

OUR SEDIMENTATION BOXES RUNNETH OVER: PUBLIC LANDS SOIL LAW AS THE  
MISSING LINK IN HOLISTIC NATURAL RESOURCE PROTECTION

BY

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*Soil is a critical component to nearly every ecosystem in the world, sustaining life in a variety of ways—from production of biomass to filtering, buffering and transformation of water and nutrients. While there are dozens of federal environmental laws protecting and addressing a wide range of natural resources and issues of environmental quality, there is a significant gap in the protection of the soil resource. Despite the critical importance of maintaining healthy and sustaining soils, conservation of the soil resource on public lands is generally relegated to a diminished land management priority. Countless activities, including livestock grazing, recreation, road building, logging, and mining, degrade soils on public lands. This article examines the roots of soil law in the United States and the handful of soil-related provisions buried in various public land and natural resource laws, finding that the lack of a public lands soil law leaves the soil resource under-protected and exposed to significant harm. To remedy this regulatory gap, this article sketches the framework for a positive public lands soil protection law. This article concludes that because soils are critically important building blocks for nearly every ecosystem on earth, an holistic approach to natural resources protection requires that soils be protected to avoid undermining much of the legal protection afforded to other natural resources.*

The soil continuum-discontinuum on the planet Earth is an open system. It is not to be studied in isolation.<sup>1</sup>

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The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea.<sup>2</sup>

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<sup>1</sup> S.W. BUOL ET AL., SOIL GENESIS AND CLASSIFICATION 143 (4th ed. 1997).

<sup>2</sup> ALDO LEOPOLD, A SAND COUNTY ALMANAC AND SKETCHES HERE AND THERE 132 (1949).



## I. INTRODUCTION

In August and September of 1996, the largest wildfire in the recorded history of the Umatilla National Forest raged over almost 51,000 acres of eastern Oregon's Blue Mountains. The fire reduced stream shade and large woody debris along 141 miles of streams, exposed soils to erosion, deposited sediment into waterways, killed fish, and destroyed fish and wildlife habitat.<sup>3</sup> When the United States Forest Service decided to conduct a salvage timber sale on several thousand acres of burned forest, a coalition of environmental groups sued the agency, claiming the Forest Service was required to prepare an environmental impact statement before the sale could proceed.<sup>4</sup> Sixty-five percent of the acres offered in the sale contained soils with high erosion potential, and tractors would skid logs over about a fifth of those acres.<sup>5</sup> The Ninth Circuit Court of Appeals agreed with the plaintiffs that the Forest Service had violated the National Environmental Policy Act (NEPA) by performing an inadequate environmental analysis of the proposed sales before concluding that no significant environmental impacts existed.<sup>6</sup> The court noted that the Forest Service provided "no documentation of the estimated sediment that would result from the logging and accompanying roadbuilding or the impacts of increased sediment on fisheries habitat. The Forest Service's only attempt to measure sedimentation failed when its data collection box overloaded with sediment."<sup>7</sup>

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<sup>3</sup> Umatilla National Forest, *Tower Fire Draft Environmental Impact Statement Summary* (1999), at <http://www.fs.fed.us/r6/uma/towersum.htm> (last modified Jan. 18, 2000).

<sup>4</sup> *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1210 (9th Cir. 1998). Environmental impact statements (EIS) are required under the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321–4370d (1994 & Supp. III 1997), for all "major Federal actions significantly affecting the quality of the human environment." *Id.* § 4332(2)(C) (1994).

<sup>5</sup> 161 F.3d at 1210.

<sup>6</sup> *Id.* at 1216. By the time the Ninth Circuit had ordered the Umatilla National Forest to halt "all logging, road building, and other ground disturbing activities" in November 1998, 19 of 26 million board feet had already been logged. *Id.* at 1211. See also Umatilla National Forest, *Tower Fire Draft Environmental Impact Statement Summary* (1999), at <http://www.fs.fed.us/r6/uma/towersum.htm> (last modified Jan. 18, 2000).

<sup>7</sup> 161 F.3d at 1213.

This is but one example where conservation of the soil resource in federal public lands management has been relegated to some lesser priority. In fact, humans have been significantly altering the ecosystems they live in, including the soil component, for as long as they have been more than hunters and gatherers. For example, geoarchaeologists working in the lowlands of Guatemala, Belize, and Mexico, have suggested that the Maya's agricultural intensification and landscape restructuring lead directly to that civilization's collapse around 900 A.D.<sup>8</sup> Referring to the Maya Collapse as "one of the most enduring [problems] in all of archaeology," researchers documented severe environmental degradation of the soil resource by examining buried soils in the region.<sup>9</sup> Much of the research suggests that intensive agricultural practices such as creation of raised fields, terraces, gardens, and various silvicultural management systems, combined with climatic changes over time, drastically altered the hydrology and chemistry of the soils.<sup>10</sup> This contributed to significant erosion and soil nutrient depletion, eventually leaving the land incapable of supporting the population.<sup>11</sup>

The lessons of the Maya and other ancient populations should not be lost on modern-day civilizations. Soil erosion is a serious problem in the United States today. Agriculture is the

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<sup>8</sup> John S. Jacob, *Archaeological Pedology in the Maya Lowlands*, in *PEDOLOGICAL PERSPECTIVES IN ARCHAEOLOGICAL RESEARCH* 51 (Mary E. Collins et al. eds., 1995).

<sup>9</sup> *Id.* at 58–59. Buried soils are soils that formed on an ancient landscape, were subsequently buried by some younger deposit, and are far enough below the present land surface that they are not affected by present soil-forming processes. PETER W. BIRKELAND, *SOILS AND GEOMORPHOLOGY* 11 (1984).

<sup>10</sup> Jacob, *supra* note 8, at 57–58.

<sup>11</sup> *Id.* Detrimental prehistoric agricultural practices have affected North American cultures, as well. In southwest New Mexico, geoarchaeologists have documented a number of prehistoric agricultural terracing sites that date to between 1000 and 1500 A.D. Jonathan A. Sandor, *Long-term Effects of Prehistoric Agriculture on Soils: Examples from New Mexico and Peru*, in *SOILS IN ARCHAEOLOGY* 217, 218 (Vance T. Holliday ed. 1992). The re-working of the landscape in order to create concentrated areas of fertile organic soils resulted in changes in vegetation from sedimentation, erosion, and human clearing; significant losses of organic matter in the soils; soil compaction; and decreased levels of phosphorous, a key soil nutrient. *Id.* at 225–228. The changes imposed by prehistoric human management of that landscape continue to alter vegetation patterns today, and the "prehistorically cultivated soils remain partly degraded nearly 900 years after agriculture ceased." *Id.* at 240.

leading national cause of soil erosion, with cropland erosion totaling 1.9 billion tons in 1997.<sup>12</sup>

Sedimentation in the Mississippi River has created the infamous 11,000 square mile hypoxic “dead zone” in the Gulf of Mexico as a result of the 331 million tons of soil that flows into the Gulf each year.<sup>13</sup> Although farms have the dubious distinction of leading the way in soil erosion, significant soil erosion and degradation problems also occur on federal public lands, primarily in the West.<sup>14</sup>

There are dozens of federal laws that protect natural resources and environmental quality.

These laws cover a wide range of resources and land use activities,<sup>15</sup> including forests,<sup>16</sup> grasslands,<sup>17</sup> plant and animal species,<sup>18</sup> water,<sup>19</sup> minerals,<sup>20</sup> and air.<sup>21</sup> That is not to mention a

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<sup>12</sup> J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27 *ECOLOGY L.Q.* 263, 279 (2000). This represents a 42% decrease from the 3.07 billion tons of sediment eroded in 1982. *Id.*

<sup>13</sup> *Id.* at 278. See also Randy Lowell, *Private Actions and Marine and Water Resources: Protection, Recovery and Remediation*, 8 *S.C. ENVTL. L.J.* 143 (2000) (citing National Oceanic and Atmospheric Administration, National Ocean Service, *Hypoxia in the Gulf of Mexico*, at [http://www.nos.noaa.gov/products/pubs\\_hypox.html](http://www.nos.noaa.gov/products/pubs_hypox.html) (revised Nov. 7, 2000)). The term “hypoxia” refers to a depletion of oxygen in the water. It is caused in the Gulf of Mexico by human-induced nutrient over-enrichment, which leads to increased algal production and increased availability of organic carbon within the ecosystem, a process known as eutrophication. The oxygen levels in the Gulf hypoxic zone are too low for most aquatic species to survive. *Hypoxia in the Gulf of Mexico*, at Introduction.

<sup>14</sup> About 70% of the land in the United States is privately owned, and farmers and ranchers own about 50% of the land, or 907 million acres. U.S. Dep’t of Agric. & U.S. Env’tl. Protection Agency, *Clean Water Action Plan, Overview* (1998), at <http://cleanwater.gov/action/overview.html> (revised Oct. 26, 2000). About 400 million acres of land is federally owned. *Id.* Note also that urbanization poses a significant threat to the soil resource. Between 1992 and 1997, about 16 million acres (3.2 acres per year) of land was converted to urban development land—more than double the rate for the periods 1982–1987 (1.3 million acres per year) and 1987–1992 (1.5 million acres per year). Soil & Water Cons. Soc’y, *The State of the Soil*, at [http://www.swcs.org/f\\_publicaffairs\\_stateofland.htm](http://www.swcs.org/f_publicaffairs_stateofland.htm) (last modified Mar. 10, 2000). Finally, the Forest Service’s Roadless EIS provides one recent example of the scope of the erosion problem on western public lands, in its discussion of mass wasting (the downward movement of soil, rock, and vegetation). U.S. FOREST SERVICE, ROADLESS AREA CONSERVATION DRAFT EIS 3-36 (2000). The EIS reports that the winter storms of 1995–96 triggered thousands of landslides in national forests throughout California, Oregon, Washington, Idaho, and Montana. *Id.* A study in Oregon and Washington, for example, reported that of 1290 slides reviewed in 41 subwatersheds, 52% were related to roads, 31% to timber harvest, and 17% to natural forest. *Id.* A study on the Oregon coast’s Siuslaw National Forest determined that roads were the source of 41% of the slides, harvest units less than 20 years old were the source of 36%, and natural forest accounted for the remaining 23%. *Id.*

<sup>15</sup> Levels of environmental “protection” and enforceability in each of these laws are, however, subject to debate. There are, of course, significant regulatory gaps in the environmental laws, for example farming. See Ruhl, *supra* note 12.

<sup>16</sup> See, e.g., National Forest Management Act of 1976, 16 U.S.C. §§ 472a, 521b, 1600, 1611–1614 (1994) (amending Forest and Rangelands Renewable Resources Planning Act of 1974, Pub. L. No. 93-378, 88 Stat. 476); Oregon & California Act, 43 U.S.C. §§ 1181 (1994).

<sup>17</sup> See, e.g., Federal Land Policy and Management Act of 1976, 43 U.S.C. §§ 1701–1785 (1994 & Supp. III 1997).

host of environmental laws targeted at toxic and polluting substances introduced into the environment by humans.<sup>22</sup> Yet, despite scattered provisions in a few statutes focused on other resources,<sup>23</sup> there is a significant gap in the protection of the soil resource. For a variety of reasons—perhaps because the soil resource is less glamorous than endangered species, or less obvious than toxically polluted waters or clearcut forests, or less politically divisive than “cowburnt”<sup>24</sup> rangelands—it has never received the sort of political or grassroots attention that other natural resources and land uses have.

In fact, soils have only received considerable attention from Congress in the private lands agricultural context—and even there only in a hands-off, “anti-law” fashion, motivated by a desire to improve soil (that is, crop) productivity.<sup>25</sup> This study, however, focuses on soils in the public lands context, leaving aside agricultural and urban soil issues, which have been discussed

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<sup>18</sup> See, e.g., Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (1994); National Wildlife Refuge System Administration Act of 1966, 16 U.S.C. §§ 668dd–668ee (1994 & Supp. IV 1998); Marine Mammal Protection Act of 1972, 16 U.S.C. §§ 1361–1421h (1994).

<sup>19</sup> See, e.g., Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251–1387 (1994 & Supp. III 1997); Wild and Scenic Rivers Act of 1968, 16 U.S.C. §§ 1271–1287 (1994 & Supp. IV 1998); Coastal Zone Management Act of 1972, 16 U.S.C. §§ 1451–1465, 1462 (1994 & Supp. III 1997); Beaches Environmental Assessment and Coastal Health Act of 2000, Pub. L. No. 106-284, 114 Stat. 870 (codified in scattered sections of 33 U.S.C.).

<sup>20</sup> See, e.g., General Mining Law of 1872, 30 U.S.C. §§ 22–45 (1994); Mineral Leasing Act of 1920, as amended, 30 U.S.C. §§ 181–287 (1994); Outer Continental Shelf Lands Act of 1953, 43 U.S.C. §§ 1331–1343 (1994); Geothermal Steam Act of 1970, 30 U.S.C. §§ 1001–1025 (1994).

<sup>21</sup> See, e.g., Clean Air Act, 42 U.S.C. §§ 7401–7671q (1994 & Supp. III 1997).

<sup>22</sup> See, e.g., Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9601–9675 (1994 & Supp. III 1997); Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901–6992k (1994 & Supp. III 1997) (amending Solid Waste Disposal Act, Pub. L. No. 89-272, 79 Stat. 992); Toxic Substances Control Act, 15 U.S.C. §§ 2601–2692 (1994 & Supp. IV 1998); Federal Insecticide, Fungicide & Rodenticide Act, 7 U.S.C. §§ 136–136y (1994 & Supp. IV 1998).

<sup>23</sup> See *infra* Part III.B.

<sup>24</sup> See Edward Abbey, *Even the Bad Guys Wear White Hats*, HARPER’S, Jan. 1986, at 51.

<sup>25</sup> See Ruhl, *supra* note 12, at 293 (federal environmental provisions that apply or could potentially apply to farms are scattered throughout many different laws). Ruhl argues that Congress has actively prevented the intersection of environmental law and farming “though a nearly unbroken series of decisions to exclude farms and farming from the burdens of federal environmental law, with states mainly following suit. Congress has enacted what I will call a vast “anti-law” of farms and the environment.” *Id.* at 268.

at some length.<sup>26</sup> Countless activities, including livestock grazing, recreation, road building, logging, mining, and irrigation degrade soils on public lands. Because there are no laws that directly address and protect soils on the public lands, consideration of soils in land use planning is usually only in the form of vaguely conceived or discretionary guidelines and monitoring requirements. This is a major gap in the effort to provide ecosystem-level protection for natural resources.

The rise of an “ecosystem approach” in environmental and natural resources law is one of the most significant aspects of the continuing evolution of this area of law and policy. One writer has observed that there is a

fundamental change occurring in the field of environmental protection, from a narrow focus on individual sources of harm to a more holistic focus on entire ecosystems, including the multiple human sources of harm within ecosystems, and the complex social context of laws, political boundaries, and economic institutions in which those sources exist.<sup>27</sup>

As federal agencies focus increasingly on addressing environmental protection from an holistic perspective under the current regime of environmental laws, a significant gap remains in the federal statutory scheme: protection of soils as a discrete and important natural resource.

Because soils are essential building blocks at the core of nearly every ecosystem on earth, and because soils are critical to the health of so many other natural resources—including, at the

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<sup>26</sup> Ruhl provides an excellent study that comprehensively addresses the environmental harms caused by farms and the countless agricultural loopholes in the environmental laws. *See supra* note 12. *See also* Larry C. Frarey et al., *Conservation Districts as the Foundation for Watershed-Based Programs to Prevent and Abate Polluted Agricultural Runoff*, 18 *HAMLIN L. REV.* 151 (1994) (proposing an approach to controlling polluted agricultural runoff that combines voluntary efforts by farmers, “under the auspices of local conservation districts,” with regulatory enforcement by water quality regulatory agencies).

<sup>27</sup> Michael M. Wenig, *How “Total” Are “Total Maximum Daily Loads”?*—*Legal Issues Regarding the Scope of Watershed-Based Pollution Control Under the Clean Water Act*, 12 *TUL. ENVTL. L.J.* 87, 89 (1998). There are, however, major questions to ask of what exactly is the focus of “ecosystem management” in some agency plans—the ecosystem or the management? *See, e.g.* MICHAEL C. BLUMM, *SACRIFICING THE SALMON: A LEGAL AND POLICY HISTORY OF THE DECLINE OF COLUMBIA BASIN SALMON* (2000) (forthcoming) (manuscript at 359–63, on file with author).

broadest level, water, air, and vegetation—they should be protected at a level at least as significant as other natural resources. Federal soil law (such as it is) is woefully inadequate as it currently stands. It is a missing link in the effort to protect the natural world at a meaningful and effective ecosystem level.

