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Qualitative, Quantitative, and Integrative Conservation

Jamison E. Colburn*

INTRODUCTION

Conservation is being overtaken by the same quantitative thinking that dominates risk regulation today. “Risk regulation,” traditionally conceived, “addresses the risk of harm that technology creates for individuals and the environment.”¹ In this light, environmental statutes like the Clean Air Act (“CAA”), Clean Water Act (“CWA”), and Toxic Substances Control Act (“TSCA”) are the legal extensions of probabilism and the “rational” pursuit of public health and safety—with conservation statutes like the Endangered Species Act (“ESA”) following right behind them.² They each invest power in an administrative agency by authorizing it to prohibit behaviors of a certain kind which it finds too risky given the probabilities of harmful consequences.³ Before they can act, however, the agencies normally must make certain required findings or determinations, based on evidence and usually according to disparate criteria fixed (or implied)

* Professor of Law, Penn State University. My thanks to Professors Dan Tarlock and Daniel Mandelker for organizing the symposium and for inviting me to take part.

1. SIDNEY A. SHAPIRO & ROBERT L. GLICKSMAN, *RISK REGULATION AT RISK* ix (2003).

2. *See, e.g.*, Office of the Science Advisor, U.S. EPA, *EXAMINATION OF EPA RISK ASSESSMENT PRINCIPLES AND PRACTICES 2* (2004), <http://www.epa.gov/OSA/pdfs/ratf-final.pdf> (“This process is highly interdisciplinary in that it draws from such diverse fields as biology, toxicology, ecology, engineering, geology, statistics, and the social sciences to create a rational framework for evaluating environmental hazards.”). The National Research Council explicitly recommended that risk analysis become the paradigm in conservation over a decade ago. *See* NATIONAL RESEARCH COUNCIL, *SCIENCE AND THE ENDANGERED SPECIES ACT 99–112* (1995) [hereinafter *SCIENCE AND THE ESA*]. That paradigm famously separates “risk assessment” from “risk management,” largely in an effort to insulate the former from the political vicissitudes of the latter. *See* NATIONAL RESEARCH COUNCIL, *SCIENCE AND DECISIONS: ADVANCING RISK ASSESSMENT 241–42* (2009) [hereinafter *SCIENCE AND DECISIONS*].

3. *See, e.g.*, *SCIENCE AND DECISIONS*, *supra* note 2, at 26–58 (describing the evolution and use of risk assessment at EPA).

by the governing statute(s), subject to judicial review.⁴ Not surprisingly, these laws have become—with help from administrative law—enmeshed in the parametric controversies of epidemiological inference,⁵ cost/benefit analysis,⁶ and time discounting,⁷ to say nothing of the metaphysics of statistical lives⁸ and a slew of other ethical dilemmas that come along for the ride when we try to quantify risk.

With the rise of “ecosystem services”⁹ and other quasi-monetizable values in conservation, not to mention the increasing salience of “measurable goals,”¹⁰ it seems as if we are entering conservation’s quantitative age. Not so long ago, the concept of risk was foreign to conservation practitioners.¹¹ Today, “biodiversity” has become conservation’s lingua franca, linking it directly to—if not collapsing it into—the risks of extirpation/extinction and the ecosystemic upsets it can bring. In this Article, I use the ESA to locate an important pivot we have reached in conservation more generally, a point at which we will choose (wittingly or not) how we face the looming crises of biodiversity loss. The more we learn about evolutionary and molecular genetics, biochemistry, geoclimatology, and many other dimensions of ecosystem composition and function, the more able we are to express the questions of conservation as matters of probability and risk. Yet, the more we express conservation’s questions as matters of risk, the less able we seem to

4. See generally A GUIDE TO JUDICIAL AND POLITICAL REVIEW OF FEDERAL AGENCIES (John F. Duffy & Michael Herz eds., 2005).

5. See generally Kenneth J. Rothman & Sander Greenland, *Causation and Causal Inference in Epidemiology*, 95 AM. J. PUB. HEALTH 144 (2005).

6. See generally MARK SAGOFF, *THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW AND ENVIRONMENT* (2d ed. 2008).

7. See generally RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT (John D. Graham & Jonathan Baert Wiener eds. 1995) [hereinafter RISK VERSUS RISK].

8. See generally FRANK ACKERMAN & LISA HEINZERLING, *PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING* (2004).

9. See, e.g., J.B. RUHL ET AL., *THE LAW AND POLICY OF ECOSYSTEM SERVICES* (2007).

10. See, e.g., Timothy H. Tear et al., *How Much Is Enough? The Recurrent Problem of Setting Measurable Objective in Conservation*, 55(10) *BIOSCIENCE* 843, 847 (2005).

11. See John Harwood, *Risk Assessment and Decision Analysis in Conservation*, 95 *BIO. CONSERV.* 219 (2000) (“[L]ess than 1% of the 1400 plus papers published in the journals *Biological Conservation* and *Conservation Biology* since January 1995 include the words ‘risk’ or ‘uncertainty’ in their title, and nearly half of those involve [three authors].”).

be to grasp and communicate them as meaningful and momentous choices in life. This is doubly true for the conservation statute with the broadest scale and scope: the ESA. This is not to say that people who deal in risk and probabilistic reasoning do not know what is important. To the contrary, my claim is that when we shift expressive frames toward quantification and probabilism, we tend to lose our collective grip of these choices as tangibly democratic questions. This stems from much more than the mere innumeracy of our median voter. In this Article, I use the evolution of ESA practice to summarize the much larger landscape of conservation's troubles in contemporary democratic societies. In my view, this can be summed up as the following progression and consequent imperative: qualitative thinking inevitably begets quantitative ambitions, but the real work of practical problem-solving demands that we find ways of integrating the two into a symbiotic—and therefore reciprocal—relationship.

I. TWO ASSUMPTIONS: A PROLOGUE

The last three decades have established two undeniable realities for conservation. Because the past cannot predict the future,¹² I present them here as assumptions going forward. To whatever extent they prove inaccurate, so much the better: it will mean more possibilities exist than I suspect. First, it seems clear that the support of the public fisc for acquiring and/or regulating natural resources for the sake of their conservation is, at best, level and more likely diminishing in proportion to recognizable needs. As a society, we are identifying urgent conservation needs much more rapidly than we are investing in them.¹³ Secondly, though related to the first assumption,

12. If only our financial regulators had kept this fundamental premise in mind over the last decade. Cf. PETER L. BERNSTEIN, *AGAINST THE GODS: THE REMARKABLE STORY OF RISK* (1996) (tracing the cultural history of risk and risk analysis in financial ordering from 1200 to the present and conjecturing that people will forever mistake inductive prediction for deductive truth).

13. One response to this framing of the assumption is to advocate for vastly expanding the scale and scope of regulatory or “police” power so that natural resources *not* owned/possessed by the public can be conserved nonetheless. For both normative and practical reasons explained in Parts I, II, and III below, I regard this as a tragically incomplete—though certainly not wholly mistaken—response to our predicament.

the costs of lawmaking and administration now drive the institutions that define legal practice and this is nowhere more manifest than in biodiversity conservation by the federal government.¹⁴ As administrative actions of all kinds have become enmeshed in conflict, procedure, and factual uncertainty, the agencies charged with the public's conservation agenda have shifted strategies to make use of increasingly administrative mechanisms, driving more and more of conservation practice further and further from public view. Part I unpacks these two framing assumptions.

A. Public Investment in Conservation Will Not Keep Pace with Identified Needs

For the ten year period from 1992–2001, federal and state authorities “spent” about thirty-two billion dollars on conservation land acquisition alone.¹⁵ For the ten year period from fiscal year 1996–2004, non-land-acquisition expenses incurred by the federal government in connection with specific listed taxa averaged \$562.9 million per fiscal year.¹⁶ Of course, compared to a thirteen trillion dollar economy literally predicated on cost-externalization and the extraction, liquidation, and consumption of natural resources (both here and abroad), this number—which has been leveling off lately—is cause for concern. With the possible exception of the Forest Service's seemingly intractable “roadless area” conservation

14. From about 1964 to 1976, public lands and other natural resource legislation in this country was thoroughly remade, essentially creating a zoning system that allocates lands according to a variety of use priorities and a range of use intensities, and which locked the agencies administering these statutes under a variety of procedural obligations. See Jamison E. Colburn, *Habitat and Humanity: Public Lands Law in the Age of Ecology*, 39 ARIZ. ST. L.J. 145, 170–95 (2007).

15. See Jeff Lerner et al., *What's in Noah's Wallet? Land Conservation Spending in the United States*, 57 BIOSCIENCE 419, 420 (2007). “Acreage figures would be a good complement to dollars spent, but such figures were not available, and they too can be double-counted by conservation partners.” *Id.* at 421. This level of funding is well below the “estimated \$5.4 billion to \$7.7 billion per year needed to create a national network of habitat conservation areas, and it is unlikely that private and local government sources will completely fill the gap.” *Id.* at 422.

16. The ESA section 18 fiscal reports are an example of hopelessly shifty accounting. From 1996–2004, however, FWS at least reported on identifiable “per-species” expenditures other than land acquisition—a category that then shifted again in Fiscal Year 2005.

initiative,¹⁷ or the recent (fitful) expansion of the National Wilderness Preservation System,¹⁸ the trends on public lands have been against the acquisition and/or protection of nature for its own sake.¹⁹ Increasingly severe droughts and fires, marked increases in recreational intensity, and continued wildland sprawl all counterbalance these comparatively small preservation projects.²⁰ A positive growth curve in “units” of the National Wildlife Refuge System²¹ is a far cry from positive growth in total area or “primary constituent elements”²² of healthy, resilient landscapes.²³ The

17. The Roadless Area Conservation Rule (a rule designed to prohibit the further roading of inventories roadless areas within the National Forest System), promulgated at the end of the Clinton Administration, has been embroiled in litigation and Forest Service reconsiderations for almost a decade now.

18. See Omnibus Public Lands Law of 2009, Pub. L. No. 111–11, to be codified throughout Title 16 U.S.C.

19. The Forest Service’s reasons for its roadless area rule were several, but habitat conservation was among them. See U.S. Forest Service, Notice of Final Rulemaking, 66 Fed. Reg. 3244, 3252 (Jan. 12, 2001) (to be codified at 36 C.F.R. pt. 294). The avowed objective was to “prohibit[] road construction, reconstruction, and timber harvest in inventoried roadless areas because they have the greatest likelihood of altering and fragmenting landscapes, resulting in immediate, long-term loss of roadless area values and characteristics.” 66 Fed. Reg. at 3244. The “values or features” that were said to “often characterize inventoried roadless areas” were (1) high quality or undisturbed soil, water, and air; (2) sources of public drinking water; (3) diversity of plant and animal communities; (4) habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; (5) primitive classes of recreation; (6) the provision of a “reference landscape” independent of human alteration; (7) traditional and sacred cultural sites/properties; and (8) various locally defined unique characteristics such as geological formations. *Id.* at 3245. Throughout the Notices of the rulemaking, these eight categories were referred to as “roadless area values.” The inventory was ultimately comprised of 58.5 million acres (almost two percent of the nation’s land), although a common attack mounted to the finalized rule highlighted the fact that no definitive maps of these areas were created specifying their boundaries. See, e.g., *Kootenai Tribe of Idaho v. Veneman*, 142 F. Supp. 2d 1231, 1244–46 (D. Idaho 2001).

20. See Robert B. Keiter, *Breaking Faith with Nature: The Bush Administration and Public Land Policy*, 27 J. LAND RESOURCES & ENVTL. L. 195 (2007).

21. Many have noted the swift growth of the National Wildlife Refuge System, both in acreage and in administrative units, since its establishment as a separate “system” in 1966. See, e.g., ROBERT L. FISCHMAN, *THE NATIONAL WILDLIFE REFUGES: COORDINATING A CONSERVATION SYSTEM THROUGH LAW* 64–76, 237–49 (2003).

22. In designating listed species’ “critical habitat,” the Services are required to identify “the *specific areas* within the geographic area occupied by the species, at the time it is listed . . . on which are found those physical or biological feature (I) essential to the conservation of the species and (II) which may require special management considerations or protection,” and any “*specific areas* outside the geographical area occupied by the species at the time it is listed . . . upon a determination by the Secretary that such areas are essential to the conservation of the species.” 16 U.S.C. § 1532(5)(A) (emphasis added). The Services have settled on identifying

landscapes that conservation managers are actually confronting today are dominated by the intermixture of jurisdictional authorities, the diverse spatial and temporal scales of change and human activity, and geoclimatic changes that are now under the study of legions of scientists. Most recently, the “adaptive ecosystem management” tide seems to have rolled out as fast as it came in, due at least in part to the informational enormity of ecosystems and our obvious incompetence regarding things so vast and unstable.²⁴

Since 1988, the ESA has made fiscal reporting a core part of the Fish and Wildlife Service’s duties. The 1988 Amendments added new ESA section 18 and required annualized accounting of expenditures made by all federal agencies and by states for the “conservation” of listed species; the Amendments also required that this accounting be reported to Congress.²⁵ As these reports have been compiled, several numerical baselines have shifted, making year-to-year comparisons difficult.²⁶ One thing is easily inferred, though: the fiscal data Congress has been collecting about the ESA’s several different programs has been growing finer-grained and is being managed more shrewdly. Indeed, frustratingly, expenditures by species and action-type are perhaps the two best data streams to which Congress has access where conservation is concerned today.

The conservation movement’s reaction to the growing deficits in public capacity and support has been, in essence, to privatize. The Nature Conservancy, the Trust for Public Land, and an ever-expanding population of local land trusts have been the fastest

the “primary constituent elements” in such “specific areas” including space for individual and population growth; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal;” and other habitats “representative of the historic geographical and ecological distribution of the species.” 50 C.F.R. 424.12(b)(1)–(5) (2008).

23. See Jamison E. Colburn, *The Indignity of Federal Wildlife Habitat Law*, 57 ALA. L. REV. 417 (2005).

24. See Fikret Berkes & Carl Folke, *Back to the Future: Ecosystem Dynamics and Local Knowledge*, in PANARCHY: UNDERSTANDING TRANSFORMATIONS IN HUMAN AND NATURAL SYSTEMS 121 (Lance Gunderson & C.S. Holling eds., 2002).

25. Pub. L. No. 100-478, 102 Stat. 2306 *et seq.*, codified at 16 U.S.C. § 1544(1)–(2).

26. The major complication for any trend analysis is what is counted as expenditure “for” a listed species or pursuant to the ESA as opposed to other programmatic responsibilities. Many funding synergies and/or overlapping agency missions deprive any such accounting of its value.

growing sectors of the conservation movement for decades.²⁷ Besides the public shortfalls, though, the trend has been fueled in good part by the anti-government rhetoric that has pervaded our public sphere for generations.²⁸ Fear of government is at least as powerful an influence in our political culture as the fear of environmental loss.²⁹ Regardless of Washington's peaks and valleys, the relative decline of conservation investment seems to be a reality going forward and will likely complicate conservation's future as much as it has its adolescence.

B. The Rise (and Rise) of Agency Informality: Soft Law's Empire

Since 1984, when *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, was decided, the federal courts have moved through various stages of evolution in the deference they afford to agency interpretations of law. In applying *Chevron*, the lower federal courts have struggled to define their institutional role,³⁰ to apply a poorly designed and poorly administered judicial test,³¹ and to map out an incompletely theorized normative and institutional landscape that includes not only legislation, but also administration, political initiative, and judicial precedent.³² The more we encounter agency

27. SALLY FAIRFAX ET AL., *BUYING NATURE: THE LIMITS OF LAND ACQUISITION AS A CONSERVATION STRATEGY, 1780–2004* (2005); RICHARD BREWER, *CONSERVANCY: THE LAND TRUST MOVEMENT IN AMERICA* (2003).

28. See generally FAIRFAX ET AL., *supra* note 27. “The hallmark of American politics . . . is the distinctive way in which power has long been distributed along an exceedingly complex array of persons, associations, and institutions that are not easily categorized as fundamentally either public or private.” William J. Novak, *Public-Private Governance: A Historical Introduction*, in *GOVERNMENT BY CONTRACT: OUTSOURCING AND AMERICAN DEMOCRACY* 23, 27 (Jody Freeman & Martha Minow eds., 2009).

29. Cf. COREY ROBIN, *FEAR: THE HISTORY OF A POLITICAL IDEA 200–25* (2004) (tracing the fear of government throughout American political and constitutional traditions).

30. See Cynthia R. Farina, *Statutory Interpretation and the Balance of Power in the Administrative State*, 89 COLUM. L. REV. 452 (1989); ADRIAN VERMEULE, *JUDGING UNDER UNCERTAINTY: AN INSTITUTIONAL THEORY OF LEGAL INTERPRETATION* (2006).

31. See William N. Eskridge, Jr. & Lauren E. Baer, *The Continuum of Deference: Supreme Court Treatment of Agency Statutory Interpretations from Chevron to Hamdan*, 96 GEO. L.J. 1083 (2008) (tracing the history of Supreme Court applications and constructions of *Chevron* and finding pronounced irregularities).

32. See generally Kenneth A. Bamberger, *Normative Canons in the Review of Administrative Policymaking*, 118 YALE L.J. 64 (2008); Jack Goldsmith & Daryl Levinson,

interpretations of law in all their diversity, the fewer assurances we have about the practical authority of agency actions within our legal traditions. The result has been an effusive—if also inconclusive—debate surrounding foundational normative questions about our administrative state.³³ The questions run from why we ought to defer to agency authority,³⁴ to when and why Congress actually delegates authority to agencies,³⁵ to the assumptions underlying any such normative analysis³⁶—and a host of gradations in between.

Not surprisingly, in the ESA—as in nature—hybridity has been the trend. Sorting out law, policy, and discretion seems to grow more challenging every year. The statute itself offers little help. ESA section 4 speaks of “guidelines” and recovery “plans” that the Secretary must “establish,” “develop,” and publish in the *Federal Register*.³⁷ It obliges the Secretary to create and publicize such norms, but it is silent on their enactment or force *as law*. So they have come to occupy a variety of cryptic stations in our legal system. They are each a type of agency “rule” shy of the “regulations” codified in

Law for States: International Law, Constitutional Law, Public Law, 122 HARV. L. REV. 1791 (2009).

33. Elsewhere, I argue that the evolution toward increasingly informal mechanisms of lawmaking is gradually undermining traditional notions of agencies as sources of law. See Jamison E. Colburn, *Agency Interpretations*, 82 TEMP. L. REV. (forthcoming).

