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Strength in Numbers: Setting Quantitative Criteria for Listing Species Under the Endangered Species Act

*Kalyani Robbins**

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I.

INTRODUCTION

For the animal shall not be measured by man. In a world older and more complete than ours, they move, finished and complete, gifted with extensions of the senses we have lost or never attained, living by voices we shall never hear. They are not brethren, they are not underlings, they are other nations caught with ours in the net of life and time, fellow prisoners of the splendour and travail of the earth.¹

Most Americans spend the majority of our time in artificial environments of our own making. We live indoors, in a sealed-off land of bug spray, temperature control, and an array of antibacterial products for our hands, dishes, and countertops. We keep our plants alive by providing all of their daily care and allowing them to live in an insect-free environment, then we climb into bed and cuddle up to our furry four-legged companions. We have developed a widely-shared informal hierarchy of life-forms. However, these choices come at our peril because, as comfortable as we have become in our cozy indoor retreats, we still inhabit a larger world whose ability to support life is dependent

1. HENRY BESTON, *THE OUTERMOST HOUSE: A YEAR OF LIFE ON THE GREAT BEACH OF CAPE COD* 25 (1st ed. 1928).

upon the maintenance of species we may not regard so highly. We depend upon this natural world both for our aesthetic and spiritual enrichment and for our very survival. Our personal preferences are not helpful in selecting species for preservation as they do not correlate with their value to biodiversity. That is why a more objective system is needed, as it forces us to set aside our personal preferences. That is why the system we do have was designed to protect all species equally. In the real world, ecosystems depend upon biodiversity that does not rank species according to how lovable they are to humans.²

Congress expressly recognized the disparity between human valuation of species and nature's diverse needs and stated its intent to protect species equally.³ Just a few years later, in 1973, Congress passed the Endangered Species Act (ESA),⁴ intended "to halt and reverse the trend toward species extinction, whatever the cost."⁵ This effort came at a crucial time, as species now go extinct at a rate of approximately one-hundred per day, a rate which continues to rise⁶ despite already "far exceed[ing] any the world has experienced in the last 65 million years."⁷

Despite Congress' attempt to give us the tools to slow down this rapid loss of biodiversity, we have frittered away that opportunity by bickering over which species we like best and our corresponding willingness to make sacrifices to protect them. The best

2. See E. O. WILSON, *THE DIVERSITY OF LIFE* xxiii (2d ed. 1999) ("Recent experimental studies on whole ecosystems support what was long suspected: in most cases, the more species living in an ecosystem, the higher its productivity and the greater its ability to withstand drought and other kinds of environmental stress. Since we depend on an abundance of functioning ecosystems to cleanse our water, enrich our soil, and manufacture the very air we breathe, biodiversity is clearly not an inheritance to be discarded carelessly."). At a time of increasing global climate change, ecosystem resiliency is especially important.

3. The Senate Report connected with earlier endangered species legislation noted that "with each species we eliminate, we reduce the pool of germ-plasm available for use by man in future years. Since each living species and subspecies has developed in a unique way to adapt itself to the difficulty of living in the world's environment, as a species is lost, its distinctive gene material, which may subsequently prove invaluable to mankind in improving domestic animals or increasing resistance to disease or environmental contaminants, is also irretrievably lost." S. REP. NO. 91-526, at 3 (1969). The same report went on to cite the above Henry Beston quote. *Id.*

4. Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1544 (2000).

5. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 184 (1978).

6. Tim W. Clark, *A Course on Species and Ecosystem Conservation: An Interdisciplinary Approach*, YALE SCH. OF FORESTRY & ENVTL. STUDIES, BULLETIN SERIES NO. 105, SPECIES AND ECOSYSTEM CONSERVATION: AN INTERDISCIPLINARY APPROACH 17, 33 (Tim W. Clark et al. eds., 2001).

7. Kent E. Holsinger, *Population Biology for Policy Makers: Promises and Paradoxes*, 45 *BIOSCIENCE* S-10, S-11 (1995).

way to free ourselves from this quagmire is to reduce the flexibility that engenders such frequent controversies. Congress expressed its desire to protect species equally, and several decades later it is getting more and more urgent that we find a way to implement that goal.

As I discuss in greater detail below, the route a species must take to reach the protections of the ESA begins with getting placed on a list of either endangered or threatened species. Congress has described this listing process as “the keystone of the Endangered Species Act.”⁸ The importance of listing properly becomes obvious when considering the fact that ESA protection is an all-or-nothing game—either you get it or you don’t—and the only dividing line is listing.⁹ As a prerequisite for the application of any other provision of the Act, listing is the single most important part of the Act.

Our system of listing species, like most others around the world, is based upon a determination of the viability of each species. We engage in population viability analysis to determine the health of a species. That said, the scientific process of population viability analysis needs a set of questions to answer. In other words, what levels of viability are we looking for? Before scientists can determine whether a species fits into a listing category, we must first determine—as a policy matter—what the criteria are for inclusion in that category. As it stands, we have only loose definitions and factors upon which to base these analyses, resulting in an extreme lack of consistency. As will be discussed further below, I propose the use of *quantitative* criteria for each listing category. Quantitative criteria are numerical thresholds applicable across the board (such as x percentage decline over y years or z generations, x total population remaining, x amount of geographic range, etc.).

Part II of this article provides necessary background information on the listing process. Part III discusses the numerous problems with the listing status quo, which combine to prevent us from meaningfully realizing the expectations Congress had for the listing process. Part IV provides the support for my primary

8. H.R. REP. NO. 97-567, at 10 (1982).

9. See Daniel J. Rohlf, *There's Something Fishy Going On Here: A Critique of the National Marine Fisheries Service's Definition of Species Under the Endangered Species Act*, 24 ENVTL. L. 617, 619 (1994) (“Although characterized as the ‘pit bull of federal environmental statutes,’ the ESA is as meek as a kitten unless an imperiled creature appears on the statute’s lists of threatened and endangered species.”).

thesis—that we can and should devise quantitative listing criteria—and suggests a superior model from which to work. Finally, Part V considers the various ways to accomplish the goals presented here. The article then concludes with a plea to the new administration to make this change.

II.

AN OVERVIEW OF THE ESA AND LISTING SPECIES

A. *In the Beginning: The Evolution of U.S. Endangered Species Legislation and Listing Priorities*

The first U.S. endangered species legislation, the Endangered Species Preservation Act of 1966,¹⁰ was the result of the Department of Interior's effort to obtain funding for an endangered species program after failed attempts to get that funding absent a preservation statute.¹¹ The 1966 Act required the Secretary of the Interior to list species that were threatened with extinction,¹² in consultation "with various scientific groups having expertise in this field."¹³ The Departments of Interior, Agriculture, and Defense were all charged with protecting these species and their habitats.¹⁴

Next came the Endangered Species Conservation Act of 1969,¹⁵ which increased protections for invertebrate species and restrictions on interstate commerce in listed species.¹⁶ The 1969 Act included listing language still in use today, requiring the decisions be based on "the best scientific and commercial data available."¹⁷ The term "commercial data" refers only to data that goes to a species' vulnerability—such as threats from overutilization in commerce—and not to the consideration of economic factors, as Congress later clarified.¹⁸ While the legislative history does not elucidate the meaning of "best scientific data

10. Endangered Species Preservation Act of 1966, Pub. L. No. 89-669, 80 Stat. 926 (1966). A discussion of the Act's provisions may be found in MICHAEL J. BEAN, *THE EVOLUTION OF NATIONAL WILDLIFE LAW* 319-21 (revised and expanded ed. 1983).

11. See S. REP. NO. 89-1463, at 1, 2, 17 (1966).

12. Endangered Species Preservation Act § 1(c).

13. S. REP. NO. 89-1463, at 3.

14. Endangered Species Preservation Act § 1(b).

15. Endangered Species Conservation Act of 1969, Pub. L. No. 91-135, 83 Stat. 275 (1969). A discussion of the Act's provisions may be found in BEAN, *supra* note 10, at 374-79.

16. See Endangered Species Conservation Act §§ 1(2), 2, 4(d), 12(a).

17. *Id.* § 3(a).

18. H.R. Rep. No. 97-567, at 20 (1982).

available," a "plausible explanation is that Congress intended through this language to continue the 1966 Act's requirement that Interior seek the input of independent biologists before making listing decisions."¹⁹ If this explanation is true, we must take into account an obvious goal behind this requirement, which was to increase objectivity and consistency in the listing process.

In 1973, the ESA, which was made possible by the enormous political support for environmental ideals at the time, became "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation."²⁰ Among the numerous improvements (from the preservation perspective) were the inclusion of species not yet on the brink of the abyss,²¹ protection for plant species,²² prohibitions of private actions on private land,²³ and a requirement that federal agencies must not jeopardize the continued existence of a protected species.²⁴ The ESA's 1982 amendments also made a key change to the listing process, adding the word "solely" before the existing language of listing "on the basis of the best scientific and commercial data available,"²⁵ thus creating the somewhat controversial "strictly science mandate."²⁶ The purpose of this change was to do away with the irrelevant economic impact analyses being conducted by the Reagan administration and require listing determinations to be purely about a species' biological condition.²⁷

At several points in the evolution of the ESA, Congress has made it clear that the listing process was intended to move forward as quickly and efficiently as possible. First, in explaining why the 1969 Act did not require the formal Administrative Procedure Act procedures to be followed, Congress stated that "[i]f the full right of hearing and judicial review is granted, the publication of the final list may be delayed for many months—months which may be crucial in determining whether a given species or

19. Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 WASH. U. L.Q. 1029, 1043 (1997).

20. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 174 (1978).

21. *See* Pub. L. No. 93-205, §§ 3(15), 4(d). Threatened status was to be granted generously to any species at a "measurable risk" of extinction. H.R. REP. NO. 93-412, at 11 (1973).

22. *See* Pub. L. No. 93-205, § 3(11).

23. *See id.* § 9.

24. *See id.* § 7.

25. 16 U.S.C. § 1533(b)(1).

26. For an in-depth discussion of this requirement, *see generally* Doremus, *supra* note 19.

27. *See* H.R. CONF. REP. NO. 97-835, at 20 (1982).

subspecies will be able to survive.”²⁸ In 1979, concerned with the slow pace of listing that had resulted in only a tiny percentage of listings out of thousands of candidates,²⁹ Congress established a priority system for considering species for listing.³⁰ By 1988, the problem of delay had gotten out of control, with over 3000 candidate species, including nearly 1000 already deemed eligible but not yet listed, and only about 50 species being listed per year.³¹ Congress expressed concern that this rate would result in many species becoming extinct while they waited.³² Accordingly, they directed the Secretary to monitor all candidate species and “make prompt use” of the emergency listing process to prevent such loss.³³

B. *The ESA Listing Process*

The power to list endangered and threatened species belongs to the Secretary of the Interior and the Secretary of Commerce, who have delegated that power to the Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS), respectively (collectively “the Services”).³⁴ The majority of species—terrestrial species and freshwater fish—are the responsibility of FWS, whereas NMFS is generally charged with the protection of marine species and anadromous fish, such as salmonids.

A species is endangered if it “is in danger of extinction throughout all or a significant portion of its range,”³⁵ and it is threatened if it “is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.”³⁶ In determining whether a species fits into one of these two categories, the Services must consider five factors:

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;

(B) overutilization for commercial, recreational, scientific, or educational purposes;

28. S. REP. NO. 91-526, at 1419 (1969).

29. H.R. REP. NO. 96-167 (1979).

30. Act of December 28, 1979, Pub. L. No. 96-159, § 3(6), 93 Stat. 1225-26 (codified at 16 U.S.C. § 1533(h)(3) (1988)).

31. Endangered Species Act Amendments of 1988, Pub. L. No. 100-478, 1988 U.S.C.C.A.N. (102 Stat.) 2306.

32. *Id.* at 2707.

33. Act of October 7, 1988, Pub. L. No. 100-478, § 1002(a), 102 Stat. 2306 (codified at 16 U.S.C. § 1533(b)(3)(C)(iii) (1988)).

34. 16 U.S.C. § 1533(c)(1); 50 C.F.R. § 402.01(b) (2006).

35. 16 U.S.C. § 1532(6).

36. *Id.* § 1532(20).

- (C) disease or predation;
- (D) the inadequacy of existing regulatory mechanisms; or
- (E) other natural or manmade factors affecting its continued existence.³⁷

While these factors do constitute "criteria" to consider in determining a species' listing status, these criteria are highly generalized. They offer *factors* to subjectively consider, but no *formulae* to follow.

Citizens may petition the Secretary to list, uplist, downlist, or delist a species,³⁸ and the Secretary must acknowledge the petition within thirty days.³⁹ The Secretary has ninety days to determine whether the petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted."⁴⁰ Substantial information means "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted."⁴¹ If the petition passes this bar, the Secretary must then commence a status review of the species,⁴² and is required within twelve months to determine whether the listing is warranted, not warranted, or warranted but precluded by competing demands.⁴³

The final category—warranted but precluded—was the brainchild of the Reagan Administration, putatively to allow those species in greatest need to be addressed first.⁴⁴ It was never intended "to allow the Secretary to delay commencing the rulemaking process for any reason other than the existence of pending or imminent proposals to list species subject to a greater degree of threat."⁴⁵ In reality, however, it has become a major source of additional discretion, leading to politically-based decisions rather than prioritization on the basis of threat. The category is an ER waiting room strewn with the corpses of those species who were forced to wait too long.

37. *Id.* § 1533(a)(1).

38. *Id.* § 1533(b)(3)(A).

39. 50 C.F.R. § 424.14(a).

40. 16 U.S.C. § 1533(b)(3)(A).

41. 50 C.F.R. § 424.14(b).

42. 16 U.S.C. § 1533(b)(3)(A).

43. *Id.* § 1533(b)(3)(B).

44. H.R. REP. NO. 97-567 (1982).

45. *Id.*

The status review is to be conducted in the same manner for citizen petitions as it is for those initiated by the agency.⁴⁶ The Services have issued policy statements regarding the information standards for the status review process. Some of the requirements thus created are: (1) biologists must evaluate all information used,⁴⁷ (2) these biologists must prefer primary sources wherever possible,⁴⁸ (3) they must also seek out and objectively evaluate data that conflicts with the agency's position on the advisability of the listing⁴⁹ and (4) the agency must obtain peer review by "three appropriate and independent specialists" for all listing proposals.⁵⁰ Although these procedures generally coincide with those of the scientific method, it is worth noting that the agencies have not relinquished any discretion here. The scientists are either agency biologists or, in the case of the three mandatory peer reviews, specialists hand-selected by the agency. In addition to selecting the peer reviewers, the agency is also free to choose not to follow their advice, though it does have to include a summary of their views in the final rule.⁵¹

As noted above, the status review results in one of three possible findings. A negative finding—either not warranted or warranted but precluded—is subject to immediate judicial review.⁵² A warranted finding leads to the administrative rulemaking process before listing, and is thus not a final agency action subject to review.⁵³ Finally, if the agency does not take action within the required time limits, citizens can sue to compel agency action.⁵⁴

Once an action is deemed warranted, a final proposed listing regulation is published,⁵⁵ and citizens have forty-five days to request a hearing.⁵⁶ The public has sixty days to comment on the

46. Kevin Cassidy, *Endangered Species' Slippery Slope Back to the States: Existing Regulatory Mechanisms and Ongoing Conservation Efforts Under the Endangered Species Act*, 32 ENVTL. L. 175, 188 (2002).

47. Notice of Interagency Cooperative Policy on Information Standards Under the Endangered Species Act, 59 Fed. Reg. 34,271 (July 1, 1994).

48. *Id.*

49. *Id.*

50. Notice of Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities, 59 Fed. Reg. 34,270 (July 1, 1994).

51. *Id.*

52. 16 U.S.C. § 1533(b)(3)(C)(ii).

53. James C. Kilbourne, *The Endangered Species Act Under the Microscope: A Closeup Look From a Litigator's Perspective*, 21 ENVTL. L. 499, 513 n.55 (1991).

54. 16 U.S.C. § 1540(g).

55. *Id.* § 1533(b)(3)(B).

56. *Id.* § 1533(b)(5)(E); 50 C.F.R. § 424.16(c)(3).

proposed listing,⁵⁷ and the final published rule includes a review of these comments, summaries and explanations of any data used, and “a summary of factors affecting the species.”⁵⁸ The listing is to take effect no less than thirty days after the publication of the final rule, and no less than ninety days after it was formally proposed.⁵⁹

C. *Lock, Stock, and Barrel: The Benefits of Getting Past the Velvet Rope*

Although the listing process is somewhat broken, in the event that a species is lucky enough to make it through, the ESA has much to offer. It is because of the extensive protections offered these species that the ESA is so often called the “pit bull” of environmental legislation.⁶⁰ This view, of course, ignores the fact that these generous protections are exceedingly difficult to come by, resulting in a statute with far duller teeth. In any event, the protective portion of the ESA is quite powerful, which is why the listing process is so incredibly important.

The first thing the agency must do upon listing a species is to designate critical habitat to allow that species some living space.⁶¹ The listing then “triggers the duty to prepare a recovery plan; the duty to conserve the species; the duty to consult; the duty to ensure that federal action is not likely to ‘jeopardize’ listed species or adversely modify critical habitat; and a prohibition on ‘taking’ listed species.”⁶² The following is a slightly more detailed description of the two most key protective sections of the ESA: the section 7 consultation requirement and the section 9 take prohibition.

57. 50 C.F.R. § 424.16(c)(2).

58. *Id.* § 424.18(a).

59. *Id.* § 424.18(b)(1)-(2).

60. See, e.g., George Cameron Coggins, *An Ivory Tower Perspective on Endangered Species Law*, 8 NAT. RESOURCES & ENV'T 3, 3 (1993); Oliver A. Houck, *The Endangered Species Act and Its Implementation by the U.S. Departments of Interior and Commerce*, 64 U. COLO. L. REV. 277, 279 (1993); Robert D. Thornton, *Searching for Consensus and Predictability: Habitat Conservation Planning Under the Endangered Species Act of 1973*, 21 ENVTL. L. 605, 605 (1991); Steven P. Quarles, *The Pit Bull Goes to School*, 15 ENVTL. F., Sept.-Oct. 1998, at 55; Timothy Egan, *Strongest U.S. Environment Law May Become Endangered Species*, N.Y. TIMES, May 26, 1992, at A11.

