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### Discussion Paper: Managing for Ecosystems on the Public Lands

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#### Citation Information

Sarah Bates, Discussion Paper: Managing for Ecosystems on the Public Lands (Natural Res. Law Ctr., Univ. of Colo. Sch. of Law 1993).



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**DISCUSSION PAPER:  
MANAGING FOR ECOSYSTEMS  
ON THE PUBLIC LANDS**

Western Lands Report No. 4

Sarah Bates

1993

## PREFACE

The Natural Resources Law Center was established at the University of Colorado School of Law in 1982. Its primary goal is to promote the wise use of natural resources through improved understanding of natural resource issues. The Center pursues this goal through three program areas: research, public education, and visitors.

In January of 1993, the Natural Resources Law Center convened a workshop of approximately 30 public lands experts to discuss priority issues in western lands and resources and to develop an agenda for the Center's new Western Lands Program. In preparation for this workshop, Center staff prepared five discussion papers, each dealing with a broad theme critical to the future of public lands policy. This discussion paper reflects the valuable comments received from workshop participants.

The following individuals attended the Western Lands Workshop in Boulder: Michael Anderson, Sarah Bates, Richard Behan, Ralph Benson, Melinda Bruce, Jo Clark, Robert Davis, Dennis Donald, Sally Fairfax, Maggie Fox, David Getches, Frank Gregg, Martha Hahn, Gary Holthaus, Ken Hubbard, Robert Keiter, Ed Lewis, Dan Luecke, Lawrence MacDonnell, Daniel Magraw, Guy Martin, Jim Martin, Jerry Muys, Robert Nelson, Jim Noteboom, Randal O'Toole, Teresa Rice, Hal Salwasser, Debbie Sease, Karin Sheldon, John Wilkes, and Charles Wilkinson. Their enthusiastic participation and assistance with the preparation of these papers is greatly appreciated.

These are discussion papers, intended to inform and to stimulate thinking about policies for the western public lands. We welcome and encourage your comments and participation in an ongoing dialogue intended to facilitate improvement in these policies that are so important to the West and the United States.

## INTRODUCTION

A glance of a map showing the distribution of public lands in the western United States reveals that there are dozens of classifications of land areas. National forests, managed by the U.S. Forest Service in the Department of Agriculture, contain wilderness areas, scenic areas, and developed recreation areas. The lands managed by the Bureau of Land Management in the Department of the Interior include "areas of special ecological concern," wilderness areas, and special recreation areas. Some national parks, under the authority of the National Park Service in the Department of the Interior, are also designated as "biosphere reserves" under the United Nations Man and the Biosphere Program. In addition to these federal land classifications, many acres of state-owned and privately-owned lands are interspersed with public lands. In terms of land management, the West is a patchwork of adjoining -- sometimes overlapping -- authorities. International boundaries introduce additional complexities.

This paper introduces the problems that arise from these many land ownership and classification patterns. It examines the concept of ecosystem management, which proposes that natural resources should be managed from the perspective of natural processes. The paper looks at the opportunities for ecosystem management within the existing legal framework, briefly describes several examples of agencies' efforts to coordinate management efforts, and provides an overview of proposals for changing public lands management to reflect ecological realities. It concludes that the concept of ecosystem management is still far from clear, and that implementation will depend to a great extent on the needs of particular places in which it is applied.

## ECOSYSTEMS AND BOUNDARY PROBLEMS

The word "ecosystem" is defined as the complex of living and non-living components that function together as a unit in a given area.<sup>1</sup> A drop of water and the tiny microorganisms it contains may be considered an ecosystem, but the word more commonly is used to describe large areas of land and the animals and plants endemic to

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<sup>1</sup>See Ecosystem Management for Parks and Wilderness 4-5 (James K. Agee and Darryll R. Johnson, eds., 1988) (hereafter Agee & Johnson).

them. For example, wildlife researchers John J. Craighead and Derek J. Craighead define an ecosystem as "a large, biogeographic area, the animal species indigenous to the area and vegetation that has been classified."<sup>2</sup> Sometimes the term for a large area of land is "greater ecosystem" (as in the Greater Yellowstone Ecosystem), which has been described as "self sustaining ecological land units of a scale large enough to support and maintain viable populations of large vertebrates and all the plant and animal species native to the area."<sup>3</sup>

Stated simply, the problem with boundaries on public lands is that the natural (or "biotic") parameters of ecosystems seldom match the political (or "legal") boundaries of land management units such as national parks, wilderness areas, or wildlife refuges. Thus, the resources in one area are likely affected by activities occurring in another.

Political boundaries often demarcate sharply contrasting land management objectives. For example, wilderness areas are the most protected of public lands. The statutes guiding their management generally prohibit motor vehicle travel and extractive development such as mining and timber harvesting. In these lands, preservation is the dominant management objective. In contrast, the multiple-use lands administered by the U.S. Forest Service and the Bureau of Land Management are managed for a broader set of objectives, including timber production, recreation, livestock forage, mineral development, water production, and wildlife habitat.<sup>4</sup> Some commentators believe that these divergent management mandates are the primary obstacle to ecosystem management: "Perhaps the main problem is that administrators and managers of agencies with specific mandates to manage natural resources, though they may recognize

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<sup>2</sup>John C. Craighead and Derek J. Craighead, New System Techniques for Ecosystem Management and an Application to the Yellowstone Ecosystem, 17 Western Wildlands 30 (Spring 1991).