34. See STEVEN P. CROLEY, REGULATION AND PUBLIC INTERESTS: THE POSSIBILITY OF GOOD REGULATORY GOVERNMENT (2008).

35. Compare Bamberger, *supra* note 32 (drawing out the tensions inherent in ascribing purposes to Congress when allocating interpretive authority between courts and agencies), with Lisa Shultz Bressman, *Chevron’s Mistake*, 58 DUKE L.J. 549, 553 (2008) (setting out a series of hypothetical circumstances in which Congress “likely delegates authority to agencies” based on public choice theory).

36. A variety of methodological disputes now engulf the claims of “rational choice” social science and, with it, positive political theory as applied in law. Compare Daryl J. Levinson, *Empire-Building Government in Constitutional Law*, 118 HARV. L. REV. 915 (2005) (contesting the claim that government officials have actual incentives to engage in self-aggrandizing behaviors), with Yochai Benkler, *Commons-based Peer Production and Virtue*, 14 J. POL. PHIL. 394 (2006) (challenging rational choice theory’s explanation of motivation-biased cognition with evidence from digitally networked environments); see generally CROLEY, *supra* note 34; Jon Hanson & David Yosifon, *The Situational Character: A Critical Realist Perspective on the Human Animal*, 93 GEO. L.J. 13 (2004); ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990).

37. See 16 U.S.C. § 1533(h) (“The Secretary shall establish, and publish in the Federal Register, agency guidelines to insure that the purposes of this section are achieved efficiently and effectively.”); *id.* § 1533(f) (“The Secretary shall develop and implement plans . . . for the conservation and survival of endangered species . . .”).

the *Code of Federal Regulations* (“CFR”).³⁸ They seem like more than the transient “interpretations” we so often encounter in litigation, guidance, notices, circulars, etc. Pinning them down with definite labels from traditional principles of administrative law may be more trouble than it is worth. Internationalists have a term, “soft law,” which was first used to refer to weaker, non-binding instruments like U.N. General Assembly resolutions. Yet it has gradually expanded in step with an evolving category of “quasi-binding” instruments that now dominate international law.³⁹ If there is a domestic equivalent, the Services’ guidelines and plans are in the mix.

Of course, the “protective regulations” the Secretary must develop “as [s/he] deems necessary and advisable to provide for the conservation of [listed] species”⁴⁰ were clearly meant to possess the force of law.⁴¹ But this rigid system of prohibitions, though still prominent in our collective consciousness of the ESA,⁴² is mediated by the many plans, policies, guidelines, and manuals⁴³ the Services maintain. They indirectly govern the scope of ESA sections 7 and 9, the Act’s two duty-creating parts. Thus, a series of policies published in the *Federal Register*, constantly followed and cited as controlling

38. On the proliferating varieties of such “rules,” both under our own Administrative Procedure Act and within the European Union’s nascent administrative system, see Peter L. Strauss, *Rulemaking in the Ages of Globalization and Information: What America Can Learn from Europe, and Vice Versa*, 12 COLUM. J. EUR. L. 645 (2005).

39. See, e.g., Hartmut Hillgenberg, *A Fresh Look at Soft Law*, 10 EUR. J. INT’L L. 499, 510–14 (1999). My thanks to Dan Tarlock for reminding me of this term’s place in international law.

40. 16 U.S.C. § 1533(d).

41. See JEFFREY S. LUBBERS, *A GUIDE TO FEDERAL AGENCY RULEMAKING* 51 (4th ed. 2006); Thomas W. Merrill & Kathryn Tongue Watts, *Agency Rules with the Force of Law: The Original Convention*, 116 HARV. L. REV. 467 (2002).

42. See STEVEN L. YAFFEE, *PROHIBITIVE POLICY: IMPLEMENTING THE FEDERAL ENDANGERED SPECIES ACT* (1982). Since Yaffee wrote, the Act has been amended (and interpreted) in ways that have made it *much* more discretionary and flexible than it was as originally implemented. See Jamison E. Colburn, *Canus (Wolf) and Ursus (Grizzly) Recovery: Taking the Measure of an Eroding Statute*, 22(2) NAT. RES. & ENV’T 22 (2007). But the ESA is still routinely characterized as a rigid, prohibitory law.

43. Besides the library of plans, policies, guidelines, and manuals on ESA practice, see, e.g., *Consultation Handbook* (1998), available at <http://www.fws.gov/endangered/consultations/s7hndbk/s7hndbk.htm>, and the *Habitat Conservation Planning Handbook* (1996), available at <http://www.fws.gov/endangered/hcp/hcpbook.html>, the Services have an equally well-developed body of such materials on the management of wildlife refuges. See Robert L. Fischman, *From Words to Action: The Impact and Legal Status of the 2006 National Wildlife Refuge System Management Policies*, 26 STAN. ENVTL. L.J. 77 (2007).

by agency personnel though never codified in the CFR, is what structures the statute's implementation. Indeed, they structure how section 4's listing factors⁴⁴ are weighed and compared,⁴⁵ how relevant biological entities are identified,⁴⁶ how available information is gathered and assessed gauging the threats facing these entities,⁴⁷ and how the conservation efforts already in place are evaluated.⁴⁸ None of

44. The five listing factors in ESA section 4(a)(1)(A)–(E) are well known and oft-cited. Less well known, however, are the “bas[e]s for determinations” set out in ESA section 4(b)(1) for listing and ESA section 4(b)(2) for critical habitat designations. *See* 16 U.S.C. § 1533(b)(1)–(2). There, the Act requires that the Services:

shall make determinations . . . solely on the basis of the best scientific and commercial data available . . . after conducting a review of the status of the species *and after taking into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction.*

Id. (emphasis added). This mandate that other jurisdictions’ “efforts” and “conservation practices” be taken “into account” complicates the Services’ decision making substantially. *See infra* note 106 and accompanying text.

45. Beginning with a draft and then a finalized set of “listing priority guidelines” in 1983, the Fish and Wildlife Service (“FWS”) has used a factored matrix to balance taxonomic distinctness, magnitude of threat, and immediacy of threat in its listing decisions. *See* Fish and Wildlife Service, Notice: Draft Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 Fed. Reg. 16,756 (Apr. 19, 1983); Fish and Wildlife Service, Notice: Final Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 Fed. Reg. 43,098 (Sept. 21, 1983).

Taxa that receive low priority numbers on this matrix usually are consigned to “candidate” status behind other, higher priority taxa to be listed more quickly. *See, e.g.,* Defenders of Wildlife et al. v. Norton, 239 F. Supp. 2d 9 (D.D.C. 2002) (challenge to FWS finding that Canada lynx’s listing was “warranted but precluded” by higher priority candidates for listing). In the event that such a prioritization is successfully changed as a result of judicial action, *see id.* at 22–24, taxa can be listed ahead of other priorities the Services deem more urgent—but the Services maintain that prioritization is required by ESA section 4(h)(3), 16 U.S.C. § 1533(h)(3). This has led to a ‘governance by lawsuit’ mentality within FWS and in the public’s perception of its programs. *See, e.g.,* Katrina Myriam Wyman, *Rethinking the ESA to Reflect Human Dominion over Nature*, 17 N.Y.U. ENVTL. L.J. 490, 496 & n.30 (2008).

46. *See* Notice, Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722 (Feb. 7, 1996) [hereinafter DPS Policy]; Notice, Policy Applying the Definition of Species Under the Endangered Species Act to Pacific Salmon, 56 Fed. Reg. 58,612 (Nov. 20, 1991) [hereinafter ESU Policy].

47. *See* Notice of Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities, 59 Fed. Reg. 34,270 (July 1, 1994) [hereinafter Peer Review Policy]; Notice of Interagency Cooperative Policy on Information Standards Under the Endangered Species Act, 59 Fed. Reg. 34,271 (July 1, 1994) [hereinafter “Information Standards” Policy].

48. *See* Notice, Policy for Evaluation of Conservation Efforts When Making Listing Decisions, 68 Fed. Reg. 15,100 (Mar. 28, 2003) [hereinafter “PECE”].

these policies has ever been codified. Most of these have also been published in the *Federal Register*, but only in the form of a “notice.”⁴⁹ And each is routinely followed as if it were law, raising some troubling questions about the normativity of the judgments they embody and convey. If an agency action creates law, fully authorized and in lockstep with authority delegated by Congress, then virtually complete deference is warranted—absent constitutional issues—when and if that action is reviewed in court.⁵⁰ Administrative law has been unsettled at least since *United States v. Mead Corp.*⁵¹ as to when agency interpretations are law in this sense, though.⁵²

As the tempo of ESA litigation has quickened, these puzzles have grown more urgent. For example, in a remarkable opinion—which now constitutes binding circuit precedent reversible only *en banc* or by the Supreme Court—the Ninth Circuit held that the Services’ “Distinct Population Segment” (“DPS”) policy possesses sufficient force of law to be due *Chevron*-style judicial deference and that that level of deference is enough to shut down even meritorious challenges to the agencies’ interpretations of the Act’s “species” concept.⁵³ The holding was made all the more remarkable by the fact that the Ninth Circuit, like other courts, now routinely sets aside agency factual findings and conclusions of law on particular listing

49. The *Federal Register* cannot publish any document “unless it is the official action of the agency concerned,” 1 C.F.R. § 5.4(c) (2008), but the publication category of “notices” includes any and all “miscellaneous documents applicable to the public . . . and other information of public interest” which are not Presidential documents, rules and regulations, or proposed rules. *Id.* § 5.9.

50. See, e.g., *Batterton v. Francis*, 432 U.S. 416, 424–26 & n.9 (1977); *Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 864–66 (1984). To the extent agencies and courts are *agents* whose actions reflect their considered judgments, this kind of deference is tantamount to rule-following, thereby making the rule-follower obedient to the rule-maker. And establishing authoritative sources and the rules they make is arguably the core of law’s purpose or point. See generally JOSEPH RAZ, *PRACTICAL REASON AND NORMS* 16–48 (Oxford 1990) (1975) (linking this theory of law as a matter of rules to a more general theory of practical reason).

51. *United States v. Mead Corp.*, 533 U.S. 218 (2001).

52. See Thomas W. Merrill & Kristin E. Hickman, *Chevron’s Domain*, 89 GEO. L.J. 833 (2001); Michael Herz, *Judicial Review of Statutory Issues Outside of the Chevron Doctrine*, in *A GUIDE TO JUDICIAL AND POLITICAL REVIEW OF FEDERAL AGENCIES* 125 (John F. Duffy & Michael Herz eds., 2005).

53. See *Nw. Ecosystem Alliance v. U.S. Fish and Wildlife Serv.*, 475 F.3d 1136, 1140–43 (9th Cir. 2007).

decisions made pursuant to the DPS Policy.⁵⁴ Thus, the DPS policy and the conservation planning it orchestrates have lately become a matter of substantial conflict, intensely questioned agency judgments, and vague, indeterminate legal standards that can either immunize the agency or expose it to rigorous judicial review depending on the timing and format of the challenges.⁵⁵

Other policies and the agency interpretations they embody are perhaps turning in this direction as well.⁵⁶ If they are, it is a mixed blessing at best for conservation, because it signals to the bureaucracies involved that they should establish their policies and judgments in a non-standard rule form that cannot be challenged as such⁵⁷ and is neither fully nor easily recognizable as such.⁵⁸ Agencies, of course, often wish to protect themselves against legal challenges involving the controversial judgments they must make. Yet, together with the internal staff-to-staff communications that constitute the agencies' working flows, these policies now exert formative influences on conservation as carried out by the federal

54. *See, e.g.*, Nat'l Ass'n of Home Builders v. Norton, 340 F.3d 835 (9th Cir. 2003); National Wildlife Federation v. Norton, 386 F. Supp. 2d 553 (D. Vt. 2005); Humane Soc'y of the U.S. v. Kempthorne, 579 F. Supp. 2d 7 (D.D.C. 2008).

55. *See, e.g.*, Cook Inlet Beluga Whale v. Daley, 156 F. Supp. 2d 16 (D.D.C. 2001); Defenders of Wildlife v. Norton, 258 F.3d 1136 (9th Cir. 2001); Nat'l Assn. of Home Builders, 340 F.3d at 835; Nat'l Wildlife Fed'n., 386 F. Supp. 2d at 553; Humane Soc'y of U.S., 579 F. Supp. 2d at 7; Cal. State Grange v. Nat'l Marine Fisheries Serv., 620 F. Supp. 2d 1111, (E.D.Cal. 2008); *see also* Doremus, *infra* note 63; Ruhl, *supra* note 9 at; 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 (1994).

56. Recovery plans under ESA section 4(f), 16 U.S.C. § 1533(f), are denominated in the Act as a "plan" requiring "public notice and opportunity for public review and comment." *Id.* § 1533(f)(4). Elsewhere, these plans, and indeed the concept of "recovery," are virtually missing from the text of the statute—although FWS guidance on and attitudes toward recovery planning have tended to confirm the importance of the plans once written. *See, e.g.*, Fund for Animals v. Babbitt, 967 F. Supp. 6 (D.D.C. 1997) (rejecting challenge to a plan designating population targets for Grizzly bear that argued plan was too fixed and result-oriented given the state of scientific knowledge).

57. Unlike many of the lower federal courts, the Supreme Court has lately taken a decidedly more skeptical view of so-called pre-enforcement review challenges to rules and rulemaking proceedings. *See, e.g.*, Summers v. Earth Island Inst., 129 S. Ct. 1142 (2009); Ohio Forestry Ass'n v. Sierra Club, 523 U.S. 726 (1998).

58. *See generally* Sam Kalen, *The Transformation of Modern Administrative Law: Changing Administrative and Environmental Guidance Documents*, 35 ECOLOGY L.Q. 101 (2009).

government. They are becoming entrenched in the Services' culture and cognition.

As normative mechanisms which may be authoritative, prescriptive, and preemptive to greater or lesser degrees, ESA section 4's "guidelines" and "plans" are growing in practical importance as well. Clearly, the agencies are following these "rules" (in the sense of that term set out in the Administrative Procedure Act) in too many ways to count.⁵⁹ And so are reviewing courts—*sometimes*. And this just deepens the curiosity. In *Batterton v. Francis*,⁶⁰ the Supreme Court contrasted the universe of "administrative interpretations of statutory terms," which it said were "given important, but not controlling, significance," as against "regulations with legislative effect," which it said a "reviewing court is not free to set aside . . . simply because it would have interpreted the statute in a different manner."⁶¹ Taking that as a benchmark, where do the guidelines, policies, and plans of the ESA fall on our spectrum of legal norms? The challenge going forward is at least as much about how courts and other legal actors answer this question—how they recognize and interpret such agency norms—as it is about anything else in the law of conservation. And the intersection of this question with the forms of practical reason in conservation more generally (whether qualitative or quantitative) will be one of the most active crossroads in the coming decades. Part II uses the saga of the Canada lynx to explore the resource constraints of ESA practice today.

II. MORE ART THAN SCIENCE: THE ESA AT THIRTY-FIVE AND COUNTING

As conservation's flagship, the ESA is often revered and reviled for the very same attributes. Part II argues, however, that it is failing structurally the further we move into our quantitative age.

59. See, e.g., LAWRENCE R. LIEBESMAN & RAFE PETERSEN, ENDANGERED SPECIES DESKBOOK 223–616 (2d ed. 2010) (collecting policies, guidance, and manual provisions currently in force).

60. 432 U.S. 416 (1977).

61. *Id.* at 424–25.

*A. Repeal by Starvation? Feeding and Caring for Your Pit Bull*⁶²

The ESA has long been revered for its powerful bite while at the same time being faulted for its genetic predispositions. Apart from the fact that what it protects in nature is, by necessity, exceptional, ESA actions have proven to be too deliberate and contentious, too sequential, and too fixated on the parts of nature already in jeopardy.⁶³ The statute screens its agents' "actions" through legal processes that are arduous, routinized, and costly—leaving its administrators to face some rather perverse incentives. The reward for plowing through all the listing petitions and backlogged protections for at-risk taxa is more of the same: triage, scarcity, and conflict.⁶⁴ Looking ahead, this vortex threatens to consume more and more resources without ever reaching the root causes of the environmental degradations at issue, and that is a tragedy in the making.⁶⁵

One focal point in this confusion of means and ends has been the periodic ritual known as the "Candidate Notice of Review" ("CNOR").⁶⁶ From 1975 to 1996, FWS periodically published an aggregative list of taxa that "should be taken into account in environmental planning,"⁶⁷—lists of taxa, in other words, that were "at risk" in some general sense.⁶⁸ Since 1996, however, "candidates" have been only those taxa for which the Services have "on file

62. See George Cameron Coggins, *An Ivory Tower Perspective on Endangered Species Law*, 8 NAT. RES. & ENV'T 3, 3 (1993) (calling ESA a "pit bull" of a law).

63. "It is widely agreed that the inability to provide protection before the late stages of decline is a serious failing of the ESA." Holly Doremus, *The Purposes, Effects, and Future of the Endangered Species Act's Best Available Science Mandate*, 34 ENVTL. L. 397, 404 (2004).

64. See, e.g., Elizabeth Kolbert, *The Sixth Extinction?*, THE NEW YORKER, May 25, 2009, at 53.

65. See J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 32–42 (2008).

66. See, e.g., U.S. Fish & Wildlife Serv., Notice: Review of Native Species that Are Candidates for Listing as Endangered or Threatened, 74 Fed. Reg. 57,804 (2009).

67. Review of Vertebrate Wildlife for Listing as Endangered or Threatened Species, 47 Fed. Reg. 58,454, 58,454 (Fish & Wildlife Serv., Dept. of Interior Dec. 30, 1982).

68. See Notice of Final Decision on Identification of Candidates for Listing as Endangered or Threatened, 61 Fed. Reg. 64,481, 64,481 (1996) ("[FWS] has decided that . . . [f]uture lists of species that are candidates for listing under the [ESA] will be restricted to those species for which the Service has on file sufficient information to support issuance of a proposed listing rule.").

sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened but for which preparation and publication of a proposal is precluded by higher priority listing actions.”⁶⁹ In December 2008, this list numbered 251.⁷⁰ The move in 1996 refined FWS’s approach to candidate status, and it now maintains that taxa may be added to its candidate list “based on an evaluation of . . . status that [they] have conducted on [their] own initiative, *or as a result of making a finding on a petition to list* . . . that listing is warranted but precluded by other higher priority listing action.”⁷¹ Confusingly enough, the Fisheries Service still takes the broader approach to “candidate” identification.⁷²

The structure and function of the “candidacy” threshold are critical for several reasons. First, it sharpens the focus down to those forms of ecological disturbance that measurably threaten ESA-relevant biological entities. As we have seen most recently with the listing of the Polar bear and the related upset of the ESA section 7 consultation rules,⁷³ the zoning of risks within or beyond the Services’ scope of operations is increasingly fully decisive of ESA choices.⁷⁴ Second, there are many more biological entities in peril

69. Part 424 defines “candidates” as “any species being considered by the Secretary for listing . . . but not yet the subject of a proposed rule.” 50 C.F.R. § 424.02(b). *See, e.g.*, Review of Plant and Animal Species That Are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions, 66 Fed. Reg. 54,808 (2001). The adoption of this criterion for “candidate” status in 1996 joined the internal and petition processes for purposes of prioritization and required findings under the ESA. *See* Notice of Final Decision on Identification of Candidates for Listing as Endangered or Threatened, 61 Fed. Reg. 64,481 (1996). Of course, it is only an informal “guideline” that sets out the priorities in listing. *See* U.S. Fish & Wildlife Serv., Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 Fed. Reg. 43, 098, 43, 102 (1983).