61. 16 U.S.C. § 1533(a)(3)(A)(i).

62. Laurence Michael Bogert, *That's My Story and I'm Stickin' to It: Is the "Best Available" Science Any Available Science Under the Endangered Species Act?*, 31 IDAHO L. REV. 85, 96 (1994) (internal citations to the statute omitted).

Section 7 requires all federal agencies to ensure that the actions they carry out, fund or authorize (such as by granting permits to private individuals) are not likely to jeopardize the continued existence of any listed species or adversely modify any designated critical habitat.⁶³ The action agency accomplishes this via formal consultation with the wildlife agency responsible for the listed species at issue, which includes any species that may be affected by the agency action.⁶⁴ The Secretary must then issue a formal biological opinion determining whether the action is or is not likely to jeopardize the species or adversely modify the critical habitat.⁶⁵ The action agency holds the ultimate responsibility for compliance with the section and is not bound by the biological opinion in determining how to proceed.⁶⁶

Section 9 prohibits any person, public or private, from “taking” a listed species of fish or wildlife.⁶⁷ “Take” is a term of art—and a relatively broad one—encompassing both direct harm to the animals and indirect harm through habitat alterations that injure the animals.⁶⁸ “Section 9 imposes extraordinarily broad liability, particularly in comparison to the laws that preceded it.”⁶⁹ The ESA directly entitles endangered species to this protection, while threatened species can only obtain section 9 protection via regulations.⁷⁰ All threatened species (with limited exceptions) governed by FWS have this coverage,⁷¹ and NMFS provides it case-by-case to individual species.⁷²

III.

DOOMED FROM THE START: HISTORY OF A FLAWED AND DAMAGED LISTING SYSTEM

After several decades with an inadequate process for listing decisionmaking, the ESA has developed quite a checkered history. Beginning with an unclear statutory directive, followed by immense political pressures on administrations unwilling or un-

63. 16 U.S.C. § 1536(a)(2).

64. 50 C.F.R. § 402.14(g)(4).

65. 16 U.S.C. § 1536(b)(3)(A).

66. *Sierra Club v. Froehlike*, 534 F.2d 1289, 1303-04 (8th Cir. 1976); 50 C.F.R. § 402.15.

67. 16 U.S.C. § 1538(a)(1).

68. *Id.* § 1532(19).

69. Holly Doremus, *The Purposes, Effects, and Future of the Endangered Species Act's Best Available Science Mandate*, 34 ENVTL. L. 397, 405 (2004).

70. 16 U.S.C. § 1533(d).

71. 50 C.F.R. § 17.31 (1995).

72. 50 C.F.R. § 223.201 to 223.205.

ble to come up with a well-organized listing plan, the candidate species backlog has continually increased. This Part reviews what is wrong, finding that the listing system was both initially flawed and then further damaged over time.

A. *A Poorly Articulated Directive: Ambiguity and Excessive Discretion*

The well-meaning and passionate goals of the ESA were ill-fated from the start. In directing the agencies to list species, the ESA uses ambiguous language, without strict definitions for the most key terms. The agencies are to list species as either "threatened" or "endangered" on the basis of the "best science available," but none of these terms have any sort of universal meaning. Indeed, the listing requirement can barely be deemed to have an "intelligible principle," as required to maintain its constitutionality.⁷³

1. This "Best" is Better Than What, Exactly?

"Best" is a purely relative term. It connotes no actual quality of its own, but is merely better than everything else similarly defined, assuming there is anything else. "'Best' . . . obviously does not mean good, reliable, conclusive, adequate or accurate. It means better than something worse, which could be and obviously is sometimes—bad."⁷⁴ Courts have been reticent to analyze the meaning of this "best science" requirement, resting on the powerful combination of APA arbitrary and capricious review and Chevron deference.⁷⁵ As a result, "the listing process has become tautological: the science is adequate to support a listing decision under section 4 if the Secretary" deems it so.⁷⁶

2. How Endangered is Endangered? How Threatened is Threatened?

In determining the degree of vulnerability a species faces, there is no scientifically accepted biological definition for either

73. See *J.W. Hampton, Jr., & Co. v. U.S.*, 276 U.S. 394, 409 (1928) ("If Congress shall lay down by legislative act an intelligible principle to which the person or body authorized to fix such rates is directed to conform, such legislative action is not a forbidden delegation of legislative power.").

74. Robert E. Gordon, Jr., *When the Best Available Data is B.A.D., The Data Error Plague*, NWI RESOURCE, Summer 1993, at 7 (expressing concern that species are wrongly listed due to bad data and citing to delistings for support of this theory).

75. Bogert, *supra* note 62, at 140.

76. *Id.*

“threatened” or “endangered.”⁷⁷ In everyday unscientific usage they actually have very similar meanings, which involve some kind of exposure to danger.⁷⁸ As a policy matter, these terms suggest some threshold of risk, indeed two distinct thresholds, but the ESA is silent as to where these thresholds lie.⁷⁹ Given that every species on earth faces some risk of extinction at some point in the future, these words are meaningless without further explanation.

Some further explanation is indeed supplied. A species is endangered if it “is in danger of extinction throughout all or a significant portion of its range,”⁸⁰ and it is threatened if it “is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.”⁸¹ Looking first at the definition of “endangered,” one can see that it suffers from the same ambiguity as the term alone—all species are in danger of becoming extinct at some point.⁸² The only clarity this definition provides is the particular danger with which the term “endangered” is concerned: extinction. This is better than nothing, but not much.

The definition of “threatened” doubles this ambiguity. First, the statute is concerned with species that are “likely” to become endangered. The statute gives no indication of *how* likely endangerment must be, a fact which only adds to the ambiguity of the term “endangered,” which, as discussed earlier, has no set meaning. Further, the term “foreseeable” is also ambiguous. The only thing that is fairly clear about the degree of threat needed for each category is that listed “species must face more than a de minimis threat,” and those listed as endangered “should face a greater or more immediate threat than threatened ones.”⁸³

3. That’s a Lot of Discretion

So how are the Services to determine which species to list in which category, based on what standards, and requiring how much scientific data? These are completely open questions left

77. Kristin Carden, *Bridging the Divide: The Role of Science in Species Conservation Law*, 30 HARV. ENVTL. L. REV. 165, 200 (2006).

78. Doremus, *supra* note 19, at 1113.

79. *Id.*

80. 16 U.S.C. § 1532(6).

81. *Id.* § 1532(20).

82. Indeed, all species *will* become extinct at some point, as surely as death and taxes.

83. Doremus, *supra* note 19, at 1117.

entirely to the agencies to decide. Given that the essential functioning of the statute rests on these questions, this leaves the agencies with significant—arguably legislative—power and discretion.

Agencies are far less democratically accountable than Congress, and are generally kept in check by the judiciary, but courts need standards against which to check the agencies' actions. Without clear direction from a statute as to exactly what methods an agency is expected to implement, the only kind of error a court can look for is that of extreme misbehavior.⁸⁴

B. *The Fallibilities of Science in Relation to the ESA*

There are some additional flaws with the statutory text relevant to this discussion, but not entirely appropriate for inclusion in the preceding subsection because ambiguity is not the source of these problems. Indeed, Congress was quite clear on this point: listing decisions are to be based *solely* on the best available science.⁸⁵ This strictly science mandate is problematic in at least two notable ways, both of which involve science's weaknesses as a policy machine. First, as many other scholars have pointed out,⁸⁶ science cannot make policy decisions, so questions which retain any elements of policy cannot be answered solely on the basis of science. Second, science is inherently uncertain, and certainty is often demanded in legal settings. The ESA lacks any direction as to how the agencies and the courts are to deal with uncertainty.

84. J.B. Ruhl, *The Battle Over Endangered Species Act Methodology*, 34 ENVTL. L. 555, 579 (2004) ("The fewer methodological constraints a statute places on an agency, the less opportunity a court has to measure the agency's use of professional judgment against anything other than a test for behavior that is obviously the result of blind ambition or sheer arrogance."); see also Doremus, *supra* note 19, at 1124 ("The lack of openly-discussed standards for determining whether species are endangered, threatened, or ineligible for listing effectively leaves the agencies free to adopt virtually any decision with virtually no discussion and little fear of judicial reversal.").

85. 16 U.S.C. § 1533(b)(1).

86. See, e.g., Katherine Renshaw, *Leaving the Fox to Guard the Henhouse: Bringing Accountability to Consultation Under the Endangered Species Act*, 32 COLUM. J. ENVTL. L. 161, 174-75 (2007); Carden, *supra* note 77 at 202; Cary Coglianese & Gary E. Marchant, *Shifting Sands: The Limits of Science in Setting Risk Standards*, 152 U. PA. L. REV. 1255, 1257-58 (2004); Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1628 (1995).

1. Science Cannot Determine Policy

Although the language of the ESA suggests that the standards for making decisions about listing, jeopardy, etc., are to be purely scientific, analyses of ESA implementation show clearly that trade-offs among conflicting objectives must be made in almost every instance.⁸⁷

In light of the unambiguously strict mandate, "Congress has forced the listing agencies into a 'science charade,' in which they must pretend to make non-scientific decisions entirely on the basis of science."⁸⁸ The task to which Congress has set the agencies is impossible to implement, as conservation choices cannot be made by science alone without injecting policy considerations.⁸⁹ The result is that agencies are forced to do their decisionmaking in private, without revealing their prohibited policy considerations, which renders their already unchecked power even less accountable.