<sup>3</sup>Mike Bader, The Northern Rockies Ecosystem Protection Act: A Citizen Plan for Wildlands Management, 17 Western Wildlands 22 (1991).

<sup>4</sup>E.g., Federal Land Policy and Management Act of 1976, 43 U.S.C. § 1701; Multiple-Use, Sustained-Yield Act of 1960, 16 U.S.C. § 52 et seq.; and National Forest Management Act of 1976, 16 U.S.C. § 1600 et seq. National Wildlife Refuges are not multiple-use lands; they are managed primarily for wildlife habitat, with other, "secondary," uses allowed so long as they are compatible with the primary purposes of the refuges. U.S. General Accounting Office, National Wildlife Refuges: Continuing Problems with Incompatible Uses Call for Bold Action, GAO/RCED-89-196 2 (Sep. 1989).

cooperation as necessary for dealing with most contemporary resources issues, are reluctant to relinquish any control."<sup>5</sup> State and locally owned lands are managed for a variety of objectives, often for maximization of economic return rather than resource protection.<sup>6</sup> And uses of private lands, which often include the most biologically-important riparian areas in mountain valleys, generally are restricted only by state-sanctioned zoning laws and selected environmental statutes.

Activities in a multiple-use area or development of a parcel of private land may adversely affect the adjacent protected area or the wildlife that require access to these areas to survive. Examples of typical cross-boundary problems are described below.

### **Migratory and Wide-Ranging Wildlife**

Wildlife species that migrate over large areas suffer from inconsistent resource management regimes that often do not take their needs into account. Consider the declining numbers of Pacific salmon and steelhead. The multitudes of anadromous fish that once journeyed from high-mountain streams to the ocean and then back to their home streams to spawn have declined precipitously this century. The causes are many: overharvest, blocked access by dams, and siltation and stream channel changes from timber harvest, mining, and land development. The American Fisheries Society estimates that at least 106 major populations of salmon and steelhead on the West Coast are now extinct, and that 214 native, naturally-spawning races of these fish are now at risk of extinction.<sup>7</sup> In addition to the loss of genetic diversity, this decline has threatened the economic security of the commercial and sport fishing industry in the region. Government agencies seeking solutions have run into the complexities of political boundaries on the Columbia River, where a single fish swimming upstream from

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<sup>5</sup>Vernon C. Gilbert, in Agee & Johnson, supra note 1, at 182.

<sup>6</sup>See Teresa Rice, Discussion Paper: State and Local Lands, prepared for the Western Lands Program, Natural Resources Law Center (1993).

<sup>7</sup>Willa Nehlsen, Jack E. Williams, and James A. Lichatowich, Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington, 16 Fisheries 4 (1991)

the ocean to its home stream to spawn may pass through as many as 17 management jurisdictions, including two countries, four states, two regional fishing councils, two federal agencies, and four tribes.<sup>8</sup>

The same is true for birds and mammals that require large home ranges. They cannot rely solely on the habitat available in protected lands such as wilderness areas and national parks. A 1985 study that examined the biotic and legal boundaries of eight national parks in North America found that the biotic boundaries for wide-ranging wildlife species exceeded the legal boundaries by factors of two to 96.<sup>9</sup> Thus, in the example with the largest discrepancy, the wolverine needs 96 times more land than is currently protected in Rocky Mountain National Park in order to maintain a minimum viable population of 500 individuals.<sup>10</sup> In another article, a University of California researcher concluded that "no park in the coterminous U.S. is capable of supporting minimum viable populations of large mammals."<sup>11</sup>

The grizzly bear is an example of this problem. Once ranging over a large part of the western United States, today the grizzly lives only in four sustaining populations in the lower 48. Its limited habitat and low reproductive rate prompted the U.S. Fish and Wildlife Service to list the species as "threatened" under the Endangered Species Act. The approximately 200 Yellowstone-area grizzlies range beyond park boundaries; their

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<sup>8</sup>Charles F. Wilkinson, Crossing the Next Meridian: Land, Water, and the Future of the West 61-62 (1992).

<sup>9</sup>William D. Newmark, Legal and Biotic Boundaries of Western North American National Parks: A Problem of Congruence, 33 Biological Conservation 197, 201 (1985).

<sup>10</sup>Id. Richard Newmark describes the following reasons for the "incongruence" of biotic and legal boundaries in national parks: (1) "many national parks were established historically for a set of objectives other than the maintenance of biological and genetic diversity"; (2) "sufficient knowledge and information was unavailable at the time of their establishment" to allow full consideration of ecosystem needs; and (3) "political expediency . . . their legal boundaries reflect political compromise and concessions." Id. at 204-205.

<sup>11</sup>R. Edward Grumbine, How to Save the National Parks and Forests, Forest Watch 21-22 (Dec. 1988). See also Hal Salwasser, Christine Schonewald-Cox and Richard Baker, The Role of Interagency Cooperation in Managing for Viable Populations, in Viable Populations for Conservation 159 (Michael E. Soulé, ed., 1987).



habitat includes six of the area's seven national forests, as well as private lands and national wildlife refuges.<sup>12</sup>

### **External Threats to Protected Areas**

In addition to the wildlife that move beyond the boundaries of protected areas, the resources within these areas suffer adverse affects of development beyond national park and wilderness boundaries. Often these impacts are not considered when activities are planned by different agencies or private individuals who control these adjacent lands.