70. *See* Review of Plant and Animal Species That Are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions, 73 Fed. Reg. 75,176, 75,177 (2008). Another fifty taxa had pending listing proposals. *Id.*

71. *Id.* at 75,176.

72. *See* National Oceanic and Atmospheric Admin., Establishment of Species of Concern List, 69 Fed. Reg. 19,975 (Nat’l Marine Fisheries Serv., Nat’l Oceanic & Atmospheric Admin., Dept. of Commerce Apr. 15, 2004).

73. *See infra* notes 178–209 and accompanying text.

74. *See* Eric Biber & Cynthia Drew, *Stopping the Conservation: Amended ESA Section 7 Regulations Put Species at Risk*, 36 *ECOLOGY L. CURRENTS* 139 (2009), <http://elq.typepad.com/currents/pdf/currents36-01-biber-2009-0122-pdf>.

today than can possibly be listed and managed as such.⁷⁵ Finally, as a practical matter, petitioning the Services to list more and more taxa each fiscal year⁷⁶ is simply exhausting the appropriations Congress sees fit to provide and indirectly hastening the use of fiscal levers (budgetary processes being the most politically opaque of all⁷⁷) to hide from public view what the “median legislator” might wish to avoid doing publicly.⁷⁸

Now, as to taxa brought to the Services’ attention by private petition, ESA section 4(b)(3)(C) expressly requires a defined “warranted-but-precluded” finding that is subject to separate judicial review should the Services conclude that the species is simply not significant enough to add to the federal lists.⁷⁹ It also requires that any such finding be reviewed by the agency at least every twelve months—establishing a rather paradoxical status quo for many species.⁸⁰ Being kept off the list of protected species represents a

75. See, e.g., T.M. Brooks et al., *Global Biodiversity Conservation Priorities*, 313 *SCIENCE* 58 (July 7, 2006).

76. ESA section 4 provides that “to the maximum extent practicable, within 90 days after receiving [a listing petition from an “interested person”] under [the APA’s rulemaking petition process] to add a species to, or to remove a species from” the endangered or threatened lists, the Services “shall make a finding as to whether the petition presents substantial scientific or commercial information indicating that petitioned action may be warranted.” 16 U.S.C. § 1533(b)(3). This ninety-day petition clock, together with the restrictions on information that may be used in assessing such petitions, has bound the Services into a series of decision-making “tunnels.” See *infra* note 230 and accompanying text.

77. See ALLEN SCHICK, *THE FEDERAL BUDGET: POLITICS, POLICY, PROCESS* 2–4 (rev. ed. 2000) (attributing the opacity of the budget process to its immense complexity, high stakes, and uncertain procedural norms).

78. See *infra* note 146 and accompanying text.

79. See, e.g., *Friends of the Wild Swan v. U.S. Fish and Wildlife Serv.*, 945 F. Supp. 1388, 1396–1400 (D. Or. 1996); *Ctr. for Biological Diversity v. Norton*, 254 F.3d 833 (9th Cir. 2001); *Am. Lands Alliance v. Norton*, 242 F. Supp. 2d 1 (D.D.C. 2003); *Sierra Forest Prods., Inc. v. Kempthorne*, 2008 WL 2384047 (E.D. Cal. 2008). All three of these courts concluded that ESA section 4(b)(3)(C)’s requirement of a separate, identifiable “warranted-but-precluded” finding entails a finding of sufficient particularity and detail as to enable effective judicial review in accordance with the principles of *State Farm*. See *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

80. 16 U.S.C. § 1533(b)(3)(C) (2000). The 1982 Amendments to section 4, which completely overhauled the listing and petition procedures the Secretary must observe, seem to have confused the agencies on taxa for which they possess sufficient information to make an affirmative listing factor finding and taxa for which a valid and substantial petition has been filed under section 4(b)(3) but which the Services elect to deny. See 16 U.S.C. § 1533(b)(3)(B)(iii) (2000); *Ctr. for Biological Diversity*, 254 F.3d at 838. After several litigated cases, the plain text of section 4(b)(3)(B)—requiring a separate finding be published

uniquely qualitative judgment, and it has in recent memory provoked important litigation and cultural conflict.⁸¹ Now, to be sure, warranted-but-precluded candidates are not wholly outside the ESA's influence. In a growing number of cases, the Services have used this "candidate" finding to spur others into action, a conservation practice I will outline below in Part IV.

Of course, as tragic as this "waiting room" may seem, the Act itself anticipates it.⁸² Indeed, Congress and the President together have quietly jammed it full by depriving the ESA of the resources it could now easily consume. When confronted, appropriations decision-makers say they are merely preventing the ESA from dominating all other public and private business with their appropriations levers.⁸³ And many struggles today are over the relative priorities assigned to particular candidates—struggles the Services often lose when they get to court.⁸⁴ Yet, because the listing processes are bound by the Anti-Deficiency Act⁸⁵ and because of annual appropriations caps Congress has placed on the listing program specifically, including sub-caps on the critical habitat

outlining the agency's conclusions that other, higher priorities precluded listing the petitioned-for candidate—became manifest. *See* *Ctr. for Biological Diversity v. Kempthorne*, 466 F.3d 1098 (9th Cir. 2006).

81. The Polar bear listing saga, both as a matter of litigation and for its role in the social and political upheaval surrounding U.S. attitudes toward climate change, is discussed below. *See infra* notes 178–209 and accompanying text; *see also* *Biodiversity Legal Found. v. Babbitt*, 146 F.3d 1249 (10th Cir. 1998).

82. ESA section 4(b)(3)(B)(i) empowers the Secretary to find that:

[t]he petitioned action is warranted, but that—

(I) the immediate proposal and timely promulgation of a final regulation implementing the petitioned action . . . is precluded by pending proposals to determine whether any species is an endangered species or a threatened species, and

(II) expeditious progress is being made to add qualified species to either of the lists . . . and to remove from such lists species for which the protections of this chapter are no longer necessary.

16 U.S.C. § 1533(b)(3)(B)(iii) (2000).

83. *See, e.g.*, Katrina Miriam Wyman, *Rethinking the ESA to Reflect Human Dominion over Nature*, 17 N.Y.U. ENVTL. L.J. 490, 496–97 & n.30 (2008).

84. *See, e.g.*, *California Native Plant Soc. v. Norton*, 2005 WL 768444 (D.D.C. 2005); *Ctr. for Biological Diversity v. Kempthorne*, 466 F.3d at 1098; *Ctr. for Biological Diversity v. Kempthorne*, 2008 WL 205253 (N.D. Cal. 2008).

85. *See* 31 U.S.C. § 1341(a)(1)(A) (2004).

program,⁸⁶ the notices of “review” have become periodic reminders of our true predicament: the ESA’s operability is becoming an accident of timing and litigation, which now drive the fates of specific taxa and habitat.⁸⁷ In short, its scale and scope are becoming functions of the scarcity of public investment in conservation. So the CNOR ritual should prove at least this much: the ESA is now about caged, muzzled power as much or more than it is about the damage it causes when finally unleashed. Part II.B illustrates with an example: the Canada lynx.

B. Mesocarnivores and Landscape Scale Conservation

Carnivores in general and mid-level carnivores in particular routinely populate lists of Earth’s most at-risk taxa.⁸⁸ The Canada lynx, a medium-sized forest carnivore, is perhaps the ESA’s richest case study in the accidents of timing, taxonomy, and threat assessment. First identified by FWS as a candidate for listing in 1982,⁸⁹ the lynx was and remains relatively abundant throughout the boreal forests of Canada and Alaska.⁹⁰ In the contiguous United States, however, its abundance has been much more uneven.⁹¹

86. See Review of Vertebrate Wildlife for Listing as Endangered or Threatened Species, 73 Fed. Reg. at 75,185 (proposed Dec. 10, 2008) (to be codified at 50 C.F.R. pt. 17).

87. Reviewing courts themselves recognize this. One of the first reported cases in which a court reversed a warranted-but-precluded finding noted the “obscurity and indeterminacy in the ranking process” and how “a species’ priority level effectively determines whether or not it is listed under the ESA.” *Friends of the Wild Swan*, 945 F. Supp. at 1391. At that point (FY ’94), FWS was still listing candidates with ranking priorities as low as “6” on their twelve point scale. *Id.* In its 2008 CNOR, FWS explained that not even a listing priority ranking of “2” any longer assured the taxa of a high enough priority for listing. See Review of Vertebrate Wildlife for Listing as Endangered or Threatened Species, 73 Fed. Reg. at 75186 (proposed Dec. 10, 2008) (to be codified at 50 C.F.R. pt. 17). Commentary now routinely spotlights the influence of budgetary starvation. See, e.g., Wyman, *supra* note 45, at 495–99.

88. See, e.g., K. Ullas Karanth & Ravi Chellam, *Carnivore Conservation at the Crossroads*, 43 ORYX 1 (2009).

89. See Review of Vertebrate Wildlife for Listing as Endangered or Threatened Species, 47 Fed. Reg. 58,454, 58,460 (proposed Dec. 10, 2008) (to be codified at 50 C.F.R. pt. 17).

90. See James K. Agee, *Disturbance Ecology of North American Boreal Forests and Associated Northern Mixed/Subalpine Forests*, in *ECOLOGY AND CONSERVATION OF LYNX IN THE UNITED STATES* 39, 39–47 (Leonard F. Ruggiero et al. eds., 2000).

91. See Kevin S. McKelvey et al., *History and Distribution of Lynx in the Contiguous United States*, in *ECOLOGY AND CONSERVATION OF LYNX IN THE UNITED STATES* 207 (Leonard F. Ruggiero et al. eds., 2000).

Reliable data record the lynx's occurrence in twenty-four states going back to at least the mid-1800s.⁹² Lynx occurrence is closely associated with conifer forest types, especially those comprising the southern, alpine extensions of the boreal forest.⁹³ Lynx are also thought to vary in abundance according to the cyclical expansion and contraction of their foremost prey, the snowshoe hare,⁹⁴ although that relationship is much more explicit in the northern parts of their range than it is in the southern parts.⁹⁵ The lynx remained a low priority for FWS until it was the subject of a petition and then a lawsuit by a collection of wildlife organizations beginning in late 1992.⁹⁶ At the same time this was going on, FWS was developing its policy on the criteria for "distinct population segments," a taxonomic category the Act recognizes but which biology does not.⁹⁷ After the suits resulted in remands to the agency for reconsideration in 1997,⁹⁸ and again in 2002,⁹⁹ the lynx population of the contiguous United States was finally listed as a "threatened" DPS through a "clarification of

92. *Id.* at 253. Confusions with bobcats render most data prior to the mid-1800s suspect. *Id.*

93. McKelvey et al., *supra* note 91, at 253.

94. Cf. Clayton D. Apps, *Space-Use, Diet, Demographics, and Topographic Associations of Lynx in the Southern Canadian Rocky Mountains: A Study*, in *ECOLOGY AND CONSERVATION OF LYNX IN THE UNITED STATES* 351, 352 (Leonard F. Ruggiero et al. eds., 2000) (offering evidence that is mildly supportive of the conventional wisdom about lynx and hare population synchronies).

95. *Id.* at 352–53.

96. See 12-Month Finding for a Petition to List As Endangered or Threatened the Contiguous United States Population of the Canada Lynx, 59 Fed. Reg. 66,507 (1994) (proposed Dec. 27, 1994) (to be codified at 50 C.F.R. pt. 17) (finding listing not warranted); 12-Month Finding for a Petition to List the Contiguous United States Population of the Canada Lynx, 59 Fed. Reg. 66,507 (proposed May 27, 1997) (to be codified at 50 C.F.R. pt. 17) (finding listing warranted but precluded under FWS listing priority guidelines).

97. ESA section 3, in defining "species," includes species, subspecies, and "distinct population segment[s] of any species of vertebrate fish or wildlife." 16 U.S.C. § 1532(16) (2000). The interpretation of this term in the Act was the subject of great uncertainty and debate within the listing agencies. See *Maine v. Norton*, 257 F. Supp. 2d 357, 377–79 (D. Me. 2003). It was not until 1996—almost twenty years after the Act was amended to include the term—that the Services adopted a joint policy setting out their "principles" for recognizing and, where appropriate, listing DPS's. See *Policy Regarding the Recognition of Distinct Vertebrate Segments under the Endangered Species Act*, 61 Fed. Reg. 4722 (Feb. 7, 1996).

98. See *Defenders of Wildlife v. Babbitt*, 958 F. Supp. 670 (D.D.C. 1997) [hereinafter "Lynx I"] (remanding "warranted-but-precluded" finding).

99. See *Defenders of Wildlife v. Norton*, 239 F. Supp. 2d at 9.

findings” FWS published in 2003.¹⁰⁰ Without the petition and without the litigation, the lynx almost certainly would have remained in the waiting room to this day.¹⁰¹

Key to establishing the lynx in the lower forty-eight states as an ESA-relevant biological entity was the use of the DPS concept¹⁰² and, specifically, the presence of an “international boundary” bisecting the range of the populations at issue. Indeed, the U.S./Canadian border is what made the lynx DPS into a taxon even possibly meeting ESA section 4’s listing criteria. Without it, the lynx populations resident in the contiguous United States just look like the southern-most edges of a relatively healthy metapopulation centered in northwestern Canada.¹⁰³ The Services maintain in their DPS Policy, and in their applications of it since 1996, that international boundaries dividing a taxon may factor into the “discreteness” or the distinctness of a population segment because international boundaries create “differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms.”¹⁰⁴ Yet, ESA section

100. See Notice of Remanded Determination of Status for the Contiguous United States Distinct Population Segment of the Canada Lynx, 68 Fed. Reg. 40,076 (proposed July 3, 2003) (to be codified at 50 C.F.R. pt. 17). In the 2003 findings, FWS listed the population as persisting in, or potentially being restored to, Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, Wisconsin, and Wyoming, and all other states with documented occurrences of lynx (Connecticut, Indiana, Iowa, Massachusetts, Nebraska, Nevada, North Dakota, Ohio, Pennsylvania, South Dakota, and Virginia) as having only ever supported dispersers and/or as being presently “extirpated.” See *id.* at 40,080. Pennsylvania was later deleted as having been included erroneously.

101. Prior to the decision in *Lynx I*, FWS characterized the threats to the lynx population(s) in the contiguous United States as both “imminent” and of “high” magnitude. See 62 Fed. Reg. at 28,657. The relatively low listing priority was the result of its taxonomic status—because it was neither a monotypic genus nor a proper “species.” *Id.* at 28,657; cf. Listing Priority Guidelines, 48 Fed. Reg. at 43,103.

102. FWS’s “DPS” concept is quite similar to the National Oceanic and Atmospheric Administration’s “evolutionarily significant unit” concept for salmonid management. See Policy on Applying the Definition of Species Under the Endangered Species Act, 56 Fed. Reg. 58,612 (1991). With each, the agencies have committed themselves to recognizing and listing biological entities that are spatially, temporally, and/or genetically segregable from their wider taxa—but only insofar as those entities are “significant” to their biological species or subspecies (an approach some criticize) and are themselves at risk according to section 4(a)’s listing factors.

103. Cf. *Defenders of Wildlife v. Norton*, 239 F. Supp. 2d at 18–21 (D.D.C. 2002) (rejecting FWS finding that losses of range within the contiguous U.S. were not “significant” because they were merely the dispersers from Canada).

104. 61 Fed. Reg. at 4725.

4 undermines that very interpretation. Listing factor (D), “the inadequacy of existing regulatory mechanisms” (the factor to which they attribute this criterion of discreteness), easily could justify the use of state and local boundaries in identifying taxa as well—something the Services have repeatedly (though cryptically) refused to do.¹⁰⁵ Indeed, it would make good practical sense to interpret section 4 as linking listing determinations rather directly to the strengths and weaknesses of existing “conservation practices.”¹⁰⁶ Thus, the naked assertion that the Act ought to be implemented without regard to local or state treatment of a taxon is neither a matter of agency expertise,¹⁰⁷ nor a matter of clearly expressed congressional intent,¹⁰⁸ nor even all that consistent with the Services’ actions elsewhere.¹⁰⁹ In reality, state, local, and private authorities

105. 61 Fed. Reg. at 4724 (“Recognition of other political boundaries, such as State lines within the United States, would appear to lead to the recognition of entities that are primarily of conservation interest at the State and local level, and inappropriate as a focus for a national program.”); *Nat’l Wildlife Fed’n v. Norton*, 386 F. Supp. 2d at 564 (FWS’s designated gray wolf DPS was structured without regard to state lines and defended on those grounds). Most often, the agencies repeat an expressed hope of the Senate Committee on Environment and Public Works (which added the DPS language to the species definition in 1978) that DPS’s be established “sparingly” and with great caution. See, e.g., *Cal. State Grange v. Nat’l Marine Fisheries Serv.*, at *50–54.

106. 16 U.S.C. § 1533(b)(2); see *supra* note 44.

107. The courts seem fully engaged in assessing the agencies’ “discreteness” judgments according to the DPS Policy and have refused to simply accept, whatever the evidence or argument, a bald assertion as to the “significance” of a discrete/distinct population. See, e.g., *Nat’l Ass’n of Homebuilders v. Norton*, 340 F.3d at 844–50 (invalidating listing of DPS because, apart from labeling the population within the United States “significant,” FWS did not explain its significance to its wider taxon).

108. The absolute weakest form of legislative history—that printed by a committee *after enactment* of the subject legislation—is where the agencies have claimed to find Congress’s expressed hope that they list populations not essential to their wider taxa only when the taxa are mostly outside the United States and the imperiled populations are within it. See 61 Fed. Reg. 4725; *Maine v. Norton*, 257 F. Supp. 2d 357, 383 (D. Me. 2003). The report in question, Senate Report 96-151, published in connection with the 1979 amendments, denominated its discussion of listing discrete “populations” an “other point” that did “not warrant amendments to the law,” but rather just “some clarification” in the form of legislative dicta. *Endangered Species Act Authorizations*, S. Rep. No. 96-151, reprinted in COMM. ON ENV’T AND PUB. WORKS, 97TH CONG., 2D SESS., A LEGISLATIVE HISTORY OF THE ENDANGERED SPECIES ACT OF 1973 at 1391, 1397 (1982).

