

Biodiversity and Land

Bradley C. Karkkainen

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BIODIVERSITY AND LAND

Bradley C. Karkkainen†

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INTRODUCTION

Biodiversity conservation has emerged recently as a leading goal of scientists, environmentalists, and policymakers, both globally¹ and in the United States.² In the popular literature, biodiversity conservation³ is closely associated with halting the destruction of tropical

¹ Biodiversity and the related concept of ecosystem management were prominently featured at the 1992 Rio de Janeiro Earth Summit, in the Convention on Biological Diversity, the Rio Declaration on Environment and Development, Agenda 21, and the nonbinding Statement of Forest Principles. *Report of the U.N. Conference on Environment and Development: Agenda 21* (June 3-14, 1992), U.N. Doc. A/CONF.151/4 (1992); *Report of the U.N. Conference on Environment and Development: Forest Principles* (June 3-14, 1992), U.N. Doc. A/CONF.151/5 (1992); *Report of the U.N. Conference on Environment and Development: Rio Declaration on Environment and Development* (June 3-14, 1992), U.N. Doc. A/CONF.151/6 (1992). Biodiversity conservation is a leading concern of the U.N. Commission on Sustainable Development and is the principal focus of project financing by the Global Environment Facility ("GEF"), a U.N. and World Bank sponsored facility to help developing nations address global environmental concerns. See Scott Hajost & Curtis Fish, *Biodiversity Conservation and International Instruments*, in *BIODIVERSITY AND THE LAW* 131, 133, 137-38 (William J. Snape III ed., 1996) (indicating that nearly half of GEF funding goes to biodiversity projects).

² See, e.g., David Farrier, *Conserving Biodiversity on Private Land: Incentives for Management or Compensation for Lost Expectations?*, 19 HARV. ENVTL. L. REV. 303, 304-05 (1995); J.B. Ruhl, *Biodiversity Conservation and the Ever-Expanding Web of Federal Laws Regulating Nonfederal Lands: Time for Something Completely Different?*, 66 U. COLO. L. REV. 555, 558 (1995); A. Dan Tarlock, *Biodiversity Federalism*, 54 MD. L. REV. 1315, 1315 (1995) [hereinafter Tarlock, *Biodiversity Federalism*]; A. Dan Tarlock, *Local Government Protection of Biodiversity: What Is Its Niche?*, 60 U. CHI. L. REV. 555, 556 (1993) [hereinafter Tarlock, *Local Biodiversity*]. Calls for preservation of wildlife and wilderness areas date to the mid-19th Century, but these were based on arguments from the aesthetic, spiritual, and recreational values of wilderness. See RODERICK NASH, *WILDERNESS AND THE AMERICAN MIND* 44 (3d ed. 1982). In the 1940s, the visionary ecologist Aldo Leopold identified preservation of the diversity of species and ecosystems as a goal. ALDO LEOPOLD, *A SAND COUNTY ALMANAC* 214-17 (Ballantine Books 1966) (1949). Only recently have such demands been raised under the rubric of "biodiversity."

³ The Biodiversity Convention defines biological diversity (or biodiversity) as "the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." *United Nations Conference on Environment and Development: Convention on Biological Diversity*, art. 2, at 818, 823 (June 5, 1992) (entered into force on Dec. 29, 1993) [hereinafter Biodiversity Convention or Convention]. More simply, the Office of Technology Assessment defines it as "the variety and variability among living organisms and the ecological complexes in which they occur." OFFICE OF TECH. ASSESSMENT, *TECHNOLOGIES TO MAINTAIN BIOLOGICAL DIVERSITY* 3 (1987) [hereinafter OTA]. Biodiversity thus encompasses genetic, species, and ecosystem diversity among both domesticated and wild flora and fauna on land and in the seas. Biodiversity conservation includes both onsite (*in situ*) and offsite (*ex situ*) measures. Although declining diversity of domesticated species and *ex situ* conservation of highly endangered species in zoos, botanical gardens, and seed banks are important components of an overall biodiversity conservation strategy, the focus of this Article is *in situ* conservation of biodiversity in the wild, particularly, terrestrial (as opposed to marine) species and ecosystems.

rainforests, especially in Amazonia.⁴ But if biodiversity is worth conserving,⁵ then we should consider the full range of biodiversity, including North American species, ecosystems, and gene pools, as candidates for protection.⁶ Contrary to popular impression, the United States is actually quite rich in biodiversity, with relatively high levels of species richness and endemism spread over a diverse array of ecosystem types and climatic conditions.⁷ But biodiversity loss is at an

⁴ See TIMOTHY BEATLEY, *HABITAT CONSERVATION PLANNING: ENDANGERED SPECIES AND URBAN GROWTH* 1 (1994). By some estimates, up to 50% of all species inhabit tropical rainforests, which are being lost at an alarming rate.

⁵ There is extensive literature documenting the benefits of biodiversity. Naturally functioning ecosystems provide nonconsumptive recreational and aesthetic benefits; crucial environmental services like flood control, watershed protection, soil formation, nutrient cycling, and carbon sequestration; and marketable natural resources that we rely on for food, medicine, fiber, and fuel. They also contain an irreplaceable store of biochemical and genetic information that may produce future medical, agricultural, and other biotechnological advances of unknown dimensions. Some further argue that because species and ecosystems are interdependent in ways we neither understand nor control, their loss may take on a "snowball" or "cascading" effect, potentially producing conditions substantially more adverse to human life. See, e.g., KATRINA BROWN ET AL., *ECONOMICS AND THE CONSERVATION OF BIOLOGICAL DIVERSITY* 13-14 (GEF Working Paper No. 2, 1993); JEFFREY A. MCNEELY, *ECONOMICS AND BIOLOGICAL DIVERSITY: DEVELOPING AND USING ECONOMIC INCENTIVES TO CONSERVE BIOLOGICAL RESOURCES* 19-29 (1988); DAVID PEARCE & DOMINIC MORAN, *THE ECONOMIC VALUE OF BIODIVERSITY* 18-22 (1994); John M. Gowdy, *The Value of Biodiversity: Markets, Society, and Ecosystems*, 73 *LAND ECON.* 25, 34-36 (1997); Alan Randall, *What Mainstream Economists Have to Say About the Value of Biodiversity*, in *BIODIVERSITY* 217, 219-20 (E.O. Wilson ed., 1988); see also Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 *NATURE* 253 (1997) (estimating annual value of global ecosystem services at \$33 trillion, or almost twice the global GDP). Many also argue that, beyond these instrumental values, living creatures are entitled to our respect, concern, and protection based on ethical considerations. See, e.g., Holly Doremus, Comment, *Patching the Ark: Improving Legal Protection of Biological Diversity*, 18 *ECOLOGY L.Q.* 265, 273-75 (1991).

⁶ See BEATLEY, *supra* note 4, at 1-3; Natalie Angier, *Redefining Diversity: Biologists Urge Look Beyond Rain Forests*, *N.Y. TIMES*, Nov. 29, 1994, at C1; Carol Kaesuk Yoon, *Forget the Tropics, Pharmaceuticals May Lie in Nearby Woods*, *N.Y. TIMES*, Nov. 5, 1996, at C4. Species and ecosystems are generally more threatened in temperate regions, where land conversion and habitat fragmentation are at a more advanced stage. See Cynthia Carlson, *NEPA and the Conservation of Biological Diversity*, 19 *ENVTL. L.* 15, 22 (1988). Given regional differentials in species richness, land costs, and the opportunity costs of restricting land use, it might be more cost-effective to focus global conservation efforts on areas like Amazonia where land is relatively cheap and biodiversity abundant, but that analysis is beyond the scope of this Article.

⁷ See LINDA K. LANGNER & CURTIS H. FLATHER, *BIOLOGICAL DIVERSITY: STATUS AND TRENDS IN THE UNITED STATES* 3 (U.S. Dep't of Agric. Forest Serv. Gen. Tech. Rep. No. RM-244, 1994) (stating that U.S. species richness exceeds that of other temperate countries, and includes as many mammal and reptile species as Brazil, but Brazil has 50% more birds and nearly three times as many plant species); Thomas D. Sisk et al., *Identifying Extinction Threats: Global Analyses of the Distribution of Biodiversity and the Expansion of the Human Enterprise*, in *ECOSYSTEM MANAGEMENT: SELECTED READINGS* 53, 63 tbl.4 (Fred B. Sampson & Fritz L. Knopf eds., 1996) (indicating that the U.S. ranks twenty-first in species richness and ninth in endemism). Species richness refers to the total number of species found within a given geographical area. Endemism refers to the number of species unique to a given area. Global biodiversity protection depends not only on the protection of especially species-rich areas (such as tropical rainforests) but also on the preservation of unique species

advanced stage in this country, as it is throughout the temperate zone.⁸ In all regions of the United States (with the possible exception of Alaska where human disturbance of natural systems has been more limited), entire ecosystems are nearing extinction⁹ and in some cases are being destroyed at a faster rate than the Amazonian rain forest.¹⁰ Consequently, scientists and environmentalists have urged a refocusing of our domestic environmental laws and public lands management policies to place the goal of biodiversity conservation at center stage.¹¹ The federal bureaucracy has, at least to some extent, heeded these appeals, but for the most part, Congress has not.¹² Interior Secretary Bruce Babbitt has identified biodiversity conservation as a central goal of public lands management.¹³ Babbitt has stitched together

and ecosystems throughout the world. See, e.g., Michael Soulé & Daniel Simberloff, *What Do Genetics and Ecology Tell Us About the Design of Nature Reserves?*, in ENVIRONMENTAL POLICY AND BIODIVERSITY 55, 56-57 (R. Edward Grumbine ed., 1994). All the estimates cited here are, of course, imprecise because not all species have been identified nor their full ranges determined. See EDWARD O. WILSON, THE DIVERSITY OF LIFE 132-33 (1992); World Wildlife Fund, *Forest Ecoregions* (visited June 7, 1997) <<http://www.wwf.org/forests/protected.htm>> (identifying ninety-eight distinct forest ecoregion types in the U.S. and Canada, ranging from tropical forests in Florida and Hawaii to boreal forests in Alaska and Canada); World Wildlife Fund, *Forest Maps, Conservation Assessment of North American Forest Ecoregions: Biological Distinctiveness—U.S. and Canada* (visited June 7, 1997) <http://www.wwf.org/forests/maps/global_importance.htm> (listing one-third of these types as providing “globally outstanding” levels of species richness, endemism, and habitats; these include half the world’s temperate rainforests).

⁸ See INTER-AMERICAN INST. FOR GLOBAL CHANGE RESEARCH, NAT’L RESEARCH COUNCIL, REPORT ON THE IAI WORKSHOP ON THE COMPARATIVE STUDIES OF TEMPERATE TERRESTRIAL ECOSYSTEMS 9-13 (1994) (stating that although temperate regions are “home to a rich diversity of wild plant and animal communities” and “range of natural ecosystems,” human population and conversion of land to agricultural and urban uses have left “spotty remnants of natural vegetation,” caused numerous species extinctions, and practically eliminated entire ecosystems); REED F. NOSS ET AL., ENDANGERED ECOSYSTEMS OF THE UNITED STATES: A PRELIMINARY ASSESSMENT OF LOSS AND DEGRADATION 3 (Nat’l Biol. Serv., Biol. Rep. No. 28, 1995).

⁹ See LANGNER & FLATHER, *supra* note 7, at 14-15; NOSS ET AL., *supra* note 8, at 17-20.

¹⁰ See NOSS ET AL., *supra* note 8, at 3 (citing freshwater aquatic ecosystems in California and old growth forests in the Pacific Northwest as examples).

¹¹ See, e.g., Farrier, *supra* note 2, at 304-09; Scott W. Hardt, *Federal Land Management in the Twenty-First Century: From Wise Use to Wise Stewardship*, 18 HARV. ENVTL. L. REV. 345, 387-96 (1994); Robert B. Keiter, *Beyond the Boundary Line: Constructing a Law of Ecosystem Management*, 65 U. COLO. L. REV. 293, 328-31 (1994); Tarlock, *Local Biodiversity*, *supra* note 2, at 555-56; Doremus, *supra* note 5, at 318-33.

¹² See David E. Blockstein, *Toward a Federal Plan for Biological Diversity*, 5 ISSUES IN SCI. & TECH., Summer 1989, at 63, 67 (“Currently, Congress has been more eager to deal with the loss of biological diversity abroad than at home.”).

¹³ See William K. Stevens, *Interior Secretary Is Pushing a New Way to Save Species*, N.Y. TIMES, Feb. 17, 1993, at A1 (noting that Babbitt named the biodiversity policy as his “most urgent task” in his first month as Interior Secretary). The three Interior Department land management agencies—the Bureau of Land Management, the Fish and Wildlife Service, and the National Park Service—have recently identified ecosystem management and biodiversity conservation as policy priorities, as has the Department of Agriculture’s Forest Service. National Forest System Land and Resource Management Planning, 60 Fed. Reg. 18,886, 18,892-96 (proposed 1995) (the “principal goal” of national forest management

the research capabilities of various Interior Department bureaus into a national biological service whose mission is to gather and analyze data on species, habitats, and ecosystems, and thus to provide the basis for scientifically informed ecosystem management planning.¹⁴ In addition, Babbitt is creatively employing the authority of the Endangered Species Act to induce ecosystem-wide, multispecies habitat conservation planning by state and local officials, landowners, and community and environmental groups.¹⁵ The Environmental Protection Agency,¹⁶ the Council on Environmental Quality,¹⁷ the State Department,¹⁸ and Vice-President Al Gore have all acknowledged biodiversity conservation as an important policy objective.¹⁹

would be "to maintain or restore the sustainability of ecosystems," inter alia by "[p]roviding for diversity of plant and animal communities"); BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, ECOSYSTEM MANAGEMENT IN THE BLM: FROM CONCEPT TO COMMITMENT (BLM/SC/GI-94/005 & 1736, 1994); FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, AN ECOSYSTEM APPROACH TO FISH AND WILDLIFE CONSERVATION: AN APPROACH TO MORE EFFECTIVELY CONSERVE THE NATION'S BIODIVERSITY (1994); U.S. GEN. ACCOUNTING OFFICE, ECOSYSTEM MANAGEMENT: ADDITIONAL ACTIONS NEEDED TO ADEQUATELY TEST A PROMISING APPROACH (GAO/RCED-94-11, 1994) [hereinafter GAO, ECOSYSTEM MANAGEMENT]; FOREST SERV., U.S. DEP'T OF AGRIC., & BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, FOREST ECOSYSTEM MANAGEMENT: AN ECOLOGICAL, ECONOMIC, AND SOCIAL ASSESSMENT (1993).

¹⁴ See William J. Snape III, *Who Owns What? A Public Trust for Biodiversity*, in BIODIVERSITY AND THE LAW, *supra* note 1, at 145, 147-48. Originally named the National Biological Survey, the service was later renamed the National Biological Service, and then in 1996 transferred to the U.S. Geological Survey and renamed the Biological Resources Division to comply with a congressional directive. See Office of the Secretary, U.S. Dep't of the Interior, *Transfer of the National Biological Service to the U.S. Geological Survey as a New Biological Resources Division* (visited Oct. 17, 1997) <http://elips.doi.gov/cgi-win/go_to_sec.exe/find_order>.

¹⁵ See *infra* notes 306-29 and accompanying text.

¹⁶ U.S. ENVTL. PROTECTION AGENCY, THREATS TO BIOLOGICAL DIVERSITY IN THE UNITED STATES (1990); U.S. ENVTL. PROTECTION AGENCY, SCIENCE ADVISORY BOARD, REDUCING RISK: SETTING PRIORITIES AND STRATEGIES FOR ENVIRONMENTAL PROTECTION (1990).

¹⁷ E.g., COUNCIL ON ENVTL. QUALITY, INCORPORATING BIODIVERSITY CONSIDERATIONS INTO ENVIRONMENTAL IMPACT ANALYSIS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT (1993) [hereinafter CEQ INCORPORATING BIODIVERSITY]; COUNCIL ON ENVTL. QUALITY, LINKING ECOSYSTEMS AND BIODIVERSITY (1992); COUNCIL ON ENVTL. QUALITY, THE GLOBAL 2000 REPORT TO THE PRESIDENT (1980); COUNCIL ON ENVTL. QUALITY, UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT: UNITED STATES OF AMERICA NATIONAL REPORT (1992) [hereinafter CEQ UNCED REPORT]. The Council on Environmental Quality has also convened an Interagency Ecosystem Management Task Force to implement an ecosystem approach to environmental management. See GAO, ECOSYSTEM MANAGEMENT, *supra* note 13, at 6.

¹⁸ U.S. DEP'T OF STATE, ENVIRONMENTAL DIPLOMACY: THE ENVIRONMENT AND U.S. FOREIGN POLICY 1 (1997) (on file with author) (identifying protection of biological diversity as one of the United States' "strategic interests" in post-Cold War era).

¹⁹ E.g., OFFICE OF THE VICE PRESIDENT, NATIONAL PERFORMANCE REVIEW REPORT OF THE DEPARTMENT OF THE INTERIOR (pt. 2) (1994) [hereinafter NATIONAL PERFORMANCE REVIEW REPORT], available in 1994 WL 53795, at *2-3 (recommending consolidation of scattered federal land holdings to improve ecosystem management and maintain biological diversity).

However, despite these recent developments, the articulated goal of biodiversity conservation has yet to develop into clear, effective, and coordinated policy in the United States.²⁰ Although President Clinton signed the Biodiversity Convention ("Convention") in 1993 and submitted it to the Senate for its advice and consent to ratification, the Senate has thus far failed to act,²¹ and the Administration's posture remains an oddly ambiguous one. President Clinton's transmittal message argued that the Convention would place the United States under no new substantive obligations because it already has in place a "tightly woven" web of laws and programs to protect biological diversity.²² But, as this Article will show, the President's assessment of our present biodiversity conservation efforts vastly overstates their significance.²³ Although some federal laws and land management policies have a salutary effect on biodiversity conservation, others fall short or are downright destructive. In the aggregate, they are neither a strong web nor a coherent strategy, but rather a patchwork of halfway measures, interstitial tinkering, and missed opportunities for conserving biodiversity, even on those lands for which the federal government bears direct management responsibility. To protect our own valuable

²⁰ See CEQ, UNCED REPORT, *supra* note 17, at 292-93, 298 (acknowledging that current U.S. laws and institutions are not designed to protect ecosystems or genetic diversity, and are likely inadequate to do so); OTA, *supra* note 3, at 8; Blockstein, *supra* note 12, at 65-66; Lee P. Breckenridge, *Reweaving the Landscape: The Institutional Challenges of Ecosystem Management for Lands in Private Ownership*, 19 VT. L. REV. 363, 382 nn.68-70 (1995); William J. Snape III, *Biodiversity and the Law: An Introduction*, 8 TUL. ENVTL. L.J. 5, 10 (1994).

²¹ The Senate Foreign Relations Committee favorably reported the Convention by a vote of 16-3 over the opposition of the committee chairman, Sen. Jesse Helms, but majority leader Sen. Robert Dole blocked a floor vote in the 104th Congress. See William J. Snape III, *International Protection: Beyond Human Boundaries*, in BIODIVERSITY AND THE LAW, *supra* note 1, at 81, 81-82.

²² Biological diversity conservation in the United States is addressed through a tightly woven partnership of Federal, State, and private sector programs in management of our land and waters and their resident and migratory species. . . . These existing programs and authorities are considered sufficient to enable any activities necessary to effectively implement our responsibilities under the Convention.

Message from the President of the United States Transmitting the Convention on Biological Diversity, 1993 PUB. PAPERS 2029 (Nov. 19, 1993).

²³ The Convention requires that "in accordance with its particular conditions and capabilities," each state party shall "[d]evelop national strategies, plans or program[s] for the conservation and sustainable use of biological diversity or adapt for this purpose existing" programs. Biodiversity Convention, art. 6, *supra* note 3, at 825. Further, each contracting state must "[e]stablish a system of protected areas or areas where special measures need to be taken to conserve biological diversity"; "[r]egulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas"; "[p]romote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings"; and "[r]ehabilitate and restore degraded ecosystems." *Id.*, art. 8, at 825-26. Although these obligations are broadly worded and allow great flexibility in the means chosen to achieve them, the United States cannot be fairly said to have developed a national strategy to achieve these purposes, or to have successfully adapted existing programs to achieve them.

biological resources, and to demonstrate to the nations of the world that our commitment to biodiversity conservation is more than mere rhetoric, the United States must enact laws that not only authorize, but also require far-reaching biodiversity conservation measures.

It is generally acknowledged that the principal cause of biodiversity loss is the fragmentation, degradation, and destruction of ecosystems and habitats through conversion of land to economically productive uses,²⁴ especially agriculture,²⁵ forestry,²⁶ mineral and fossil fuel extraction,²⁷ and urban development.²⁸ We can expect, then, that land use policy will play a central role in biodiversity conservation policy,²⁹ and that as pressure builds to place biodiversity conservation at the forefront of the national and international environmental agenda, environmental advocates will demand increasingly stringent controls on both federal land management and private land use.³⁰

²⁴ Land conversion is the principal cause of biodiversity loss for most terrestrial species and ecosystems. See, e.g., BROWN ET AL., *supra* note 5, at 28-35; COUNCIL ON ENVTL. QUALITY, ENVIRONMENTAL QUALITY 1980: THE ELEVENTH ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY (1980). Other causes include pollution, overharvesting, intentional extermination by humans, and climate changes. See C.S. Holling et al., *Biodiversity in the Functioning of Ecosystems: An Ecological Synthesis*, in BIODIVERSITY LOSS: ECONOMIC AND ECOLOGICAL ISSUES 44, 78-83 (Charles Perrings et al. eds., 1995) [hereinafter BIODIVERSITY LOSS]. An important and frequently overlooked cause is the human-assisted introduction of exotic (non-native) species, which at first may appear to enhance biodiversity but often puts pressure on native species through competition, predation, infection, hybridization, or adverse alteration of basic ecosystem processes. See Peter Jenkins, *Harmful Exotics in the United States*, in BIODIVERSITY AND THE LAW, *supra* note 1, at 105, 105-07. For aquatic species, overharvesting, pollution, climate change, alteration of habitats, and introduction of exotics are often the critical factors. See Suzanne Iudicello, *Protecting Global Marine Diversity*, *in id.* at 120, 121.

²⁵ Timothy Swanson argues that global biodiversity loss is the logical outcome of the process of agricultural conversion which has systematically displaced diverse, naturally occurring plants and animals with a narrow range of specialized domesticated and cultivated species over the last 10,000 years. Timothy Swanson, *The International Regulation of Biodiversity Decline: Optimal Policy and Evolutionary Product*, in BIODIVERSITY LOSS, *supra* note 24, at 225, 226-28. By neglecting other factors, Swanson overstates the role of agricultural conversion, especially in developed countries where agricultural conversion is substantially complete. See BROWN ET AL., *supra* note 5, at 32; David Western, *Population, Resources, and Environment in the Twenty-First Century*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY 11, 19-20 (David Western & Mary C. Pearl eds., 1989).

²⁶ See Keiter, *supra* note 11, at 331-32. The most celebrated recent conflict is the northern spotted owl controversy, which pitted the spotted owl as proxy for its diminishing old-growth forest habitat against the timber industry and timber-dependent communities in the Pacific Northwest. See STEVEN LEWIS YAFFEE, *THE WISDOM OF THE SPOTTED OWL: POLICY LESSONS FOR A NEW CENTURY* 3-6 (1994).

²⁷ See, e.g., Richard J. Fink, *The National Wildlife Refuges: Theory, Practice, and Prospect*, 18 HARV. ENVTL. L. REV. 1, 65-66 (1994) (describing damage to habitat in National Wildlife Refuges).

²⁸ See Tarlock, *Local Biodiversity*, *supra* note 2, at 558-59.

²⁹ See Tarlock, *Biodiversity Federalism*, *supra* note 2, at 1318; Tarlock, *Local Biodiversity*, *supra* note 2, at 557-58.

³⁰ See Tarlock, *Biodiversity Federalism*, *supra* note 2, at 1332-33.

There can be little doubt that any significant new effort to conserve biological resources will require a strong federal role.³¹ Yet, it is equally certain that major federal initiatives in this area will be controversial.³² Land use is traditionally a matter of state and local concern, and an expanded federal role in this field will raise serious federalism concerns. Because the externalized effects of land-use decisions were once thought to be principally, if not exclusively, local in nature, federal intrusion into land use matters was generally regarded as unwise and contrary to the spirit of our federalist structure, if not flatly proscribed by the Constitution. An expansive federal biodiversity policy is sure to challenge this traditional understanding.

Additional legal obstacles may lie in the minefield of "takings" law. In recent years, some landowners, operating loosely under the banner of a new "property rights" movement, have insisted that environmental regulation—including regulation aimed at protecting wetlands and endangered species—has already gone too far, infringing on private property rights thought to be foundational to our economic structure, constitutional architecture, and legal and cultural traditions.³³ Paralleling and closely allied with this movement is a "wise-use" movement that seeks to overturn environmental restrictions on the use of the Western federal lands in favor of private grazing, timber, and mineral production rights.³⁴ Thus far, the property-rights

³¹ See *infra* Part III.

³² See *infra* Part IV (discussing federalism concerns) and Part V (discussing takings and fairness concerns). Additionally, many believe that the federal government has simply grown too big and needs to be downsized. A bipartisan political commitment to reduce budget deficits while avoiding tax increases or even tax cuts further constrains new federal initiatives. These are political rather than legal constraints, and this Article does not examine them.

³³ See generally R. MCGREGGOR CAWLEY, *FEDERAL LAND, WESTERN ANGER* (1993) (discussing Western opposition to the shift from traditional conservation policy to more stringent environmental protection); WILLIAM L. GRAF, *WILDERNESS PRESERVATION AND THE SAGEBRUSH REBELLIONS* (1990) (discussing organized resistance to federal public land policies in the West); DAVID HELVARG, *THE WAR AGAINST THE GREENS: THE WISE USE MOVEMENT, THE NEW RIGHT, AND ANTI-ENVIRONMENTAL VIOLENCE 1-14* (1994) (describing the growing tension between the property-rights movement and environmentalists). At its root, this movement rests on the belief that private property in land "may be our most cherished institution." DONALD WORSTER, *THE WEALTH OF NATURE: ENVIRONMENTAL HISTORY AND THE ECOLOGICAL IMAGINATION* 98 (1993).

³⁴ See Keiter, *supra* note 11, at 321-22; John D. Leshy, *Unraveling the Sagebrush Rebellion: Law, Politics and Federal Lands*, 14 U.C. DAVIS L. REV. 317, 343-48 (1980) (discussing the genesis and roots of the "sagebrush rebellion," a particular example of the wise-use movement's actions). The "wise use" movement generally contends that federal land management policies overemphasize environmental considerations at the expense of local human costs, undercut the autonomy of local communities, and infringe on vested rights—which amount to property interests that can be protected—of private parties (especially commodity producers). See Andrea Hungerford, "Custom and Culture" Ordinances: Not a Wise Move for the Wise Use Movement, 8 TUL. ENVTL. L.J. 457, 458-61 (1995); Patrick Austin Perry, Comment, *Law West of the Pecos: The Growth of the Wise-Use Movement and the Challenge to Federal*

and wise-use movements have had only limited success in the courts, state legislatures, and Congress. Litigation challenging federal statutes and regulations to protect wetlands and endangered species habitats has produced only isolated and qualified victories,³⁵ and the wise-use movement's litigation strategy has failed dismally.³⁶ Although the 104th Congress produced a spate of legislative compensation proposals, many of which specifically targeted wetlands and endangered species regulation,³⁷ none was enacted into law.

This Article undertakes a broad evaluation of contemporary federal biodiversity policy and offers a sweeping proposal for reform. Part I describes proposals for biodiversity conservation strategies advanced by conservation biologists and other experts. Part II examines biodiversity conservation on the federal lands, which constitute nearly one-third of our national land area. It concludes that although the current portfolio of federal landholdings, legal authorities, and federal land management policies falls well short of a coherent biodiversity conservation strategy, the federal government—as the nation's largest landowner—is nevertheless the logical starting point and should be the principal focal point for such a strategy. This Part then advances a proposal to establish a new category of federally owned and managed biological reserves, carved out of current federal landholdings, as well as other lands acquired expressly for that purpose and managed primarily to protect representative ecosystems.

Part III reviews current federal laws attempting, albeit indirectly, to protect biodiversity conservation on private lands, as well as proposals to strengthen and expand the federal regulatory role in order to

Public Land-Use Policy, 30 LOY. L.A. L. REV. 275, 276-78 (1996). The claims of the wise-use movement thus span both federalism and private property concerns.

³⁵ See *infra* text accompanying notes 461-505.

³⁶ See Perry, *supra* note 34, at 319-20; Jim Carrier, *Rebels on the Range: Nevadans Take on Federal Sovereignty*, DENV. POST, Jan. 21, 1996, at A1 ("For all the fury and publicity, sagebrushers have yet to win a substantive case.").

³⁷ See, e.g., Private Property Protection Act, H.R. 925, 104th Cong. (1995) (passed by House March 3, 1995) (landowner entitled to compensation if the fair-market value of "any portion" of property is diminished by 10% or more as a result of Clean Water Act, Endangered Species Act, Food Security Act, and other specified laws); Private Property Owners' Bill of Rights, H.R. 790, 104th Cong. (1995) (landowner entitled to compensation if federal action to protect wetlands or endangered species causes diminution of property value of 50% or more); Clean Water Amendments of 1995, H.R. 961, 104th Cong. (passed by House May 16, 1995) (landowner entitled to compensation if value of "any portion" of property is diminished by 20% or more as a result of section 404 wetlands permit action); Endangered Species Recovery and Conservation Incentives Act of 1995, H.R. 2364, 104th Cong. (1995) (landowner entitled to compensation if value of "any portion" of property is diminished by 20% or more by any action taken under Endangered Species Act). The leading proposal in the Senate, co-sponsored by Senators Gramm and Dole, was not so narrowly targeted; it would have required compensation anytime governmental regulation reduced property values by 25% or more. Private Property Rights Restoration Act, S. 145, 104th Cong. (1995).

achieve biodiversity conservation objectives. Part IV discusses the federalism implications of biodiversity conservation policy. It concludes that because the benefits of biodiversity are national or even global in scope, the federal government should have principal responsibility for biodiversity conservation; but because the costs of biodiversity conservation are likely to be locally concentrated, serious federalism concerns are implicated. The proposal this Article advances, which focuses on federally owned reserves, while not without drawbacks, goes further toward addressing these federalism concerns than the alternative of general federal regulation of private land use.

Part V examines private landowners' and property-rights advocates' resistance to federal land use regulation, and concludes that only in limited circumstances are they likely to prevail in attacking biodiversity protection measures on takings grounds. Nonetheless, a federal biodiversity protection strategy must address the underlying questions of fundamental fairness in the distribution of society's burdens that animate these claims. On this score too, this Article's proposal is superior to the regulatory alternative.

Although the Article recommends federal ownership rather than regulation of private land use as the centerpiece of a federal biodiversity strategy, ancillary federal regulation of privately owned lands adjacent to federal reserves is probably necessary to optimize their conservation value, while permitting economically viable land uses compatible with that goal. Part VI proposes that such federal regulation be based on context-specific, ecosystem-wide land use plans created jointly by landowners, conservation groups, state and local governments, and federal land managers.

I

TOWARD BIODIVERSITY CONSERVATION

A. Large Reserves Where Possible, Small Reserves Where Necessary

There is a broad, though not universal, consensus within the scientific community that a biodiversity conservation strategy should be built on the foundation of a system of biological reserves³⁸ containing

³⁸ See, e.g., David W. Crumpacker et al., *A Preliminary Assessment of the Status of Major Terrestrial and Wetland Ecosystems on Federal and Indian Lands in the United States*, CONSERVATION BIOLOGY, March 1988, at 103, 104 ("The most cost-effective and practical method of maintaining large amounts of biological diversity is on-site in natural ecosystems.") (citation omitted); S.J. McNaughton, *Ecosystems and Conservation in the Twenty-First Century*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY, *supra* note 25, at 109, 119-20; Edwin M. Smith, *The Endangered Species Act and Biological Conservation*, 57 S. CAL. L. REV. 361, 406-07 (1984) (arguing that biological reserves efficiently and prophylactically protect multiple species and, because they typically rely on minimizing human-caused disturbances, require less intensive management than regulatory approaches). *But cf.* David Western, *Conserva-*

relatively undisturbed habitats³⁹ for diverse communities of species, linked where possible by a network of wildlife migration corridors.⁴⁰ It is also widely agreed that, other things being equal, large reserves are preferable to small ones.⁴¹ This preference exists for several reasons. First, reserves large enough to protect naturally functioning ecosystems containing viable populations of resident species protect far more biodiversity—at the genetic, species, and ecosystem levels—at a far lower cost than do species-by-species management strategies.⁴² These reserves are also generally cheaper to acquire and maintain per unit of protected area than a series of smaller reserves of comparable total size.⁴³ Second, some species, especially large mammals, have large home ranges, low natural growth rates, and low population densities, and therefore require large areas of protected habitat.⁴⁴ Third,

tion Without Parks: Wildlife in the Rural Landscape, in CONSERVATION FOR THE TWENTY-FIRST CENTURY, *supra* note 25, at 158, 158-65 (explaining that because biological reserves do not represent all species or ecosystems and are themselves subject to mismanagement, the best opportunities for biodiversity conservation may lie in human-disturbed landscapes). Western acknowledges, however, that the “shortcomings in nature reserves are [no] reason . . . to reduce effort in them.” *Id.* at 165.

³⁹ A recent sea-change in thinking among ecologists and conservation biologists has rejected the “balance of nature” paradigm, in which ecosystems were thought to remain in equilibrium if undisturbed by human intervention, in favor of a dynamic view of communities and ecosystems as constantly evolving, disorderly mosaics in creative disequilibrium. See DANIEL B. BOTKIN, *DISCORDANT HARMONIES: A NEW ECOLOGY FOR THE TWENTY-FIRST CENTURY* 8-12 (1990); DONALD WORSTER, *NATURE’S ECONOMY: A HISTORY OF ECOLOGICAL IDEAS* 389-94 (2d ed. Cambridge Univ. Press 1994) (1977); Brian Walker, *Diversity and Stability in Ecosystem Conservation*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY, *supra* note 25, at 121, 122-24. This view by no means requires rejection of the notion of conservation reserves, however. Conservation biologists now emphasize the importance of allowing species and ecosystem processes to evolve on their own trajectory with a minimum of human intervention. See WORSTER, *supra*, at 417-20; Walker, *supra*, at 130.

⁴⁰ Such corridors allow recolonization of habitats where various kinds of disturbances have resulted in population loss, and encourage interpopulation gene flow, thus preventing inbreeding and genetic depression. See Robert C. Vrijenhoek, *Population Genetics and Conservation*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY, *supra* note 25, at 89, 97-98.

⁴¹ See R. Edward Grumbine, *Viable Populations, Reserve Size, and Federal Lands Management: A Critique*, CONSERVATION BIOLOGY, June 1990, at 127, 128 (“There is a broad consensus among biologists that long-term protection of viable populations requires large reserves.”); Reed F. Noss, *The Wildlands Project: Land Conservation Strategy*, in ENVIRONMENTAL POLICY AND BIODIVERSITY, *supra* note 7, at 233, 254-55 (“The desirability of large reserves, all else being equal, is one of the few almost universally accepted principles of conservation biology.”).

⁴² See David S. Woodruff, *The Problems of Conserving Genes and Species*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY, *supra* note 25, at 76, 77.

⁴³ See Noss, *supra* note 41, at 254; Soulé & Simberloff, *supra* note 7, at 55, 57.

⁴⁴ Noss estimates that populations of large carnivores and ungulates may require protected areas of 1-10 million hectares (2.5 to 24 million acres) to be reasonably assured of survival. Noss, *supra* note 41, at 255. Many conservation biologists argue that setting aside reserves large enough for such species would have the salutary effect of providing an “umbrella” to protect numerous other species of vegetation, birds, reptiles, amphibians, small mammals, insects, and invertebrates whose habitat requirements are much smaller. See, e.g., R. EDWARD GRUMBINE, *GHOST BEARS: EXPLORING THE BIODIVERSITY CRISIS* 58 (1992).

larger protected areas can generally support larger and more genetically diverse populations and "metapopulations," thus supporting genetic diversity within species and reducing the risk of extinction from human or natural disturbances, invasion by exotics, predation, disease, demographic events, or genetic depression.⁴⁵ Fourth, other things being equal, larger protected areas are less likely to suffer from adverse "edge effects," including both human and natural disturbances from adjacent unprotected lands.⁴⁶

Nonetheless, large reserves are not always possible. In many parts of the country, habitats are already so fragmented that large blocks of relatively undisturbed land may be impossible to assemble. In such regions, species and ecosystems are most likely to be threatened or endangered precisely because habitat fragmentation is so advanced. In these regions, small reserves may be essential to protect the last valuable ecosystem fragments and habitat patches which, despite their shortcomings, may represent the best hope for survival of species on the brink of extinction.⁴⁷

There is also a high degree of consensus on reserve selection and management principles. R. Edward Grumbine, for example, identifies the following goals of conservation planning:

1. Maintain viable populations of all native species *in situ*.
2. Represent, within protected areas, all native ecosystem types across their natural range of variation.
3. Maintain evolutionary and ecological processes (e.g., disturbance regimes, hydrological processes, nutrient cycles, etc.).

⁴⁵ See GRUMBINE, *supra* note 44, at 53-56; Soulé & Simberloff, *supra* note 7, at 60-61 (stating that species survival requires habitat adequate to support a "minimum viable population," which varies by species but is more likely to be found in larger protected areas).

⁴⁶ See Soulé & Simberloff, *supra* note 7, at 59 (Factors include "penetration of preserves by . . . wind, disease, exotic species, and increase in the densities of species that prefer 'edge habitats'"). In addition to its size, the shape of the reserve is a major factor in determining the ratio of edge to protected area; generally, the "rounder" the shape, the less edge per acre of interior protected area, and the higher the conservation value. See GRUMBINE, *supra* note 44, at 49-51; Todd G. Olson, *Biodiversity and Private Property: Conflict or Opportunity?*, in BIODIVERSITY AND THE LAW *supra* note 1, at 67, 73-75.

⁴⁷ See generally Dennis D. Murphy, *Invertebrate Conservation*, in BALANCING ON THE BRINK OF EXTINCTION: THE ENDANGERED SPECIES ACT AND LESSONS FOR THE FUTURE 181, 186 (Kathryn A. Kohm ed., 1991) [hereinafter BALANCING ON THE BRINK] (indicating that in areas of intensive urban development, large vertebrates are often already extirpated, while small habitat patches remain for small vertebrates, invertebrates, and plants in greatest jeopardy of extinction); Soulé & Simberloff, *supra* note 7, at 57 (small reserves are sometimes necessary "to protect the last refugia of endangered species and habitats," especially in regions where land conversion and disturbance are more advanced); Craig L. Shafer, *Values and Shortcomings of Small Reserves*, BIOSCIENCE, Feb. 1995, at 80, 81-82 (noting that although large reserves are generally preferable, small reserves are sometimes all that is possible and can make an important contribution to the conservation of most species except large mammals).

4. Manage, over substantial periods of time, to maintain the evolutionary potential of species and ecosystems.
5. Accommodate human use and occupancy within the above constraints.⁴⁸

Similarly, Reed Noss proposes that the "fundamental objectives" of biodiversity conservation planning are to (1) represent, in a system of protected areas, all native ecosystem types and several stages across their natural range of variation; (2) maintain viable populations of all native species; (3) maintain ecological and evolutionary processes; and (4) design and manage the system to be responsive to environmental changes and to maintain evolutionary potential.⁴⁹ Noss would select for immediate protection areas of high species richness, high endemism, high sensitivity to human pressure, and high levels of stress from human-caused disturbances.⁵⁰ Michael Soulé and Daniel Simberloff concur, suggesting that reserves should be selected so as to include optimal habitats for any species of special concern; areas where habitat and species diversity are greatest; areas of maximum endemism; and, finally, sites that are particularly secure for long-term conservation.⁵¹

B. Buffer Zones

Many commentators have pointed out that areas set aside as reserves are often relatively small "islands" representing only fragments of larger regional ecosystems. Consequently, they argue, the ability of reserve managers to achieve biodiversity conservation objectives is limited.⁵² One obvious solution is to create larger reserves. However, this is prohibitively costly not only in terms of land acquisition and management costs, but also in consideration of the opportunity costs of foregoing development on all the land necessary to protect the full array of representative ecosystems. Consequently, scientists and policy experts have recommended the establishment of "buffer zones" adjacent to protected reserves, thereby allowing some productive land uses, but restricting other uses to provide extended habitat for some species and limit adverse spillover effects on the core protected reserve.⁵³

⁴⁸ GRUMBINE, *supra* note 44, at 184-85.

⁴⁹ Noss, *supra* note 41, at 235.

⁵⁰ Reed F. Noss, *From Endangered Species to Biodiversity*, in BALANCING ON THE BRINK, *supra* note 47, at 227, 240.

⁵¹ Soulé & Simberloff, *supra* note 7, at 56.