For example, Redwood National Park was established in 1968 to preserve the redwood trees on the north coast of California. The original park included 58,000 acres of land, concentrated at the mouth of Redwood Creek where the largest, oldest trees stood. The lands upstream from the park were managed by the U.S. Forest Service and were opened for largescale timber harvest. When the trees were removed from these steep slopes, the deep topsoil eroded into the stream at accelerated rates with every rainfall. The heavy load of sediment flowed down to Redwood National Park, raising the streambed level and causing flooding waters to undercut streambanks.<sup>13</sup> Soon the protected redwood trees began toppling, and park managers were facing a crisis. After years of litigation and Congressional legislation, the Park Service purchased an additional 48,000 acres of upstream lands, including 36,000 acres of clearcut forests needing substantial rehabilitation -- not the typical national park acquisition.

Air and water pollution are other problems that cross political boundaries and affect resources in protected areas. For example, a National Park Service study of air pollution in Grand Canyon National Park reported that sulfur dioxide from the coal-fired Navajo Generating Station reacts with other chemicals and sunlight to form tiny particles

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<sup>12</sup>Congressional Research Service, The Library of Congress, Yellowstone: Ecosystem, Resources, and Management, report prepared for the Subcommittee on Public Lands and the Subcommittee on National Parks and Recreation of the Committee on Interior and Insular Affairs, U.S. House of Representatives, 99th Cong., 2d Sess., Dec. 1986.

<sup>13</sup>Karen Griffen, Watershed Rehabilitation at Redwood National Park, 66 Whole Earth Review 49 (Spring 1990).

that impair visibility at the park's scenic overlooks.<sup>14</sup> The 2,500-megawatt Navajo Station, one of the largest coal-fired electrical generating facilities in the country, is located in Page, Arizona, just 15 miles from Grand Canyon National Park.<sup>15</sup> The operators of the Navajo Station contend that the smog originates 240 miles away in Los Angeles.<sup>16</sup>

One of the most difficult problems today is the growing number of vacation, retirement, and other homes in relatively undeveloped areas of the West, often very close to protected areas. Officials at Glacier National Park consider residential and commercial development on private lands adjacent to park boundaries as the Park's "single biggest threat."<sup>17</sup> New homes, businesses, and roads interfere with wildlife movement, send pollutants into streams and air shared with the park, and obstruct the park's scenic vistas. This concern about developments on adjacent lands is shared by other national park managers.<sup>18</sup> Of course, park resources also suffer from the effects excessive vehicle traffic and commercial development within park boundaries.

## **WHAT IS ECOSYSTEM MANAGEMENT?**

Just as the definition of "ecosystem" is far from precise, the concept of "ecosystem management" is not entirely clear. As one group of observers points out: "Perhaps the biggest obstacle facing advocates of ecosystem management in the [Greater Yellowstone Ecosystem] is the lack of a shared problem definition and consequently lack of a

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<sup>14</sup>Navajo Cited for Canyon Haze, Electrical World 16 (March 1991).

<sup>15</sup>EPA to Limit Canyon Haze, 127 Public Utilities Fortnightly 16 (March 15, 1991).

<sup>16</sup>Study Shows Los Angeles Smog Creates Grand Canyon Haze, Southwestern Pay Dirt 14A (January 1991).

<sup>17</sup>Personal communication, Brace Hayden, Scientist, Glacier National Park (March 12, 1992).

<sup>18</sup>See, e.g., "External Development Affecting the National Parks," proceedings of a conference sponsored by the Natural Resources Law Center, University of Colorado School of Law (1986).

common definition of what ecosystem management is."<sup>19</sup> A recent book edited by Robert Keiter and Mark Boyce suggests the following components of ecosystem management:

First, ecosystem management is built upon cooperative interagency institutional structures, as well as public involvement and support. Second, ecosystem management draws heavily upon scientific principles and research; it requires an improved understanding of ecological systems so that management proposals can be designed to minimize disruption of ecosystem processes. Third, ecosystem management is committed to preserving and restoring biological diversity within regional fauna and flora. Finally, ecosystem management policies must manifest broadly shared public values [such as aesthetic concerns and amenity values].<sup>20</sup>

In a law review article published in 1990, Robert Keiter summarizes the cross-boundary perspective of ecosystem management as follows:

As a general principle, ecosystem management views public lands and resources from a regional or resource system perspective; it regards natural phenomena, such as watersheds, airsheds and wildlife habitats, as the appropriate focus for management decisionmaking. . . . In short, management priorities -- set in accordance with ecological principles -- should transcend jurisdictional boundaries and reflect an overarching commitment to an integrated public domain.<sup>21</sup>

R. Edward Grumbine focuses on the institutional and social issues in this prescription for ecosystem management:

The model requires cooperation, an awareness of conflicting legal mandates, site-specific goals, regional social participation, a biological information base, and a strong sense of the interconnections between social, political, and environmental issues.<sup>22</sup>

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<sup>19</sup>Tim C. Clark, Elizabeth Dawn Amato, Donald G. Whittemore, and Ann H. Harvey, Policy and Programs for Ecosystem Management in the Greater Yellowstone Ecosystem: An Analysis, 5 Conservation Biology 412, 414 (Sep. 1991).

<sup>20</sup>Robert B. Keiter and Mark S. Boyce, Greater Yellowstone's Future: Ecosystem Management in a Wilderness Environment, in The Greater Yellowstone Ecosystem: Redefining America's Wilderness Heritage 379, 381 (Robert B. Keiter & Mark S. Boyce, eds., 1991).

