreclose the additional unoccupied critical habitat designation. The agency would not be limited to designating

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161. *See* Weyerhaeuser Co. v. U.S. Fish & Wildlife Serv., 139 S.Ct. 361, 367 (2018) (noting a $33.9 million loss in future profits from critical habitat designation that would bar future development of the site).

162. *See supra* Part III.A.

163. *Dusky Gopher Frog*, IUCN RED LIST, https://www.iucnredlist.org/species/58714/118983642 (last updated June 4, 2021); *see also* LILIANA NARVAEZ ET AL., UNU EHS TECHNICAL REPORT: ACCELERATING EXTINCTIONS 7 (2023) (noting dusky gopher frog's role as an ecosystem engineer that provides pest control for longleaf pine forests without which would cause ecosystem destruction).

164. *See* Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv., 67 F.4th 1027, 1030 (9th Cir. 2023).

165. *Id.*

166. *Id.* at 1046.

167. *Id.*

168. *Id.*

unoccupied critical habitat only after the occupied critical habitat was determined to be insufficient for species conservation. This is because the FWS would be required to consider temporal and spatial elements outlined in the "habitat" definition. The agency would then have to consider the past and future ranges of the jaguar, the jaguar's essential use of corridors, and the genetic buffer zone present on habitat edges.[169] If the proposed definition was applied to these facts, it is very likely this unoccupied critical habitat would have been deemed essential to the species' survival. Therefore, the court would not have overturned the agency's designation.

C. Counterarguments: Convincing a Conservative Congress or Agency

Three counterarguments are likely to arise against the proposed solution. First, the current Congress lacks the political will to codify a definition of this nature.[170] Second, despite a climate-sensitive and science-forward definition, a more conservative agency could still drag its feet on designating critical habitat. Third, private landowners and developers may be reluctant to support a policy that requires more land conservation and limits residential or commercial development. While these arguments carry weight, they should be reconsidered in light of the increasingly deleterious effects of climate change on biodiversity and the essential ecosystem services provided by diverse ecosystems. Nature is on the precipice of a tipping point for species extinction—the status quo is no longer sufficient to prevent ecosystem collapse.[171]

First, it is possible that the current Congress may not codify this definition. Congress has a long history of attacking the ESA because of economic interests. In particular, critical habitat designations have been

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169. See *supra* Part III.A.

170. Stephanie Kurose, Brett Hartl, Isabel Sten, *Paving the Road to Extinction: Congress's Expanded Assault on Endangered Species Through Appropriations Poison-Pill Riders*, CENTER FOR BIOLOGICAL DIVERSITY 1 (Jan. 2024), https://www.biologicaldiversity.org/publications/papers/Paving-the-Road-to-Extinction.pdf (noting how the 118th Congress proposed bills with the "largest number of anti-wildlife poison pill riders in the 50-year history of the Endangered Species Act."); *see also* John A. Vucetich & Jeremy T. Bruskotter, *Congress Is Trying to Weaken the Endangered Species Act. Again.*, EARTHJUSTICE (Apr. 30, 2024) (discussing Congress's more recent attacks on wildlife through the Trust the Science Act, lead by Representative Boebert, and other attempts to weaken the ESA).

171. The United Nations University's Institute for Environment and Human Security published a report that indicated the globe is now facing six environmental tipping points, including a tipping point for species extinction. NARVAEZ ET AL., *supra* note 163, at 9. The report warned that one million plants and animals are predicted to become extinct in mere decades. *Id.* This rapid extinction will trigger cascading extinctions of dependent species and put the "intricate web of species relationships in nature at risk of catastrophic failures." *Id.* As a result, the ecosystems on which all living things depend will collapse and cease to offer life-sustaining ecosystem services, such as food production. *See id.*

blamed for thwarting lucrative industry expansion in "logging, mining and oil and gas."[172] Regardless of this perception, most federal government actions can continue so long as the actors mitigate the impact on the imperiled species.[173] However, conservative members of Congress have been working tirelessly to disempower the ESA over the past few years, proposing 15 anti-ESA bills in 2022 and 13 anti-ESA bills in 2023.[174] Despite this, the ESA continues receiving strong bipartisan support among the general public.[175] Congress has a duty to represent their constituents as elected officials. Congress can be compelled to codify this definition to reflect American values with effective campaigning and vocal bipartisan support.

Second, a more conservative agency can always strategically slow or limit critical habitat designations, despite a statutory "habitat" definition. This is all too common in the 51-year history of the ESA—from failing to designate critical habitat or promulgating regulations that undermine the ESA's intent and purpose entirely. However, under this proposed definition, the FWS and the National Marine Fisheries Service (NMFS) will be limited in their ability to sabotage the statute. Conversely, they will be required to designate critical habitat that considers ecological underpinnings of space, time, and context using the best science available. This will enable climate-sensitive critical habitat designations, even under the most conservative administrations.