This article examines the gap with respect to soil conservation and protection in current federal public land and resources law. Part II briefly examines the role of soils as integral components of ecosystems and the comprehensive importance of soil functions in human life. Part III traces the roots of soil law as it currently stands, from the establishment of the Soil Survey and the agriculturally oriented soil laws on the books, to the handful of soil-related provisions buried in various public land and natural resources laws. This analysis concludes that the lack of a public lands soil law leaves the soil resource under-protected and exposed to significant harm, and emasculates the environmental protections afforded to other natural resources. Part IV details the essential elements of a public lands soil protection law, including the scope of such a law, the use of scientific knowledge already in place, administration of the law, and necessary and effective provisions of the law. This article concludes that because soils are critically important building blocks for nearly every ecosystem on earth, a holistic approach to natural resources protection requires that this resource be protected to avoid undermining much of the legal protection that has been afforded other natural resources.

## II. SOIL AS AN ECOSYSTEM COMPONENT

### *A. Defining Soil and Its Place in Human Existence*

Soils are critical components to nearly every ecosystem in the world<sup>28</sup>—they are essential ecosystem building blocks at the confluence of the atmosphere, hydrosphere, biosphere,

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<sup>28</sup> BUOL ET AL., *supra* note 1, at 143.

pedosphere, and lithosphere.<sup>29</sup> Simply put, soil is “a natural body of mineral and organic matter that changes, or has changed, in response to climate and organisms.”<sup>30</sup> The Soil Survey<sup>31</sup> defines soil as

a natural body composed of solids (minerals and organic matter), liquid, and gases that occurs on the land surface, occupies space, and is characterized by one or both of the following: horizons, or layers, that are distinguishable from the initial materials as a result of additions, losses, transfers, and transformations of energy and matter *or* the ability to support rooted plants in a natural environment.<sup>32</sup>

Stated more in layperson’s terms,

[t]he upper limit of soil is the boundary between soil and air, shallow water, live plants, or plant materials that have not begun to decompose. . . . The lower boundary that separates soil from the nonsoil underneath is [where] . . . soil grades . . . to hard rock or to earthy materials virtually devoid of animals, roots, or other marks of biological activity.<sup>33</sup>

Perhaps most useful in terms of understanding how soil forms and is continually affected by its surrounding environment is Hans Jenny’s simple soil equation, which states that soil is a function of climate, organisms, relief, parent material, and time.<sup>34</sup> In other words, each of these five soil-forming factors interacts with the others, on a site-specific basis, to influence the formation and characteristics of the soil in a given location.

The soil resource is critical to human existence. In fact, an initiative for a United Nations Convention on Sustainable Use of Soils<sup>35</sup> identifies at least six significant functions of soil for

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<sup>29</sup> See HANS JENNY, *THE SOIL RESOURCE: ORIGIN AND BEHAVIOR* (1980).

<sup>30</sup> BUOL ET AL., *supra* note 1, at 11. Depending on who is defining the term (for example, geologists, ecologists, archaeologists, chemists), the term “soil” can have a variety of interrelated definitions. See, e.g., *id.*; BIRKELAND, *supra* note 9, at 3.

<sup>31</sup> See *infra* Part III.A.1 (discussing the establishment and functions of the national soil survey program).

<sup>32</sup> SOIL SURVEY STAFF, *KEYS TO SOIL TAXONOMY* 9 (8th ed. 1998) [hereinafter *KEYS TO SOIL TAXONOMY*], available at <http://www.statlab.iastate.edu/soils/nssc/> (revised May 26, 2000).

<sup>33</sup> *KEYS TO SOIL TAXONOMY*, *supra* note 32, at 9.

<sup>34</sup> HANS JENNY, *FACTORS OF SOIL FORMATION* (1941). Jenny’s factors are often referred to by their acronym, “CIORPT.”

<sup>35</sup> International Soc’y of Soil Science, *Convention of Sustainable Use of Soils* (1998), available at <http://www.soil-convention.org/English.htm> (last modified Aug. 17, 1999).

human life: 1) production of biomass by agriculture and forestry; 2) filtering, buffering and transformation between the atmosphere, groundwater, and plant cover; 3) value as biological habitats and gene reserves, much larger in quantity and in quality than the total above-ground biomass; 4) service as a spatial base for technical, industrial and socio-economic structures; 5) use as a source of raw materials (for example clay, sand, and gravel for construction); and, 6) repositories of a “geogenic and cultural heritage, forming an essential part of the landscape in which we live and concealing paleontological and archaeological treasures of high value for the understanding of the history of earth and mankind.”<sup>36</sup> The Director of the Natural Resources Conservation Service’s (NRCS) National Soil Survey Center states, “Soil is the essence of life. It supports plants, filters water, and is home to chemical reactions and organisms that we are just beginning to understand.”<sup>37</sup> In short, soil is central to ecosystem health and human existence.

### *B. The Soil Resource*

As the numerous definitions of soil suggest, the soil resource is a complex ecosystem component. It is probably because soils affect or are affected by most environmental processes that it has been easier for policy makers and land managers simply to consign consideration of soils to the management of other resources, rather than create an independent management scheme for soil. However, this approach ignores the critical central role of soils in ecosystem health, and the fragility of soils as natural resources. While a clearcut forest may regenerate to an old-growth forest in a matter of a few centuries, soil formation is much more gradual. Rates of soil formation differ greatly depending on the various soil-forming factors, but those rates may vary from anywhere between half a century to thousands or even tens of thousands of

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<sup>36</sup> *Id.*

<sup>37</sup> Robert J. Ahrens, Director, National Soil Survey Ctr., *Introduction*, at <http://www.statlab.iastate.edu/soils/nssc/> (last modified Oct. 2, 2000).

years.<sup>38</sup> Thus, where a soil is significantly eroded or otherwise degraded, it may require a tremendous amount of time to return to a fully developed and “functional” state.

Human land management activities may degrade soils in a variety of physical and chemical ways, including erosion, depletion of nutrients, loss of organic matter, compaction, reduced infiltration and porosity, physical breakdown of soil structure, saturation, and salinization.<sup>39</sup> These various forms of soil degradation may lead in turn to a chain reaction of subsequent environmental problems—for example, water quality and stream habitat degradation from sedimentation, air pollution from wind erosion of exposed soil, and altered vegetation patterns from nutrient depletion. In short, human impacts on the soil resource are pervasive, and every component of the ecosystems humans live in and depend on is affected in one way or another by the soil resource.

### III. SOIL LAW—OR THE LACK THEREOF

There is no true federal soil law. In fact, very few people have even thought about a body of soil law outside of the agricultural context.<sup>40</sup> The greatest attention paid to soils as a natural resource has been in the agricultural context, where the focus has been on reducing erosion and increasing crop productivity. Soil erosion, especially on private agricultural lands, is a critically important issue in the country’s sustainability of crop production.<sup>41</sup> While agricultural soil law is production-based and incentive-driven, there are no true preservation-

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<sup>38</sup> BUOL ET AL., *supra* note 1, at 185–90. The authors provide a table of example estimates of soil formation rates, ranging from 1.3 cm/year for a soil forming in volcanic ash, to 40 cm/year for a soil forming in a weathered loess in the Midwest, to 750 cm/year for a soil forming in tropical Africa.

<sup>39</sup> For an example of one land use activity’s effects on soils, see A. Joy Belsky & Dana M. Blumenthal, *Effects of Livestock Grazing on Stand Dynamics and Soils in Upland Forests of the Interior West*, 11 CONS. BIOL. 315 (1997).

<sup>40</sup> In fact, public lands soil issues have really only been discussed tangentially in works focused on agricultural erosion issues. See, e.g., Ruhl, *supra* note 12, at 298–304 (discussing nonpoint source pollution under the Clean Water Act); John H. Davidson, *State Soil Erosion Control Laws, Conservation Plans and Nonpoint Pollution*, 1 GREAT PLAINS NAT. RESOURCES J. 421 (1996) (addressing whether state soil erosion and sediment control laws constitute a meaningful constraint on state agriculture and forestry practices).

based, protective laws that apply to soil quality on public lands. As a result, federal agency consideration of soils in land use planning is usually only in the form of vaguely conceived and discretionary goals, guidelines, or monitoring requirements. This section begins with a discussion of the few laws devoted solely to soils, followed by a discussion of the scattered references to soil management and conservation that occur in a handful of federal environmental and natural resource laws.

### *A. Soil Conservation and Soil-Specific Statutes: Origins to Present*

#### *1. Establishment of the Soil Survey*

Over a century ago, at a time when the United States still had one foot firmly planted in its agricultural origins, Congress initiated a nationwide soil survey in the Agricultural Appropriation Act of 1896.<sup>42</sup> The soil survey was one of a variety of conservation-minded actions at the close of the nineteenth century that signaled the end of the federal land disposal policy and the beginning of an era of land reservation and withdrawal.<sup>43</sup> The 1896 Act provided funding for an investigation “of the relation of soils to climate and organic life” and “of the texture and composition of soils in field and laboratory.”<sup>44</sup> By 1899, the Department of Agriculture (USDA) had completed field investigations and soil mapping in portions of Utah, Colorado, New Mexico, and Connecticut.<sup>45</sup> The soil survey authority was expanded and vested in the Soil Conservation Service in 1935, and continues today as part of the Natural Resources

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<sup>41</sup> James L. Arts & William L. Church, *Soil Erosion—The Next Crisis?*, 1982 WIS. L. REV. 535, 552–61 (1982).

<sup>42</sup> Agricultural Appropriation Act of 1896, 53rd Cong., ch. 169.

<sup>43</sup> Other significant acts at that time included the General Revision Act of 1891, 16 U.S.C. § 471 (1994), which authorized the President to “set apart and reserve . . . any part of the public lands . . . as public reservations,” and the Organic Act of 1897, 16 U.S.C. §§ 473–481 (repealed in part, 1976), which authorized protective management of withdrawn forest reserves. *See, e.g.*, George Cameron Coggins & Margaret Lindberg-Johnson, *The Law of Public Rangeland Management II: The Commons and the Taylor Act*, 13 ENVTL. L. 1, 3–22 (1982).

<sup>44</sup> Agricultural Appropriation Act of 1896, 53rd Cong., ch. 169.

<sup>45</sup> SOIL SURVEY STAFF, U.S. DEP’T OF AGRICULTURE, SOIL SURVEY MANUAL 11 (1993) [hereinafter SOIL SURVEY MANUAL], available at [http://www.statlab.iastate.edu/soils/ssm/gen\\_cont.html](http://www.statlab.iastate.edu/soils/ssm/gen_cont.html) (issued Oct. 1993).

Conservation Service (NRCS).<sup>46</sup>

A soil survey describes the characteristics of the soils in a given area, classifies and maps soils according to a standard system, and “makes predictions about the behavior of soils.”<sup>47</sup> In its 1999 Annual Report, the USDA called the soil survey “perhaps the largest and most valuable natural resource database in the world.”<sup>48</sup> Early soil surveys essentially served as agricultural tools, helping farmers decide which crops and management practices were most suitable for different types of soils.<sup>49</sup> Beginning in the early twentieth century, more and more scientists were studying soils and developing an increasingly sophisticated understanding of soil formation processes.<sup>50</sup> Soil science began to evolve as a discipline of its own, rather than a sub-discipline of geology or agricultural chemistry.<sup>51</sup> By the late 1920s, soil surveys were being used for farming, ranching, forestry, highway and airfield construction, residential and industrial developments, and even tax assessment.<sup>52</sup>

Despite the increasing scientific sophistication and understanding of soils, the political movement to protect soil degradation was essentially a one-man “crusade” in the first three decades of the twentieth century.<sup>53</sup> A government geologist named Hugh Bennett vociferously argued that soil erosion was destroying American farm productivity, and that a federal soil conservation program was needed.<sup>54</sup> The federal government first recognized these arguments in

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<sup>46</sup> See *infra* Part III.A.2.

<sup>47</sup> SOIL SURVEY MANUAL, *supra* note 45, at 1.

<sup>48</sup> U.S. DEP’T OF AGRIC., SOWING THE SEEDS FOR A NEW MILLENNIUM: ANNUAL REPORT OF THE SECRETARY OF AGRICULTURE, FY 1999, 20 (2000) [hereinafter U.S. DEP’T OF AGRIC 1999 ANNUAL REPORT].

<sup>49</sup> SOIL SURVEY MANUAL, *supra* note 45, at 2.

<sup>50</sup> SOIL SURVEY MANUAL, *supra* note 45, at 2–3.

<sup>51</sup> SOIL SURVEY MANUAL, *supra* note 45, at 3–4.

<sup>52</sup> SOIL SURVEY MANUAL, *supra* note 45, at 11.

<sup>53</sup> JEANNE NIENABER CLARKE & DANIEL C. MCCOOL, STAKING OUT THE TERRAIN: POWER AND PERFORMANCE AMONG NATURAL RESOURCE AGENCIES, 91 (2d. ed. 1996).

<sup>54</sup> *Id.* See also Arts & Church, *supra* note 41, at 589.

1928 when the USDA published Bennett’s paper titled, “Soil Erosion, A Natural Menace.”<sup>55</sup> It was not until the Dust Bowl years of the early 1930s, however, that Congress paid any further attention to soils.

## 2. *The Soil Erosion Act of 1935*

In 1933, President Roosevelt’s Secretary of Interior, Harold Ickes, established the Soil Erosion Service in the Department of the Interior.<sup>56</sup> Ickes appointed Hugh Bennett as the first head of the Service, which was to assist farmers in implementing soil erosion control projects and create jobs through the Civilian Conservation Corps.<sup>57</sup> Bennett’s Soil Erosion Service actively pursued its goals for two years, culminating in 1935 with the ultimate political trump card for his cause: Bennett was testifying before Congress on behalf of his cause on a day when the Capitol building was shrouded in a thick dust storm that had billowed across the Nation from two thousand miles away.<sup>58</sup>

In 1935, Congress enacted the Soil Conservation and Domestic Allotment Act,<sup>59</sup> also known as the Soil Erosion Act or Soil Conservation Act. Among the Act’s major accomplishments were the creation of the Soil Conservation Service (SCS)<sup>60</sup> and the authorization of funding to assist farmers in soil erosion control. Congress “recognized that the wastage of soil and moisture resources on farm, grazing, and forest lands of the Nation, resulting

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<sup>55</sup> CLARKE & MCCOOL, *supra* note 53, at 91.

<sup>56</sup> *Id.* at 92. The Soil Erosion Service functioned as part of the National Industrial Recovery Administration. *Id.* See also Arts & Church, *supra* note 41, at 588–89.

<sup>57</sup> CLARKE & MCCOOL, *supra* note 53, at 91.

<sup>58</sup> *Id.* See also Douglas Helms, *Brief History: Natural Resources Conservation Service*, in A HISTORICAL GUIDE TO THE U.S. GOVERNMENT 434-439 (1998), available at <http://www.nhq.nrcs.usda.gov/RESS/econ/History/BriefHistory.html> (last modified June 12, 2000) (recounting Bennett’s description of that day before Congress, when the Senators peered out the windows as the dust storm rolled in, in “sun-darkening proportions”).

<sup>59</sup> Soil Conservation and Domestic Allotment Act of April 27, 1935, ch. 85, 49 Stat. 163 (1935) (codified as amended at 16 U.S.C. §§ 590a–590q (1994 & Supp. VI 2000)).

<sup>60</sup> However, “to Secretary Ickes’ chagrin,” the act established the SCS in the Department of Agriculture rather than in the Department of The Interior. CLARKE & MCCOOL, *supra* note 53, at 92.

from soil erosion, is a menace to the national welfare.”<sup>61</sup> The Soil Erosion Act declares Congress’s policy “to provide permanently for the control and prevention of soil erosion and thereby to preserve natural resources, control floods, prevent impairment of reservoirs, and maintain the navigability of rivers and harbors, protect public health, public lands and relieve unemployment.”<sup>62</sup>

To accomplish these lofty purposes, the Secretary of Agriculture was authorized to 1) conduct, publish, and disseminate “surveys, investigations, and research” regarding soil erosion and its prevention; 2) carry out “preventive measures,” including “engineering operations, methods of cultivation, the growing of vegetation, and changes in use of land”; 3) cooperate or enter into agreements with agencies and individuals; and 4) “acquire lands, or rights or interests therein . . . wherever necessary for the purposes of this Act.”<sup>63</sup> The actions authorized in section 590a(1)–(2) are permitted on federal lands, with the cooperation of the agency with jurisdiction over the particular lands, and on private lands after obtaining the consent or “necessary rights or interests in such lands.”<sup>64</sup>

Between 1935 and 1985, Congress amended and added to the purposes of the Soil Erosion Act.<sup>65</sup> A more detailed list of purposes in section 590g includes 1) “preservation and improvement of soil fertility”; 2) “promotion of the economic use and conservation of land”; 3) reduction of “exploitation and wasteful and unscientific use of national soil resources”; 4) protection of rivers and harbors against soil erosion, to maintain navigability and aid flood

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<sup>61</sup> 16 U.S.C. § 590a (1994).