<sup>21</sup>Robert Keiter, NEPA and the Emerging Concept of Ecosystem Management on the Public Lands, 25 Land and Water L. Rev. 43, 45 (1990).

<sup>22</sup>R. Edward Grumbine, supra note 11, at 23.

In short, the emerging philosophy of ecosystem management proposes that public land managers should conduct planning and management activities in such a way that impacts on natural resources and natural systems throughout the affected ecosystem will be considered. This is sometimes described as taking a "landscape" view of the resources. It should include consideration of activities that take place on privately-owned lands within the ecosystem.

The federal land management agencies have embraced the language (if not all the substantive components) of ecosystem management as a mandate for broader public participation and interdisciplinary approaches to resource management. One BLM official defined ecosystem management as "a collaborative approach to managing landscapes . . . a better interface between science, management, and the public."<sup>23</sup> Although the BLM has not adopted a national policy on ecosystem management, the agency has pursued a variety of initiatives aimed at coordinated, regional resource management. For example, the BLM recently released draft management plans for six districts in western Oregon extending over 2.5 million acres of land. The plans attempt to coordinate the agency's management efforts over this entire region, a departure from its traditional focus on individual resource areas.<sup>24</sup> And, in California, the BLM is a signatory to a multi-agency memorandum of understanding aimed at developing "a coordinated regional strategy that ensures protection of biological diversity and the maintenance of economic viability throughout California,"<sup>25</sup> potentially an even broader attempt at ecosystem management.

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<sup>23</sup>Personal communication, Gary McVicker, Deputy State Director, Bureau of Land Management, Denver, Colorado (October 7, 1992).

<sup>24</sup>For an overview of the planning approach, see U.S. Department of the Interior, Bureau of Land Management, Executive Summary: Western Oregon Draft Resource Management Plans/Environmental Impact Statements (August 1992).

<sup>25</sup>Memorandum of Understanding: California's Coordinated Regional Strategy to Conserve Biological Diversity 1-1 (August 14, 1991). The "Agreement on Biological Diversity" was signed by representatives of the California Resources Agency, California Department of Fish and Game, California Department of Forestry, California Department of Parks and Recreation, State Lands Commission, Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service, and the University of California.

The U.S. Forest Service has adopted a national policy of "ecosystem management," although the agency is struggling to define that term.<sup>26</sup> Forest Service Chief Dale Robertson announced the policy in June 1992, explaining that: "Under ecosystem management, we will consider more elements in the decisions we make, and we will also consider them at a broader range of spatial and temporal scales."<sup>27</sup> In September 1992 the Deputy Chief of the Forest Service articulated the agency's new direction as follows: "It is time for the Forest Service to embrace the concept of managing ecosystems to sustain both their diversity and productivity. It is time to chart a new course that makes ecosystem management the foundation for sound multiple-use, sustained-yield management."<sup>28</sup> The Forest Service appears to intend ecosystem management as a means of fine-tuning its existing mandates in order also to address concerns for biological diversity and public involvement.<sup>29</sup>

Ecosystems may also be defined by or viewed with a focus on the human communities they contain. The various communities within a defined ecosystem share common interests with one another, and those interests often revolve around the use or preservation of natural resources. The emerging philosophy of "bioregionalism" promotes greater integration of the various communities within defined geographic areas. Kirkpatrick Sale writes that "the crucial and perhaps only and all-encompassing task is to

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<sup>26</sup>The author has spoken with Forest Service employees from various parts of the United States about their perceptions of the new policy. It is clear from these discussions that the policy is still in very early stages of development, but that it represents an encouraging new direction to those who have been dissatisfied with the agency's historical focus on commodity production. Agency employees at the national forest and regional levels have been encouraged to help articulate the practical dimensions of the new policy.

<sup>27</sup>This statement was in an attachment to the Chief's statement, dated June 25, 1992. The attachment was derived from a Forest Service-sponsored workshop, "Taking an Ecological Approach to Management," Salt Lake City, Utah, April 27-30, 1992.

<sup>28</sup>James C. Overbay, A Bias Toward Diversity: The Meaning of Ecosystem Management on the National Forests, 13 Forest Watch 19 (Sep. 1992).

<sup>29</sup>The relationship of this concept of ecosystem management to multiple use is explored in Sarah Bates, Discussion Paper: The Changing Management Philosophies of the Public Lands, Western Lands Report No. 3, Natural Resources Law Center, University of Colorado School of Law (1993).

understand *place*, the immediate specific place where we live."<sup>30</sup> Once local residents understand the source of their water, the capacity of their forests to sustain timber harvest, and all the other particulars of place, the bioregional vision sees these people as assuming a preeminent role in resource management. This idea of ecosystem management (which is sometimes subsumed in the concept of sustainability) focuses far less on the federal land managers, emphasizing instead the potential for local governance. Consider, for example, the evolution of the Mattole Restoration Council, an association of people living in the watershed of the Mattole River in coastal Northern California.<sup>31</sup> The Council began out of concerns for the river's declining salmon, but since has expanded its efforts to land use practices (timber cutting, road building, and farming), education, and community governance. In addition to treating the "symptoms of habitat decline," writes one of the Council's leaders, "an equally important goal is to provide individuals and inhabitants the clear experience of themselves as functionally benign parts of the living system."<sup>32</sup>

## LEGAL AUTHORITIES FOR ECOSYSTEM MANAGEMENT

Whatever it is called, and however it is defined, an ecosystem-oriented approach to public land management appears to be the dominant trend. Will this direction require new legislation or simply new applications of existing mandates? This section provides an overview of existing and proposed legal authorities for cross-boundary resource management.