109. The agencies’ use of “existing conservation efforts,” for example, constantly incorporates state and/or local conservation priorities as factors in listing determinations. See Kristen Uchitel, *PECE and Cooperative Conservation: Innovation or Subversion under the Endangered Species Act*, 26 J. LAND RESOURCES & ENVTL. L. 233 (2006). The fact that this “consideration” appears in ESA section 4(b) under “basis for determinations” and not in ESA

exert powerful influences over the conservation and restoration of at-risk taxa. State and local boundaries are, in this connection, highly salient. For example, as the gray wolf delisting saga has demonstrated, if taxa are going to be identified at listing using state-by-state records of historic occurrence, the Services inevitably will confront the variation in state and local conservation policies when and if they find their DPS(s) “recovered” to the point that a status change is warranted.¹¹⁰ In short, the Services’ reasons for ignoring subnational legal boundaries while responding to international boundaries are either weak or, as yet, unspecified.

All of that matters because the conservation of Canada lynx is now scaling down as FWS and the federal land management bureaus grapple with the designation and management of the lynx’s “critical habitat.”¹¹¹ Delayed for years while FWS addressed its massive critical habitat backlog, the Service eventually finalized a determination in 2006.¹¹² Within the “specific areas” occupied by the lynx DPS at listing, the critical habitat designation of 2006 excluded all but a tiny fraction of the lands within the DPS’s range.¹¹³ As

section 4(a)(1), under listing determinations “generally,” has never been explained or authoritatively interpreted by the agencies, to my knowledge.

110. See Fish and Wildlife Serv., Final Rule to Identify the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and to Revise the List of Endangered and Threatened Wildlife, 74 Fed. Reg. 15,123 (Apr. 2, 2009).

111. Most recently, the agency finalized an amended critical habitat rule for the lynx which took specific notice of new information on the likely effects of climate change upon lynx habitat in the contiguous United States. See Revised Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx, 74 Fed. Reg. 8616, 8617 (Feb. 25, 2009). See *infra* notes 115, 121 and accompanying text.

112. See Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx, 71 Fed. Reg. 66,008 (Nov. 9, 2006).

113. See *id.* at 66,028–31. The exclusions were justified by various forms of deference to other land and habitat conservation arrangements, including Land and Resource Management Plans governing National Forest System lands under the National Forest Management Act, private landowner commitments, and state and local land use plans and restrictions. See *id.* at 66,030–51. A cryptic statement in connection with the economic analysis of the designation made it unclear precisely *why* FWS was making the exclusions. See *id.* at 66,052 (“[W]e evaluated the benefits of conservation programs, plans, and partnerships relative to the regulatory benefits of critical habitat. . . . As a result, we are only finalizing critical habitat for the lynx lands [in three national parks not governed by those other mechanisms].”). ESA section 4(b)(2) allows that FWS “may exclude any area from critical habitat if [it] determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat. . . .” 16 U.S.C. § 1533(b)(2). If FWS made its finding in the 2006 rule on the basis of a “draft economic analysis” that was never finalized, however, it did so only impliedly

things turned out, this action was one of many tainted by the involvement of disgraced Deputy Assistant Secretary of the Interior Laurie McDonald.¹¹⁴ FWS reissued the finding following McDonald's departure, greatly expanding it.¹¹⁵ The revised designation included all "areas occupied by the species that currently contain the physical and biological features essential to the conservation of the lynx."¹¹⁶ These include areas with the presence of snowshoe hare, denning sites (coarse woody debris or rock formations), and/or what FWS refers to as "matrix habitats"—patchy forests of different vegetative and geologic types.¹¹⁷ In short, the mixture is the measure: lynx habitat needs are a rather unpredictable amalgam of the boreal and alpine environments in which they evolved.¹¹⁸

For many, this lynx critical habitat designation represents a powerful lever in the struggle against cultivated forests, mining, motorized recreation, sprawl, and other choice land uses.¹¹⁹ But notice how localized those struggles are and will remain—and how unlikely it is that they will be resolved by the (arduous, costly, divisive, and legally confined) act of critical habitat designation for

in the quoted statement above and almost certainly opened itself to the charge that it obscured the grounds of its decisions. *See, e.g.,* Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 419–20 (1971); Wagner Elec. Corp. v. Volpe, 466 F.2d 1013 (3d Cir. 1972); United States v. Nova Scotia Food Prods. Corp., 568 F.2d 240 (2d Cir. 1977).

114. Throughout her tenure, McDonald allegedly took dozens of questionable and/or obviously inappropriate steps to obstruct conservation programs throughout the Department of Interior. *See U.S. Dept. of Interior, Office of Inspector General, Report of Investigation: Julie MacDonald, Deputy Assistant Secretary, Fish, Wildlife & Parks* (copy on file with author); *Before the H. Comm. on Natural Res. (2008)* (statement of Robin M. Nazzarro, Director of Natural Resources and Environment, U.S. Government Accountability Office) [hereinafter Nazzarro Testimony].

115. *See* Revised Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx, 74 Fed. Reg. 8616.

116. *Id.* at 8617. "Area of occupation" and at what historical baseline are two perennial sources of dispute in ESA section 4 decision making. In the case of the lynx, one of the alleged interferences by McDonald was her insistence that firm proof of occurrence be documented as of 1995—a criterion to which many objected (within and outside FWS) because it departed from the agency's past practices.

117. *See id.* at 8635–38.

118. William R. Rice, *Speciation Via Habitat Specialization*, 1(4) EVOL. ECOL. 301 (1987) (sorting and discussing evidence that genotype and phenotype interact as habitat demands).

119. *See, e.g.,* Stephen C. Trombulak & Kimberly Royar, *Restoring the Wild: Species Recovery and Reintroduction*, in WILDERNESS COMES HOME: REWILDING THE NORTHEAST 157 (Christopher McGrory Klyza ed., 2001).

the lynx. “Critical habitat designation alone . . . does not require property owners to undertake affirmative actions to promote the recovery of the species.”¹²⁰ Indeed, FWS has long been convinced that “in many instances, the benefit of critical habitat designation is low compared to the conservation benefit that can be achieved through conservation efforts or management plans, especially when the likelihood of a Federal action occurring is low.”¹²¹ Yet, as many times as the Service has deemed the designation of critical habitat not worth it or not “prudent,”¹²² the courts still resist these judgments.¹²³

Lynx habitat is a paradigmatic case of the micro crosshatching the macro in conservation politics. The more we study this particular carnivore—and federal land managers have known for years that more and better information about lynx ecology and behavior are sorely needed¹²⁴—the more evident it becomes that a variety of forest types can support lynx, that the lynx’s populational source and sink dynamics are complex because of the long distances it can disperse and the cyclicity of its reproduction, and that so-called early-successional habitats (forests after logging, fire, or other disturbances) tend to advantage lynx, albeit not where later-

120. 74 Fed. Reg. at 8646.

121. *Id.* at 8646. Virtually identical conclusions about the relative benefits of critical habitat designations appear in the revised designation for Peninsular bighorn, *see* Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Peninsular Bighorn Sheep and Determination of a Distinct Population Segment of Desert Bighorn Sheep (*Ovis canadensis nelsoni*), 74 Fed. Reg. 17,288 (Apr. 14, 2009), and the revised designation for the Quino checkerspot butterfly, *see* Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Quino Checkerspot Butterfly (*Euphydryas editha quino*), 74 Fed. Reg. 28,766, 28,806–22 (June 17, 2009).

122. ESA section 4(a)(3) states that the Services shall “to the maximum extent prudent and determinable,” designate critical habitat at the time of listing. 16 U.S.C. § 1533(a)(3)(A).

123. *See, e.g.*, *Sierra Club v. U.S. Fish & Wildlife Serv.*, 245 F.3d 434, 444–46 (5th Cir. 2001); *Natural Res. Def. Council v. United States Dep’t of Interior*, 113 F.3d 1121, 1125–27 (9th Cir. 1997); *Jumping Frog Research Inst. v. Babbitt*, 1999 WL 1244149 (N.D. Cal. 1999); *Conservation Council of Haw. v. Babbitt*, 2 F. Supp. 2d 1280, 1284–85 (D. Haw. 1998); *Bldg. Indus. Ass’n v. Babbitt*, 979 F. Supp. 893, 905–06 (D.D.C. 1997).

124. Fifteen years ago, the Forest Service undertook a comprehensive review of four “forest carnivores”: the American marten, the fisher, the lynx, and the wolverine. *See* Rocky Mountain Forest and Range Experiment Station, *The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States* (1994) (Technical Report RM-254). The study of lynx in that undertaking was noteworthy for the many “research needs” that emerged from the analysis, underscoring how little the existing scientific information aided actual lynx management. *See id.* at 74–94.

successional habitats are completely absent.¹²⁵ Now that the lynx DPS is a federally protected taxon, though, how much of a federal priority should it become? The Services' deployment of the DPS concept has been notoriously slippery,¹²⁶ leaving us to wonder about their priorities. Of course, biologically, natural diversity is measured at many different levels:

[T]he causal historical process of evolution operates on lineages. However, lineages exist at all levels of biological organization: genes, chromosomes, organisms, kin groups, tribes, etc., and the processes of evolution can at least potentially [a]ffect the entities which make up lineages at all of these levels. Thus, any lineage is a potential unit of evolution.¹²⁷

So should our notion of “critical habitat” or the official designations thereof change when it is a DPS—and not a proper “species”—at issue?

125. See Angela K. Fuller et al., *Winter Habitat Selection by Canada Lynx in Maine: Prey Abundance or Accessibility?*, 71 J. WILDLIFE MGMT. 1980 (2007).

126. See, e.g., Holly Doremus, *Listing Decisions under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 WASH. U. L.Q. 1029 (1997); Benjamin Fenton, *Home Builders v. Norton: The Role of International Boundaries under the Endangered Species Act*, 35 ECOLOGY L.Q. 575 (2005); Katherine M. Hausrath, *The Designation of “Distinct Population Segments” under the Endangered Species Act in Light of National Association of Homebuilders v. Norton*, 80 CHI.-KENT L. REV. 449 (2005); Kevin D. Hill, *The Endangered Species Act: What Do We Mean by Species?*, 20 B.C. ENVTL. AFFS. L. REV. 239 (1993); David S. Pennock & Walter M. Dimmick, *Critique of the Evolutionarily Significant Unit as a Definition for “Distinct Population Segments” under the U.S. Endangered Species Act*, 11 CONSERV. BIO. 611 (1997); Kevin W. Grierson, Note, *The Concept of Species and the Endangered Species Act*, 11 VA. ENVTL. L.J. 463 (1992); Andrew E. Wetzler, Note, *The Ethical Underpinnings of the Endangered Species Act*, 13 VA. ENVTL. L.J. 145, 154–67 (1993). This confusion stems in large part from the biological species concept itself. See Paul-Michael Agapow et al., *The Impact of Species Concept on Biodiversity Studies*, 79(2) Q. REV. BIO. 161, 163 (2004) (“The BSC is simple, obvious, and ultimately flawed.”). Of course, reproductively isolated populations are intuitively specific, and the BSC is also attractive to scientists because “proposed species boundaries are falsifiable by the natural (and substantial) production of fertile hybrids across them.” *Id.* at 162. But “discerning potential reproductive barriers can be difficult, time-consuming, expensive, and fraught with error.” *Id.* at 163. Moreover, for all the species that do not reproduce sexually, the BSC is useless. *Id.* (“The BSC can illuminate only a small fragment of the Tree of Life.”).

127. Christopher D. Horvath, *Discussion: Phylogenetic Species Concept: Pluralism, Monism, and History*, 12 BIO. & PHIL. 225, 229 (1997).

While the Service's considered judgment on the overall utility of designating critical habitat seems rooted in experience,¹²⁸ if this is as definite and firm as it has sounded lately, it is unclear what role such a judgment should play in guiding subordinate officials who make the particular critical habitat findings like that in the lynx saga. The findings that shifted in the lynx's case, it bears mentioning, were not that a critical habitat designation could positively benefit lynx or that the designation itself might have significant social costs. The shifts came in the relative values assigned to those probabilities.¹²⁹ It was the measurements that changed.

Of course, at a minimum, the revised critical habitat designation—which voided the extensive exclusions that had been made in the first (McDonald-tainted) designation¹³⁰—was a highly salient social signal.¹³¹ FWS boosted the total area of designation from roughly

128. See, e.g., Amy Sinden, *The Economics of Endangered Species: Why Less Is More in the Economic Analysis of Critical Habitat Designations*, 28 HARV. ENVTL. L. REV. 129 (2004) (tracing the evolution of the critical habitat program from a loosely structured decisional process to one governed by a vast array of factors and sometimes conflicting legal precedents).

129. Of course, we could easily dwell on how FWS would turn so dramatically from concluding that the benefits of exclusion outweighed those of inclusion to concluding the precise opposite across so much territory so rapidly. After all the speculation and recriminations, though, we are not likely to learn all that much that we did not know already. When the stakes are high—or at least seem high—political actors at the heads of agencies will insert themselves into otherwise routine decision-making processes, sometimes in sinister ways. Many have argued that this is a cautionary tale about the involvement of politicians (especially crooked politicians) in what should be a pristinely expert—even *scientific*—agency action. It certainly is a cautionary tale. But none of this episode involved decisions that could ever possibly be made solely on the basis of “scientific” information or scientific methods (which is not to say that the latter cannot be used to *improve* decisions in many ways). See, e.g., J.B. Ruhl & James Salzman, *In Defense of Regulatory Peer Review*, 84 WASH. U. L. REV. 1 (2006).

130. When this matter is ultimately litigated, it will probably be a function of the specific economic analysis (and the many assumptions driving it) produced by FWS's contractor, Industrial Economics, Inc., that has dominated the parties' attention thus far. In extensive comments on that analysis, Defenders of Wildlife argued that, in general, it lacked any quantification of the benefits of a critical habitat designation, noting that it “focuse[d] exclusively on the expected costs” of the action and was, therefore, “one-sided” and “distorting.” Comments on the U.S. Fish and Wildlife Service's Revised Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx (*Lynx Canadensis*), at 2 (copy on file with author).

131. The Services are always careful to note that critical habitat designations have an inherent “educational” value. See, e.g., 74 Reg. at 8653 (“Critical habitat designation educates the public about the location of core lynx habitat and areas most important for the recovery of this species.”).

1,800 to roughly 39,000 square miles across six states.¹³² Yet the Services envision it as more than a social signal,¹³³ and it should be said that the Services have encountered skepticism in court when they have reached virtually *any* critical habitat judgment without record evidence.¹³⁴ For now, though, they seem not to be budging from the conviction that ESA section 4(b) leaves them considerable discretion in how they balance all the disparate factors it mentions.¹³⁵

Of course, given the persistent uncertainties surrounding lynx conservation and restoration¹³⁶ and the highly variable cycles of lynx survival and prosperity, we might just as well double back to the unadulterated normative questions themselves. What should decide for FWS, for example, whether a critical habitat designation will actually reduce the overall intensity of snowmobiling in backcountry areas or will, instead, merely shift its location?¹³⁷ Such a prediction is almost certainly socioeconomic in nature—about as far from lynx ecology as can be. To what degree must FWS weigh the probabilities of human behavior, technology, social norms, and/or natural selection

132. Compare 71 Fed. Reg. at 66,030 (table), with 74 Fed. Reg. at 8642 (table). FWS's lead lynx biologist was interviewed in February 2009 and maintained that this was the largest terrestrial animal critical habitat designation ever. See Susan Gallagher, *Lynx Critical Habitat Increases*, ASSOCIATED PRESS, Feb. 25, 2009, at 1.

133. Cf. 74 Fed. Reg. at 8634 (“Critical habitat designations identify, to the extent known using the best scientific data available, habitat areas that provide essential life cycle needs of the species . . .”).

134. Cf. *Bldg. Indus. Ass'n v. Babbitt*, 979 F. Supp. at 893, 906 (D.D.C. 1997) (rejecting FWS finding that critical habitat designation was not “prudent” in part because designation might enable would-be vandals to destroy designated habitat).

135. See Memorandum for the Solicitor, United States Department of the Interior, The Secretary's Authority to Exclude Areas from a Critical Habitat Designation under Section 4(b)(2) of the Endangered Species Act (Oct. 3, 2008) (M-37016).

136. Leonard F. Ruggiero & Kevin S. McKelvey, *Toward a Defensible Lynx Conservation Strategy: A Framework for Planning in the Face of Uncertainty*, in *ECOLOGY AND CONSERVATION OF LYNX IN THE UNITED STATES* 5, 8 (Leonard F. Ruggiero et al. eds., 2000).

137. Cf. 74 Fed. Reg. at 8629 (responding to commenter that welfare gains from restrictions on snowmobiling owing to CHD may well be cancelled out by welfare losses from increased crowding among snowmobilers and that, therefore, the “analysis does not assume that there is a net decrease in snowmobiling but a change in the distribution of [its] occurrence”). Two economists working with Defenders of Wildlife on its comments to the economic analysis had elsewhere argued that omission of such benefit calculations “reduces the informational value of the analysis,” and thus compromises their utility. See Timm Kroeger & Frank Casey, *Economic Impacts of Designating Critical Habitat under the U.S. Endangered Species Act: Case Study of the Canada Lynx (Lynx Canadensis)*, 11 HUMAN DIMENSIONS OF WILDLIFE 437, 450 (2006).

itself in order to take “action”? All of this data and data integration, supposing it could be done, would establish only the relative costs and benefits of taking an action Congress has itself strictly limited in its legal significance. Should not the Service be constrained in what it invests in such decisions by the benefits its actions can even possibly generate?

And what real expertise has FWS to decide whether current land management plans, policies, and laws are—or may end up being—*better* “conservation practices” for a listed taxon than the critical habitat designation? The latter means the injection of a resource-starved federal wildlife agency increasingly beset by litigation, staff shortages, and informational scarcity, into an indefinite list of activities involving both the taxon and the federal government. The language of ESA section 4(b) invites the Services to make just this kind of multi-factored judgment.¹³⁸ Yet, in reality, they must guess at such junctures. In the original 2006 critical habitat rule, FWS pointedly deferred to the “Lynx Conservation Assessment and Strategy” (“LCAS”), a multi-agency management framework created in 2000 by the Forest Service, Bureau of Land Management, and FWS.¹³⁹ In this LCAS,¹⁴⁰ several different agencies pooled their expertise and information on lynx to establish measurable goals for lynx habitat conservation in a wide range of federal land management units across the West.¹⁴¹ Critics attacked this use of the LCAS,¹⁴² and

138. If there is any part of the ESA more deeply qualified in its commitment to conservation by “other factors,” I have never found it. ESA section 4(b)(2) states that critical habitat shall be designated “on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat” 16 U.S.C. § 1533(b)(2).