⁵² See GRUMBINE, *supra* note 44, at 41-44; Western, *supra* note 38, at 158-59.

⁵³ See, e.g., Reed F. Noss, *Conservation of Biodiversity at the Landscape Scale*, in BIODIVERSITY IN MANAGED LANDSCAPES: THEORY AND PRACTICE 574, 584-85 (Robert C. Szaro & David W. Johnston eds., 1996) [hereinafter MANAGED LANDSCAPES].

As early as 1933, the visionary ecologist Victor Shelford recommended the core-and-buffer concept as a strategy for wildlife conservation.⁵⁴ Its more recent incarnations include the UNESCO Man and the Biosphere program's biosphere reserve concept⁵⁵ and the "multiple-use module" (or "MUM") concept developed by Reed Noss and Larry Harris, essentially an elaboration on the biosphere reserve concentric zoning model.⁵⁶

II

BIODIVERSITY AND THE FEDERAL LANDS

A. The Present Situation

The federal government owns some 650 million acres, or about thirty percent of our national land area. Most of this land is in eleven Western states⁵⁷ and Alaska.⁵⁸ The vast majority of these lands—623 million acres, or twenty-seven percent of our national land area—is managed by four large federal agencies: the Forest Service (192 million acres), the Bureau of Land Management ("BLM") (267 million),

⁵⁴ Shelford was the leading wildlife ecologist of his day and a co-founder of the Ecologists' Union, which later became the Nature Conservancy. See WORSTER, *supra* note 39, at 214, 363 & n.29.

⁵⁵ The Biosphere Reserve concept contemplates three concentric land-use zones: a central protected "core" reserve, surrounded by a "managed use area" or "buffer" allowing limited land uses consistent with protection of the core, and finally a peripheral "transition area" or "zone of cooperation" in which more intensive land uses are permitted. Some 337 sites in 85 countries, including 45 in the United States, have been designated as Biosphere Reserves. See U.S. DEP'T OF STATE, THE UNITED STATES MAN AND THE BIOSPHERE PROGRAM 8-9 (1997). Although an area must include a "legally protected core" to qualify for Biosphere Reserve designation, in the U.S. (as in most nations) that designation itself neither alters the legal authorities under which the core area is managed, nor does it confer additional regulatory authority over adjacent land uses.

⁵⁶ See GRUMBINE, *supra* note 44, at 190-92 (describing Noss's and Harris's work); see also Reed F. Noss, *The Wildlands Project: Land Conservation Strategy*, WILD EARTH Special Issue, 1992, at 10, 14-18 (describing an ambitious proposal for a connected system of core reserves surrounded by partially protected buffer zones, amounting to about half the land area of the United States, to allow the recovery of whole ecosystems and landscapes in every region).

⁵⁷ In descending order of federal dominance, they are: Nevada (82.9% federally owned), Utah (63.9%), Idaho (61.6%), Oregon (52.4%), Wyoming (48.9%), Arizona (47.2%), California (44.6%), Colorado (36.3%), New Mexico (32.4%), Washington (28.3%), and Montana (28.0%). See BUREAU OF LAND MANAGEMENT, U.S. DEP'T OF THE INTERIOR, PUBLIC LAND STATISTICS 1993, at 5 tbl.3 (1994). Outside this region and Alaska, the federal government owns less than 4% of the land, ranging from a low of 0.2% (Connecticut) to a high of 15.5% (Hawaii). See *id.* Note that federal land statistics cited in this Article may vary slightly by source and date of publication as a result of ongoing programs of federal land acquisition, disposition, and interagency transfers.

⁵⁸ The federal government owns 67.8% of Alaska's land, see *id.*, and these vast Alaskan holdings account for 38.6% of the four principal federal agencies' total land holdings. See U.S. GEN. ACCOUNTING OFFICE, LAND OWNERSHIP: INFORMATION ON THE ACREAGE, MANAGEMENT, AND USE OF FEDERAL AND OTHER LANDS 24-26 (GAO/RCED-96-40, 1996) [hereinafter GAO, LAND OWNERSHIP].

the Fish and Wildlife Service ("FWS") (87 million), and the National Park Service (77 million).⁵⁹ These federal lands include most of the largest remaining undeveloped tracts in the nation.⁶⁰ Some 272 million acres—nearly forty-four percent of the land these agencies manage—are designated for "conservation" purposes, such as national parks and monuments, recreation areas, research areas, wildlife refuges, and wilderness areas.⁶¹ Given the vast scope of federal landholdings, and given that federal lands are already managed in large blocks and are already subject to land use restrictions of varying degrees of stringency, it is clear that federal land management policies will be an important component in any national biodiversity conservation strategy.⁶² Yet, conservation of natural biological resources on these lands has historically taken a back seat to other objectives, and although biodiversity conservation has now become an explicit policy goal, it is still in tension with other governmental priorities and is subject to conflicting statutory mandates.

1. *Cross-Cutting Statutes Affecting Biodiversity Conservation*

Each federal land management agency is subject to unique statutory requirements and constraints, but all must comply with the National Environmental Policy Act of 1969 ("NEPA")⁶³ and the Endangered Species Act of 1973 ("ESA").⁶⁴ Although these statutes remain important pieces of the biodiversity conservation policy puzzle, as presently written, they neither constitute nor require a broad biodiversity strategy.

a. *National Environmental Policy Act*

Under NEPA, federal land managers are required to prepare detailed environmental impact statements ("EIS") to accompany all "proposals for legislation and other major [f]ederal actions significantly affecting the quality of the human environment."⁶⁵ Biodiversity

⁵⁹ See GAO, *LAND OWNERSHIP*, *supra* note 58, at 18-19 (as of Sept. 30, 1994). The Forest Service is part of the Department of Agriculture, while the BLM, Fish and Wildlife Service, and National Park Service are all divisions of the Department of Interior. The Department of Defense is the next largest federal land manager with less than 2% of the nation's land. See *id.* at 2. The rest of the federal lands are small holdings spread among various agencies.

⁶⁰ See generally *id.* (detailing federal land holdings).

⁶¹ See *id.* at 25-26. The GAO lists all National Park Service lands, all units of the National Wildlife Refuge System, all designated Wilderness Areas, and various other use-restricted areas such as Research Natural Areas, Wild and Scenic Rivers, and Areas of Critical Environmental Concern as "conservation" acreage. *Id.*

⁶² See Jack Ward Thomas & Hal Salwasser, *Bringing Conservation Biology into a Position of Influence in Natural Resource Management*, *CONSERVATION BIOLOGY*, June 1989, at 123, 125.

⁶³ 42 U.S.C. § 4321 (1994).

⁶⁴ 16 U.S.C. § 1531 (1994).

⁶⁵ 42 U.S.C. § 4332(2)(C).

considerations are clearly within NEPA's ambit; binding regulations promulgated by the Council on Environmental Quality direct that federal agencies are to report impacts on ecosystems, including "effects on natural resources and on the components, structures, and functioning of affected ecosystems," in an EIS.⁶⁶ But as valuable as NEPA might become as an information-generating statute under which federal agencies may be compelled to study and disclose the biodiversity impacts of their actions,⁶⁷ courts have interpreted the requirements of NEPA to be purely procedural.⁶⁸ Agencies must produce the required information, but are not required to act in such a way as to reduce adverse environmental impacts or to increase environmental benefits.⁶⁹ NEPA's defenders nonetheless claim that the threat of NEPA litigation creates a powerful incentive for agencies to carefully sift and evaluate environmental impacts.⁷⁰ In some instances, production of the required information may be sufficient to alter their behavior, either alone or in combination with a fear of political backlash, if clearly adverse environmental impacts are identified through the NEPA process. NEPA can thus be a useful educational tool, compelling federal managers to study and consider the biodiversity implications of their management policy, but its substantive effect is limited.

b. *Endangered Species Act*

Federal land managers must also comply with the ESA, a powerful measure aimed explicitly at preventing the extinction of species.⁷¹ Unlike NEPA, the ESA imposes not only procedural requirements, but also substantive constraints on the actions of federal land manag-

⁶⁶ 40 C.F.R. § 1508.8 (1996); see also CEQ, INCORPORATING BIODIVERSITY, *supra* note 17, at 23 (stating that NEPA requires federal agencies to "consider all reasonably foreseeable environmental effects of their actions. To the extent that federal actions affect biodiversity, and that it is possible to both anticipate and evaluate those effects, NEPA requires federal agencies to do so.").

⁶⁷ See, e.g., *Seattle Audubon Soc'y v. Moseley*, 798 F. Supp. 1473, 1483 (W.D. Wash. 1992) (stating that NEPA requires the Forest Service to consider the biodiversity implications of logging in old-growth forests), *aff'd sub nom*, *Seattle Audubon Soc'y v. Espy*, 998 F.2d 699 (9th Cir. 1993).

⁶⁸ See *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 558 (1978) (holding that NEPA does not mandate particular results, but only a fully informed decision).

⁶⁹ See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-51 (1989) (noting that so long as the agency has identified and evaluated the environmental impacts of the proposed action, NEPA does not bar it from concluding that other factors outweigh environmental values). For a more detailed discussion, see Carlson, *supra* note 6, at 25-29.

⁷⁰ See Robert B. Keiter, *NEPA and the Emerging Concept of Ecosystem Management of the Public Lands*, 25 LAND & WATER L. REV. 43, 45 (1990).

⁷¹ See BEATLEY, *supra* note 4, at 21-22 (ESA is "powerful law" providing "the cornerstone of federal efforts to protect species and biodiversity"); Doremus, *supra* note 5, at 265 (ESA is "widely regarded as the strongest legislation ever devised for the protection of nonhuman species").

ers. Under the ESA, the Secretary of the Interior is required to list a species as "endangered" if he finds that it is "in danger of extinction throughout all or a significant portion of its range,"⁷² or as "threatened" if it is "likely to become an endangered species within the foreseeable future."⁷³ Listing determinations are required to be made solely on the basis of the best scientific information, without regard to economic consequences.⁷⁴ At present, more than one thousand U.S. species are listed as endangered or threatened.⁷⁵

The ESA contains provisions for preservation that have been implemented with mixed results. The Act requires the Secretary to designate critical habitats for listed species when "prudent and determinable,"⁷⁶ and to prepare and implement recovery plans designed to ensure the species' long-term viability.⁷⁷ However, critical habitats have been identified for only about one out of every eight listed species,⁷⁸ and only about two-thirds of listed species have approved recovery plans.⁷⁹ The Act also authorizes the Secretary of the Interior to acquire lands containing habitats for listed species⁸⁰ using

⁷² 16 U.S.C. §§ 1532(6), 1533(a)(1) (1994). In the case of marine and anadromous species, this responsibility is shared with the Secretary of Commerce. *See id.* § 1533(a)(2).

⁷³ *Id.* § 1532(20). There is no bright line separating "endangered" from "threatened" species, leaving the Secretary considerable discretion in the listing process. *See infra* notes 97-99 and accompanying text.

⁷⁴ *See* 16 U.S.C. § 1533(b)(1)(A). The listing process can be cumbersome and lengthy. *See* Jon Welner, Note, *Natural Communities Conservation Planning: An Ecosystem Approach to Protecting Endangered Species*, 47 STAN. L. REV. 319, 327 (1995). The U.S. Department of the Interior's Inspector General noted in 1990 that at then-current rates of listing, it could take up to forty-eight years to make listing determinations for all species then on the candidate list, and that thirty-four species had already become extinct while awaiting listing. OFFICE OF THE INSPECTOR GEN., U.S. DEP'T OF THE INTERIOR, AUDIT REPORT: THE ENDANGERED SPECIES PROGRAM 5, 7 (Rep. No. 90-98, 1990).

⁷⁵ Division of Endangered Species, U.S. Fish & Wildlife Service, *Box Score: Listings and Recovery Plans* (as of Oct. 31, 1997) (visited Nov. 6, 1997) <<http://www.fws.gov/~r9endspp/boxscore.html>> [hereinafter *Box Score*] (listing 1,074 U.S. species as "endangered" or "threatened").

⁷⁶ 16 U.S.C. § 1533(a)(3). Critical habitats are habitats "essential for the conservation of the species" which "may require special management considerations or protection." *Id.* § 1532(5)(A)(i). Critical habitat designation is based not only on scientific criteria, but also on "economic impact, and any other relevant impact." *Id.* § 1533(b)(2).

⁷⁷ *See id.* § 1533(f).

⁷⁸ *See* Division of Endangered Species, U.S. Fish & Wildlife Serv., *Endangered Species General Statistics* (as of Jan. 31, 1997) (visited Mar. 28, 1997) <<http://www.fws.gov/~r9endspp/esastats.html>> [hereinafter *Endangered Species Statistics*] (providing that critical habitat had been designated for 123 of the 1067 species then listed as "endangered" or "threatened").

⁷⁹ *See id.* (noting that 644 of 1067 listed species had approved recovery plans). An approved recovery plan is merely a plan, however, and carries no guarantee that funds will be appropriated to carry out the concrete measures necessary to implement the plan. *See* RICHARD J. TOBIN, *THE EXPENDABLE FUTURE: U.S. POLITICS AND THE PROTECTION OF BIOLOGICAL DIVERSITY* 245 (1990).

⁸⁰ 16 U.S.C. § 1534(a).

funds from the Land and Water Conservation Fund.⁸¹ However, expenditures for endangered species habitats have been quite modest.⁸²

Once a species is listed as threatened or endangered, the ESA prohibits federal agencies from taking any action that "is likely to jeopardize [its] continued existence" or "result in the destruction or adverse modification of [critical] habitat of such species."⁸³ Prior to taking any action that might adversely affect a listed species or land designated as its critical habitat, the agency must consult with the FWS,⁸⁴ which then issues a "biological opinion" as to whether the action would jeopardize the species and recommends mitigation measures.⁸⁵

In restricting the actions of federal agencies, the ESA has sometimes produced dramatic effects. The listing of an undistinguished three-inch fish, the snail darter, as an endangered species resulted in suspension of construction of the Tellico Dam on the Tennessee River, despite an \$80 million investment in the project.⁸⁶ The identification of the northern spotted owl as a threatened species led to the suspension of timber sales throughout thousands of acres of old growth forest in the Pacific Northwest.⁸⁷

⁸¹ The Land and Water Conservation Fund, created by the Land and Water Conservation Fund Act of 1965, Pub. L. No. 88-578, 78 Stat. 897 (codified as amended at 16 U.S.C. §§ 4601-4 to -11 (1994)), consists of revenues from surplus land sales, outer continental shelf oil and gas leases, a federal motorboat fuels tax, and recreational user fees, which may be used to acquire national park, conservation, and recreation areas. The fund also provides grants to states for the purpose of acquiring recreational and conservation lands. See NATIONAL RESEARCH COUNCIL, SETTING PRIORITIES FOR LAND CONSERVATION 52-55 (1993) [hereinafter *PRIORITIES FOR CONSERVATION*]; Robert L. Glicksman & George Cameron Coggins, *Federal Recreational Land Policy: The Rise and Decline of the Land and Water Conservation Fund*, 9 COLUM. J. ENVTL. L. 125, 138-47 (1984).

⁸² See Ruhl, *supra* note 2, at 585 n.77 (noting that over a 26-year period from 1967 through 1993, the FWS spent a total of \$238 million to acquire 349,405 acres of land under § 5(a) and predecessor statutes). The Land and Water Conservation Fund nominally receives some \$900 million annually in revenues, but those funds can be spent for conservation purposes only to the extent appropriated by Congress, and far smaller amounts have usually been appropriated, with the rest made available to the Treasury for other uses. See *PRIORITIES FOR CONSERVATION*, *supra* note 81, at 52. If all revenues nominally credited to the Fund are counted, its accumulated unexpended (because unappropriated) surplus now exceeds \$10 billion. See Congressional Research Serv., Land and Water Conservation Fund: Current Funding (visited Sept. 12, 1997) <<http://www.cnie.org/nle/nrgen-1.html>>.

⁸³ 16 U.S.C. § 1536(a)(2).

⁸⁴ Or, in the case of marine or anadromous species, the agency must consult the National Marine Fisheries Service.

⁸⁵ By regulation, the FWS must issue a "jeopardy" opinion if the proposed federal action either jeopardizes the survival of the species or destroys or adversely modifies critical habitat, essentially collapsing the two requirements into one. See 50 C.F.R. § 402.14(h)(3) (1996); see also Katherine Simmons Yagerman, *Protecting Critical Habitat Under the Federal Endangered Species Act*, 20 ENVTL. L. 811, 838-45 (1990) (detailing problems with the single-pronged approach).

⁸⁶ See *TVA v. Hill*, 437 U.S. 153, 189-95 (1978). Congress later exempted the project from the ESA.

⁸⁷ See *Northern Spotted Owl v. Hodel*, 716 F. Supp. 479, 483 (W.D. Wash. 1988).

As show-stopping as the Act has sometimes been, however, its limitations as a biodiversity conservation measure are equally well understood. First, the ESA employs a species-by-species approach that does little to protect ecosystem diversity, genetic diversity within species, or nonlisted species.⁸⁸ At first glance, it might seem obvious that saving any species from extinction would benefit biodiversity.⁸⁹ However, efforts to protect a single species may sometimes have adverse effects on other species or on ecosystems, and the conservation measures adopted under the ESA's species-specific approach may not always produce a net biodiversity benefit. For example, to provide prey for the timber wolf—a listed species—the Forest Service sought to increase white-tailed deer populations by encouraging logging in Wisconsin's national forests, reasoning that the logging would increase the new-growth vegetation available to the deer.⁹⁰ Greater logging, however, fragments the forest and alters its vegetational composition, consequences adverse to many other species and to the forest ecosystem itself.⁹¹ Of course, nothing in the ESA *requires* federal land managers to adopt such narrow, single-species management strategies, and indeed, one of the stated purposes of the Act is to “provide a means whereby the *ecosystems* upon which endangered species and threatened species depend may be conserved.”⁹² Yet, a single-species management approach is also not prohibited, and, consequently, federal land managers may comply with the operational provisions of the Act without taking into consideration adverse effects on ecosystems and nonlisted species.

⁸⁸ See Smith, *supra* note 38, at 386-88; Christopher A. Cole, Note, *Species Conservation in the United States: The Ultimate Failure of the Endangered Species Act and Other Land Use Laws*, 72 B.U. L. REV. 343, 346-47, 358 (1992); Doremus, *supra* note 5, at 284-85, 304-09.

⁸⁹ Cf. BEATLEY, *supra* note 4, at 6-9 (advancing arguments for protection of biodiversity and endangered species as if the two were inseparably linked); *id.* at 7 (stating that because each species occupies a unique ecological niche, the “loss of one species may have long-term ‘cascading’ effects, setting off an ecological chain reaction”); TOBIN, *supra* note 79, at 5 (implicitly equating “protection of biological diversity” with “protection of . . . species”).

⁹⁰ See Walter Kuhlmann, *Wildlife's Burden*, in BIODIVERSITY AND THE LAW, *supra* note 1, at 189, 190-91. Not coincidentally, measures to increase the size of the deer herd are also politically popular with Wisconsin's recreational hunters.

⁹¹ See *id.* Old growth forests are characterized by low light levels, large standing and fallen dead trees, multiple layers of vegetation, and gradations of thermal environment, all factors conducive to roosting, nesting, and hiding by bird and animal species that may not thrive in openings or newly emergent forested areas. See Thomas A. Spies & Jerry F. Franklin, *The Diversity and Maintenance of Old-Growth Forests*, in MANAGED LANDSCAPES, *supra* note 53, at 296, 303.

⁹² 16 U.S.C. § 1531(b) (1994) (emphasis added). Oliver Houck argues that the principal reason we should care about endangered species at all is that they are a proxy for, and indirectly a means of protecting, endangered ecosystems. Oliver A. Houck, *Why Do We Protect Endangered Species, and What Does That Say About Whether Restrictions on Private Property to Protect Them Constitute “Takings”?*, 80 IOWA L. REV. 297, 301 (1995).

Second, the ESA intervenes, if at all, only after a species has been pushed to the brink of extinction; it does nothing to prevent a species from becoming threatened or endangered in the first place.⁹³ Such "emergency room care"⁹⁴ is highly inefficient because, by the time action is taken, available remedies are limited and populations of the listed species may be so diminished, and habitats so degraded, that recovery is either impossible or extremely costly.⁹⁵ In addition, with populations in deep decline, genetic diversity within the species may drastically and irretrievably decline before any protective action is taken.⁹⁶

A third, well-understood limitation of the ESA is that it has generally afforded greater protection to high-profile "charismatic" species, especially large vertebrates, at the expense of lesser-known or less popular species,⁹⁷ even though proportionally more plant and noncharismatic animal species are in peril.⁹⁸ The Act allows listing of geographically distinct subpopulations of vertebrates that become endangered or threatened, even if the species as a whole is not in danger, whereas geographically distinct populations of plants and invertebrates are not afforded similar protection.⁹⁹ Similarly, the Act

⁹³ See TOBIN, *supra* note 79, at 255; Craig R. Groves, *Candidate and Sensitive Species Programs: Lessons for Cost-Effective Conservation*, in *ENDANGERED SPECIES RECOVERY: FINDING THE LESSONS, IMPROVING THE PROCESS* 227, 228 (Tim W. Clark et al. eds., 1994) [hereinafter *ENDANGERED SPECIES RECOVERY*]; Doremus, *supra* note 5, at 316-17.

⁹⁴ William K. Stevens, *Battle Looms Over U.S. Policy on Species*, N.Y. TIMES, Nov. 16, 1993, at C1.

⁹⁵ See TOBIN, *supra* note 79, at 255-56; Groves, *supra* note 93, at 228; Doremus, *supra* note 5, at 316-17. For example, in highly urbanized Riverside County, California, the last remaining habitat for the endangered Stephens' kangaroo rat sold for \$400,000 per acre. See BEATLEY, *supra* note 4, at 206.

⁹⁶ See Doremus, *supra* note 5, at 284-85; see also NATIONAL RESEARCH COUNCIL, SCIENCE AND THE ENDANGERED SPECIES ACT 142 (1995) ("Small population sizes usually lead to the loss of genetic variation, especially if the populations remain small for long periods.").

⁹⁷ See U.S. GEN. ACCOUNTING OFFICE, *ENDANGERED SPECIES: MANAGEMENT IMPROVEMENTS COULD ENHANCE RECOVERY PROGRAM* 4-5 (GAO/RCED-89-5, 1988); Douglas O. Linder, "Are All Species Created Equal?" and Other Questions Shaping Wildlife Law, 12 HARV. ENVTL. L. REV. 157, 174-75 (1988); James Drozdowski, Note, *Saving an Endangered Act: The Case for a Biodiversity Approach to ESA Conservation Efforts*, 45 CASE W. RES. L. REV. 553, 565, 571-72 (1995). This bias in favor of charismatic species is characteristic of conservation policy generally. See McNaughton, *supra* note 38, at 115 ("Conservation policy is generally blind to the two classes of organisms most important to human welfare: plants and microbes . . . [which] are the crucial, indispensable components of every ecosystem . . .").

⁹⁸ See THE NATURE CONSERVANCY, *PRIORITIES FOR CONSERVATION: 1996 ANNUAL REPORT CARD FOR U.S. PLANT AND ANIMAL SPECIES* 8-9 (1996) (noting that birds and mammals are proportionally the least jeopardized groups, with two-thirds of freshwater mussels and crayfish, approximately 40% of amphibians and freshwater fish, and one-third of flowering plants categorized as "vulnerable" or "imperiled," in contrast to 16% of mammals and 15% of birds).

⁹⁹ The ESA defines "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532(16) (1994) (emphasis added). By negative implication, then, a subpopulation of a plant or invertebrate species is not a "species" entitled to protection if endan-

prohibits the "taking" of any listed animal species on private lands,¹⁰⁰ but provides little protection to plants found in similar locales.¹⁰¹ Historically, the FWS's lists of endangered and threatened species have been heavily weighted in favor of vertebrates.¹⁰² Even among listed species, a handful of charismatic species such as the bald eagle, the peregrine falcon, and the spotted owl receive a disproportionately large share of agency resources.¹⁰³

Fourth, although the ESA is often perceived as stringent in its requirements, there is in fact a great deal of flexibility in its application.¹⁰⁴ The FWS routinely approves thousands of proposed agency

gered or threatened. Thus, for example, although the gray wolf as a species is not endangered because there are numerous gray wolves in Canada and Alaska, geographically distinct subpopulations in the lower forty-eight states are classified as "endangered" or "threatened" and protected by the ESA. Similar protection would not be available to a plant or invertebrate species that is abundant in Canada or Alaska but nearing extinction in the lower forty-eight states. Cf. NATIONAL RESEARCH COUNCIL, *supra* note 96, at 92 ("There is no biological or physical reason that standards relating to habitat protection, survival, and recovery should differ for plants and animals and for public and private lands.").

¹⁰⁰ 16 U.S.C. § 1538(a)(1)(B) (making it unlawful to "take any such species within the United States or the territorial sea of the United States").

¹⁰¹ See George Cameron Coggins & Anne Fleishel Harris, *The Greening of American Law?: The Recent Evolution of Federal Law for Preserving Floral Diversity*, 27 NAT. RESOURCES J. 247, 295-98 (1987). The ESA makes it unlawful to "remove and reduce to possession" any listed plant species from federal lands, and to "remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law." 16 U.S.C. § 1538(a)(2)(B). Consequently, under the ESA, it is entirely lawful to take or destroy endangered or threatened plant species on one's own land, or on any private land with permission of the owner, so long as state law does not prohibit that act. See Farrier, *supra* note 2, at 372-73.

¹⁰² See Murphy, *supra* note 47, at 182-87 (suggesting the imbalance is due in part to an agency culture at FWS emphasizing traditional fish and wildlife species, and in part to the perception that listing of invertebrates might undermine public support for the ESA itself); see also STEVEN LEWIS YAFFEE, PROHIBITIVE POLICY: IMPLEMENTING THE FEDERAL ENDANGERED SPECIES ACT 72-75 (1982) (discussing the effects of available information and of the personal and professional values and goals of FWS staff members on listing decisions); J. Alan Clark, *The Endangered Species Act: Its History, Provisions, and Effectiveness*, in ENDANGERED SPECIES RECOVERY, *supra* note 93, at 19, 31-32. Currently, of the 449 listed animal species, only 140 are invertebrates, see Box Score, *supra* note 75, even though invertebrate species vastly outnumber vertebrates. Recently, however, the FWS has made dramatic progress in listing threatened and endangered plants. Before 1985, only 79 plant species had been listed. See Division of Endangered Species, U.S. Fish & Wildlife Serv., *U.S. Listed Flowering Plant Species Index by Lead Region and Status* (as of Nov. 30, 1997) (visited Dec. 9, 1997) <<http://www.fws.gov/~r9endspp/pl1data.html>>; Division of Endangered Species, U.S. Fish & Wildlife Serv., *U.S. Listed Non-Flowering Plant Species Index by Lead Region and Status* (as of Nov. 30, 1997) (visited Dec. 9, 1997) <<http://www.fws.gov/~r9endspp/pl2data.html>>. Today, 625 plant species are listed, constituting a majority of all listed species. See Box Score, *supra* note 75.

¹⁰³ See Michael J. Bean, *Creating Policy on Species Diversity*, in MANAGED LANDSCAPES, *supra* note 53, at 689, 692.

¹⁰⁴ See Oliver A. Houck, *The Endangered Species Act and Its Implementation by the U.S. Departments of Interior and Commerce*, 64 U. COLO. L. REV. 277, 358 (1993) (describing how

actions after informal consultation. Even upon formal consultation, the FWS issues "no jeopardy" opinions in the vast majority of cases, because it finds that the action, however detrimental to the listed species, falls short of creating an imminent danger of extinction across the species' range.¹⁰⁵ In the rare cases where the FWS initially issues a "jeopardy" opinion, the agency is often allowed to proceed with the action by incorporating mitigation measures.¹⁰⁶ Finally, if all else fails, the agency proposing the action may appeal to a cabinet-level Endangered Species Committee,¹⁰⁷ popularly known as the "God squad," which may grant exemptions to the "no jeopardy" rule if it finds that there is no reasonable and prudent alternative to the proposed action, that its benefits outweigh its costs, and that the agency is taking reasonable steps to mitigate and minimize the adverse consequences.¹⁰⁸ Only rarely have the ESA requirements significantly delayed or canceled federal projects.¹⁰⁹

Responding to these criticisms, the FWS and the National Marine Fisheries Service ("NMFS") have recently undertaken some significant initiatives to enhance the effectiveness of the ESA as a biodiversity

discretion-enhancing interpretations have allowed "federal agencies to avoid conflict under the Act to an extraordinary degree").

¹⁰⁵ See U.S. GEN. ACCOUNTING OFFICE, *ENDANGERED SPECIES ACT: TYPES AND NUMBER OF IMPLEMENTING ACTIONS* (GAO/RCED 92-131BR, 1992) (finding more than 16,000 informal consultations allowing proposed project to go forward over a 5-year period, compared to 2,000 formal consultations, resulting in 181 jeopardy opinions); TOBIN, *supra* note 79, at 188 (summarizing formal and informal consultations and jeopardy opinions over a 10-year period); *id.* at 262-63 (contending that the most plausible explanation for the paucity of formal consultations and jeopardy opinions is the FWS's desire to avoid conflict with other federal agencies); Michael J. Bean, *Taking Stock: The Endangered Species Act in the Eye of a Growing Storm*, 13 PUB. LAND L. REV. 77, 80-81 (1992) (noting that, annually, more than 95% of the ten thousand to twenty thousand proposed federal actions potentially affecting listed species are approved after informal consultation; of those proceeding to formal consultation, 85% result in a determination of "no jeopardy").

¹⁰⁶ See Bean, *supra* note 105, at 80-81; Clark, *supra* note 102, at 24; Houck, *supra* note 104, at 318-21. Between 1987 and 1995, the FWS issued only 600 "jeopardy" opinions out of 186,000 endangered species consultations; and of these 600, the FWS ultimately approved "reasonable and prudent alternatives" in all but 100 cases, resulting in an overall approval rate of 99.9% of actions it reviewed. See *Endangered Species Statistics*, *supra* note 78.

¹⁰⁷ See Houck, *supra* note 104, at 330-33. The Committee is composed of the Secretaries of Agriculture, the Army, and the Interior, the Chairman of the Council of Economic Advisors, the Administrators of the EPA and the National Oceanic and Atmospheric Administration, and designated representatives of each affected state. See 16 U.S.C. § 1536(e)(3) (1994).

¹⁰⁸ See 16 U.S.C. § 1536(h)(1). This hierarchy of opportunities for compromise produces, unsurprisingly, a great deal of compromise, as "[t]he higher in the hierarchy the dispute goes, the greater the likelihood that compromise will be achieved." YAFFEE, *supra* note 102, at 99.

¹⁰⁹ See Steven L. Yaffee, *Avoiding Endangered Species/Development Conflicts Through Inter-agency Consultation*, in *BALANCING ON THE BRINK*, *supra* note 47, at 86, 86-89. Yaffee suggests, however, that a low rate of project cancellations could as easily indicate the ESA's success as its failure, if agencies are incorporating endangered species protection into project planning. *Id.* at 90-91.

conservation tool.¹¹⁰ These include: conducting group listings on an ecosystem basis; identifying umbrella,¹¹¹ indicator,¹¹² and keystone¹¹³ species as priority candidates for listing, thereby importing a broader focus on ecosystem protection; emphasizing the listing of plants and nonvertebrate animal species;¹¹⁴ renewing the emphasis on critical habitat designation and recovery plans and explicitly incorporating ecosystem management and biodiversity considerations into these documents;¹¹⁵ and using the leverage created by the ESA's prohibitory provisions to induce government agencies and private landowners to cooperate in regional ecosystem-wide, multi-species habitat conservation planning.¹¹⁶

Overall, the ESA plays an important role in forcing federal land management agencies to address the needs of listed species on public lands.¹¹⁷ However, because its benefits are limited to listed species, it falls far short of a comprehensive biodiversity conservation measure, even with respect to the federal lands where its benefits are greatest.

¹¹⁰ See Notice of Interagency Cooperative Policy for the Ecosystem Approach to the Endangered Species Act, 59 Fed. Reg. 34,273 (1994); Ruhl, *supra* note 2, at 587-600.

¹¹¹ An umbrella species is one with such large area requirements that protecting its habitat will simultaneously protect the lesser included habitats of numerous other species. See Noss, *supra* note 50, at 234-35.

¹¹² An indicator species is one whose population serves as a proxy for the health of the broader ecosystem of which it is a part. An example is the northern spotted owl, whose habitat is old-growth forests in the Pacific Northwest upon which as many as 1,000 other species of birds, mammals, amphibians, reptiles, invertebrates, and plants depend. See Doremus, *supra* note 5, at 306-08. *But cf.* GRUMBINE, *supra* note 44, at 106 (questioning the assumption of "an overlap in different species' living requirements," upon which the concept of indicator species rests).

¹¹³ A keystone species is one that performs such essential ecological functions within an ecosystem that its disappearance would jeopardize the entire ecosystem. See Doremus, *supra* note 5, at 306. Examples include coral, which forms the coral reefs that provide critical habitat for scores of marine species, and the beaver, which creates and maintains wetland habitat for dozens of plant and animal species. See Noss, *supra* note 50, at 233-34.

¹¹⁴ See Endangered and Threatened Wildlife Plants; Review of Plant and Animal Taxa 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, 62 Fed. Reg. 49,398 (1997) (proposed Sept. 19, 1997).

¹¹⁵ See Keiter, *supra* note 11, at 308-09 (describing how new recovery plans for the northern spotted owl and grizzly bear incorporate ecosystem-level protection, including provision for corridors linking habitat areas to minimize adverse effects of fragmentation).

¹¹⁶ Perhaps the most significant example on public lands is the Clinton Administration's attempt to resolve the spotted owl controversy through an ambitious ecosystem-wide, multispecies habitat planning process delineating future uses of the old growth forests of the Pacific Northwest. See U.S. DEP'T OF AGRIC. & U.S. DEP'T OF THE INTERIOR, DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT ON MANAGEMENT OF HABITAT FOR LATE-SUCCESSIONAL AND OLD-GROWTH FOREST RELATED SPECIES WITHIN THE RANGE OF THE NORTHERN SPOTTED OWL (1993).

¹¹⁷ See NATIONAL RESEARCH COUNCIL, *supra* note 96, at 15 (despite shortcomings, "the ESA has successfully prevented some species from becoming extinct" and its retention will help to prevent species extinction).

2. *The Federal Land Managers*

a. *The Bureau of Land Management*

The BLM manages more land than any other agency or organization in the nation, public or private, controlling over 264 million acres or 11.4% of our national land area.¹¹⁸ The BLM is the residual manager of original public domain lands neither disposed of nor withdrawn for other purposes such as national forests, national parks, or wildlife refuges.¹¹⁹ Of the BLM's nationwide total, 165 million acres are rangeland, and another 90 million acres are forested, the latter principally in Alaska.¹²⁰ BLM lands also include grasslands, brushlands, tundra, wetlands, and various kinds of bodies of water.¹²¹

BLM manages its lands under the broad multiple-use mandate of the Federal Land Policy and Management Act of 1976 ("FLPMA"),¹²² which includes ecological and environmental considerations within a broader framework of multiple-use management objectives. Thus, the BLM is instructed to manage the public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; [and] that will provide food and habitat for fish and wildlife."¹²³ At the same time, the BLM is obligated to "provide food and habitat for . . . domestic animals" and to "provide for outdoor recreation and human occupancy and use."¹²⁴ The BLM is also required to manage its lands "in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands."¹²⁵ Under this "have your cake and eat it too" approach, the BLM holds broad discretionary authority to balance competing land uses, but historically, its land management poli-

¹¹⁸ See BUREAU OF LAND MANAGEMENT, *supra* note 57, at 6 tbl.4.

¹¹⁹ In addition, the BLM manages some 2.6 million acres of lands in western Oregon that were previously conveyed for railroad construction, but were later reconveyed to the federal government. *Id.* at 6 tbl.4, 9 tbl.5.

¹²⁰ BLM holdings include 88 million acres in Alaska. *Id.* at 6 tbl.4.

¹²¹ See KEYSTONE CENTER, FINAL CONSENSUS REPORT OF THE KEYSTONE POLICY DIALOGUE ON BIOLOGICAL DIVERSITY ON FEDERAL LANDS 49 (1991) [hereinafter KEYSTONE REPORT].

¹²² 43 U.S.C. §§ 1701-1784 (1994). FLPMA directs the BLM to "manage the public lands under principles of multiple use and sustained yield" except where a tract of land has been "dedicated to specific uses according to any other provisions of law." *Id.* § 1732(a); see also *id.* § 1712(c)(1) (directing BLM to "use and observe the principles of multiple use and sustained yield" in drawing up and revising land use plans). FLPMA defines multiple use as "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people" for "recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values." *Id.* § 1702(c).

¹²³ *Id.* § 1701(a)(8).

¹²⁴ *Id.*

¹²⁵ *Id.* § 1701(a)(12).

cies have given primacy to commodity production, especially grazing and mining.¹²⁶ Indeed, BLM is often cited as the prototypical example of the "agency capture" phenomenon, in which concentrated economic interests having the greatest and most immediate stake in the outcome, and, therefore, the greatest incentive to mobilize resources to influence the process, come to dominate the agency's decisionmaking.¹²⁷

Only 1.6 million acres are currently under wilderness designation, but another 26.5 million acres of roadless areas are currently designated as wilderness study areas.¹²⁸ Additional BLM lands are use-restricted under a variety of designations. These include Areas of Critical Environmental Concern,¹²⁹ National Conservation Areas,¹³⁰ Research Natural Areas ("RNAs"),¹³¹ and Wild and Scenic

¹²⁶ See George Cameron Coggins, *Snail Darters and Pork Barrels Revisited: Reflections on Endangered Species and Land Use in America*, in BALANCING ON THE BRINK, *supra* note 47, at 62, 65; Keiter, *supra* note 11, at 312, 318. *But cf.* CAWLEY, *supra* note 33, at 42 (contending that since the enactment of FLPMA, BLM policy has emphasized environmental concerns at the expense of commodity production, to the consternation of Western ranchers and other commodity-producing users of federal lands).

¹²⁷ See, e.g., TOBIN, *supra* note 79, at 40; George Cameron Coggins, *Some Directions for Reform of Public Natural Resources Law*, 3 ENVTL. L. 67, 72-73 (1988) (describing the BLM as "the very model of the agency capture phenomenon, the Rodney Dangerfield of agencies").

¹²⁸ See BUREAU OF LAND MANAGEMENT, *supra* note 57, at 58 tbl.38, 60-62 tbl.40; *see also infra* Part II.A.2.e (explaining the significance of wilderness and wilderness study designation).

¹²⁹ These are "areas within the public lands where special management attention is required . . . to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes." 43 U.S.C. § 1702(a). In drawing up land use plans, the BLM is instructed to "give priority to the designation and protection of areas of critical environmental concern." *Id.* § 1712(c) (3). Areas of Critical Environmental Concern include sites set aside for a variety of nonbiological values and recreational hunting, as well as ecological reserves, and the BLM has been criticized for its reluctance to use this authority to protect representative ecosystems. *See* Keiter, *supra* note 11, at 312 & n.106. Currently, some 10 million acres are designated Areas of Critical Environmental Concern. *See* BUREAU OF LAND MANAGEMENT, *supra* note 57, at 139 tbl.5-7.

¹³⁰ These may be established either by act of Congress, *see, e.g.*, 16 U.S.C. § 460y (1994) (designating King Range National Conservation Area), or by administrative withdrawals, *see, e.g.*, 43 U.S.C. § 1714.

¹³¹ BLM regulations require the Bureau to set aside RNAs "for the management and protection of public lands having natural characteristics that are unusual or . . . of scientific or other special interest." 43 C.F.R. § 8223.0-1 (1996). RNAs must be "sufficient [in] number and size to adequately provide for scientific study, research, and demonstration purposes." *Id.* § 8223.0-6. They are to be established on land having "one or more of the following characteristics: (1) A typical representation of a common plant or animal association; (2) an unusual plant or animal association; (3) a threatened or endangered plant or animal species; (4) a typical representation of common geologic, soil, or water features; or (5) outstanding or unusual geologic, soil, or water features." *Id.* § 8223.0-5. By thus providing for the BLM to protect both representative and unique biological communities, the regulations appear to contemplate and authorize a system of biological reserves on BLM lands, but thus far only a few small areas have been designated as RNAs. *See* GAO, LAND

Rivers,¹³² as well as one major National Monument,¹³³ and National Recreation Areas.¹³⁴ Altogether some 58 million acres, or 22% of the BLM's total, are thus managed "primarily for conservation" according to the General Accounting Office,¹³⁵ although much of this acreage is reserved primarily for recreational use or selected for scenic rather than biological values.

A common view is that BLM lands are the nation's left-over lands—too harsh, arid, and inaccessible for any purpose other than livestock grazing or mineral production. The common perception is that the lands are, in many cases, left in poor condition as a result of decades of overgrazing and mismanagement and are thus not particularly interesting from a biodiversity conservation perspective.¹³⁶ However, more recent research suggests that these lands encompass a broad range of ecosystem types providing habitat to species and communities of native flora and fauna not found elsewhere,¹³⁷ and that

OWNERSHIP, *supra* note 58, at 26 (providing that 326,000 acres of BLM land have been designated as RNAs).