### Existing Legal Authorities

Federal land managers operate within the authority of their agencies' organic legislation and subsequently-enacted statutes. The organic acts tend to provide very

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<sup>30</sup>Kirkpatrick Sale, Dwellers in the Land: The Bioregional Vision 42 (1985).

<sup>31</sup>E.g., Freeman House, To Learn the Things We Need to Know, 66 Whole Earth Review 36 (Spring 1990).

<sup>32</sup>Id. at 47.

broad mandates for management. More recently, however, Congress has defined land management agencies' duties and responsibilities with more particularity. The more recently-specified responsibilities have included mandates for coordination with other agencies.

The National Forest Management Act (NFMA) directs the agency to use an interdisciplinary approach throughout the land-planning process<sup>33</sup> and requires national forest management plans to be coordinated with the planning processes of other federal agencies and state and local governments.<sup>34</sup> Regulations promulgated under the NFMA interpret this requirement as including coordination with Indian tribes,<sup>35</sup> and require the Forest Service to recognize that "the National Forests are ecosystems and their management for goods and service requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems . . . ."<sup>36</sup> The NFMA also requires the Forest Service to include biological diversity goals in the agency's land management plans.<sup>37</sup>

The BLM has similar authority under the Federal Land Policy and Management Act (FLPMA).<sup>38</sup> For example, FLPMA requires the agency to develop land management plans similar to those required by the NFMA, using a "systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences . . . ."<sup>39</sup> The BLM must coordinate its resource management plans with plans prepared by other agencies, states, tribes, and local

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<sup>33</sup>16 U.S.C. § 1604(f)(3).

<sup>34</sup>*Id.* at §§ 1604(a) and 1601(c).

<sup>35</sup>36 C.F.R. § 219.(1)(b)(9).

<sup>36</sup>36 C.F.R. § 219.1(b)(3).

<sup>37</sup>16 U.S.C. § 1604(g)(3)(B).

<sup>38</sup>43 U.S.C. § 1701 et seq.

<sup>39</sup>*Id.* at § 1712(c)(2).

governments.<sup>40</sup> And, like the Forest Service, the BLM has discretionary authority to cooperate with state and local agencies and tribes in land management planning.<sup>41</sup> The BLM is directed to ensure the consistency of its land use plans with those promulgated by state and local governments "to the maximum extent . . . consistent with Federal law and the purposes of [FLPMA]."<sup>42</sup>

In contrast to the agency-specific land management statutes, environmental statutes such as the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) apply to a broad range of federal activities. NEPA requires that federal agencies prepare an environmental impact statement (EIS) when considering an action that may have significant environmental effects.<sup>43</sup> Before the EIS is released, NEPA requires that "the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved."<sup>44</sup> NEPA regulations require interagency notification and comment<sup>45</sup> and require discussion in the EIS of "possible conflicts between the proposed action and the objectives of Federal, regional, State, and local [and tribal] land use plans, policies and controls for the area concerned."<sup>46</sup> Thus, "NEPA facilitates interagency relationships among land managers, even among those that operate under fundamentally different legal mandates."<sup>47</sup> Although these provisions appear to be strong mandates for interdisciplinary, interagency cooperation, the courts

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<sup>40</sup>Id. at § 1712(c)(9). See also 43 U.S.C. § 1712(b).

<sup>41</sup>Id. at § 1737(b).

<sup>42</sup>43 U.S.C. § 1712(e)(9).

<sup>43</sup>42 U.S.C. § 4332(2)(C).

<sup>44</sup>Id.

<sup>45</sup>40 C.F.R. § 1501.6.

<sup>46</sup>Id. at § 1502.16(c).

<sup>47</sup>Keiter, supra note 21 at 47.



have interpreted NEPA as a purely procedural statute.<sup>48</sup> Thus, as Robert Keiter observes, NEPA "does not insure meaningful substantive coordination sensitive to transboundary ecological realities."<sup>49</sup>

NEPA's other provisions provide support for ecosystem management, including mandates to maintain the environment for diversity<sup>50</sup> and to analyze indirect environmental impacts,<sup>51</sup> which the regulations define as including impacts on ecosystems.<sup>52</sup> The courts, however, have limited the reach of the latter provision, holding in several recent cases that land managers need not consider the cumulative impacts of their actions on natural systems beyond their own jurisdictional boundaries.<sup>53</sup> NEPA requires consideration of "the worldwide and long-range character of environmental problems" and, to the extent that U.S. foreign policy is not compromised, directs all federal agencies to "lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment."<sup>54</sup>

The Endangered Species Act (ESA) specifically states that one of its purposes is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved . . . ."<sup>55</sup> The ESA requires federal

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<sup>48</sup>E.g., Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519 (1978); Robertson v. Methow Valley Citizens Council, 109 S. Ct. 1835 (1989).

<sup>49</sup>Keiter, supra note 21 at 48, n.28.

<sup>50</sup>42 U.S.C. § 4331(b)(4).

<sup>51</sup>40 C.F.R. § 1502.16(b).

<sup>52</sup>Id. at § 1508.8(b).