139. See 71 Fed. Reg. at 66,010.

140. See BILL RVEDIGER ET AL., U.S.D.A. FOREST SERVICE, CANADA LYNX CONSERVATION ASSESSMENT AND STRATEGY (2d ed. 2000) [hereinafter LCAS].

141. The focus in the LCAS was creating practicable measures to be incorporated into the land management plans required of the Forest Service and BLM by the enabling legislation. LCAS, *supra* note 140, at 1–4. “Irrespective of the limitations of current knowledge, management of lynx habitat will occur on nearly 50 national forests, BLM field offices in 6 states, 7 national parks, and possibly on a few wildlife refuges The conservation strategy must provide guidance that retains future options provides management consistency, offers necessary flexibility, and conserves lynx and lynx habitat.” *Id.* at 3.

142. See, e.g., Defenders of Wildlife et al., Comments on the U.S. Fish and Wildlife

FWS later recanted, concluding in 2009 that the LCAS, while helpful to federal land managers, ought not to preempt the designation of critical habitat.¹⁴³ ESA section 5 directs FWS to cooperate with the Forest Service in acquiring land for the National Forest System to “conserve fish, wildlife, and plants” therein, “including” those that are listed.¹⁴⁴ But Congress has never seen fit to invest FWS with the sort of human resources that would enable it to judge the efficacy of the Forest Service’s (or others’) conservation practices.

Whether the lynx’s current distribution and abundance in the contiguous United States is worth the trouble FWS already has had with this DPS or not, it seems right to conclude at least the following: (1) even with much better information about the lynx or its ecology, a recognizably complete risk analysis of any of the choices outlined above would essentially be out of order so long as restorative work would rebuild future lynx populations;¹⁴⁵ and (2) the multi-factored analysis that section 4 demands in the listing and critical habitat procedures would actually amount to comparative institutional analysis—something well beyond the present abilities of the Services. The most potent lesson here, however, may be one of politics, publicity, and the shaping of public priorities. The median legislator in Congress has very little reason to care about the lynx saga or the forces that converged to create it. Indeed, the lynx is arguably the most anonymous “charismatic megafauna”—and sometime beneficiary of federal management—ever.¹⁴⁶ While the ESA has withstood attempts at its repeal, because of the annual appropriations process (not to mention a stream of exceptions like,

Service’s Revised Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx (*Lynx canadensis*), Revised Proposed Rule. 73 Fed. Reg. 62,450 (Oct. 21, 2008), letter of Nov. 20, 2008, at 5 (on file with author).

143. See 71 Fed. Reg. at 66,020.

144. 16 U.S.C. § 1534.

145. *Global* extinction risks, in other words, present the kind of definite outcomes that can be matched up with alternative possible futures and compared. Declining abundance and/or range, however, arguably lack the definition and determinate variables that make a risk analysis productive. See *infra* note 230 and accompanying text.

146. Cf. Shannon Petersen, *Congress and Charismatic Megafauna: A Legislative History of the Endangered Species Act*, 29 ENVTL. L. 463 (1999) (reviewing the ESA’s history and innate connection with charismatic megafauna from the Puerto Rican parrot to the black-footed ferret without ever mentioning the lynx).

for example, the Sikes Act¹⁴⁷), it remains a far cry from an effective solution to biodiversity loss. Unfortunately, boosting appropriations will do little to address the underlying predicament (although more money might help at the margins). As Part III argues, the demands for information and proceduralized deliberation in conservation today are most likely insatiable. And the more they are set and met as parameters for federal agency action, the more vicious becomes the circle they draw. Part III describes the imbalanced triaging system into which the ESA has evolved.

III. DELIBERATE TRIAGE: QUANTIFYING, PRIORITIZING, AND SIGNALING RISKS

Evidence-based conservation and standard risk analyses, especially when decision makers must weigh and compare several disparate choice factors, have daunting informational needs. The further we have delved into “population viability analysis” (“PVA”), the less certain we are that we can ever know which biological entities merit our protection.¹⁴⁸ When integrated into the choice situations that real actors like the Services face, PVA becomes a veritable black hole for information.¹⁴⁹ Thus, judicial review that identifies “rationality” with reason-giving¹⁵⁰ predictably renders agency *inaction* more likely even while our judiciary resists reviewing inaction in itself.¹⁵¹ And the further we look into our future

147. Pub. L. No. 86-797, 74 Stat. 1052 (1960), codified as amended, 16 U.S.C. §§ 670a–o.

148. Many extinction probability estimates are, given the paucity of evidence one way or the other, essentially meaningless. See, e.g., John Feiberg & Stephen P. Ellner, *When Is It Meaningful to Estimate an Extinction Probability?*, 81(7) *ECOLOGY* 2040 (2000).

149. See Martin Drechsler & Mark Burgman, *Combining Population Viability Analysis with Decision Analysis*, 13 *BIODIVERSITY & CONSERV.* 115 (2004). Some of the cognitive barriers are being addressed by the mainstreaming of serviceable PVA software. See Tim Coulson et al., *The Use and Abuse of Population Viability Analysis*, 15(5) *TRENDS ECOL. & EVOL.* 219, 220 (2001). Nothing can eliminate the need for real data, though. *Id.* at 220.

150. Cf. 5 U.S.C. § 706(2)(A) (“The reviewing court shall . . . hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, [or] an abuse of discretion. . . .”); *Ass’n of Data Proc. Serv. Orgs., Inc. v. Board of Governors*, 745 F.2d 677, 684 (D.C. Cir. 1984) (“Review [of agency factual findings] without an agency record . . . comes down to review of reasonableness.”).

151. Cf. Eric Biber, *The Importance of Resource Allocation in Administrative Law*, 60 *ADMIN. L. REV.* 1, 23 (2008) (“Any time a court reviews an agency decision, the court is in

as the outlines of a (radically) disrupted global climate come into focus, the more urgent our decisional trees seem. The recent listing of the Polar bear as “threatened” under the ESA illustrates this trap in Section B. Section A first considers the normative and positive senses of information availability.

*A. The Structuring Influences of Uncertainty: Beyond “Availability”
Heuristics*

The ESA famously joins its most critical required findings to the use of the “best available” “scientific” information.¹⁵² But what is the best available scientific information¹⁵³ *as a norm*? Clearly, there is a sense in which “available” in this standard is just a matter of fact: if an agent possesses scientific data, it must be used.¹⁵⁴ But one evident alternative—a normative sense in which agents must account to someone else for their data gaps—has factored prominently in the few judicial decisions invalidating or questioning the Services’ judgments on the availability of information.¹⁵⁵ And it assumes that

some way interfering with agency resource allocation, and not just where a court compels an agency to take a particular action.”)

152. See Ruhl & Salzman, *supra* note 129, at 16–19.

153. “Best available scientific information” is a phrase that appears in no fewer than a dozen different conservation and environmental statutes—and is defined in none of them. See Holly Doremus, *Listing Decisions under the Endangered Species Act: Why Better Science Isn’t Always Better Policy*, 75 WASH. U. L.Q. 1029, 1034 n.9 (1995).

154. As J.B. Ruhl has argued, this sense of the term renders the clause essentially redundant in our legal system given the scope and nature of “arbitrary and capricious” review pursuant to the Administrative Procedure Act. See J.B. Ruhl, *The Battle over Endangered Species Act Methodology*, 34 ENVTL. L. 555, 582 (2004).

155. See, e.g., *Western Watersheds Project v. Fish & Wildlife Serv.*, 535 F. Supp. 2d 1173, 1183–85 (D. Idaho 2007); *Kern County Farm Bureau v. Allen*, 450 F.3d 1072, 1080–81 (9th Cir. 2006); *Sw. Ctr. for Biological Diversity v. Babbitt*, 926 F. Supp. 920, 924–27 (D. Ariz. 1996). Economists long ago accepted that it could be entirely rational to forego collecting information the costs of which outweighed any of its expected benefits. See, e.g., George J. Stigler, *The Economics of Information*, 69 J. POL. ECON. 213 (1961). This corresponded roughly with the rise of “bounded rationality” as a methodological assumption in the study of human and organizational behavior. Most proponents of such structured search, thus, assume that some kind of “optimal search” strategy exists, at least theoretically, for virtually any informational demand. See Peter Morgan & Richard Manning, *Optimal Search*, 53 ECONOMETRICA 923 (1985). Thus, the “best available” scientific information requirements in the ESA probably allow that some search costs will not be worth incurring. Cf. SCIENCE AND THE ESA, *supra* note 2, at 126–29 (arguing that estimation techniques, even techniques with known flaws, often are clearly superior to information collection in aiding decision making).

judging the informational insufficiencies is rightly carried out by the intensely interested few who go to court and/or by the judiciary¹⁵⁶—returning us to exactly the sort of comparative institutional analysis so few in government have any expertise in conducting.¹⁵⁷

Even putting aside search costs and the risks of indefinite searching, ‘available information’ can be a notoriously corrosive influence in both individual and collective decision making.¹⁵⁸ So-called ‘availability cascades,’ are proven causes of some of the most persistent forms of irrationality and unreason: through these cascades, a pool of agents will keep repeating a mistaken judgment from the “available”—though perhaps radically incomplete or incorrect—information.¹⁵⁹ Moreover, even beyond availability cascades, the “best” available information can subtly rigidify decision makers who, intent on assuring others that they have done their “best,” grow resistant to critique, re-analysis, and/or subsequent correction.¹⁶⁰ Such indirect consequences of the ESA’s underlying premises are surely hard to quantify. And a more immediate concern may be the extent to which this particular normative ideal has rendered ESA “actions” sclerotic.¹⁶¹ So what ought we to expect from the Services as they

156. *Cf.* *Kandra v. United States*, 145 F. Supp. 2d 1192, 1208 (D. Or. 2001) (articulating a presumption that “best available scientific information” is used and requiring a challenging party to rebut that presumption with more than mere allegations).

157. This perhaps explains the waning interest of some courts in “best available information” claims generally. *See, e.g.*, *Ctr. for Biological Diversity v. Badgley*, 335 F.3d 1097 (9th Cir. 2003).

158. *See* PAUL SLOVIC, *THE PERCEPTION OF RISK* 106–07 (2000).

159. *See* Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 *STAN. L. REV.* 683 (1999); Roger G. Noll & James E. Krier, *Some Implications of Cognitive Psychology for Risk Regulation*, 19 *J. LEGAL STUD.* 747 (1990). Even worse is when an “expert” makes such a mistake and then others lazily copy it in light of that actor’s reputation. Kuran & Sunstein, *supra*, at 737–38. A large, diverse population, at least, will not perceive risks according to the same (or “correlated”) biases. Finally, to a measurable extent, some biases are exacerbated and/or trimmed by one’s hard-to-alter “worldviews.” *See* Dan M. Kahan et al., *Fear of Democracy: A Cultural Evaluation of Sunstein on Risk*, 119 *HARV. L. REV.* 1071 (2006); *cf.* Douglas A. Kysar & James Salzman, *Environmental Tribalism*, 87 *MINN. L. REV.* 1099 (2003) (describing the formative influences of “worldview” in qualitative terms).

160. *See* Kuran & Sunstein, *supra* note 159, at 754 & n.249.

161. Litigation brought to enforce this more normative sense of “best available information” against the Services has often been protracted, highly visible, and antagonistic. *See, e.g.*, *Western Watersheds Project v. Kempthorne*, 2008 WL 2338501 (D. Idaho 2008); *Ctr. for Biological Diversity v. Badgley*, 335 F.3d at 1097; *Western Watersheds Project v. Fish & Wildlife Serv.*, 535 F. Supp. 2d 1173 (D. Idaho 2007).

carry out the Herculean tasks required by the ESA? The “policy scientist” suggested by Harold Lasswell and his successors¹⁶²—the skillful professional who blended interdisciplinary science with practical political sense—was always a vision, never a reality.¹⁶³ But as we intuit ways to cope with the two framing assumptions laid out above, both the direct and indirect consequences of the ESA’s “best available” information standards ought to enter the assessment.

Consider for a moment one court’s recent holding that FWS had not used the best available scientific information in reaching a “not warranted” finding on several petitions to list the greater sage grouse.¹⁶⁴ The Service had convened a panel of seven outside scientists with relevant expertise and asked them when the sage grouse would go extinct.¹⁶⁵ Only three of those panelists seemed to believe the grouse was likely to be extinct within a century; the other four said it probably would take longer.¹⁶⁶ The Service director ultimately concluded that listing was not warranted, in large part because of this outcome on the panel.¹⁶⁷ This actually was a rather clever procedure: “majority voting most effectively aggregates the information dispersed among the panel of experts. Nose counting of

162. Lasswell’s ideal was recently refurbished by Professors Shapiro and Schroeder. See Sidney A. Shapiro & Christopher H. Schroeder, *Beyond Cost-Benefit Analysis: A Pragmatic Reorientation*, 32 HARV. ENVTL. L. REV. 433, 437–45 (2008).

163. See James Farr et al., *The Policy Scientist of Democracy: The Discipline of Harold D. Lasswell*, 100 AM. POL. SCI. REV. 579 (2006). “The policy scientist of democracy . . . was—and is—too demanding and contradictory a hero, aspiring to possess too much power and expertise and to sit too closely and comfortably with those in power.” *Id.* at 586.

164. *Western Watersheds Project v. Fish & Wildlife Serv.*, 535 F. Supp. 2d at 1173.

165. *Id.* at 1180. The panel was *not* asked for a final written report or to respond to the listing petitions or to make findings on any particular listing factor in ESA section 4 or on whether to list as threatened or endangered. *Id.* First, the panelists each were given 100 “votes” to allocate as between (1) extinction in 100 years, and/or (2) various intervals longer than 100 years. Each panelist was then asked to rank order the threats facing the grouse. *Id.* Finally, the panelists were given the opportunity to amend their allocation of votes in light of how their peers voted—at which point “36% of the votes cast were for extinction within 100 years”—but sixty-four percent of the votes were cast against that outcome. *Id.*

166. *Id.* at 1180. After the panelists were briefed on existing and projected future conservation projects for the grouse, one of the three recanted their >100 year vote. *Id.* A second panel comprised of FWS managers who had observed the experts’ deliberations was then asked to evaluate how an ESA section 4 analysis ought to come out. That team also chose 100 years as the benchmark timeline and five of those seven believed that the grouse would not go extinct in that period of time. *Id.* at 1181.

167. *Id.*

the assembled experts is a means by which the agency can in effect aggregate expert views, even if the agency itself lacks first-order competence.”¹⁶⁸ Allowing each expert one hundred “votes” gave them an opportunity to express their judgments probabilistically. Unfortunately, on review, Judge Winmill found that the “best science” was “represented by the expert panel”¹⁶⁹ and chastised the agency for aggregating the panelists’ views as it had.¹⁷⁰ In the court’s view, because no record had been kept of the panel’s deliberations, “FWS failed to adequately preserve . . . the ‘best science,’” making it impossible “to review whether the Team and the Director accurately applied the ‘best science’ represented by the expert panel.”¹⁷¹ This was, to put it mildly, naïve. There is no such thing as information unmediated by the persons conveying it.¹⁷² Indeed, FWS’s panel was arguably managed expertly given the possibilities of strategic behavior, groupthink,¹⁷³ and the existence of past ESA section 4 precedents open to conflicting interpretations.¹⁷⁴

The notion that the “best scientific data available” somehow was repressed in the process simply because the agency did not keep a

168. Adrian Vermeule, *The Parliament of the Experts*, 58 DUKE L.J. 2231, 2245 (2009).

169. *Western Watersheds Project v. Fish & Wildlife Serv.*, 535 F. Supp. 2d at 1183 (emphasis added). This is a curious conclusion: the “best science”—or, more specifically, the “best scientific or commercial data available”—cannot be “represented,” by scientists or anyone else. For the ultimate decision on listing belonged to the Director as the Secretary had legally delegated that responsibility to him. *See* 50 C.F.R. § 402.01(b). Of course, probing the Director’s mind was out of the question. *Cf.* *United States v. Morgan*, 313 U.S. 409, 422 (1941) (even where administrative proceeding is “adjudicative” in nature, the official who decides ought never be examined on how his or her decision was made).

170. *Western Watersheds Project v. Fish & Wildlife Serv.*, 535 F. Supp. 2d at 1183–84.

171. *Id.* at 1183–84.

172. Recall, moreover, that courts generally must review the record agencies generate unless a statute requires the record take a particular form. *See, e.g., Camp v. Pitts*, 411 U.S. 138, 142 (1973).

173. It is entirely possible that panel members would have no incentive to vote sincerely, to acquire information in preparation for such panels, or to express themselves candidly had FWS changed any of the conditions under which this panel operated. *See* Vermeule, *supra* note 168, at 2257–74. “[U]nder identifiable conditions, the accuracy of the group’s median or mean member will necessarily exceed that of its single most competent member.” *Id.* at 2259 (citing SCOTT E. PAGE, *THE DIFFERENCE: HOW THE POWER OF DIVERSITY CREATES BETTER GROUPS, FIRMS, SCHOOLS, AND SOCIETIES* 158 (2007)).

174. In *Oregon Natural Resources Council v. Daley*, 6 F. Supp. 2d 1139 (D. Or. 1998), the court used the report generated by an outside expert panel—a panel of experts that had recommended listing the taxa at issue but had not considered all of ESA section 4’s listing factors before doing so—as one of the grounds for invalidating the listing rule under challenge.

detailed enough record of what several experts expressed is an accusation, nothing more.¹⁷⁵ Whatever else the domain experts who populated this panel expressed their judgments on, they almost certainly had no expertise in evaluating the “conservation practices” of the affected actors.¹⁷⁶ Finally, recall that the Act says nothing about how the Services ought to collect or integrate the best scientific information “available.” The Services alone must do that on a rolling—and repeat—basis.¹⁷⁷

B. Constructing a “Foreseeable Future”: Ursus Maritimus at Risk

The Polar bear (*Ursus maritimus*) has become global climate disruption’s mascot precisely because of its powerful symbolism among those who care little about climate change. It presents to those who care very deeply the prospect of motivating others without data or explicit linkages of cause to effect. But what happens when the Polar bear’s persuasive powers run out? Arguments for bold action that involve the Polar bear are, after all, enthymematic: they omit key premises that might, when spelled out, change some minds. Of course, one takeaway from the pitched struggle over centralized regulatory review by the Office of Information and Regulatory Affairs (“OIRA”) is that fear and its manipulation have become key variables in our regulatory state.¹⁷⁸ People can fear the loss of Polar

175. The court had plenty of accusations, too. See *Western Watersheds Project v. Fish & Wildlife Serv.*, 535 F. Supp. 2d at 1183–85, 1187–89. Unfortunately, this was another proceeding in which Julie MacDonald played a role. *Id.* at 11188 (“MacDonald’s principal tactic is to steer the “best science” to a pre-ordained outcome. That may explain why so much of the “best science” in this case was verbally communicated and never reduced to writing . . .”). The bifurcated panel approach is, in large measure, what FWS has used in other proceedings, though. See, e.g., *Western Watersheds Project v. Kempthorne*, 2008 WL 2338501, at *5–14 (D. Idaho 2008).