The ambiguities in the statute leave significant policy choices unmade: How much risk is our society willing to take that species will be lost forever? How many sacrifices are people willing to make to prevent this? More specifically, how endangered does a species have to be to get listed in either category? These questions have not been generally answered anywhere. As pure policy questions, they certainly cannot be answered scientifically.

Scientists have been trying to get this across as well, complaining: "Conservationists have commonly confused the task of assessing extinction risk with that of setting priorities for conservation action. Assessing the risk of extinction is a purely biological problem," whereas setting conservation priorities requires more subjective considerations.⁹⁰ As one biologist astutely pointed out, the passing of the buck to "science" has led the agencies to make these policy decisions separately for each species, which makes for very unscientific policy:

The threshold at which a species is defined as endangered, as Mark Shaffer (1981) has pointed out, is essentially a policy rather than a

87. NATIONAL RESEARCH COUNCIL, SCIENCE AND THE ENDANGERED SPECIES ACT 134 (1995) (internal citations omitted).

88. Doremus, *supra* note 19, at 1035 (internal citation omitted).

89. *Id.* at 1056.

90. Holsinger, *supra* note 7, at S-10; see also Timothy H. Tear et al., *How Much is Enough? The Recurrent Problem of Setting Measurable Objectives in Conservation*, 55 *BIOSCIENCE* 835, 838 (2005) ("The job of scientists is to make clear exactly what numerical objective is required to reach an associated goal. It is society's choice to revisit and modify conservation goals in light of scientific information.").

science decision. Such policy decisions are made on a species-by-species basis, leading to decisions of endangerment that are not equitable across species. Courts, lacking scientific knowledge and specific biological criteria with which to judge decisions, typically defer to the expertise of the implementing agency.⁹¹

There is no serious question that policy decisions remain that go beyond the text of the ESA, yet none of the branches of government have yet attempted to deal with these choices. Absent clear criteria for determining whether a species is threatened, endangered, or neither, the agencies will continue to reinvent the values wheel for each and every listing decision. Even with the best of intentions, there is no way to achieve any consistency with this system.

2. Nothing is Certain: Deal With It

I promise nothing complete; because any human thing supposed to be complete, must for that very reason infallibly be faulty.

Herman Melville, *Moby Dick*

A fundamental difference between science and policy is the differing expectation of certainty. Scientists work *toward* certainty, never expecting to reach it, but hoping to get as close as possible to that elusive goal.⁹² Policymakers, on the other hand, tend to prefer more absolute information upon which to make their decisions. They seek a perfectly understandable world that scientists know cannot exist. When it comes to implementing the ESA, there will rarely be enough data to be certain regarding a species vulnerability status, yet we must move ahead with the process anyway.⁹³ The agencies must decide quickly, often before they are able to gather all relevant information on even the best-studied species, if there is to be any hope of saving those in need of help.⁹⁴

91. Andrea Easter-Pilcher, *Implementing the Endangered Species Act*, 46 *BIO-SCIENCE* 355, 362 (1996).

92. See Dennis D. Murphy & Barry D. Noon, *Coping with Uncertainty in Wildlife Biology*, 55 *J. WILDLIFE MGMT.* 773, 775-76 (1991) (describing scientific knowledge as a building constantly being bombarded with data bricks that reveal its weak spots, which are reinforced before the building is then further bombarded, eventually revealing fewer and fewer weak points).

93. Carden, *supra* note 77, at 203.

94. Sasha Gennet, *New ESA Amendments: Sound Science or Political Shell Game?*, 54 *BIO-SCIENCE* 1070 (2004) ("ESA decisions about endangered species are necessarily made before all the pertinent information on even well-studied species can be compiled.").

The courts have also recognized this situation, requiring the agencies to move forward in spite of incomplete data, stating that they “must rely on even inconclusive or uncertain information if that is the best available at [decision] time.”⁹⁵ Indeed, simply by invoking science at all, Congress implicitly endorsed reliance on uncertain information, because “[i]t is inevitable, given the nature of science and the nature of species conservation, that agencies must often act with an incomplete understanding.”⁹⁶ It is clear that the agencies must act in spite of missing or uncertain data, but they have yet to adequately deal with the situation.

Dealing with uncertainty is no passive thing—it is not about acceptance, but rather actions that must be taken to address it. The response to uncertainty needs to move from avoidance to accommodation.⁹⁷ In order to work toward more consistent and objective decisionmaking, “lawmakers must understand and provide for the data gaps and uncertainties that characterize science in general, and ecosystem-based science in particular.”⁹⁸ One method of actually reducing uncertainty without additional data is to set well-defined criteria. As one biologist has noted, “such a methodology would aid in reducing uncertainty and allow for more equitable and objective comparison of species by their degree of vulnerability.”⁹⁹

Not only is uncertainty acceptable in science in general, but it is especially unavoidable in environmental decisionmaking. Consider, for example, the fact that the ESA listing process comes with deadlines¹⁰⁰ and requires no independent agency research to add to the existing data pool.¹⁰¹ Given that the data has been so expressly limited (most of all by the time constraints), requiring a

95. *Southwest Ctr. for Biological Diversity v. Norton*, 2002 WL 1733618 at *9 (D.D.C. 2002); *see also* *Defenders of Wildlife v. Babbitt*, 958 F. Supp. 670, 680 (D.D.C. 1997) (the ESA’s best available science mandate “require[s] far less than ‘conclusive evidence.’”).

96. Carden, *supra* note 77, at 189.

97. Doremus, *supra* note 19, at 1036 (“Instead of pretending that uncertainty can be avoided, we must learn how best to factor it into decisions.”).

98. Carden, *supra* note 77, at 169.

99. Easter-Pilcher, *supra* note 91, at 355.

100. This is by necessity, as we do not have an indefinite time to make these decisions regardless of the legal limits.

101. *Sw. Ctr. for Biological Diversity*, 2002 WL 1733618 at *9.

certain quantity of data in order to list species would effectively put the brakes on the whole process.¹⁰²

But what of the 95% certainty expectation so often observed in scientific literature? Is that scientific? And if the scientists expect it, shouldn't the agencies apply it in keeping with the best available science? Actually, while many peer-reviewed journals set the bar at 95% certainty for scientific conclusions, even that is an arbitrarily determined figure with no scientific basis.¹⁰³ Moreover, the D.C. Circuit has made clear that this certainty benchmark does not apply to the world of environmental regulation:

While awaiting [95%] certainty may constitute the typical mode of scientific behavior, its appropriateness is questionable in environmental medicine, where regulators seek to prevent harm that often cannot be labeled "certain" until after it occurs. . . . Where a statute is precautionary in nature, the evidence difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge . . . we will not demand rigorous step-by-step proof of cause and effect.¹⁰⁴

In sum, the strictly science mandate requires the use of uncertain data, which in turn requires the agencies to articulate a plan for how to work with uncertainty and gaps in data. This unaddressed matter and the policy decisions regarding risk aversion are both weak spots in the ESA listing scheme as it stands.

C. *Turning Lemons into Lemons: The Sloppy Application of Poor Instructions*

The agencies have not only failed to do anything to improve upon the mistakes of Congress in drafting the ESA, they have actively made it worse with their haphazard approach to implementing the statute. Instead of attempting to clarify the definitions of "endangered" and "threatened," the listing regulations simply repeat the very same ambiguous language used in the stat-

102. See Daniel J. McGarvey & Brett Marshall, *Making Sense of Scientists and "Sound Science": Truth and Consequences for Endangered Species in the Klamath Basin and Beyond*, 32 *ECOLOGY L.Q.* 73, 108-09 (2005).

103. See DAVID S. MOORE, *STATISTICS: CONCEPTS AND CONTROVERSIES* 416-18 (3d ed. 1991).

104. *Ethyl Corp. v. EPA*, 541 F.2d 1, 25, 28 (D.C. Cir. 1976). The term "precautionary" in this quote does not likely refer to the "precautionary principle," a philosophical approach of applying liberal environmental protections at greater economic expense in order to be extremely risk-averse. Rather, I would posit that Judge Wright is referring to statutes that are protective against future harms, and the ESA clearly is such a statute.

ute.¹⁰⁵ The little additional guidance FWS provides is an apparent requirement in practice that “endangered” species be in “imminent” danger of extinction,¹⁰⁶ but it provides no elucidation of “imminent,” which thus becomes just another equally ambiguous standard.

“Not only do the agencies refuse to formulate explicit listing standards, they offer no apology for the apparent inconsistency of their decisions.”¹⁰⁷ There is little relationship between listing status and vulnerability: Many unlisted species are in great danger of extinction while those species that are listed are not always the most vulnerable.¹⁰⁸ In addition, no standard exists even to distinguish threatened from endangered,¹⁰⁹ so the agencies are free to pick whichever they prefer, given the political climate of the moment.¹¹⁰

A study that reviewed the complete history of listing decisions through 1996 found no evidence of consistent standards for identifying species as endangered or threatened.¹¹¹ This study found that listed mammals consistently had higher remaining populations than did other species in the same listing category, demonstrating that mammals were more likely to be listed than birds, reptiles, or fish.¹¹² The study further revealed that the language used to justify listing decisions had inconsistent meanings, depending upon the type of species.¹¹³ For example, the use of the terms “rare” and “extremely rare” did not correlate with population data.¹¹⁴ In addition, the study revealed that the final listings often failed to include available biological data regarding both “historic and current distribution, population, habitat, reproductive potential, and forage and/or prey information as well as in-

105. 50 C.F.R. § 424.02(e), (m).