¹³² See Wild and Scenic Rivers Act of 1968, 16 U.S.C. § 1271 (1994). In total, 829,000 acres of BLM lands have been designated as Wild and Scenic Rivers. See GAO, LAND OWNERSHIP, *supra* note 58, at 26. Although these designations are primarily based upon recreational and scenic values, ravine and riparian ecosystems are often biodiversity rich and provide habitat for many species not found elsewhere. Thus, the protection afforded under this statute may make a significant contribution to biodiversity conservation.

¹³³ National Monuments may be created by acts of Congress or by presidential proclamation pursuant to the Antiquities Act of 1906, which authorizes the President to withdraw public lands to preserve "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest." 16 U.S.C. § 431 (1994). Under this authority, President Clinton designated 1.7 million acres of BLM lands in southwestern Utah as the Grand Staircase-Escalante National Monument, the first and only National Monument to remain under BLM management. Proclamation No. 6920, 3 C.F.R., 1996 Comp. 64 (1997).

¹³⁴ See, e.g., 16 U.S.C. §§ 460mm-2 to -4 (1994) (designated the White Mountains National Recreation Area in Alaska, to be managed by the BLM under authority of the FLPMA).

¹³⁵ GAO, LAND OWNERSHIP, *supra* note 58, at 6.

¹³⁶ See, e.g., VICTORIA EDWARDS, DEALING IN DIVERSITY 3 (1995) (stating that BLM lands are "relatively sparse as a pool of biological and genetic diversity"); George Cameron Coggins, *The Law of Public Rangeland Management V: Prescriptions for Reform*, 14 ENVTL. L. 497, 500-02 (1984). In part, this perception may result from the common error of conflating biodiversity with lush vegetation or, more generally, with biological productivity, i.e., the total biomass supported by a given land area. Some biologically productive ecosystems support relatively little species richness and low levels of endemism, while some harsh, arid, low-productivity Western landscapes provide unique microclimates, rare ecological niches, and high levels of endemism. See, e.g., Robert Costanza et al., *Scale and Biodiversity in Coastal and Estuarine Ecosystems*, in BIODIVERSITY LOSS, *supra* note 24, at 84, 90-91 (noting that coastal and marine ecosystems generally rank low in species richness and endemism but high in biological productivity).

¹³⁷ See COMMITTEE ON RANGELAND CLASSIFICATION, BD. ON AGRIC., NAT'L RESEARCH COUNCIL, RANGELAND HEALTH: NEW METHODS TO CLASSIFY, INVENTORY AND MONITOR RANGELANDS 18-19 (1994) (stating that the federal government owns 43% of U.S. rangelands, which constitute a diverse array of ecosystems supporting an equally diverse array of plant and animal life); REED F. NOSS & ALLEN Y. COOPERRIDER, SAVING NATURE'S LEGACY:

the BLM lands are, collectively, relatively rich in biodiversity.¹³⁸ In the final analysis, although some BLM lands may be of little value for either commercial or biodiversity conservation purposes, and others may be of greater commercial than biological value, some BLM lands include habitats and ecosystems that are deserving of protection.

b. *The Forest Service*

The U.S. Department of Agriculture Forest Service is the nation's second-largest land management agency, responsible for 191 million acres of land.¹³⁹ Although most Forest Service lands are in the West, the Forest Service also has a major presence in several important eastern ecoregions, including the upper Great Lakes, northern New England, the southern Appalachians, and the Ozarks.¹⁴⁰ Some 34.5 million acres of Forest Service land, or about 18% of the total, are under wilderness designation, with another 6.6 million acres designated as wilderness study areas.¹⁴¹ Additional areas are protected as Research Natural Areas,¹⁴² Wild and Scenic

PROTECTING AND RESTORING BIODIVERSITY 220-21 (1996) (stating that rangelands make up roughly 70% of the terrestrial surface, and include a wide variety of natural communities and ecosystem types); Neil E. West, *Strategies for Maintenance and Repair of Biotic Community Diversity on Rangelands*, in *MANAGED LANDSCAPES*, *supra* note 53, at 326, 326 ("rangelands constitute the largest category of generally non-tilled, but extensively used land across the world" and include a "wide variety of ecosystem types" such as shrublands, grasslands, deserts, tundra, heaths, salt marshes, and post-clearcut forests).

¹³⁸ See KEYSTONE REPORT, *supra* note 121, at 49 (stating that partial study of BLM lands in 10 Western states found at least 114 of 261 Bailey-Küchler natural vegetation types); Crumpacker et al., *supra* note 38, at 114 (finding BLM lands include slightly more than half of all major terrestrial and wetland ecosystem types, a "surprisingly large number . . . in view of the fact that most of these lands occur only in the western half of the United States").

¹³⁹ See National Park Serv., *The National Park System Acreage* (last modified Apr. 24, 1997) <<http://www.nps.gov/legacy/acreage.html>> [hereinafter *National Park System Acreage*]. Of all the major land management agencies, the Forest Service has the least land and the lowest percentage of its overall holdings in Alaska, where it manages 22 million acres. See GAO, *LAND OWNERSHIP*, *supra* note 58, at 16-17. Its holdings there, however, include the magnificent Tongass National Forest in the Alaskan panhandle, the largest and, many would argue, the most ecologically important unit in the entire National Forest system. See, e.g., Joby Warrick, *Dispute in Alaskan Logging Helps Stall Pena Nomination*, WASH. POST, Mar. 1, 1997, at A2 (noting that 17 million acre Tongass is "home to the North America's largest remaining temperate rain forest, a rare expanse of old growth trees and rare wildlife that environmentalists consider the crown jewel of this country's national forests").

¹⁴⁰ Great Lakes: Mich.—2.8 million acres, Minn.—2.8 million, Wis.—1.5 million; New England: N.H.—721,000, Vt.—341,000; southern Appalachians: Ga.—860,000, Ky.—673,000, Tenn.—628,000, Va.—1.6 million, W. Va.—1.0 million; Ozarks: Ark.—2.5 million, Mo.—1.5 million. See U.S. CENSUS BUREAU, *STATISTICAL ABSTRACT OF THE UNITED STATES* (1996).

¹⁴¹ See GAO, *LAND OWNERSHIP*, *supra* note 58, at 26.

¹⁴² See *id.* (approximately 300,000 acres). Forest Service regulations require each forest plan to identify "examples of important forest, shrubland, grassland, alpine, aquatic, and geologic types that have special or unique characteristics of scientific interest and importance." 36 C.F.R. § 219.25 (1996). The Chief of the Forest Service is to "establish a

Rivers,¹⁴³ National Monuments,¹⁴⁴ National Recreation Areas,¹⁴⁵ and National Game Refuges.¹⁴⁶ In total, the GAO lists 49.9 million acres, or 26% of the Forest Service total, as "managed primarily for conservation," although this figure includes recreational and scenic areas as well as areas reserved for their biological resources.¹⁴⁷

Forest Service lands not subject to such special designations are managed under a "multiple use-sustained yield" mandate.¹⁴⁸ In principle, this mandate gives the Forest Service broad discretionary authority to determine appropriate land uses and levels of commodity outputs.¹⁴⁹ In practice, however, this mandate has historically resulted in an emphasis on commodity (especially timber) production¹⁵⁰

series of research natural areas, sufficient in number and size to illustrate adequately or typify for research or educational purposes, the important forest and range types in each forest region, as well as other plant communities that have special or unique characteristics of scientific interest and importance." *Id.* § 251.23. These are to be "retained in a virgin or unmodified condition except where measures are required to maintain a plant community which the area is intended to represent." *Id.* Like the BLM Research Natural Areas regulations, *see supra* note 131, the Forest Service regulations appear to contemplate identification and setting aside of representative and scientifically valuable communities—in effect, a system of biological reserves. But like the BLM, the Forest Service has thus far committed only isolated small tracts, comprising a modest fraction of the land under its management, to Research Natural Area designation. *See* WILLIAM S. ALVERSON ET AL., *WILD FORESTS: CONSERVATION BIOLOGY AND PUBLIC POLICY* 143-44 & fig.9-2, 160 (1994).

¹⁴³ *See* GAO, *LAND OWNERSHIP*, *supra* note 58, at 26 (approximately 618,000 acres).

¹⁴⁴ *See id.* (3.4 million acres). Most national monuments are under management of the National Park Service, although a few located in national forests are managed by the Forest Service.

¹⁴⁵ *See id.* (2.7 million acres).

¹⁴⁶ *See id.* (1.2 million acres). These are established by acts of Congress.

¹⁴⁷ *Id.* at 24-26.

¹⁴⁸ The Multiple Use-Sustained Yield Act of 1960, 16 U.S.C. §§ 528-531 (1994), provides that national forests "shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes," *id.* § 528, and "utilized in the combination that will best meet the needs of the American people," including a "high-level annual or regular periodic output of the various renewable resources." *Id.* § 531(a)-(b).

¹⁴⁹ *See* George Cameron Coggins, *Of Succotash Syndromes and Vacuous Platitudes: The Meaning of "Multiple Use, Sustained Yield" for Public Land Management*, 53 U. COLO. L. REV. 229, 240-43 (1982); Keiter, *supra* note 11, at 309; *see also* Perkins v. Bergland, 608 F.2d 803, 807 (9th Cir. 1979) (holding that the court should review the agency's factual findings under the "arbitrary and capricious" standard).

¹⁵⁰ *See* ALVERSON ET AL., *supra* note 142, at 142-43; GRUMBINE, *supra* note 44, at 109; CHARLES F. WILKINSON, *CROSSING THE NEXT MERIDIAN* 135-41 (1992); Oliver A. Houck, *On the Law of Biodiversity and Ecosystem Management*, 81 MINN. L. REV. 869, 884 (1997); Keiter, *supra* note 11, at 318. This phenomenon is usually attributed to agency capture by timber interests. *See, e.g.,* Michael C. Blumm, *Public Choice Theory and the Public Lands: Why "Multiple Use" Failed*, 18 HARV. ENVTL. L. REV. 405, 406-07 (1994). An equally plausible explanation is that a strong internal agency culture has, since the founding of the Forest Service under Gifford Pinchot in the Progressive era, emphasized the superiority of scientific/rational/bureaucratic silviculture to maximize sustained commodity output. *See* ROBERT H. NELSON, *PUBLIC LANDS AND PRIVATE RIGHTS: THE FAILURE OF SCIENTIFIC MANAGEMENT* 48-51 (1995); RANDAL O'TOOLE, *REFORMING THE FOREST SERVICE* 20-24 (1988). Moreover, congressional appropriations historically have been tied to timber production, creating a bureaucratic incentive to maximize output at the expense of

and, secondarily, on recreational use.¹⁵¹

In recent years, however, timber production from the national forests has declined dramatically under the constraints of the ESA and other environmental laws. As Congress and administrative agencies have set aside increasingly large areas for conservation purposes,¹⁵² this decline has prompted congressional response in the form of the so-called "Salvage Logging" rider to the 1995 Emergency Supplemental Appropriations bill.¹⁵³ This bill suspended environmental constraints, administrative appeals, and judicial review of timber sales on thousands of acres of national forest lands.¹⁵⁴ These developments have left the agency reeling, whipsawed between conflicting and seemingly irreconcilable legal and political demands for both increased conservation and increased timber output.¹⁵⁵

environmental services for which the agency is not similarly rewarded. See U.S. GEN. ACCOUNTING OFFICE, *FOREST SERVICE DECISION-MAKING: A FRAMEWORK FOR IMPROVING PERFORMANCE* 63-64 (GAO/RCED-97-71 1997) [hereinafter GAO, *FOREST SERVICE DECISION-MAKING*]; O'TOOLE, *supra*, at 14; Keiter, *supra* note 11, at 318.

¹⁵¹ See GRUMBINE, *supra* note 44, at 140-41 (stating that the Forest Service has embraced recreational use as a secondary goal in a defensive maneuver to prevent additional lands from being transferred to the rival National Park Service). Recreational use of the national forests has grown enormously, and this trend is expected to continue. See GAO, *FOREST SERVICE DECISION-MAKING*, *supra* note 150, at 60-61.

¹⁵² In western Washington, western Oregon, and northern California, some 47% of forest service lands previously available for timber production have been set aside for conservation purposes. See GAO, *FOREST SERVICE DECISION-MAKING*, *supra* note 150, at 58. National forest timber production fell from its peak level of 11.3 billion board feet in 1988 to 3.1 billion board feet in 1994. See *id.* at 59. The decline was partially attributable to staff reductions, government furloughs, and a severe fire season in 1994, which all contributed to delays in re-establishing a timber sale program held up by injunctions stemming from the spotted owl controversy. See COUNCIL ON ENVTL. QUALITY, *ENVIRONMENTAL QUALITY 1994-95 307* [hereinafter CEQ *ENVIRONMENTAL QUALITY*].

¹⁵³ Emergency Salvage Timber Sale Program, Pub. L. No. 104-19 § 2001, 109 Stat. 194, 240 (1995). The statute, adopted as a rider to a budget reconciliation bill, is labeled the "Logging Without Laws Bill" by some environmental groups because it provides that timber sales on qualifying lands will be deemed to be in compliance with environmental laws—whether they are or not. See Patti Goldman, *1995 Logging Without Laws: Legislating by Budget Rider*, *ENV'T*, Apr. 1, 1996, at 41.

¹⁵⁴ See CEQ *ENVIRONMENTAL QUALITY*, *supra* note 152, at 309-12; GAO, *FOREST SERVICE DECISION-MAKING*, *supra* note 150, at 64.

¹⁵⁵ See GAO, *FOREST SERVICE DECISION-MAKING*, *supra* note 150, at 63-66 (describing how this conflict is played out internally among Forest Service professionals, externally among competing pressure groups, politically among contending factions in Congress and in the Administration, and legally through apparently conflicting statutory mandates); GAO, *FOREST SERVICE: ISSUES RELATED TO MANAGING NATIONAL FORESTS FOR MULTIPLE USES* 9 (GAO/T/RCED-96-111 1996) (stating that because demands for both commodity and noncommodity uses of national forests are expected to intensify, Congress must set clear priorities if noncommodity uses, especially biodiversity, are to be protected). Many observers attributed the abrupt resignation of Forest Service Chief Jack Ward Thomas, a career Forest Service wildlife biologist who played a central role in resolving the spotted owl controversy and later became the first nonforester to head the agency, to Thomas's inability to resolve this fundamental role confusion. See, e.g., Scott Sonner, *Forest Service Head to Quit*;

The National Forest Management Act of 1976 ("NFMA")¹⁵⁶ establishes an elaborate land-use and commodity production planning process. This process produces legally binding, long-term forest plans for each national forest, thus limiting the agency's management discretion once the forest plan has been adopted.¹⁵⁷

The Forest Service is the only federal land management agency with an explicit biodiversity conservation mandate in its organic statute. The NFMA directs the agency to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives."¹⁵⁸ Implementing regulations require forests to be managed, "where appropriate and to the extent practicable," to "preserve and enhance the diversity of plant and animal communities . . . so that it is at least as great as that which would be expected in a natural forest"¹⁵⁹ and to provide sufficient habitat to "maintain viable populations of existing native and desired non-native vertebrate species."¹⁶⁰ The Forest Service carries out these directives primarily by identifying and monitoring "management indicator species"¹⁶¹ for each national forest, "selected because their population changes are believed to indicate the effects of management activities,"¹⁶² and by incorporating goals for the "maintenance and improvement of habitat for [these] species"¹⁶³ in each forest management plan "to the degree consistent with overall multiple use objectives."¹⁶⁴

Some of the northern spotted owl's most significant legal victories came from judicial rulings based on the threat of timber harvesting to the species, which had been identified as a management indicator species for forests in the Pacific Northwest even prior to its

He Urges Truce Over Logging—Wants Politics Put Aside and 'Clear Mission' Defined, SEATTLE TIMES, Oct. 11, 1996, at A6.

¹⁵⁶ 16 U.S.C. §§ 1601-1617 (1994).

¹⁵⁷ Under the NFMA, each national forest must produce an inventory of forest resources and undergo a broad, interdisciplinary planning process, subject to public input, before producing a legally binding ten-year to fifty-year forest plan. See generally Charles F. Wilkinson & H. Michael Anderson, *Land and Resource Planning in the National Forests*, 64 OR. L. REV. 1, 43-45 (1985) (describing the NFMA planning process); see also GAO, FOREST SERVICE DECISION-MAKING, *supra* note 150, at 28 (stating that forest plans generally take 3 to 10 years to complete and cost up to \$8 million per forest).

¹⁵⁸ 16 U.S.C. § 1604(g)(3)(B).

¹⁵⁹ 36 C.F.R. § 219.27(g) (1996).

¹⁶⁰ *Id.* § 219.19.

¹⁶¹ *Id.* § 219.19(a).

¹⁶² *Id.* § 219.19(a)(1). Management indicator species may include listed endangered and threatened species, other species with special habitat needs, game species, nongame species of "special interest," or species whose population changes are believed to indicate the status and health of other species within the community. See *id.*

¹⁶³ *Id.* § 219.19.

¹⁶⁴ *Id.* § 219.19(a).

listing under the ESA.¹⁶⁵ However, the Forest Service's biodiversity mandate is ultimately a weak one. The statutory language itself suggests that the goal of "providing for diversity" is subsidiary to the agency's broader mission of "meet[ing] overall multiple use objectives."¹⁶⁶ The implementing regulations underscore this important qualification, instructing the Forest Service to manage forests to protect indicator species "to the degree consistent with overall multiple-use objectives,"¹⁶⁷ and pursue diversity objectives "where appropriate and to the extent practicable,"¹⁶⁸ with reductions in diversity allowable "where needed to meet overall multiple-use objectives."¹⁶⁹ By thus subordinating biodiversity conservation to multiple-use management, the statute places less emphasis on biodiversity considerations, and appears to leave the Forest Service a free hand to continue its traditional emphasis on timber output. In practice, the Forest Service has often interpreted its biodiversity requirements in ways that many environmentalists and conservation biologists have found to be antithetical to biodiversity conservation goals.¹⁷⁰ For example, the Forest Service has made questionable selections of indicator species,¹⁷¹ failed to adequately monitor populations of indicator species,¹⁷² and relied on single-species and site-specific mitigation rather than broader, ecosystem-protective conservation measures.¹⁷³ Despite the dramatic results in the spotted owl cases, courts have generally deferred to the Forest Service's "expert" determinations, holding the statutory and regulatory diversity mandates to be broadly discretionary.¹⁷⁴ Finally, the Forest

¹⁶⁵ See, e.g., *Seattle Audubon Soc'y v. Evans*, 771 F. Supp. 1081, 1096 (W.D. Wash. 1991), *aff'd*, 952 F.2d 297 (9th Cir. 1991) (enjoining logging in spotted owl habitat because Forest Service had failed to protect adequate habitat to ensure spotted owl's viability as required by NFMA and implementing regulations).

¹⁶⁶ 16 U.S.C. § 1604(g)(3)(B) (1994); see also GRUMBINE, *supra* note 44, at 104 (discussing the vague language of the NFMA).

¹⁶⁷ 36 C.F.R. § 219.19(a).

¹⁶⁸ *Id.* § 219.27(g).

¹⁶⁹ *Id.*; see also GRUMBINE, *supra* note 44, at 106 (discussing the indicator species selection process).

¹⁷⁰ See ALVERSON ET AL., *supra* note 142, at 218-21; CRUMBINE, *supra* note 44, at 107-08.

¹⁷¹ See ALVERSON ET AL., *supra* note 142, at 218-19 (recounting that national forest managers in Wisconsin selected "ubiquitous" species and "habitat generalists" like white-tailed deer, ground squirrels, and ruffed grouse as indicator species, despite their abundance and, in some cases, preferences for cut-over areas); Houck, *supra* note 150, at 920-21 (describing similar selections of ubiquitous species like deer, quail, turkey, squirrel, and mouse as "indicators" in Texas, Arkansas, and Oklahoma national forests).

¹⁷² See ALVERSON ET AL., *supra* note 142, at 220; GRUMBINE, *supra* note 44, at 113 (describing how one national forest plan simply assumes a relationship between acreage of available habitat and population of indicator species, rather than actually monitoring species population).

¹⁷³ See ALVERSON ET AL., *supra* note 142, at 217.

¹⁷⁴ See, e.g., *Sierra Club v. Marita*, 46 F.3d 606, 619 (7th Cir. 1995); *Krichbaum v. Kelley*, 844 F. Supp. 1107, 1111-12 (W.D. Va. 1994), *aff'd*, 61 F.3d 900 (4th Cir. 1995); *Oregon Natural Resources Council v. Lowe*, 836 F. Supp. 727, 732 (D. Or. 1993), *aff'd*, 109 F.3d

Service, while continuing to insist that its biodiversity provisions are procedural only and do not require any particular level of biodiversity protection,¹⁷⁵ is now considering abandoning its diversity regulations entirely, in favor of an even more broadly discretionary "ecosystem management" approach.¹⁷⁶

In sum, although the Forest Service manages lands rich in biodiversity under a mandate that explicitly embraces biodiversity conservation, that mandate is a limited one. It is easily overwhelmed by the agency's primary objective of meeting timber production targets, toward which it is impelled not only by statutory mandate but also by interest-group pressure, traditional agency culture, and the bureaucratic imperatives of the budget process.

c. *The National Wildlife Refuge System*

The FWS, the federal government's third-largest land management agency with holdings of 92 million acres in 511 national wildlife refuges in all fifty states, administers the National Wildlife Refuge System.¹⁷⁷ Four-fifths of the system's land holdings—76 million acres in sixteen wildlife refuges—are found in Alaska.¹⁷⁸ Some 19 million

521, 526 (9th Cir. 1997); *Sierra Club v. United States Forest Serv.*, 878 F. Supp. 1295, 1306-07 (D.S.D. 1993), *aff'd*, 46 F.3d 835, 838-39 (8th Cir. 1995); *Sierra Club v. Robertson*, 810 F. Supp. 1021, 1025 (W.D. Ark. 1992), *aff'd in part*, 28 F.3d 753 (8th Cir. 1994); *see also* Houck, *supra* note 150, at 919-22.

¹⁷⁵ *See Robertson*, 810 F. Supp. at 1027-28; Keiter, *supra* note 70, at 56.

¹⁷⁶ Under the proposed rule, the "principal goal" of national forest management would be "to maintain or restore the sustainability of ecosystems," and "diversity of plant and animal communities" would be recognized as "an inherent feature of sustainable ecosystems," but forest managers would "retain the discretion to determine for each plan area which conditions are indicative of sustainable ecosystems and how the plan area could be managed to promote achievement of those conditions," and "nothing in the proposed rule . . . establishes a concrete standard regarding ecosystem sustainability or diversity." National Forest System Land and Resource Management Planning: Proposed Rule, 60 Fed. Reg. 18,886, 18,892 (1995). One version of the proposed rule would replace current diversity and indicator species viability requirements with a generalized directive to forest managers to "provide for the protection of habitat capability for sensitive species," *id.*, so as to "prevent the need for listing the species as threatened or endangered under ESA," *id.* at 18,894, but management decisions under this provision are "inherently dependent on professional judgment," *id.* at 18,922, that is to say, discretionary. An alternative version would restate the current requirement that habitat be managed to "maintain viable populations" of management indicator species, *id.* at 18,922-23, but in place of the current requirement that each forest plan include "objectives for the maintenance and improvement of habitat," 36 C.F.R. § 219.19(a) (1996) (emphasis added), the proposed rule would require only "guidelines," 60 Fed. Reg. at 18,923, adding yet more flexibility to an already highly discretionary regulation. Both versions of the proposed rule would drop the current requirement that forests be managed to produce diversity "at least as great as that which would be expected in a natural forest." 36 C.F.R. § 219.27(g).

¹⁷⁷ *See* U.S. Fish & Wildlife Service, Dept. of the Interior, Three New Refuges Added to National Wildlife Refuge System (Oct. 31, 1996) (press release, on file with author).

¹⁷⁸ *See* GAO, LAND OWNERSHIP, *supra* note 58, at 17. The Arctic National Wildlife Refuge alone is larger than the combined acreage of all the wildlife refuges outside Alaska. *See*

acres, just over one-fifth of the total, are under wilderness designation.¹⁷⁹ Refuges are created by acts of Congress,¹⁸⁰ executive withdrawals of public lands,¹⁸¹ and acquisition through donation or purchase under a variety of statutes.¹⁸²

The stated purpose of the system is to develop "a national program of wildlife and ecological conservation and rehabilitation" through "restoration, preservation, development and management of wildlife and wildlands habitat."¹⁸³ Although this might suggest a broadly conceived goal of biodiversity conservation, historically, most wildlife refuges have served the narrower purpose of protecting habitat for waterfowl, other migratory birds, and game species.¹⁸⁴ Moreover, the FWS has been traditionally identified as the federal counterpart of state sport fishing and game management agencies.¹⁸⁵

Arctic National Wildlife Refuge (visited Nov. 11, 1997) <<http://www.r7.fws.gov/nwr/arctic/descrip.html>>.

¹⁷⁹ See KEYSTONE REPORT, *supra* note 121 at 58; Fink, *supra* note 27, at 35. Some 90% of the acreage so designated is in Alaska, leaving relatively little wilderness on the FWS' generally smaller holdings in the lower forty-eight states. See *id.*

¹⁸⁰ See Fink, *supra* note 27, at 10-12.

¹⁸¹ See *id.* at 10-11. President Theodore Roosevelt used an executive order to create the first national wildlife refuge, Pelican Island, off the Florida coast, in 1903, and by 1909 had established 53 refuges. See *id.* at 10-11 & nn.52, 56. The federal government already owned some 97% of the acreage of today's system at the time it was set aside for conservation purposes. See *id.* at 11.

¹⁸² These include the Migratory Bird Conservation Act, 16 U.S.C. §§ 715-715r (1994); the Migratory Bird Hunting and Conservation Stamp Act, 16 U.S.C. § 718d; the Fish and Wildlife Coordination Act, 16 U.S.C. § 661; the North American Wetlands Conservation Act of 1989, 16 U.S.C. §§ 4401-4413; the Emergency Wetlands Resources Act of 1986, 16 U.S.C. §§ 3901-3932; and the Endangered Species Act, 16 U.S.C. § 1534. See Fink, *supra* note 27, at 13-19. Money from the Land and Water Conservation Fund may be used to acquire land for refuges, see *id.* at 17-18, and to acquire habitat of endangered or threatened species, see *id.* at 18-19. See also *supra* notes 81-82 (discussing the funding sources and objectives of the Fund).

¹⁸³ 50 C.F.R. § 25.11(b) (1996).

¹⁸⁴ See DEFENDERS OF WILDLIFE, PUTTING WILDLIFE FIRST: RECOMMENDATIONS FOR REFORMING OUR TROUBLED REFUGE SYSTEM 5 (1992) ("Today's national wildlife refuges are a collection of landscape fragments."); NATHANIEL P. REED & DENNIS DRABELLE, THE UNITED STATES FISH AND WILDLIFE SERVICE 19 (1984); Keiter, *supra* note 11, at 306 ("[M]ost of the nation's refuges were not designed as ecologically sustainable entities, even though they provide critical habitats for particular species."); Murphy, *supra* note 47, at 183 (describing the FWS' "historical mission" as protecting "traditional fish and wildlife values" rather than biodiversity broadly conceived). The FWS now includes "biological diversity" among the five priority goals in its Land Acquisition Priority System (LAPS), along with endangered species, migratory birds, nationally significant wetlands, and fishery resources. See PRIORITIES FOR CONSERVATION, *supra* note 81, at 71-74; Fink, *supra* note 27, at 84-85. However, because the LAPS analysis produces only two land acquisition lists—one for migratory birds and one for endangered species—biodiversity must be considered at best a secondary criterion. See *id.* at 85.

¹⁸⁵ See TOBIN, *supra* note 79, at 52; YAFFEE, *supra* note 102, at 110-13 (stating that hunters and sport fishers form the FWS's core constituency, and its staffing, programs, and policy priorities traditionally reflect these interests). Prior to 1974, the FWS was named the "Bureau of Sport Fisheries and Wildlife." See TOBIN, *supra* note 79, at 36. In addition to

Apart from Alaska, where the system's vast acreages protect habitats for multiple species and whole ecosystems,¹⁸⁶ most units in the system are small, often just a few acres in area, and many are managed under narrow statutory mandates tailored to their narrow, species-specific purpose.¹⁸⁷

The refuge program has principally emphasized setting aside small wetland acreages as seasonal habitat for waterfowl and other migratory birds, especially along the principal north-south "flyways."¹⁸⁸ Wetlands, comprising some 37% of the system's acreage, represent the largest category of landholdings.¹⁸⁹ Since 1934, revenues from Duck Stamps, federal waterfowl hunting permits that every adult hunter of migratory waterfowl must purchase and carry affixed to his state hunting license, have largely funded the acquisition of lands for waterfowl refuges.¹⁹⁰ As a quid pro quo, portions of these refuges are open to duck and goose hunting.¹⁹¹

Other refuges have been established to provide habitats for large mammals.¹⁹² More recently, the ESA has influenced FWS land acquisition priorities through the establishment of refuges specifically providing habitats for listed endangered or threatened species.¹⁹³

managing wildlife refuges and the endangered species program, the FWS manages 70 fish hatcheries, and until 1986, was responsible for eradicating "predators such as bears, bobcats, coyotes, [and] mountain lions," some of which are now protected under the Endangered Species Act. *See id.* at 42-43.

¹⁸⁶ The Alaska National Interest Lands Conservation Act of 1980 ("ANILCA"), which nearly tripled the size of the wildlife refuge system, expressly provides that the purpose of the Alaskan refuges is to conserve fish and wildlife populations and habitats "in their natural diversity." Pub. L. No. 96-487, §§ 302-303, 94 Stat. 2371, 2385-93 (1980). Congress thereby intended to "conserve the entire spectrum of plant and animal life" in the Alaskan wilds. S. Rep. No. 96-413, at 174 (1980), *reprinted in* 1980 U.S.C.C.A.N. 5070, 5118.

¹⁸⁷ *See* U.S. GEN. ACCOUNTING OFFICE, NATIONAL WILDLIFE REFUGE SYSTEM: CONTRIBUTIONS BEING MADE TO ENDANGERED SPECIES RECOVERY 4 (GAO/RCED-95-7 1994) [hereinafter GAO, ENDANGERED SPECIES RECOVERY]; REED & DRABELLE, *supra* note 184, at 19.

¹⁸⁸ *See* REED & DRABELLE, *supra* note 184, at 19; Fink, *supra* note 27, at 23.

¹⁸⁹ *See* KEYSTONE REPORT, *supra* note 121, at 57. Other major landscape types include grasslands (4.6%), forests (19.1%), brush (9.3%), desert (6.5%), tundra (19.6%), and others (4.3%). *See id.*

¹⁹⁰ *See* TOBIN, *supra* note 79, at 52. Sales of Duck Stamps, officially known as Migratory Bird Hunting and Conservation Stamps, have generated some \$500 million for the purchase of more than 4.5 million acres of waterfowl habitat. *See* U.S. Fish and Wildlife Service, Dep't of the Interior, Deadline Is September 15 for Federal Duck Stamp Art Contest, July 21, 1997 (press release, on file with author).

¹⁹¹ *See* TOBIN, *supra* note 79, at 52. The Act provides that 40% of the area of refuges established with Duck Stamp funds shall be open for hunting. 16 U.S.C. §§ 718-718h (1994).

¹⁹² These include the National Bison Range in Montana, the Key Deer National Wildlife Refuge in the Florida Keys, the National Elk Refuge in Wyoming, and the Charles Sheldon Antelope Range in Nevada. *See* REED & DRABELLE, *supra* note 184, at 20-21.

¹⁹³ *See* GAO, ENDANGERED SPECIES RECOVERY, *supra* note 187, at 6 (as of 1994, fifty-five refuges totalling 310,000 acres had been established to provide habitat for listed species). Many other wildlife refuges also provide habitat to listed species, and it is estimated that about one-quarter of listed species occur somewhere within the refuge system. *See id.* at 1.

However, consistent with longstanding ESA priorities,¹⁹⁴ less charismatic members of the animal kingdom rarely receive such special protection, and refuges typically are not set aside especially for the benefit of plant species or threatened ecosystems.¹⁹⁵ Nonetheless, the refuge system is estimated to represent nearly half of the major ecosystem types in the United States.¹⁹⁶

Although even unprotected species might derivatively benefit from the protection of land as wildlife refuges, active management for the benefit of the chosen species is not always consonant with biodiversity protection. Refuge managers have occasionally altered naturally occurring ecosystems to benefit target species, for example, by replacing forests with artificial wetlands to serve as waterfowl habitat,¹⁹⁷ or producing grains or other species-specific food crops at the expense of naturally occurring flora and the diverse communities they support.¹⁹⁸ In some cases, managers have aggressively suppressed predators through hunting, trapping, and poisoning as well as nonlethal means.¹⁹⁹ Many refuges allow recreational fishing, hunting, and trapping.²⁰⁰ Even though recreational exploitation of game species is not always inconsistent with species or ecosystem conservation,²⁰¹ frequently wildlife conservation must compete with hunting, fishing, and other recreational uses, and, in some cases, commercial or governmental uses incompatible with conservation objectives.²⁰² In

¹⁹⁴ See *supra* text accompanying notes 97-103.

¹⁹⁵ See GAO, ENDANGERED SPECIES RECOVERY, *supra* note 187, app. III (identifying only six refuges established for protection of listed plant species and invertebrates).

¹⁹⁶ See Crumpacker et al., *supra* note 38, at 113; Fink, *supra* note 27, at 23-24 & n.147.

¹⁹⁷ See OTA, *supra* note 3, at 230.

¹⁹⁸ See TOBIN, *supra* note 79, at 52-53 (describing efforts by refuge managers to "transform their refuges into 'artificial duck and goose farms,'" disrupting normal migratory patterns through such means as grain crops and placement of decoys); Fink, *supra* note 27, at 87-88.

¹⁹⁹ See Fink, *supra* note 27, at 88-89 & n.650.

²⁰⁰ See REED & DRABELLE, *supra* note 184, at 48. Under the National Wildlife Refuge System Administration Act of 1966, 16 U.S.C. § 668dd(d)(1)(A) (1994), hunting may be authorized by the manager of the refuge, provided appropriate formal rulemaking procedures are followed, no endangered or threatened species is adversely affected, and the state in which the refuge is located assents. See *id.*; see also *Humane Society of the United States v. Lujan*, 768 F. Supp. 360 (1991) (upholding decision to allow deer hunting in a refuge that was established as a bald eagle sanctuary).

²⁰¹ See, e.g., *Humane Society*, 768 F. Supp. at 363-64 (noting that the FWS determined that deer population far exceeding the carrying capacity of Mason Neck National Wildlife Refuge was causing extensive damage to vegetation, justifying thinning through a "well-controlled public hunt"). The FWS and other wildlife management agencies have long maintained that hunting is an effective and appropriate means of controlling populations of ungulates, like deer, which may damage vegetation, especially in the absence of large predators, which have all but vanished due to eradication and habitat loss. See Fink, *supra* note 27, at 68-69.

²⁰² See Fink, *supra* note 27, at 27 (describing wildlife refuges as "dominant use" lands, falling somewhere between more restrictive "single use" designations like wilderness areas, and less restrictive "multiple use" lands like national forests and BLM lands). In addition

1996, President Clinton issued an executive order defining the system's mission as "preserv[ing] a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources of the United States for the benefit of present and future generations," but simultaneously identified recreational hunting and fishing among the "priority public uses" of the system.²⁰³ In 1997, Congress enacted legislation intended to have a similar effect.²⁰⁴

Perhaps the National Wildlife Refuge System is best understood as two systems operating under a single title. Its vast Alaskan holdings may come closer than any other category of federal lands to constituting genuine biodiversity reserves—large enough to provide broad ecosystem-level protection and managed principally to provide prophylactic protection of their diverse biological resources—whether or not the protected species and ecosystems are presently "threatened" or "endangered." By contrast, refuges in the lower forty-eight states are generally small habitat fragments, set aside to provide species-specific protection, often imperiled by adverse spillovers from neighboring land uses or harmful conflicting uses of the refuge itself and historically not managed under broad ecosystem-level biodiversity conservation management principles. However, because these small refuges include some of the last remaining habitat fragments for some species and communities, they are of considerable conservation value and could provide core holdings around which larger biological reserves could be assembled. Consolidation and adjustment of boundaries, assertion of regulatory authority to prevent adverse spillovers from adjacent land uses, and explicit emphasis on biodiversity conservation as the central goal in refuge land acquisition and management could capitalize on their biodiversity conservation potential.

to hunting and fishing, recreational uses include motorized and nonmotorized boating, waterskiing, off-road vehicles, swimming, horseback riding, hiking, and wildlife observation. See TOBIN, *supra* note 79, at 44; Fink, *supra* note 27, at 67 & n.480. More than one-third of all refuges accommodate grazing or farming. See *id.* at 65. A few refuges have been used as gunnery or bombing ranges or for other military exercises, see *id.* at 70, or have been subject to physical alterations for flood control or navigation purposes, see U.S. GEN. ACCOUNTING OFFICE, NATIONAL WILDLIFE REFUGES: CONTINUING PROBLEMS WITH INCOMPATIBLE USES CALL FOR BOLD ACTION 31-32 (GAO/RCED-89-196, 1989) [hereinafter GAO, INCOMPATIBLE USES]; Fink, *supra* note 27, at 20, 29, 66 n.475. Finally, where the FWS does not hold the subsurface mineral rights, refuges may be entered for mining and oil and gas exploration and production. See GAO, INCOMPATIBLE USES, *supra*, at 29; Fink, *supra* note 27, at 29, 39 & n.188, 65-66.

²⁰³ Exec. Order No. 12,996, 61 Fed. Reg. 13,647 (1996).

²⁰⁴ See National Wildlife Refuge System Improvement Act of 1997, Pub. L. No. 105-57 (1997) (defining the mission of the system to "administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats . . . for the benefit of present and future generations" and identifying "wildlife-dependent recreational uses" as "priority general public uses").

d. *The National Park System*

The National Park Service, a division of the Department of the Interior, manages 80.7 million acres in 376 national parks, monuments, seashores, recreation areas, and other units, with about 60% of this total in Alaska.²⁰⁵ Although these lands include many important minimally disturbed natural areas protected from conversion and commodity production, for several reasons, they contribute less to biological diversity than might be expected.²⁰⁶ First, the system's acreage includes not only national parks, but other, typically smaller units such as national monuments and national recreation areas, often established and managed primarily for their recreational, historical, cultural, or scenic value.²⁰⁷ Second, with some notable exceptions, such as Florida's Everglades,²⁰⁸ our national parks themselves were in most cases reserved for their scenic and recreational importance, not for their biological riches.²⁰⁹ Consequently, many habitats and ecosystem types are not represented at all in the national parks.²¹⁰ Even in the

²⁰⁵ See *National Park System Acreage*, *supra* note 139.

²⁰⁶ But see Jim Fowler, *Making a Difference*, NAT'L PARKS, July/Aug. 1996, at 28-29 (describing importance of national parks as habitat for such rare, endangered, or threatened species as grizzly bear, Florida panther, North American crocodile, piping plover, gray wolf, black-footed ferret, and California condor).

²⁰⁷ A few nonpark units have been established primarily to preserve unique ecosystems. These include Florida's Big Cypress Preserve and the new Tallgrass Prairie National Preserve in Kansas and Mojave National Preserve in California. See S. Rep. 93-1128 (1974), 1974 U.S.C.C.A.N. 5568 (stating that Congress established the Big Cypress National Preserve to safeguard the ecological values of Big Cypress swamp); S. Rep. 104-376 (1996) (stating that Congress established the Tallgrass Prairie National Preserve to protect "one of the few unaltered expanses of the once vast tallgrass prairie" ecosystem).

²⁰⁸ See Ted Levin, *Immersed in the Everglades*, SIERRA, May/June 1996, at 56, 56. Among the other national parks arguably falling into this category are the large national parks in Alaska, Olympia National Park in Washington's temperate rainforest, as well as the Redwoods, Sequoia, Death Valley, and Joshua Tree National Parks in California.

²⁰⁹ See FREDERIC W. WAGNER ET AL., WILDLIFE POLICIES IN THE U.S., NATIONAL PARKS 1, 19-21 (1995); David Hales, *Changing Concepts of National Parks*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY, *supra* note 25, at 139, 139-40; Noss, *supra* note 41, at 234. Our first national park, Yellowstone, was established not to protect wilderness but as a tourist mecca, offering such natural "curiosities" as geysers and hot springs; conservation of wildlife and wilderness was later added to the park's mission as an afterthought. See NASH, *supra* note 2, at 108-13. U.S. national parks thus differ from the great national parks of Africa, which were established primarily to protect wildlife. See WAGNER ET AL., *supra*, at 1. More recently, parks and reserves have been set aside in Latin America specifically to conserve biodiversity. See Francisco Dallmeier, *Biodiversity Inventories and Monitoring: Essential Elements for Integrating Conservation Principles with Resource Development Projects*, in MANAGED LANDSCAPES, *supra* note 53, at 221, 228-30.