176. *But cf.* ESA § 4(b)(2)–(3), 16 U.S.C. § 1533(b)(2)–(3).

177. “The magnitude of a perceived risk depends on how readily an individual can recall instances of misfortune associated with that risk.” Kahan et al., *supra* note 159, at 1085. But domain experts are, unfortunately, just as capable of errors in risk perception as lay people. “As is true of disagreements among members of the public generally, disagreements among risk experts are distributed in patterns that cannot plausibly be linked either to access to information or capacity to understand it.” *Id.* at 1093. A wealth of research suggests that even experts are subject to a variety of biasing influences. *Id.* at 1093–96, nn.68–85.

178. Compare CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE (2005) (arguing that ordinary citizens often are induced to fear trivial risks while

bears or pikas¹⁷⁹ without understanding what meaningful action against climate change entails. But what if these fears skew the allocation of scarce conservation resources?

In its recent listing of the Polar bear as “threatened,” FWS confronted a carnivore “believed to be completely dependent upon Arctic sea ice for survival.”¹⁸⁰ Arctic sea ice, of course, is in jeopardy as summers in the Arctic grow warmer and warmer.¹⁸¹ Modeling collected by the Intergovernmental Panel on Climate Change (“IPCC”) suggests these trends will worsen, although substantial variance still divides particular models.¹⁸² Putting together Polar bear ecology and (modeled) future Arctic conditions left FWS with a dilemma: characterizing the urgency of this particular taxon’s troubles. The Act permits “threatened” designations where the taxon is likely to become “endangered” throughout all or a significant portion of its range within the “foreseeable future.”¹⁸³ But what is the *foreseeable* future where global climatological processes are concerned? A century? A decade?

The Polar bear listing was an exercise in default assumptions and informational scarcity, clearly.¹⁸⁴ It was also a signal from FWS to the world at large. Polar bear populations are currently about as robust as at any time on record and the determination was, therefore,

ignoring significant risks and that experts normally will process these risks more rationally), with Kahan et al., *supra* note 159, at 1106–08 (arguing that risks can be misperceived just as readily by experts and that expert dismissals of supposedly trivial risks amount to anti-democratic, illiberal advancement of “partisan visions of the ideal society”).

179. Ruhl, *supra* note 65, at 2 (“[T]he American pika is running out of places to live, and global climate change appears to be the primary cause of its decline.”).

180. 12-Month Petition Finding and Proposed Rule to List the Polar Bear (*Ursus maritimus*) as Threatened Throughout Its Range, 72 Fed. Reg. 1064, 1071 (Jan. 9, 2007) (to be codified at 50 C.F.R. pt. 17) [hereinafter 12-Month Petition].

181. *Id.* at 1071 (“Observations have shown a decline in late summer Arctic sea ice extent of 7.7 percent per decade and in the perennial sea ice area of up to 9.8 percent per decade since 1978.”).

182. *Id.* at 1072.

183. 16 U.S.C. §§ 1532(20), 1533(a), (b)(1)–(2).

184. Cf. Bradley C. Karkkainen, *Bottlenecks and Baselines: Tackling Information Deficits in Environmental Regulation*, 86 TEX. L. REV. 1409, 1421 (2008) (“[T]he burden of information production and the burden of persuasion rest squarely on the regulatory agency, and the default position is that there is no regulation unless and until the agency can establish, by “reasoned elaboration” capable of withstanding judicial review, a convincing . . . justification . . .”).

based on projected habitat loss.¹⁸⁵ Confident predictions of future habitat conditions, in short, were the principal—if not necessarily the sole—grounds for the agency’s finding. Though perhaps unprecedented, this probabilism was long overdue. Yet, paradoxically, the complexities of global climate processes actually make the long run more predictable than the short run on this point.¹⁸⁶ So why would the Service interpret the Act’s foreseeability notion as a function of the Polar bear’s generations? Was it because the International Union for the Conservation of Nature (“IUCN”) had interpreted its forecasting role that way in keeping its so-called “Red List”?¹⁸⁷ With projected ice-free summers by about 2040, the Arctic is now expected to become much less advantageous for Polar bears in about three generations¹⁸⁸—exactly the benchmark IUCN uses for its “vulnerable” status designations.¹⁸⁹ Indeed, the Department of the Interior later stated that default time periods are of little-to-no-value in constructing a “foreseeable” future¹⁹⁰—that foreseeability is

185. See 12-Month Petition, *supra* note 180, at 1081 (positive finding on Factor A); *id.* at 1085 (negative finding for Factor B); *id.* at 1086 (negative finding for Factor C); *id.* at 1091 (negative finding for Factor D); *id.* at 1094 (negative finding for Factor E). The Service did note that future stresses from contaminants (Factor E), over-harvestation, and/or site-specific disturbances (Factor D) could interact with the projected future habitat losses to augment the threats to Polar bears at a population level. *Id.* at 1095.

186. See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 594–645 (2007) (evaluating available models and concluding that variability increases as particular locations and time frames become the focus).

187. IUCN’s Species Survival Commission and its Polar Bear Study Group updated their assessment in 2006, reclassifying the Polar bear as “vulnerable.” 12-Month Petition, *supra* note 180, at 1081. IUCN Red List guidelines allow generations to be calculated in a number of ways, but the most common is as the age of sexual maturity plus fifty percent of the lifetime reproductive period and that vulnerability in the foreseeable future means three generations or less. See STANDARDS AND PETITIONS WORKING GROUP, IUCN SSC BIODIVERSITY ASSESSMENTS SUB-COMMITTEE, GUIDELINES FOR USING THE IUCN RED LIST CATEGORIES AND CRITERIA 22–23 (Version 7.0, 2008) [hereinafter IUCN REDLIST GUIDELINES] (on file with author); 12-Month Petition, *supra* note 180, at 170–71. That put the Polar bear’s generation at fifteen years and the Service found that IUCN’s use of three generations as a baseline in its threat assessments was “reasonable.” *Id.* at 1070.

188. *Id.* at 1080–81.

189. See IUCN REDLIST GUIDELINES, *supra* note 187, at 13.

190. These conclusions contrast with the judge’s notions of foreseeability in the sage grouse case. See *supra* note 164 and accompanying text. Note, however, that the IUCN’s Red List Guidelines stipulate that, in assessing vulnerability, *either* a set period of years *or* certain set generational increments should be used, whichever is longer. IUCN REDLIST GUIDELINES, *supra* note 187, at 56–57.

necessarily a matter of threats and populations and that “reliable predictions with respect to multiple trends and threats over different periods of time” depend upon careful “synthesis.”¹⁹¹ What it has never done is explain the role that such policy judgments play in Service deliberations/actions more generally.

After all, what made FWS’s signal so significant was not its ultimate conclusion: there is widespread agreement that Polar bears face a real risk of extinction.¹⁹² It was methodologically significant in that it took up so much data from so many different domain experts,¹⁹³ assigned a high significance to the probable loss of Arctic sea ice,¹⁹⁴ and yet still purported to produce a wholly factual conclusion: a “danger of extinction throughout all or a significant portion of its range” “within the foreseeable future.”¹⁹⁵ It was significant, that is, because of how separate its assessment of the bear’s “conservation status” was made to seem from that of its

191. *The Meaning of “Foreseeable Future” in Section 3(20) of the Endangered Species Act*, U.S. Dept. of the Interior, Op. Off. Solicitor M-37021, 13 (Jan. 16, 2009).

192. See 12-Month Petition, *supra* note 180, at 1081. Moreover, contrary to implications in some critiques of the Polar bear decision, *see, e.g.*, J. Scott Armstrong et al., *Polar Bear Population Forecasts: A Public-Policy Forecasting Audit*, 38(5) INTERFACES 382, 389 (2008), FWS used the best scientific information *currently available* in responding to the listing petitions—just as the statute required. While the “forecasts” FWS was forced to make involved several key “assumptions,” relied heavily on the still-primitive “general circulation models” available in 2007, and arguably strayed from certain forecasting protocols championed by Armstrong and his colleagues, *see id.* at 383–89, it is pure fantasy to suggest that changes along any of these lines would have rendered the listing proceeding more “scientific.” *But cf.* J. Scott Armstrong et al., *What is the Appropriate Public-Policy Response to Uncertainty?*, 38(5) INTERFACES 404, 405 (2008) (suggesting that FWS did not follow “scientific procedures” in its Polar bear listing proceeding). As Amstrup and colleagues argued in response, GCM’s and basic knowledge of the physics of the Earth’s solar energy balancing make it a virtual certainty that warming will continue as greenhouse gas concentrations rise and that ice-free summers in the Arctic will eventually occur—and that that certainty only increases the further into the future the projections stretch. Steven C. Amstrup et al., *Rebuttal of “Polar Bear Population Forecasts: A Public-Policy Forecasting Audit.”* 39(4) INTERFACES 353, 355–57 (2009). In other words, the immediacy of thawing in the Arctic may be open to reasonable doubt without the probability of thawing being so.

193. See 12-Month Petition, *supra* note 180, at 1065 (a panel of twelve outside experts and ten “peer reviewers” used in Status Assessment).

194. The USGS scientists whose work on the Polar bear supported FWS’s listing determination have said that this probability was unequivocally the most powerful influence in their estimates. *See* Amstrup et al., *supra* note 192, at 9–11.

195. 16 U.S.C. §§ 1532(6), (20) (2000).

“conservation priority.”¹⁹⁶ These two are perhaps epistemically different things—one of them positive, the other normative. Yet, while they may present distinct kinds of choices, they are tightly coupled as a practical matter. For example, a taxon’s chances for survival influence the priority any particular actor assigns its conservation.¹⁹⁷ Before we respond that “status” assessments should always precede “prioritization” in conservation, recall the informational barriers involved and the need for at least *some* prioritizations in order to rank all of the candidates for assessment.¹⁹⁸

Let us consider the Polar bear as a global conservation priority. Assigning it a high priority is at least counterintuitive next to quantitative metrics like richness-to-cost ratios¹⁹⁹ and what it probably will take to arrest the trends in Arctic sea ice. Yet the Polar bear dominated conservation politics for years, literally embodying the implausibility of separating what we know—or think we know—from our priorities. Moreover, given the structure of ESA section 4,²⁰⁰ to say nothing of FWS’s own quite jaundiced listing priority

196. This was important because confusion of conservation status with conservation priority is a common error globally. *See, e.g.*, Rebecca M. Miller et al., *National Threatened Species Listing Based on IUCN Criteria and Regional Guidelines: Current Status and Future Perspectives*, 21(3) CONSERVATION BIOLOGY 684, 689 (2007). Maintaining the distinction in the Polar bear’s case is doubly significant given how comparatively few species are at risk exactly *because* of the Arctic’s loss of sea ice and how extensive will be the measurable human consequences of reversing the causal influences behind that particular environmental disturbance. Judging from the specific rulemakings that followed—including the special rule under ESA section 4(d) and the changes to ESA section 7 consultation procedures (later rescinded)—the Service’s “status” assessment was intimately bound up with its “priority” assessment as a practical matter.

197. *Cf.* THOMAS HOBBS, *LEVIATHAN* ch. XIV 25 (Richard Flathman ed., 1997) (1651) (“[T]o promise that which is known to be Impossible, is no Covenant.”); IMMANUEL KANT, *CRITIQUE OF PURE REASON* A548 (N.K. Smith trans., 1929) (1787) (“The action to which the ‘ought’ applies must indeed be possible under natural conditions.”); Ruhl, *supra* note 179, at 61 (“The agency’s objective should be to avoid accelerating the decline of species who stand no chance of surviving climate change, but not to take measures on their behalf which could pose threats to other species.”).

198. *See supra* notes 45, 149 and accompanying text.

199. *See, e.g.*, Andrew Balmford et al., *Integrating Costs of Conservation into International Priority Setting*, 14 CONSERVATION BIOLOGY 597, 599 (2000); Brooks et al., *supra* note 75, at 60–61.

200. The Act requires the Services to hear and decide petitions roughly as they are filed. *See* 16 U.S.C. § 1533(b)(3); *Ctr. for Biological Diversity v. Norton*, 254 F.3d 833, 837–40 (9th Cir. 2001).

“guidelines,”²⁰¹ FWS was always facing severe constraints in how it responded to the Polar bear petition and justified its actions. As a “signal,” the Polar bear’s listing status today begs the question of how we are responding to conservation’s real challenges.

To put the point more clinically, priority-setting and information availability are inescapably agent-centered. A somewhat clunky—but accurate—depiction of this nexus is that assessments of conservation status and priority are neither exogenous nor endogenous to one another because, while they should be epistemically distinguishable,²⁰² each is vital to the other if they are to do real work as reasons for action. Now FWS only had reason to list and to act to “conserve” the Polar bear by virtue of its legal obligations under the ESA²⁰³ and its findings and conclusions about the bear’s probable future. The balance of its reasons, in other words, stemmed from the norms imposed upon it, its own internal norms, and its “available” information.²⁰⁴ In a real sense, that is, the Services’ duties often are

201. See Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 Fed. Reg. 43,098 (Sept. 21, 1983). In substance, the listing priority guidelines preference taxa that are (1) the most “genetically distinct” from their evolutionary neighbors; (2) facing comparatively “imminent” threats; and (3) likely to benefit from conservation actions. *Id.* at 43103–05. But the Service recognized that assessing these factors was likely to become somewhat paradoxical in practice. *Cf. id.* at 43099 (“[T]he setting of listing priorities is an intermittent, rather than continuous, activity, and . . . information developed on a species believed to have a high priority may indicate that a lower priority is justified, but . . . this situation would not necessarily preclude its being listed while the status information was available and current.”).

202. See, e.g., Holly Doremus, *Scientific and Political Integrity in Environmental Policy*, 86 TEX. L. REV. 1601, 1620–29 (2008).

203. As already mentioned, the Services have been fortifying and rearranging those obligations for decades with their steady stream of rules, regulations, policies, plans, and guidelines. See *supra* note 43 and accompanying text. FWS’s listing priorities could easily have included consideration of the information costs entailed in listing a taxon. *Cf.* Fish and Wildlife Service, Endangered and Threatened Species Listing and Recovery Priority Guideline Notice, 48 Fed. Reg. 43,098, 43,100 (Sept. 1, 1983) (describing comments from Environmental Defense Fund cautioning against the over-analysis of listing decisions). *But see id.* at 43,103–04 (explaining FWS’s three “criteria” in its listing priority matrix: immediacy of threat, magnitude of threat, and the degree of the taxon’s genetic isolation, establishing twelve priority categories).

204. In the petition process, the Services must evaluate the merits of petitions based solely on the information presented in the petition. See, e.g., *Colo. River Cutthroat Trout v. Kempthorne*, 448 F. Supp. 2d 170, 176 (D.D.C. 2006). As for intent, petitioners likely did not expect the Services to weaken the consultation rules or to issue the special ESA section 4(d) rule. They probably rather saw the Polar bear as a public relations campaign. See, e.g., E.B. Boyd, *Kassie Siegel ’95 Promotes the “Bear” Necessities*, WM. & MARY MAG., Summer 2009,

the products of their own deliberation combined with that of others who purposefully deprive them of the discretion they would otherwise need to engage in uninhibited reason balancing. This is perhaps as it should be in a democratic constitutional order,²⁰⁵ but it is also a reminder that the Services' actions hardly ever are straightforwardly probabilistic.²⁰⁶

More significantly, then, notice how FWS's finding on Polar bears confirmed the relevance of IUCN's work to its own section 4 status assessments—signaling the informational influence of that already-expansive network on its practices.²⁰⁷ Given the extraordinary potential scope of this cooperation going forward, this aspect of the Polar bear proceeding may prove the most productive. If ESA practice has shown us anything, it is that combining the Services' deliberations with that of the actors around them is growing increasingly difficult, especially as reviewing courts impose their own normative preconceptions of deliberation²⁰⁸ and as the Services order their own ranks with increasingly cryptic instruments of law, policy, and planning.²⁰⁹ In short, with the costs of deliberation rising, public investments in conservation falling, and the challenges expanding, the practice of endangered species protection may be its own undoing unless and until its agents find better, more efficient ways of partnering and collaborating. Part IV makes the case for shifting the Services' attention considerably as they confront

at 26 (explaining that Siegel and Cummings, lawyers for the Center for Biological Diversity, have long viewed the Polar bear as the ideal public relations tool). They perhaps even intended to spur congressional action on climate change. *See id.* But this is clearly the confusion of means and ends that has become so characteristic of the hyper-strategic environment in which ESA practice occurs today.

205. *See supra* note 36.

206. *Cf.* Leona K. Svancara et al., *Policy-Driven Versus Evidence-based Conservation: A Review of Political Targets and Biological Needs*, 55 *BIOSCIENCE* 989, 990–94 (2005) (contrasting evidence-based measurable goals and politically oriented measurable goals and concluding that the latter have almost always been unrelated to what biology or ecology reveal about species' needs).

207. The public announcement of this cooperation perhaps alleviated some transparency concerns that may have otherwise arisen, *see, e.g.*, Benedict Kingsbury et al., *The Emergence of Global Administrative Law*, 68 *LAW & CONTEMP. PROBS.* 15, 17–21 (2005), although it did nothing to mitigate the potential reputational cascades or other cognitive biases that networks of this kind often exacerbate. *See* Kahan et al., *supra* note 159.

208. *See supra* notes 157–67 and accompanying text.

209. *See supra* notes 40–59 and accompanying text.

“conservation practices” all around them without the resources one would need properly to improve them.