106. See, e.g., Threatened Status for the Louisiana Black Bear and Related Rules, 57 Fed. Reg. 588, 592 (Jan. 1992) (“Endangered status is not chosen because the threats are not believed to place the Louisiana black bear in imminent danger of extinction.”).

107. Doremus, *supra* note 19, at 1124.

108. Holsinger, *supra* note 7, at S-10.

109. Doremus, *supra* note 19, at 1123.

110. See *infra* notes 119-130 and accompanying text.

111. Easter-Pilcher, *supra* note 91, at 359.

112. *Id.*

113. *Id.*

114. *Id.*

formation regarding past and future impact from humans, exotics, pollution, disease, and [other] organisms."¹¹⁵

Not only are listing decisions inconsistent, they are also intentionally delayed, taking advantage of the listing bottleneck created by the "warranted but precluded" category in order to increase agency discretion.¹¹⁶ The category "has become a black hole for unlisted endangered species," some of which spend decades there.¹¹⁷ Far more species are designated as warranted but precluded than are actually listed.¹¹⁸ It is a horrible situation, but one that works quite well for the agencies, as the more species they list, the more actively involved they must become in the conservation of these species.¹¹⁹ The Department of Interior has made this very argument in objecting to increased funding for the listing process, calling listing a "lower priority activity" that simply leads to greater funding needs for recovery, consultation, and the like.¹²⁰

D. *Plenty of Blame to Go Around: The Intense Political Pressures on the Listing Process*

The significant agency discretion and complete lack of objective standards has opened the floodgates for political lobbying from interest groups of all ideological persuasions. Political pressure frequently inhibits the listing process.¹²¹ For the more controversial species, "citizen petitions are required to begin that process and frequently litigation is necessary to complete it."¹²² This results in most species, out of those that make it at all, reaching the list at an extremely late stage of their decline.¹²³ And those are the lucky ones. "Faced with political opposition and threats of lawsuits from property owners and other economically interested parties, the FWS sometimes finds that the simplest course is to avoid making the listing decision altogether."¹²⁴

115. *Id.* (referring to data available in the set *Mammals of the World*, by Nowak & Paradiso).

116. Houck, *supra* note 60, at 296.

117. *Id.* at 286.

118. *Id.* at 296.

119. *Id.* at 293-94.

120. *Id.*

121. Doremus, *supra* note 69, at 402.

122. *Id.*

123. *Id.* at 403.

124. Barton H. Thompson, Jr., *The Endangered Species Act: A Case Study in Takings and Incentives*, 49 STAN. L. REV. 305, 312 (1997) (noting that the FWS can

Unfortunately, this decision is impossible to avoid, as failure to list a dying species is itself a very meaningful decision.

Repeated investigations by the General Accounting Office have consistently found that listing decisions are more politically driven than based on science.¹²⁵ Particularly strong evidence of this comes from a study published in 1999, which found “that public opposition and support can substantially slow and hasten, respectively, the progress of candidate species through the parts of the listing process most directly under the agency’s control.”¹²⁶ The study found that the listing process was sped up by either a supporting petition (direct public pressure) or the presence of a pro-environment congressperson from the region in which the species lives. On the other hand, the listing process was significantly slowed down by either direct public opposition or the presence of a pro-development congressperson from the region in which the species lives.¹²⁷ Interestingly, the study found that simultaneous pressure from both sides could cause some initial delay (especially where opposition dominates over support) but generally resulted in speeding up the process, as significant additional support often materialized in response to early opposition.¹²⁸ This may sound like a net benefit to the species; however, case-by-case decisionmaking driven by politics deprives endangered species of fair and meaningful protection.

As one commentator has noted, “[e]ven relatively uncontroversial decisions seem sensitive to the agencies’ perception of the direction of the political winds.”¹²⁹ In an apparent testing of the political waters, FWS has proposed species for listing as threatened and—with no change in the data but the notable absence of opposition to the listing—went on to list the species as endangered.¹³⁰

easily postpone the decision indefinitely by either a finding of inadequate information or a determination that listing is warranted but precluded).

125. See, e.g., U.S. General Accounting Office, *Endangered Species: Factors Associated with Delayed Listing Decisions* (1993); U.S. General Accounting Office, *Endangered Species: Spotted Owl Petition Evaluation Beset by Problems* (1989); U.S. General Accounting Office, *Endangered Species: A Controversial Issue Needing Resolution* (1979).

126. Amy Whritenour Ando, *Waiting to be Protected Under the Endangered Species Act: The Political Economy of Regulatory Delay*, 42 *J.L. & Econ.* 29, 29 (1999).

127. *Id.* at 47-48.

128. *Id.* at 50.

129. Doremus, *supra* note 19, at 1125.

130. *Id.* at 1125-26.

A major problem with this politically driven system is that it heavily favors charming species over those that may be more valuable to their ecosystems,¹³¹ abandoning the ESA's goal of protecting all species equally on the basis of threat alone. Although they express an ethical interest in protecting biodiversity, "most Americans remain fixed on a narrow segment of the biotic community—largely vertebrate animals, particularly creatures of special historical, cultural, and aesthetic significance."¹³² This is truly as far as it gets from scientific reasoning. As the GAO noted in its 1989 report on the spotted owl fiasco, citing the high emotions and economic interests involved in listing species under the ESA, FWS "needs to be able to demonstrate that its review process and ultimate decisions have been as thorough, independent, and objective as possible."¹³³ Indeed, a clear and objective process is the only way out of this political quagmire. This leads to the question: how do we get there?

IV.

THERE IS HOPE: SETTING QUANTITATIVE CRITERIA LEADS TO GOOD POLICY, GOOD SCIENCE, AND LESS CONFUSION

There are many great reasons to set quantitative criteria for each listing category, the most important of which are consistency, efficiency, transparency and legitimacy. It is important to note that criteria-setting is not the same thing as requiring *proof* that a species meets those criteria, for as discussed above, absolute certainty has no place in environmental regulation. Rather, quantitative criteria are preset standards for species vulnerability, standards which can be met probabilistically on the basis of incomplete information, such as through modeling. These numerical values apply to various data sets, such as population changes, and are discussed in more detail *infra*. Not only is it advisable to set quantitative criteria, but there is a plausible argument that this method is itself the best available science. Indeed, scientists worldwide have come together to develop the criteria used for the IUCN Red List of species at varying levels of vulner-

131. Neither of these is a factor in the ESA, but at least the latter has some relationship to the ultimate goal of preserving biodiversity.

132. STEPHEN R. KELLERT, *THE VALUE OF LIFE: BIOLOGICAL DIVERSITY AND HUMAN SOCIETY* 62 (1996).

133. U.S. General Accounting Office, *Endangered Species: Spotted Owl Petition Evaluation Beset by Problems*, at p. 2 (1989).

ability. After decades of study went into preparing the IUCN criteria, it would be wise for us to draw from this work—at least methodologically—in setting our own.

A. *Setting Quantitative Criteria Will Improve and Legitimize the Listing Process*

Most advocates for change in the ESA listing criteria base their suggestions on what will be most likely to result in their desired outcome, whether that be fewer or more generous listings.¹³⁴ Those with an economic interest in reducing the number of species listed generally advocate for requiring more scientific data in order to list a species. They often rest this argument on the combination of the strictly science mandate and the traditional scientific method, which tests a hypothesis with a strong preference for the null hypothesis (that the hypothesis is false).¹³⁵ This simply does not work in the ESA context. “To concurrently employ both ‘purely scientific’ and ‘ESA compliant’ standards in the face of substantial uncertainty will, at times, be impossible, because the two doctrines have been fashioned to prevent different types of errors.”¹³⁶ Specifically, the scientific method strongly favors the null hypothesis in order to prevent false positives (called “Type I error”), while the ESA directs the agencies to list *all* species that are endangered or threatened, thus requiring avoidance of false negatives (called “Type II error”).¹³⁷ Requiring this traditional style of peer-reviewed scientific method “would render ESA decision making more like Ph.D. dissertation defenses,”¹³⁸ resulting in very poor protection for the many vulnerable species whose cases cannot be proven with the requisite certainty.

The “precautionary principle,” advocated by some environmental groups seeking to increase listings, can be equally unrealistic, depending upon the degree of precaution proposed. The approach I critique here is one which would resolve all uncer-

134. Ruhl, *supra* note 84, at 563 (“What I find in the battle over ESA methodology, however, is mostly rhetoric, intended to disguise efforts to shift the substantive playing field.”).

135. McGarvey & Marshall, *supra* note 102, at 100 (“Statistical inference does, however, confer a categorical advantage to the null hypothesis; anytime the scientist fails to accumulate sufficient proof of the alternative, she is obligated, under the tenets of peer review, to defer to the null hypothesis.”).

136. *Id.* at 104.