²¹⁰ See Linder, *supra* note 97, at 191 (stating that most national park lands are coniferous forests; other biodiversity-rich ecosystem types such as grasslands and Mediterranean-type zones are "substantially underrepresented"). This is not to suggest, of course, that our national parks do not include important reserves of biological riches. Some, like the Haleakala and Hawaii Volcanoes National Parks in Hawaii, are critical reserves of unique and highly endangered endemic species and ecosystems. See Faith Campbell, *The Appropriations History*, in BALANCING ON THE BRINK, *supra* note 47, at 134, 139. Others, such as California's

case of the largest parks, there is often a mismatch between park boundaries and the ecosystems of which they are a part, so that parks alone may not provide adequate habitats for some species and communities.²¹¹ Third, although the stated policy of the Park Service is to "provid[e] the American people with the opportunity to enjoy and benefit from natural environments evolving through natural processes minimally influenced by human actions,"²¹² the demands of visitor access and recreational use often take precedence over resource protection. As a result, visitor-caused disturbances alter natural ecological processes. The steadily growing popularity of national parks as vacation destinations requires more roads, parking lots, campgrounds, and concessions,²¹³ and stretches park operating budgets to cover the costs of trash removal, general maintenance, utilities, and employee overtime.²¹⁴ Finally, the parks' own natural resource management policies and priorities have contributed to declining levels of biodiversity. Consistent with its statutory mandate to ensure that parks are left "unimpaired for the enjoyment of future generations,"²¹⁵ the Park Service now emphasizes the primacy of long-term resource preservation and has recently adopted a hands-off attitude toward natural

Sequoia and Redwoods National Parks, represent important surviving fragments of formerly more prevalent ecosystem types. Taken as a whole, however, they are not nearly as representative as they might be had they been selected according to biological, rather than scenic and recreational, criteria.

²¹¹ See Robert B. Keiter, *Taking Account of the Ecosystem on the Public Domain: Law and Ecology in the Greater Yellowstone Region*, 60 U. COLO. L. REV. 923, 931-32 (1989) [hereinafter Keiter, *Yellowstone*]; William D. Newmark, *Legal and Biotic Boundaries of Western North American National Parks: A Problem of Congruence*, 33 BIOLOGICAL CONSERVATION 197, 198-200 (1985); Noss, *supra* note 41, at 234. Precise delineation of ecosystems is difficult because species, habitats, communities, and ecosystems occur not in tidy bundles but in overlapping gradients over larger landscapes. See Ruhl, *supra* note 2, at 576-77. Nonetheless, few would dispute that, in many cases, the fit between park boundaries and ecosystems is a poor one. For example, the Everglades National Park has been severely degraded by draining, diversion, and pollution of the larger wetlands ecosystem of which the park is but a part. See Noss & Cooperrider, *supra* note 137, at 133-34. Even Yellowstone, one of the largest national parks at 2.2 million acres, is only a fraction of the 18 million acre Greater Yellowstone Ecosystem which spans two national parks, parts of six national forests, three national wildlife refuges, and BLM lands, together with state, local, and private lands in three states. See Robert B. Keiter, *An Introduction to the Ecosystem Management Debate*, in *THE GREATER YELLOWSTONE ECOSYSTEM: REDEFINING AMERICA'S WILDERNESS HERITAGE* 3, 4 (Robert B. Keiter & Mark S. Boyce eds., 1991) [hereinafter Keiter, *Ecosystem Management Debate*].

²¹² DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE MANAGEMENT POLICIES 4:1 (1988).

²¹³ See EDWARDS, *supra* note 136, at 99-100, 112-13; WAGNER ET AL., *supra* note 209, at 84, 87-90; Keiter, *supra* note 11, at 304, 318.

²¹⁴ See U.S. GEN. ACCOUNTING OFFICE, NATIONAL PARKS: DIFFICULT CHOICES NEED TO BE MADE ABOUT THE FUTURE OF THE PARKS 34-35 (GAO/RCED-95-238 1995) [hereinafter GAO, NATIONAL PARKS: DIFFICULT CHOICES].

²¹⁵ National Park Service Organic Act, 16 U.S.C. § 1 (1994). See Robin Winks, *Dispelling the Myth*, NAT'L PARKS, July/Aug. 1996, at 52-53 (arguing that the legislative history and the textual mandate to keep parks "unimpaired" indicate congressional intent that resource preservation be given primacy over visitor access and recreational use).

processes.²¹⁶ However, alteration of vegetation by large protected populations of ungulates such as deer and elk,²¹⁷ invasions by exotic species, fire suppression, negative spillovers and edge effects from development on adjacent lands, and the relatively small size of parks poorly matched to the larger ecosystems of which they are a part, combine to put stresses on the species, habitats, and ecosystems found on park lands.²¹⁸

The pressures of recreational use have grown rapidly and are only likely to increase in coming years.²¹⁹ If valuable biological resources in our national parks are to be protected, reserve areas must be identified and sequestered, with visitor access to these areas strictly limited. In addition, boundary adjustments, consolidations with adjacent federal landholdings,²²⁰ assertion of regulatory authority to prevent adverse spillovers from adjacent lands,²²¹ and explicit statutory directives

²¹⁶ See Keiter, *Yellowstone*, *supra* note 211, at 1007.

²¹⁷ Generally national parks are off-limits to hunting, see 43 C.F.R. § 24.4(f) (1996) (hunting prohibited in national parks by regulation, except when specifically authorized by Congress), and the ungulates' natural predators, including wolves, coyotes, and mountain lions, are themselves threatened or endangered due to habitat loss and decades of suppression by humans. See George Cameron Coggins, *Protecting the Wildlife Resources of National Parks from External Threats*, 22 LAND & WATER L. REV. 1, 4 (1987).

²¹⁸ See WAGNER ET AL., *supra* note 209, at 62-68, 71-76; Noss, *supra* note 41, at 234. The problem of small reserve size is especially acute for large carnivores like the wolf, grizzly bear, mountain lion, and wolverine, which have large home ranges, low population densities, and low growth rates. See GRUMBINE, *supra* note 44, at 41-44. In addition, smaller reserves are subject to potentially "catastrophic" disturbances by fire, windstorm, or flood; in larger reserves, such natural disturbances would affect only a portion of the total area, allowing for recolonization from undisturbed portions of the reserve. See *id.* at 53-56.

²¹⁹ See GAO, NATIONAL PARKS: DIFFICULT CHOICES, *supra* note 214, at 33.

²²⁰ While Yellowstone is often cited as an example of the insufficiency of even our largest national parks to protect biological resources, see, e.g., Newmark, *supra* note 211, at 199, the federal government owns much of the land surrounding Yellowstone National Park and comprising the Greater Yellowstone ecosystem. In theory at least, a much larger biological reserve, better matched to ecosystem boundaries, could be carved out of the Yellowstone and Grand Teton National Parks and the national forests and BLM lands in northwestern Wyoming, southwestern Montana, and eastern Idaho. Yellowstone is not unique in this regard. Federal lands surround many of the larger Western national parks, including Yosemite, King's Canyon, Sequoia, Rocky Mountain, North Cascades, Mt. Rainier, Olympic, Grand Teton, and Glacier. See Joseph L. Sax & Robert B. Keiter, *Glacier National Park and Its Neighbors: A Study of Federal Interagency Relations*, 14 ECOLOGY L.Q. 207, 208 (1987).

²²¹ Current statutes provide ambiguous regulatory authority to ensure that adverse spillovers from adjacent land uses do not threaten resources on federal lands, and federal agencies have been reluctant to assert such authority. See William J. Lockhart, *External Threats to our National Parks: An Argument for Substantive Protection*, 16 STAN. ENVTL. L.J. 3, 45-51 (1997). However, federal courts have held that the federal government has constitutional power to regulate activities on private lands adjacent to, within, or near federal lands. Under the Property Clause, Congress is empowered to "make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States," U.S. CONST. art. IV, § 3, cl. 2, on the theory that "'Congress' power must extend to regulation of conduct on or off of the public land that would threaten the designated purpose of federal lands." *Free Enterprise Canoe Renters Ass'n v. Watt*, 711 F.2d 852 (8th Cir. 1983) (hold-

to acquire and manage these lands for biodiversity conservation purposes could elevate the potential of the national parks to serve as important biodiversity reserves.

e. *Wilderness Areas*

The Wilderness Act of 1964 established a process by which federal land managers were to identify and assess the suitability of roadless and "underdeveloped [f]ederal land retaining its primeval character and influence" and "of sufficient size as to make practicable its preservation and use in an unimpaired condition"²²² for congressional designation as wilderness areas. Once these areas are designated, the Act directs federal agencies to manage wilderness areas "for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness" and "for preservation . . . in their natural condition."²²³ Congress has designated some 96 million acres of national parks, national forests, wildlife refuges, and BLM lands as wilderness areas. An additional 33 million acres are currently in "wilderness study" status, affording them interim protection until a decision is made on wilderness designation.²²⁴ The statute generally prohibits commercial enterprises, the construction of roads and buildings, and the use of motor vehicles, motorized boats, and aircraft in wilderness areas,²²⁵ but permits "recreational, scenic, scientific, educational, conservation, and historical" uses consistent with preservation of the area's "wilderness charac-

ing that federal regulation of out-of-park private canoe rentals to protect Ozark National Scenic Riverways from excessive recreational use is a valid exercise of Property Clause power) (quoting *Minnesota v. Block*, 660 F.2d 1240 (8th Cir. 1981)); see also Lockhart, *supra*, at 57-58 (discussing cases that recognize Congress's power under the Property Clause to regulate private land use that threatens the designated purpose of federal lands).

²²² 16 U.S.C. § 1131(c) (1994).

²²³ *Id.* § 1131(a). See generally Michael McCloskey, *The Wilderness Act of 1964: Its Background and Meaning*, 45 OR. L. REV. 288 (1966) (providing general discussion of Wilderness Act's history and meaning); Daniel Rohlf & Douglas L. Honnold, *Managing the Balances of Nature: The Legal Framework of Wilderness Management*, 15 ECOLOGY L.Q. 249 (1988) (discussing how the Wilderness Act circumscribes and mandates wilderness management).

²²⁴ See GAO, *LAND OWNERSHIP*, *supra* note 58, at 26; see also 16 U.S.C. § 1132(b), (c); 43 U.S.C. § 1782(c) (1994) (mandating study of roadless and primitive areas for possible wilderness designation).

²²⁵ See 16 U.S.C. § 1133(c). There are important exceptions. Water resource development, mining, and such construction and motorized transport as may be necessary to carry out these activities are permitted under some circumstances, as are commercial activities "proper for realizing the recreational or other wilderness purposes." *Id.* § 1133(d). In addition, grazing, aircraft, and motorboat use are permitted if these uses were established prior to wilderness designation. See *id.*; Rohlf & Honnold, *supra* note 223, at 260. In addition, the statutes designating particular wilderness areas may contain exceptions to the general use restrictions. See, e.g., *Minnesota Pub. Interest Research Group v. Butz*, 541 F.2d 1292, 1297 (8th Cir. 1976) (reconciling Wilderness Act's general provisions with special provision allowing commercial logging in Boundary Waters Canoe Area to the extent consistent with "maintaining its primitive character").

ter."²²⁶ These uses typically include low-impact activities like hiking, camping, canoeing, rafting, hunting, and fishing.²²⁷ Although the Act makes no special provision for wildlife management or biodiversity conservation,²²⁸ it arguably addresses these concerns by the mandate to preserve "natural conditions."²²⁹ Like national parks, wilderness areas are often selected for scenic and recreational rather than biological values,²³⁰ and, like other protected areas, their boundaries often do not coincide with ecosystems.²³¹ Furthermore, like other protected public lands, wilderness areas are regionally concentrated in the West, particularly in Alaska. Nonetheless, wilderness areas unquestionably provide important, minimally disturbed habitats for many species and communities, and include many large blocks of relatively undisturbed land.²³² The wilderness system thus remains an important conservation asset. Current wilderness units could, if properly managed and protected, provide important core holdings for a national system of biodiversity reserves. However, because of the shortcomings identified here, wilderness areas, as presently conceived, are not an adequate substitute for a system of biological reserves identified, acquired, and managed explicitly for biodiversity conservation purposes.

3. *Biodiversity Conservation on Federal Lands: Assessment and New Directions*

IFederal lands form a vast and elaborate patchwork of landholdings and management authorities, in which biodiversity conservation is at best a secondary goal.²³³ Nonetheless, the federal lands include an impressive array of species, habitats, and ecosystems. The biodiversity conservation potential of these lands is substantial. However, without a fundamental revamping of our public lands management

²²⁶ 16 U.S.C. § 1133(b).

²²⁷ See *id.* § 1133(c), (d).

²²⁸ See Fink, *supra* note 27, at 36.

²²⁹ Rohlf & Honnold, *supra* note 223, at 275-77. *But cf.* Keiter, *supra* note 11, at 305-06 ("[D]espite strong preservationist language, the Wilderness Act does not fully ensure the integrity of wilderness ecosystems.").

²³⁰ See Noss, *supra* note 50, at 238 (stating that because wilderness areas are selected for scenic and recreational values, they are disproportionately low-diversity alpine zones); Noss, *supra* note 41, at 234 ("[H]igh-elevation sites (rock and ice), wetlands, and other scenic but not particularly diverse lands dominate our system of protected areas; many ecosystem types are not represented, at least not in sizable areas.").

²³¹ See Rohlf & Honnold, *supra* note 223, at 272.

²³² See *id.* at 275.

²³³ See Farrier, *supra* note 2, at 311-12 (describing land conservation decisions as "ad hoc" and "dominated" by "factors other than wildlife conservation"); Keiter, *supra* note 11, at 314 ("The fact is that few, if any, of the principal laws governing public land management are modeled upon contemporary ecological principles.").

strategy, we can expect only limited progress in conserving biodiversity on federal lands.

As the foregoing discussion demonstrates, federal law currently does not require sequestration of federal lands for biodiversity conservation purposes or prioritization of biodiversity conservation considerations in federal land management agencies' land use plans.²³⁴ Indeed, far from mandating biodiversity conservation, the current statutes fragment responsibility for ecosystem management and impose conflicting requirements on many categories of federal land, limiting the ability of even the best-intentioned administrators to implement far-reaching biodiversity conservation plans.²³⁵ Consequently, biodiversity conservation on the federal lands is discretionary, interstitial, meager, and impermanent, operating on a "catch-as-catch-can" basis at the margins of federal lands management, easily trumped by conflicting statutory requirements or passed over in favor of competing discretionary policy objectives. Only a statutory mandate can make biodiversity conservation on federal lands an explicit and binding national policy objective.²³⁶

Specifically, biodiversity conservation requires that a federal statute establish a new category of biological reserves, set aside large areas for special protection explicitly on the basis of their importance in conserving biodiversity, and strictly limit activities in these areas to uses consistent with the conservation mandate. These areas could in-

²³⁴ See OTA, *supra* note 3, at 12-13.

²³⁵ See CEQ ENVIRONMENTAL QUALITY, *supra* note 152, at 135-36 (ecosystem management is hindered by "specific [agency] missions, rigidly stratified and specialized agency structures, and the subdivision of problems into narrowly defined tasks," as well as program-specific budgeting "sometimes linked primarily to the production of tangible outputs such as commodities"); GAO, FOREST SERVICE DECISION-MAKING, *supra* note 150, at 84-85, 90, 96 (stating that conflicting statutory mandates hinder interagency cooperation in ecosystem management, producing disparate planning processes, agency missions, responsibilities, substantive objectives, and procedures, often including a lack of shared definitions and comparable data); U.S. GEN. ACCOUNTING OFFICE, ISSUES RELATED TO MANAGING NATIONAL FORESTS FOR MULTIPLE USES 6 (GAO/T-RCED-96-111 1996) (describing agencies' failure to agree on plans or projects crossing jurisdictional boundaries, due to differing evaluations of likely environmental impacts and reflecting "disparate missions and responsibilities"); Keiter, *supra* note 11, at 295 (stating that by fragmenting land management authority within larger ecosystems among various agencies, and by imposing separate management regimes emphasizing production of individual commodities like timber and minerals, "federal public land law runs directly counter to ecosystem management principles"); Office of the Vice President, National Performance Review, Monograph on Environmental Management (1994), available in 1994 WL 170853, at *10 (many factors including "inconsistent statutory missions, demands of special interests, incompatible data, distinct agency cultures, inconsistent planning and budgeting cycles, and differing agency organizational structures" have hindered coordinated interagency ecosystem management).

²³⁶ See OTA, *supra* note 3, at 8-19 (recommending legislation establishing biodiversity conservation as a national policy goal and explicitly mandating biodiversity conservation by federal land management agencies).

clude all or portions of existing national parks, national forests, wilderness areas, and wildlife refuges, but should also include areas newly acquired or withdrawn specifically for biodiversity conservation purposes.²³⁷ The congressionally mandated process by which federal land management agencies identified, studied, and recommended proposed wilderness areas, which were then formally designated by acts of Congress, provides a model for how the designation process might commence. However, to evaluate the biological value of various lands, the Department of the Interior's national biological service should also play a central role.

Once Congress designates such biodiversity reserves, an important subsidiary question is whether these reserves should be unified under a single management agency, or, like wilderness areas, remain under the management of the various agencies out of whose territory they are carved.²³⁸ Given longstanding interagency rivalries and the imperatives of internal bureaucratic politics, agencies might cooperate more fully in the designation process if they could expect to retain management authority over areas designated as biological reserves.²³⁹ However, a unified management regime is more likely to provide a clear mission, policy coordination, and efficiency gains by eliminating redundancy in agency functions and consolidating information and in-house expertise.²⁴⁰ In addition, biodiversity concerns are less likely

²³⁷ This has already begun on a limited and ad hoc basis with the creation of some ecosystem-preserving national parks and similar conservation areas. For example, in 1994, Congress enacted the California Desert Protection Act of 1994, Pub. L. No. 103-433, 108 Stat. 4471-4508 (1994) (codified in scattered sections of titles 16 & 43 U.S.C.), which transferred three million acres from the BLM to the National Park Service, established a 1.4 million acre Mojave National Preserve, redesignated the Death Valley and Joshua Tree National Monuments as national parks, and designated 3.6 million acres of adjacent BLM lands as wilderness areas. See CEQ ENVIRONMENTAL QUALITY, *supra* note 152, at 146; see also Omnibus Parks and Public Lands Management Act of 1996, Pub. L. No. 104-333, 110 Stat. 4093 (1996) (codified in scattered sections of 16, 31, 36, 40, & 43 U.S.C.) (establishing Tallgrass Prairie National Preserve in Kansas).

²³⁸ See *supra* Part II.A.2.e.

²³⁹ See Craig W. Allin, *Wilderness Protection as a Bureaucratic Tool*, in FEDERAL LANDS POLICY 127, 127 (Phillip O. Foss ed., 1987) (attributing Forest Service's support of wilderness designations to its desire to keep lands from being transferred to the National Park Service); GRUMBINE, *supra* note 44, at 141 (same); cf. DEFENDERS OF WILDLIFE, *supra* note 184, at 22 (recommending creation of a National Wildlife Habitat System consisting of present National Wildlife Refuges and additional designated federal lands, which would "remain as holdings of, and managed by, the pre-designating agency" but would be "managed predominantly for wildlife values").

²⁴⁰ Some have suggested that the current division of land management responsibilities among four agencies whose missions are increasingly similar is fundamentally flawed, and that the agencies should be combined into one or, at a minimum, their responsibilities should be reorganized and integrated to reduce unnecessary duplication and improve policy coordination. See e.g., U.S. GEN. ACCOUNTING OFFICE, FEDERAL LAND MANAGEMENT—STREAMLINING AND REORGANIZATION ISSUES (GAO/T-RCED-96-209 1996). While that view has considerable merit, and the proposal to create a unified system of biodiversity reserves underscores its importance, creation of biodiversity reserves need not necessarily await res-

to be submerged, subordinated, or simply lost in the shuffle if consolidated in a single-mission agency (or a single-mission unit within an existing agency) than if parceled out among traditionally commodity-oriented, multiple-use agencies like the BLM and the Forest Service, as well as recreation-oriented agencies like the National Park Service and the FWS. Finally, because there may be opportunities to create large ecosystem-wide reserves crossing current agency jurisdictional boundaries in areas like the Greater Yellowstone region, consolidating reserves under a unified management regime might actually lead to less interagency rivalry in the operation and management of the reserves.²⁴¹

More than twenty years ago, the Nature Conservancy recognized that the existing patchwork of federal laws and land management programs then in place did not add up to a coordinated policy of ecological protection, and proposed that the federal government establish a National Ecological Reserve System consisting of "protected natural areas representing the full spectrum of biological communities, ecosystems, features, habitat, and forms."²⁴² That prescient advice remains good today. Although federal laws and land management policies have changed in the two decades since the Nature Conservancy issued that recommendation, and although biodiversity conservation is now on policymakers' radar screens, there is still no coherent, coordinated federal policy to achieve it.

Even with a clear statutory mandate and a unified management regime for biological reserves, an important limitation on federal land management as a biodiversity conservation strategy will arise from the fact that federal lands are heavily concentrated in eleven contiguous Western states and Alaska, which together account for more than 93% of the lands the four leading federal land agencies manage.²⁴³ The fact that the federal government owns less than 4% of the land outside the region²⁴⁴ leads some commentators to conclude that we should focus our principal biodiversity conservation efforts on private

olution of these broader questions. A system of biodiversity reserves could be placed somewhere within the current agency structure (e.g., under management of the Fish and Wildlife Service), in a new structure alongside existing agencies, or within a unified or streamlined federal land management agency.

²⁴¹ See *supra* notes 220-21 and accompanying text.

²⁴² THE NATURE CONSERVANCY, *THE PRESERVATION OF NATURAL DIVERSITY: A SURVEY AND RECOMMENDATIONS* 40-41 (1975).

²⁴³ See GAO, *LAND OWNERSHIP*, *supra* note 58, at 20-22 tbl.I.2 (illustrating that of 623 million acres the four agencies manage, 580 million, or 93%, are located in Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming). Alaska alone accounts for 39% of all the land these four agencies manage, 56% of the federal land currently designated for conservation purposes, 60% of designated wilderness areas, and 80% of National Wildlife Refuge acreage. See *id.* at 20-22 tbl.I.2, 24-25 tbl.I.3.

²⁴⁴ See EDWARDS, *supra* note 136, at 3.

lands.²⁴⁵ This gross figure may be misleading, however, if it causes us to overlook the federal government's substantial land ownership role in such disparate and critical ecoregions as Hawaii, south Florida, the upper Great Lakes, the New Jersey pinelands, northern New England, the southern Appalachians, and the Ozarks.²⁴⁶ Gross acreage also belies the importance of federal holdings in fragile coastal wetlands and barrier lands along the Atlantic and Gulf Coasts which, although small in acreage, represent unique, priceless, and endangered biological assets.²⁴⁷ Even where the federal role is smaller, it is hardly trivial. The federal government owns one million acres or more in nineteen states outside the Western-Alaska region.²⁴⁸ In almost every state, the federal government is either the largest landowner or second only to the state government,²⁴⁹ and the federal holdings often include many of the best preserved remaining fragments of critical ecosystems—the lands with the most potential for serving as biological reserves. Fi-

²⁴⁵ See, e.g., GRUMBINE, *supra* note 44, at 211-17 (arguing for conservation efforts aimed at federal, state, and private lands); Michael A. O'Connell, *Managing Biodiversity on Private Lands*, in *MANAGED LANDSCAPES*, *supra* note 53, at 665; Farrier, *supra* note 2, at 317 (describing biodiversity conservation efforts aimed solely at federal lands as a "ghetto approach").

²⁴⁶ The relevant percentages of federal land ownership are Haw.—16.8%; Fla.—7.8%; Minn.—14.3%; Mich.—12.9%; Wis.—8.4%; N.H.—13.2%; Vt.—7.3%; N.J.—13.3%; Va.—11.8%; W. Va.—7.1%; N.C.—7.8%; Tenn.—5.9%; Ark.—8.7%. See BUREAU OF LAND MGMT., *supra* note 57, at 6. Even these state-level figures may be misleading, since in many cases federal holdings are regionally concentrated within these states; a glance at a map suggests that the federal government is a major landowner in the upper Great Lakes (northern portions of Minnesota, Wisconsin, and Michigan), along the southern Appalachian spine (western Virginia and North Carolina; eastern West Virginia, Kentucky, and Tennessee; and north Georgia), and in the Ozarks (northern Arkansas and southern Missouri).

²⁴⁷ Various federal agencies manage an impressive string of National Seashores, National Recreation Areas, and National Wildlife Refuges, together with assorted National Forests and military bases, extending from Cape Cod through the Florida Keys, and back around the Gulf coast to the Mexican border. See National Geographic Society, *Federal Lands in the Fifty States*, NAT'L GEOGRAPHIC, Oct. 1996, Map Supp.; see also RUTHERFORD H. PLATT, *LAND USE AND SOCIETY: GEOGRAPHY, LAW, AND PUBLIC POLICY* 411-12 (1996) (describing the ecological significance of coastal wetlands and barrier beaches); *id.* at 433 fig.12-7 (showing 53% of Atlantic and Gulf coast barrier lands are under protected status).

²⁴⁸ By way of comparison, the largest private conservation organization, The Nature Conservancy, owns about one million acres nationwide. The Nature Conservancy's efforts are not insignificant: it selects its acquisitions carefully, it owns many priceless and irreplaceable reserves, and its conservation efforts are widely and justly applauded. See John G. Sprankling, *An Environmental Critique of Adverse Possession*, 79 CORNELL L. REV. 816, 855 nn.183-84 (1994).

²⁴⁹ See PRIORITIES FOR CONSERVATION, *supra* note 81, at 42. State and local governments hold an estimated 8% of the nation's land, but holdings vary widely, ranging from 2% in the South to 11% in the West. See *id.* In the aggregate, they include 11 million acres of state parks, 14 million acres of state wildlife refuges, and 27 million acres of state forests. See John A. Georges, *Our Critical Forest Resources*, in *LAND USE IN AMERICA* 223, 226 fig.I (Henry L. Diamond & Patrick F. Noonan eds., 1996). While these figures pale in comparison to their federal counterparts, state governments are still among the largest landowners, and states with large holdings play an important role in managing ecosystems, whether for good or ill.

nally, although private landowners own roughly twice as much land as the federal government,²⁵⁰ much of the privately held land is in biodiversity-poor categories such as cropland and pasturage,²⁵¹ industrial forests,²⁵² urbanized areas,²⁵³ or small-scale rural developments contributing to the fragmentation of habitats and ecosystems.²⁵⁴ This

²⁵⁰ The federal government owns roughly 30%, private landowners 59%, state and local governments 8%, and Indian tribes about 3% of the land in the United States. See PRIORITIES FOR CONSERVATION, *supra* note 81, at 42, 45, 94.

²⁵¹ As of 1992, about 382 million acres, roughly a fifth of the nation's land outside Alaska and nearly 30% of the privately owned land, was cropland. See U.S. CENSUS BUREAU, STATISTICAL ABSTRACT OF THE UNITED STATES 1993, at 229 [hereinafter STATISTICAL ABSTRACT]. Another 125 million acres are pastureland and 396 million acres are rangeland, *see id.*, with more than half of the grazing land privately owned. CEQ ENVIRONMENTAL QUALITY, *supra* note 152, at 284. More than 80% of the cropland is used to produce corn, wheat, hay, and soybeans, *see id.* at 283 fig.16.4, resulting in a remarkable paucity of floral diversity and consequently providing habitat to a limited diversity of wildlife species. In some Midwestern states, more than two-thirds of the privately owned land is cropland. See STATISTICAL ABSTRACT, *supra*, at 229 (Iowa 70.8%; Illinois 69.4%).

²⁵² Privately owned forests cover 394 million acres, or just over half of the forested land in the United States. See STATISTICAL ABSTRACT, *supra* note 251, at 229, 685. Some 90% of the privately owned forests are classified as "timberland," capable of producing twenty cubic feet of industrial timber per acre annually and not reserved from timber harvest, accounting for almost three-quarters of the nation's total inventory of timberland. *See id.* at 685. This acreage includes seventy million acres owned directly by firms in the forest industry. See CEQ ENVIRONMENTAL QUALITY, *supra* note 152, at 300. Authorities expect this figure to grow in the future. *See id.* at 303 (stating that pine plantations in the South are expected to double from the current level of 23 million acres). Intensive even-aged silviculture has reduced species and habitat diversity in many of these industrial timberlands so as to produce commercially valuable and easily harvested single-species, uniform-aged crops. See ALVERSON ET AL., *supra* note 142, at 59; William A. Atkinson, *Managing the Urban/Forest Interface: A View From Forest Industry*, in LAND USE AND FOREST RESOURCES IN A CHANGING ENVIRONMENT: THE URBAN/FOREST INTERFACE 189, 191-93 (Gordon A. Bradley ed., 1984) [hereinafter URBAN/FOREST INTERFACE] (discussing the forest industry's techniques to maximize returns on timber as a slow-growing crop, achieving efficiencies through mass production by monocropping and large scale clearcutting).

²⁵³ "Developed" areas, including cities, towns, highways, and individual developed parcels exceeding ten acres in size, account for 92 million acres, or nearly 5% of the U.S. land area. This figure is growing rapidly, increasing by 14 million acres from 1982 to 1992 alone. See Natural Resources Conservation Serv., U.S. Dep't of Agric., 1992 *National Resources Inventory Highlights* (visited Oct. 17, 1997) <<http://www.nhg.nrcs.usda.gov/nrihigh.html>> [hereinafter 1992 *Inventory Highlights*]. In most urbanized areas, urban expansion is outpacing population growth as population shifts to low-density suburbs. See Christopher B. Leinberger, *Metropolitan Development Trends of the Late 1990s: Social and Environmental Implications*, in LAND USE IN AMERICA, *supra* note 249, at 203, 209 (stating that between 1970 and 1990, metropolitan Chicago grew 4% in population but 46% in land area, and metropolitan Los Angeles grew 45% in population but tripled in size to an area equal to the state of Connecticut). Most authorities accept the view that "urban sprawl" leads directly to habitat destruction or to fragmentation and biodiversity loss. *See, e.g.*, Reid Ewing, *Is Los Angeles-Style Sprawl Desirable?* 63 J. AM. PLAN. ASS'N 107 (1997). A contrary view holds that where low-density residential development displaces cropland, it may actually prove beneficial to wildlife, which is often a high-value residential amenity but a nuisance to farmers. See Richard D. Taber, *Wildlife Conservation at the Urban/Forest Interface*, in URBAN/FOREST INTERFACE, *supra* note 252, at 109, 109-10.

²⁵⁴ Rural developments under 10 acres are excluded from the government's definition of "developed" areas. See U.S. Dep't of Agric., *Percent Change in Developed Land Area, 1982-*

is not to suggest that privately held lands are of no conservation value or that the federal holdings are without important gaps. Indeed, the greatest loss of biodiversity almost certainly occurs at the frontiers of expansion of these categories of privately owned land, as natural areas are fragmented and partially or fully converted to human-engineered floral monocultures, built upon, or simply paved over. But merely totaling acreage and observing that more land is privately owned than federally owned should not mislead us to undervalue the role and potential of federal lands in conserving biodiversity, even in regions where federal holdings are relatively modest.

Moreover, the fact that the federal lands are concentrated in the West and Alaska has some beneficial aspects. First, with lower population densities, less developed land,²⁵⁵ and less land under agricultural cultivation,²⁵⁶ these regions include many of the nation's largest remaining areas of unfragmented, relatively undisturbed natural areas,²⁵⁷ and thus present unique opportunities to set aside large reserves. Equally important, the public already owns many of the largest contiguous blocks of undeveloped land. Thus, the public's claim to make biodiversity conservation a binding requirement in the management of the lands best-suited to that purpose is at its strongest in these areas.²⁵⁸

In addition, the Western states, where federal ownership is most heavily concentrated, are among the most biodiversity-rich in the na-

1992 (visited Nov. 11, 1997) <<http://www.nhg.nrcs.usda.gov/land/meta/m2311.html>>. Nonetheless, many observers believe the rapid growth of rural residences, vacation homes, recreational developments, and industry contributes significantly to the fragmentation of rural landscapes, especially in high-growth regions such as the Pacific Northwest. See, e.g., Edward J. Blakely, *The New People in the Woods*, in *URBAN/FOREST INTERFACE*, *supra* note 252, at 141, 142-43 (describing rapid growth in conversion of rural lands to residential, commercial, industrial, and recreational uses such as second homes and hobby farms); Keith Dearborn, *A New Zoning Strategy for Forest Lands*, in *URBAN/FOREST INTERFACE*, *supra* note 252, at 180, 180-81 (stating that Pacific Northwest forests provide scenic, recreational, and "quality of life" amenities that, ironically, attract rural population growth, leading to fragmentation and degradation of forest ecosystems and conversion of land from forest to nonforest uses).

²⁵⁵ Except for California (4.9%) and Washington (4.1%), every state in the Western region falls well below the national figure of about 5% of "developed" land. See *STATISTICAL ABSTRACT*, *supra* note 251, at 229.

²⁵⁶ Every state in the Western region falls significantly below the national figure of 20% of land in cropland as a percentage of total land area. See *id.* at 229; see also *id.* at 676 (showing Western states lagging behind Eastern states in total planted acreage per state).

²⁵⁷ See LANGNER & FLATHER, *supra* note 7, at 13-16 (stating that conversion and fragmentation of forest, grassland, and wetland ecosystems is generally least advanced in the West and most advanced in the eastern two-thirds of the nation; and loss of natural vegetation types ranges from a low of 4% in Nevada, to a high of 92% in Iowa).

²⁵⁸ See Keiter, *Ecosystem Management Debate*, *supra* note 211, at 4-5 (stating that various federal agencies already control 12 million acres in the Greater Yellowstone ecosystem, sometimes described as the least-disturbed major regional ecosystem left in the lower 48 states, and perhaps in the entire United States).

tion, ranking high in both species richness and endemism,²⁵⁹ and including many rare and unique ecosystems. A recent study found that 56% of identified "rare" ecological communities occur in a thirteen-state Western region, due to a "high level of natural diversity" in the region.²⁶⁰ Other studies suggest that the federal lands are more broadly representative of the nation's ecosystem types than one might expect, given their regional concentration. David Crumpacker, for example, found that three-quarters of all major U.S. ecosystem types are relatively well represented on federal lands, with only nine of the 135 types in the Kùchler typology wholly unrepresented and another twenty-four "underrepresented."²⁶¹ Although they fall short of fully representing all of the nation's ecosystem types, the lands the federal government currently holds present enormous conservation opportu-

²⁵⁹ See BEATLEY, *supra* note 4, at 4 fig.1.1 (showing that, of the 13 states having the largest numbers of endemic plant species, 10 are in the Western region: California leads with 1517, followed by Hawaii with 883, Florida 385, Texas 379, Utah 169, Arizona 164, Oregon 109, Nevada 90, New Mexico 81, Alaska 80, Colorado 54, Washington 49, and Idaho 37. Wyoming ranks sixteenth, with nineteen endemic species, and Montana ties for twentieth with six species).

²⁶⁰ Dennis H. Grossman & Kathleen Lemon Goodin, *Rare Terrestrial Ecological Communities of the United States*, in OUR LIVING RESOURCES 218, 219-20 (Edward T. LaRoe et al. eds., 1995). The western states offer great variability in altitude, hydrology, geology, and climate, producing numerous "microclimates" and unique ecosystem niches and consequently large numbers of endemic species. See Rodger Doyle, *Plants at Risk in the U.S.*, Sci. AM., Aug. 1997, at 26, 26 (stating that "patchwork mountain and desert" landscapes, such as those in the West, provide diverse habitats and "ample opportunities for geographical isolation;" in contrast, Midwestern and Central states feature uniform climate, topography, and geology, generally favoring ubiquitous species); Peter Warshall, *Southwestern Sky Island Ecosystems*, in OUR LIVING RESOURCES, *supra*, at 318, 318 (stating that mountaintop "sky islands" in Southwestern deserts provide pronounced microclimates, diverse habitats, and numerous rare species). The thirteen-state region in the Grossman and Goodin study also includes Hawaii, home to many unique and endangered species and ecosystems. See J. Michael Scott, *Hawaii: Overview*, in OUR LIVING RESOURCES, *supra*, at 361, 361 (stating that Hawaii has "degrees of endemism . . . unmatched anywhere else in the world" but that "loss of species in the islands has been staggering" due to habitat loss, introduction of exotics, and pressure from human population and tourism).

²⁶¹ Crumpacker et al., *supra* note 38, at 111; see also LANGNER & FLATHER, *supra* note 7, at 17 (stating that similar studies of National Forest land and wilderness areas support Crumpacker's conclusions). Crumpacker bases his analysis on a mapping of Kùchler potential natural vegetation ("PNV") types, the vegetation that would exist in the absence of human disturbances and "if the plant succession . . . were telescoped into a single moment." Crumpacker et al., *supra* note 38, at 104. Examples are Spruce-Cedar-Hemlock Forest, Palo Verde-Cactus Shrub, Bluestem Prairie, and Conifer Bog. See *id.* Crumpacker acknowledges that the Kùchler typology is crude: it measures potential rather than actual vegetation, it does not account for variations in the plant and animal species that comprise a broad type over its geographic range or at different successional stages, and it is not sufficiently fine-grained to account for some especially rare, small-scale or unique ecosystems. *Id.* at 104-05. In particular, the Kùchler typology has received criticism for failing to distinguish among wetland types. See LANGNER & FLATHER, *supra* note 7, at 13. But Crumpacker argues that despite their shortcomings, the Kùchler types "provide the only assessment of major, above-ground, terrestrial and wetland ecosystem diversity that describes the entire United States in reasonable detail." Crumpacker et al., *supra* note 38, at 104.

nities and are the logical starting point for a national biodiversity conservation strategy.

Management of federal lands is undoubtedly critical to biodiversity conservation in the eleven-state Western region, where 45% of all land is under federal control, and in Alaska, where the federal government owns 61% of the land.²⁶² Because the federal government is the dominant landowner in a twelve-state area comprising some 40% of the nation, federal land management must be a central component of the national biodiversity conservation strategy.²⁶³

Even in the West, it is not enough simply to rely on the federal government's dominant role as landowner. To optimize the conservation value of federal lands, adjustments in boundaries, agency jurisdiction, and management authority are necessary. Many federal lands that are important for biodiversity conservation purposes are not currently protected,²⁶⁴ and protected areas do not represent²⁶⁵ the full array of ecosystem types within the region.²⁶⁵ In California, according to one estimate, 95% of alpine habitat is included in protected reserves of some sort,²⁶⁶ while only 1% of riparian ecosystems—often rich in biodiversity, but subject to intense development pressure and degradation from pollution and anthropogenic alteration—receives protection.²⁶⁷ Moreover, as noted, the boundaries of current federal landholdings often do not coincide with the geography of ecosystems.²⁶⁸ The federal government should identify its lands of high biological value in the West and sequester them in a separate, protected category of biological reserves. The government should supplement those lands with the acquisition of additional lands containing habitat

²⁶² See GAO, *LAND OWNERSHIP*, *supra* note 58, at 20-22 tbl.1.2.

²⁶³ See *id.*

²⁶⁴ See, e.g., Thomas C. Edwards, Jr., *Protection Status of Vegetation Cover Types in Utah*, in *OUR LIVING RESOURCES*, *supra* note 260, at 463, 464 tbls.2, 3 (stating that although federal lands comprise 64% of Utah's territory and include all vegetation cover types occurring in the state, most vegetation types are represented inadequately in "protected" conservation areas, which "are more of a random product than a systematic approach to protecting the diversity of vegetation"); David M. Stoms, *Biodiversity in the Southwestern California Region*, in *OUR LIVING RESOURCES*, *supra* note 260, at 465, 465 (stating that although publicly owned lands comprise nearly 40% of southern California's coastal sage scrub region, protected areas are confined largely to higher elevations; 88% of areas below five hundred meters elevation, where development pressure is greatest and ecosystems are most endangered, are either unprotected public lands or privately held).

²⁶⁵ See OTA, *supra* note 3, at 227; Farrier, *supra* note 2, at 310.

²⁶⁶ See Doremus, *supra* note 5, at 322 n.356. Alpine ecosystems receive protection not only because of their scenic value, but also because they do not lend themselves readily to competing land uses. See *id.* at 322.

²⁶⁷ See OTA, *supra* note 3, at 67. Riparian lands generally are more developed and largely privately held because access to water has made these lands the most valuable to settlers in the region.