IV. MEASURING WITHOUT MANAGING?: COGNITIVE UNBUNDLING IN A NETWORKED WORLD

A variety of mishaps in quantitation have garnered close attention in risk regulation lately,²¹⁰ reminding us of how badly astray even well-intentioned exercises in quantification can go.²¹¹ To attack the use of quantitative methods root and branch by pointing to the mistakes they have generated is itself irrational, though.²¹² Mistakes are a constant throughout all of practical reason, and refusing to measure simply because of the risk of error is a good heuristic in very few settings. Risk regulation is about imagining possible futures and bringing about the desired futures we can both envision and collectively effectuate knowing what little we do about causes and effects.²¹³ And to posit a quantified present probability of the threats to an organism, population, species, species-assemblage, or

210. The “excesses” of quantitation would include, in the views of many, the use of monetary values to score risk reducing actions, the use of discount rates to scale future benefits/costs back to present value, and a host of other quantitative methods having either minor or serious shortcomings in and of themselves. *See, e.g.*, SHAPIRO & GLICKSMAN, *supra* note 1; ACKERMAN & HEINZERLING, *supra* note 8.

211. As Professor Kysar has argued, “the formal language of the cost-benefit framework is not only irreducibly incomplete; it also is capable of denying its own incompleteness.” Douglas A. Kysar, *Discounting . . . On Stilts*, 74 U. CHI. L. REV. 119, 138 (2007). Unfortunately, though, qualitative reasoning purged of numeric estimation is just as “incomplete,” if not more so.

212. *See* MATTHEW D. ADLER & ERIC A. POSNER, *NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS* 1–2 (2006); RICHARD L. REVESZ & MICHAEL A. LIVERMORE, *RETAKING RATIONALITY: HOW COST-BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH* (2008). Indeed, virtually any quantitative technique can, given the right time and place, serve as a useful tool to policymakers. *See, e.g.*, Shane Frederick et al., *Time Discounting and Time Preference: A Critical Review*, 40 J. ECON. LIT. 351 (2002) (reviewing the various methods and justifications for time discounting).

213. As Professor Dan Esty put it:

Uncertainty seems to be the hallmark of the environmental domain. Disagreements over how best to cope with information deficits have translated into bitterly partisan and divisive environmental politics and limited progress in recent years in pollution control and natural resource stewardship. Perhaps this picture represents the inescapable reality of the environmental realm.

Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 114, 118 (2005).

ecosystem, is merely to continue our “Enlightenment” so often traced to Newton, Leibniz, Hume, Bayes, and their successors.²¹⁴ But modern conservation—compounding multiple probabilities estimated from disparate epistemic domains—requires many minds working in concert. That inevitably injects the imprecision of communication and the hazards of strategic, lazy, and/or biased decision making, all while attracting attention as a uniquely normative social event. Discouragingly, the more this form of collective action is patterned to our legal system as it is, the less ably it seems to approximate simple rationality.

Of course this is not an interpretive argument. The ESA itself obviously assumes a healthy measure of risk assessment (conservation “status”) and risk management (prioritization and implementation) by its agents.²¹⁵ The private sector, too, has begun separating these two broad kinds of work.²¹⁶ When we confront defined probabilities, we have long supposed that the right response is to multiply whatever harm or benefit is at issue by that probability to derive a kind of “discounted” factor and even to do so continuously as events unfold and information changes.²¹⁷ That,

214. Compare COLIN HOWSON, HUME’S PROBLEM: INDUCTION AND THE JUSTIFICATION OF BELIEF 168–220 (2000) (interpreting Hume’s discussions of causality and probability throughout the *Treatise* and the *Enquiry* as a precursor to Bayes’s concept of probability which collapsed it into partial beliefs subject to rationality constraints), with Michael E. Gilpin & Michael E. Soulé, *Minimum Viable Populations: Processes of Species Extinction*, in CONSERVATION BIOLOGY: THE SCIENCE OF SCARCITY AND DIVERSITY 19 (Michael E. Soulé ed., 1986) (proposing a mode of analysis, later known as population viability analysis, that seeks to isolate stochastic and deterministic influences relative to each other in order to enable quantitative measurement of the threats to survival). See also DAVID HUME, A TREATISE OF HUMAN NATURE 334 (1740) (Dover 2003) (setting out Hume’s famous dictum that “is” and “ought” require different forms of reasoning).

215. See, e.g., Oliver A. Houck, *Of Bats, Birds, and B-A-T: The Convergent Evolution of Environmental Law*, 63 MISS. L.J. 403 (1994).

216. See, e.g., CRAIG R. GROVES, DRAFTING A CONSERVATION BLUEPRINT (2003) (outlining an evidence-based approach to conservation planning by The Nature Conservancy or other resource acquisition firms).

217. See John D. Graham & Jonathan Baert Wiener, *Confronting Risk Tradeoffs*, in RISK VERSUS RISK, *supra* note 7, at 1. The cognitive capacity to execute such successive comparisons is another matter entirely. See *id.* On that more adaptive, “Bayesian” approach to, for example, population viability analysis, see Bruce G. Marcot et al., *Using Bayesian Belief Networks to Evaluate Fish and Wildlife Population Viability under Land Management Alternatives from an Environmental Impact Statement*, 153 FOREST ECOLOGY & MGMT. 29 (2001).

however, demands continuous refinement of probabilities and fairly precise accounts of the relevance of consequences.²¹⁸ Given the pace of conservation practice, those conditions alone are enough for misgivings about ambitious quantification. Moreover, an added difficulty comes when internally plural actors—such as the Services—must aggregate dispersed information and then collectively weigh their choice factors. Because risks are unevenly distributed and the disparities of exposure are widely perceived, high-profile deliberations of the kind (like ESA section 4 status changes) become an opportunity to revisit society’s deepest fissures. So what is to be done? Part IV argues that unbundling and better distributing conservation’s tasks may well be our best hope for developing institutions with true comparative advantages.

A. Conservation Assessment in a Hostile World

The Services face two daunting challenges framed by the ESA in its current form. First, they need to better adapt institutionally to the constant advances of probabilistic reasoning across a wide variety of relevant domains. Biology today is on the brink of giant leaps forward as we work to create the digital architecture empowering thousands (if not millions) of collaborators to pool and integrate their own bits of observational data.²¹⁹ To look at them, the Services seemed poised to play essentially no role in that endeavor. ESA section 4 is just one example of a statute requiring the Services to solve for an array of complex, multivariate equations and to give reasons for whatever judgments they reach. And, given the chances that these reasons will be rejected in any given action, it is unsurprising that they have learned how to announce and defend,²²⁰

218. Establishing the (social) relevance of consequences in conservation is fraught with difficulty given the pervasive moral and political disagreements over what Kenneth Goodpaster called “moral considerability.” See Kenneth Goodpaster, *On Being Morally Considerable*, 75 J. PHIL. 308 (1978). With deep disagreement over the relevance of consequences, investments in quantification often are moot. See generally Kai M Chan et al., *When Agendas Collide: Human Welfare and Biological Conservation*, 21 CONSERV. BIO. 59 (2007).

219. See Steve Kelling et al., *Data-Intensive Science: A New Paradigm for Biodiversity Studies*, 59 BIOSCIENCE 613 (2009).

220. See Alejandro E. Camacho, *Can Regulation Evolve?: Lessons from a Study in Maladaptive Management*, 55 U.C.L.A. L. REV. 293, 308–23 (2007).

to dissemble when new data question their conclusions,²²¹ and to minimize exposing their overall insufficiency for the jobs Congress handed them.²²²

The obvious upshot of being organized for multiple roles is that the Services cannot optimize for any single role. And that means that, generally speaking, resources are a *chief* constraint.²²³ Ideally, the Services would have the expertise to provide needed coordination to the research currently being done on demography, dispersal, colonization, migration, habitat disruption, and speciation.²²⁴ But they are incapable of doing so today and, indeed, too often are unaware such research is even being conducted.²²⁵ In short, the Services have a lot of improving to do as networks.

Secondly, and relatedly, they must better structure themselves to fit a fiscal environment and a political world full of existing “conservation practices” that are both hostile to top-down prescriptions of how properly to value nature. Jurisdictional plurality and the conditions it sets for democracy are genetically encoded in America and, by extension, in its conservation statutes. Our vertical and horizontal divisions of authority are more standard than ever today, even as our culture, economy, and communities scale upward and outward.²²⁶ And handing a society’s richest, most challenging

221. See, e.g., Philip Kline, *Grizzly Bear Blues: A Case Study of the Endangered Species Act’s Delisting Process and Recovery Plan Requirements*, 31 ENVTL. L. 371 (2001) (detailing the selectivity of data uptake in the recovery planning for Grizzly bears).

222. See Jamison E. Colburn, *The Indignity of Federal Wildlife Habitat Law*, 57 ALA. L. REV. 417 (2005).

223. It is even possible to model the effects of “enactments costs”—the procedural and other investments agencies must make in their policymaking actions—on an agency’s incentives to invest in acquiring expertise. See Matthew C. Stephenson, *Bureaucratic Decision Costs and Endogenous Agency Expertise*, 23 J.L. ECON. & ORG. 469 (2007).

224. See JAMES H. BROWN, *MACROECOLOGY* 230–35 (1995).

225. The accounts are too numerous to cite detailing the lack of scientific awareness—or blatant disregard of scientific data—at some decisional juncture within one of the Services. See, e.g., Liza Gross, *Why Not the Best?: How Science Failed the Florida Panther*, 3(9) PLOS BIO. 1525 (2005) (detailing the ignorance and suppression of scientific data indicating demographic crises as a result of habitat loss in the remaining Florida panthers of southwestern Florida). Even if total awareness of the natural sciences were possible, the Services would still need to acquire a far better understanding of human behavior, as well. Cf. Chan et al., *supra* note 218, at 65 (“Conservation biologists must also become more adept at bridging disciplinary divides and consulting the social science literature for insights about how to design culturally, politically, and socioeconomically appropriate conservation plans.”).

226. This is our constitutionalism’s paradox in a cosmopolitan world, though, not

questions about its relationship to nature to two smallish agencies with sub-cabinet-level leadership and politically vulnerable budgets is an odd way of prioritizing biodiversity. The Services need political leaders capable of reworking their organizations at a structural level.

Organizational psychology has long distinguished between “disjunctive” tasks, in which only one person needs to succeed for the group to be successful, and “conjunctive” tasks in which each person’s contribution is critical to success.²²⁷ The ESA saddles the Services with far too many conjunctive tasks today, inviting their opponents to disrupt, delay, and defeat them²²⁸ and leaving them prone to side-tracking.²²⁹ From “candidate” status to designated critical habitat for the Canada lynx contiguous-U.S. DPS took over twenty years—and is probably still not settled.²³⁰ If things were measurably improved for the lynx in that period, it was not due to FWS’s swift actions on its behalf.

It is often said that novices count in fives or tens while experts count in sixteenths. But this is half right at best. Most experts know

conservation’s. *See, e.g.*, ROBERT A. SCHAPIRO, POLYPHONIC FEDERALISM: TOWARD THE PROTECTION OF FUNDAMENTAL RIGHTS 10 (2009) (“Federalism is often linked with localism, with respect and affection for local institutions and local culture. Federalism generally exists in opposition to nationalism. The nationalizing trends in the United States, though, seem to be increasing.”); *cf.* EDWARD L. RUBIN, BEYOND CAMELOT: RETHINKING POLITICS AND LAW FOR THE MODERN STATE 47 (2005) (“The reified, nonheuristic character of the three-branch metaphor produces fruit of [an] . . . addictive nature. As a general matter, it induces us to underemphasize the administrative character of our government and overemphasize the value of political and judicial controls.”).

227. *See, e.g.*, Ivan D. Steiner, *Models for Inferring Relationships between Group Size and Potential Group Productivity*, 11(4) BEHAV. SCI. 273 (1966).

228. *See supra* note 44 and accompanying text.

229. *See* Wyman, *supra* note 45; Sinden, *supra* note 128;

230. In *Defenders of Wildlife v. Kempthorne*, No. 04-1230 (GK) 2006 WL 2844232 (D.D.C. 2006), the district court heard arguments on whether FWS had properly answered all of the court’s questions about its findings and conclusions when listing the lynx as “threatened” (and not “endangered”) in 2001. *Id.* at *9–13. Judge Kessler found that FWS had *not* fully answered why the loss of lynx range and abundance in the contiguous United States was not sufficient to list it as endangered under ESA section 4 and remanded the matter to FWS for a better explanation—which she “hope[d] that FWS [could] accomplish . . . within 90 days.” *Id.* at *13. FWS obliged and “clarified” its conclusions on the lynx’s status, *see* Clarification of Significant Portion of the Range for the Contiguous United States Distinct Population Segment of the Canada Lynx, 72 Fed. Reg. 1186 (Jan. 10, 2007) (to be codified at 50 C.F.R. pt. 17), but later noticed yet another status review involving further geographic coverage for the DPS. *See* 90-Day Finding on a Petition to Change the Listing Status of the Canada Lynx, 73 Fed. Reg. 76,990 (Dec. 18, 2008) (to be codified at 50 C.F.R. pt. 17).

that cognitive shortcutting is indispensable in practice. Take the Services' "warranted-but-precluded" findings and the paradoxical "candidate" statuses they now bestow.²³¹ These are necessarily *relative* prioritizations based on qualitative judgments like the supposed "magnitude" of known threats to a certain taxa.²³² Because of the forces bearing down on them, though, the Services must literally over-parameterize these assessments in order to give plausible reasons for their actions—reasons that obscure deeply normative judgments of scale, value, and intuitive risk assessment.²³³ Instead of conducting these analyses systematically, the Services camouflage them and obscure the fact that they generate irreducibly *qualitative* judgments. "Well-designed risk-assessment processes create products that serve the needs of a community of consumers, including risk-managers, community and industrial stakeholders, risk assessors themselves, and ultimately the public."²³⁴ If ESA section 4 could be that dialectical, the Services seem not to have noticed.²³⁵

Try as we have, and no matter how often we are reminded that personifying agents of the state comes at great cost,²³⁶ we still misperceive entities like the Services as "persons"²³⁷ instead of

231. See *supra* notes 66–72, 79 and accompanying text.

232. See Listing Priority Guidelines, 48 Fed. Reg. 43,098, 43,103 (Sept. 21, 1983).

233. The list of precedents demanding better, clearer "reasons" for warranted-but-precluded findings is long and growing. See, e.g., *Friends of the Wild Swan, Inc. v. U.S. Fish and Wildlife Serv.*, 945 F. Supp. at 1388; *Carlton v. Babbitt*, 900 F. Supp. 526 (D.D.C. 1995).

The Ninth Circuit, in particular, has taken to this game, demanding that clear "reasons" for a warranted-but-precluded finding be published concurrent with the "finding." See, e.g., *Ctr. for Biological Diversity v. Norton*, 254 F.3d 833 (9th Cir. 2001); *Ctr. for Biological Diversity v. Kempthorne*, 466 F.3d 1098, 1098 (9th Cir. 2006). That court seems oblivious to the resource-constrained context of this struggle, though.

234. SCIENCE AND DECISIONS, *supra* note 2, at 65.

235. Instead, we have shifting and inconsistent applications of (vague) concepts like "distinct population segments," see *supra* note 97 and accompanying text, incomplete economic analyses of the practical value of critical habitat designations, see *supra* notes 113, 130 and accompanying text, and cryptic legal norms like the Listing Priority Guidelines. See *supra* notes 87, 201, 203, 232 and accompanying text.

236. See, e.g., CHARLES R. BEITZ, *POLITICAL THEORY AND INTERNATIONAL RELATIONS* 180 (1979) ("States are not sources of ends in the same sense as are persons. Instead, states are systems of shared practices and institutions within which communities of persons establish and advance their ends."). See generally Daryl J. Levinson, *Making Governments Pay: Markets, Politics, and the Allocation of Constitutional Costs*, 67 U. CHI. L. REV. 345 (2000).

237. Cf. HOBBS, *supra* note 197 (conceiving of the "state" as a legal person named "Leviathan").

viewing them as the networks of interconnected agents and teams they truly are.²³⁸ If decision costs are depleting the Services as actors, maybe they should simplify or shed some of those decisions. In other words, given that priority-setting and information availability are agent-centered, perhaps the wisest reform is to *unbundle* these steps as conservation tasks, distribute them to different agents, and monitor the way in which partnerships form. As Georgina Mace has argued, there are two fundamentally different kinds of actions conservation requires:

On the one hand species are units for listing whereas on the other they are the identifiable targets for conservation actions on the ground. Both of these activities require that there is a valid and documented name, against which candidates for listing, protection and management can be tested. . . . However, listing on the one hand, and designing and implementing practical conservation actions *in situ* on the other, are very different processes. . . . [T]hese two kinds of major conservation activity . . . have different purposes, constraints, and requirements.²³⁹

As our rehearsals of the Canada lynx and Polar bear sagas underscored, establishing and describing relevant biological entities and the threats they face is its own struggle, rendered more treacherous by the vagaries of the *biological species concept* (“BSC”).²⁴⁰ Without a stable identity, it is impossible to say what is at risk, and the truth is that, too often, biology raises more questions than it answers about natural kinds.²⁴¹ The actual expression of those

238. See RUBIN, *supra* note 226, at 53 (“The network metaphor provides an alternative image of government to the . . . image of three separate branches.”).

239. Georgina M. Mace, *The Role of Taxonomy in Species Conservation*, 359 PHIL. TRANS. R. SOC. LOND. 711, 713 (2004).

240. See Fuller, *supra* note 125; see also Agapow et al., *supra* note 126, at 163 (“BSC can illuminate only a small fragment of the Tree of Life.”).

241. Cf. Brent D. Mishler & Robert N. Brandon, *Individuality, Pluralism, and the Phylogenetic Species Concept*, 2 BIOLOGY & PHIL. 397, 398 (1987) (“[N]either species nor other biological taxa can *productively* be viewed as sets or classes defined by possession of certain features.”); see also T.E. Wilkerson, *Species, Essences and the Names of Natural Kinds*, 43 PHIL. Q. 1, 3 (1993) (“We confidently apply the word ‘tiger’, literally or metaphorically pointing to certain typical tigers, but may not have the faintest idea what actually determines membership of the kind.”); Michael Donoghue, *A Critique of the Biological Species Concept*

kinds genetically, spatially, morphologically, and ecologically, is precisely what commends the decentralization and distribution of our decision making.²⁴² The top-down BSC, in short, is probably coming to the end of its useful life.²⁴³

Yet the actions that aim to protect habitat and reproduction *in situ* are equally complicated and no less cognitively demanding. Will the critical habitat designation measurably improve the Canada lynx's chances in the contiguous United States?²⁴⁴ On the evidence, it is essentially a coin flip.²⁴⁵ There certainly is a substantial federal role

and Recommendations for a Phylogenetic Alternative, 88(3) THE BRYOLOGIST 172, 173 (1985) (“The biological species concept rests on the idea that interbreeding . . . is of prime importance in evolution, i.e., breeding determines whether morphological or ecological divergence can occur. This theory now appears grossly oversimplified and, as a result, so does the biological species concept.”).