<sup>53</sup>E.g., Connor v. Burford, 848 F.2d 1441 (9th Cir. 1988); Thomas v. Peterson, 754 F.2d 753 (9th Cir. 1985); Save the Yaak Comm. v. Block, 840 F.2d 714 (9th Cir. 1988); and LaFlamme v. Federal Energy Regulatory Comm'n, 852 F.2d 389 (9th Cir. 1988).

<sup>54</sup>42 U.S.C. § 4332(2)(F).

<sup>55</sup>16 U.S.C. § 1531(b).

agencies to take necessary actions for the recovery of listed species,<sup>56</sup> including the preparation of recovery plans,<sup>57</sup> and requires federal agencies to consult with the Secretary of the Interior if a proposed action "may affect" a listed species.<sup>58</sup> Cooperation with private parties is encouraged by a requirement for a habitat conservation plan (HCP) as a condition for an incidental take permit.<sup>59</sup>

As demonstrated by the interagency efforts to save the grizzly,<sup>60</sup> ESA recovery plans can foster ecosystem approaches to natural resource management. And, as has been illustrated in the Pacific Northwest, protection of critical habitat for a listed species (in that case the northern spotted owl) can have far-reaching effects on public land management. Citizen lawsuits have played an important role in the growth of the ESA as a force in public land management: environmental groups petition agencies to list species and subsequently protect large areas of land (critical habitat for the listed species) from development. Conservation biologists would prefer legislation that protects ecosystems more directly and argue that single-species management is contrary to the philosophy of ecosystem management.<sup>61</sup> On the other hand, legislation that does not end at political boundaries offers opportunities for interjurisdictional approaches to resource management -- at least one component of ecosystem management.

International law also offers potential legal bases for ecosystem-oriented approaches. For example, the World Heritage Convention<sup>62</sup> obligates the United States and other signatory parties to protect cultural and natural heritage sites identified on the

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<sup>56</sup>Id. at § 1536(a)(1).

<sup>57</sup>Id. at 1533(f).

<sup>58</sup>Id. at § 1536(a)(2); 50 C.F.R. § 402.14.

<sup>59</sup>16 U.S.C. § 1539(a).

<sup>60</sup>See discussion infra at pp. 20-21.

<sup>61</sup>See, e.g., Suzanne Winckler, Stopgap Measures, 269 Atlantic Monthly 74 (Jan. 1992).

<sup>62</sup>Convention Concerning the Protection of the World Cultural and Natural Heritage, Nov. 16, 1972, 27 U.S.T. 37, T.I.A.S. No. 8226.

World Heritage list. (Glacier National Park is one of the national parks on the list.) The legal enforcement mechanisms available under the World Heritage Convention are not clear, however.<sup>63</sup> Other international agreements, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),<sup>64</sup> offer cross-boundary resources protection.

### **Proposed Legislative Authorities**

In recent years Congress has considered legislation intended to protect national parks from external threats and to encourage interagency coordination. The National Park System Protection and Resource Management Act of 1983, for example, focused on activities on lands adjacent to national parks, requiring consideration of their impacts on park resources.<sup>65</sup> The bill passed the House but failed in the Senate, apparently because it vested the National Park Service with a review authority (some saw it as a "veto power") and effectively created a buffer zone of increased scrutiny around national parks.<sup>66</sup> George Coggins reviews this and other proposed approaches to protecting national parks, concluding that additional measures are necessary to coerce cooperation among agencies responsible for adjoining federal public lands.<sup>67</sup>

More recently, a bill introduced in 1992 proposed new wilderness areas in national forest lands drawn on ecosystem boundaries. The Northern Rockies Ecosystem Protection Act of 1992 stated as one of its purposes to "promote and ensure interagency

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<sup>63</sup>See Daniel Barstow Magraw, International Law and Park Protection: A Global Responsibility, in Our Common Lands: Defending the National Parks 143 (David J. Simon, ed., 1988).

<sup>64</sup>March 3, 1973, 27 U.S.T. 1087, T.I.A.S. 8249.

<sup>65</sup>H.R. 2379, 98th Cong., 1st Sess. (1983).

<sup>66</sup>For an analysis of H.R. 2379, see Robert Keiter, On Protecting the National Parks from the External Threats Dilemma, 20 Land & Water L. Rev. 355 (1985); John Hiscock, Protecting National Park System Buffer Zones: Existing, Proposed, and Suggested Authority, 7 J. Energy L. & Policy 35 (1986); and George Coggins, Protecting the Wildlife Resources of National Parks from External Threats, 22 Land & Water L. Rev. 1 (1987).

<sup>67</sup>Coggins, supra note 66, at 21-27.

cooperation in the implementation of integrated, holistic ecosystem management."<sup>68</sup> It proposed designation of 15 million acres of public lands in Idaho, Montana, Oregon, Washington, and Wyoming as wilderness, wild and scenic rivers, and national park and preserve study areas (all familiar designations), as well as a new system of wild land recovery areas and biological connecting corridors. The wild land recovery areas ("the most promising component of the Act," according to one supporter<sup>69</sup>) would be established in wildlife corridors, historically-important fishing and spawning grounds, and other high-priority areas damaged by road-building, clearcutting, overgrazing, and mining. These areas would be managed by the Wild Land Recovery Corps, a new branch of the Forest Service, charged with the task of "ecosystem restoration." The biological connecting corridors on federal lands would be managed under several strict restrictions: no clearcutting, mining, oil and gas development, or new road construction. Further, the Act directed the Secretaries of the Interior and Agriculture to enter into cooperative agreements with private landowners and state, local, and tribal governments to ensure that non-federal lands within the designated corridors are managed under similar restrictions. The bill was not enacted in 1992, and most of its sponsors were not reelected.