<sup>62</sup> *Id.*

<sup>63</sup> *Id.* § 590a(1)–(4).

<sup>64</sup> *Id.* § 590b.

<sup>65</sup> *Id.* § 590g (Apr. 27, 1935, ch. 85, § 7, as added Feb. 29, 1936, ch. 104, § 1, 49 Stat. 1148, and amended June 28, 1937, ch. 395, § 1, 50 Stat. 329; Pub. L. No. 87-703, title I, § 101(1), Sept. 27, 1962, 76 Stat. 605; Pub. L. No. 92-419, title VI, Sec. 606(1), Aug. 30, 1972, 86 Stat. 676; Pub. L. No. 99-198, title XII, § 1253, Dec. 23, 1985, 99 Stat. 1517).

control; 5) reestablishment and maintenance of a specified net purchasing power ratio for farmers; 6) “prevention and abatement of agricultural-related pollution”; and, 7) “promotion of energy and water conservation through dry land farming.”<sup>66</sup> Finally, the Soil Erosion Act states that, “[i]n carrying out the purposes of this section due regard shall be given to the maintenance of a continuous and stable supply of agricultural commodities adequate to meet consumer demand at prices fair to both producers and consumers.”<sup>67</sup>

One of the primary ways the SCS implemented its 1935 mandate was by establishing demonstration projects in cooperation with individual farmers.<sup>68</sup> Those projects tested practices such as contour plowing, strip cropping, planting erosion resistant crops such as alfalfa and clover, periodically resting lands, and using small-scale terraces and dams.<sup>69</sup> While the demonstration projects met their individual goals, the SCS wanted to implement soil conservation practices over a much broader scale.<sup>70</sup> To achieve a more comprehensive impact, the SCS initiated the idea of soil conservation districts.<sup>71</sup> These local administrative units were based upon a 1937 standardized state conservation districts law, which President Roosevelt submitted to all state governors.<sup>72</sup> After a state had passed the conservation district law, individual districts were organized by local referenda: At least twenty-five farmers had to submit a petition to a state conservation committee, which would then fix boundaries for the

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<sup>66</sup> *Id.* § 590g(a)(1)–(7).

<sup>67</sup> *Id.* § 590g(a).

<sup>68</sup> CLARKE & MCCOOL, *supra* note 53, at 93.

<sup>69</sup> CLARKE & MCCOOL, *supra* note 53, at 93.

<sup>70</sup> CLARKE & MCCOOL, *supra* note 53, at 94.

<sup>71</sup> CLARKE & MCCOOL, *supra* note 53, at 94.

<sup>72</sup> U.S. DEP’T OF AGRIC., A STANDARD STATE SOIL CONSERVATION DISTRICTS LAW (1936). *See* Arts & Church, *supra* note 41, at 589–90. Oregon, for example, enacted its version of the model statute in 1939. OR. REV. STAT. §§ 568.225, 568.300 (1999) (policy; petition for formation of district). *See also* CHARLES V. LILES, GRASS ROOTS: A CHRONICLE OF NATURAL RESOURCE CONSERVATION AND MANAGEMENT IN OREGON, 1939-1985 (Joseph and Patricia McCray eds. 1985) (history of conservation districts in Oregon).

district and initiate public hearings.<sup>73</sup> A district could only be formed with a majority vote in the ensuing local referendum.<sup>74</sup> Today, there are 3000 soil conservation districts organized under state law—almost one in every county of the nation.<sup>75</sup> NRCS describes soil conservation districts as “the heart of the conservation delivery system . . . operat[ing] on the premise that local people know the most about local needs.”<sup>76</sup> In general, soil conservation districts provide technical assistance to private landowners; help land managers control erosion on farms and public lands through various conservation practices; help protect beaches, streams, and rivers; help with flood control and drought management programs; and help in drafting and implementing conservation and resource management plans in watersheds.<sup>77</sup>

### 3. *The Soil and Water Resource Conservation Act of 1977*

In 1977, Congress passed the Soil and Water Resource Conservation Act<sup>78</sup> (SWRCA), the closest thing to a true soil conservation law on the books. Finding that “[t]here is a growing demand on the soil, water, and related resources of the Nation to meet present and future needs,”<sup>79</sup> Congress directed the Secretary of Agriculture to:

- (1) apprais[e] on a continuing basis the soil, water, and related resources of the Nation;
- (2) develop[] and updat[e] periodically a program for furthering the conservation, protection, and enhancement of the soil, water, and related resources of the Nation consistent with the roles and program responsibilities of other Federal agencies and

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<sup>73</sup> See, e.g., OR. REV. STAT. § 568.300(1) (1999) (requiring 25 or more land owners, or owners of 70% or more of land proposed to be included in district).

<sup>74</sup> CLARKE & MCCOOL, *supra* note 53, at 94–95. Soil Conservation Districts are very similar to irrigation districts (also known as conservation districts, reclamation districts, and water control districts) in the West, which are local quasi-governmental bodies organized under state law to regulate the distribution of irrigation water.

<sup>75</sup> Natural Res. Cons. Serv., *NRCS At A Glance*, at <http://www.nrcs.usda.gov/NRCSglnc.html> (last modified Oct. 12, 2000).

<sup>76</sup> *Id.* See also Arts & Church, *supra* note 41, at 592 (soil and water conservation districts as “[t]he centerpiece of the soil conservation program”).

<sup>77</sup> See, e.g., OR. REV. STAT. §§ 568.210–568.933 (1999) (setting out powers and authorities of Oregon soil and water conservation districts). See also Arts & Church, *supra* note 41, at 592–96.

<sup>78</sup> Soil and Water Resource Conservation Act of 1977, 16 U.S.C. §§ 2001–2009 (1994).

<sup>79</sup> *Id.* § 2001(1).

State and local governments; and  
(3) provid[e] to Congress and the public, through reports, the information developed pursuant to paragraphs (1) and (2) of this subsection, and [provide] Congress with an annual evaluation report as provided in section 2006 of this title.<sup>80</sup>

Significantly, however, the SWRCA essentially applies only to private, non-federal lands.<sup>81</sup>

Although the term “soil, water, and related resources” is defined as “those resources which come within the scope of the programs administered and participated in by the Secretary of Agriculture,”<sup>82</sup> the programs referred to are NRCS federal programs that provide “assistance” or “cooperative efforts” to state programs.<sup>83</sup> Thus, even though the Secretary of Agriculture manages the national forests, the SWRCA does not apply to the wholly federal management activities on the national forests.<sup>84</sup>

Nevertheless, as one of only two soil-specific statutes, the SWRCA merits some attention here. The Act has several significant, albeit often vague, sections. First, the Act directs the Secretary to carry out a continuous collection and appraisal of data.<sup>85</sup> The appraisal should include data on 1) the “quality and quantity of soil, water, and other resources, including fish and wildlife habitats”; 2) the capability and limitations of those resources for meeting the nation’s needs; 3) changes in the condition of those resources resulting from past uses; 4) federal and state laws, policies, and programs relating to use, development, and conservation of those natural resources; 5) the costs and benefits of “alternative soil and water conservation practices”; and 6)

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<sup>80</sup> *Id.* § 2003.

<sup>81</sup> *See id.* § 2005(a) (authorizing Secretary of Agriculture to develop soil and water conservation program for conservation “on the private and non-Federal lands of the Nation”).

<sup>82</sup> *Id.* § 2002(2).

<sup>83</sup> For example, the next term, “soil and water conservation program,” is defined as “a set of *guidelines for attaining the purposes of this chapter.*” *Id.* § 2002(3) (emphasis added).

<sup>84</sup> The SWRCA also does not apply to the 264 million acres of public lands managed by the Bureau of Land Management (BLM), which is in the Department of the Interior. *See infra* note 136–37, and accompanying text.

<sup>85</sup> 16 U.S.C. § 2004 (1994).

alternative irrigation techniques.<sup>86</sup>

Section 2005 authorizes and directs the Secretary to develop a national soil and water conservation program to guide the Secretary's activities with respect to "furthering soil and water conservation on the *private and non-Federal lands of the Nation*."<sup>87</sup> This program is to use the inventory and appraisal data collected under section 2004 in order to analyze and evaluate the concerns listed in that section, as well as resource problems, government authorities, and the feasibility of reusing organic waste materials.<sup>88</sup> The Secretary is also required to provide an annual report on the program, which is included in the NRCS's National Resources Inventory.<sup>89</sup> Finally, the Secretary is directed to coordinate the efforts of the various federal and state agencies involved, in order to carry out the inventory and conservation program.<sup>90</sup>

The task of carrying out the SWRCA's soil and water conservation program was originally assigned to the Soil Conservation Service. When Congress reorganized the USDA in 1994,<sup>91</sup> the SCS joined parts of the Agricultural Stabilization and Conservation Service to form a new agency: the Natural Resources and Conservation Service. Along with the SCS's programs, including the Soil Survey, the NRCS is also in charge of the Watershed Surveys and Planning program,<sup>92</sup> the Farmland Protection Program, the Conservation of Private Grazing Lands Initiative, and the Wetlands Reserve Program, among others.<sup>93</sup> With its instruction for the SCS

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<sup>86</sup> *Id.* § 2004(1)–(6).

<sup>87</sup> *Id.* § 2005(a) (emphasis added).

<sup>88</sup> *Id.* § 2005(a).

<sup>89</sup> *Id.* § 2006(b). See Natural Res. Cons. Serv., *National Resources Inventory*, at <http://www.nrcs.usda.gov/CCS/NRIrlse.html> (last modified Sept. 25, 2000). The NRCS conducts the Natural Resources Inventory every five years, collecting data on non-federal lands regarding land cover, land use, soil erosion, prime farmland soils, wetlands, habitat diversity, selected conservation practices, and other natural resources information. *Id.*

<sup>90</sup> 16 U.S.C. § 2008 (1994).

<sup>91</sup> Department of Agriculture Reorganization Act of 1994, 7 U.S.C. §§ 6901–7014 (1994).

<sup>92</sup> Authorized by Watershed and Flood Prevention Act, P.L. 83-566, August 4, 1954, (codified at 16 U.S.C. 1001–1008 (1994)).

<sup>93</sup> Synopses of these and other NRCS programs appear on the agency's website at Natural Res. Cons. Serv., *USDA*

to comprehensively inventory and evaluate the Nation's soil and water resources, the SWRCA was a product of the post-NEPA emphasis on environmental planning.<sup>94</sup> The SWRCA, however, did not mandate the consideration of the information and the decision-making process that NEPA did. Although the SCS collected large volumes of data, it largely failed to use those data to evaluate its programs and make substantive changes.<sup>95</sup> Nevertheless, some commentators have suggested that the immense task of quantifying soil erosion (on private lands) was a significant benefit in and of itself.<sup>96</sup>

### *B. Soil Conservation Provisions in Other Public Natural Resources Laws*

Aside from the 1935 Soil Erosion Act and the 1977 Soil and Water Resource Conservation Act, there are no other soil-specific statutes. There are, however, a number of scattered provisions in other public natural resource laws that address soil conservation and management. These provisions generally are relegated to some lesser priority status because they are tucked into laws whose primary focus is on some other natural resource. As a result, the provisions in the following discussion are typically use- or resource-specific, rarely applying to soil conservation or management across all types of agency actions or jurisdictions. There are at least a couple of statutory schemes that have the potential to provide limited protection for the soil resource. In general, though, public lands soil protection is left to the haphazard and often inconsistent provisions of statutes enacted for other purposes or with soils far down the list of priorities.

#### *1. Soil Protection on the National Forests: The National Forest Management Act*

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*Conservation Programs*, at <http://www.nrcs.usda.gov/NRCSProg.html> (last modified Oct. 25, 2000).

<sup>94</sup> CLARKE & MCCOOL, *supra* note 53, at 103.

<sup>95</sup> *Id.*

<sup>96</sup> *Id.* at 103–104 (citing Douglas Helms, *New Authorities and New Roles: SCS and the 1985 Farm Bill*, in READINGS IN THE HISTORY OF THE SOIL CONSERVATION SERVICE (U.S. Dep't of Agric., Soil Cons. Serv., Historical

Of all public natural resource laws, the National Forest Management Act (NFMA)<sup>97</sup> provides by far the greatest protection to the soil resource. Nevertheless, despite the fact that NFMA covers management of almost 192 million acres of national forests and grasslands across the United States, this is still less than a third of the public lands.<sup>98</sup> In addition, many of NFMA's strongest soil protecting provisions apply specifically to logging operations and not to the myriad other uses that occur on the national forests, such as livestock grazing, recreation, mineral extraction, and so forth. Reacting to increasing litigation in the early 1970s over the Forest Service's timber management practices,<sup>99</sup> Congress in 1976 passed NFMA, which provides the Forest Service's basic management authority.<sup>100</sup> NFMA focuses mainly on timber harvest planning, mandating that the Forest Service perform inventories,<sup>101</sup> plan in accordance with the NEPA,<sup>102</sup> consider the physical and economic suitability of the lands,<sup>103</sup> provide for

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Notes no. 1, 1992)).

<sup>97</sup> National Forest Management Act of 1976, 16 U.S.C. §§ 472a, 521b, 1600, 1611–1614 (1994) (amending Forest and Rangelands Renewable Resources Planning Act of 1974, Pub. L. No. 93-378, 88 Stat. 476).

<sup>98</sup> U.S. DEP'T OF AGRIC 1999 ANNUAL REPORT, supra note 48, at 17. The Bureau of Land Management manages another 264 million acres of public lands. BUREAU OF LAND MANAGEMENT, PUBLIC LANDS STATISTICS 1999 (2000) [hereinafter PUBLIC LANDS STATISTICS], available at <http://www.blm.gov/natacq/pls99/Pls99home.html> (last updated Mar. 15, 2000).

<sup>99</sup> See, e.g., *Izaak Walton League v. Butz*, 522 F.2d 945 (4th Cir. 1975) (held that 1897 Organic Act prohibited clear cutting because practice violated statutory mandate to designate, appraise, and sell only “dead, matured or large growth of trees”).

<sup>100</sup> Congress authorized discretionary executive designation of Forest Reserves in 1891, General Revision Act of 1891, 16 U.S.C. § 471 (1994), repealed by Pub. L. 94-579, § 704(a), 90 Stat. 2792 (repealed 1976), and provided management standards for those Reserves in the 1897 Organic Act. United States Forest Service Organic Act, 16 U.S.C. §§ 471–543(h), 473 (1994). For a brief history of the establishment and management of the national forest system, see Susan Jane M. Brown, “*The Forest Must Come First*”: *Gifford Pinchot's Conservation Ethic and the Gifford Pinchot National Forest—The Ideal and the Reality*, 11 *FORDHAM ENVTL. L.J.* 137, 137–148 (1999). The Multiple-Use, Sustained Yield Act (MUSY) clarified the Forest Service's management mission in 1960, although the MUSY's broad language lacked any enforceable legal standards. Multiple-Use Sustained Yield Act of 1960, 16 U.S.C. §§ 528–531 (1994). The MUSY does state that management of the national forests must provide “sustained yields” “in perpetuity . . . without impairment of the productivity of the land.” *Id.* § 531(b). The Forest Service cites this provision as authority “specifically governing Forest Service soil management.” U.S. FOREST SERVICE, FOREST SERVICE MANUAL § 2556.04a (1990) [hereinafter FSM], available at <http://www.fs.fed.us/im/directives/fsm/> (last modified Nov. 3, 1997).

<sup>101</sup> National Forest Management Act of 1976, 16 U.S.C. § 1604(g)(2)(B) (1994).

<sup>102</sup> *Id.* § 1604(g)(1).