²⁶⁸ See *supra* notes 186-87, 211, 231 and accompanying text.

and ecosystem types currently unrepresented or only partially represented within current federal landholdings.²⁶⁹

However, the identification, acquisition, and sequestration of additional representative and uniquely valuable habitats and ecosystems should not be limited to the West. Many of the nation's most critically endangered ecosystems are located in Hawaii and in the eastern two-thirds of the continental United States,²⁷⁰ where population densities are generally higher, land conversion and ecosystem fragmentation are more advanced,²⁷¹ and the federal presence is generally much smaller. Not coincidentally, many of these states also rank among the leaders in listed endangered and threatened species.²⁷² Federal land acquisitions in these regions are unlikely ever to occur on a scale that would bring them into parity with federal landholdings in the West and Alaska, because land costs in these regions are generally higher,²⁷³ widely dispersed ownership makes large-scale acquisitions difficult,²⁷⁴ and, in any case, there are relatively few large blocks of

²⁶⁹ Cf. Crumpacker et al., *supra* note 38, at 111 (arguing that ecosystem types currently unrepresented or underrepresented on federal lands "should be given special consideration in federal programs concerned with the maintenance of biological diversity").

²⁷⁰ A 1993 study by Defenders of Wildlife ranked Florida, California, and Hawaii with the most endangered ecosystems, followed by Georgia, North Carolina, Texas, South Carolina, Virginia, Alabama, and Tennessee. REED F. ROSS & ROBERT L. PETERS, DEFENDERS OF WILDLIFE, *ENDANGERED ECOSYSTEMS: A STATUS REPORT ON AMERICA'S VANISHING HABITAT AND WILDLIFE* (1993); see also CEQ ENVIRONMENTAL QUALITY, *supra* note 152, at 131-32 tbl.7.1 (citing 1995 study listing 21 "most endangered ecosystems," of which 14 occur predominantly or exclusively outside the twelve-state Western region, led by South Florida Landscape, Southern Appalachian Spruce-Fir Forest, and Longleaf Pine Forest and Savanna).

²⁷¹ See *supra* note 257.

²⁷² See BEATLEY, *supra* note 4, at 5 fig.1.2; Division of Endangered Species, U.S. Fish & Wildlife Serv., *Listed Species by State/Territory* (visited Mar. 28, 1997) <<http://www.fws.gov/~r9endspp/listmap.html>> (noting that states with most listed species are Hawaii, California, Florida, Alabama, Texas, Tennessee, North Carolina, Georgia, Virginia); David S. Wilcove et al., *Envtl. Def. Fund., Rebuilding the Ark: Toward a More Effective Endangered Species Act for Private Land* (visited June 16, 1997) <<http://www.edf.org/pubs/Reports/help-esa/index.html>> (stating that endangered species are concentrated on private lands, especially in states with relatively little federal land, and those listed species with habitat primarily on federal land are far more likely to be in improving or stable condition, while those on private land are more often in decline); A.P. Dobson et al., *Geographic Distribution of Endangered Species in the United States*, 275 *Sci.* 550, 551-53 (1997) (finding greatest numbers of endangered species in Hawaii, southern California, southeastern coastal states, and southern Appalachia, areas characterized by high species endemism and intensive urban and agricultural development).

²⁷³ See STATISTICAL ABSTRACT, *supra* note 251, at 665 (indicating that, of 28 states with average value of farm land and buildings exceeding \$1,000 per acre, only Oregon and Washington are in the Western region; other Western states all rank in the bottom third).

²⁷⁴ Some 85% of the nation's privately owned timberlands exists outside the Western region, see *id.* at 685, and, apart from lands owned directly by forest industry firms, ownership of the timberlands is dispersed widely, see CEQ ENVIRONMENTAL QUALITY, *supra* note 152, at 300-01 (stating that six million people own 287 million acres of private nonindustrial timberlands). Farmland ownership is also dispersed widely, see National Agric. Statistics Serv., U.S. Dep't of Agric., *Farms and Land in Farms* (1996) (news release, on file with

undisturbed habitat.²⁷⁵ Nevertheless, if carefully selected and properly managed, even much smaller scale acquisitions can play an important, positive role in biodiversity conservation.²⁷⁶ Indeed, in some areas—Hawaii, Florida, Texas, parts of the Southeast, and high-population coastal areas generally—where concentrations of rare, unique, or especially fragile ecosystems combine with intense development pressure to create a heightened threat of species and ecosystem extinction, targeted federal acquisitions of the last remaining habitat fragments may be the last best hope for conserving biodiversity.²⁷⁷

author) (stating that 2.06 million farms, with an average farm size of 469 acres, consist of 968 million acres), especially in the Eastern regions where farms are more numerous and smaller in size. See STATISTICAL ABSTRACT, *supra* note 251, at 663 (detailing the number of farms and average size of farm by state and by region). Forest lands and farmlands account for the bulk of privately owned acreage, see *supra* notes 251-52, but adding owners of developed land—generally held in even smaller, more numerous, and more costly parcels—brings the total to 34 million private landowners. See PRIORITIES FOR CONSERVATION, *supra* note 81, at 45 (citing 1980 figures).

²⁷⁵ See *supra* text accompanying notes 46-47. Pursuant to its authority under the Weeks Law, 16 U.S.C. § 515 (1994), the Forest Service has over the years acquired large tracts of relatively undeveloped, primarily second-growth forests in parts of the East and Southeast, especially in the upper Great Lakes, northern New England, the southern Appalachians, and the Ozarks. A number of other important and largely undeveloped tracts are national parks (e.g., the Everglades in south Florida, Great Smoky Mountains in the southern Appalachians, and Voyageurs and Isle Royale National Parks in the upper Great Lakes), other units of the National Park Service (e.g., Cape Cod National Seashore, Big Cypress Preserve), or National Wildlife Refuges (e.g., Okefenokee). Virtually all federal lands east of the 100th meridian have been acquired in this century. See PRIORITIES FOR CONSERVATION, *supra* note 81, at 41. In a few cases, very large state parks have been set aside to fill a similar niche, most notably the nation's largest park, Adirondack Park, in upstate New York.

²⁷⁶ See *supra* note 47 and accompanying text; see also Donald H. Miller, *Strategies to Achieve Public and Private Land Use and Forest Resource Goals*, in URBAN/FOREST INTERFACE, *supra* note 252, at 163, 172-73 (stating that although public acquisition of land may be costly in areas under development pressure, "purchases of land or rights in land in the open market may be the most direct, simplest, least controversial, and even least expensive way of preserving key parcels") (citation omitted).

²⁷⁷ See CURTIS H. FLATHER ET AL., SPECIES ENDANGERMENT PATTERNS IN THE UNITED STATES 26-27 (U.S. Dept. of Ag., Gen. Tech. Rpt. RM-241 1994) (stating that the greatest multispecies conservation benefit would come from land acquisition or other conservation measures targeted to regions of high species endangerment, generally characterized by high species richness, high endemism, and intense development pressure); see also Lloyd L. Loope & Charles P. Stone, *Strategies to Reduce Erosion of Biodiversity by Exotic Terrestrial Species*, in MANAGED LANDSCAPES, *supra* note 53, at 261, 264-67 (describing the critical role of Haleakala and Hawaii Volcanoes National Parks in protecting Hawaii's critically endangered ecosystems and numerous endemic plant and bird species, despite the parks' small sizes); Marla Cone, *San Diego OKs Broadest Conservation Plan in U.S.*, L.A. TIMES, Mar. 19, 1997, at A1 (noting that San Diego County has an extraordinary concentration of endangered species, due to a combination of endemic species and real estate development pressure). These regions have been among the fastest-growing in the country, and those trends will likely continue. See U.S. Census Bureau, *Projections of the Total Population of States: 1995 to 2025* (visited Oct. 17, 1997) <<http://www.census.gov/population/projections/state/stpjpop.txt>> [hereinafter *Population Projections*] (indicating that California, Hawaii, Florida, Texas, the southeastern states generally, and several southeastern states including Georgia, North Carolina, Virginia, and Tennessee, will likely rank among the fastest-growing over a thirty-year period).

Ultimately, the problem is neither that the federal government owns too little land, nor that it owns too much. Rather, the problem is that the federal government must diversify and better manage its rich portfolio of land in order to achieve biodiversity conservation goals.²⁷⁸ Critics of a biodiversity conservation strategy premised on federal land ownership frequently overlook that neither the present portfolio of federal lands nor the authorities under which those lands are managed are immutable facts of nature; they are political and legal artifacts from an earlier era in which biodiversity conservation had yet to appear on the national policy agenda. The federal government can make adjustments where important ecosystem types and habitats are not represented or where the boundaries of federal landholdings are not well matched to the ecosystems of which they are a part.

Some federal lands have moderate to high commercial value for commodity production (e.g., grazing,²⁷⁹ timber,²⁸⁰ oil and gas, coal, or mineral development),²⁸¹ for private recreational development,²⁸² or for urban development in some of the fastest-growing regions of

²⁷⁸ As the chief conservation officer of The Nature Conservancy has noted: "The challenge for the federal government is not the amount of land it manages, but rather the biological or ecological value of the land it owns. Not all land is biologically equal." *Hearing Before the Subcomm. on Interior and Related Agencies of the House Comm. on Appropriations*, 104th Cong. (Mar. 14, 1996) (testimony of Bruce Runnels, The Nature Conservancy) [hereinafter Testimony of Bruce Runnels].

²⁷⁹ Grazing has some market value, but perhaps not as much as ranchers and critics of "below market" grazing fees commonly believe. Many economists have concluded that livestock grazing is a low-value activity in much of the West, and likely could not sustain significantly higher fees. See NELSON, *supra* note 150, at 264-65 (indicating that the direct and indirect costs of administering grazing programs exceed not only grazing fee revenues, but also the full market value of current livestock grazing); *id.* at 266 (stating that the value of recreational outputs of BLM lands exceeds the market value of livestock grazing by a factor of five, and the gap is likely to grow wider); see also William E. Riebsame, *Ending the Range Wars?*, ENV'T, May 1996, at 4, 9 (stating that the costs of federal range programs exceed profits that the ranchers make from grazing livestock on public lands).

²⁸⁰ The federal government owns half of the nation's softwood timber inventory, but current federal timber management policies have received criticism for subsidizing timber production in areas where it is uneconomic and discouraging production in high-quality, accessible stands that are capable of producing more and better timber at a lower cost. See NELSON, *supra* note 150, at 76-77, 221. One solution may be to reform these policies so as to concentrate timber production in prime timber-producing areas. See *id.* at 77 (citing Sierra Club proposals to that effect). But once policymakers reach that decision, there is little reason to retain federal ownership of the prime commodity-producing lands. See *infra* note 291 and accompanying text.

²⁸¹ See NELSON, *supra* note 150, at 315 (estimating that the value of unleased federally owned coal reserves in the Powder River Basin of Wyoming and Montana, which lie primarily under privately owned surfaces and are therefore of little biological conservation value, is \$6 billion); see also *Hearing Before the Senate Committee on Governmental Affairs*, 104th Cong. (June 27, 1996) (testimony of Robert H. Nelson) [hereinafter Nelson Testimony] (stating that federal lands include one-third of all U.S. coal reserves, major oil and gas reserves, as well as hardrock mineral deposits such as gold, copper, and nickel).

²⁸² See Nelson Testimony, *supra* note 281.

the country.²⁸³ Some of these lands also contain important biological resources, and the federal government will need to make hard choices about which values to promote and protect, and on which lands to do so. But the federal holdings also include lands that are relatively less important, or, in some cases, simply redundant from a biodiversity conservation perspective,²⁸⁴ but are nonetheless commercially valuable. Through an aggressive program of in-kind land swaps or cash sales of these lands, the federal government could substantially rectify this imbalance in the federal land portfolio without significantly increasing (or decreasing) its overall role as landowner and land manager. The federal government could then use the proceeds from these programs to acquire and protect fee interests or lesser property interests (like conservation easements) in valuable ecosystems and habitats.²⁸⁵

Land-swapping agreements may offer the opportunity to enhance the biodiversity conservation value of the federal land portfolio. The Interior Department has already undertaken a number of strategic land swaps to secure endangered species habitats, and unique and threatened ecosystems.²⁸⁶ In addition, the BLM regularly engages in

²⁸³ See NELSON, *supra* note 150, at 311 (estimating that the value of BLM holdings in the rapidly growing Las Vegas metropolitan area is "several hundred million dollars"); see also *Population Projections*, *supra* note 277 (indicating that Alaska and eleven Western states are expected to be among the fastest-growing over a thirty-year period); Mike Dombeck, Acting Director, Bureau of Land Management, State of the Public Lands: Remarks before Conservation Roundtable at the National Press Club 3 (Oct. 9, 1996) (transcript on file with author) (noting that BLM lands are concentrated in the Rocky Mountain region, which is projected to be the fastest-growing region of the country over a ten-year period, with Nevada, Utah, and Arizona projected to be the three fastest growing states).

²⁸⁴ Conservation biologists generally recommend that reserves include some redundancy of ecosystem types and habitats, as insurance against localized disturbances. Nonetheless, some ecosystem types are probably overrepresented in current federal landholdings, and diversifying the portfolio of federal lands could achieve greater overall biodiversity protection.

²⁸⁵ See UNI. CONSERVATION EASEMENT ACT § 1(1), 12 U.L.A. 170 (1996).

"Conservation easement" means a nonpossessory interest of a holder in real property imposing limitations or affirmative obligations the purposes of which include retaining or protecting natural, scenic, or open-space values of real property, assuring its availability for agricultural, forest, recreational, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural, archaeological, or cultural aspects of real property.

Id.

²⁸⁶ See Bruce Babbitt, *The Endangered Species Act and "Takings": A Call for Innovation Within the Terms of the Act*, 24 ENVTL. L. 355, 365 (1994) (describing a land swap in which the Department of the Interior acquired 100,000 acres in Florida's Big Cypress Swamp in exchange for one hundred acres in downtown Phoenix, Arizona); John H. Cushman Jr., *U.S. Using Swaps to Protect Land*, N.Y. TIMES, Sept. 29, 1996, at A1 (describing land swaps as a "decades-old practice [that] has achieved new prominence" as the Clinton Administration seeks to protect environmentally-sensitive lands by exchanging lands of high development value).

land exchanges with other federal and state agencies²⁸⁷ and wholesale exchanges between the BLM and the Forest Service have been recommended periodically to allow each agency to rationalize its holdings.²⁸⁸ Others have suggested, for reasons of management efficiency, that land swaps should consolidate federal lands, which are currently divided into isolated parcels or "checkerboard" patterns, interspersed with state, local, and private lands. Under these ownership patterns, land is often more difficult and costly to manage, and less valuable for either conservation purposes or for some private uses, than it might be if held in larger consolidated blocks.²⁸⁹ By packaging conservation lands in fewer, but larger, units, consolidation of holdings could significantly increase the conservation value of some federal lands. At the same time, it could benefit state and local governments and private landowners by freeing larger contiguous parcels for development or other purposes. Furthermore, the principle that the federal government should seek to optimize the conservation value of its landholdings through land exchanges should extend beyond consolidations with adjacent parcels. The government should seek to assemble the portfolio that represents the greatest conservation value, wherever the lands are located.

Land swaps, of course, raise notoriously difficult questions of valuation, and, for that reason, often generate considerable controversy.²⁹⁰ Alternatively, or additionally, Congress could authorize a

²⁸⁷ See NATIONAL PERFORMANCE REVIEW REPORT, *supra* note 19, at *2 (stating that the BLM typically exchanges about 250,000 acres annually with other federal and state agencies). The BLM is authorized to engage in land swaps under section 206 of the Federal Land Policy and Management Act, which authorizes the Secretary of the Interior to dispose of public lands by exchange when the Secretary "determines that the public interest will be well served," 43 U.S.C. § 1716(a) (1994), provided that the lands exchanged must be of equal value or, if not equal, equalized by a supplemental cash payment, *see id.* § 1716(b).

²⁸⁸ *See id.*; NATIONAL PERFORMANCE REVIEW REPORT, *supra* note 19, at *2-3 (citing proposals made in the 1980s, and recommending renewed efforts at BLM-Forest Service exchanges).

²⁸⁹ See FRANK GREGG, FEDERAL LAND TRANSFERS: THE CASE FOR A WESTWIDE PROGRAM BASED ON THE FEDERAL LAND POLICY AND MANAGEMENT ACT 5-8 (1982); Coggins, *supra* note 136, at 520-26.

²⁹⁰ See Office of Inspector Gen., U.S. Dep't of the Interior, *Final Audit Report on Nevada Land Exchange Activities, Bureau of Land Management* (visited July 20, 1997) <<http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=wais.access.gpo.gov&filename=nevada.wais&directory=/diskb/wais/data/interior>> [hereinafter *Final Audit Report*] (concluding that the Nevada BLM office based its exchanges on overappraisals of private lands and underappraisals of public lands) (may only be indirectly accessed through <su_docs/aces/aaces002.html>); Cushman, *supra* note 286 (stating that public lands economist Robert H. Nelson describes land swaps as a "second-best solution" because barter exchange is less efficient than cash exchange). See generally Jon Margolis, *Let's Make a Deal: Federal Land Swaps Are Now a Valuable Tool of Resource Conservation, But Is the Public Getting All It Should?*, AUDUBON, Mar.-Apr. 1997, at 71 (questioning the valuations of exchanged lands and challenging the legitimacy of secret bargaining between federal agents and private landowners). A partial solution is to require competitive exchanges, in which, rather than

systematic program of market sales of potentially valuable commodity-producing lands, or lands with high development value, with the proceeds designated for the acquisition of lands for biodiversity conservation purposes.²⁹¹ In some cases, it may be possible to stretch these conservation dollars by acquiring less than a full fee interest because the purchase of a conservation easement is typically less costly and may be perfectly adequate to achieve the government's conservation objectives.²⁹² This approach would require federal land managers to weigh the market value of lands currently in the government's portfolio against their biological value, and to compare the biological value of lands currently under government ownership with lands that might be acquired in their stead. Thus, in each case, the federal land managers would weigh, in concrete fashion, the costs and benefits of conservation against the costs and benefits of development. The federal land managers would seek to get the most conservation available for a limited conservation budget—a healthy fiscal discipline found neither under current approaches to federal land management²⁹³ nor under a broad-based regulatory approach.²⁹⁴

relying on appraisers' estimates to establish the terms in a negotiated two-party transaction, the public agency solicits bids by private landowners, who offer competing packages of land and cash in exchange for an identified parcel of federal land. See *Final Audit Report*, *supra*, at 11 (describing prototype program of competitive land exchanges by Forest Service and recommending its adoption by BLM). This approach will not work, however, when the federal government wants to acquire a particular ecologically valuable parcel.

²⁹¹ See NELSON, *supra* note 150, at 311-14. The broad outlines of such a mechanism already exist under the Land and Water Conservation Fund, which uses proceeds from, inter alia, sales of "surplus" public lands for acquisition of park, recreation, and conservation land. But the government is not currently in the business of actively seeking to market its most commercially valuable lands, *see id.*, nor is biodiversity conservation per se a high priority consideration in land acquisition, *see PRIORITIES FOR CONSERVATION*, *supra* note 81, at 6-9 (stating that of the four major land agencies, only the FWS explicitly includes biodiversity in its land acquisition criteria, but that the OMB sets the overall acquisition priorities under criteria that largely ignore biodiversity and ecosystem considerations). Because Land and Water Conservation Fund moneys are available for land acquisition only as provided in annual appropriations by Congress (which have been limited in recent years), most of the Fund's money has been diverted to deficit reduction. See *supra* note 82. Nonetheless, the Land and Water Conservation Fund has funded federal acquisition of between four and five million acres over a twenty-five-year period. See *PRIORITIES FOR CONSERVATION*, *supra* note 81, at 103.

²⁹² See *PRIORITIES FOR CONSERVATION*, *supra* note 81, at 23; Robert J. Smith, *The Endangered Species Act: Saving Species or Stopping Growth?*, REG., Winter 1992, at 83, 87.

²⁹³ Currently, the federal government generally retains ownership of any particular parcel regardless of the opportunity costs, the only question being what weight the government will give conservation in the land's management as the agency seeks to juggle conflicting mandates, missions, and political pressures. See Robert L. Glicksman, *Fear and Loathing on the Federal Lands*, 45 U. KAN. L. REV. 647, 650-51 (1997) (describing historical shift in federal policy from disposal to retention and accompanying ascendancy of environmental and resource conservation objectives).

²⁹⁴ See *infra* notes 522-25 and accompanying text.

Some economists and many environmentalists have argued that the federal government should get out of the commodity production business entirely and concentrate its efforts on providing benefits (such as biodiversity) that markets will fail to produce in adequate quantities. Although some environmentalists are suspicious of any suggestion that the federal government divest land,²⁹⁵ their emphasis on the primacy of environmental values should logically support the conclusion that the federal portfolio should include those lands capable of producing the greatest environmental benefits. Exchanging environmentally less-valuable lands for other lands capable of producing greater environmental benefits can achieve this end.²⁹⁶ Many economists contend that there is no economic justification for continued federal ownership of valuable commodity-producing lands because markets are quite capable of producing those commodities more efficiently.²⁹⁷ This argument is supported, in many cases, by the fact that the public lands are managed under policies that ensure an annual taxpayer subsidy to the private parties licensed to exploit the commodities, a situation not only economists, but many environmentalists, find intolerable.²⁹⁸ The cost to taxpayers is thus two-fold. First, the

²⁹⁵ See NELSON, *supra* note 150, at 312 (stating that proposals to sell public lands are often equated with "privatization" proposals by former Reagan Administration Interior Secretary James Watt, anathema to environmentalists).

²⁹⁶ See Testimony of Bruce Runnels, *supra* note 278 ("The Nature Conservancy has little disagreement with the notion that the federal government should divest itself . . . of federal lands having little or no important biological value.").

²⁹⁷ See, e.g., Barney Dowdle, *The Case for Privatizing Government Owned Timberlands*, in PRIVATE RIGHTS AND PUBLIC LANDS 71, 76 (Phillip N. Trulock ed., 1983) (identifying specific government timber management policies as inefficient because they are unresponsive to market demand and price signals); B. Delworth Gardner, *The Case for Divestiture*, in RE-THINKING THE FEDERAL LANDS 156, 157, 169-78 (Sterling Brubaker ed., 1984) (stating that private markets produce more efficient allocations of commodities than does government ownership); Gary D. Libecap, *The Efficiency Case for the Assignment of Private Property Rights to Federal Lands*, in PRIVATE RIGHTS AND PUBLIC LANDS, *supra*, at 29, 34 ("In neither timber land nor rangeland [a]re there significant public good reasons or other externalities to justify land retention by the government."); Robert H. Nelson, *The Future of Federal Forest Management: Options for Use of Market Methods*, in FEDERAL LANDS POLICY, *supra* note 239, at 159, 172 (arguing that the private sector has a comparative advantage "in producing outputs for which most of the benefits can be captured in market prices," while the federal government has an advantage "in managing forestland that provides recreational or other nonmarket benefits of importance to the whole nation"); Roger A. Sedjo, *Market and Nonmarket Influences in Urban/Forest Interface Conflicts*, in URBAN/FORREST INTERFACE, *supra* note 252, at 93, 93 (stating that "[t]here is no reason to believe that the unregulated private market could not adequately provide socially desirable levels of timber production," by shifting more land to forestry, increasing output from industrial timberlands through new technologies, and increasing reliance on nonindustrial private timberlands).

²⁹⁸ See B.J. Bergman, *Logger's Free Lunch: When Will Big Timber Get Off the Dole?*, SIERRA, July/Aug. 1997, at 22 (criticizing below-cost timber production on federal lands); Coggins, *supra* note 136, at 526-28 (stating that the BLM sets grazing fees below market price); Brad Knickerbocker, *Butting Heads with the Environmental Status Quo*, CHRISTIAN SCI. MONITOR, Jan. 24, 1997, at 4 (stating that the Mining Law of 1872 allows mining companies to claim federal land for a token fee and extract valuable minerals without payment of royalties).

taxpayers pay through annual appropriations to support large federal bureaucracies like the Forest Service and BLM, whose work consists largely of subsidizing private, profitable production of commodities that the private sector would produce, even in the absence of any subsidy. Second, the taxpayers pay in the form of opportunity costs when the federal government dedicates federal lands to commodity production. These opportunity costs arise because those lands (or substituted lands of equal market value but greater conservation value) could be used instead to produce other, potentially more valuable, public goods such as biodiversity, the production of which we forego under current federal land ownership patterns and management policies.²⁹⁹ A more sensible approach to federal land management would place biodiversity conservation above commodity subsidization in the hierarchy of public values; selective divestiture of commercially valuable federal lands in favor of acquisition of lands of higher conservation value is consistent with that approach.

However, even a major program of federal land acquisition, trading, and sequestration to achieve biodiversity conservation objectives would almost certainly leave gaps in biodiversity protection. In large parts of the nation, most land is—and is likely to remain—in private ownership. Federal biodiversity reserves are unlikely ever to cover the full range of habitats and ecosystems that merit protection. Even where reserves are set aside, biodiversity policy must concern itself with ecosystems that may not be well matched with reserve boundaries, and with potentially adverse spillovers from adjacent land uses.³⁰⁰ For these reasons, federal biodiversity law and policy must also address the use of adjacent privately owned lands.

III

FEDERAL REGULATION OF PRIVATE LAND USE

Regulation of private land use has traditionally been the province of state common-law courts and, more recently, state and municipal legislative and administrative bodies.³⁰¹ Although Congress flirted briefly with proposals to establish a National Land Use Act in the 1970s, the federal government has, for the most part, avoided direct intervention in land use regulation, viewing it as properly a state and local affair.³⁰² However, several federal statutes enacted in the “environmental decade” of the 1970s profoundly affect private land-use decisions. The most important of these, from a biodiversity conservation

²⁹⁹ See NELSON, *supra* note 150, at 76 (identifying “social loss” that occurs when uneconomic, subsidized commodity production displaces nonmarket uses of public lands).

³⁰⁰ See *supra* notes 186-87, 211, 231 and accompanying text.

³⁰¹ See Tarlock, *Biodiversity Federalism*, *supra* note 2, at 1318.

³⁰² See Doremus, *supra* note 5, at 288-89, 302.

perspective, are the ESA, which restricts landowners' ability to alter their land in ways that adversely affect the habitats of plant or animal species listed as "threatened" or "endangered,"³⁰³ and the federal wetlands protection programs, especially section 404 of the Clean Water Act³⁰⁴ and the "Swampbuster" provision of the Farm Bill.³⁰⁵

A. Endangered Species Act and Private Lands

Part II.A.1.b above discussed the duties which the ESA imposed on federal land managers. But the ESA also affects private landowners. Under the ESA, it is unlawful for "any person"—private parties and government agencies alike³⁰⁶—to "take" any fish or wildlife species listed as "endangered."³⁰⁷ By statutory definition, "take" includes "harm."³⁰⁸ By regulation, "harm" is defined as any "act which actually kills or injures wildlife," including "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering."³⁰⁹ The Secretary of the Interior has, by regulation, extended the same protection to species listed as "threatened,"³¹⁰ but may modify this protection by special rule where appropriate.³¹¹ The upshot is that private landowners generally may not develop their land if it would "harm" a listed endangered or threatened wildlife species

³⁰³ See *supra* notes 83-85 and accompanying text.

³⁰⁴ See *infra* Part III.B.1.

³⁰⁵ See *infra* Part III.B.2.

³⁰⁶ 16 U.S.C. § 1532(13) (1994).

³⁰⁷ *Id.* § 1538(a)(1). Violators are subject to civil and criminal penalties. See *id.* § 1540. The prohibition on "taking" does not apply to endangered plant species. Instead, it is unlawful to "remove and reduce to possession" endangered plants from areas under federal jurisdiction, or to "remove, cut, dig up, or damage or destroy" such plants "in knowing violation" of state law or in the course of criminal trespass. *Id.* § 1538(a)(2)(B). Consequently, endangered plants may be "taken" from private land if state law does not forbid it.

³⁰⁸ *Id.* § 1532(19) ("The term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.").

³⁰⁹ 50 C.F.R. § 17.3 (1996). This regulation—the principal basis for federal regulation of private land use under the ESA—has been upheld by the Supreme Court as a reasonable interpretation of the statute. *Babbitt v. Sweet Home Chapter of Communities for a Great Or.*, 515 U.S. 687 (1995).

³¹⁰ The statute authorizes the Secretary to "issue such regulations as he deems necessary and advisable to provide for the conservation of [threatened] species." 16 U.S.C. § 1533(d). On this authority, the Secretary of Interior has issued a regulation generically extending the taking ban to all threatened species, except as otherwise provided by special rule. See 50 C.F.R. §§ 17.31(a), 17.71. The Secretary of Commerce has not taken parallel measures for threatened marine and anadromous species, but instead issues protective regulations for such species on a case-by-case basis. See Robert Meltz, *Where the Wild Things Are: The Endangered Species Act and Private Property*, 24 ENVTL L. 369, 375 n.35 (1994).

³¹¹ See 50 C.F.R. §§ 17.40-17.48.

by adversely modifying its habitat so as to disrupt breeding, food supplies, or nesting.³¹²

Nevertheless, a landowner seeking to modify the habitat of a listed species may apply for an "incidental take permit"³¹³ that allows the taking of a listed species if the taking is incidental to otherwise lawful activity and will not appreciably reduce the likelihood of the species' survival and recovery.³¹⁴ The applicant must also win federal approval of a habitat conservation plan designed to "minimize and mitigate such [adverse] impacts . . . [and including] such other measures that the Secretary may require as being necessary or appropriate for purposes of the plan."³¹⁵

For some years, the permit process was viewed as a narrow and rarely used exception to the general prohibition on taking listed species.³¹⁶ The current administration, however, views the process as an opportunity to encourage (or perhaps to compel) landowners, developers, local officials, and conservation groups in areas containing the habitats of listed species to collaborate in comprehensive, ecosystem-wide, multispecies habitat conservation planning.³¹⁷ Secretary Babbitt's biggest success to date involved the coastal scrub sage ecosystems of southern California's Orange and San Diego Counties.³¹⁸ There, comprehensive federal habitat conservation plans embrace ecosystem-wide land use plans developed under California's Natural Community Conservation Planning Act ("NCCP"), which provides for ecosystem-

³¹² This can create perverse incentives. In some instances, landowners have intentionally destroyed populations of candidate species on their land, so as not to fall under the ESA's "taking" prohibition in the event the species were eventually listed as threatened or endangered. See Holmes Rolston, III, *Property Rights and Endangered Species*, 61 U. COLO. L. REV. 283, 283-84 (1990).

³¹³ 16 U.S.C. § 1539(a)(1)(B).

³¹⁴ See *id.* § 1539(a)(2)(B); 50 C.F.R. § 17.22(b)(2)(i), (iv).

³¹⁵ 16 U.S.C. § 1539(a)(2)(A)(ii), (iv).

³¹⁶ See Farrier, *supra* note 2, at 376; Robert D. Thornton, *Searching for Consensus and Predictability: Habitat Conservation Planning Under the Endangered Species Act of 1973*, 21 ENVTL. L. 605, 650-52 (1991) (citing the cost and delay involved in the planning process, together with difficulty in reaching consensus among many groups with disparate interests, as barriers to successful implementation). The most prominent early habitat conservation plans were developed in California, for the mission blue butterfly on San Bruno Mountain, just south of San Francisco, and for the fringe-toed lizard in Riverside County's Coachella Valley. See Tarlock, *Local Biodiversity*, *supra* note 2, at 606-08.

³¹⁷ See Babbitt, *supra* note 286, at 361-64; U.S. Fish & Wildlife Serv., Dep't of the Interior, *Habitat Conservation Planning Is Streamlined Under New Guidelines Announced by Two Agencies* (Press Release, Dec. 3, 1996), available in 1996 WL 694915, at *2 (noting that from 1982 to 1992, FWS issued only 14 HCPs, but by September 1996, 197 HCPs had been approved with another two hundred under development). The first such regional multispecies plan, the Balcones Canyonlands Conservation Plan in the Texas Hill Country around Austin, predates the present administration. See BEATLEY, *supra* note 4, at 173-93; Tarlock, *Local Biodiversity*, *supra* note 2, at 608.

³¹⁸ See Cone, *supra* note 277.

wide planning on a purely voluntary basis.³¹⁹ Although the NCCP planning process was already underway by the time the California gnatcatcher was listed under the ESA, the federal listing lent gravity and urgency to the planning process. It triggered land use plans to protect a threatened ecosystem upon which dozens of rare plants and animals depend, in a region under tremendous developmental pressure.³²⁰

Clearly, the ESA's ban on adverse habitat modification gives the government a powerful club to hold over the heads of would-be developers and local officials, in order to induce their participation in "voluntary" biodiversity conservation planning efforts.³²¹ Not surprisingly, the process is not always a smooth or amicable one.³²² Secretary Babbitt has made a bid to sweeten the pot for landowners with a "no surprises" policy, promising that once a multispecies habitat conservation plan is approved, the federal government will not later introduce additional demands for protection of species or habitat, absent "extraordinary circumstances."³²³ The habitat conservation planning approach, although not without its critics,³²⁴ is now widely touted as

³¹⁹ 1991 Cal. Stat. 765 (codified at CAL. FISH & GAME CODE §§ 2800-2840 (West Supp. 1997)).

³²⁰ See Tarlock, *Local Biodiversity*, *supra* note 2, at 610; Welner, *supra* note 74, at 338-46; Cone, *supra* note 277.

³²¹ See Federico Cheever, *An Introduction to the Prohibition Against Takings in Section 9 of the Endangered Species Act of 1973: Learning to Live with a Powerful Species Preservation Law*, 62 U. COLO. L. REV. 109, 198 (1991).

³²² See Ruhl, *supra* note 2, at 623, 639-40 (describing habitat planning process as "coercive" in nature, if not outright "extortion"); Cone, *supra* note 277 (stating that some San Diego landowners and politicians bitterly oppose what one calls the "multiple stolen and confiscated property" plan); Ralph K.M. Haurwitz, *Urban Habitat: Eight Years in the Making, a Plan to Preserve 30,000 Austin-Area Acres Will Soon Gain Federal Approval—But Not Everyone Is Cheering*, AUSTIN AM.-STATESMAN, Apr. 21, 1996, at A1 (stating that despite broad public approval, some landowners regard Austin's habitat conservation plan as a "high-handed land grab"). *But cf.* BEATLEY, *supra* note 4, at 196, 211-13 (stating that, despite acrimony, factions usually find common ground because developers come to see the habitat planning process as more efficient than site-by-site battles over the ESA, and may reap market benefits from open space and related environmental amenities).

³²³ See Notice of Availability of Final Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, 61 Fed. Reg. 63,854 (1996); *see also* Tarlock, *Biodiversity Federalism*, *supra* note 2, at 1352 (discussing the "no surprises" policy); Eric Fisher, Comment, *Habitat Conservation Planning Under the Endangered Species Act: No Surprises & the Quest for Certainty*, 67 U. COLO. L. REV. 371, 387-90 (1996) (discussing the requirements and difficulties of the "no surprises" policy). The "extraordinary circumstances" exception, of course, is sufficiently open-ended to make many would-be developers skeptical of the value of the "no surprises" commitment, and is also opposed by some environmentalists who argue that the policy handcuffs the government, leaving it without sufficient flexibility to respond to new information or changed factual circumstances. *See* Christine L. Younger, *Environmental Groups Say "No Surprises" Policy Is No Good*, WEST'S LEGAL NEWS, Nov. 7, 1996, available in 1996 WL 638734.

³²⁴ *See* Marianne Lavelle, *Endangered Species Act: Feds Settle to Save Act and Species, But Critics Say Deals May Hurt Not Help Endangered*, NAT'L L.J., Dec. 16, 1996, at A1.

the wave of the future.³²⁵ Thus, the incidental take provision threatens to become the exception that swallows the rule against adverse modification of habitat for listed species, and deeply implicates the federal government in the heretofore largely local matter of land-use planning.

Secretary Babbitt also appears to be receptive to listing species as "threatened" rather than "endangered,"³²⁶ allowing greater flexibility in applying the ESA.³²⁷ For threatened (but not for endangered) wildlife species, the Secretary may issue special rules modifying the ESA's strictures against taking that species.³²⁸ For example, because the coastal California gnatcatcher was listed as threatened rather than endangered, the Secretary was able to issue a special rule prospectively permitting incidental takes of the species, provided they were consistent with California's NCCP for the coastal sage scrub region.³²⁹

The ESA may also affect private landowners if their land development projects require federal permits or funding. The ESA can affect private landowners in this way because the relevant federal agency is subject to the ESA's consultation requirements, as well as its proscriptions against taking any action (including issuing a permit or funding a project) that would "jeopardize" or adversely affect the designated critical habitat of a listed species.³³⁰ For example, a proposed development on a privately owned wetland normally requires a permit from the Army Corps of Engineers.³³¹ If the proposed wetland development adversely affects a listed species, however, the ESA requires that the Corps consult with the FWS prior to issuing the permit, and prohibits the Corps from issuing the permit if doing so would jeopardize or adversely affect the designated critical habitat of the listed spe-

³²⁵ See, e.g., BEATLEY, *supra* note 4, at 192 (stating that the plan "is impressive in its efforts to take a regional multi-species approach and may well represent the best model for habitat conservation in the future"); see also Lavelle, *supra* note 324, at A17 (stating that Michael Bean, who is widely considered the "father" of the ESA for his early and ongoing work on endangered species protection, endorses the HCP process as a "creative new solution" to conflicts that have undermined species protection).

³²⁶ Although the statutory definitions of these terms differ, see *supra* text accompanying notes 72-73, the distinction is at best imprecise, leaving the agency with considerable discretion to determine whether a species is "in danger of extinction" and therefore "endangered," or merely "likely to become an endangered species within the foreseeable future" and therefore "threatened." Although the statute directs the Secretary to make listing determinations solely on the basis of the best scientific information, see *supra* text accompanying note 74, the uncertain line separating the categories invites manipulation.

³²⁷ See Meltz, *supra* note 310, at 382-83; Welner, *supra* note 74, at 343; see also Tom Kenworthy, *Babbitt Clears Compromise to Protect California Bird*, WASH. POST, Mar. 26, 1993, at A2 (describing flexibility of this approach with respect to the gnatcatcher).

³²⁸ See *supra* note 311 and accompanying text.

³²⁹ See Meltz, *supra* note 310, at 383 n.81; Welner, *supra* note 74, at 343-44.

³³⁰ See Meltz, *supra* note 310, at 384; Farrier, *supra* note 2, at 377.

³³¹ See *infra* Part III.B.1.

cies.³³² As noted previously, however, the vast majority of such consultations are either approved outright or approved subject to mitigation requirements.³³³

B. Wetlands

"Wetlands" is an umbrella term for a diverse array of semi-aquatic ecosystems, encompassing marine, estuarine, riverine, lacustrine (lake and pond), and palustrine (inland basin) systems such as tidal flats, salt and freshwater marshes, fens, bogs, swamps, bottomlands, and prairie potholes.³³⁴ Wetlands processes and functions vary widely,³³⁵ but in general, wetlands provide habitats for many species of birds, amphibians, reptiles, mammals, arthropods, fish, shellfish, insects, hydrophytic plants, and micro-organisms,³³⁶ and serve as "nurseries" for the reproductive and early developmental stages of many species, including many commercially valuable fish and shellfish species.³³⁷ By some estimates, approximately half the animals and one-third of the plants currently listed as endangered or threatened under the ESA are wetland-dependent.³³⁸ In addition, wetlands often perform crucial flood control, erosion control, freshwater storage, groundwater recharge, nutrient cycling, and water filtering and

³³² See U.S. GEN. ACCOUNTING OFFICE, ENDANGERED SPECIES ACT: INFORMATION ON SPECIES PROTECTION ON NONFEDERAL LANDS 7-8 (GAO/RCED-95-16 1994) (giving specific examples).

³³³ See Meltz, *supra* note 310, at 384; *supra* notes 104-09 and accompanying text. Any project authorized under the consultation process is not considered a "taking," see 16 U.S.C. § 1536(o) (1994), and thus such approval trumps the taking requirements, see Meltz, *supra* note 310, at 384. One commentator has suggested that because the consultation process operates on a faster timetable, has no public participation requirements, and does not place the burden on the landowner to produce a habitat conservation plan, landowners may find it advantageous to proceed under section 7 rather than section 10. See Farrier, *supra* note 2, at 378-79.

³³⁴ See Mark S. Dennison & James F. Berry, *Overview, in WETLANDS: GUIDE TO SCIENCE, LAW AND TECHNOLOGY* 1, 3-8 (Mark S. Dennison & James F. Berry eds., 1993) [hereinafter *WETLANDS*]. Although there is no consensus definition, scientists and government agencies generally identify wetlands by reference to hydrology (inundated or saturated for at least part of the year), soil types (hydric, i.e., exhibiting anaerobic characteristics consistent with inundation or saturation), and vegetation (hydrophytic, i.e., characteristically growing in wet areas). See *id.* at 4-6.

³³⁵ See, e.g., GLENDA DANIEL & JERRY SULLIVAN, *A SIERRA CLUB NATURALIST'S GUIDE TO THE NORTH WOODS OF MICHIGAN, WISCONSIN, AND MINNESOTA* 264-302 (1981) (describing six distinctive types of northern forest wetland communities, ranging from "lush" marshes "vibrant with life," to "cold, nutrient-poor" and "stingy" sphagnum bogs that support only a few specialized plant species).

³³⁶ See James F. Berry, *Ecological Principles of Wetland Ecosystems, in WETLANDS, supra* note 334, at 18, 55-60.

³³⁷ *Id.* at 55-56, 130.