242. Shifting across these dimensions of natural kinds shifts conservation's spatial and temporal scales and can therefore shift its political salience, perhaps in counter-intuitively productive ways. Cf. Chrisoula Andreou, *Environmental Preservation and Second-Order Procrastination*, 35(3) PHIL. & PUB. AFF. 233 (2007) (arguing that persistent procrastination on conservation measures is not necessarily tantamount to hypocrisy and that some preferences are just not normally expressed until the prospect of looming losses). “When there is nothing I need to do immediately but plenty I need to do at some point, I often break out of my list of things to do and start in right away on those tasks that I can clearly see my way to accomplishing.” *Id.* at 248.

But note that experts contributing to one of the Services' section 4 status assessments are increasingly likely to be aware of the consequences that can flow from their choices and, therefore, that the continued lockstep linkage of risk assessment and risk management under the ESA will not necessarily optimize “available” information. Experts, in particular, seem given to masking disagreements they cannot explain to non-experts. So, for example:

[j]oint acceptance of a position is consistent with considerable disagreement among group members, and with considerable abstention as well. I may agree to let *p* stand as my *group's* position, even though I *myself* reject it and accept *q* instead. . . . Given the meaning of joint acceptance, and the obligations incurred in an act of joint of acceptance, this form of agreement can clearly lead to the withholding of information about the state of knowledge, and especially t he extent of disagreement within a group.

John Beatty, *Masking Disagreement among Experts*, 52 EPISTEME 53 (2006). Finally, given the pervasive human tendency to discount future consequences, dampening information flows in this way can make centralization into a recipe for inaction. Andreou, *supra*, at 245–48.

243. This is not to say that a reauthorized ESA would omit the species concept. Various bottom-up successors to the BSC, some quite powerful, have been in development for years. See Agapow et al., *supra* note 126, at 163.

244. See *supra* notes 44, 128, 132 and accompanying text.

245. Many types of evidence have, of course, been brought to bear on this and similar questions of habitat protection. See, e.g., Amara Brook et al., *Landowners' Responses to an Endangered Species Act Listing and Implications for Encouraging Conservation*, 17

in protecting habitat, as I have argued elsewhere. But decoupling the different aspects of that role and distributing the pieces might allow the Services, for example, to develop exactly the kind of comparative institutional analyses needed for the choices ESA section 4(b)(3) prefigures.²⁴⁶ Furthermore, better distribution could reduce the “uncertainty absorption” for which complex organizations are notorious,²⁴⁷ bring greater cognitive diversity to bear in assessing the risks to nature’s vast composition and complex functionality,²⁴⁸ and—given our fragmentary jurisdictions—increase the opportunities to address those risks at a variety of spatial and temporal scales.²⁴⁹

Thus, as presently constituted, the Services would perhaps do best to focus their energies on the “status assessments” from which modern, evidence-based conservation begins.²⁵⁰ Marrying all of the uncertainties and conflicts that *in situ* conservation actions entail to the risk assessments that are already complicated by our biological sciences is almost certainly asking one agent to do too much.²⁵¹ It

CONSERVATION BIOLOGY 1638 (2003); Dean Lueck & Jeffrey A. Michael, *Preemptive Habitat Destruction under the Endangered Species Act*, 46 J.L. & ECON. 27 (2003).

246. Professor Sinden argues that courts ought to expect less from the Services in these decisions, as if insistent litigants threatened by critical habitat designations will not simply shift their focus to some other (analytical) shortfall(s). See Sinden, *supra* note 128, at 161–83. More importantly, though, a sophisticated cost-benefit analysis of critical habitat designations as practical, *in situ* conservation measures might actually empower others to take cost-effective actions in service of the taxon’s habitat needs and perhaps even to coordinate those actions at broader scales.

247. See, e.g., HERBERT A. SIMON, *ADMINISTRATIVE BEHAVIOR: A STUDY OF DECISION-MAKING PROCESSES IN ADMINISTRATIVE ORGANIZATIONS* (4th ed. 1997).

248. Cf. Kahan et al., *supra* note 159, at 1083–88 (collecting evidence suggesting that cognitive diversity ameliorates biases that often diminish the collective decision-making capacities of homogenous groups).

249. On the urgent need for this kind of diversification, see William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1 (2003); Kirsten H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159 (2006); Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 MICH. L. REV. 570 (1996); Richard L. Revesz, *Federalism and Environmental Regulation: A Public Policy Analysis*, 115 HARV. L. REV. 553 (2001).

250. Cf. SCIENCE AND DECISIONS, *supra* note 2, at 48 (critiquing EPA “risk assessment” and “risk management” practices by observing that different kinds of professionals comprise the work teams doing one or the other and observing that risk assessors and risk managers have different roles).

251. Cf. SCIENCE AND DECISIONS, *supra* note 2, at 222–24.

[T]o ensure that risk assessments are maximally useful for risk-management decisions, the questions that risk assessments need to address must be raised before

compounds the practical problems of taxonomy with those of axiology—the study of quality and value—to create a cognitively gargantuan decision point. Combined, these two are making evidence-based conservation under the ESA incorrigibly complex and submerging it in an ocean of epistemic and normative conflict. The most plausible solution, in short, is to better distribute the tasks to prevent any one of them from dragging down the whole vessel.

B. Integrative Conservation: Qualitative and Quantitative by Design

Nature's composition and function are both vital and are both arguably in jeopardy.²⁵² Focusing on one to the other's exclusion has always been a questionable interpretation of the ESA, to say nothing of our common purposes. But it has been over twenty years since Agee and Johnson's pioneering work emphasizing the sort of omniscient "ecosystem management"²⁵³ that the prophylactic guarding of both composition and function would entail. As we form our priorities, ESA section 4 status changes stand out for the unavoidably value-driven choices they entail. They showcase the importance of resource constraints and just how profoundly such choices are affected by the perspectives from which we approach them. "Ask a hundred people to view a forest that has recently experienced a hurricane or crown fire, and few would say they are looking at a healthy ecosystem. From the perspective of a

risk assessment is conducted and may need to be different from the questions that risk assessors have traditionally been tasked with answering.

....

[R]isk assessment is of little usefulness, and can even waste resources, if it is not oriented to help discriminate among risk-management options that have to be informed by risk (and often nonrisk) considerations.

Id.

252. See J. Baird Callicott et al., *Current Normative Concepts in Conservation*, 13 CONSERVATION BIOLOGY 22 (1998) (exploring the distinction between compositionism and functionalism). Current extinction *rates* are thought to be three or four orders of magnitude greater than the norm (judging by the fossil record), imperiling both composition and function. See Stuart L. Pimm et al., *The Future of Biodiversity*, 269 SCIENCE 347, 347 (1995).

253. See ECOSYSTEM MANAGEMENT FOR PARKS AND WILDERNESS (James K. Agee & Darryll R. Johnson eds., 1988).

woodpecker or bark beetle, however, a forest with hundreds of dead trees is very healthy indeed.”²⁵⁴

The moral considerability of *all* people, of *future* people, and/or of *only* people is, in other words, fundamental to any real estimation of our collective priorities.²⁵⁵ Such considerations are deeply foreign to the administrative process, though. ESA decisions are made in a context that virtually precludes meaningful engagement on the big questions, ensuring that the deliberations they entail are far too costly for what they can possibly yield: a little help for a few taxa and a little public education.²⁵⁶ The ESA has evolved to a point where its quantitative aspirations are depleting and discrediting its fundamentally qualitative substance because the steps that ought to be decentralized and distributed are not, even while—at the same time—decisions that ought to be made carefully and authoritatively are over-abundant, over-partitioned, and lost in the commotion. Ironically enough, it was work on a single carnivore population, Yellowstone grizzlies, which pushed Agee and Johnson (and so many others) to scale up their assessments and managerial ambitions a generation ago.²⁵⁷ But it is a deeply political enterprise to raise the priority questions and engage them and the actors they interest in a full-scaled consideration of what we collectively view as desirable future conditions. This is perhaps why the ESA has limped along for eighteen years now without ever being reauthorized.²⁵⁸ The risks in so wide a political theatre—especially in the context of our anemic political culture—seem too daunting. The temptation is to keep finding Polar bears and using them as a kind of political judo.

254. Malcolm L. Hunter Jr., *Refining Normative Concepts in Conservation*, 14 CONSERVATION BIOLOGY 573, 573 (2000).

255. For the record, I am deeply skeptical that we can rightly discount future *lives*. See, e.g., John Broome, *Cost-Benefit Analysis and Population*, 29 J. LEGAL STUDS. 953, 970 (2000). On the other hand, without doing so, the simple quantity of projected future lives quickly dwarves our own satisfaction in comparison.

256. Note that, by IUCN’s criteria, for example, at least a quarter of all mammal species are at present risk of extinction. See Natasha Gilbert, *A Quarter of Mammals Face Extinction*, 455 NATURE 717 (Oct. 9, 2008).

257. See ECOSYSTEM MANAGEMENT FOR PARKS AND WILDERNESS, *supra* note 253.

258. The statute has not been reauthorized since 1992. See Congressional Research Service, *Reauthorization of the Endangered Species Act (ESA): A Comparison of Pending Bills and Proposed Amendment with Current Law 1* (2006).

Yet if we aspire to anything like broad-scale conservation, the public's agents must find ways to study, describe, and propose the means of resilience—not as their managerial ends, but rather as robust and scalable metrics for everyone else to use. This would be a mission tailored to the networked, data-driven, multi-agent environments of today. Launching that mission would include (1) the immediate conduct of several cross-cutting “value-of-information” analyses; (2) the design and incremental specification of measurable outcomes for various kinds of “protected areas”; (3) the development of models that describe how the human, biological, physical, and chemical components of the whole “earth system” interact; (4) boosting the funding of basic research into the genetic and evolutionary processes of speciation; and (5) sorting out and ordering our now all-pervasive modes of “informal” regulation.

Taking them in order, “[a] fundamental aspect of decision-making under uncertainty involves the inevitable choice between making an immediate decision with the information and analysis available and delaying the decision while, for example, more raw information is collected. . . .”²⁵⁹ And several chronic sources of uncertainty across a variety of ESA contexts are, at least in theory, eliminable. Yet the Services have never developed generic methods for optimizing data collection/analysis efforts based on the expected *practical* value of the information to be gathered.²⁶⁰ This kind of meta-analysis is now standard in risk regulation, and it should be for biodiversity too.²⁶¹

259. SCIENCE AND DECISIONS, *supra* note 2, at 82.

260. Demographic connectivity, for example, is an extremely promising—and under-explored—field. See Stephen R. Palumbi, *Population Genetics, Demographic Connectivity, and the Design of Marine Reserves*, 13(1) ECOLOGICAL APPLICATIONS (Supplement) S146 (2003). A better understanding of demographic connectivity would enhance our ability to scale viability analyses and threat assessments of different kinds. For information that is likely of high value in ESA section 4 status changes and, in particular, priority ranking “candidate” species, the overall representativeness and/or efficacy of surrogate (“keystone,” “flagship,” “umbrella,” etc.) species as managerial foci is another area the Services would both do well to investigate. See T.M. Caro & Gillian O’Doherty, *On the Use of Surrogate Species in Conservation Biology*, 13 CONSERVATION BIOLOGY 805 (1998).

261. Value-of-information (“VOI”) analysis is decision-centric. “In a VOI analysis, an information source is valued solely on the basis of the probability and magnitude of its potential impacts on a specific decision at a specific time with a specific state of prior knowledge.” SCIENCE AND DECISIONS, *supra* note 2, at 82. Given the diversity of decision makers governing habitat and other facets of conservation, this kind of analysis would inevitably draw in a range

Second, a generation after reinterpreting our parks, refuges, and other public lands as a network of so many “protected areas,” we seem no closer to a concrete understanding of their needs or long-term performance.²⁶² Today, we know that protectedness is relative and that a range of governance regimes encourage and discourage our various uses of land. Yet, from tax-subsidized conservation easements to critical habitat designations (barely restricting governmental action itself) to the massive sanctuaries like Yellowstone—and all manner of local and state variation in between—protected areas today are a broad, deep category with hardly any scalable metrics by which to benchmark their performances. Enumerating such metrics and identifying the thresholds at which these different regimes might actually pursue our optima should be a high priority.²⁶³ Third, “it appears . . . that we are concentrating our monitoring efforts on species which most closely resemble ourselves, in places where people with the most money and spare time happen to live.”²⁶⁴ Even a crude understanding of complex systems—and certainly our present knowledge of how tightly coupled systems interact—rejects that strategy. Lacking the panoramic data we need, though, the most we can do is to begin modeling and funding more basic research into how natural differentiation actually occurs.²⁶⁵

of partners as parameters must be defined and quantified. *See supra* note 2 and accompanying text.

262. As I have argued elsewhere, the evidence we do have suggests that every protected area loses species richness over time. *See* Colburn, *supra* note 23, at 453–65.

263. *See, e.g.*, Malcolm L. Hunter, Jr. et al., *Thresholds and the Mismatch Between Environmental Laws and Ecosystems*, 23 CONSERVATION BIOLOGY 1053, 1053 (2009).

264. Andrew Balmford et al., *The 2010 Challenge: Data Availability, Information Needs and Extraterrestrial Insights*, 360 PHIL. TRANSACTIONS BIOLOGICAL SCI. 221, 224 (2005).

265. *See* Andrew Balmford et al., *The Convention on Biological Diversity’s 2010 Target*, 307 SCIENCE 212, 212–13 (Jan. 14, 2005) (arguing that the development of super-models that collocate human, biological, physical, and chemical components of the whole “earth system” would at least guide future data collection efforts). Likewise, the state of actual research (largely simulations, models, and other mathematical gap-filling) into speciation and whether, for example, physical barriers always play roles in genotypic or phenotypic differentiation, remains primitive. *See, e.g.*, M.A.M. de Aguiar et al., *Global Patterns of Speciation and Diversity*, 460 NATURE 384 (July 16, 2009) (reporting simulation results suggesting physical barriers are not necessary for speciation to occur and demographic stochasticity might be sufficient). Four decades after MacArthur and Wilson published *The Theory of Island Biogeography*, indeed, we still have but hypotheses on the basic relationships between

Finally, the path-dependence of the Polar bear and lynx sagas should remind us just how intertwined our normative and informational troubles have become. As our agencies drift toward increasingly informal modes of regulation, devices like the priority ranking guidelines,²⁶⁶ DPS policy,²⁶⁷ and FWS's professed disfavor of critical habitat designations,²⁶⁸ are guiding more and more legal agents without governing them.²⁶⁹ Never "enacted" as such, these quasi-legal instruments are now affecting actions like listing determinations in rather inscrutable ways.²⁷⁰ If judicial review truly is a core mode of holding government accountable, the precise point and direction that these instruments enter into agency deliberations must be made clearer.

CONCLUSIONS

Our deepest trouble is that risk has no antonym. The future of biodiversity is a variety of loss scenarios—some worse than others—and the only thing that can turn these risks into facts is time. Risk is an indexical expression of possible futures—one that implicitly brackets debates about, or the mediation of, harms to the present as such. Thus, to a significant degree, the normative considerations that define consequences as good or bad are obscured in the quantification of risk. And people bridle at the way such expressions constrain them. But failing or refusing to quantify risk because it might complicate the collective prioritizations we need to address risks—because, for example, it "disempowers"²⁷¹ the policymaker or the

populations and environments. *See, e.g.*, STEPHEN P. HUBBELL, *THE UNIFIED NEUTRAL THEORY OF BIODIVERSITY AND BIOGEOGRAPHY* (2001).

266. *See supra* notes 201–06 and accompanying text.

267. *See supra* notes 100–08 and accompanying text.

268. *See supra* notes 111–15, 119–23, 128–39 and accompanying text.

269. *See* Colburn, *Agency Interpretations*, *supra* note 33.

270. FWS's infamous "Petition Management Guidance" highlighted this analytical problem with the Services' "policies," "plans," and "guidelines." *See* Am. Lands Alliance v. Norton, 360 F. Supp. 2d 1 (D.D.C. 2003); *cf.* Fischman, *supra* note 21, at 122 (arguing that Service "policies" published as "notices" in the *Federal Register* are more law-like than other internal agency communications and bind the agency until validly repealed or amended because they approximate the procedures set out in 5 U.S.C. § 553).

271. *See* Sinden, *supra* note 128, at 207.

public—is to leave our troubles “hopelessly indeterminate”²⁷² just because quantification is necessarily progressive by nature. I have argued here that extinctions are a perfect example of how qualitative and quantitative factoring can integrate as a matter of practical agency. There are causes of extinction of which we are aware and causes of which we are unaware. And no matter what we discover or learn to measure, we never will be fully aware of all the possible causes of extinction *or* of the losses it represents. Refusing to enumerate and continuously refine the relevance of these different choice factors even while their ordinal ranking(s) remain undone (or provisional), though, is no more than a shabby pursuit of justice.²⁷³ It segregates one’s actions from the many like-minded others whose cooperation so often turns on the kind of accountability, transparency, and communicative reciprocity that measurement and quantity have delivered in the modern world.²⁷⁴ Other minds can transform our understandings and experiences of quality and quantity. Establishing productive terms on which to engage them and their various cognitive advantages is our common challenge.

272. Sinden, *supra* note 128, at 210 (arguing that cost-benefit analysis “produces hopelessly indeterminate results susceptible to easy challenge by anyone with the money to hire a Ph.D economist”). Why it enhances determinacy to leave values unquantified—for Ph.D. moral philosophers to debate, one supposes—is a mystery to me.

273. We can hardly appropriately value one another with deliberations that occlude the very autonomous choices so central to our liberal commitments. See Steven M. DeLue, *Public Reason and Democracy: The Place of Science in Maintaining Civic Friendship*, in SCIENTIFIC VALUES AND CIVIC VIRTUES 25 (Noretta Koertge ed., 2005).

274. “Transparency [is] likely to be effective when the new information [it] generate[s] can be easily embedded into the routines of information users and when information disclosers, in turn, embed users’ changed choices in their decision making in ways that advance public aims.” ARCHON FUNG ET AL., FULL DISCLOSURE: THE PERILS AND PROMISE OF TRANSPARENCY 173–74 (2007); cf. Mace et al., *supra* note 239, *passim* (arguing that the shift of IUCN’s Red List Guidelines to quantitative criteria led to a transformative enhancement of their utility). “The consequences of developing the new criteria have been far broader and deeper than could have been anticipated in the 1980s. Apart from its many uses in species conservation, the IUCN Red List is used in applied and theoretical conservation research, in legislation, and for national and international conservation planning and priority setting.” *Id.* at 1439.