<sup>103</sup> *Id.* §§ 1604(g)(3)(A), (E), & 1604(k).

diversity of plant and animal communities,<sup>104</sup> and follow certain harvesting guidelines and practices.<sup>105</sup>

NFMA contains a fair number of provisions dealing with soil degradation, both with respect to inventory and planning, and management standards. First, the Secretary is required to obtain inventory data on soil and other “renewable resources.”<sup>106</sup> During the planning process, the Secretary must identify as “not suited for timber production” any lands where logging cannot be performed “without irreversible resource damage to soils productivity, or watershed conditions.”<sup>107</sup> Forest planning also must provide for “evaluation of existing or potential watershed conditions that will influence soil productivity.”<sup>108</sup> The Act requires that the Forest Service “insure that timber will be harvested from National Forest System lands only where (i) soil, slope, or other watershed conditions will not be irreversibly damaged.”<sup>109</sup> All “vegetative manipulation” must “[a]void permanent impairment of site productivity and ensure conservation of soil and water resources.”<sup>110</sup> In addition, all “even-aged” management practices must be “carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources.”<sup>111</sup> Finally, perhaps the most significant management standard in the regulations specifies that forest management practices must “[c]onserve *soil* and water resources and not allow *significant or permanent impairment of the productivity of the land*.”<sup>112</sup> A Texas district court case contains some of the most extensive judicial analysis

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<sup>104</sup> *Id.* § 1604(g)(3)(B).

<sup>105</sup> *See, e.g., id.* §§ 1604(g)(3)(F) (limiting clearcutting), 1604(m) (prohibiting cutting unless stands have reached “culmination of mean annual increment” of growth).

<sup>106</sup> *Id.* § 1604(g)(2)(B).

<sup>107</sup> 36 C.F.R. § 219.14(a)(2) (2000).

<sup>108</sup> *Id.* § 219.23(e).

<sup>109</sup> 16 U.S.C. § 1604(g)(3)(E).

<sup>110</sup> 36 C.F.R. § 219.27(b)(5) (2000).

<sup>111</sup> 16 U.S.C. § 1604(g)(3)(F)(v) (1994). *See also* 36 C.F.R. § 219.27(c)(6) (2000).

<sup>112</sup> 36 C.F.R. § 219.27(a)(1) (2000) (emphasis added).

of NFMA’s soil protection requirements.<sup>113</sup> Plaintiff environmental organizations had claimed that the Forest Service’s management of Texas national forests was in violation of NFMA requirements regarding diversity of plant and animal species, protection of key resources, and inventorying and monitoring requirements.<sup>114</sup> After a trial and extensive findings of fact in its opinion, the court held that the Forest Service acted arbitrarily and capriciously in carrying out its duty to protect soil and watershed resources and collect inventory and monitoring data.<sup>115</sup>

The court described the Forest Service’s management of the soil resource as follows:

[T]he evidence shows that the Forest Service’s management activities are causing severe soil erosion and loss of essential organic matter. This loss of soil and organic matter substantially and permanently affects the productivity of the land. Without rich forest soil, plant and animal communities suffer as well as the forest land’s ability to produce healthy timber stands.<sup>116</sup>

Citing a number of NFMA provisions and regulations regarding protection of soils and other resources, the court determined that the Forest Service was “neither protecting nor conserving the key resource of soil.”<sup>117</sup> Regarding the related watershed resource, the court concluded that Forest Service timber harvest management was causing “substantial and permanent impairment” via soil erosion and sedimentation in waterways.<sup>118</sup> The evidence presented at trial suggested

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<sup>113</sup> *Sierra Club v. Glickman*, 974 F. Supp. 905 (E.D. Texas 1997), *aff’d sub nom. Sierra Club v. Peterson*, 185 F.3d 349 (5th Cir. 1999), *vacated and remanded en banc*, 2000 WL 1357506 (5th Cir. Sept. 20, 2000). As the following discussion demonstrates, the court’s analysis provides valuable insight into NFMA’s soil-protecting provisions, despite the *en banc* ruling. The district court opinion sets out the full procedural history of this decade-plus series of cases. 974 F. Supp. at 912.

<sup>114</sup> 974 F. Supp. at 911.

<sup>115</sup> *Id.*

<sup>116</sup> *Id.*

<sup>117</sup> *Id.* at 926 (citing National Forest Management Act of 1976, 16 U.S.C. § 1604(g)(3)(F)(v) (1994), 36 C.F.R. § 219.27(c)(6) (2000) (even-aged harvest must be consistent with protection of soil); 16 U.S.C. § 1604(g)(3)(C) (1994) (management plans to insure no substantial and permanent impairment of productivity of the land); *id.* § 1604(g)(2)(B) (requiring inventory data on various resources, including soil); *id.* § 1604(g)(3)(E)(i) (management plans to insure timber harvest only where soil, slope, or other watershed conditions will not be irreversibly damaged); 36 C.F.R. § 219.27(a)(1) (2000) (requiring conservation of soil and water resources in management plans); *id.* § 219.27(b)(5) (management involving “vegetative manipulation” of tree cover must ensure soil conservation); *id.* § 219.27(f) (soil conservation to be guided by instructions in official technical handbooks)).

<sup>118</sup> *Id.* at 911.

that the factors causing the severe soil degradation included poor timber harvest site selection, excessive rutting and compaction, logging within streamside management zones, logging during vulnerable soil conditions, intensive site preparation, eradication of hardwood trees from sites, and failure to restore damaged areas.<sup>119</sup>

Despite the district court's extensive findings recounting numerous egregious instances of disregard for any protective management of the soil resource, the case was vacated and remanded upon rehearing *en banc* because the complaint was deemed not to challenge a final agency action as required by the Administrative Procedure Act (APA).<sup>120</sup> The *en banc* majority for the Fifth Circuit concluded that the plaintiffs' challenge was "programmatic" in nature: "Rather than limit their challenge to individual sales, [plaintiffs] merely used these sales as evidence to support their sweeping argument that the Forest Service's 'on-the-ground' management of the Texas forests over the last twenty years violates the NFMA."<sup>121</sup> The *en banc* dissent, on the other hand, rejected the majority's suggestion that the plaintiffs' general allegations somehow "dilute[d] or negate[d] the existence of the plaintiffs['] specific allegations."<sup>122</sup> The dissent instead focused on the fact that the district court had found that the Forest Service had violated and was continuing to violate NFMA through the agency's forest management practices.<sup>123</sup> Despite the fact that it was vacated and remanded, the district court's analysis nevertheless highlights several valuable soil protection requirements in NFMA.

However, plaintiffs may have to restructure their "programmatic challenges" in such a way as to focus their complaint on site-specific, identifiable agency actions—for example, on a timber sale

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<sup>119</sup> *Id.* at 926.

<sup>120</sup> *Sierra Club v. Peterson*, 2000 WL 1357506 (5th Cir. Sept. 20, 2000) (*en banc*). Administrative Procedure Act, 5 U.S.C. §§ 551–559, 701–706, 1305, 3105, 3344, 4301, 5335, 5372, 7521 (1994 & Supp. IV 1998).

<sup>121</sup> 2000 WL 1357506, at \*5.

<sup>122</sup> *Id.* at \*12.

by timber sale basis.<sup>124</sup>

The Forest Service has also developed somewhat extensive internal standards in its Forest Service Manual (FSM)<sup>125</sup> and Forest Service Handbook (FSH).<sup>126</sup> The FSM's chapter on soil management states the agency's policy and objectives, as well as detailing requirements for soil resource inventories, soil management "support services," soil resource improvement, soil quality monitoring, soil resource data management and analysis, and special soil investigations and studies.<sup>127</sup> Not surprisingly, however, the FSM demonstrates a prevailing focus on productivity from an agricultural perspective, with inventorying and management practices couched in terms of "improv[ing] soil productivity," "optimiz[ing] sustained yields of goods and services," and "improv[ing] soil quality to selected levels for specific purposes by mechanical treatment, chemical or other soil additives, irrigation, or vegetation manipulation."<sup>128</sup> The Forest Service also asserts exclusive jurisdiction over soil survey activities on its lands, and pledges to develop soil surveys and provide that information to the Soil Survey by the year 2000.<sup>129</sup>

In the FSH, the Forest Service sets out its internal requirements for soil resource inventories and soil quality monitoring.<sup>130</sup> The FSH provides instructions on performing actual research and monitoring fieldwork, and developing inventories and reports on existing soil

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<sup>123</sup> *Id.* at \*13.

<sup>124</sup> *Id.* at \*8–\*9. *See also* Ohio Forestry Ass'n v. Sierra Club, 523 U.S. 726 (1998) (held that a generic challenge to a forest plan, without any specific or concrete harm alleged, was not ripe for adjudication); Wilderness Soc'y v. Thomas, 188 F.3d 1130 (9th Cir. 1999) (rejecting as non-justiciable a claim that the Forest Service violated NFMA by adopting a Forest Plan before conducting a grazing suitability determination).

<sup>125</sup> FSM, *supra* note 100.

<sup>126</sup> U.S. FOREST SERVICE, FOREST SERVICE HANDBOOK, SOIL MANAGEMENT HANDBOOK § 2509.18 (1991) [hereinafter FSH], available at <http://www.fs.fed.us/im/directives/dughtml/fsh2000.html> (last modified Mar. 17, 1999).

<sup>127</sup> FSM, *supra* note 100.

<sup>128</sup> FSM, *supra* note 100, at §§ 2550.2, 2550.3, 2553.02.

<sup>129</sup> FSM, *supra* note 100, at § 2551.02. *See also* Natural Res. Cons. Serv., Soil Survey Div., *Soil Survey Program Priorities and Status*, at <http://www.statlab.iastate.edu/soils/soildiv/> (last modified Feb. 10, 2000) (only 80% of federal lands have published soil surveys).

<sup>130</sup> FSH, *supra* note 126.

resources. The soil quality monitoring chapter provides standards for “maintain[ing] or improv[ing] the inherent long-term soil productivity” and addressing soil disturbances.<sup>131</sup> Actual soil quality standards take the form of 1) threshold values beyond which soil disturbances become detrimental and 2) the allowable areal extent of detrimental soil disturbances.<sup>132</sup> Despite some interesting requirements and attempts to set quantitative standards, it is questionable how much attention the Forest Service actually pays to the soil resource in its consideration of specific projects and its development of Forest Plans.<sup>133</sup> It is also important to note that the FSM and FSH have no legal binding effect on the agency.<sup>134</sup>

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<sup>131</sup> FSH, *supra* note 126, at § 2509.18, Ch. 2.02. It is interesting to note that the definition of “soil displacement” does *not* include “[m]ixing of surface soil layers by disking, chopping, or bedding operation.” FSH, *supra* note 126, at § 2509.18, Ch. 2.05-7.

<sup>132</sup> FSH, *supra* note 126, at § 2509.18, Ch. 2.2. The general threshold value is set at an “estimated 15 percent reduction in soil productivity potential as a guideline for determining when the change becomes detrimental or significant.” *Id.* For example, one soil disturbance threshold in a particular area might prohibit more than a 15% increase in bulk density or more than a 15% reduction in total porosity. FSH, *supra* note 126, at § 2509.18, Ch. 2.2, Exhibit 01.

<sup>133</sup> For example, the Siuslaw National Forest, located in the Coast Range on the central Oregon coast, provides little in its land and resource management plan (LRMP) beyond the general standards and guidelines set out in the FSH. SIUSLAW NATIONAL FOREST, U.S. DEP’T OF AGRIC., SIUSLAW NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN (1990). Its standards and guidelines address soil damage, stability assessment, site productivity, organic material, and leave area protection. *Id.* at IV-51. The Siuslaw LRMP applies the general 15% guidelines by prohibiting “the total acreage of all detrimental soil conditions (i.e., erosion, compaction, puddling, displacement, and severely burned soil) to exceed 15% of the total Forest land within the project area, including no more than 5–6% in landings and roads.” *Id.* Land managers are to “[c]onsider restoration if detrimental soil conditions approach 15%.” *Id.* (emphasis added). The only other quantitative standard imposed requires the Forest to leave a minimum of two logs per acre having a “volume of at least 40 cubic feet and 12 inches in diameter” during logging activities. *Id.* Otherwise, the guidelines are characterized by phrases such as “*assess* the stability of,” “retain *sufficient* ground vegetation and organic matter,” and “leave vegetation *intact* on slopes where [it] *may be needed*.” *Id.* (emphasis added). The Klamath National Forest (located in southern Oregon) LRMP also provides very few quantitative standards, although it does include a very brief review of the current status of the soils on the Forest. KLAMATH NATIONAL FOREST, U.S. DEP’T OF AGRIC., KLAMATH NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN 3-1 to 3-2 (1994). With the exception of projects that will permanently occupy a site, such as roads or buildings, the LRMP sets minimum levels of total soil cover to be maintained to reduce erosion. *Id.* at 4-21. For example, for logging operations using tractors on a sandy loam (textured) soil, on slopes between 0–25%, the Forest must maintain at least 70% soil cover. *Id.* “Soil cover” consists of low growing live vegetation, rock fragments, slash, and fine organic matter, each with size restrictions of its own. *Id.* The Klamath LRMP also provides some quantitative requirements for organic matter at the soil surface and within the top 12 inches of the soil. *Id.* In short, these LRMPs demonstrate the minimal and insufficient quantitative standards that the Forest Service generally includes in its management plans.

<sup>134</sup> See *Western Radio Serv. Co. v. Espy*, 79 F.3d 896 (9th Cir. 1996). In denying a claim that the Forest Service acted arbitrarily and capriciously by not complying with procedures set forth in the FSH, the Ninth Circuit noted that the FSH “does not have the independent force and effect of law.” *Id.* at 900–01.

In short, at least one federal court has recognized that NFMA provides some concrete requirements and protective standards regarding the impacts of logging activities on the soil resource.<sup>135</sup> However, because that decision was vacated and remanded on procedural grounds, the strongest case authority considering the substance of NFMA’s soil-protecting provisions has been undermined. Even so, those soil-protecting requirements only apply to roughly one-third of the public lands, and often only in conjunction with logging activities. The next section considers the authority of the Bureau of Land Management, which manages approximately two-thirds of the public lands.

## 2. *Soil Protection on the Grasslands: The Federal Land Policy and Management Act*

The Bureau of Land Management (BLM) manages over 264 million acres of public lands, most of which are in the twelve western states of Alaska, Washington, Oregon, California, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, Arizona, and New Mexico.<sup>136</sup> This accounts for most of the remaining non-forested federal land (in fact about one-eighth of the land in the United States) and obviously encompasses a tremendous amount of soil. With very few exceptions, BLM administers arid grasslands.<sup>137</sup> The Federal Land Policy and Management Act (FLPMA)<sup>138</sup> is BLM’s authority for management under multiple use and sustained yield principles.<sup>139</sup> Although enforcement and judicial interpretation of FLPMA often have been dubious, the statute’s strongest standard appears in section 302, which states, “[T]he Secretary shall, by regulation or otherwise, take any action necessary to *prevent unnecessary or undue*

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<sup>135</sup> *Sierra Club v. Glickman*, 974 F. Supp 905 (E.D. Texas 1997), *aff’d sub nom. Sierra Club v. Peterson*, 185 F.3d 349 (5th Cir. 1999), *vacated and remanded en banc*, 2000 WL 1357506 (5th Cir. Sept. 20, 2000).

<sup>136</sup> PUBLIC LANDS STATISTICS, *supra* note 98.

<sup>137</sup> A historical anomaly resulted in BLM administering the forested “O & C Lands” of western Oregon. *See* 43 U.S.C. § 1181 (1994). Over 86 million acres of BLM public lands are in Alaska. BLM also manages an additional 300 million acres of subsurface mineral resources. PUBLIC LANDS STATISTICS, *supra* note 98.

<sup>138</sup> Federal Land Policy and Management Act of 1976, 43 U.S.C. §§ 1701–1785 (1994 & Supp. III 1997).

<sup>139</sup> *Id.* § 1732(a) (1994).

*degradation* of the [public] lands.”<sup>140</sup>

FLPMA controls BLM’s management of the public lands for all types of actions, perhaps the most widespread and harmful of which is livestock grazing.<sup>141</sup> Grazers have been running livestock on the western public lands since Euro-American settlers began pushing west two centuries ago.<sup>142</sup> As early as 1890, the Supreme Court determined that, by its silence, Congress acquiesced to grazing on the public lands.<sup>143</sup> In 1934, Congress finally authorized the Secretary of the Interior to withdraw all remaining public lands into grazing districts and allocate grazing privileges via a preference permit system.<sup>144</sup> The Taylor Grazing Act (TGA) requires the Secretary of the Interior to establish grazing districts based on whether lands are “chiefly valuable for grazing and raising forage crops.”<sup>145</sup> The TGA states that the Secretary “shall make provision for the protection, administration, regulation, and improvement” of grazing districts, and that “he shall . . . do any and all things necessary . . . to regulate their occupancy and use, to *preserve the land and its resources from destruction or unnecessary injury*, to provide for the orderly use, improvement, and development of the range.”<sup>146</sup> Soil is specifically mentioned in

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<sup>140</sup> *Id.* § 1732(b) (emphasis added).