## ECOSYSTEM MANAGEMENT IN PRACTICE

Natural resources management with an ecosystem perspective recognizes cross-boundary links among the various land management authorities. As the Forest Service "ecosystems principles" explains: "Ecosystems frequently cross ownership boundaries. Certain resources or issues can actually become the integrating factors that compel better coordination of ecosystem management across jurisdictional lines."<sup>70</sup> This section describes a variety of approaches to ecosystem-oriented natural resources management.

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<sup>68</sup>Sec. 2(b)(E), H.R. 5944, 102nd Cong., 2nd Sess. (1992). See Wild Rockies Act Finally Introduced, 13 Forest Watch 10 (October 1992).

<sup>69</sup>Bader, supra note 3 at 26.

<sup>70</sup>Attachment to Robertson Memorandum, supra note 27.

### **The Broad Concept: Biosphere Reserves**

The conceptual basis for ecosystem management is reflected in the delineation of biosphere reserves throughout the world. These reserves, created under the authority of the United Nations Man and the Biosphere Program, are intended to represent a cross-section of biotic communities and to encourage ecosystem-oriented management and research.<sup>71</sup> Biosphere reserve designations usually include protected areas such as national parks, but they also may extend to cover the surrounding multiple-use and privately-held lands -- in other words, all lands within the defined ecosystem. The lands outside the most-protected core areas are part of a "transition zone" in which human uses and settlements are common. People are recognized as part of the ecosystem. The worldwide system of biosphere reserves is intended to protect a broad representation of ecosystems, encourage scientific research and education, and insure economic opportunities for people living in and around the designated reserves.<sup>72</sup>

In the words of a member of the United States Man and the Biosphere Program, "the reality of biosphere reserves is a long way from the goal."<sup>73</sup> The designation does not carry any enforceable legal responsibilities, although since 1984 nations submitting proposed biosphere reserves have been required to agree to "a minimum set of [research, education, and management planning] activities which should be implemented in each biosphere reserves."<sup>74</sup> According to Joseph Sax and Robert Keiter, the National Park Service has adopted the biosphere reserve concept readily, and sees it as "the basis for a theory of regional resource management."<sup>75</sup> The Forest Service, on the other hand, has

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<sup>71</sup>See M.I. Dyer and M.M. Holland, "Unesco's Man and the Biosphere Program" 38 BioScience 635 (October 1988).

<sup>72</sup>U.S. Man and the Biosphere Program, Directory of Biosphere Reserves in the United States (June 1991).

<sup>73</sup>Proceedings of the Symposium on Biosphere Reserves, Fourth World Wilderness Congress, September 14-17, 1987 (William P. Gregg, Jr., Stanley L. Krugman, and James D. Wood, eds.)

<sup>74</sup>UNESCO, Action Plan for Biosphere Reserves 20 Nature and Resources 11 (1984).

<sup>75</sup>Joseph L. Sax and Robert B. Keiter, Glacier National Park and Its Neighbors: A Study of Federal Interagency Relations, 14 Ecology L.Q. 207, 253 (1987). See also Grumbine, supra note 11 at 22-23.

not viewed the designation of a biosphere reserve as creating any legal obligations; one observer believes that "the Forest Service sees [the biosphere reserve concept] as a threat to its autonomy."<sup>76</sup> A number of commentators favor an expanded role of biosphere reserves in ecosystem management,<sup>77</sup> but it does not appear that designation has led to significant changes in land management in any of the United States biosphere reserves. In fact, the National Park Service reported in 1980 that the twelve biosphere reserve parks reported more than three times as many threats as other, non-designated national parks.<sup>78</sup> Unfortunately, the boundaries of the typical biosphere reserve in the United States are drawn contiguous with national park boundaries -- defeating the goal of merging human occupancy and use with resource protection in these reserves.

### **Working Within Existing Structures: Interagency Cooperation**

In light of the limited success of biosphere reserves in encouraging ecosystem management, commentators have called for new approaches to coordinate management to recognize ecosystems and deal with trans-boundary problems. Vernon C. Gilbert concludes that "[t]he very nature of ecosystems dictates that broad, cooperative, and integrated approaches to ecosystem management have to be developed."<sup>79</sup> Hal Salwasser et al. conclude that interagency cooperation is essential for achieving ecosystem management ("It may provide our only hope for creating the huge conservation areas necessary to preserve most large vertebrates in the wild"<sup>80</sup>) and describe three levels of cooperation, ranging from informal working arrangements to

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<sup>76</sup>Grumbine, supra note 11 at 23.

<sup>77</sup>E.g. Newmark, supra note 10, at 206: "the biosphere reserve model represents an innovative approach by which biotic protection can be promoted while at the same time incorporating local peoples into the management of the reserve and allowing the sustainable use of selected renewable resources in restricted zones."

<sup>78</sup>U.S. Dept. of the Interior, National Park Service, State of the Parks - 1980: A Report to Congress viii (1980).

<sup>79</sup>Vernon C. Gilbert, in Agee & Johnson, supra note 1, at 180, 182.