137. *Id.*

138. Ruhl, *supra* note 84, at 560-61.

tainty in favor of listing a species, even where the stronger probability suggests that the species would likely survive for the foreseeable future without ESA protection.¹³⁹ This involves effectively flipping the scientific method over, such that the burden of its high demand for proof is shifted in favor of listing, requiring opponents of listing to prove the species is secure. This method "would wreak economic havoc under the ESA and . . . would severely reduce the statute's legitimacy from its already tenuous status."¹⁴⁰ This is the last thing anybody needs, *especially* those who support the ESA's continued strength.

Setting quantitative criteria suffers from neither of these ailments. As a theoretical matter, setting criteria is a completely separate thing from designating the degree of evidentiary proof required to meet those criteria. As a practical matter, setting quantitative criteria tends to render the process more objective, requiring administrators to treat like cases alike through the use of "reasonably definite standards."¹⁴¹ "Striving for consistency from case to case is essential for equal justice."¹⁴² Setting quantitative criteria promotes fairness among species up for consideration, preventing the ad hoc application of the above-described philosophies. "Any federal regulatory policy must be uniform in its application, or it will be perceived as unfair."¹⁴³ That is exactly how both sides perceive the ESA's current implementation.

The ESA is in desperate need of increased political legitimacy, which adherence to consistent standards would provide. In a typically unscientific move, FWS developed a system that favored species according to life-form,¹⁴⁴ in spite of the fact that there is no biological justification for treating vertebrates differently from invertebrates or plants.¹⁴⁵ Congress immediately ad-

139. See *id.* at 561. Sometimes the term "precautionary principle" is used to promote acceptance of uncertainty in available data (for example in the letter of 300 scientists opposing the "sound science" bills), rather than requiring high degrees of certainty in order to regulate to protect the environment. This view is in line with my immediately preceding discussion and is not here criticized.

140. *Id.* at 562.

141. KENNETH CULP DAVIS, *DISCRETIONARY JUSTICE* 219 (1969).

142. KENNETH CULP DAVIS, *ADMINISTRATIVE LAW TREATISE* 116 (2d ed. 1978).

143. Emily Hartshorne Goodman, *Defining Wetlands for Regulatory Purposes: A Case Study in the Role of Science in Policymaking*, 2 *BUFF. ENVTL. L.J.* 135, 137 (1994).

144. See 50 C.F.R. § 424 (1981).

145. COMMITTEE ON SPECIFIC ISSUES IN THE ENDANGERED SPECIES ACT, NAT'L RESEARCH COUNCIL, *SCIENCE AND THE ENDANGERED SPECIES ACT* 53 (1995). NATIONAL RESEARCH COUNCIL, *SCIENCE AND THE ENDANGERED SPECIES ACT* 55 (1995).

dressed this with its 1982 amendment forbidding discrimination according to life-form,¹⁴⁶ yet the agencies continue to treat species differently on this basis. For example, different methods of measurement are used for measuring reproduction in different classes of species (such as eggs per clutch, clutches per year, young per pair, litter number, productivity), rather than a measurement that could apply across taxa, such as realized natality.¹⁴⁷ “If the agency were mandated to address a set of documented, objective, biological criteria within and across classes, and if these criteria were then made available to the scientific community, the courts, and the public, then ‘arbitrary or frivolous’ listing actions might be effectively eliminated.”¹⁴⁸ In addition to increasing fairness among classes of species, consistent standards would prevent the phenomenon of “shifting baseline syndrome,” in which species further along in their decline are met with lower expectations for population levels, and thus increase fairness among species with different levels of existing human interference.¹⁴⁹

The use of clearly defined criteria is not only more consistent, it is also far more efficient than determining individual expectations of viability for each and every species. This long debate over each separate listing is the cause of the enormous backlog of candidate species. “Until the backlog in listing species is addressed, developers will continue to be surprised by the discovery of ‘new’ species, while environmentalists look at a mounting toll of unlisted species that have entirely disappeared.”¹⁵⁰ In addition, much time is wasted debating how to prioritize species for consideration (e.g., based on degree of threat or potential for recovery)¹⁵¹ or on how best to monitor the species languishing in the waiting areas,¹⁵² time that could be invested in a plan to get rid of the backlog altogether.

Delays have not only led to this infamous backlog, but also directly affected the outcome of individual listing decisions. In

146. Endangered Species Act Amendments of 1982, Pub. L. No. 97-304, 96 Stat. 1411.

147. Easter-Pilcher, *supra* note 91, at 361. “Realized natality” refers to the birth-rate under given ecological conditions.

148. *Id.* at 362.

149. See Tear et al., *supra* note 90, at 836 (discussing this phenomenon in the context of successive generations of wildlife managers resetting the baseline according to the conditions at the start of their careers).

150. Houck, *supra* note 60, at 281.

151. See *id.* at 295 n.126.

152. See *id.* at 296 n.129.

addition to discovering that political influences affect timing for listings,¹⁵³ Amy Ando's study also found that delay was correlated with outcome.¹⁵⁴ Delay made it more likely for a species to be "demoted" to an earlier stage in the process,¹⁵⁵ and less likely to ever be "promoted" to the next stage in the process.¹⁵⁶ Delay can also "enable private citizens and firms to take preemptive irreversible actions (harvesting trees, developing land) on the land that will be protected once the listing is made."¹⁵⁷ Of course, Ando also found that delay increased the likelihood that a species would go extinct while awaiting decision.¹⁵⁸ Moreover, even if a species does eventually get listed, "the longer the ESA waits to protect a species, the worse the species' chances for recovery."¹⁵⁹

Opponents of setting standard listing criteria raise two arguments: that doing so would be a clear articulation of policy and thus violate the strictly science mandate, and that a "one-size-fits-all" approach is incompatible with science because different species function differently.¹⁶⁰ The first point misinterprets the statutory text. The ESA directs the Secretary to "make determinations required by subsection (a)(1) solely on the basis of the best scientific and commercial data available to him after conducting a review of the status of the species . . ."¹⁶¹ This text refers both to the individual listing subsection and to scientific data available in relation to the review of an individual species. The "determinations" it speaks of are clearly individual listing determinations; it does not affect policies to general listing issues.¹⁶²

Setting across-the-board criteria is not an individual listing determination subject to this strictly science requirement, but

153. See *supra* notes 124-26 and accompanying text.

154. Ando, *supra* note 126, at 36.

155. *Id.* at 36, 45.

156. *Id.* at 44-45 ("The promotion hazard seems to rise to a peak around 2.5 years and taper off after that; after about 6 years there is almost no probability of being promoted.").

157. *Id.* at 36.

158. *Id.*

159. Gennet, *supra* note 94, at 1070.

160. See Kevin Eldridge, *Whale for Sale?: New Developments in the Convention on International Trade in Endangered Species of Wild Fauna and Flora*, 24 GA. J. INT'L & COMP. L. 549, 561 n.62 (1995).

161. 16 U.S.C. § 1533(b)(1)(A).

162. Since this text has been included in the ESA, there have been many policies promulgated to address general listing issues, none of which has been struck down on the basis of the strictly science mandate. 50 C.F.R. § 424.11 (2008).

rather a formula in which to enter that scientific information. In fact, such criteria would effectively limit the individual listing considerations to those based on science, thereby increasing compliance with the strictly science mandate. As scientists regularly point out, once the criteria are set, analyzing viability against those criteria “is purely a biological problem.”¹⁶³ Setting quantitative criteria takes policymaking out of the day-to-day process.

Further, endangered and threatened are ambiguous terms, thus allowing the agencies to interpret them in any reasonable fashion. This position gains powerful support from *Northwest Ecosystem Alliance v. U.S. Fish and Wildlife Service*, in which the Ninth Circuit granted *Chevron* deference¹⁶⁴ to the agencies’ joint policy that set criteria for listing distinct population segments under the ESA. The court noted that “Congress expressly delegated authority to the Services to develop criteria for evaluating petitions to list endangered species.”¹⁶⁵ Thus, setting quantitative criteria would not violate the strictly science mandate; rather, it would simply be an interpretive step necessary to implement the statute. Once that interpretive step has been taken, it will become far easier to abide by the strictly science mandate in individual listings.

The second argument, which has been raised by FWS among others, that a “one-size-fits-all” approach is incompatible with science because different species function differently, is inapposite. As I will discuss in greater detail in the subpart on IUCN criteria, much of this difficulty can be resolved by setting a variety of criteria that apply according to lifecycles of species, and which encompass the varying ways species begin to exhibit decline. Further flexibility would be possible if it were to become necessary. For example, we could treat the criteria as guidelines that must be followed most of the time, and require strict procedures for explaining any deviation from them. The possibility of such exceptions would enable FWS to address outliers, but the difficulty of making exceptions would strongly discourage the haphazard approach we have now.

163. Holsinger, *supra* note 7, at S-10; see also Eric W. Sanderson, *How Many Animals Do We Want to Save? The Many Ways of Setting Population Target Levels for Conservation*, 56 *BIOSCIENCE* 911 (2006); Tear et al., *supra* note 90, at 835.

164. *Chevron v. Natural Res. Def. Council*, 467 U.S. 837 (1984).

165. *Nw. Ecosystem Alliance v. U.S. Fish and Wildlife Serv.*, 475 F.3d 1136, 1141 (9th Cir. 2007).