<sup>141</sup> For an exhaustive review of the science underlying grazing’s myriad environmental harms, see A.J. Belsky et al., *Survey of Livestock Influences on Stream and Riparian Ecosystems in the Western United States*, 54 J. SOIL AND WATER CONS. 419 (1999). See also Belsky & Blumenthal, *supra* note 39, at 11.

<sup>142</sup> See CHARLES F. WILKINSON, *CROSSING THE NEXT MERIDIAN: LAND, WATER, AND THE FUTURE OF THE WEST* 82–89 (1992). See also Coggins & Lindberg-Johnson, *supra* note 43 (detailed history and analysis of early public rangeland management). Today, grazing is authorized on about 159 million acres (approximately 90%) of BLM lands in the western United States and about 85 million acres (approximately 60%) of the national forests in the lower 48 states.

<sup>143</sup> *Buford v. Houtz*, 133 U.S. 320 (1890).

<sup>144</sup> Taylor Grazing Act, 43 U.S.C. §§ 315–315o-1 (1994).

<sup>145</sup> *Id.* § 315. The Oregon Natural Desert Association (ONDA) and numerous other environmental groups filed a petition with the Secretary of Interior in 1998, claiming that the Secretary has never actually made this “chiefly valuable” determination. In Re Petition for Rulemaking Pursuant to 43 C.F.R. § 14.1-4 and 5 U.S.C. § 553(e) (Oct. 1998) (Petitioners’ Statement of Reasons in Support of Rulemaking), *available at* <http://www.onda.org/Projects/TGA/TGAPetition.pdf> (last modified June 4, 2000). When the Secretary failed to respond for nearly two years, ONDA filed suit. *Oregon Natural Desert Ass’n v. Babbitt*, No. \_\_\_ (D. Or. filed May 2000), *available at* <http://www.onda.org/Projects/TGA/TGAComplaint.pdf> (last modified June 4, 2000).

<sup>146</sup> 43 U.S.C. § 315 (1994) (emphasis added). This section also specifically authorized the Secretary to “continue the study of erosion.” *Id.*

the preamble of the TGA, which states that the Act was passed “[t]o stop injury to the public grazing lands by preventing overgrazing and *soil deterioration*.”<sup>147</sup> It is interesting to note that the Congress that enacted the TGA is largely the same Congress that enacted the Soil Erosion Act just ten months later, in 1935. Between the TGA’s application on public lands and the Soil Erosion Act’s application on private lands, it appears that Congress intended sweeping and comprehensive protection of the soil resource across the country. Over half a century of weak agency interpretation and enforcement seems to have diffused what may have been a comprehensive soil protection mandate.

Despite the TGA preamble and the fact that BLM manages hundreds of millions of acres of arid lands with highly sensitive soil types, the agency has very few requirements that mandate or even promote protection of the soil resource. In fact, the word “soil” does not appear at all in FLPMA itself. BLM’s Range Management regulations require State Directors to develop and implement regional standards and guidelines for livestock grazing management.<sup>148</sup> To implement the standards and guidelines, BLM must employ its range management authorities under FLPMA and the regulations, in order to make “significant progress toward fulfillment of the standards and significant progress toward conformance with the guidelines.”<sup>149</sup> The minimum guidelines in the regulations (for those states that failed to develop standards and guidelines before the 1997 deadline) contain a few broad narrative mandates for soils, including 1) “[m]aintaining or promoting adequate amounts of vegetative cover . . . to support infiltration, maintain soil moisture, and stabilize soils; and 2) “[m]aintaining or promoting subsurface soil

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<sup>147</sup> Taylor Grazing Act of June 28, 1934, ch. 865, preamble, 48 Stat. 1269 (emphasis added).

<sup>148</sup> 43 C.F.R. § 4180.2 (2000). The standards and guidelines must conform with, and are based on, the “fundamentals of rangeland health,” which provide the general requirements for watersheds, ecological processes, water quality, and habitats. *Id.* § 4180.1.

<sup>149</sup> *Id.* § 4180.2(c).

conditions that support permeability rates appropriate to climate and soils.”<sup>150</sup>

Even though the standards and guidelines must be applied in land use plans and project plans (including grazing permits), these types of vague, broad provisions provide no ascertainable “standards.” As a result, the state standards and guidelines can be just as unhelpful. The standards and guidelines for Oregon and Washington, for example, address soils primarily in two places.<sup>151</sup> First, the standard for upland watershed function requires that, “[u]pland soils exhibit infiltration and permeability rates, moisture storage and stability that are *appropriate* to soil, climate and landform.”<sup>152</sup> “Potential indicators”<sup>153</sup> for this so-called standard include “[p]rotection of the soil surface from raindrop impact, detention of overland flow, maintenance of infiltration and permeability, and protection of the soil surface from erosion.”<sup>154</sup> These indicators are measured by a number of factors, including accumulation and incorporation of organic matter in soils, the thickness and continuity of the A horizon,<sup>155</sup> the root occupancy of the soil profile, and the absence of accelerated erosion and overland flow.<sup>156</sup> However, there are no concrete, quantitative requirements for any of these factors. Similarly malleable are the guidelines for grazing management, which direct land managers to “provide

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<sup>150</sup> *Id.* § 4180.2(e)(1)–(2).

<sup>151</sup> Oregon/Washington State Office, Bureau of Land Management, *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington* (1997) [hereinafter *Oregon/Washington Standards & Guidelines*], at <http://www.or.blm.gov/Rangelands/s&gfinal.htm> (last visited Nov. 4, 2000).

<sup>152</sup> *Oregon/Washington Standards & Guidelines*, *supra* note 151, at 7 (emphasis added).

<sup>153</sup> “Indicators” are “parameters of ecosystem function that are observed, assessed, measured, or monitored to directly or indirectly determine attainment of a standard.” *Oregon/Washington Standards & Guidelines*, *supra* note 151, at 16.

<sup>154</sup> *Oregon/Washington Standards & Guidelines*, *supra* note 151, at 7.

<sup>155</sup> Soil “horizons” are layers in the soil that are distinguishable from adjacent layers by a set of properties produced by soil-forming processes, for example texture, color, consistence, structure, concretions, voids, pH, boundary characteristics, and horizon continuity. BUOL ET AL., *supra* note 1, at 45. See also SOIL SURVEY MANUAL, *supra* note 45, at 60. An “A horizon” is a mineral horizon that formed at the surface or below and O (organic) horizon and is characterized by any or all of the following: has humified organic matter mixed with mineral material; is not dominated by properties characteristic of O or E horizons; or, has properties resulting from cultivation, pasturing, or similar kinds of disturbance. SOIL SURVEY MANUAL, *supra* note 45, at 119.

*adequate*” plant and plant residue cover to promote infiltration, conserve soil moisture, and maintain soil stability in upland areas; “*promote* soil surface conditions that *support* infiltration”; “*avoid* sub-surface soil compaction”; and “*promote* soil and site conditions that provide the *opportunity* for the establishment of desirable plants.”<sup>157</sup> If these provisions leave the reader wondering where exactly the “standards” are, then the point has been made.

While FLPMA and the Rangeland Standards and Guidelines appear to address soil protection by imposing certain standards on rangeland management activities, it is clear that the standards generally fail to provide any meaningful protection. Also, these standards and guidelines only apply to BLM’s grazing management, leaving soil protection for other activities without any standards at all. The following section shifts the focus from soil protection per se, to addressing the effects of poor federal lands soil management practices on water quality.

### *3. Soil Protection and Water Quality: Nonpoint Source Pollution Control Under the Clean Water Act*

The Clean Water Act (CWA) is the nation’s comprehensive federal law for the control and abatement of water pollution.<sup>158</sup> The Act’s goal is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”<sup>159</sup> Although the CWA does not protect the soil resource explicitly, that goal is at least implicit in the statute’s goals and provisions for control of “nonpoint source” pollution, which consists of surface runoff.<sup>160</sup> In the context of

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<sup>156</sup> *Oregon/Washington Standards & Guidelines*, *supra* note 151, at 7–8.

<sup>157</sup> *Oregon/Washington Standards & Guidelines*, *supra* note 151, at 12–13 (emphasis added).

<sup>158</sup> Federal Water Pollution Control Act, 33 U.S.C. §§ 1251–1387 (1994 & Supp. III 1997).

<sup>159</sup> *Id.* § 1251(a) (1994).

<sup>160</sup> The CWA essentially divides the water pollution world into two spheres, generally addressing separately pollution from “point” and “nonpoint” sources. A “point source” is “any discernable, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.” *Id.* § 1362(14) (1994 & Supp. III 1997). This term also “does not include agricultural stormwater discharges and return flows from irrigation agriculture.” *Id.* The CWA does not specifically define the term “nonpoint source,” although it does appear in the Act. *Id.* § 1288(b)(2)(F) (1994) (“Any [areawide wastewater

livestock grazing or logging operations, for example, trampled or cutover areas that have been stripped of vegetation may be susceptible to soil erosion into nearby streams during times of rain or snowmelt.

Although the CWA does have two provisions aimed expressly at nonpoint source pollution,<sup>161</sup> those provisions have generally failed to achieve any significant control over nonpoint source pollution.<sup>162</sup> There are, however, two remaining CWA strategies that may prove quite effective in controlling nonpoint sources of pollution.<sup>163</sup> The first, development of total maximum daily loads (TMDLs), involves calculating the total daily input of a given pollutant that a particular water body can sustain and still meet applicable water quality standards, and then apportioning loadings of point and nonpoint source pollutants to that water body.<sup>164</sup> The

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treatment management plan] . . . shall include, but not be limited to a process to (i) identify, if appropriate, agriculturally and silviculturally related nonpoint sources of pollution . . . .”); *Id.* § 1329 (1994 & Supp. III 1997) (titled “Nonpoint source management programs”). The Environmental Protection Agency (EPA) defines nonpoint source pollution as pollution “caused by diffuse sources that are not regulated as point sources and normally [are] associated with agricultural, silvicultural and urban runoff.” ENVIRONMENTAL PROTECTION AGENCY, NONPOINT SOURCE GUIDANCE 3 (1987), *reprinted in* ENVIRONMENTAL LAW INSTITUTE, CLEAN WATER DESKBOOK 177 (1991). *See also* Alia S. Miles, *Searching for the Definition of “Discharge”: Section 401 of the Clean Water Act*, 28 ENVTL. L. 191, 196–198 (1998) (discussing definitions of point and nonpoint sources of pollution).

<sup>161</sup> Section 208 requires states to develop “areawide waste treatment management” plans, but states that choose not to develop such plans simply do not receive the grant money available for development and operation. 33 U.S.C. § 1288 (1994). Section 319 (“Nonpoint source management programs”) requires states to develop assessment reports and management programs, but EPA has no authority to prepare or implement the programs or to require the use of particular best management practices (BMPs). *Id.* § 1329 (1994 & Supp. III 1997). *See also* Robert L. Glicksman, *Pollution on the Federal Lands II: Water Pollution Law*, 12 U.C.L.A. J. ENVTL. L. & POL’Y 61, 77 (1993). BMPs are methods for controlling nonpoint sources of pollution that are set out in a state’s areawide management plan. 33 U.S.C. § 1329 (1994 & Supp. III 1997).

<sup>162</sup> For criticisms of the CWA’s effectiveness with respect to nonpoint source pollution, see Robert W. Adler, *Integrated Approaches to Water Pollution: Lessons from the Clean Air Act*, 23 HARV. ENVTL. L. REV. 203, 226–30 (1999); Scott D. Anderson, *Watershed Management and Nonpoint Source Pollution: The Massachusetts Approach*, 26 B.C. ENVTL. AFF. L. REV. 339, 339–40 (1999); Miles, *supra* note 148, at 200; David Zaring, *Agriculture, Nonpoint Source Pollution, and Regulatory Control: The Clean Water Act’s Bleak Present and Future*, 20 HARV. ENVTL. L. REV. 515 (1996).

<sup>163</sup> *See* Peter M. Lacy, *Addressing Water Pollution From Livestock Grazing After ONDA v. Dombeck: Legal Strategies Under the Clean Water Act*, 30 ENVTL. L. 617 (2000).

<sup>164</sup> States must place those waters not meeting water quality standards on the “303(d) list.” 33 U.S.C. § 1313(d)(1)(A)–(B) (1994). Water quality standards consist of a designated use for the water body, criteria, and an antidegradation provision. *Id.* §§ 1313(c), (d). *See also* 40 C.F.R. §§ 131.10–12 (1999). States must then calculate TMDLs for those waters on the 303(d) list. 33 U.S.C. § 1313(d)(1)(C) (1994); 40 C.F.R. § 130.7 (1999). *See, e.g.*, Oliver A. Houck, *TMDLs IV: The Final Frontier*, 29 Env’tl. L. Rep. (BNA) 10,469 (1999); Oliver A. Houck,

second involves the CWA's federal facilities provision,<sup>165</sup> which, at least in the Ninth Circuit, has been interpreted to require federal agencies to adhere to state water quality regulations for both point and nonpoint sources.<sup>166</sup>

Although these strategies may control soil erosion quite effectively in some instances, they remain focused on the water resource rather than the soil resource, and depend on the water quality standards that are in place for a particular water body. In other words, these strategies are effective only along streams that are water quality limited for some soil-erosion-related attribute such as turbidity, and where a federal action is causing soil erosion in sufficient quantities to violate the water quality standard. For example, the Forest Service may have to alter or stop logging operations adjacent to a stream with a water quality standard prohibiting turbidity to exceed ten percent, if it can be shown that the logging will cause that standard to be violated.<sup>167</sup> There are undoubtedly numerous such situations in a variety of land use contexts, but the CWA is certainly a limited solution to soil degradation that results in water pollution on public lands.<sup>168</sup>

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*TMDLs III: A New Framework for the Clean Water Act's Ambient Standards Program*, 28 *Envtl. L. Rep. (BNA)* 10,415 (1998); Michael M. Wenig, *How "Total" Are "Total Maximum Daily Loads"?*—*Legal Issues Regarding the Scope of Watershed-Based Pollution Control Under the Clean Water Act*, 12 *TUL. ENVTL. L.J.* 87 (1998); Oliver A. Houck, *TMDLs, Are We There Yet?: The Road Toward Water Quality-Based Regulation Under the Clean Water Act*, 27 *Envtl. L. Rep. (BNA)* 10,391 (1997) [hereinafter Houck II].

<sup>165</sup> 33 U.S.C. § 1323 (1994).

<sup>166</sup> See *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146 (9th Cir. 1998); *Marble Mountain Audubon Soc'y v. Rice*, 914 F.2d 179 (9th Cir. 1990); *Oregon Natural Res. Council v. Lyng*, 882 F.2d 1417 (9th Cir. 1989); *Oregon Natural Res. Council v. United States Forest Serv. (ONRC v. USFS)*, 834 F.2d 842 (9th Cir. 1987); *Northwest Indian Cemetery Protective Ass'n v. Peterson*, 795 F.2d 688 (9th Cir. 1986), *rev'd on other grounds*, 485 U.S. 439 (1988) (reversed on First Amendment free exercise of religion claim).

<sup>167</sup> See, e.g., *Marble Mountain Audubon Soc'y* 914 F.2d at 182 (reaffirming that the Forest Service must comply with all state water quality standards—a duty that included violations from nonpoint sources—specifically, a state requirement that turbidity must not increase by more than twenty percent).

<sup>168</sup> Also note the limited nonpoint source pollution provisions in the Coastal Zone Management Act (CZMA) Reauthorization Amendments. Coastal Zone Management Act of 1972, 16 U.S.C. §§ 1451–1465, 1462 (1994 & Supp. III 1997). The CZMA offers financial assistance to states that adopt federally approved coastal management plans. The 1990 amendments address nonpoint source pollution, requiring that states with approved coastal zone management programs submit to EPA and the National Oceanic and Atmospheric Administration (NOAA) a program that will implement nonpoint source management measures. Although the plans must obtain EPA approval,

As an example of the CWA's potential to protect water quality from soil erosion, a district court in northern California upheld a TMDL developed for a stream polluted entirely by nonpoint sources of pollution.<sup>169</sup> In *Pronsolino v. Marcus*, the plaintiff had a permit from the state forestry department to harvest timber, subject to several restrictions imposed to reduce soil erosion into the Garcia River.<sup>170</sup> Pronsolino's permit incorporated very specific conditions, requiring that the plaintiff

(a) inventory controllable sediment sources from all roads, landings, skid trails and agricultural facilities . . . (b) mitigate 90% of controllable sediment volume at "road related" inventoried sites . . . (c) prevent sediment loading caused by road construction; (d) retain five conifer trees greater than 32 inches in diameter at breast height ("dbh") per 100 feet of all Class I and Class II watercourses . . . (e) harvest only during dry, rainless periods between May 1 and October 15; (f) refrain from constructing or using skid trails on slopes greater than 40% within 200 feet of a watercourse; and (g) forbear removing trees from certain unstable areas which have a potential to deliver sediment to a watercourse.<sup>171</sup>

Pronsolino did not challenge the soil and sedimentation restrictions per se, but rather challenged the EPA's authority under section 303(d) of the CWA to develop TMDLs for rivers polluted only by nonpoint sources.<sup>172</sup> The court held that under section 303(d), "TMDLs [are] authorized . . . for all substandard rivers and waters . . . without regard to the sources of pollution," including waters polluted solely by nonpoint sources.<sup>173</sup> Rejecting the plaintiff's argument that the listing and TMDL requirements under section 303(d) applied only to point

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the federal government does not impose its own standards on states and the penalties for failing to implement a plan are minimal. See Dana R. Flick, *The Future of Agricultural Pollution Following USDA and EPA Drafting of a Unified National Strategy For Animal Feeding Operations*, 8 DICK. J. ENVTL. L. & POL'Y 61 (1999).