³³⁸ See Farrier, *supra* note 2, at 377; see also Berry, *supra* note 336, at 57 (stating that, as of 1991, 43% of the species listed as endangered or threatened by the U.S. Fish and Wildlife Service were wetland dependent).

cleansing functions, and also provide aesthetic and recreational benefits.³³⁹

Yet, wetlands are among our most endangered ecosystems. Nearly half of the naturally occurring wetlands in the United States have already been lost and others have been seriously degraded, with the largest losses resulting from agricultural conversion.³⁴⁰ In coastal areas, however, the largest threat to wetlands is urbanization and open-water developments.³⁴¹ An estimated 75% of the wetlands in the lower forty-eight states are located on privately held land.³⁴²

1. *Clean Water Act*

The Clean Water Act³⁴³ generally prohibits discharging pollutants into the "waters of the United States" without a permit.³⁴⁴ Section 404 authorizes the Secretary of the Army, as the head of the Army Corps of Engineers, to issue permits for the "discharge of dredged or fill material into the navigable waters at specified disposal sites" under guidelines developed by the Environmental Protection Administration ("EPA").³⁴⁵ From this unremarkable language springs the nation's principal wetlands protection program.

³³⁹ See Dennison & Berry, *supra* note 334, at 8; R.K. Turner et al., *Wetland Valuation: Three Case Studies*, in BIODIVERSITY LOSS, *supra* note 24, at 129, 133.

³⁴⁰ See Berry, *supra* note 336, at 67. An estimated 87% of wetlands losses were due to agricultural conversion, 8% to urban development, and 5% to other land conversions. See Turner et al., *supra* note 339, at 130. From the mid-19th century until the 1980s, the federal government had an explicit policy of transferring what were considered "useless" lands to agricultural production. In many cases, the government approved and subsidized agricultural conversions of wetlands. See Dalana W. Johnson, *Saving the Wetlands from Agriculture: An Examination of Section 404 of the Clean Water Act and the Conservation Provisions of the 1985 and 1990 Farm Bills*, 7 J. LAND USE & ENVTL. L. 299, 299-300 (1992).

³⁴¹ See PLATT, *supra* note 247, at 437 fig.12-9 (indicating that the greatest losses to saltwater wetlands come from open water developments such as ports, canals, and marinas, and secondarily from urban uses, but freshwater wetland losses involve far larger acreage and are caused primarily by agricultural conversion); DAVID SALVESEN, WETLANDS: MITIGATING AND REGULATING DEVELOPMENT IMPACTS 3, 18-19 (1990). Many of our major cities, including New York, Boston, Washington, San Francisco, and Seattle, are built at least in part on converted wetlands. See *id.* at 1.

³⁴² See Farrier, *supra* note 2, at 311.

³⁴³ 33 U.S.C. §§ 1251-1387 (1994).

³⁴⁴ Section 301 prohibits the unlicensed "discharge of any pollutant by any person." *Id.* § 1311(a). Section 502 defines "discharge of a pollutant" as "any addition of any pollutant to navigable waters from any point source," *id.* § 1362(12)(A), and further defines "navigable waters" as "the waters of the United States." *Id.* § 1362(7).

³⁴⁵ *Id.* § 1344(a), (b). The EPA may veto a permit if it determines that the discharge "will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas . . . wildlife, or recreational areas." *Id.* § 1344(c). This veto power is rarely exercised. See Farrier, *supra* note 2, at 358 (stating that, as of mid-1994, the EPA had exercised its veto power only eleven times).

The Army Corps of Engineers,³⁴⁶ the EPA,³⁴⁷ and the courts³⁴⁸ have interpreted this provision broadly to require a permit for any dredging or filling of wetlands³⁴⁹ adjacent to navigable or interstate waters or their tributaries, as well as for any wetlands that could affect interstate commerce. The EPA's permit guidelines explicitly provide for ecosystem-level biodiversity conservation,³⁵⁰ but more importantly, the guidelines carry a general presumption against wetlands development. The Corps will not issue a permit if a less adverse "practicable alternative" is available,³⁵¹ or, even in the absence of such an alternative, if the development would contribute to "significant degradation" of jurisdictional waters.³⁵² Section 404 contains an important exemption for "normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, [and] harvesting,"³⁵³ but the statute expressly forbids bringing an area "into a use to which

³⁴⁶ See 33 C.F.R. § 328.3(a)(2), (3), (7) (1996).

³⁴⁷ The EPA develops the guidelines under which the Army Corps of Engineers issues section 404 permits. See 33 U.S.C. § 1344(b)(1); 40 C.F.R. pt. 230 (1996).

³⁴⁸ See *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 134 (1985) (holding that section 404 applies to wetlands adjacent to rivers). The Court left unanswered the question of whether the provision applies to so-called "non-adjacent" wetlands, such as prairie potholes, that are not adjacent to any navigable or interstate body of water. *Id.* at 131 n.8. In *Hoffman Homes, Inc. v. EPA*, 999 F.2d 256, 261 (7th Cir. 1993), the Seventh Circuit held that the use of isolated wetlands as habitat by migratory birds would bring them under § 404 coverage, but on the facts of the case determined that such a nexus had not been established. In *Leslie Salt Co. v. United States*, 55 F.3d 1388, 1394-96 (9th Cir. 1995), *cert. denied sub nom. Cargill, Inc. v. United States*, 116 S. Ct. 407 (1995), the Ninth Circuit upheld the reasonableness of the Corps' "migratory bird rule," under which even an isolated, man-made wetland is deemed to fall within the jurisdictional scope of section 404 wetlands regulations if it provides habitat to migratory birds.

³⁴⁹ The Corps defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." 33 C.F.R. § 328.3(b). Under this definition, wetlands delineators examine the hydrology, soil, and vegetation of a site to determine whether it is a wetland, but even highly qualified experts using standard definitions often disagree as to whether a particular site qualifies as a wetland. See, e.g., *Avoyelles Sportsmen's League, Inc. v. Marsh*, 715 F.2d 897, 917-18, 930-34 (5th Cir. 1983) (acknowledging that disagreement as to proper classifications of vegetation and soil types leads various government experts to disagree on wetland delineation, with estimates ranging from 60% to 100% of a 20,000 acre tract); Ralph W. Tiner, *Problem Wetlands for Delineation*, in *WETLANDS*, *supra* note 334, at 199 (describing practical and definitional problems wetlands delineators face).

³⁵⁰ 40 C.F.R. §§ 230.10(c), 230.11(e), 230.41(b) (1996); see also Farrier, *supra* note 2, at 355 (discussing the visibility of the ecosystem conservation perspective in the EPA Guidelines).

³⁵¹ 40 C.F.R. § 230.10(a). If the proposed development is not water-dependent, there is a rebuttable presumption that practicable alternatives (such as relocating the development to an alternative site, whether or not the developer owns such a site) are available. See *id.* § 230.10(a)(2), (3).

³⁵² Ruhl, *supra* note 2, at 605.

³⁵³ 33 U.S.C. § 1344(f)(1)(A) (1994).

it was not previously subject" unless a permit is obtained.³⁵⁴ Consequently, a new agricultural conversion of a wetland requires a permit.³⁵⁵

The Corps receives approximately fourteen thousand dredge-and-fill permit applications per year. Of these, only about five hundred are denied, with the remainder either granted, withdrawn, or categorically approved under "nationwide" or "general" permits³⁵⁶ without individual review because they are part of a class deemed to have minimal adverse impact.³⁵⁷ Proposed developments affecting larger areas or otherwise not qualifying for generic treatment undergo a case-by-case permit review process, with the Corps ultimately basing its decision on a broad, multifactor "public interest" balancing test.³⁵⁸ Contrary to popular impression, section 404 does not categorically prohibit wetlands developments; instead, it categorically allows those developments that fall into classifications deemed to have minimal adverse impact, strongly disfavors larger projects for which "practicable alternatives" exist, and selects among the rest through a highly discretionary, individualized permit determination. Although there is some dispute as to how effective section 404 has been in stemming the tide of wetlands conversions, the weight of the evidence suggests that

³⁵⁴ *Id.* § 1344(f)(2).

³⁵⁵ See, e.g., *Avoyelles Sportsmen's League, Inc. v. Marsh*, 715 F.2d 897, 925-26 (5th Cir. 1983) (holding that transformation of forest into soybean field was not a "normal farming activity" that would qualify for exemption under § 1344(f)); see also Johnson, *supra* note 340, at 304-05 and cases cited therein (discussing the application of the agricultural exemption in several cases).

³⁵⁶ The Corps may establish nationwide or regional general permits for categories of activities that are "similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment." 33 U.S.C. § 1344(e). There are currently 37 such Nationwide Permits ("NWP"). The most controversial of these is NWP 26, which until recently gave such generic treatment to all developments affecting up to 10 acres of "isolated" or "headwaters" wetlands. Critics charged that thousands of acres of wetlands were being lost annually through NWP 26 permits. See Mark S. Dennison & James F. Berry, *The Regulatory Framework, in WETLANDS*, *supra* note 334, at 213, 240. In December 1996, the Corps of Engineers issued a revised rule limiting NWP 26 to developments affecting up to three acres, and announced plans to phase out NWP 26 within a two-year period. See 61 Fed. Reg. 65,874 (1996).

³⁵⁷ See SALVESEN, *supra* note 341, at 8.

³⁵⁸ After determining whether there are "practicable alternatives," the Corps broadly weighs the benefits of a proposed development against its "reasonably foreseeable detriments," considering such factors as:

conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.

33 C.F.R. § 320.4(a) (1996).

the rate of conversions has slowed dramatically in recent decades.³⁵⁹ Effective or not, however, this section generates heated opposition from affected landowners. Even successful developers complain of the delay, cost, complexity, uncertainty, and arbitrariness of the individualized permit system, which often adds significantly to the development process.³⁶⁰

Mitigation requirements are another source of controversy. Landowners often complain that the Corps conditions its approval of permit requests on excessive mitigation requirements, disproportional to the adverse impact of a proposed development.³⁶¹ Environmentalists counter that the Corps is too lenient in allowing the loss of complex and irreplaceable naturally occurring wetlands in exchange for off-site mitigation projects, including restoration and creation of artificial wetlands with unproven ecosystem benefits—an approach they regard as scientifically unfounded.³⁶² In an effort to soften the regulatory burden and lend additional flexibility to the regulatory scheme, the Reagan, Bush, and Clinton administrations have all endorsed mitigation banking, which permits developers to purchase “credits” earned by public or private entities for wetland creation, restoration, or enhancement projects, and offset them against wetland losses that result from their proposed developments.³⁶³

2. *Swampbuster*

Under the “Swampbuster” provisions of the 1985,³⁶⁴ 1990,³⁶⁵ and 1996 farm bills,³⁶⁶ farmers who convert wetlands to crop production

³⁵⁹ See Farrier, *supra* note 2, at 360-61.

³⁶⁰ See VIRGINIA S. ALBRECHT & BERNARD N. GOODE, *WETLAND REGULATION IN THE REAL WORLD* 7 (1994); Margaret N. Strand, *Current Issues of Wetlands Law: The Search for Fairness*, C981 A.L.I.-A.B.A. 245 (1995) (citing alleged unfairness as a result of vague, unevenly applied, and shifting standards, as well as the length, cost, and uncertainty of the permit process, as causes of landowner criticisms of the section 404 program).

³⁶¹ Mitigation can include “creating, enhancing, preserving, restoring, buffering, and purchasing wetlands as well as contributing money to conservation groups.” ALBRECHT & GOODE, *supra* note 360, at 22. Albrecht and Goode found that in the 1993 fiscal year, mitigation projects affecting 1.31 acres were required for every one acre of adversely impacted wetlands. *Id.*

³⁶² See Farrier, *supra* note 2, at 368-70 (contending that since substitute wetlands are often unsuccessful, “[I]ittle is known about the extent to which restored or created wetlands will provide suitable habitat”); William W. Sapp, *Mitigation Banking: Panacea or Poison for Wetlands Protection*, 1 ENVTL. LAW. 99, 117-19 (1994) (citing environmentalist objections).

³⁶³ See Farrier, *supra* note 2, at 365-68; Michael G. Le Desma, *A Sound of Thunder: Problems and Prospects in Wetland Mitigation Banking*, 19 COLUM. J. ENVTL. L. 497, 498 (1994); Sapp, *supra* note 362, at 111 n.72.

³⁶⁴ Food Security Act of 1985, Pub. L. No. 99-198, 99 Stat. 1504.

³⁶⁵ Food, Agriculture, Conservation, and Trade Act of 1990, Pub. L. No. 101-624, 104 Stat. 3359.

³⁶⁶ Federal Agriculture Improvement and Reform Act of 1996, Pub. L. No. 104-127, 110 Stat. 888.

become ineligible for federal farm subsidies for any of their crops.³⁶⁷ To convert a wetland, a farmer generally must first receive a section 404 permit from the Army Corps of Engineers.³⁶⁸ The Swampbuster provision does not prohibit such conversions, which may legally proceed if properly permitted.³⁶⁹ However, Swampbuster does cut off all federal farm subsidies, including price supports, loans, and other payments, to anyone who converts a wetland "for the purpose, or to have the effect, of making the production of an agricultural commodity possible" on the converted land after 1990.³⁷⁰ Thus, not only is the converted wetland ineligible for federal farm subsidies, but so is all land cultivated by the person who converted the wetland. This ineligibility is permanent, unless the wetland is restored.³⁷¹ Although few enforcement actions have been taken under Swampbuster,³⁷² it remains a powerful deterrent to agricultural conversion.

However, the long-term viability of Swampbuster as a deterrent to wetland conversions is now in doubt, because the 1996 farm bill drastically alters farm subsidies, replacing traditional variable price supports with flat "market transition payments," which are not tied to commodity prices or production limits.³⁷³ These "transition payments" are intended to wind down agricultural commodity subsidies over a seven-year period, after which all agricultural production is expected to be carried out on a purely free-market, unsubsidized basis. The end of subsidies would, of course, eliminate the effectiveness of the Swampbuster provision, because farmers would no longer pay any

³⁶⁷ See 16 U.S.C. §§ 3801, 3821-3823 (1994).

³⁶⁸ See *supra* notes 353-55 and accompanying text.

³⁶⁹ Previous versions of the farm bill subjected farmers to Swampbuster penalties even if they had permits to convert wetlands under the Clean Water Act. That is no longer the case under the 1996 Farm Bill. Now, any wetland conversion that a Clean Water Act permit authorizes is exempt from Swampbuster penalties, provided the loss of wetlands functions and values is adequately mitigated. See 16 U.S.C. § 1322(f)(4) (1994); see also Lisa Moore, "Flexibility" Over Wetland Protection, 18 NAT'L WETLANDS NEWSLETTER, Nov.-Dec. 1996, at 7, 10-11 (discussing the application and implications of the exemption).

³⁷⁰ 16 U.S.C. § 3821(b). Note, however, that ineligibility is triggered only by conversion for purposes of agricultural commodity production. A farmer who converts a wetland for another purpose, such as to build a road or to subdivide for residential development, remains eligible for farm subsidies. See Farrier, *supra* note 2, at 339-40; Johnson, *supra* note 340, at 310. In addition, because "agricultural commodity" is defined as "any agricultural commodity planted and produced . . . by annual tilling of the soil," 16 U.S.C. § 3801(a)(1)(A), conversion to pasturage, hay, or other perennial crops is not prohibited. See Farrier, *supra* note 2, at 339 n.168; Anthony N. Turrini, *Swampbuster: A Report from the Front*, 24 IND. L. REV. 1507, 1510 (1991).

³⁷¹ See Johnson, *supra* note 340, at 309-10.

³⁷² See *id.* at 310; Turrini, *supra* note 370, at 1509-10. *But cf.* Farrier, *supra* note 2, at 340-41, 341 n.172 (questioning Swampbuster's effectiveness due to lax enforcement and the fact that two-thirds of all farms, representing half of farm acreage, receive no subsidies and therefore are not affected). Elsewhere, however, Farrier credits Swampbuster with dramatic reductions in conversions of wetlands to agricultural use. *Id.* at 361 & n.272.

³⁷³ See Stephen Blakely, *Seeds of Change for Farmers*, NATIONS BUS., Dec. 1996, at 42.

penalty for converting wetlands.³⁷⁴ In addition, the 1996 farm bill eliminated the government-imposed production restraints that previously accompanied many farm subsidy programs. Consequently, farmers can be expected to seek opportunities to expand their production by, among other things, converting additional lands, including wetlands. During the transition period, however, Swampbuster will likely retain its effectiveness.

3. *Wetlands Subsidy Programs*

The 1996 farm bill extends several important programs designed to offer financial subsidies (or "incentives") to farmers to retain and restore wetlands. Under the Conservation Reserve Program ("CRP"), the Department of Agriculture contracts with farmers to take land out of production and plant it in vegetative cover. In return, the government provides cost-sharing, technical assistance, and rental payments over a ten-year period.³⁷⁵ The statute and implementing regulations authorize the Department of Agriculture to enter into CRP agreements to prevent soil erosion, protect water quality, and provide wildlife habitats.³⁷⁶ Although the program is not specifically designed to conserve biodiversity,³⁷⁷ recent changes to the regulations have expanded eligibility for wetlands, filter strips, and riparian buffers to prevent soil runoff, and have placed protection of wildlife habitats on an equal footing with soil erosion and water quality as program objectives.³⁷⁸

Under the more narrowly targeted Wetlands Reserve Program, the government subsidizes farmers who restore wetlands converted to agricultural use prior to 1985. As in the CRP, the government may provide cost-sharing and technical assistance. In some cases, however, the government also purchases either permanent or thirty-year con-

³⁷⁴ Cf. Farrier, *supra* note 2, at 341 & n.172 (noting that Swampbuster has "no hold over landowners who do not grow [subsidy] program crops"); Turrini, *supra* note 370, at 1511 (stating that farmers who do not rely on price supports or other federal payments "can ignore Swampbuster altogether").

³⁷⁵ See 16 U.S.C. §§ 3831-44 (1994); 62 Fed. Reg. 7620-22 (1997) (to be codified at 7 C.F.R. §§ 1410.40-42); Johnson, *supra* note 340, at 314-15.

³⁷⁶ 16 U.S.C. § 3831(b); 62 Fed. Reg. 7618-19 (1997) (to be codified at 7 C.F.R. § 1410.31). The program's original purpose was to conserve soil and protect water quality by taking erodible land out of production and placing it under vegetative cover. As a result, it raises farmers' incomes by reducing agricultural commodity production, thus raising prices. See Farrier, *supra* note 2, at 330, 332.

³⁷⁷ See Farrier, *supra* note 2, at 330. The program does not require that the cover vegetation consist of native species, and in many cases farmers have planted non-native species that do not help restore native ecosystems. See *id.* at 332.

³⁷⁸ See Farm Serv. Agency & Commodity Credit Corp., U.S. Dep't of Agric., Conservation Reserve Program—Long-Term Policy, 62 Fed. Reg. 7602 (1997) (codified at 7 C.F.R. §§ 1410.6, 1410.31).

ervation easements to preserve the restored wetlands.³⁷⁹ Restoration plans must be approved by both the Department of Agriculture's Natural Resources Conservation Service (formerly the Soil Conservation Service) and the FWS, which evaluate proposals based on their wetland and wildlife benefits and their likelihood of success.³⁸⁰ The 1996 farm bill caps enrollment in the program at 975,000 acres, and directs the Secretary of Agriculture to maintain an equal balance between permanent easements, temporary (thirty-year) easements, and restoration-only cost-sharing agreements.³⁸¹

4. *Assessment of Federal Regulation of Private Land Use as a Biodiversity Conservation Strategy*

Neither the ESA nor the federal wetlands programs—individually or in the aggregate—amount to a coherent strategy for biodiversity conservation on private lands. Although these programs have salutary effects in conserving some valuable biological resources, the results are spotty: the programs selectively protect only a narrow range of species (those listed as “endangered” or “threatened”) and ecosystems (wetlands, especially larger wetland parcels and wetlands in agricultural districts), without attempting to be comprehensive or to set overall conservation priorities.³⁸² Moreover, because both the ESA and the section 404 wetlands program assign unquantified, but potentially very large and unequally distributed conservation costs to private parties under regulatory processes and criteria that often appear highly uncertain and arbitrary,³⁸³ these programs spark enormous controversy.³⁸⁴ Finally, because these regulatory programs are inherently prohibitory in nature, they can proscribe only activities thought to be harmful. They cannot, as a practical matter, compel or induce sound stewardship of biological resources.³⁸⁵

³⁷⁹ See 16 U.S.C. § 3837(a)(e); 7 C.F.R. § 1467.4 (1997).

³⁸⁰ See 16 U.S.C. § 3837(c); 7 C.F.R. §§ 1467.4(d)(2), 1467.6(b).

³⁸¹ 16 U.S.C.A. § 3837(b) (West Supp. 1997).

³⁸² See Farrier, *supra* note 2, at 391 (maintaining that although wetlands regulations do an adequate job of protecting wetlands, this is only one of many types of ecosystems worth protecting). The programs do set conservation priorities by default, of course. In effect, they say that wetlands are more deserving of protection than other threatened ecosystem types, and that species are only worthy of conservation measures when they are identified as already being at the brink of extinction.

³⁸³ See generally *supra* notes 88-109, 326-28 and accompanying text (discussing programs protecting endangered species); *supra* notes 349-60 and accompanying text (discussing programs protecting wetlands).

³⁸⁴ See Oliver A. Houck & Michael Rolland, *Federalism in Wetlands Regulation: A Consideration of Delegation of Clean Water Act Section 404 and Related Programs to the States*, 54 Md. L. Rev. 1242, 1243 (1995) (“Wetlands regulation may be the most controversial issue in environmental law.”); Ruhl, *supra* note 2, at 559-62.

³⁸⁵ See Farrier, *supra* note 2, at 389.

The farm bill wetland programs—Swampbuster and the Conservation Reserve and Wetlands Reserve Programs—offer important alternative approaches. These programs tie conservation objectives to subsidy payments, thus creating economic incentives for conservation. Swampbuster's incentive is a negative one: farmers must conform to Swampbuster's prohibition on wetlands conversion or lose farm program payments. Although Swampbuster merely makes federal subsidies conditional on wetland conservation, and is therefore voluntary because farmers are free to forego the subsidies if they regard the conditions as too onerous, the program appears to farmers as the functional equivalent of a prohibitory requirement with stiff financial penalties attached. Consequently, Swampbuster engenders the same kind of resistance as the ESA and the section 404 wetlands program.³⁸⁶ Furthermore, although Swampbuster is credited with helping reduce the rate of wetlands conversion, it is unlikely to serve as a model for categories of landowners not receiving such valuable federal subsidies as farmers. The scheduled termination of farm subsidies within the next few years compounds these shortcomings.³⁸⁷

By contrast, the Conservation Reserve and Wetlands Reserve Programs award direct subsidies on a competitive basis for voluntarily undertaken conservation-promoting investments and activities.³⁸⁸ Farmers warmly regard these subsidies as a positive incentive to conserve.³⁸⁹ The principal limitation on these programs is that they impose substantial direct costs on the United States Treasury, even at their presently modest scale.

IV

BIODIVERSITY CONSERVATION AND FEDERALISM

If habitat destruction through land conversion is the principal cause of biodiversity loss for terrestrial species, then biodiversity conservation policy will necessarily implicate land-use policy.³⁹⁰ However, in the United States, land use is traditionally a matter of state and local concern. It is governed in the first instance by the state common-law doctrines of public and private nuisance,³⁹¹ and, more re-

³⁸⁶ See Beth Baker, *After a Long Wait, an Environmental Farm Bill Passes Muster*, BIOSCIENCE, July 17, 1996, at 486; Keith Pins, *Farmers Drowned Out in Policy Debate? Those Surveyed Are Dissatisfied Saying They Have Little Say in the Formation of Farm Policy*, DES MOINES REG., Feb. 27, 1994, at 1 (47% of Iowa farmers surveyed say they want Swampbuster rules eased).

³⁸⁷ See *supra* note 373 and accompanying text.

³⁸⁸ See *Glickmon Announces Heavy Sign-Up for Reserve Program*, NAT'L J.'S CONGRESS DAILY, Mar. 19, 1997.

³⁸⁹ See Pins, *supra* note 386 (56% of Iowa farmers want CRP retained as is, and another 25% want it expanded).

³⁹⁰ See Houck & Rolland, *supra* note 384, at 1251; Tarlock, *Biodiversity Federalism*, *supra* note 2, at 1318, 1341.

³⁹¹ See DANIEL R. MANDELKER, *LAND USE LAW* § 4.02, at 100-02 (3d ed. 1993).

cently, by municipal zoning and related forms of land-use regulation authorized by state statute. State-level regulatory controls supplement these regulations to varying degrees.³⁹² The federal government has traditionally played only a minor role in regulating land use. The exception to this tradition is land owned by the government itself; under the Property Clause of the Constitution,³⁹³ the federal government has all the ordinary proprietary powers of a landowner, as well as plenary power as sovereign to regulate the use of its lands.³⁹⁴

In an earlier era, it may have been thought that land, being inherently and irrevocably fixed in its location, was not an article of interstate commerce, and was thus beyond the reach of Congress's Commerce Clause power.³⁹⁵ Later, the New Deal's jurisprudential revolution radically expanded the conception of the reach of the Commerce Clause.³⁹⁶ This culminated in the Supreme Court's adop-

³⁹² See *id.* § 1.01, at 1-2. All states authorize local governments to regulate land use through land-use planning and zoning. See *id.* at 1, § 4.16, at 113-14. Most also allow local governments to regulate for such specialized purposes as residential subdivision controls, see *id.* §§ 9.01 to .04, at 401-04, and historic preservation, see *id.* §§ 11.22 to .25, at 479-82. Many states undertake direct regulation at the state level to achieve specialized purposes such as protection of wetlands, coastal zone management, or agricultural land protection. See *id.* § 12.01, at 497-98. A smaller number of states engage in comprehensive state-level land-use planning, accompanied either by direct state regulation of land use or by state review of local regulations to ensure their consistency with state planning goals. See DANIEL R. MANDELKER ET AL., *PLANNING AND CONTROL OF LAND DEVELOPMENT* 865-82 (4th ed. 1995) (describing programs in Vermont, Florida, Oregon, Hawaii, and New Jersey, and listing Georgia, Maine, Rhode Island, and Washington as requiring state review of local land-use planning); see also FRED BOSSELMAN & DAVID CALLIES, *THE QUIET REVOLUTION IN LAND USE CONTROLS passim* (1972) (describing the growth of state-level land-use regulation in response to local regulation's inability to address state and regional problems such as the effects on ecosystems and extraterritorial pollution).

³⁹³ U.S. CONST., art. IV, § 3, cl. 2 ("The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States . . .").

³⁹⁴ See *Kleppe v. New Mexico*, 426 U.S. 529, 540 (1976) (holding that under the Property Clause, Congress exercises regulatory power over public lands that is complete, without limits, and "analogous to the police power of the several states") (quoting *Camfield v. United States*, 167 U.S. 518, 525 (1897)).

³⁹⁵ U.S. CONST., art. I, § 8, cl. 3 (stating that Congress is empowered "[t]o regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes"). Until the mid-1930s, courts held that the Commerce Clause empowered Congress to regulate the sale or transportation of goods across state lines, but not "purely local" activities occurring in a fixed location, such as mining, manufacturing, and agricultural production, even if the products of these "local" activities were subsequently sold or shipped in interstate commerce. See *Carter v. Carter Coal Co.*, 298 U.S. 238, 301-03 (1936); see also *Champlin Refining Co. v. Corporation Comm'n*, 286 U.S. 210, 235 (1932) (oil production is not interstate commerce); *Oliver Mining Co. v. Lord*, 262 U.S. 172, 178 (1923) ("Mining is not interstate commerce but, like manufacturing, is a local business."); *Crescent Cotton Oil Co. v. Mississippi*, 257 U.S. 129, 135 (1921) (owning and operating a cotton gin is not interstate commerce); *Browning v. Waycross*, 233 U.S. 16, 22 (1914) (erecting of lightning rods on houses is not interstate commerce).

³⁹⁶ See, e.g., *Wickard v. Filburn*, 317 U.S. 111, 128-29 (1942) (holding that the growing of wheat on private land solely for on-site consumption is subject to Commerce Clause

tion of highly deferential standards, under which it appeared that virtually any federal regulatory statute could withstand Commerce Clause challenge.³⁹⁷ Nonetheless, because the effects of land-use decisions were considered primarily local in nature, land-use regulation was left principally in the hands of state and local officials rather than federal authorities.³⁹⁸ Indeed, land use is perhaps the most important single power left to local governments.³⁹⁹

In the early 1970s, Congress and the Nixon Administration flirted briefly with the notion of expanding the federal role through a combination of positive and negative financial incentives to induce states to develop land-use plans.⁴⁰⁰ Nixon's proposed National Land Use Policy Act⁴⁰¹ would have required states to assume principal responsibility for land-use planning over "areas of critical environmental concern" and other lands and developments of regional or statewide significance.⁴⁰² The federal government would have awarded planning grants and, under some later versions, imposed stiff sanctions for non-compliance, including cutoffs of federal highway and airport funds.⁴⁰³ Thus, Congress would have acted under its spending power, a power even more expansive than that used to regulate interstate commerce

regulation); *NLRB v. Jones & Laughlin Steel Corp.*, 301 U.S. 1 (1937) (holding that labor relations in the steel industry are subject to Commerce Clause regulation).

³⁹⁷ See Ann Althouse, *Enforcing Federalism After United States v. Lopez*, 38 ARIZ. L. REV. 793, 798-99 (1996).

³⁹⁸ In the heyday of the New Deal, the National Resources Planning Board and its predecessors attempted to coordinate land-use planning by federal agencies, and to stimulate land use planning at the state and local levels, but these efforts did not extend to direct federal regulation of private land use. See Marion Clawson, *Land and Water Use Planning in the New Deal*, in *BEYOND THE URBAN FRINGE: LAND USE ISSUES OF NONMETROPOLITAN AMERICA* 273, 273-74 (Rutherford H. Platt & George Macinko eds., 1983).

³⁹⁹ Even state-level intervention in land-use regulation is often strongly resisted, both because municipal governments are fiercely protective of their power in this area, and because citizens may perceive the state government as too remote and unaccountable to be entrusted with decisions producing such profoundly local costs and benefits. See MANDELKER ET AL., *supra* note 392, at 863-65.

⁴⁰⁰ See Jayne E. Daly, *A Glimpse of the Past—A Vision for the Future: Senator Henry M. Jackson and National Land-Use Legislation*, 28 URB. LAW. 7 *passim* (1996) (describing competing proposals for national land-use legislation offered by Senator Jackson, the Nixon Administration, and others). Under the proposed legislation "it is not inaccurate to say that the land use policy of the federal government [would have been] that the states shall have a policy." ROBERT G. HEALY, *LAND USE AND THE STATES* 13 n.1 (1976).

⁴⁰¹ S. 992, 92d Cong. (1971).

⁴⁰² Daly, *supra* note 400, at 21 & nn.76-79. This would include both crucial public facilities like airports, highways, and major recreational facilities, as well as large-scale private developments affecting constituencies beyond the local jurisdiction. See *id.* The Nixon Administration offered their proposal as an alternative to a bill sponsored by Sen. Henry M. "Scoop" Jackson (D-Wash.)—a leading Democratic presidential contender—which would have required states to engage in comprehensive land-use planning extending to all areas of the state, not just "critical areas." See *id.* at 18-21, 23.

⁴⁰³ See *id.* at 21-22.

(if that is possible).⁴⁰⁴ In the end, however, Congress rejected this limited approach to federal intervention in land-use planning, largely because of concerns about excessive federal intrusion into state and local affairs.⁴⁰⁵ Congress considered land-use regulation to be no business of the federal government, whether or not the contemplated federal role was constitutionally permissible.

The dawning of the age of biodiversity conservation fundamentally challenges that notion. Biodiversity depends upon land use, and many important benefits of biodiversity conservation—or conversely, the costs of failing to conserve biodiversity—are not local, but are national,⁴⁰⁶ or even global,⁴⁰⁷ in scope. These costs and benefits include

⁴⁰⁴ See, e.g., *South Dakota v. Dole*, 483 U.S. 203, 207 (1987). The *Dole* court noted that, although not unlimited, Congress's power to spend in pursuit of the general welfare is broad and "is not limited by the direct grants of legislative power found in the Constitution." *Id.* (quoting *United States v. Butler*, 297 U.S. 1 (1936)). The *Dole* court thus concluded that "objectives not thought to be within Article I's 'enumerated legislative fields' may nevertheless be attained through the use of the spending power." *Id.* (citation omitted).

⁴⁰⁵ A compromise bill including elements of the Nixon Administration bill and Senator Jackson's alternative, *sans* sanctions and with drastically reduced funding for planning grants, passed the Senate in September, 1972, but the House never acted upon it. See Daly, *supra* note 400, at 27. A similar bill again passed the Senate early in the next session, but failed in the House after the White House suddenly reversed course and withdrew its support. See *id.* at 33-34. Conservative lawmakers apparently persuaded President Nixon that the bill raised serious federalism concerns, possibly of constitutional dimensions. See *id.* at 34 n.155.

⁴⁰⁶ See BROWN ET AL., *supra* note 5, at 45 ("[T]he net benefits of conservation are lowest for the local community and highest for the national and global community. Indeed, at the local level, net benefits may be negative, indicating that there is no local incentive to undertake land conservation."); Michael Wells, *Biodiversity Conservation, Affluence and Poverty: Mismatched Costs and Benefits and Efforts to Remedy Them*, AMBIO, May 1992, at 237, 237-41 (claiming that the benefits of biodiversity conservation are modest at the local level, higher at the national level, and highest at the global level). *But cf.* BEATLEY, *supra* note 4, at 206-08 (contending that biological reserves may incidentally produce many localized benefits, including preservation of open space and environmental amenities that make local communities more attractive and raise market values of neighboring private lands).

⁴⁰⁷ Arguably, an effective global biodiversity conservation regime is needed to prevent free-riding at the international level. See Timothy Swanson, *International Regulation*, in BIODIVERSITY LOSS, *supra* note 24, at 225, 252 (contending that biodiversity conservation at the national level will produce inefficiencies, as nations externalize the costs of suboptimal investment in conservation). *But cf.* Charles P. Kindleberger, *International Public Goods Without International Government*, in READINGS IN PUBLIC SECTOR ECONOMICS 222, 232 (Samuel H. Baker & Catherine S. Elliott eds., 1990) (discussing the differences between realists and institutionalist "regime" theorists). Kindleberger contends:

Realists maintain that international public goods are produced, if at all, by the leading power, a so-called "hegemon," that is willing to bear an undue part of the short-run costs of these goods, either because it regards itself as gaining in the long run, because it is paid in a different coin such as prestige, . . . or some combination of the two.

Id. Whether the United States undertakes the costs of biodiversity conservation as global hegemon or as a step toward establishing an effective global conservation regime is of little import here; if we want to protect biodiversity in the United States, the responsibility rests with the federal government.

the following: the benefits of pharmaceutical and agricultural products derived from naturally occurring genetic resources; the aesthetic benefits; the "option value" in preserving stocks of biological resources for yet-undreamed-of future uses; the "existence value";⁴⁰⁸ and the insurance value of diverse and healthy ecosystems as a prophylactic against, and reserve resource pool in the event of, catastrophic disturbances or "crashes" that could make human life immeasurably more difficult.⁴⁰⁹

While the benefits of biodiversity conservation are national or global in scope, the costs are locally concentrated.⁴¹⁰ This is because conserving biodiversity usually depends upon deferring, modifying, or foregoing the conversion of particular parcels of land.⁴¹¹ This does not require preventing land conversion and economic development entirely. However, it does require, in some cases, the steering of certain kinds of land uses to alternative locations where the adverse effects on valuable habitats and ecosystems are less severe. In other cases, it requires the modification of the nature and extent of land conversion to mitigate the damage to valuable biological resources. In either case, difficulties arise as development becomes more costly in some locations (and, in certain cases, prohibitively expensive), and locally beneficial developments are redirected from some localities to others.

This formula of global benefits and localized costs argues strongly against reliance on state or local land-use regulation (or, for that matter, private land use decisions by individual landowners) to conserve biodiversity.⁴¹² Despite biodiversity's global benefits, many biodiversity-rich landowners, communities, and states will calculate that they will be better off externalizing the costs of biodiversity by letting local land conversion and development proceed apace, while leaving the

⁴⁰⁸ The existence value of biodiversity consists in the psychic satisfaction we derive merely from knowing it exists, apart from any other benefit we might receive from it.

⁴⁰⁹ See *supra* note 5 (summarizing putative benefits of biodiversity).

⁴¹⁰ See BROWN ET AL., *supra* note 5, at 45 (noting that the costs of preserving biodiversity are greatest at the local level); Jeffrey A. McNeely, *Economic Incentives for Conserving Biodiversity*, in MANAGED LANDSCAPES, *supra* note 53, at 647, 650 ("The opportunity costs of conserving biodiversity are paid disproportionately by the people who live closest to the greatest biodiversity."); Wells, *supra* note 406, at 237-42, 241 tbl.3 (claiming that while national governments typically absorb the direct costs of maintaining biological reserves, the opportunity costs of foregone development fall locally, and the global beneficiaries of biodiversity conservation bear only de minimis costs).

⁴¹¹ See Wells, *supra* note 406, at 241 tbls.2, 3.

⁴¹² See Jacques LeBoeuf, *The Economics of Federalism and the Proper Scope of the Federal Commerce Power*, 31 SAN DIEGO L. REV. 555, 557-74 (1994) (arguing that federal regulation is justified only where state regulation would be inefficient due to the presence of significant positive or negative externalities); *id.* at 568-69 (claiming that rational local governments will underproduce public goods to the extent the benefits fall outside the jurisdiction).

costs of conservation to others.⁴¹³ Indeed, states and communities with the largest inventories of undisturbed habitat and ecosystems are probably the least inclined to protect them for two reasons. First, from a local perspective, these lands may appear to be an *overabundant* resource. Second, these localities may be reluctant to protect these resources because they would carry a disproportionate share of the localized costs of conservation if they must forego development on a disproportionate percentage of their lands.⁴¹⁴

Economists have long argued that one of the principal advantages of our federal system, with its three tiers of federal, state, and local governments, is that it allows us to match responsibility for producing public goods with the territorial scope of the benefits thereby provided, on the theory that this division will result in a more efficient allocation of these goods.⁴¹⁵ More localized tiers of governmental authority—states and municipalities—are likely to underprovide public goods, if the costs will be borne locally, but many (perhaps most) of the benefits will flow to persons outside the jurisdiction.⁴¹⁶ Thus, the federal government should maintain the Grand Canyon, which provides aesthetic and recreational benefits to a national population, while the local government should maintain a local park benefiting primarily local residents. Of course, our three-tiered governmental structure is not perfect. Given only three levels of government from which to choose, there will be many mismatches between the scale of government and the geographical scope of the public good provided.⁴¹⁷ Additional mismatches may be created by constitutional lim-

⁴¹³ See John Baden, *A Primer for the Management of Common Pool Resources*, in *MANAGING THE COMMONS* 137, 140 (Garrett Hardin & John Baden eds., 1977) (discussing free-rider problems in the context of public goods and management of common pool resources); Tarlock, *Biodiversity Federalism*, *supra* note 2, at 1336-37 (suggesting that state and local officials are even less likely to act to protect "intangible values" like biodiversity than more immediate and localized benefits like public health effects of air and water pollution).

⁴¹⁴ See Houck & Rolland, *supra* note 384, at 1253 (making a similar point in the context of wetlands regulation).

⁴¹⁵ See, e.g., DAVID N. KING, *FISCAL TIERS: THE ECONOMICS OF MULTI-LEVEL GOVERNMENT* 14-20 (1984); MICHAEL WELLS & KATRINA BRANDON, *PEOPLE AND PARKS: LINKING PROTECTED AREA MANAGEMENT WITH LOCAL COMMUNITIES* 60-65 (1992); Wallace E. Oates, *An Economic Approach to Federalism*, in *READINGS IN PUBLIC SECTOR ECONOMICS*, *supra* note 407, at 554, 561-64; LeBoeuf, *supra* note 412, at 557-65. Cf. Henry N. Butler & Jonathan R. Macey, *Externalities and the Matching Principle: The Case for Reallocating Environmental Regulatory Authority*, 14 *YALE L. & POL'Y REV.* Symposium Issue 23, 53 (1996) (arguing that environmental regulation is most likely to be efficient when "regulatory authority . . . go[es] to the political jurisdiction that comes closest to matching the geographic area affected by a particular externality").

⁴¹⁶ See Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 *MICH. L. REV.* 570, 587 (1996) (describing "structural mismatches" that occur when "the regulator ignores the potential welfare gains of the extrajurisdictional beneficiaries," and consequently "too little of the public good is provided").