Third, private landowners are the demographic who must bear the largest burden and cost of critical habitat designations. As a result, they may be apprehensive to support the expansion of critical habitat. While the ESA does not necessarily prohibit development, it does place a burden on private landowners whose property overlaps with critical habitat.[176] However, ESA implementation has shifted away from solely utilizing regulatory prohibitions over the past few decades.[177] Instead, ESA implementation is

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172. Andrew Carter & Mary Elizabeth Beetham, *Species Under Siege: Why the Endangered Species Act Is in Congressional Crosshairs*, DEF. OF WILDLIFE (Mar. 23, 2023), https://defenders.org/blog/2023/03/species-under-siege-why-endangered-species-act-congressional-crosshairs.

173. *See* Jacob W. Malcom & Ya-Wei Li, *Data Contradict Common Perceptions About Controversial Provision of the US Endangered Species Act*, 112 PNAS 15844, 15847 (Dec. 29, 2015) (citing over 88,000 government actions over a seven-year period that raised a Section 7 ESA consultation).

174. Carter, *supra* note 172.

175. Tulchin, *supra* note 53, at 2.

176. Specifically, Section 7 prohibits the "destruction or adverse modification" of critical habitat which can result in costly mitigation efforts that fall on the private landowner. 16 U.S.C.§ 1536(a).

177. Rebecca Epanchin-Niell, James Boyd, *Private-Sector Conservation Under the US Endangered Specieds Act: A Return-on-Investment Perspectice*, FRONTIERS IN ECOLOGY AND THE ENVIRONMENT (Apr. 6, 2020), https://esajournals.onlinelibrary.wiley.com/doi/10.1002/fee.2193 ("Over

moving toward leveraging both prohibitions and incentive-based solutions that encourage private landowners to be compensated for conserving critical habitat.[178] For example, a privately owned land parcel that serves as a critical habitat for a listed species likely requires some level of ecological maintenance.[179] This maintenance can also serve as a mechanism to preserve the land for lucrative activities.[180] These activities include ecotourism, mitigation crediting, or other market-based solutions that incentivize species conservation.[181] Further, the Secretary of the Department of the Interior proposed a rule to clarify and streamline the permitting and voluntary agreement program.[182] The proposal incentivizes private property owners to comply with the ESA while pursuing development projects.[183] The expansion of market-based solutions and federal policies that mitigate burdens, reduce costs, and stimulate participation in critical habitat conservation may be the key to ensure private landowners' long-term support and compliance with the ESA.[184]

CONCLUSION

If there was ever an opportunity to marry science and the law to affect positive change for people and the planet, it is at this pivotal moment with the Endangered Species Act (ESA) and the current state of climate change. The science is established: a single species is but a small cog in an elegant system of dependent functions that creates the diversity of life. This diversity of life is our greatest tool in combating climate change. The law is also

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the past several decades, [FWS and NMFS] have developed programs targeted at the private sector to reduce the ESA's restrictiveness and to increase voluntary, proactice, and 'beyond compliance' conservation investments. These programs include Habitat Conservation Plans, Candidate Conservation Agreements, Candidate Conservation Agreements with Assurances, Safe Harbor Agreements, and a Voluntary Prelisting Conservation Actions policy, among others.")

178. YA-WEI (JAKE) LI, THE CTR. FOR GROWTH AND OPPORTUNITY AT UTAH ST. UNIV., WHEN DOES CRITICAL HABITAT DESIGNATION BENEFIT SPECIES RECOVERY? 5 (2020).

179. *See id.*

180. *See id.*

181. *See id.*

182. *Interior Dep't Takes Action to Strengthen Endangered Species Act*, U.S. DEP'T OF THE INTERIOR (Feb. 8, 2023), https://www.doi.gov/pressreleases/interior-department-takes-action-strengthen-endangered-species-act.

183. *Id.*

184. *See generally* Shari L. Rodriguez, M. Nils Peterson, Frederick W. Cubbage, Erin O. Sills, Howard D. Bondell, *Private Landowner Interest in Market-Based Incentive Programs for Endangered Species Habitat Conservation*, WILDLIFE SOCIETY BULLETIN (Jul. 9, 2012), https://wildlife.onlinelibrary.wiley.com/doi/10.1002/wsb.159 (concluding that market-based solutions could remedy costs and burdens on private landowners while stimulating participation in habitat conservation programs).

established: The ESA is the most powerful tool for protecting the integrity of our natural system and the most fragile cogs within that system. The nature of threats to biodiversity has changed dramatically over the ESA's 51-year history; however, Congress intended for the ESA to adapt to the threats to species and the systems on which they depend. The ESA must not only listen to the susurrus of a single species but also to the symphony of the diverse ecosystem to which the species belongs. The law must be updated to reflect a confluence of established knowledge bases that will turn up the volume of life and prevent the lonely call of a bird searching for a mate that it will never find.