<sup>169</sup> *Pronsolino v. Marcus*, 91 F. Supp. 2d 1337 (N.D. Cal. 2000). As EPA seeks to fulfill its TMDL obligations, the agency's authority to enforce TMDLs developed solely for nonpoint source pollution is increasingly the subject of debate. The agency has observed that section 303(d) contains "no express exclusion of nonpoint source impacted waterbodies from the statute's requirements," and has stated that its authority to do so is consistent with the CWA's definition of "pollutant," 33 U.S.C. § 1362(6) (1994 & Supp. III 1997), because it is clear that nonpoint sources can cause pollutant loadings to waters. Proposed Revisions to the Water Quality Planning and Management Regulation, 64 Fed. Reg. 46,012, 46,021 (proposed Aug. 23, 1999) (codified at 40 C.F.R. pt. 130).

<sup>170</sup> 91 F. Supp. 2d at 1338.

<sup>171</sup> *Id.*

sources and that water impaired solely by nonpoint sources cannot be listed or subjected to TMDL preparation, the court determined that EPA properly listed and issued a TMDL for the river.<sup>174</sup>

If other courts follow *Pronsolino*'s correct determination that TMDLs can be developed for streams polluted solely by nonpoint sources, the TMDL strategy will be a valuable tool for addressing the effects of soil erosion on water quality.<sup>175</sup> As indicated above, though, the CWA addresses soil erosion only after the fact, and only if the soil-eroding activity adversely affects water quality in a listed stream. The CWA does not protect soil for soil's sake, and obviously does not address soil degradation if no runoff actually reaches a water body. An even more limited strategy involves protecting soil via the protections afforded to endangered species' habitat requirements.

#### 4. *Soil Protection and Wildlife: Critical Habitat Under the Endangered Species Act*

The Endangered Species Act<sup>176</sup> (ESA) seeks to ensure the survival and recovery of plants and animals in danger of extinction. The Act declares a congressional policy "that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this chapter."<sup>177</sup> The key factor in recovering a species is preserving the habitat that species needs to survive.<sup>178</sup> When a species is

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<sup>172</sup> *Id.* at 1337.

<sup>173</sup> *Id.* at 1356.

<sup>174</sup> *Id.* at 1346–48.

<sup>175</sup> Note that a group of plaintiffs including several individuals, the Baker County Farm Bureau, and the Baker County Livestock Association, brought a nearly identical claim in state court in Oregon. The claim was removed to federal court by the government. *Hawes v. State of Oregon*, No. CV-00-587-PA (D. Or. filed May 2000).

<sup>176</sup> Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (1994). Congress passed the ESA in 1973, "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved." *Id.* § 1531(b).

<sup>177</sup> *Id.* § 1531(c)(1).

<sup>178</sup> Jack McDonald, *Critical Habitat Designation Under the Endangered Species Act: A Road to Recovery?*, 28 ENVTL. L. 671, 671 (1998).

listed as endangered or threatened, the Secretary must, to the “maximum extent prudent and determinable,”<sup>179</sup> determine that species’ critical habitat.

The ESA defines “critical habitat” as the habitat that is necessary for conservation of a species.<sup>180</sup> Conservation in turn means using all methods possible—including “research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and translocation”—to return a species to the point at which the measures provided in the ESA are no longer necessary.<sup>181</sup> While the duty to conserve requirement employs the mandatory “shall,” agencies still retain significant discretion in terms of what “conservation” entails.<sup>182</sup> Nevertheless, agency discretion regarding what conservation steps are necessary to conserve a species is not unlimited—the agency must at least show that it has taken the proper steps and engaged in a process designed to decide how it will fulfill its statutory mandate.<sup>183</sup> In short, conservation under the ESA is equated with recovery—agencies must not only prevent jeopardy, but also recover listed species to the point that ESA protection is no longer needed.

Protection of soils by way of the ESA is, of course, limited to the species that rely on

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<sup>179</sup> 16 U.S.C. § 1533(a)(3)(A) (1994).

<sup>180</sup> *Id.* § 1532(5)(a)(i) (areas occupied by a listed species that have “physical or biological features (i) essential to the conservation of the species and (ii) which may require special considerations or protection”); *id.* § 1532(a)(ii) (areas not currently occupied by a listed species that “are essential for the conservation of the species”).

<sup>181</sup> *Id.* § 1532(3) (“the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary”).

<sup>182</sup> *See, e.g., Carson-Truckee Water Conservancy Dist. v. Clark*, 741 F.2d 257, 262–63 (9th Cir. 1984); *Pyramid Lake Paiute Tribe v. United States Dep’t of Navy*, 898 F.2d 1410, 1418 (9th Cir. 1990) (holding the “Secretary is to be afforded some discretion in ascertaining how best to fulfill the mandate to conserve under section 7(a)(1)”).

Jason M. Patlis, *Recovery, Conservation, and Survival Under the Endangered Species Act: Recovering Species, Conserving Resources, and Saving the Law*, 17 PUB. LAND & RESOURCES L. REV. 55, 88–89 (1996). *See also*, Houck II, *supra* note 164, at 327–28.

<sup>183</sup> *See, e.g., Defenders of Wildlife v. Andrus*, 428 F. Supp. 167, 170 (D.D.C. 1977) (“It is clear from the face of the statute that the [agency] must do far more than merely avoid the elimination of protected species. It must bring these species back from the brink so that they may be removed from the protected class, and it must use all methods necessary to do so”). *See also Sierra Club v. Glickman*, 156 F.3d 606, 617–18 (5th Cir. 1998) (holding that section 7(a)(1) places upon federal agencies a mandatory duty to conserve threatened and endangered species, and that agencies must develop conservation programs for specific species).

soils as a component of their critical habitat.<sup>184</sup> In Oregon, for example, the Malheur wire-lettuce (*Stephanomeria malheurensis*) was designated as an endangered plant species in 1982.<sup>185</sup> The plant is known only from one small population near Malheur National Wildlife Refuge in southeastern Oregon, and is vulnerable to even minor habitat alteration.<sup>186</sup> In its 1982 listing decision, the U.S. Fish and Wildlife Service (FWS) stated that the most immediate threats to the survival of the wire-lettuce were surface mining for zeolites, competition from exotic cheat grass, and grazing by black-tailed jackrabbits.<sup>187</sup> In fact, FWS reported that the cheat grass invasion was probably the direct result of a 1972 controlled burn “which had thrown the natural vegetation out of balance.”<sup>188</sup> As a result of the listing, FWS designated as the wire-lettuce’s critical habitat a 160-acre “Scientific Study Area” that was fenced off from livestock grazing that was otherwise permitted on the surrounding BLM land.<sup>189</sup> FWS concluded that any activity that “would significantly disturb the soil, topography or other physical and biological components of the area where *Stephanomeria malheurensis* occurs would adversely modify its Critical Habitat. Land uses in the immediate locality of the population and in its surroundings would need to be carefully regulated to prevent such modifications.”<sup>190</sup> As with several of the strategies discussed in this section, this approach can be valuable in discrete circumstances,<sup>191</sup> but is a far cry from

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<sup>184</sup> The number of listed species that actually have had critical habitat designated also imposes a limit. By 1999, only ten percent, or 120 of 1181 listed species (703 plants and 478 animals), had critical habitat designated. See U.S. Fish & Wildlife Serv., *Species Information*, at <http://endangered.fws.gov/wildlife.html> (last updated Aug. 29, 2000).

<sup>185</sup> United States Fish & Wildlife Serv., *Determination of *Stephanomeria Malheurensis* (Malheur Wire-Lettuce) To Be an Endangered Species, With Determination of its Critical Habitat*, 47 Fed. Reg. 50,881 (Nov. 10, 1982) (codified at 50 C.F.R. pt. 17). The species was only discovered in 1966. *Id.* at 50,882.

<sup>186</sup> 47 Fed. Reg. at 50,881–50,882.

<sup>187</sup> *Id.* at 50,882.

<sup>188</sup> *Id.*

<sup>189</sup> *Id.* at 50,884. This study area was, as critical habitat is permitted to be, broader than the wire-lettuce’s extremely limited range at the time of listing. Note that, economic considerations may not be part of the wildlife service’s listing decision, economics may be considered in the designation of critical habitat. Endangered Species Act of 1973, 16 U.S.C. § 1533(a), (b) (1994).

<sup>190</sup> 47 Fed. Reg. at 50,884.

<sup>191</sup> Note, for example, a suit filed against eight-nine livestock grazing allotments on five national forests in the Gila

the holistic protection that the soil resource requires.

##### 5. *Soils and Environmental Decision Making: The National Environmental Policy Act*

Finally, the National Environmental Policy Act (NEPA)<sup>192</sup> also provides some protection to the soil resource in limited instances. It is paramount to bear in mind, of course, that NEPA is a procedural statute that dictates no substantive results.<sup>193</sup> The only time a NEPA claim may result in some substantive review occurs when the underlying statute (for example, NFMA) includes a broad list of environmental factors the action agency must take into account. Thus, at most, NEPA might require a federal agency to perform careful environmental analysis of a proposed action's effects on soils, where that action is determined to "significantly affect the quality of the human environment."<sup>194</sup>

*Blue Mountains Biodiversity Project v. Blackwood*,<sup>195</sup> presented at the outset of this article, provides a good example of application of NEPA to soil erosion. In that case, environmental plaintiffs had argued that the Forest Service's decision to conduct a massive salvage timber sale following a series of wildfires violated NEPA because the agency had failed to develop an EIS for the sale.<sup>196</sup> With nearly two thirds of the sale slated to occur on soils classified by the Forest Service as having high erosion potential, and well over a hundred miles of streams exposed to sedimentation after the fire, the Forest Service simply could not justify

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River Basin in southern Arizona and New Mexico. Center for Biological Diversity, *Suit Challenges Grazing on 1.8 Million Acres of National Forest in Arizona and New Mexico*, at <http://www.biologicaldiversity.org/swcbd/alerts/index/alerts.html> (last modified Nov. 21, 2000) ("Although nearly 900 miles of rivers running through these allotments has been designated as 'critical habitat' for two threatened fish (the loach minnow and spikedace), the Forest Service has refused to review the impacts of livestock grazing on the streams.").

<sup>192</sup> National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370d (1994 & Supp. III 1997).

<sup>193</sup> *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351 (1989) ("NEPA merely prohibits uninformed—rather than unwise—agency action").

<sup>194</sup> 42 U.S.C. § 4332(c) (1994).

<sup>195</sup> 161 F.3d 1208 (9th Cir. 1998).

<sup>196</sup> *Id.* at 1210.

that no significant environmental impacts existed.<sup>197</sup> As noted at the outset, the Ninth Circuit observed that “[t]he Forest Service’s only attempt to measure sedimentation failed when its data collection box overloaded with sediment.”<sup>198</sup>

In short, there is a significant regulatory gap with respect to the soil resource in the federal public lands natural resource laws. The few soil-specific statutes generally deal with private lands from an agricultural perspective, although they have established the Soil Survey as a valuable information-producing resource. Meanwhile, the public lands environmental and natural resources laws provide only scattered provisions that are useful in limited factual or geographic circumstances. Soil protection by way of those provisions typically is relegated to secondary status, lost in laws whose primary focus is on some other natural resource. As a result, the lack of federal protection of the soil resource is an Achilles heel in holistic natural resource protection.

#### IV. TOWARD A FEDERAL PUBLIC LANDS SOIL LAW

In light of the decidedly scattered and inconsistent soil-protecting provisions in the current body of federal natural resource laws, a public lands soil law is obviously needed. Moreover, it is very much a manageable undertaking. There are two significant pieces of the puzzle already in place that would be necessary to create a strong and effective public lands soil law. These include 1) federal and state agencies with the expertise and competence to administer such a law, and 2) scientific knowledge, a database of that knowledge, and an established system of data collection. The following discussion addresses the scope of the suggested law, the agencies with the expertise to administer such a law, the existing scientific database, and finally, a general framework for the essential elements of a public lands soil law.

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<sup>197</sup> *Id.* at 1216.

### *A. Scope of the Law*

In developing an effective public lands soil law, there are a few initial choices presented. Of primary importance is the scope of such a law—that is, should the law be limited to protection of soils on federal public lands, or should it be more like the ESA and extend to all soils no matter where they are found? This article takes the former, more limited scope as a preferred starting point. Protection of soils on public lands under the type of law proposed here is probably the only realistic option. Because of the immense body of agricultural law in place affecting private lands—not to mention potentially overwhelming political considerations—an ESA-like soil law would be nearly impossible to enact without a major overhaul of current agricultural law.<sup>199</sup> As well, the sheer geographic vastness of the soil cover across the country is considerably greater than the distribution of threatened and endangered species or even those species' critical habitats.

A more practical question concerns the scope of a soil law on the public lands with respect to already existing land management schemes. That is, how would the law interact with the current management provisions described above (in NFMA and FLPMA, for example), with special management areas (wild and scenic river corridors and wilderness areas, for example), and with different administering agencies (BLM versus Forest Service, for example)? The short answer is that a public lands soil law should be the general rule and should serve as a “floor” for public lands management. In other words, the law should apply to all public lands and therefore to all federal agencies for the public lands they manage. The law should also set minimum standards for management, so that where current management standards and practices in

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<sup>198</sup> *Id.* at 1213.

<sup>199</sup> *See, e.g.*, Ruhl, *supra* note 12, at 333–48 (suggesting extensive overhaul in proposed framework for a “positive law of farms and the environment”).

particular areas are more stringent than the general soil law, those more stringent standards should not be altered. In other words, this would look something like an “antidegradation standard” for currently existing soil protections.

*B. Federal and State Agencies to Administer a Public Lands Soil Law*

There are a number of federal and state agencies that already have significant expertise and competence to administer a public lands soil law. These include the United States Department of Agriculture’s Forest Service and Natural Resources Conservation Service (NRCS), the state soil conservation services, and perhaps the United States Department of the Interior’s Bureau of Land Management. One question to ask, which is closely related to the issue of the geographic scope of the law, is whether administration of the law should be by a single federal agency, by individual state agencies, or by a cooperative arrangement of federal and state agencies. Should the soil law be administered by whatever agency has jurisdiction over the land, or perhaps with some sort of consultation procedure involving an agency with more expertise, such as the NRCS?

Management by a single authority has the advantage of one agency attaining a highly developed level of expertise in administering the law. In addition, a single federal administering agency would lend itself to consistent action and statutory and policy interpretation across the country. On the other hand, options that employ state soil conservation services or the managing agency for the particular piece of land in question have the advantage of using a local administering agency that has a great deal of site-specific, field-based knowledge about the land to be managed. Perhaps the most sensible arrangement, therefore, would involve a combination of these possibilities. A management scheme that attempts to employ each of these advantages might involve a consultation and coordination scheme similar to that of the ESA. That is, the

agency proposing an action that falls under the ambit of the soil law would be required to engage in some sort of consultation or coordination with the NRCS Soil Conservation Service, in conjunction with the state soil conservation services.

Under this type of scheme, the action agency might be required to consult with the NRCS and the state soil conservation service for certain actions that might adversely affect the soil resource.<sup>200</sup> Similar to the ESA, the action agency would make the final determination on the proposed action. After obtaining the state service's opinion regarding the potential effects of the proposed action on the soil resource, the action agency would make a determination as to how it would proceed, including any mitigating measures that would be implemented. The NRCS would then give a final opinion to the action agency, indicating whether the proposed action would successfully avoid adversely impacting the soil resource, and suggesting any necessary mitigating measures that should be taken. While the state soil conservation services would provide local soil expertise and information, the NRCS would fill the role of the single federal authority that ultimately insures consistency in procedure, decision making policies, and substantive requirements.