⁴¹⁷ See RICHARD A. MUSGRAVE & PEGGY B. MUSGRAVE, *PUBLIC FINANCE IN THEORY AND PRACTICE* 445-46 (5th ed. 1989); Gordon Tullock, *Federalism: Problems of Scale*, 6 *PUB. CHOICE*

itations on the distribution of decisionmaking authority, which may not map perfectly onto the efficient production of public goods.⁴¹⁸ Finally, public choice theorists would add that the supply of public goods may not match demand, due to scarce or distorted information, the distorting effects of governmental decisionmaking procedures, and individual and institutional incentives of governmental decisionmakers and bureaucracies.⁴¹⁹ Nevertheless, the economists' insight strongly suggests that the federal government should be charged with the primary responsibility of ensuring biodiversity conservation.⁴²⁰

How, then, to do the job? Some have suggested direct federal regulation of land use, building on the limited prototypes already in place—the ESA and the federal wetlands programs. Although the ESA currently falls far short of a comprehensive biodiversity conservation policy, some commentators have suggested that its underlying regulatory model is sound enough, if broadened to become something like an Endangered Ecosystems Act⁴²¹ or a Representative Ecosystems Act,⁴²² to prohibit adverse modification of protected ecosystems or ecosystem types.

The section 404 wetlands program offers an alternative prototype.⁴²³ In contrast to the ESA, which generally prohibits any action

19, 25 (1969) (stating that perfect fiscal federalism would require “a genuinely Rube Goldberg arrangement in which the individual citizen would be a member of a vast collection of governmental units, each . . . dealing with a separate activity”).

⁴¹⁸ See Oates, *supra* note 415, at 563-64 (stating that constitutional constraints may not match decisionmaking authority with “representatives of the interests of the proper geographical subsets of society”). *But cf.* William N. Eskridge, Jr. & John Ferejohn, *The Elastic Commerce Clause: A Political Theory of American Federalism*, 47 VAND. L. REV. 1355, 1395-97 (1994) (stating that the historical pattern of Supreme Court dormant Commerce Clause decisions implicitly embraces “efficiency norms” limiting states’ ability to externalize costs).

⁴¹⁹ See James M. Buchanan, *Public Finance and Public Choice*, in READINGS IN PUBLIC SECTOR ECONOMICS, *supra* note 407, at 38, 45-47.

⁴²⁰ See Tarlock, *Biodiversity Federalism*, *supra* note 2, at 1336-37 (biodiversity protection, which requires “partial subordination of immediate human demands” to achieve broader, longer-term, and more abstract ecological objectives, is likely to face intense resistance at the state and local levels where more immediate and localized concerns predominate); *id.* at 1322 (national government must play the central role in articulating biodiversity protection goals, with implementation by all levels of government). In addition, because state and local political boundaries are often mismatched with ecosystem boundaries, fragmented regulatory authority may impede efficient production of biodiversity protection. See Tarlock, *Local Biodiversity*, *supra* note 2, at 557-58.

⁴²¹ See, e.g., Julie B. Bloch, *Preserving Biological Diversity in the United States: The Case for Moving to an Ecosystems Approach to Protect the Nation’s Biological Wealth*, 10 PACE ENVTL. L. REV. 175, 217-22 (1992) (proposing an Ecosystems Protection Act modeled on the ESA); C.E. Hunt, *Creating an Endangered Ecosystems Act*, ENDANGERED SPECIES UPDATE, NOS. 3-4, 1992, at 1-5.

⁴²² See Doremus, *supra* note 5, at 318-24 (proposing Representative Ecosystems Act). Doremus would protect “representative” examples of ecosystem types, whether or not the type or the particular ecosystem had already reached endangered status. *Id.*

⁴²³ See *supra* notes 346-72 and accompanying text.

adversely affecting a listed species, section 404 imposes a permitting requirement, with permit decisions made on a case-by-case basis. Conceivably, the federal government could expand this model to include ecosystems other than wetlands. The federal government could delineate *particular* ecosystems for this kind of protection, or could afford protection to designated *types* of ecosystems.⁴²⁴

There are good reasons to be skeptical of these kinds of direct federal regulatory approaches, not only for the pragmatic reason that both the ESA and section 404—the first, limited steps toward federal land-use regulation—have encountered intense local opposition.⁴²⁵ In the first place, the Supreme Court's recent decision in *United States v. Lopez*⁴²⁶ appears to open the door to a fundamental rethinking of Commerce Clause doctrine⁴²⁷ and arguably calls into question Congress's power to regulate private land use. *Lopez* struck down a federal statute prohibiting firearms possession near schools, an activity the Court said was not "commerce" and did not "substantially affect" interstate commerce.⁴²⁸ Although federal environmental regulation is now part of our basic governmental architecture and has long been assumed to be a valid exercise of the Commerce power,⁴²⁹ it might be argued that neither biodiversity nor land-use is inherently "commercial." Land is, of course, routinely bought and sold in commerce (as are guns), but just as the Gun-Free School Zones Act sought to regulate the *use* of guns rather than *commerce* in them, so land-use regulations are directed at the *use* of land, not *commerce* in it. Although some uses of land are commercial (as are some uses of guns), land-use regulations—such as those prohibiting conversions of wetlands or destruction of valuable habitats—typically apply whether or not the land is put to commercial use.⁴³⁰ Just as the Gun-Free School Zones Act was

⁴²⁴ Cf. Cole, *supra* note 88, at 378 (proposing Federal Land Use Act under which federal authorities would engage in comprehensive land-use planning and permitting aimed at protecting ecosystems and habitat).

⁴²⁵ See *supra* note 384 and accompanying text.

⁴²⁶ 514 U.S. 549 (1995).

⁴²⁷ See, e.g., Althouse, *supra* note 397. But see Donald H. Regan, *How to Think About the Federal Commerce Power and Incidentally Rewrite United States v. Lopez*, 94 MICH. L. REV. 554, 563-70 (1995) (concluding that *Lopez* does not signal a major shift in Commerce Clause doctrine).

⁴²⁸ *Lopez*, 514 U.S. at 558-62. The Court recognized two other categories of legitimate exercises of the Commerce Clause power—regulations to protect the "channels of commerce," and regulations to protect "instrumentalities of interstate commerce, or persons or things in interstate commerce." *Id.* at 558-59.

⁴²⁹ See, e.g., *Hodel v. Virginia Surface Mining & Reclamation Ass'n*, 452 U.S. 264, 282 (1981) (upholding the Surface Mining Control and Reclamation Act and agreeing with lower federal courts which had "uniformly found the power conferred by the Commerce Clause broad enough to permit congressional regulation of activities causing air or water pollution, or other environmental hazards that may have effects in more than one State").

⁴³⁰ Under the Endangered Species Act, for example, I am prohibited from destroying the habitat of a nesting pair of bald eagles whether I do it for the commercial purpose of

held to be fatally flawed because it did not distinguish between possession of a handgun in the course of commercial activity and possession in noncommercial activities,⁴³¹ so one might also argue that Congress may not enact land-use regulations applying to noncommercial uses of land.

Lopez recognizes, of course, that even a noncommercial activity may be regulated if it "substantially affects" interstate commerce.⁴³² Would federal land-use regulations that protect biodiversity pass that test? Biodiversity is a valuable public good that produces a variety of national benefits, some of them of a commercial character. However, it is not altogether clear that these commercial benefits would provide a sufficient nexus to appease the *Lopez* Court.⁴³³ If the derivative commercial benefits of education are too remotely linked to interstate commerce to justify federal regulation of the localized, noncommercial activity of possessing a gun near a school, it might be plausibly argued that the derivative commercial benefits of biodiversity are similarly too remote to justify federal regulation of noncommercial uses of land.⁴³⁴

building a shopping center, or for the noncommercial use I plan to make of the land for my own aesthetic enjoyment. Compare *Marbled Murrelet v. Babbitt*, 83 F.3d 1060 (1996) (habitat modification by commercial logging is a "taking") with *Palila v. Hawaii Dep't of Land and Natural Resources*, 639 F.2d 495 (9th Cir. 1985) (habitat modification by noncommercial maintaining of feral goats and sheep is a "taking"). ESA makes it unlawful for "any person" to "take" listed wildlife, 16 U.S.C. § 1538(a) (1994), i.e., to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" it, *id.* § 1532(19), making no distinction between commercial and noncommercial versions of those prohibited activities. Nor does the regulation extending "harm" to include habitat modification draw such a distinction. See 50 C.F.R. § 17.3 (1996); 46 Fed. Reg. 54,748 (1981).

⁴³¹ See *Lopez*, 514 U.S. at 561.

⁴³² *Id.* at 558-69.

⁴³³ See *id.* at 563-65.

⁴³⁴ This line of argument potentially calls into question a great deal of federal environmental law. In general, environmental regulations are aimed not at commerce per se, but at the externalized social costs and benefits (positive and negative externalities) of polluting activities, whether the activities are commercial or noncommercial. See William Tucker, *Marketing Pollution*, in READINGS IN PUBLIC SECTOR ECONOMICS, *supra* note 407, at 101, 101-02. For example, although much of the worst air pollution comes from industrial (and therefore "commercial") sources, most provisions of the Clean Air Act apply whether or not the polluting activity is "commercial." Because there ordinarily are no markets or "commerce" in these pollution externalities, they cannot provide the requisite commercial nexus. Nor are the benefits of such regulations themselves primarily "commercial." See Larry E. Ruff, *The Economic Common Sense of Pollution*, in READINGS IN PUBLIC SECTOR ECONOMICS, *supra* note 407, at 88, 89-91 ("Pollution control is for lots of things: breathing comfortably, enjoying mountains, swimming in water, for health, beauty, and the general delectation.") Regulation of air pollution, for example, is justified primarily on the grounds that it protects public health, a public good which, like biodiversity and education may produce derivative commercial benefits, but may itself not count as "commerce."

Another important dimension to the *Lopez* case is the notion of "areas of traditional state concern."⁴³⁵ *Lopez* turns on the following *reductio ad absurdum*: if the Gun-Free School Zones Act is deemed a legitimate Commerce Clause regulation by virtue of the derivative commercial benefits of education or the derivative commercial costs of crime, then *any* exercise of federal power affecting crime or education can be similarly justified, along with any federal action affecting any other area of traditional state concern.⁴³⁶ That would make the Commerce Clause a power of truly unlimited reach. But this cannot be so, because it is axiomatic that our national government is one of limited powers. Consequently, there must be some areas of traditional state concern beyond the reach of the Commerce Clause, and that clause, to remain a limited power, cannot sweep so broadly as to include this statute. *Lopez* thus teaches that courts must be especially careful to prevent federal intrusion into areas of traditional state concern, except when there is a clearly demonstrated commercial nexus justifying the federal intervention. By the same logic, courts may be especially solicitous of state (and, by delegation, local) power over land use, traditionally a matter of state and local concern.⁴³⁷

It is, of course, too early to tell whether *Lopez* will be given such an expansive reading⁴³⁸ and whether even a broad reading of *Lopez* would prove an insurmountable barrier to direct federal regulation of land use to achieve biodiversity conservation. That might depend on the exact nature of the regulations adopted, as well as the justifica-

⁴³⁵ *Lopez*, 514 U.S. at 583 (Kennedy, J., concurring). The phrase appears in Justice Kennedy's concurrence, but Chief Justice Rehnquist's majority opinion expresses a similar idea when it says that the Gun-Free School Zones Act intrudes on "areas such as criminal law enforcement or education where States historically have been sovereign." *Id.* at 564. *Lopez* thus revives a concept that many thought the Court had abandoned in *Garcia*. See *Garcia v. San Antonio Metro. Transit Auth.*, 469 U.S. 528, 549-50 (1985) (overruling *National League of Cities v. Usery*, 426 U.S. 833 (1976), which had held that a federal statute intruding on a "traditional area of state concern" was invalid under the 10th Amendment).

⁴³⁶ *Lopez*, 514 U.S. at 564.

⁴³⁷ *But cf. Hodel v. Virginia Surface Mining & Reclamation Ass'n*, 452 U.S. 264, 275-76 (1981) (rejecting claim by coal producers that Surface Mining Control and Reclamation Act was a land-use regulation, thus "within the inherent police powers of the States and their political subdivisions" and not subject to Commerce Clause regulation). *Hodel* was, of course, a pre-*Lopez* case, but even under *Lopez*, courts could easily find the requisite commercial nexus in a statute regulating coal mining—a commercial activity involving the production of "a commodity that moves in interstate commerce." *Id.* at 281. The *Hodel* Court did, however, offer an alternative Commerce Clause rationale that might prove more questionable post-*Lopez*: the Court stated that the Commerce Clause authorizes Congress to regulate interstate pollution and other environmental hazards—apparently even in the absence of any other commercial nexus. *Id.* at 282.

⁴³⁸ Four Justices dissented in *Lopez*, and of the five-member majority, Justice Kennedy, joined by Justice O'Connor, wrote separately to emphasize that the holding was "limited." *Lopez*, 514 U.S. at 568 (Kennedy, J., concurring). Nonetheless, while Justice Kennedy's concurrence differs in emphasis, he accepts the core logic of Chief Justice Rehnquist's argument for the majority, which Justice Kennedy himself joined.

tions offered for them. For example, regulations expressly aimed at protecting genetic diversity in order to promote interstate commerce in pharmaceutical, agricultural, and other biotechnology products might pass muster under even the most expansive reading of *Lopez*. Alternatively, under a narrower reading of *Lopez*, regulations applicable only to commercial uses of land might also survive, even if aimed at broader ecological goals encompassing noncommercial as well as commercial benefits.

However, even if direct federal land-use regulation could pass constitutional muster, there are reasons to be concerned about the rigidities and inefficiencies of sweeping, uniform federal controls on land use. The literature is replete with tales of the inherent inefficiencies of command-and-control regulation, which some of these proposals contemplate.⁴³⁹ But even where command-and-control rigidity is evaded through case-by-case permitting or market-based regulatory schemes, vast geographical and metaphorical distances separate Washington bureaucrats from the local contexts in which land-use decisions are typically made, and where their consequences, at least on the cost side, are most keenly felt. Arguably, such decisions are so inherently context-sensitive that in a nation as vast and diverse as ours, centralized agencies are not well-situated to make them.⁴⁴⁰ Also, in most cases, federal land-use controls would be an "add-on" to an already tangled web of land-use regulations that state and local authorities are unlikely to surrender, both because state and local governments would be disinclined to abdicate so much power and because the regulations serve critical state and local governmental interests that federal biodiversity protection regulations would not address.⁴⁴¹ As a result, developers would face two or even three tiers of land-use regulation. The cumulative, and potentially conflicting or redundant, permitting requirements could dramatically increase development

⁴³⁹ See, e.g., Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1334-40 (1985) (describing the inefficiencies of command and control strategies in the context of the Clean Air and Clean Water Acts).

⁴⁴⁰ Cf. LeBoeuf, *supra* note 412, at 563-65 (pointing out that the advantages of local government include greater sensitivity to costs of government action, greater accountability on the part of public officials, and heightened levels of political participation at the local level). For similar reasons, there is resistance in many states even to state-level intrusion into land-use regulation, which is regarded as properly a local matter. See *supra* note 399.

⁴⁴¹ See MANDELKER, *supra* note 391, §§ 1.01 to .10, at 1-9 (providing an overview of typical state and local land-use control measures and the purposes they putatively serve). For example, federal biodiversity regulations would not address a local community's interest in controlling local negative land-use externalities by separating "incompatible" land uses in a zoning scheme, nor would it likely be practical to administer both local zoning and federal biodiversity regulations in a unified administrative process. Consequently, a developer would be required to comply with two sets of regulations, through separate administrative processes.

costs.⁴⁴² Finally, if biodiversity conservation costs are mostly local, then direct federal regulation could have potentially enormous redistributive consequences among localities. Even if federal land-use regulation were to have relatively modest implications for the federal budget,⁴⁴³ it would place conservation costs squarely on those communities and those landowners who happen to be currently providing biodiversity benefits to the rest of us, free of charge.

If direct federal regulation is too rigid, costly, and unfair, one commentator has suggested that we replace it with a revived version of the old Nixon-era cooperative-federalism approach, in which the federal government would structure incentives to induce states to plan for biodiversity conservation.⁴⁴⁴ Under this proposal, states would inventory and nominate biological zones worthy of special management protection and submit management plans to the federal government for approval.⁴⁴⁵ States would be responsible for implementing the plans, with the federal role limited to (noncoercive) coordination, oversight, and matching-share financing.⁴⁴⁶

A model of this approach is the Coastal Zone Management Act ("CZMA"),⁴⁴⁷ under which the federal government approves grants to the states to develop and implement state-level land-use plans to protect coastal resources, including biological resources as well as, for example, scenic and recreational values.⁴⁴⁸ The CZMA has been rightly criticized as producing dramatically inconsistent results.⁴⁴⁹ Most coastal states participate in coastal zone management planning, and,

⁴⁴² Developers subject to federal wetlands or endangered species regulations already face this problem. Under the Clean Water Act section 404 wetlands regulations, for example, federal permitting decisions come only after the developer has secured all necessary state and local approvals. See Houck & Rolland, *supra* note 384, at 1253; see also Ronald J. Rychlak, *Coastal Zone Management and the Search for Integration*, 40 DEPAUL L. REV. 981, 996 (1991) (recounting that a Connecticut landowner found he needed thirteen separate federal, state, and local permits to build a floating restaurant in a coastal zone, but because some permits expired before others were granted, the process stretched on for years. The owner died before successfully assembling all necessary permits.).

⁴⁴³ More likely, however, a large new federal bureaucracy would be needed to identify appropriate areas for regulation, draw up detailed and context-specific regulations, enforce them, process and adjudicate tens of thousands of applications for development permits, and defend its actions against the inevitable welter of legal challenges.

⁴⁴⁴ See Ruhl, *supra* note 2, at 661-71 (proposing a Biological Resources Zone Management Act).

⁴⁴⁵ See *id.* at 662-65.

⁴⁴⁶ See *id.* at 665-71.

⁴⁴⁷ 16 U.S.C. §§ 1451-1464 (1994).

⁴⁴⁸ See generally Rychlak, *supra* note 442, at 984-90 (discussing the legislative scheme of the CZMA and the various considerations that states take into account). Under the CZMA, states are awarded grants to be applied towards the cost of preparing a Coastal Management Plan, 16 U.S.C. § 1454, and the cost of implementing the plan, *id.* § 1455.

⁴⁴⁹ See generally Oliver A. Houck, *Ending the War: A Strategy to Save America's Coastal Zone*, 47 MD. L. REV. 358 (1988) (arguing that to preserve coastal environments, "we need to recognize the limitations of the approaches on which we currently rely," including the

as a result, coastal resources have probably been afforded greater protection than they might have received in the absence of the federal Act.⁴⁵⁰ However, goals, plans, standards, and the effectiveness of implementation vary widely,⁴⁵¹ depending upon how highly each state values its coastal environmental resources. This pattern of inconsistency can only be expected to be greater in the case of biodiversity conservation. Unlike coastal resources, which largely benefit the coastal state, biodiversity benefits are more likely to be external to the state hosting critical biological resources. Consequently, there would be a greater temptation to “free-ride” on others’ conservation efforts while foregoing one’s own conservation costs. It may be possible to improve upon the CZMA model by requiring state participation and setting mandatory minimum standards.⁴⁵² However, the further one goes down that road, the more closely the program resembles direct federal regulation, with all its pathologies.⁴⁵³

This Article suggests a radically different approach—federal ownership, not regulation of private land uses, should be the centerpiece of our national biodiversity conservation strategy. This approach may sound a bit contrarian in an age in which we are told that the “era of big government is over”⁴⁵⁴ and where, in many other areas, state governments are rapidly gaining more power. But by resting biodiversity protection principally on the management of federally owned land, this proposal would substantially defer to the traditional prerogatives of states and local governments to regulate private land uses.

CZMA); Rychlak, *supra* note 442, at 990 nn.49-50, 991, 994-95 (noting the mixed reviews that have accompanied the CZMA and certain troublesome areas of the Act).

⁴⁵⁰ See Rychlak, *supra* note 442, at 987-88, 988 n.36, 990 nn.49-50, 991.

⁴⁵¹ See MANDELKER ET AL., *supra* note 392, at 836 (state CZMA programs vary widely, ranging from Rhode Island’s “networked” program, which introduces no new legislative or regulatory authority, to California’s comprehensive coastal zone planning and regulatory program); David W. Owens, *National Goals, State Flexibility and Accountability in Coastal Zone Management*, 20 *COSTAL MGMT.* 143 (1992) (state programs vary so widely that comparisons and evaluations of program effectiveness are nearly impossible).

⁴⁵² Over time, federal dissatisfaction with the states’ performance under the CZMA has led to more intrusive federal standard-setting, much to the condemnation of local and state governments, which see the expanding federal role as interfering with their power over land use and betraying the original conception under which the federal role was to be limited to coordination and funding. See Rychlak, *supra* note 442, at 1001-05.

⁴⁵³ Most major federal environmental statutes embrace cooperative federalism, at least formally. See Robert V. Percival, *Environmental Federalism: Historical Roots and Contemporary Models*, 54 *MD. L. REV.* 1141, 1174 (1995) (stating that cooperative federalism is the “predominant” model in environmental statutes; federal agencies typically set national standards which states may elect to administer and enforce subject to federal supervision). To regulated parties and to many states, however, the federal statutes often appear rigid, demanding, and uniformly burdensome, while from the federal perspective, the quality of state administration is uneven and often inadequate. See *id.* at 1175.

⁴⁵⁴ Alison Mitchell, *Clinton Offers Challenge to Nation, Declaring, ‘Era of Big Government Is Over,’* *N.Y. TIMES*, Jan. 24, 1996, at A1 (quoting President Clinton’s State of the Union address).

Of course, federal land management is hardly uncontroversial, and raises its own federalism concerns. Many Westerners, and in particular those in communities dependent upon surrounding federal lands, view the federal government as a gargantuan, insensitive, and heavy-handed absentee landlord that controls vast resources of great value to local communities, but manages them for the benefit of some amorphous and shifting "national interest," which in practice means the interests of federal bureaucrats and distant, affluent, and principally Eastern environmentalists.⁴⁵⁵ Federal ownership does not eliminate the problem of balancing global or national benefits against the local costs of foregoing development and commodity exploitation, but simply displaces it to another arena. The notion that additional areas of federal land, including areas now open to commodity exploitation, should be "locked up" for biodiversity conservation purposes is almost certain to meet with stiff resistance in some quarters. However, the proposal outlined here also recommends a shift in both the geographic concentration and core purpose of federal lands management. This would free some of the most commercially valuable Western lands from federal control. In return, other biologically valuable lands, likely to be located in regions where there is now less federal presence, would be acquired. This approach also lays the groundwork for more explicit social cost-accounting, requiring federal land managers to balance the costs of biodiversity conservation against its benefits. To achieve overall biodiversity conservation objectives, federal land managers would need to ask, with respect to each parcel of federal land, whether it is best kept for biodiversity conservation or, to the contrary, whether it is so commercially valuable that we are better off disposing of it and using the proceeds to acquire more environmentally important lands.

Certainly, not all local communities would come out "winners" in this process. In areas of high biodiversity conservation value, commodity production would be curtailed. In some cases, that loss might be offset by ancillary economic benefits such as a growth in tourism or an enhancement in the value of neighboring private lands due to the

⁴⁵⁵ See CAWLEY, *supra* note 33, at 89-91; Hungerford, *supra* note 34, at 458-60 (describing widespread belief among Wise Use movement adherents that federal land managers are "power and money hungry bureaucrats" whose interests are antithetical to the economic well-being of Western citizens and communities). The West versus East characterization miscasts the conflict, however, as it ignores the important and growing role of Western environmentalists and recreational users of federal lands. See William E. Riebsame, *The Changing West*, ENV'T, May 1996, at 8 (stating that "New Westerners," largely immigrants from other regions employed in the rapidly growing service economy, tend to favor environmental protection, aesthetic amenities, and recreational uses of public lands, and disfavor traditional commodity-producing uses such as mining, ranching, and timber production).

recreational and aesthetic benefits of nearby conservation areas.⁴⁵⁶ Nonetheless, the transition will often be painful and there will be long-term distributional consequences.⁴⁵⁷ Overall, however, this scheme is broadly consistent with federalism concerns—it leaves the most important land use regulatory power in the hands of states and localities, and asserts within that framework the federal government's undeniable right as property owner to choose to forego development and leave its land intact to provide broad public benefits.

Moreover, this approach is on firm constitutional footing, even if the Supreme Court radically curtails the federal government's Commerce Clause powers in the next few years, as some have suggested *Lopez* portends.⁴⁵⁸ First, even if the Constitution prohibits direct federal regulation of land use due to an absence of the requisite interstate commercial nexus, surely the protection of biodiversity—a public good producing universal benefits—is aimed at “provid[ing] for the . . . general Welfare,”⁴⁵⁹ and Congress may spend to acquire and manage lands for that purpose. Second, the federal courts have consistently held that the Article IV “Property Clause” not only gives the federal government all the proprietary powers of an ordinary landowner, but also gives it the powers of a sovereign over federal lands, notwithstanding state law to the contrary.⁴⁶⁰ Surely this power includes the ability to manage federally owned lands to produce and protect biodiversity and the multiple benefits associated with it.

V

BIODIVERSITY AND TAKINGS

Any ambitious governmental effort to protect biodiversity by regulation of private landowners will face challenges under the “Takings

⁴⁵⁶ See Raymond Rasker, *A New Look at Old Vistas: The Economic Role of Environmental Quality in Western Public Lands*, 65 U. COLO. L. REV. 369, 378-80 (1994); Riebsame, *supra* note 455 (explaining that, in general, Western counties with the greatest proportion of federal lands have grown faster than others, and those with designated wilderness areas grew the fastest of all, in part because new immigrants are attracted by aesthetic and recreational benefits of public lands).

⁴⁵⁷ The federal government could, of course, compensate for these losses by providing transition assistance in the form of job retraining, business loans, and special infrastructure projects to affected communities. The government could also consider long-term payments, in lieu of taxes, to communities adversely affected by the removal of lands, jobs, and commodity-producing businesses from the local tax base. These forms of assistance would, of course, add substantially to the costs of the program.

⁴⁵⁸ See generally Althouse, *supra* note 397, at 816-23 (discussing the benefits of a more scrutinizing Commerce Clause analysis and concluding that *Lopez* should lead to a renewed emphasis on federalism concerns).

⁴⁵⁹ U.S. CONST. art. 1, § 8, cl. 1; see *supra* note 404 and accompanying text (noting that the spending power, although not unlimited, is broad and not confined by the limitations of the Commerce Clause).

⁴⁶⁰ See, e.g., *Kleppe v. New Mexico*, 426 U.S. 529, 535-41 (1976); *Camfield v. United States*, 167 U.S. 518, 523-28 (1897).

Clause” of the Fifth Amendment,⁴⁶¹ which flatly provides: “[N]or shall private property be taken for public use, without just compensation.”⁴⁶² This clause “was designed to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole.”⁴⁶³ As commentators have pointed out, the Takings Clause was originally thought to require compensation only when the government physically seized or occupied such tangible property as land or slaves.⁴⁶⁴ Government regulation of the uses of private property, on the other hand, was regarded as beyond the scope of Takings Clause protection. Nevertheless, in 1922, Justice Oliver Wendell Holmes announced for the Supreme Court in *Pennsylvania Coal Co. v. Mahon* that “while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking.”⁴⁶⁵ *Pennsylvania Coal* thus led the Court into the dismal swamp of “regulatory takings” jurisprudence, which remains one of the most contested and conceptually muddled areas of constitutional doctrine.⁴⁶⁶

⁴⁶¹ Wetlands regulations have been the subject of numerous takings challenges. See, e.g., *Loveladies Harbor, Inc. v. United States*, 28 F.3d 1171 (Fed. Cir. 1994); *Florida Rock Indus., Inc. v. United States*, 18 F.3d 1560 (Fed. Cir. 1994). Oddly, however, ESA regulations have rarely been subject to takings challenges, although the reasons for this are disputed. See Meltz, *supra* note 310, at 385-87 (explaining that some environmentalists contend property rights criticisms of the ESA are overstated, but other explanations include narrowness of takings doctrine and high barriers of ripeness requirements).

⁴⁶² U.S. CONST. amend. V.

⁴⁶³ *Armstrong v. United States*, 364 U.S. 40, 49 (1960); see also *Monongahela Navigation Co. v. United States*, 148 U.S. 312, 325 (1893) (stating that a purpose of the Takings Clause is to prevent “loading upon one individual more than his just share of the burdens of government”).

⁴⁶⁴ See William Michael Treanor, *The Original Understanding of the Takings Clause and the Political Process*, 95 COLUM. L. REV. 782, 785-97 (1995). Treanor provides historical evidence that James Madison, who drafted the Takings Clause, thought owners of land and slaves were especially vulnerable to confiscation of their property by redistributionist majoritarian politics. *Id.* at 836-55. Contrast this narrow view of the Takings Clause with Richard Epstein’s expansive, ahistorical reading of the clause as presumptively requiring compensation whenever governmental regulation diminishes the value of private property, except when necessary to protect the rights of neighboring property owners or to confer compensating benefits on an aggrieved property owner. RICHARD A. EPSTEIN, *TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN passim* (1985).

⁴⁶⁵ *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922) (holding that a statute that requires the owner of subsurface mineral rights to provide support to the surface estate amounts to a taking).

⁴⁶⁶ See Carol M. Rose, *Mahon Reconstructed: Why the Takings Issue Is Still a Muddle*, 57 S. CAL. L. REV. 561, 561-62 (1984). In a provocative article, Robert Brauneis challenges the widespread view that *Mahon* extended the Fifth Amendment prohibition on uncompensated takings to “regulatory takings.” Robert Brauneis, “*The Foundation of Our Regulatory Takings Jurisprudence: The Myth and Meaning of Justice Holmes’s Opinion in Pennsylvania Coal Co. v. Mahon*,” 106 YALE L.J. 613, 666-71 (1996). Brauneis contends that *Mahon*—which invalidated a Pennsylvania statute requiring coal companies to provide subjacent support to surface owners—was decided based on substantive due process grounds, and Holmes’s use of the term “taking” should not be taken to have anything to say about the scope or

The Supreme Court's recent attempts to clean up the mess have left many questions unresolved. The principal case is *Lucas v. South Carolina Coastal Council*.⁴⁶⁷ In 1986, David Lucas paid \$975,000 to purchase the last two undeveloped lots in an upscale residential development on the Isle of Palms, a barrier island off Charleston, South Carolina, intending to build homes there.⁴⁶⁸ The lots were zoned for single-family residential use, and although they were potentially subject to restrictions under South Carolina's Coastal Zone Management Act, no regulation barred residential development on them at the time of purchase.⁴⁶⁹ In 1988, the South Carolina legislature adopted the Beachfront Management Act to protect the coastal beach and sand dune system from further erosion and overdevelopment.⁴⁷⁰ Under this Act, the South Carolina Coastal Commission established a setback line landward from a baseline connecting the landward-most points of erosion over the previous forty-year period, with the consequence that Lucas was prohibited from building on his lots.⁴⁷¹ Lucas claimed that even if the new regulation had been enacted for legitimate police-power purposes, he was entitled to compensation under the Takings Clause, insofar as he had suffered a one-hundred percent diminution in the value of his property.⁴⁷² For the Court, Justice Scalia said that "where regulation denies all economically beneficial or productive use of land,"⁴⁷³ it would automatically trigger a compen-

contours of the Fifth Amendment, which the Court did not understand to apply to the states. *Id.* at 666-70. Whatever the merits of this claim, recent Supreme Court cases indisputably establish that the Fifth Amendment Takings Clause applies to the states through the Fourteenth Amendment, and includes regulatory takings as well as physical ones. *See, e.g., Dolan v. City of Tigard*, 512 U.S. 374, 383-84 (1994).

⁴⁶⁷ 505 U.S. 1003 (1992). For criticism of *Lucas*, see David L. Callies, *Taking the Taking Issue into the Twenty-First Century*, in *AFTER Lucas: Land Use Regulation and the Taking of Property Without Compensation* 1, 7-9 (David L. Callies ed., 1993) [hereinafter *AFTER Lucas*]; Richard A. Epstein, *Lucas v. South Carolina Coastal Council: A Tangled Web of Expectations*, 45 *STAN. L. REV.* 1369 *passim* (1993); William W. Fisher III, *The Trouble with Lucas*, 45 *STAN. L. REV.* 1393 *passim* (1993); Richard J. Lazarus, *Putting the Correct "Spin" on Lucas*, 45 *STAN. L. REV.* 1411, 1421-25 (1993); Joseph L. Sax, *Property Rights and the Economy of Nature: Understanding Lucas v. South Carolina Coastal Council*, 45 *STAN. L. REV.* 1433 *passim* (1993).

⁴⁶⁸ *See Lucas*, 505 U.S. at 1006-07.

⁴⁶⁹ *See id.* at 1007-08.

⁴⁷⁰ The stated purposes of the Act were to:

"(a) protect[] life and property by serving as a storm barrier which dissipates wave energy and contributes to shoreline stability . . . ;

(b) provide[] the basis for a tourism industry . . . ;

(c) provide[] habitat for numerous species of plants and animals, several of which are threatened or endangered. . . . ;

(d) provide[] a natural healthy environment for the citizens of South Carolina"

S.C. CODE ANN. § 48-39-250 (Law. Co-op. Supp. 1996).

⁴⁷¹ *See Lucas*, 505 U.S. at 1008-09.

⁴⁷² *See id.* at 1009.

⁴⁷³ *Id.* at 1015.

sable taking, absent some "pre-existing limitation upon the landowner's title" under the state's background law of nuisance or property.⁴⁷⁴

Some commentators have dismissed *Lucas* as a unique case not easily replicated on its facts, because, even under the most stringent land use regulations, only rarely will land be devoid of all economically beneficial use.⁴⁷⁵ Indeed, as the dissenters in *Lucas* suggest, because *Lucas* could have continued to use his land for some purposes (for example, as a campsite), it must have had some residual value, notwithstanding the uncontested factual finding to the contrary in the proceedings below, which served as the factual predicate of the Supreme Court's holding.⁴⁷⁶ Nonetheless, it is not difficult to imagine restrictions on land use for biodiversity protection purposes reaching *Lucas*-type dimensions.⁴⁷⁷ Indeed, *Lucas* itself is a biodiversity protection case, insofar as one of the stated purposes of South Carolina's development ban under the Beachfront Management Act was the protection of coastal flora and fauna.⁴⁷⁸ Suppose the South Carolina legislature had enacted a similar statute solely to protect fragile coastal ecosystems, prohibiting any land use that would be harmful to protected classes of plants and animals. Now suppose further that *Lucas*'s land were the last remaining habitat for a protected species of turtle that laid its eggs in the sand, so that even camping or walking on the land might jeopardize the turtles' survival. In that case, *Lucas* might have been deprived of *all* use of his land, and, a fortiori, all economically beneficial use, giving rise to a compensable taking according to the logic of *Lucas*.⁴⁷⁹

Undoubtedly, such extreme restrictions on land use would be unusual under almost any imaginable biodiversity protection regime,⁴⁸⁰

⁴⁷⁴ *Id.* at 1028-29.

⁴⁷⁵ See, e.g., Patrick A. Parenteau, *Who's Taking What? Property Rights, Endangered Species, and the Constitution*, 6 FORDHAM ENVTL. L.J. 619, 629 (1995) (noting that *Lucas* was premised on a trial court finding that the property was "valueless" and stating that "[e]ven the most severe environmental restriction leaves some uses, if only recreational, so that rarely, if ever, is the post-regulation value literally zero"); Ernest E. Smith, *Environmental Issues for the '90s: Golden-Cheeked Warblers and Yellowfin Tuna*, 47 ME. L. REV. 346, 355 (1995) (same).

⁴⁷⁶ See *Lucas*, 505 U.S. at 1043-44 (Blackmun, J., dissenting); *id.* at 1076-77 (statement of Souter, J.).

⁴⁷⁷ Cf. Houck, *supra* note 92, at 305-07, 307 n.55 (constructing hypothetical fact pattern that tracks *Lucas*, but in which the statutory provision that was offended is section 9 of the ESA or section 404 of the CWA).

⁴⁷⁸ See *supra* note 470.

⁴⁷⁹ Conceivably, the ESA's section 9 prohibition on adverse modification of habitat could have this same effect.

⁴⁸⁰ But see Jack H. Archer & Terrance W. Stone, *The Interaction of the Public Trust and the "Takings" Doctrines: Protecting Wetlands and Critical Coastal Areas*, 20 VT. L. REV. 81, 106 & n.139 (1995) (pointing out that owners of wetlands often have plausible claims of total takings under current wetlands regulations, which may deny all economic use). Archer and Stone argue that because of privately owned wetlands' intimate connection to the

and the overall regulatory scheme would likely survive a facial challenge—although individual property owners might still have valid as-applied claims based on total takings.⁴⁸¹

A more serious problem would arise if courts were to reinterpret the takings doctrine so as to abandon the so-called “entire parcel” rule in favor of review of regulatory takings based on a loss to any portion of the owner’s land. Traditionally, courts have said that the relevant unit of property for purposes of determining whether there has been a taking is the owner’s parcel as a whole.⁴⁸² However, in a footnote in the *Lucas* opinion, Justice Scalia seemed to imply that it remained an open question whether the entire parcel, or some smaller portion of it, is the appropriate unit of analysis for determining whether there has been a total taking.⁴⁸³ Subsequently, the Court appeared to squarely and unanimously reject the suggestion that property could be subdivided for purposes of takings analysis.⁴⁸⁴ Nonetheless, later cases in the Federal Circuit have upheld takings claims based on alleged loss of economic value in areas representing only a portion of the owner’s original parcel.⁴⁸⁵ Under this approach, any wetlands

waterways, they are held subject to the public trust doctrine, and this is precisely the kind of limitation inherent in the title that, under *Lucas*, creates an exception to the per se total takings rule. *Id.* at 107-15. Even if this is true of wetlands, however, the public trust doctrine may not apply to other kinds of habitats and ecosystems that might be protected under a broader biodiversity protection regulatory statute. *See* Scott B. Yates, Comment, *A Case for the Extension of the Public Trust Doctrine in Oregon*, 27 ENVTL. L. 663, 672-76 (1997) (stating that the public trust doctrine traditionally protected only public rights to navigation, commerce, and fishing on navigable waters and the lands beneath them, but has been extended to some other resources in some states).

⁴⁸¹ *See, e.g.*, *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 127 (1985) (reversing lower court’s narrow construction of federal wetlands regulation to avoid potential takings problems; “[a] requirement that a person obtain a permit before engaging in a certain use of his or her property does not itself ‘take’ the property” because the permit may be granted or other economically viable uses may be available, and, in any event, an aggrieved landowner may seek compensation in the Claims Court for any taking that occurs through operation of a federal statute).

⁴⁸² *See, e.g.*, *Penn Cent. Transp. Co. v. New York City*, 438 U.S. 104, 130-31 (1978).

⁴⁸³ *Lucas*, 505 U.S. at 1016 n.7.

⁴⁸⁴ *See Concrete Pipe & Prods. v. Construction Laborers Pension Trust*, 508 U.S. 602, 643-44 (1993) (affirming and relying on the holding in *Penn Central*, and ruling that “a claimant’s parcel of property could not first be divided into what was taken and what was left for the purpose of demonstrating the taking of the former to be complete and hence compensable”). Although *Concrete Pipe* involves the question of whether purely financial interests are subdivisible for purposes of takings analysis, its unequivocal language leaves little doubt that the principle applies to land as well.

⁴⁸⁵ *See Loveladies Harbor, Inc. v. United States*, 28 F.3d 1171, 1180-82 (Fed. Cir. 1994) (finding that the denial of a section 404 wetlands permit to develop 12.5 acres constitutes a taking; the 12.5 acre tract was the “relevant parcel” for takings analysis, even though the owner had already successfully developed 199 acres of its original 250-acre holding); *Florida Rock Indus., Inc. v. United States*, 18 F.3d 1560, 1562-63, 1567-73 (Fed. Cir. 1994) (applying an innovative “partial takings” analysis to determine that a taking occurred when the value of a limestone quarry was substantially diminished, but not eliminated, by denial of a section 404 wetlands permit). In the absence of clarification by the Supreme Court,

permit or restriction on the alteration of an endangered species' habitat that prohibited development on only a fraction of the owner's land could be found to be a per se compensable taking, provided the owner proves a loss of economic value on that portion of the parcel where development was prohibited—that is, in almost every case.

As Justice Scalia's majority opinion in *Lucas* noted, there remains another category in which a compensable taking may be found "without case-specific inquiry into the public interest advanced in support of the restraint": situations in which a property owner "suffer[s] a physical 'invasion' of his property."⁴⁸⁶ Although this principle goes back to the earliest takings cases,⁴⁸⁷ *Loretto v. Teleprompter Manhattan CATV Corp.*⁴⁸⁸ established that even a trivial physical invasion—in that case, a cable wire and junction box which, by local ordinance, the landowner was compelled to allow the cable company to affix to his building—can constitute a compensable taking, "without regard to the public interests that it may serve," so long as it is governmentally authorized and permanent.⁴⁸⁹ It is difficult to imagine a biodiversity conservation regulation that would authorize or require a permanent physical invasion of the type contemplated by this branch of takings law.⁴⁹⁰ Although landowners have occasionally argued that the intrusive presence of government-protected wildlife on privately owned land without the landowners' consent must be deemed a physical invasion amounting to a taking, thus far courts have rejected this theory.⁴⁹¹

the Federal Circuit's expansive, pro-plaintiff interpretation of the regulatory takings doctrine could have profound implications for federal land-use regulation. See Meltz, *supra* note 310, at 416 n.251. That court has appellate jurisdiction over decisions of the Court of Federal Claims, which in turn has exclusive jurisdiction over takings claims against the United States for amounts exceeding \$10,000. See 28 U.S.C. §§ 1346(a)(2), 1491(a)(1) (1994).