For an excellent example of how well this can work, we need look no further than Florida, the state that has been the most willing to embrace the setting of quantitative objectives for wild-life conservation.¹⁶⁶ “The Florida Forever Act of 1999 explicitly recognizes that measurable goals are central to successful conservation programs.”¹⁶⁷ Florida used a series of population viability analyses to determine its criteria for selecting areas of land for conservation.¹⁶⁸ Even when this preset criteria led to the discovery that massive areas of land were needed to meet the objectives, the plans were able to survive the ensuing public outcry.¹⁶⁹ Thanks to a solid foundation, “the objectives remained intact because of the defensibility of the process, independent of perceived feasibility.”¹⁷⁰

Finally, setting quantitative criteria would meet several implicit goals Congress suggested via the ESA’s best available science mandate. Professor Holly Doremus provides the following list of purposes most likely served by the mandate:

First, it could promote substantively more accurate decisions in a context where the legislature could readily conclude that science dominates decision-making needs. Second, it might increase public trust and build political credibility by encouraging the polity to believe that decisions are objectively determined by the evidence, rather than chosen arbitrarily or to serve the particular values of the decision maker. . . . Third, it could affect judicial review of agency decisions, either protecting those decisions from close examination by invoking special deference to agency expertise or inviting more stringent review by providing the courts with an additional standard to enforce.¹⁷¹

Each of these potential purposes is best served by setting objective quantitative criteria. First, it would result in listings that were more accurate across the board by eliminating the many confounding factors discussed above. Second, it would remove the subjectivity that eats away at public trust. Third, it would

166. Tear et al., *supra* note 90, at 843.

167. *Id.*

168. *Id.*

169. *Id.*

170. *Id.*

171. Doremus, *supra* note 69, at 418 (noting that “[t]here is no direct legislative history explaining the ESA’s best available science mandate.”). The list included a fourth possible purpose, not applicable here: “Fourth, it could alter the decision-making process in ways that might be important (to fans or foes of regulation) either for their own sake or because they make a difference in the substance of the ultimate decisions.” *Id.*

significantly strengthen judicial review by providing clear standards for that review. The Supreme Court has held that the best available science standard's "obvious purpose . . . is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise."¹⁷²

B. *Quantitative Criteria IS the Best Available Science*

The classification of the constituents of chaos, nothing less is here essayed. Listen to what the best and latest authorities have laid down.

Herman Melville, *Moby Dick*

Not only would setting quantitative criteria aid in attaining the goals underlying the best available science mandate, this sort of criteria arguably *is* the best available science. Indeed, while this Article is the first in the law review context to focus on the proposal of setting quantitative criteria for ESA listing, the argument is found throughout the scientific literature.¹⁷³ Lawyers and politicians should heed the advice of biologists on this incredibly important regulatory matter.

We hear a lot about the "sound science" movement, which has led to a number of bills proposing tougher scientific-method-like requirements for the scientific data that is needed to *list* a species (but, of course, not to deny listing).¹⁷⁴ As already discussed, such scientific methods are based upon principles inapplicable to the ESA context and require data that rarely exists. Thus, such methods are not "sound" for use in the listing process.¹⁷⁵ The scientists know better—more than 300 of them, including prominent members of the National Academy of Sciences, signed a letter to Congress opposing the "sound science" bills. The scientists noted that the bills would exclude the soundest science for the

172. *Bennett v. Spear*, 520 U.S. 154, 176 (1997).

173. Leah R. Gerber & Lelia T. Hatch, *Are We Recovering? An Evaluation of Recovery Criteria Under the U.S. Endangered Species Act*, 12 *ECOLOGY* 672 (2002); Michael K. Young & Amy L. Harig, *A Critique of the Recovery of Greenback Cutthroat Trout*, 15 *CONSERVATION BIOLOGY* 1575, 1578 (2001); Leah R. Gerber & Douglas P. DeMaster, *A Quantitative Approach to Endangered Species Act Classification of Long-Lived Vertebrates: Application to the North Pacific Humpback Whale*, 13 *CONSERVATION BIOLOGY* 1203, 1204 (Oct. 1999).

174. See, e.g., Sound Science for Endangered Species Act Planning Act of 2002, H.R. 4840, 107th Cong. (2d Sess.) (2002), reintroduced in both houses as Sound Science for Endangered Species Act Planning Act of 2003, H.R. 1662, 108th Cong., and Sound Science for Endangered Species Act Planning Act of 2004, S. 2009, 108th Cong.

175. See generally McGarvey & Marshall, *supra* note 102.

ESA context: population viability analysis and modeling.¹⁷⁶ Discussing this letter with the press, Dr. David Blockstein, a leading conservation biologist, stated that the “scientific methodologies [must be] defined and managed by scientists, [or] they have no credibility.”¹⁷⁷ Fortunately, scientists have collaborated on an excellent methodology for endangered species identification, which I discuss below in the section on IUCN criteria.

“[S]cientists understand that sound science is more of a process than an end point.”¹⁷⁸ Science is not just a set of data, or even the interpretations of that data, but is also procedural, in that it is itself about process.¹⁷⁹ There is no single universal scientific method, but rather various methodologies which apply to varying contexts. Scientists define “sound science” differently than politicians do for the ESA context: “The documented, systematic consideration of a set of well-defined variables and categories within them is a necessary first step in the development of a sound, scientific methodology for making determinations of endangerment.”¹⁸⁰

In Andrea Easter-Pilcher’s study,¹⁸¹ she found that existing listings reflect a significant lack of data and instead rest primarily on general description.¹⁸² Setting quantitative criteria would be an excellent way to work with a lack of data. As she notes, “this lack does not preclude systematic consideration of a set of better-defined variables and categories within them.”¹⁸³ Indeed, this would be a significantly better way to deal with otherwise insufficient data:

The potential use of data-hungry techniques such as population viability analysis fades in light of the high levels of missing data reported in this study. However, it is possible that by consistently addressing definitive biological criteria a computerized ranking algorithm such as classification and regression trees may be devel-

176. Ellen Paul, *Science: The Newest Political Football in the Endangered Species Game*, 52 *BIOSCIENCE* 792 (2002); see also Cat Lazaroff, *Species Protection Law Key to Grizzly Survival*, Environment News Service, July 23, 2002, available at <http://www.ens-newswire.com/ens/jul2002/2002-07-23-06.asp>.

177. *Id.*

178. McGarvey & Marshall, *supra* note 102, at 75.

179. Doremus, *supra* note 19, at 1057-58.

180. Easter-Pilcher, *supra* note 91, at 359.

181. See *Id.* (discussing her study’s findings regarding FWS listing mammals more easily than other species).

182. *Id.* at 357.

183. *Id.*

oped and used to evaluate, compare, and rank the status of different species.¹⁸⁴

While we cannot cure the inevitable defect of information gaps, we can certainly learn to compare the data that we do have in a consistent manner, allowing us to gain a better understanding of how our limited data does inform us. Setting quantitative criteria is the best way to accomplish this.

C. *The Scientist-Developed IUCN Listing Criteria: America's Next Top Model?*

Now for the best news of all: much of the work required to set up this more objective process has already been done. The International Union for the Conservation of Nature (IUCN) is an international nongovernmental organization whose mission is to provide scientific expertise free of political influence to aid conservation programs worldwide.¹⁸⁵ It initially formed in 1948 and released its first Red Data Book (listing species by degree of vulnerability) in 1960.¹⁸⁶ The IUCN's most current "Red List Categories and Criteria," which sets out clear quantitative criteria for identifying varying threat levels, were created over the course of more than a decade of collaboration and revision by scientists from around the world.¹⁸⁷ I propose that we use these criteria as a model for setting new ESA listing criteria, ideally enlisting the aid and support of scientists from the IUCN.

In drafting the early endangered species statutes, both houses of Congress specifically suggested that reference to the IUCN's Red Book "should be especially valuable in identifying" species worthy of being listed under U.S. legislation.¹⁸⁸ They also recommended direct consultation with the IUCN as a step in the listing process.¹⁸⁹ Application of the IUCN criteria would put us in good company, as the current criteria "have become widely recognized internationally," and are currently applied "by numerous governmental and non-governmental organizations."¹⁹⁰ Perhaps

184. *Id.* (internal citation omitted).

185. See ROBERT BOARDMAN, INTERNATIONAL ORGANIZATION AND THE CONSERVATION OF NATURE 42, 47, 74-75 (1981).

186. *Id.* at 47, 55.

187. INT'L UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES [IUCN], IUCN RED LIST CATEGORIES AND CRITERIA: VERSION 3.1, 2-3 (2001) [hereinafter "IUCN Criteria"].

188. S. REP. NO. 91-526, at 5; H.R. REP. NO. 91-382, at 6.

189. *Id.*

190. IUCN Criteria, *supra* note 187, at 1.

most notable is the 1994 adoption of IUCN-devised criteria for use in the primary international treaty to protect endangered species, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).¹⁹¹ The new CITES criteria have been described as “the most objective standards in endangered species listing being used in the world,”¹⁹² and after the adoption of these criteria for use in CITES, “the process of listing species became clearer and firmer.”¹⁹³

The IUCN articulates four goals behind its new criteria:

- to provide a system that can be applied consistently by different people;
- to improve objectivity by providing users with clear guidance on how to evaluate different factors which affect the risk of extinction;
- to provide a system which will facilitate comparisons across widely different taxa;
- to give people using threatened species lists a better understanding of how individual species were classified.¹⁹⁴

These goals read like a wishlist of what is most needed to reform the ESA listing process, leaving only the question of how well the criteria accomplish them. Given the “[e]xtensive consultation and testing” that went into developing the criteria,¹⁹⁵ they are at a minimum better qualified to attain those goals than anything else we have to work with.