Although the original Soil Conservation Service was often relegated to secondary importance by more powerful agencies in a “crowded bureaucratic environment,” a public lands soil law might clarify the NRCS's regulatory niche and alleviate much of the intra-agency competition that has steadily reduced and scattered the NRCS role over the years.<sup>201</sup> The “problem of overlapping jurisdictions”—in terms of duties, authorities, and geographic jurisdiction—arises frequently in natural resources management, and the Soil Erosion Act set the

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<sup>200</sup> See *infra* Part IV.D.A (detailing the interaction of an environmental assessment of land use activities' effects on soils, and this consultation and coordination requirement).

<sup>201</sup> CLARKE & MCCOOL, *supra* note 53, at 98–99 (“crowded bureaucratic environment”).

SCS up for inevitable conflicts with other agencies.<sup>202</sup> The 1935 Act’s preamble declares a congressional policy to control and prevent soil erosion “and thereby to preserve natural resources, control floods, prevent impairment of reservoirs, and maintain the navigability of rivers and harbors, protect public health, public lands and relieve unemployment.”<sup>203</sup> It may well be easier to list the federal agencies *not* implicated in that broad statement of policy. Thus, the NRCS, as the modern incarnation of the SCS, has the potential to be revived and refocused, and finally realize its basic original mission of controlling soil degradation.

This, of course, would require Congress to adequately fund and re-vamp an agency whose place has been uncertain for decades,<sup>204</sup> nevertheless there is an infrastructure in place.<sup>205</sup> The NRCS’s Soil Survey Division includes 1011 total soil scientists, 941 of which are NRCS soil scientists.<sup>206</sup> Although the 1935 Congress that enacted the Soil Erosion Act had farming on its mind, it would be very appropriate for the NRCS to reinvent itself in the public lands context at the dawn of the new century.<sup>207</sup> Of course, some would also argue that a major paradigm shift would have to take place within the NRCS because the agency is not known as a historically environmentally minded agency.<sup>208</sup> Despite these potential hurdles, the agency infrastructure is

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<sup>202</sup> *Id.* at 95.

<sup>203</sup> Soil Conservation and Domestic Allotment Act, 16 U.S.C. § 590a (1994).

<sup>204</sup> As recently as 1997 the House Agriculture Committee considering “revisit[ing] the reorganization of USDA with an eye toward folding NRCS into the farm services agency.” Davidson, *supra* note 40, at 440 (also noting that although the NRCS “now appears to be an agency that is staffed with talented and motivated people who are looking for a meaningful job to perform,” the agency’s “goals have become clouded and any sense of purpose or mission faded long ago”).

<sup>205</sup> In addition, the consultation and coordination scheme proposed here likely would require significant federal financial aid to the state soil conservation services, so that they could successfully carry out the increased responsibilities envisioned in this process.

<sup>206</sup> Natural Res. Cons. Serv., Soil Survey Div., *Soil Survey Program Priorities and Status*, at <http://www.statlab.iastate.edu/soils/soildiv/> (last modified Feb. 10, 2000).

<sup>207</sup> Note, as above, the TGA and the Soil Erosion Act arguably support an overriding congressional intent for a comprehensive soil protection scheme. See *supra* Part III.B.2.

<sup>208</sup> See Jason Waanders, *Growing a Greener Future? USDA and Natural Resource Conservation*, 29 ENVTL. L. 235, 244 (1999) (noting that the SCS is generally in charge of very localized programs, and that these localized interests provide little incentive for nationwide conservation policies).

in place to establish effective, coordinated, and positive management and protection of soils on federal lands. Related to this administrative infrastructure is the equally important issue of the availability of information to make effective soil-protecting land management decisions.

### *C. Scientific Knowledge and Information Database*

Unlike the dearth of data often associated with issues such as endangered plant and animal species or old-growth forest ecosystems, there is already in place an immense, detailed database and extensive knowledge regarding soils and soil formation processes across the country. The foundation of this database is the soil survey, which describes the characteristics of the soils in a given area, classifies and maps soils according to a standard system, compiles related data such as climate and geologic information, and interprets the soils' potential suitabilities for a range of land use activities and vegetation types.<sup>209</sup> The Soil Survey began collecting data and published its first surveys over a century ago, in 1899.<sup>210</sup> Today, the NRCS Soil Survey Division estimates that it has mapped ninety percent of the United States' 2.3 billion acres of land, including ninety-one percent of private lands, eighty percent of public lands, and seventy-five percent of Indian lands.<sup>211</sup> This in turn includes 3253 soil survey manuscripts, 2485 of which are published and 597 of which are being updated.<sup>212</sup> As well, the Soil Survey has digitized over 750 of its surveys and has begun to publish its soil survey manuscripts and maps online for twenty-three states and the Caribbean.<sup>213</sup>

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<sup>209</sup> SOIL SURVEY MANUAL, *supra* note 45, at 11–13. Note that the Soil Survey—that is, the Soil Survey Division of the NRCS's National Soil Survey Center—produces individual documents called “soil surveys” for county-scale areas across the country.

<sup>210</sup> SOIL SURVEY MANUAL, *supra* note 45, at 11.

<sup>211</sup> Natural Res. Cons. Serv., Soil Survey Div., *Soil Survey Program Priorities and Status*, at <http://www.statlab.iastate.edu/soils/soildiv/> (last modified Feb. 10, 2000). The Soil Survey estimates that 41% of the total area needs to be updated. *Id.*

<sup>212</sup> *Id.*

<sup>213</sup> *Id.* See also Natural Res. Cons. Serv., Soil Survey Div., *On-Line Soil Survey Manuscripts*, at <http://www.statlab.iastate.edu/soils/soildiv/> (last modified Sept. 18, 2000).

The level of sophistication in data collection, analysis, and dispersal continues to improve. Taxonomy and classification of soils is standardized via the Soil Survey's *Keys to Soil Taxonomy*<sup>214</sup> and the *Soil Survey Manual*.<sup>215</sup> In individual soil surveys, the array of quantitative data available is immense, including, for example, soil depth and horizonation, structure, clay content, bulk density, permeability and infiltration rates, available water storage capacity, soil pH, shrink-swell potential, erosion susceptibility factors, wind erodibility, organic matter content, and water table data.<sup>216</sup> In short, there is a vast and highly developed body of data, as well as an established infrastructure and geographic coverage of soil surveys, available to provide the informational base for an effective public lands soil law. Between the agency infrastructure, and the information and data-collecting infrastructure to make meaningful decisions, perhaps the two most essential elements for establishing an effective public lands soil law are in place. With these critical building blocks in mind, the discussion turns to the features of an effective public lands soil law.

#### *D. The Framework of a Public Lands Soil Law*

The ideal public lands soil law should build upon the information and infrastructure already in place. As well, it should build upon the collective experience of over thirty years in the “modern era” of natural resources and environmental law. In a recent article documenting the environmental harms caused by farms and the environmental legal safe harbors they enjoy, one commentator has assumed the task of proposing a framework for a positive environmental

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<sup>214</sup> KEYS TO SOIL TAXONOMY, *supra* note 32.

<sup>215</sup> SOIL SURVEY MANUAL, *supra* note 45.

<sup>216</sup> See, e.g. NATURAL RES. CONS. SERV., SOIL SURVEY OF LAKE COUNTY, OREGON, SOUTHERN PART, *at* <ftp://ftp.or.nrcs.usda.gov/pub/soil/surveys/Southlake.pdf> (last modified July 27, 1999); SOIL CONS. SERV., SOIL SURVEY OF MARINETTE COUNTY, WISCONSIN (1991) (on file with author).

farming law.<sup>217</sup> The proposals that follow adhere to an approach similar to that one, which “borrow[s] from many models to assemble a cohesive approach that involves federal, state, and local authorities working in partnership rather than in feudal arrangements.”<sup>218</sup> The core of an effective public lands soil law should evolve around positive goals and policies, regulation that emphasizes classification, environmental assessment and use of readily available data, and clear enforceability.

### *1. Soil Conservation Goals*

The first section of this public lands soil law should clearly delineate its soil conservation goals. Those goals should unambiguously place primary emphasis on soil health, which should include the idea that a healthy soil is a requisite characteristic for a holistically healthy ecosystem of which the soil is a part. Although proliferation of the term “ecosystem management” in agency parlance can be somewhat misleading,<sup>219</sup> this concept, properly conceived, can be the basis of soil conservation. Moreover, the danger of letting an ecosystem management-based law slip into the abyss otherwise known as “adaptive management” is significantly reduced where, as in the soil context, there already exist voluminous data.

The NRCS Soil Quality Institute has identified a number of essential functions of healthy soil, including: 1) regulating water as it flows over land and through soil; 2) sustaining plant and animal diversity and productivity; 3) filtering, buffering, degrading, immobilizing, and detoxifying potential organic and inorganic pollutants; and, 4) cycling, storing, and transforming nutrients such as carbon, nitrogen, and phosphorous.<sup>220</sup> The Soil Quality Institute suggests a

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<sup>217</sup> Ruhl, *supra* note 12, at 333–348.

<sup>218</sup> *Id.* at 334.

<sup>219</sup> *See supra* note 27.

<sup>220</sup> Natural Res. Cons. Serv., Soil Quality Institute, *What Is Soil Quality?*, at <http://www.statlab.iastate.edu/survey/SQI/sqw.html> (last modified Oct. 11, 2000).

number of soil quality indicators.<sup>221</sup> For example, soil organic matter—a soil characteristic easily measured in the laboratory—is an indicator of soil fertility, structure, stability, nutrient retention, and soil erosion.<sup>222</sup> Thus, soil health should be based on easily measurable quantitative data that provide meaningful insights into physical, chemical, and biological soil characteristics.<sup>223</sup>

## 2. *Use of the Existing Soil Information Databases*

The public lands soil law should specifically mandate what types of uses should be made of the extensive soil survey data across the country. For example, that data and knowledge should be used to designate different levels of protection and management, set standards, assess proposed agency actions, and implement mitigation requirements. By using existing information (and requiring continual collection and analysis by reaffirming the mandate of the Soil Survey), the law ultimately can be based more on scientific and quantitative factors than on economics or political influence. There may be less potential for political tug-of-wars regarding program funding, administrative interpretations, and similarly malleable aspects of agency-interpreted environmental statutes, once the data have been incorporated into the law. Finally, using the NRCS as the single federal agency that oversees implementation of the law will insure a high level of understanding of the subject matter of the law, as well as consistent interpretation of

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<sup>221</sup> *Id.*

<sup>222</sup> The Soil Quality Institute also describes examples of physical, chemical, and biological soil quality indicators: Physical attributes such as soil structure, depth, infiltration and bulk density, and water holding capacity are indicators of retention and transport of water and nutrients, habitat for microbes, crop productivity potential, compaction, and porosity. Chemical attributes such as pH, electrical conductivity, and extractable nitrogen, phosphorous, and potassium are indicators of biological and chemical activity thresholds, plant and microbial activity thresholds, available nutrients, and potential for nitrogen and phosphorous loss. Finally, biological attributes such as microbial biomass carbon and nitrogen, potentially mineralizable nitrogen, and soil respiration are indicators of microbial catalytic potential and repository potential for carbon and nitrogen, soil productivity and nitrogen supplying potential, and microbial activity measure. *Id.*

<sup>223</sup> *Id.* (citing M.J. Mausbach & C.A. Seybold, *Assessment of Soil Quality*, in SOIL QUALITY AND AGRICULTURAL SUSTAINABILITY 33–43 (R. Lal ed., 1998); D.L. Karlen et al., *Soil Quality: A Concept, Definition, and Framework*

information. Of course, the fact that extensive data are available does not actually determine what those standards and assessment and mitigation requirements should be. The soil survey data only enable those ultimate policy choices to be based on quantitative, easily measurable, and consistent characteristics. The following sections examine the potential uses of the existing soil survey data, with respect to land use classifications and quantitative management requirements.

### *3. Classification and Designation of Soil Management Areas*

One valuable regulatory component of the public lands soil law would be the classification and designation of various soil management areas. For example, “outstanding soil areas” or soil preservation/conservation areas might have differing levels of protection and management, and differing permitted uses. This scheme might be similar to those in a number of environmental laws, including the distinction between wild, scenic, and recreational rivers under the Wild and Scenic Rivers Act,<sup>224</sup> tier 1, 2, and 3 waters under the Clean Water Act’s antidegradation regulations,<sup>225</sup> or wilderness and wilderness study areas under the Wilderness Act.<sup>226</sup>

Initial designations might be made in a couple ways. First, designations could rely on the local soil surveys, with watersheds or soil types designated by a simple formula of quantitative attributes that are readily available in the soil survey. Alternatively, designations could be based upon the current administrative land classification. To use BLM lands as an example: wilderness areas or land within a wild and scenic river corridor with a soil-related “outstandingly

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*for Evaluation*, 61 SOIL SCI. SOC’Y AMER. J. 4–10 (1997); METHODS FOR ASSESSING SOIL QUALITY, Soil Science Soc’y of America Spec. Publ. 49 (J.W. Doran & A.J. Jones, eds., 1996)).

<sup>224</sup> Wild and Scenic Rivers Act of 1968 (WSRA), 16 U.S.C. §§ 1271–1287, 1273(b) (1994).

<sup>225</sup> 40 C.F.R. § 131.12 (2000).

<sup>226</sup> Wilderness Act, 16 U.S.C. §§ 1131–1136 (1994). *See also* Federal Land Management and Policy Act, 43 U.S.C.

remarkable value”<sup>227</sup> could be designated automatically as “outstanding soil areas” subject to a non-degradation standard; lands within wilderness study areas could be designated as “soil conservation areas” subject to soil management practices that would not impair the values for which the area was designated; lands without special classifications could take on some lesser designation that would protect the soils from impairment, according to a host of quantitative criteria.

Decisions regarding the land designation and level of soil protection afforded to various areas also will depend in large part on what uses the land is valued or intended for. In this respect, a classification system similar to the Clean Water Act’s “designated uses” under its water quality standards scheme serves as a potential model. When EPA or a state sets water quality standards for a particular water body, it must first establish one or more designated uses for that water body.<sup>228</sup> Under the CWA, designated uses may include public water supplies, propagation of fish and wildlife, recreation, agriculture, and industrial purposes.<sup>229</sup> Numeric, biological, or narrative criteria, and antidegradation provisions then protect the designated

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§ 1782(a) (1994) (lands subject to review and designation as wilderness).

<sup>227</sup> To be designated under the WSRA, a river must be “free-flowing” and “possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values” (ORVs). 16 U.S.C. § 1271 (1994). In addition, “other similar values, . . . if outstandingly remarkable, can justify inclusion of a river in the national system.” National Wild and Scenic Rivers System; Final Revised Guidelines for Eligibility, Classification and Management of River Areas, 47 Fed. Reg. 39,454, 39,457 (Sept. 7, 1982). See also Charlton H. Bonham, *The Wild and Scenic Rivers Act and the Oregon Trilogy*, 21 PUB. LAND & RESOURCES L. REV. 109, 117 (2000) (noting that “although classification [as wild, scenic, or recreational] is a key consideration for agency river management decisions, the river must be managed according to its ORVs not its classification”). Finally, see *Oregon Natural Desert Ass’n v. Singleton*, 47 F. Supp. 2d 1182 (D. Or. 1998):

Regardless of whether cattle grazing was a permitted use when the rivers were first designated, if grazing proves to be detrimental to soil, vegetation, wildlife, or other values, or is inconsistent with the “wild” designation, then clearly the BLM has the right—indeed, the duty—not only to restrict it, but to eliminate it entirely.

*Id.* at 1192.

<sup>228</sup> Federal Water Pollution Control Act of 1972, 33 U.S.C. § 1313(c)(2)(A) (1994); see also 40 C.F.R. § 131.10 (2000).

<sup>229</sup> 33 U.S.C. § 1313(c)(2)(A) (1994).

uses.<sup>230</sup> Applying this model to soil protection, soils might have a variety of designated uses, including plant and animal habitat, forest crop or other biomass production, cultural resource preservation, water filtration and cycling, overland and subsurface water flow control, recreation, use for raw materials, and use as a physical base for human-made structures. Then, according to which use or uses a particular area's soils are designated for, different numeric criteria and standards may be set.