⁴⁸⁶ *Lucas*, 505 U.S. at 1015.

⁴⁸⁷ See Treanor, *supra* note 464 and accompanying text.

⁴⁸⁸ 458 U.S. 419 (1982).

⁴⁸⁹ *Id.* at 426.

⁴⁹⁰ It is, of course, easy to imagine the need for temporary physical invasions (for inspection and monitoring purposes, for example), but these are unlikely ever to rise to the level of a taking.

⁴⁹¹ See, e.g., *Christy v. Hodel*, 857 F.2d 1324, 1334-35 (9th Cir. 1988) (holding that there was no taking by physical invasion when federally protected grizzly bears entered private land and ate sheep); *Mountain States Legal Found. v. Hodel*, 799 F.2d 1423, 1428-29 (10th Cir. 1986) (holding that there was no taking by physical invasion when federally protected wild horses entered private land and ate forage); *Florida Game & Fresh Water Fish Com'n v. Flotilla, Inc.*, 636 So. 2d 761, 763-64 (Fla. Dist. Ct. App., 1994) (rejecting temporary takings claim on theory of physical invasion when occupancy by nesting pair of bald eagles required developer to leave undeveloped subdivision acreage undisturbed for several years). See generally Tarlock, *Local Biodiversity*, *supra* note 2, at 591 n.183, and cases cited therein (discussing doubt that *Lucas* cast on the parcel-as-a-whole test, and the significance of the distinction between partial and total takings requirements).

For the larger number of cases involving neither a "total taking" nor a physical invasion, *Lucas* makes clear that partial regulatory takings will continue to be decided under the *Penn Central* multifactor balancing test.⁴⁹² The factors that the court considers under the *Penn Central* test include the character of the government's interest, the burden on the property owner, and the degree to which the regulation interferes with the property owner's investment-backed expectations.⁴⁹³ Although the *Penn Central* Court acknowledged that these factors require "ad hoc, factual inquiries,"⁴⁹⁴ landowners rarely win these cases because any valid governmental interest is usually regarded as sufficient to outweigh all but the most extreme burdens on landowners.⁴⁹⁵ Because the courts have long recognized that the government has a legitimate interest in protecting wildlife, as well as a valid interest in conserving dwindling biological resources that markets alone cannot provide,⁴⁹⁶ this main branch of takings law is not likely to pose a threat to biodiversity conservation regulation.

Two other important and recent Supreme Court takings cases merit mention. *Nollan v. California Coastal Commission*⁴⁹⁷ established that where a permit to develop property is conditioned upon a reduction in the owner's property rights, there must be some rational "nexus" between the purpose of the regulatory scheme and the condition imposed.⁴⁹⁸ *Dolan v. City of Tigard*⁴⁹⁹ extended this principle to include a requirement of "rough proportionality," so that the burden

⁴⁹² *Lucas*, 505 U.S. at 1019 n.8 (citing *Penn Central*, 438 U.S. at 124).

⁴⁹³ *Penn Central*, 438 U.S. at 124.

⁴⁹⁴ *Id.*

⁴⁹⁵ See, e.g., *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470, 491 (1987) (upholding state statute limiting coal operators' rights to mine coal in order to provide support to surface); *Agins v. City of Tiburon*, 447 U.S. 255, 260-61 (1980) (upholding municipal open-space zoning ordinance). In both cases, the Court inquired whether the regulation substantially advanced a legitimate government interest, and whether the landowner was deprived of all economically viable use of her property. In both cases, the answer to the first question was affirmative and the answer to the second question was negative, and the regulation was upheld against a takings challenge. This outcome suggests that any government interest will be upheld, unless the deprivation to the landowner is total (or, possibly, near-total, although the Supreme Court has not yet decided such a case).

⁴⁹⁶ See, e.g., *Reahard v. Lee County*, 968 F.2d 1131 (11th Cir. 1992) (finding no taking where the plaintiff's property was designated as a resource protection area).

⁴⁹⁷ 483 U.S. 825 (1987).

⁴⁹⁸ *Id.* at 837. In *Nollan*, the California Coastal Commission required the landowner to grant a pedestrian right-of-way across his beachfront property to users of neighboring public beaches as a condition for receiving a permit to build a residence that would impair visual access to the oceanfront from the public road behind the property. The Court said that the regulatory purpose of protecting visual access from the road would not be advanced by allowing pedestrians to cross the land, and without the requisite nexus, the deprivation of the landowner's right to exclude others from his land amounted to a compensable taking.

⁴⁹⁹ 512 U.S. 374 (1994).

imposed on the landowner may not be disproportionate to the benefit provided (or harm prevented) by the regulation.⁵⁰⁰ Both *Nollan* and *Dolan* involved transfers of title to partial interests in land and permanent government-authorized physical invasions, but only as conditions attached to permits. Because the landowner remained free to reject the condition (along with the permit), these are not per se physical invasion takings as in *Loretto*. Instead, the Court imposed intermediate tests, more stringent than the deferential *Penn Central* balancing approach, but short of the categorical rules of *Lucas* and *Loretto*.⁵⁰¹ However, the reach of the *Nollan* nexus and *Dolan* proportionality requirements remains unclear. Do they apply to *all* conditions on permits to develop land, or only to conditions involving transfer of title, or perhaps to conditions interfering with the owner's right to exclude, as in the *Nollan* and *Dolan* cases themselves?⁵⁰² Or, as a middle ground, do they apply to conditions "substantially" or "significantly" interfering with any important "stick in the owner's bundle of rights"? And, if the latter, how are we to determine that threshold? Once again, the cases appear to raise more questions than they answer.

The answers to those questions may be crucial to the future of biodiversity conservation regulatory measures. Conditional permitting is already a well-trod path for regulatory approaches that attempt to accommodate both development and conservation goals. Section 404 wetlands permits, for example, are frequently conditioned upon mitigation measures,⁵⁰³ and even the most ambitious ESA habitat conservation plans amount to little more than a grand architecture of conditions imposed upon incidental take permits.⁵⁰⁴ Such conditions may or may not implicate *Nollan*- and *Dolan*-type transfers of title or interferences with the right to exclude, but they invariably implicate the owner's right to use her land. If courts subject these conditional

⁵⁰⁰ *Id.* at 391. In *Dolan*, the municipality approved a permit to construct a store and parking lot, on the condition that the landowner dedicate a portion of her property for improvement of a storm drainage system and grant an easement for construction of a bicycle path over her property. The municipality reasoned that the bikepath would help alleviate traffic congestion caused in part by the new construction. The Court said that the traffic congestion may provide the requisite nexus between the condition and the regulatory purpose, but the municipality had not demonstrated that the incremental benefit of the bikepath was "roughly proportional" to the burden placed on the owner: the deprivation of her right to exclude others from her property.

⁵⁰¹ See Robert H. Freilich & Elizabeth A. Garvin, *Takings After Lucas: Growth Management, Planning, and Regulatory Implementation Will Work Better Than Before*, in *AFTER Lucas*, *supra* note 467, at 53, 57-58 (explaining that *Nollan* employs heightened scrutiny, shifting the burden to the government to justify the regulation by showing the requisite nexus).

⁵⁰² See Daniel J. Curtin, Jr. et al., *Nollan/Dolan: The Emerging Wing in Regulatory Takings Analysis*, 28 *URB. LAW.* 789, 791-95 (1996) (stating that lower courts are divided on whether the *Nollan* and *Dolan* requirements apply to conditions other than dedications of land).

⁵⁰³ See *supra* notes 361-63 and accompanying text.

⁵⁰⁴ See *supra* notes 313-25 and accompanying text.

permits to heightened judicial scrutiny under the *Nollan-Dolan* nexus and proportionality requirements, they may find that a good many more are takings than if *Penn Central* were the governing precedent.⁵⁰⁵ Ironically, then, conditional permitting under the Clean Water Act and ESA—devices that were intended to provide regulatory flexibility and to ease the burden on landowners by allowing development where flat prohibitory regulation would not—may be subject to stricter judicial scrutiny under *Nollan* and *Dolan* than prohibitory regulations, which the courts will presumably continue to review under the more deferential *Penn Central* balancing test.

As a result, the status of takings jurisprudence and its implications for biodiversity conservation policy remain highly unsettled. Furthermore, even if biodiversity protection policies can survive takings challenges, the ferocity of opposition to wetlands and endangered species legislation among private landowners should give us pause. What future can there be in the broader regulation of private land use, in the name of biodiversity protection, if even the current limited and inadequate measures face so much resistance? And what is the source of this opposition? Although the jagged edges of contemporary takings jurisprudence may offer little comfort to regulated landowners, deeper principles that animate the Takings Clause are nonetheless implicated in their claims, and should inform our design of a larger biodiversity conservation policy.

Landowners often perceive wetlands and endangered species regulations as unfair for several important and related reasons. First, from the landowner's perspective, the regulations often appear to fall arbitrarily, with unjust distributional consequences. For example, the owner of one parcel of vacant, semi-arid land in the path of development in southern California may find his land declared habitat for the Stevens' kangaroo rat—a listed species—and therefore subject to stringent federal regulation, while the owner of an otherwise similar parcel a few miles away may escape such designation.⁵⁰⁶ Neighboring parcels, now developed, may have provided habitat for the kangaroo

⁵⁰⁵ See generally Stephen M. Johnson, *Avoid, Minimize, Mitigate: The Continuing Constitutionality of Wetlands Mitigation After Dolan v. City of Tigard*, 6 *FORDHAM ENVTL. L.J.* 689, 726 (1995) (arguing that some mitigation conditions may be vulnerable to challenge as “disproportional” under *Dolan*). Habitat conservation plans under the ESA may also be vulnerable to challenge, especially where the Interior Department has used the conditional permitting process to leverage ecosystem-wide, multi-species conservation plans. HCP requirements aimed at protecting species not listed as threatened or endangered arguably may not even meet the *Nollan* “essential nexus” test because they overreach the congressionally authorized purposes of the statute.

⁵⁰⁶ See Tarlock, *Local Biodiversity*, *supra* note 2, at 602 (describing what he calls the “equal protection” implications of biodiversity regulation: land developers see land as a fungible commodity, but conservation biologists see two tracts of land as performing distinct ecosystem functions).

rat at one time, but they suffer no regulatory burden because development took place before the kangaroo rat was listed. In other words, only latecomers bear the cost of protecting listed species, even though, from a broader perspective, it is the early developers who brought the species to near extinction in the first place.⁵⁰⁷ Of course, many other kinds of land-use restrictions also treat land differently depending upon its location. Often, these restrictions apply prospectively while “grandfathering” pre-existing uses. In the case of protected habitats (for species listed under the ESA) or ecosystems (like wetlands), however, the regulated area is often quite small and isolated, and regulation is the exception and not the norm.⁵⁰⁸ Finally, both the ESA listing process and the Clean Water Act section 404 wetlands delineation process often appear so lacking in predictability and uniformity from the landowners’ perspective as to be almost random in their application.⁵⁰⁹ This perception undoubtedly contributes to a sense that the regulations are not of general applicability, and that the costs fall arbitrarily on some landowners but not on others.

The second and related point concerns the distribution of the costs and benefits of biodiversity protection. We saw in Part IV that biodiversity’s benefits are principally national or global, while its costs are principally local, thus raising important federalism concerns. This principle also has a takings dimension because the costs of biodiversity protection are extremely local, falling in the first instance on the owner of a parcel of land who suffers the opportunity cost of foregoing habitat-altering conversion or development. When such land is privately owned, the result is that individual landowners absorb the cost of producing a global public good.⁵¹⁰ The problem of biodivers-

⁵⁰⁷ See generally Ike C. Sugg, *Caught in the Act: Evaluating the Endangered Species Act, Its Effects on Man and Prospects for Reform*, 24 CUMB. L. REV. 1 (1993) (arguing that the ESA is unconstitutional as applied because it effectuates takings from landowners without compensation).

⁵⁰⁸ This may suggest that the perceived unfairness stems from too little federal regulation, rather than from too much, in that landowners who are subject to habitat- or ecosystem-protective regulation would not feel so unfairly burdened if all landowners were subject to similar restrictions. But only the most tortured logic would argue for burdening all landowners to alleviate the perceived unfairness of the burdens now placed on a few.

⁵⁰⁹ See *supra* notes 72-75, 97-103, 326 and accompanying text (ESA listing); *supra* note 349 (wetlands delineation).

⁵¹⁰ See Robert L. Carlton, *Property Rights and Incentives in the Preservation of Species*, in THE PRESERVATION OF SPECIES: THE VALUE OF BIOLOGICAL DIVERSITY 255, 258-59 (Bryan G. Norton ed., 1986); Charles Perrings et al., *Introduction: Framing the Problem of Biodiversity Loss*, in BIODIVERSITY LOSS, *supra* note 24, at 1, 14-15; Robert D. Weaver, *Economic Valuation of Biodiversity*, in BIODIVERSITY AND LANDSCAPES: A PARADOX OF HUMANITY 255, 263-64 (Ke Chung Kim & Robert D. Weaver eds., 1994). Pure public goods, like lighthouses and national defense, are both non-rival (one person’s use of the good does not diminish another’s ability to use it) and non-excludable (once provided, it is available to all). The earth’s biodiversity in its purest form—the variety of genes, species, and ecosystems—fits this description. Although the information contained in the genetic codes of diverse orga-

ity loss is the typical problem of public goods—not one of overconsumption, but of inadequate provision. Because producers of biodiversity—that is, owners of land producing biodiversity—capture at best only a small fraction of its benefits, no one has an adequate incentive to produce that good in socially optimal quantities.⁵¹¹

On the other hand, as we have seen, there are costs to producing biodiversity, the most important of which is the opportunity cost of foregoing development.⁵¹² Biodiversity conservation measures may be relatively inexpensive, and there will often be a net social benefit once nonpecuniary benefits are factored in, if there are readily available development alternatives that do not also result in comparable or greater biodiversity loss.⁵¹³ For example, if the choice is between building a shopping mall in a biodiversity-rich wetland or in a nearby biodiversity-poor cornfield, building the mall in the cornfield may not cost any more in pecuniary terms, and there will likely be a net social benefit. However, that decision has important distributional consequences. For the private owner of the wetland who is called upon to forego development, the cost may be very great indeed, while the benefits he receives from the biodiversity thereby conserved may be no greater than the benefits received by a resident of Brooklyn or Timbuktu.⁵¹⁴

nisms can be appropriated to produce extractive benefits such as new pharmaceutical and agricultural products, the genetic information that produces these benefits is non-rival and non-excludable, absent special intellectual property protection, which is not currently available for naturally occurring biological resources. Many of biodiversity's other benefits—aesthetic, scientific and educational value; existence value; bequest value; and option value—are also public goods. See BROWN ET AL., *supra* note 5, at 11-24; Scott Barrett, *On Biodiversity Conservation*, in BIODIVERSITY LOSS, *supra* note 24, at 283, 289. Nonetheless, biodiversity can also be understood as the sum of tangible biological resources and those biological resources that typically produce additional benefits, some of them public goods, some private, and others mixed. See BEATLEY, *supra* note 4, at 206-08; BROWN ET AL., *supra* note 5, at 12; EDWARDS, *supra* note 136, at 21.

⁵¹¹ It is often assumed that biodiversity loss results from a Hardin-type tragedy of the commons, based on individual incentives to over-exploit rival resources in an open-access regime. Over-exploitation is a factor in the loss of some marine species and a handful of terrestrial species such as elephants and rhinoceroses, but for most terrestrial species and ecosystems, the problem is one of incidental loss, essentially a form of underinvestment due to the inability of landowners to capture returns on the conservation investments required to maintain biodiversity. See BROWN ET AL., *supra* note 5, at 37; Barrett, *supra* note 510, at 284; Perrings et al., *supra* note 510, at 15 (because biodiversity is a public good, “[t]here is a systematic bias against private investment in diversity, and in favor of investment in the specific populations whose benefits can be captured”).

⁵¹² See *supra* notes 410-11 and accompanying text.

⁵¹³ See R. Kerry Turner, *Policy Failures in Managing Wetlands*, in MARKET AND GOVERNMENT FAILURES IN ENVIRONMENTAL MANAGEMENT: WETLANDS AND FORESTS 9, 24 (1992) (raising this argument in the context of wetlands protection).

⁵¹⁴ Of course, the landowner may receive other benefits, such as recreational use or aesthetic enjoyment of the wetland, perhaps some commercial hunting or fishing fees, and the psychological gratification of knowing he has helped save global biodiversity; but in

Because markets typically underprovide public goods, we expect governments to provide them (for example, lighthouses or national defense);⁵¹⁵ to subsidize private parties to provide them (for example, grants for scientific research); or to create new incentives, such as new forms of property rights, and thereby establish markets that will provide them (for example, intellectual property protection for published works, musical compositions, and inventions). We could enact regulations to require private landowners of suitably situated parcels to build lighthouses, defense installations, or scenic and recreational parks, but typically we do not. We do sometimes provide public goods through governmental regulation of private activity, but usually only in such a way that the burden falls more or less equally on all beneficiaries (for example, compulsory universal education) or, in some cases, randomly, so that the likelihood of the burden falls more or less equally on all beneficiaries (for example, compulsory military service by universal lottery or compulsory jury duty by drawing from a list). However, the burden of compulsory production of biodiversity is distributed neither equally nor randomly, nor by any other mechanism perceived to be fair. The costs are heavily concentrated on a relatively small number of individuals that compose a distinct subgroup of a much larger beneficiary class.

This discussion returns us to the normative underpinnings of takings law. William K. Jones suggests that three underlying purposes are served by the just compensation requirement of the Takings Clause: it alleviates insecurity among property owners, encourages private investment, and imposes a measure of fiscal discipline on government officials who must secure public funding to achieve governmental objectives.⁵¹⁶ Jones concludes that when "the government seeks to employ [land use regulation], not to preclude inharmonious land development, but to lighten the burden on the public treasury . . . by compelling the land to be used for some public purpose . . . the courts will find an improper taking."⁵¹⁷ Frank Michelman, in his landmark 1967 article, similarly identifies fairness as a critical dimension of takings law, and specifically names landowners' "demoralization costs" as a principal determinant of whether a taking had occurred.⁵¹⁸ Jed

many cases these will fall far short of the cost of the lost development opportunity. See EDWARDS, *supra* note 136, at 26-27.

⁵¹⁵ See Baden, *supra* note 413, at 138.

⁵¹⁶ William K. Jones, *Confiscation: A Rationale of the Law of Takings*, 24 HOFSTRA L. REV. 1, 4-5 (1995).

⁵¹⁷ *Id.* at 43-44.

⁵¹⁸ Frank I. Michelman, *Property, Utility, and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law*, 80 HARV. L. REV. 1165, 1214-15 (1967). In Michelman's formulation, if the landowner's "demoralization cost" exceeds the government's "settlement cost," i.e., what it would cost to satisfy the landowner's objections to the regulation, then the government must provide compensation.

Rubinfeld argues that compensation is owed when government appropriates the use-value of property to achieve a public purpose.⁵¹⁹ Justice Scalia, in his majority opinion in *Lucas*, says that the overriding goal of takings law is to minimize the risk that "private property is being pressed into some form of public service under the guise of mitigating serious public harm."⁵²⁰ Numerous commentators have struck similar themes.⁵²¹

These commentaries, in my view, are more helpful in illuminating the animating spirit behind the Takings Clause than in delineating its doctrinal contours. They reveal why, to many landowners, biodiversity-conserving regulation of private land use may feel like a taking even when the courts say it is not.⁵²² To these landowners, the regulatory approach to biodiversity conservation appears costly, arbitrary, and fundamentally unfair. It requires a few private parties to absorb concentrated and heavy costs of a kind that, in other contexts, we expect government (or the public generally) to absorb. This scheme allows the government to operate "on the cheap" by compelling a few private parties to provide goods that benefit the broader public, without expending public funds.⁵²³ By shifting the costs to private parties, this approach obscures the true costs of biodiversity conservation, removing any incentive for fiscal discipline and making it difficult for even the best-intentioned government decisionmakers to make informed judgments about conservation priorities and acceptable trade-offs. Thus, the argument that protection of biodiversity through government ownership and management of biological resources would be prohibitively expensive misses this critical point; reg-

⁵¹⁹ Jed Rubinfeld, *Usings*, 102 YALE L.J. 1077, 1114-18 (1993).

⁵²⁰ *Lucas*, 505 U.S. at 1018.

⁵²¹ See, e.g., Daniel A. Farber, *Public Choice and Just Compensation*, 9 CONST. COMMENTARY 279, 280 (1992); William A. Fischel, *Introduction: Utilitarian Balancing and Formalism in Takings*, 88 COLUM. L. REV. 1581, 1583-85 (1988); William A. Fischel & Perry Shapiro, *Takings, Insurance, and Michelman: Comments on Economic Interpretations of "Just Compensation" Law*, 17 J. LEGAL STUD. 269, 281-83 (1988); Thomas W. Merrill, *Rent Seeking and the Compensation Principle*, 80 NW. U. L. REV. 1561, 1577-85 (1986) (reviewing RICHARD A. EPSTEIN, *TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN* (1985)).

⁵²² See Leigh Raymond, *The Ethics of Compensation: Takings, Utility, and Justice*, 23 ECOLOGY L.Q. 577, 587-600 (1996) (discussing the ethical foundations of takings doctrine in utilitarian and contractarian theories of justice, and attributing doctrinal confusion to the failure to distinguish these ethical theories and their implications); Note, *The Principle of Equality in Takings Clause Jurisprudence*, 109 HARV. L. REV. 1030, 1044-47 (1996) (contending that equality norms underlie much of takings jurisprudence and should be incorporated more explicitly into takings doctrine).

⁵²³ See Sugg, *supra* note 507, at 12 (arguing that under the ESA "private property owners . . . are providing habitat for the majority of the public's interest in wildlife free of charge," which amounts to "nothing less than a subsidy to the public—the provision of a public good at private expense"). Cf. Esty, *supra* note 416, at 589 (describing as a "potential taking" the situation in which "the regulating entity provides benefits broadly but concentrates costs unfairly on a narrow group").

ulation of private landowners may be equally expensive, or perhaps even more so, but we are less likely to know its true cost.

Our current approach to biodiversity conservation—an approach generally of inaction, except for panicked, last-ditch, costs-be-damned efforts to save individual species once they have reached the brink of extinction—may prove to be the most costly of all. The adverse consequences of land conversion only increase over time. Natural resource economists point out that converting the first half of any given species' habitat is typically relatively costless from a biodiversity conservation perspective because, in most cases, ample habitat remains to ensure the continued vitality of the species, its role in the ecosystem, and the diversity of its gene pool.⁵²⁴ Converting the next forty percent is much more costly, however, because it pushes the species to the threatened or endangered category, creating a significant risk of extinction and limiting our options for recovery. Converting the final ten percent is the most costly of all, because it results in irreversible extinction. By waiting until the last minute to conserve, we effectively decide to conserve only the last bit of habitat, regardless of the cost, which is often considerably higher than it might have been under more timely and foresighted intervention.⁵²⁵ Under the approach recommended in this Article, the government would intervene at an earlier stage in the process, acting as a market participant to purchase and set aside in advance viable reserves, at times and in places where it is cost-effective to do so.⁵²⁶

Asking the government to pay for biodiversity conservation out of public funds invites and, indeed, demands case-by-case judgments as to whether the benefits outweigh the costs, and where any proposed conservation investment stacks up against others in a ranking of priorities.⁵²⁷ Of course, the government will not always answer these questions correctly. It may overinvest or underinvest in the aggregate, and it may overestimate or underestimate the relative value of particular projects. More fundamentally, we may find it difficult to agree on common conservation goals, objectives, and metrics. Nonetheless, at least an open, public discussion of the appropriate allocation of conservation dollars invites us to wrestle with those questions, in a way that prohibitory land-use regulation does not.

⁵²⁴ See BROWN ET AL., *supra* note 5, at 38.

⁵²⁵ See *supra* text accompanying notes 93-96.

⁵²⁶ Cf. BROWN ET AL., *supra* note 5, at 38-39 (raising a similar argument, in the context of the voluntary cooperation of individual countries).

⁵²⁷ Cf. Smith, *supra* note 292, at 86 (raising a similar argument in the context of endangered species habitat).

VI

ANCILLARY REGULATION IN THE CONTEXT OF ECOSYSTEM
CONSERVATION PLANNING

Although considerations of federalism and fairness counsel against reliance on regulation of private land use as the foundation for a federal biodiversity conservation strategy, a more limited federal regulatory role may nonetheless be necessary. As we saw in Part I.A, the conservation value of reserves is limited by their size, as well as by the spillover effects from land uses on neighboring parcels.⁵²⁸ Recognizing that practical limitations on reserve size stem not only from fiscal constraints but also from the necessity that land be available for other essential and economically valuable uses, the scientific and policy literature has long recommended that core reserves be surrounded by buffer zones, in which land may be put to productive uses compatible with the protection and functioning of the core reserve.⁵²⁹ Properly designed buffer zones can thus, in principle, provide a range of residential, recreational, agricultural, silvicultural, and even industrial uses, while also providing supplemental wildlife habitats, contributing to ongoing ecosystem functions, and limiting adverse spillovers to the core reserves.⁵³⁰

This goal is most likely to be achieved through ancillary *federal* regulation of lands adjacent to core federally owned reserves.⁵³¹ By limiting the federal government's assertion of land-use regulatory authority to identified buffer areas, and its purpose to prevention of adverse spillover effects on adjacent federal lands, this approach cabins the federal regulatory role, both geographically and conceptually. Thus confined, federal regulation is narrowly tailored, contextualized, localized, and concrete. Rather than calling upon landowners to sacrifice their economic interests to advance an amorphous global public good,⁵³² federal regulation fits squarely within the widely understood and broadly accepted traditional purpose of land-use regulation: the prevention of adverse, nuisance-like spillovers from one parcel of land onto its neighbors.⁵³³

⁵²⁸ See *supra* notes 41-46 and accompanying text.

⁵²⁹ See *supra* notes 54-56 and accompanying text.

⁵³⁰ See *supra* notes 52-56 and accompanying text.

⁵³¹ For reasons we saw in Part IV, see *supra* notes 412-14 and accompanying text, state and local governments are likely to underinvest in biodiversity conservation.

⁵³² See *supra* notes 510-14 and accompanying text.

⁵³³ See, e.g., EPSTEIN, *supra* note 464, at 112-21. Cf. Tarlock, *Local Biodiversity*, *supra* note 2, at 595 (arguing that the goal of biodiversity regulation is to "prevent long term harm to the sustainability of similarly situated parcels of larger ecosystems"). Tarlock thus attempts to place all biodiversity-conserving regulation within the traditional nuisance-prevention paradigm, under the rubric of preventing harm to neighboring parcels. But if biodiversity protection relies solely, or even principally, on regulation of private land use, the owners of neighboring parcels are similarly burdened, not mutually benefited, by the regulation.

Under such a system, the precise nature and scope of land-use regulation would vary depending on the nature and extent of the reserve to be protected, the nature and boundaries of the ecosystem of which it is a part, and the nature and degree of local needs and opportunities. The menu of regulatory options could include, for example, density limitations, open space requirements, restrictions on landscaping of residential developments to prevent introduction of harmful exotic species, exclusive agricultural or silvicultural zoning, restrictions on potentially adverse agricultural or silvicultural practices, and restrictions on industrial or mineral extraction practices upstream or upwind from the protected core reserve.

To achieve biodiversity conservation goals, commentators have recommended a variety of market-based incentives as an alternative to command-and-control regulation. Farrier, for example, suggests a combination of conservation easements, tax exemptions, land exchanges, and market-based mitigation banks.⁵³⁴ A leading environmentalist group, Defenders of Wildlife, has argued for a broad menu of tax credits for habitat improvements, and tax penalties for habitat conversion, coupled with tradeable development rights and impact fees.⁵³⁵ Todd G. Olson argues for a market-based "habitat transaction method" in which conservation planners would assign to every parcel of land within a landscape a numerical "conservation value" based on its contribution to the ecosystem, and establish an overall target level of biodiversity protection.⁵³⁶ A would-be developer could then mitigate the adverse effects of her development by setting aside her own or other parcels to protect ecosystem functions.⁵³⁷ These proposals have considerable merit. They promote flexibility and efficiency, and, in these respects, may be superior to traditional command-and-control regulatory approaches. Standing alone, however, these mechanisms are likely to prove inadequate. Some of these proposals

The nuisance-prevention rationale is more apt if the government regulates in order to protect its interests as owner of neighboring lands set aside for biodiversity protection.

⁵³⁴ Farrier, *supra* note 2, at 323-27, 389-405; *see also* GRUMBINE, *supra* note 44, at 12-13 (stating that the "[c]urrent laws are deeply flawed" and must be replaced with a combination of different programs); ELINOR OSTROM, *GOVERNING THE COMMONS* (1990).

⁵³⁵ DEFENDERS OF WILDLIFE, *BUILDING ECONOMIC INCENTIVES INTO THE ENDANGERED SPECIES ACT* (Wendy E. Hudson ed., 2d ed. 1993).

⁵³⁶ Olson, *supra* note 46, at 72-78. Olson proposes a two-step process in which conservation planners would first assign a numerical "habitat quality" value to each parcel, based on "the extent to which the land is characteristic of the subject habitat type," considering such factors as soil types, elevation, characteristic vegetation, and presence or absence of "indicator species." *Id.* at 73. Then they would make upward or downward adjustments based on the size, shape, and contiguity of the habitat patch of which the parcel is a part, with higher values for larger, more contiguous, and "rounder" patches. *Id.* at 73-75.

⁵³⁷ Note, however, that like other transferable development rights schemes, this one presupposes that development is generally prohibited unless authorized by the accumulation of sufficient "credits."

incorrectly assume that all lands are of equal conservation value. They would reward (or penalize) particular kinds of conservation measures adopted by individual landowners, regardless of any parcel's relative value for conservation purposes, and without regard to the existence or absence of a coherent, regionwide ecosystem plan.

Nonetheless, some of the specific market-based mechanisms proposed in this literature could be easily adapted to the core-and-buffer approach recommended in this Article, and should be on the menu of regulatory options available to decisionmakers in tailoring the most efficient and effective regulatory protection in the buffer zone. For example, a scaled system of tax penalties and tax credits—with tax penalties for adverse habitat modification and tax credits for conservation measures calibrated to distance from the core reserve or other ecosystem-specific considerations⁵³⁸—might prove to be an efficiency-enhancing and, from the landowners' perspective, relatively painless way to steer adverse development away from biodiversity reserves. This system would also encourage conservation where it will be most effective—in areas immediately adjacent to the core reserve. By thus contextualizing application of the tax incentive tool, this approach honors the principle that not all conservation investments are equally productive; the more valuable ones ought to be identified in a decentralized, ecosystem-specific planning process and especially encouraged. Similarly, Olson's tradeable development rights concept can be easily adapted to the core-and-buffer scheme by assigning such rights within the regulated buffer zone, based on distance from the core reserve or other metrics of the potential adverse impact on biological resources to be protected.⁵³⁹ Following this approach, the cost of converting land farther away from the core reserve and the cost of conservation-damaging spillovers from developments in the buffer zones would be reduced.

Even such narrowly tailored and contextualized regulation is not without its problems, of course. State and local governments may still be concerned that the federal regulatory process would not adequately protect state- and local-level interests. Affected landowners may also feel unfairly inconvenienced by a federal decision to locate a reserve in their vicinity and consequently, to impose special regulatory burdens upon them not shared by landowners generally.

⁵³⁸ Other context-specific ecosystemic factors could also be drawn into the equation. For example, it might be advantageous to steer certain kinds of developments downstream (or downwind) from the core reserve, rather than upstream (or upwind), where the negative spillovers are potentially more harmful; or to encourage certain developments in second-growth rather than in old-growth forests.

⁵³⁹ Again, as with tax incentives, other factors such as direction of air or water flow could be calculated into the equation.

An ecosystem-level conservation planning approach, involving a collaborative, consensus-oriented process bringing together all the "stakeholders" in conservation and land development within the regional ecosystem, may help to alleviate these concerns and produce superior substantive results. Such a decentralized, participatory process would allow landowners, state and local governments, conservation organizations, and other affected parties to see that their interests are represented and addressed in the decisionmaking process. It would also facilitate the acquisition and consideration of relevant information on local conditions and individual needs that otherwise might not be readily available to agency officials. In short, it would allow regulation to be tailored to local conditions in a way that general, nationwide regulation is unlikely to be.⁵⁴⁰

Despite its many shortcomings,⁵⁴¹ the Habitat Conservation Planning ("HCP") process that has evolved out of the ESA's incidental take permit requirements⁵⁴² provides a useful prototype for this kind of planning process. It should be noted that the HCP process has been most successful when the plan has called for setting aside core-habitat reserves, accompanied by some level of development restrictions on surrounding lands.⁵⁴³ Thus, the end result bears a striking similarity to the core-and-buffer approach recommended in this Article.

Although under ESA habitat conservation plans the reserves are not always federally owned,⁵⁴⁴ federal land acquisitions have often played a critical role. For example, in the Balcones Canyonlands regional HCP, the new forty-one thousand acre National Wildlife Refuge, a twenty-nine thousand acre network of local and private reserves, and appropriate use restrictions on surrounding private lands play a central role in the preservation plan.⁵⁴⁵ Clearly there is a creative synergy at work here; neither the federal wildlife refuge nor the network of private preserves and land use restrictions alone would

⁵⁴⁰ See *supra* notes 444-46, 453 and accompanying text.

⁵⁴¹ See *supra* notes 316-25 and accompanying text.

⁵⁴² See *supra* notes 313-15 and accompanying text.

⁵⁴³ See BEATLEY, *supra* note 4, at 177-82 (stating that the main components of the Balcones Canyonlands habitat conservation plan include a new National Wildlife Refuge and a linked network of private and local government reserves); Cone, *supra* note 277 (reporting that the San Diego coastal sage scrub conservation plan creates a 172,000 acre habitat preserve, combining areas closed to development with areas where development is permitted, subject to a 75% open space set-aside).

⁵⁴⁴ See BEATLEY, *supra* note 4, at 206-09 (recounting that the federal government has purchased reserves for a number of habitat conservation plans, but that others are created and funded in whole or in part by developer impact fees, dedications of developer-owned land, state and local government bonding authorities, special taxing districts, dedicated taxes, or general state or local government revenues).

⁵⁴⁵ See *id.* at 180, 190 (describing the habitat conservation planning process as an "important catalyst in establishing [the national wildlife] refuge").

be adequate to address the habitat needs of the species at risk in the Balcones Canyonlands, but together they go a long way toward achieving ecosystem-level conservation objectives and suggest a promising model for the future.

For better or worse, the ESA thus far has provided the best entree for the federal government to play a role in promoting local and regional land-use planning for biodiversity conservation. In the absence of the regulatory club held over the heads of private parties and governmental entities by virtue of the prohibitory potential of the ESA, federal authorities are rarely in a position to bring parties to the bargaining table or to force consensus or compromise. However, the HCP process is currently available only when triggered by a threat to a listed species; consequently, it cannot be used proactively to protect conservation-worthy ecosystems that have not already been so damaged as to push resident species to extinction's door.⁵⁴⁶ Even where a listed species is present, its habitat may not be sufficiently extensive, or the necessary protective measures sufficiently stringent or far-reaching, to bring all the relevant parties to the bargaining table.

Nevertheless, the limitations of the ESA's HCP process should not be confused with the inerts of regional ecosystem conservation planning. By most accounts, the approach is a promising one. It can be advanced by my proposal for core federal reserves, surrounded by regulated adjacent buffers. By identifying and setting aside biological reserves, the federal government creates a place for itself at the table of stakeholders in regional conservation planning. By asserting regulatory authority over adjacent lands, the federal government wields the club that may be necessary to bring other stakeholders to the table and to advance the discussion toward consensus when, absent such authority, negotiation might otherwise break down.

Intelligent design of land-use regulations that simultaneously serve both the federal interest in biodiversity conservation and local and private interests in development will require the kind of dialogue that the ecosystem conservation planning process is intended to foster. Although such dialogue by no means guarantees elimination of local opposition to federal land ownership and regulation, it is at least likely to mitigate it by increasing local understanding of federal objectives and accommodating, to the extent feasible, local concerns. A

⁵⁴⁶ See *id.* at 191 (stating that the Balcones Canyonlands habitat conservation plan, widely hailed as a model of regional multispecies planning, fails to protect the adjacent, increasingly rare blackland prairie ecosystem because no listed species reside there). Notable examples of failed or only partially successful efforts at regional ecosystem conservation planning in the absence of ESA-inspired urgency are the efforts undertaken in the Greater Yellowstone Ecosystem, see Keiter, *Yellowstone*, *supra* note 211, at 926-28, and in the Northern Forest of New England and upstate New York, see Breckenridge, *supra* note 20, at 364-67.

congressionally authorized system of federal biological reserves therefore ought to include a requirement that federal land managers engage in an ecosystem-wide management planning process prior to promulgating regulations affecting nonfederal lands.

CONCLUSION

This Article proposes a system of federally owned core biological reserves—selected on the basis of such features as ecosystem and species representativeness, endemism, and species richness—surrounded by buffer zones in which the federal government would permit private ownership and compatible economic activities, but would regulate land use to limit and control adverse spillover effects in the protected core reserves. The proposal thus offers a way of giving legal and practical effect to UNESCO's Man and the Biosphere Program concept of "biosphere reserves"—core reserve areas selected for the importance of their biological resources, surrounded by "buffer" zones of limited economic activity compatible with conservation of the core.⁵⁴⁷

Since its unveiling in 1968, the biosphere reserve concept has remained little more than a widely hailed idea. In this country, as throughout much of the world, "biosphere reserve" designation currently does not confer any special protections or binding legal obligations. Instead, the designation merely serves to signal interested parties that an area is of special concern for the value of its biological riches.⁵⁴⁸ Under my proposal, compatible (and therefore permissible) land uses permitted in the buffer areas certainly could include such activities as scientific research, education, and some recreational uses, even in areas immediately adjacent to the protected core.⁵⁴⁹ Farther away from the core, the government could permit (or encourage) increasingly intensive forms of economic activity on a sustainable basis, through application of traditional land-use planning techniques, participatory ecosystem-level planning by private stakeholders and affected units of state and local government, and creative use of innovative market-based approaches.

So long as the government permits viable economic uses on private lands in these outer concentric zones, the takings doctrine should not pose any problems to this scheme. And although this proposal does envision a strong federal role in land-use planning, that role would be much more confined, both in geographical scope and regu-

⁵⁴⁷ See Peter Bridgewater et al., *Creating Policy on Landscape Diversity*, in *MANAGED LANDSCAPES*, *supra* note 53, at 711, 719; CONGRESSIONAL RESEARCH SERV., *BIOSPHERE RESERVES: FACT SHEET 2* (June 6, 1996) (96-517 ENR) [hereinafter *BIOSPHERE RESERVES*].

⁵⁴⁸ See *BIOSPHERE RESERVES*, *supra* note 547, at 2; GRUMBINE, *supra* note 44, at 157-58; Sax & Keiter, *supra* note 220, at 253-57.

⁵⁴⁹ See Bridgewater et al., *supra* note 547, at 719.

latory ambition, than in other, more expansive proposals for direct federal regulation of private lands for biodiversity conservation. With the federal role in land use regulation aimed primarily at protecting federally owned biodiversity reserves against negative spillovers from adjacent lands, the federalism and takings concerns of the kinds discussed in Parts IV and V may not be eliminated entirely, but would at least be cabined. This approach therefore represents a reasonable accommodation of the inherent tension between the global nature of the benefits of biodiversity conservation and the localized nature of its costs.

Finally, this Article suggests that it is time to move beyond our current thinking about the respective roles of “publicly owned lands” and “private lands” in biodiversity conservation—that some impenetrable and immovable barrier exists between these two categories. Although some lands that public land management agencies currently hold are extremely valuable for biodiversity conservation purposes, others are less so, and the same may be said of lands that private landowners currently hold. The challenge is to identify the most biologically valuable lands and devise workable strategies to protect them.

This Article proposes a core-and-buffer approach, with publicly owned lands (or, where appropriate, public ownership of less-than-fee interests) as the centerpiece. This would require a major overhaul of our public lands management strategy, placing biodiversity conservation at the pinnacle of public values to be served by federal land ownership and management. It also would necessitate a major reshuffling of the federal land portfolio, divesting lands of lesser biological value in favor of acquisitions of higher biological value. Admittedly, this approach necessitates a massive undertaking. Many will think the federal government is not up to the task. It is a daunting task, but the leading alternatives—continuing to muddle through on the road to extinction, or conducting a massive and unprecedented federal intervention in land-use regulation on a generalized and nationwide basis—are almost certainly worse.