The IUCN Criteria set out nine categories into which all species somewhere fall: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient, and Not Evaluated.¹⁹⁶ Species that fall into the three categories from Vulnerable through Critically Endangered are generally referred to as Threatened¹⁹⁷ and are the

191. Convention on Int'l Trade in Endangered Species of Wild Fauna and Flora [CITES], Mar. 3, 1973, 27 U.S.T. 1087, 993 U.N.T.S. 243.

192. Shawn M. Dansky, *The CITES "Objective" Listing Criteria: Are They "Objective" Enough to Protect the African Elephant?*, 73 TUL. L. REV. 961, 979 (1999) (criticizing the criteria for being “not completely objective, as they still allow Parties to take into consideration range-states’ economic and social problems). Due to the ESA’s prohibition on such considerations, the weakness complained of here would not exist in our criteria.

193. Scott Hitch, *Losing the Elephant Wars: CITES and the "Ivory Ban"*, 27 GA. J. INT'L & COMP. L. 167, 179 (1998).

194. IUCN Criteria, *supra* note 187, at 1.

195. *Id.*

196. *Id.* at 14-15.

197. *Id.* at 5.

sort of species on which the ESA focuses. The five criteria used for each of these three categories function very similarly, distinguishable primarily by the actual numbers they set. These five criteria were designed to collectively address the viability indicia of all taxa, so for any given species one criterion will be more applicable than another.¹⁹⁸ For this reason, each species is to be evaluated against all criteria, but need meet only one criterion in order to be listed at that level.¹⁹⁹

The first criterion is based on a reduction in population, with varying percentages depending upon the cause and timeframe at issue. For a population reduction over the last ten years or three generations (whichever is longer), but for which the cause has been discovered and ceased and is reversible, the criteria interpret a 90% reduction as Critically Endangered, a 70% reduction as Endangered and a 50% reduction as Vulnerable.²⁰⁰ For that same time period, but where the cause has not ceased or may not be reversible, the criteria interpret an 80% reduction as Critically Endangered, a 50% reduction as Endangered and a 30% reduction as Vulnerable.²⁰¹ If projecting into the future for the same period of time, the criteria use these same latter percentages, and likewise for a period of that length which is presently underway (part past, part future).²⁰²

The second criterion sets quantitative figures for geographic range, dealing both with extent of occurrence and area of occupancy.²⁰³ The third criterion considers total population size in conjunction with decline and/or fluctuations.²⁰⁴ The fourth criterion simply looks at population size, without requiring decline or fluctuation, and thus sets the population figures for each category significantly lower than those in the third criterion.²⁰⁵ The fifth and final criterion is pure population viability analysis, requiring a probability of extinction in the wild within varying lengths of time/generations and at varying percentages, depending upon the

198. *Id.* This is also a powerful response to the most common argument made against setting standardized criteria: that it is not biologically sound to use a "one-size-fits-all" approach, revealing that argument to be a pretext for holding onto the great discretion the agencies now enjoy.

199. *Id.* at 5, 16-23.

200. *Id.* at 16-23.

201. *Id.*

202. *Id.*

203. *Id.*

204. *Id.*

205. *Id.*

category.²⁰⁶ Although all five criteria are divided into three categories of vulnerability, it would be possible, ideally through consultation with the IUCN, to structure the criteria around the ESA's threatened and endangered categories.

The IUCN Criteria were built on the cutting edge of developments in population viability analysis, have stood up well for over a decade, and "represent a significant advance over other systems."²⁰⁷ If the Services refuse to consider using this type of quantitative criteria for listing endangered and threatened species under the ESA, Congress should direct them to do so. If neither branch makes any effort to move in this direction, the public deserves an explanation as to why the best scientific developments are not being utilized.

V.

WHICH BRANCH MIGHT HAVE THE MOST SWAY?

In light of the importance of moving toward the use of quantitative criteria in the ESA listing process, upon which the future of biodiversity in the U.S. may well depend, it is worthwhile to consider the various avenues for doing so. Indeed, there is at least some potential in all three branches of government, though the balance of pros and cons greatly varies among them. This potential is most heavily concentrated in the legislative and executive branches. Given the difficulty in locating individuals with the motivation to use their constitutional authority for this cause, let us consider each avenue with an open mind, as the best or most obvious one may not be available.

A. *The Regulatory Approach*

The most obvious—and likely the easiest—path to improving the listing process would be rulemaking within the very agencies that must thereafter implement it. There are many reasons why administrative regulation is likely the best way to design the much-needed quantitative criteria for listing endangered and threatened species. First, the rulemaking process would allow for diverse public comment, both with regard to the policy choices involved in setting the numerical thresholds and also as to the scientific community's views on the criteria design itself. Second, administrative rules could adapt more easily than legislation

206. *Id.*

207. Holsinger, *supra* note 7, at S-10.

could as scientific knowledge develops and as we see how the first set of criteria work in practice. Third, setting the criteria may be too politically difficult for a split Congress, whereas the agencies can more easily work together on the process. Finally, taking this step could help the agencies to rehabilitate their tainted image after decades of unscientific listing decisions, as well as allow them to escape from under the intense political pressures weighing down the listing process.

There are also disadvantages to getting this done at the administrative level, though they are likely outweighed by the advantages. First, the agencies lack the ability to adjust their own funding as may be required in order to achieve more comprehensive listing reform, which would be a desirable approach. That said, this would not affect their ability to set quantitative criteria, which is the most valuable step in the reform. Perhaps the stickier issues would relate to limits on agency authority. Not only do some argue that setting listing thresholds would violate the ESA's strictly science mandate,²⁰⁸ but doing so could also raise some concerns regarding whether Congress' leaving this step to the agencies was an excessive delegation of legislative power.²⁰⁹

B. *Statutory Amendment by Congress*

Congressional amendment would allow for more comprehensive reform of the listing process. In addition to addressing the need for quantitative criteria, Congress could also require some amount of data-gathering in cases where there is insufficient data to evaluate a species against those criteria, and could fund that mandate.²¹⁰ If Congress were to take a stab at setting the criteria, it could depart from the existing endangered/threatened pair and split species into more categories (more akin to the IUCN criteria), which the agencies cannot do. This would also avoid the questions of delegation and otherwise questionable agency authority, but could raise problems with lack of adaptability and

208. See *supra* notes 161-165 and accompanying text for the arguments against this position.

209. See generally David M. Wagner, *American Trucking: The "New Nondelegation Doctrine" is Dead (Long Live the Old One?)*, 11 U. BALT. J. ENVTL. L. 25 (2003) (arguing that the *American Trucking* case may have actually breathed new life into the nondelegation doctrine by eliminating both the spectrum approach to considering delegations and the potential for agencies to cure the defect).

210. Although such studies could delay the listing process for those species, given that it would only be applicable in cases of insufficient data (which generally result in no listing at all), this would likely be harmless.

possibly inadequate public input on the details. In light of these problems, along with the political gridlock Congress tends to experience in dealing with the ESA, it might be wise for Congress to merely direct the agencies to set quantitative criteria, providing them with an intelligible principle for doing so. This would avoid the need to make the biggest policy decision, which is where exactly to set the thresholds. It would also resolve the questions regarding agency authority to set the criteria. Indeed, if the agencies do not act on this need soon, Congress should take this step.

C. *Pressure from the Courts*

Finally, courts may begin to push for better criteria, especially when judges are made aware of the IUCN criteria. This is the least likely avenue for reform, but one federal court has already struck down a Fish & Wildlife Service interpretation of “foreseeable future” in the definition of “threatened” because it strayed too far from the IUCN’s criteria without explaining that departure.²¹¹ This could certainly turn out to be an isolated incident, but if attorneys continue to argue the point, it may well become a wider trend.

VI. CONCLUSION

We live in a time of rapidly increasing environmental awareness. While it is no new concept that everything is connected, such that harming one thing can harm others whose relationship is not readily apparent, it is a concept that is spreading more than ever in the face of global warming and extraordinary rates of extinction. These issues have led to widespread concern, so our new administration should take heed. Not only do we need to

211. *See* *Western Watersheds Project v. Foss*, 2005 WL 2002473 (D. Idaho, Aug. 19, 2005) (“Furthermore, other agencies and organizations, have designated much lower extinction risk within 100 years as qualifying a species for a ‘threatened’ status. For example, in this case, the FWS rejected the timeframes suggested by the International Union for the Conservation of Nature (‘IUCN’), which places a 10% extinction risk within 100 years as falling within the definition of ‘threatened.’ In fact, in its own notes, the FWS acknowledged that its definition of ‘foreseeable future’ and ‘threatened’ differed from that of IUCN and observed that it would have to explain why it used a different standard. The Court could not glean from the expansive administrative record where the FWS explained this deviation from IUCN guidelines for extinction risk.”) (internal citations to administrative record omitted).

maintain thriving ecosystems at home, but the U.S. is a relevant player in worldwide biodiversity, so we have a duty to implement our primary biodiversity statute effectively. Setting appropriate quantitative criteria for listing species is perhaps the single most important step in this direction.