It also would be essential to insure in the statute that the designations either occur upon enactment or automatically after a certain amount of time. One problem that has cropped up time and again in environmental regulation is agency recalcitrance and foot-dragging when it comes to carrying out certain statutory mandates, including promulgation of rules and regulations—especially mandates of wide geographic scope. One prime example is EPA's early "glacial" approach to implementing the Clean Water Act's 303(d) program for listing water quality limited waters and developing TMDLs for those waters.<sup>231</sup> For example, it was a full six years after the enactment of the Clean Water Act before a lawsuit finally forced EPA to issue the simple list of pollutants that would activate TMDL planning.<sup>232</sup> Similarly, a district court noted in 1999 that Virginia had completed only a single, disputed TMDL on a half-mile long, unnamed tributary to a creek in the nearly twenty years since the original statutory deadline.<sup>233</sup> This

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<sup>230</sup> *Id.* § 1313(c)(2)(A), (d)(4)(B); *see also* 40 C.F.R. §§ 131.11–131.12 (2000).

<sup>231</sup> 33 U.S.C. § 1313(d) (1994). *See* Houck II, *supra* note 164, at 10,392–10,395. *See also* Idaho Sportsmen's Coalition v. Browner, 951 F. Supp. 962, 967 (W.D. Wash. 1996) (where in the mid-1990s Idaho only expected to finish preparing its currently-scheduled TMDLs in twenty-five years, court stated that "nothing in the law could justify so glacial a pace").

<sup>232</sup> Houck II, *supra* note 164, at 10,393 (citing Board of County Comm'rs v. Costle, No. 78-0572, slip op. (D.D.C. June 20, 1978) (cited in Total Maximum Daily Loads Under Clean Water Act, 43 Fed. Reg. 42,303 (Sept. 20, 1978))). Section 303(d)(2) requires that states' first lists of "the waters identified and the loads established" under section 303 be submitted to EPA within 180 days after the publication by EPA of its first identification of pollutants. 33 U.S.C. § 1313(d)(2) (1994). Section 304 required the EPA to identify and publish a list of those pollutants. *Id.* § 1314(a)(2)(D).

<sup>233</sup> American Canoe Ass'n v. EPA, 54 F. Supp. 2d 621, 624 (E.D. Va. 1999).

potential problem may be readily avoidable in a soil law, by virtue of the extensive data and pre-existing land classifications already in place. In short, the statute could require land managers to designate soils under proscribed categories, according to a series of criteria, with public comment and involvement; if, however, a particular agency or district failed to begin that process within 180 days or adhere to a set timeline, it would be possible, given the existing land use classifications and soil survey data already in place, to designate statutorily various soils according to the schemes described above.

#### *4. Quantitative Requirements*

Because there is an extensive database of soil information in place, the ideal public lands soil law should use that information to set quantitative requirements and standards—or require and set a specific procedure for agency development of quantitative standards<sup>234</sup>—for soil health and soil protection. Such quantitative requirements would be in stark contrast to nebulous and perpetually deferential standards such as FLPMA’s “unnecessary or undue degradation” standard.<sup>235</sup> The quantitative requirements in a public lands soil law might involve soil parameters such as soil organic matter and nutrient levels, O-horizon disturbance or depletion, slope and aspect characteristics, or requirements to preserve certain levels of measurable physical, chemical, and biological characteristics. For example, in a given “soil conservation area,” a certain land use activity might be required to preserve minimum levels of organic matter or refrain from certain levels of soil structure degradation, where specified elements of climate

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<sup>234</sup> This approach might be preferred simply because of the vast geographic scope of the soil resource. In general, however, the more the law delegates promulgation of standards and other requirements to increasingly local agency units, the more specific and regimented the law should be in terms of outlining the process the local agency units must employ to develop the standards.

<sup>235</sup> Federal Land Policy and Management Act of 1976, 43 U.S.C. § 1732 (1994 & Supp. III 1997) (“In managing the public lands the Secretary shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands”).

or relief are present.

As discussed above, the Forest Service has similar (but not enforceable) requirements in its FSH regarding soil quality standards.<sup>236</sup> The FSH standards address soil disturbance thresholds and the allowable areal extent of detrimental soil disturbance. However, the only actual numeric standard that appears in those soil quality standards is the fifteen percent “guideline” that is to be applied across the board to unspecified (but presumably quantifiable) soil quality characteristics.<sup>237</sup> The sole statement of the allowable areal extent “standard” states, “Define the areal extent that detrimental soil conditions, which reflect significant change in productivity, may occur.”<sup>238</sup> Obviously, much stronger, more specific, and more uniform standards are required to have any positive impact on land use activities’ effects on the soil resource.

Soil-disturbing activities should be quantitatively limited in a variety of ways: Depletion of soil organic matter or loss of nitrogen, for example, might be limited to no more than a ten percent reduction, so long as absolute minimum levels are maintained. Both the percent reduction and the absolute minimum levels should be adjusted according to soil type. Agency actions might also be classified according to whether soils would be disturbed at a surface or subsurface level—actions that merely affect the soil surface might only invoke a set of standards that address physical attributes such as compaction and infiltration rates, whereas invasive actions affecting the subsurface might also invoke standards that also address chemical and biological attributes. In addition, each of these types of quantitative standards should be set

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<sup>236</sup> FSH, *supra* note 126, at § 2509.18, Ch. 2.2. *See also supra* note 134 (lack of enforceability of FSH).

<sup>237</sup> FSH, *supra* note 126, at § 2509.18, Ch. 2.2-1. This fifteen percent standard is applied to all soil characteristics; for example, soil porosity should not be degraded by more than 15% during a given action.

<sup>238</sup> FSH, *supra* note 126, at § 2509.18, Ch. 2.2-2. “Significant changes in productivity” is defined in agricultural terms as “changes in soil properties that are expected to result in a reduced productive capacity over the planning

according to the soil designation given to a particular area—thus, “healthy” soil areas might not require as stringent standards as fragile soil areas or “outstanding soil areas.”

Regardless of how the standards are set, it is important that they are set in a far more criterion-specific fashion than the FSH’s one-size-fits-all fifteen percent standard. Setting quantifiable standards is a difficult, but critical, component of effective regulation. Certainly the law could provide for refinement and revision, as long as specified procedures guard against the perpetual limbo of “adaptive management.” In short, quantitative standards for soil health and protection that use the soil survey data currently available provide the base that is essential to informed decision making. The discussion now turns to the heart of the decision-making process: assessment of land use activities’ effects on soils.

##### *5. Environmental Assessment of Land Use Activities’ Effects on Soils*

Also invaluable is a requirement that land managers prepare a soil impact statement (SIS)—that is, either a report assessing the effects of a proposed action on the soil, or a requirement that all actions requiring NEPA analysis specifically include a soil analysis. To employ a scheme of local field expertise combined with federal oversight, an ESA consultation-type soil assessment may be effective.<sup>239</sup> Development of a SIS might be required independently for certain enumerated project types, and it might be prepared and tiered to an EA or EIS any time NEPA analysis is required. Either way, the action agency would be required to enlist the aid and expertise of the local soil conservation service during the preparation of a soil report, which would in turn be submitted to the NRCS for final federal approval, akin to the wildlife agencies’ “jeopardy/no jeopardy” determination under the ESA section 7 consultation process.<sup>240</sup>

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horizon.” FSH, *supra* note 126, at § 2509.18, Ch. 2.05-2.

<sup>239</sup> See also discussion *supra*, at Part IV.B.

<sup>240</sup> Endangered Species Act of 1973, 16 U.S.C. § 1536 (1994).

The SIS itself should first examine the soil types present and their current condition, which should have been addressed initially as part of the land designation process described above. The SIS should then consider the potential immediate and cumulative effects of the proposed action on the soil. Depending on the land designation and the regulations concerning that type of designation, the proposed action may be limited to certain levels of adverse impacts, ranging from a non-degradation standard in highly protected soils, to specified acceptable levels of impacts in lesser protected soils. These allowable levels of impacts would be specified according to a variety of different physical, chemical, and biological soil quality characteristics. To maintain or improve soil health, depending upon the initial level of soil quality, the SIS should indicate mandatory mitigation requirements that the action agency must adhere to in order to proceed with the proposed action.<sup>241</sup> The NRCS and state soil conservation services should already have particular expertise in the mitigation area, as a result of decades of work studying the control and prevention of soil degradation from agriculture. Finally, the SIS should incorporate specific quantitative data requirements with respect to standards, mitigation, and monitoring.

#### *6. Agency Duty to Act and Enforceability*

As suggested, central to any effective environmental law is the clear imposition of an agency duty to act—that is, to conserve or protect, to designate conservation area boundaries, to set quantitative standards and requirements, to mitigate adverse impacts, and so forth—

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<sup>241</sup> Contrast this mandatory requirement with mitigation in an EIS under NEPA. At the EIS stage, NEPA requires that the discussion of the environmental consequences of an action include a discussion of the means to mitigate adverse environmental impacts. 40 C.F.R. § 1502.14(f) (2000). However, NEPA does not require a complete mitigation plan be actually formulated and adopted. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351–52 (1989). At the EA/finding of no significant impact (FONSI) stage, though, an agency must have a mitigation plan and it must be enforceable, to have a defensible FONSI. Requiring a mandatory mitigation plan in the case of an SIS reinforces the policy that adverse modification of the soil resource without further action is not acceptable, in addition to causing an agency to engage in some form of cost-benefit analysis in terms of the costs of

combined with a mechanism for enforcement of the statute. The most important aspect of a public lands soil law may be its mandatory nature. Environmental laws or specific provisions that are couched in terms of “guidelines” or standards that “should” be implemented will always be subject to resistance by those who are regulated.<sup>242</sup> Agency employees in the field are certainly not isolated from local political pressure. In addition, agencies first must satisfy mandatory federal environmental regulations, rather than exhausting limited agency resources on mere goals and guidelines. When statutes are developed in terms of absolute mandates, there is little agency discretion to simply ignore directives.

Of course, mandates do not always have to impose exact numerical standards from the federal government “on high.” The CWA is a good example of a statute that requires approved states to take active roles in a federal program—such as listing impaired waters and developing water quality standards—but leaves considerable local discretion as to the exact contours of the standards and lists. A public lands soil law may employ this localized approach by requiring forests and BLM districts, in coordination with state soil conservation districts, to promulgate their own soil protection standards according to the very specific criteria enumerated in the statute. The soil law should also follow the CWA’s lead in terms of providing that where agencies fail to designate soil areas or develop standards, the statute’s own minimum (and not necessarily locally adapted) standards kick in after a set time period. Besides adopting the CWA’s designated use scheme, a public lands soil law might also emulate the CWA by using a “soil quality limited” list as its initial regulatory trigger. That is, land management agencies could be directed to first inventory their lands and designate soil quality limited areas where the soil is either already in a degraded state or is susceptible to significant degradation if subjected to

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mitigation versus the benefits of the proposed action.

various land uses. After these designations are made according to a set timeline, the substantive and procedural requirements of the soil law would take effect.

Finally, citizens should be authorized under the soil law 1) to bring APA suits against the agencies to enforce timelines and other procedural requirements; and 2) to bring citizen suits to enforce the substantive requirements of the law against the agency and private individuals using federal lands. While the action agency may or may not use its authority to enforce against private violators who are using the public lands, the agency itself must still be held accountable for actions it undertakes, authorizes, or permits. Citizens certainly would retain the ability to bring suits under the APA to challenge final agency actions “made reviewable by statute” and “for which there is no adequate remedy in a court.”<sup>243</sup>

The administering agencies must have the authority to enforce the statute by imposing conservation or mitigation requirements in permits or in the SIS, as well as the authority to fine or otherwise enforce against private violators—for example timber companies with permits to log, or grazing permittees. Because the federal government’s docket is always full, and because different administrations place different emphases on enforcement of various environmental and other programs, the most important enforcement mechanism in many environmental laws has proven to be the citizen suit provision.<sup>244</sup> A typical citizen suit provision allows private citizens (and organizations, via representational standing) to act as private attorneys general by bringing suit on their own behalf. For example, the Clean Water Act permits citizens to bring suit against any person, including the United States, who is alleged to be in violation of any effluent standard

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<sup>242</sup> See *supra* notes 148–57 and accompanying text (BLM range management standards and guidelines).

<sup>243</sup> Administrative Procedure Act, 5 U.S.C. § 704 (1994).

<sup>244</sup> See, e.g., Barton H. Thompson, Jr., *The Continuing Innovation of Citizen Enforcement*, 2000 UNIV. OF ILL. L. REV. 185, 185 (2000) (calling citizen suits “[p]erhaps the most pervasive, prominent, and continuing innovation in the modern environmental era”); Adam Babich, *Citizen Suits: The Teeth in Public Participation*, 25 *Envtl. L. Rep.*

or EPA- or state-issued order regarding such standard.<sup>245</sup> Citizens generally must provide sixty days' written notice to the relevant Secretary, the State, and any other alleged violators.<sup>246</sup>

Citizen suits are generally precluded where the federal government or the state has already initiated a suit and is “diligently prosecuting” the action in court.<sup>247</sup> However, citizens should be permitted to intervene as of right in such circumstances, in order to preserve citizen interests that may be based on different goals and interests than the government's.<sup>248</sup>

### 7. *Public Participation*

Finally, NEPA has demonstrated over its thirty-plus years of existence that public participation is one of the most effective methods of insuring protection of natural resources and an open discussion of the varying societal interests inevitably at stake in land management decisions.<sup>249</sup> One of the most important aspects of NEPA is its provision for public participation at each step of the decision-making process. The public is involved at the scoping stage when an agency identifies the significant issues related to a proposed action,<sup>250</sup> and at the decision-making stage when the action agency must solicit and consider the comments of the public on EISs.<sup>251</sup> In addition to soliciting public comments, action agencies must consider and respond to

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(BNA) 10,141 (1995).

<sup>245</sup> Federal Water Pollution Control Act of 1972, 33 U.S.C. §§ 1365 (1994). *See also* Endangered Species Act of 1973, 16 U.S.C. § 1540(g) (1994); Clean Air Act, 42 U.S.C. § 7604 (1994).

<sup>246</sup> *See, e.g.*, 33 U.S.C. § 1365(b)(1)(A) (1994); 16 U.S.C. § 1540(g)(2) (1994); 42 U.S.C. § 7604(b) (1994).

<sup>247</sup> *See, e.g.*, 33 U.S.C. § 1365(b)(1)(B) (1994); 16 U.S.C. § 1540(g)(2) (1994); 42 U.S.C. § 7604(b)(1)(B) (1994).

<sup>248</sup> *See, e.g.*, 33 U.S.C. § 1365(b)(1)(B) (1994); 42 U.S.C. § 7604(b)(1)(B) (1994).

<sup>249</sup> *See also* Thompson, *supra* note 244, at 186–87 (noting that citizens' role as monitors and informants is at least as important as their role in bringing citizen suit enforcement actions).

<sup>250</sup> 40 C.F.R. § 1501.7(1) (2000) (mandating an “early and open” scoping process where the agency must “[i]nvite the participation of affected Federal, State, and local agencies, any affected Indian tribe, the proponent of the action, and other interested persons (including those who might not be in accord with the action on environmental grounds)”).

<sup>251</sup> *Id.* § 1503. The action agency must “[r]equest comments from the public, affirmatively soliciting comments from those persons or organizations who may be interested or affected.” *Id.* § 1503.1(a)(4). *See also id.* § 1506.6 (mandating that agencies make “diligent efforts” to involve the public in preparation and implementation of NEPA procedures, hold public meetings and hearings, and provide public notice of meetings, hearings and environmental documents).

those comments.<sup>252</sup> NEPA's policy of providing the government and the public with as much information as possible has proven to be a valuable mechanism for assuring adequate consideration of alternative courses of action and open agency decision making. In short, information is the key to informed decision making, and the public must be involved in decisions regarding initial soil area designations, agency standards and regulations, decisions made as the result of soil impact statements, and mitigation requirements.

## V. CONCLUSION

The concept of a soil-specific statute for the public lands is an idea whose time is imminent. As early as the 1930s, Congress explicitly recognized the importance of soil conservation on the nation's lands, and now it is time to manifest that ethic in a positive public lands soil law. Moreover, we must learn from the shortcomings of laissez-faire private lands agricultural schemes, as well as the effective regulatory schemes in the various public natural resource laws. In an era in which nonpoint source water pollution is increasingly at the forefront of the nation's environmental problems and priorities, it is time to move forward into the next phase of environmental law—a phase where our environmental regulatory scheme protects all resources in order to provide holistic, ecosystem level conservation and avoid undermining the protections afforded other ecosystem elements.

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<sup>252</sup> *Id.* § 1503.4(a) (agency “shall assess and consider comments both individually and collectively, and shall respond . . . stating its response in the final statement”)