<sup>80</sup>Salwasser et al., supra note 11, at 162.

formal, legislatively-mandated cooperation, and provide the following evaluation of the various approaches:

The first approach, locally arranged, informal cooperation, may be the most easily attained, but is also likely to have only a small impact and be the least stable through time. The second, agreement requiring the signatures or endorsement of top-level administrators (e.g. department heads or agency directors), is more difficult to obtain, but is more likely to survive and affect management activities. Finally, a legislative act mandating cooperation among federal (national) land management agencies is likely to produce long-lasting and broad results, but usually requires equally strong financial backing, public interest, and political support.<sup>81</sup>

The 1991 Memorandum of Understanding on biological diversity, signed by federal and state land managers in California, demonstrates the second of these approaches. A BLM official involved in that process describes the MOU as a "broad ecosystem approach to planning."<sup>82</sup> Yet, despite a considerable fanfare at its signing, the agreement soon attracted criticism from local community leaders (who felt left out) and conservatives (who perceived it as a movement toward regional government). The MOU was modified to include more local signatories and to encourage county and regional participation. The actual implementation of the agreement remains to be seen.

Another approach to encourage cooperation beyond political boundaries was attempted in July 1992, when California's Resources Agency convened the "Sierra Summit," a conference to discuss resource issues in the Sierra Nevada. Over 1,500 participants attended a series of five workshops that followed the two-day summit conference. The proceedings of the Sierra Summit include a section on "Success Stories" in the Sierra Nevada: cooperative efforts including soil erosion projects in the Lake Tahoe Basin, and the Feather River Cooperative Resource Management Plan, signed by 13 agencies to deal with local water quality and water supply problems.

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<sup>81</sup>Id. at 163.

<sup>82</sup>Personal communication, Carl Rountree, Chief, Planning and Environmental Staff, Bureau of Land Management (October 15, 1992).

The Northwest Power Act<sup>83</sup> is an example of a legislative ecosystem management mandate. The Act, passed in 1980 to address concerns about electrical power generation and declining salmon in the Columbia River Basin, says that the Columbia River and its tributaries are to be treated "as a system." Under this authority, the four basin states created the Northwest Power Planning Council, a unique institutional approach to cross-boundary problems. In addition to its planning and coordination functions, the Council possesses limited legal authority to guide the actions of federal water and power agencies.<sup>84</sup>

Ecosystem-oriented approaches often are focused on a single resource (such as water) or species (such as the salmon). For example, the Interagency Grizzly Bear Study Team (IGBST) was formed in 1973 to conduct cooperative research on Yellowstone's grizzlies.<sup>85</sup> After the grizzly was listed as a threatened species in the lower 48 in 1975, the cooperating agencies formed the Interagency Steering Committee to guide the IGBST's work.<sup>86</sup> In 1979 the grizzlies' habitat needs were the subject of the interagency Yellowstone Grizzly Bear Guidelines,<sup>87</sup> which effectively "zoned" the lands in the Yellowstone ecosystem based on the likelihood that activities in each area will impact grizzly activity.<sup>88</sup> The Interagency Grizzly Bear Committee (IGBC), established in 1983, included a subcommittee focused on the Yellowstone area population.<sup>89</sup> The

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<sup>83</sup>P.L. 96-501, 16 U.S.C. §§ 839-839h.

<sup>84</sup>Kai N. Lee, The Columbia River Basin: Experimenting With Sustainability, 31 *Environment* 6, 10 (July/Aug. 1989).

<sup>85</sup>Clark, *supra* note 19, at 416.

<sup>86</sup>*Id.* at 417.

<sup>87</sup>*Id.*

<sup>88</sup>Congressional Research Service, The Library of Congress, Issues Surrounding the Greater Yellowstone Ecosystem: A Brief Review, report prepared for the Subcommittee on Public Lands and the Subcommittee on National Parks and Recreation, Committee on Interior and Insular Affairs, U.S. House of Representatives, 99th Cong., 1st Sess., Oversight Hearing held on October 24, 1985.

<sup>89</sup>Clark, *supra* note 19, at 417.



IGBC gained the support of state governments in 1984.<sup>90</sup> In addition to fostering communication among agency officials, the IGBC has developed a "cumulative effects assessment" to study the impacts of human activity on bear habitat, distribution, and mortality.<sup>91</sup> In 1987 the model developed through that process revealed that a proposed ski area outside West Yellowstone would negatively impact the grizzly; the Forest Service consequently reversed its earlier decision to grant a permit for the development.<sup>92</sup>

In another cooperative effort to address cross-boundary issues, in 1991 the U.S. Environmental Protection Agency formed the Grand Canyon Visibility Transport Commission, comprised of representatives of nine states in the Colorado Plateau. The Commission has until 1995 to study the movement of pollutants in the region and make recommendations to protect visibility in parks and wilderness areas.<sup>93</sup> In the meantime, the Navajo Generating Station is installing new equipment to reduce sulfur dioxide emissions by 90%, a target agreed to at the end of a six-month negotiating process involving the EPA, the Salt River Project (operator of the Navajo Station), the Environmental Defense Fund (which sued the EPA in 1984 to compel enforcement of the Clean Air Act), and the Grand Canyon Trust.

Interagency cooperation includes more than agreements among federal and state agencies. It also includes participation in local governments' land-use planning efforts. Officials at Glacier National Park report that they plan to make a "major effort" at convincing county leaders of the need for land-use planning.<sup>94</sup> Salwasser et al. urge federal land managers to pursue cooperative arrangements with "regional and local

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<sup>90</sup>The agreement among the federal agencies and the states appears in the Oversight Hearing report, supra note 87, at 225-228.

<sup>91</sup>See the CRS report in the Oversight Hearing Report, supra note 91, at 169.

<sup>92</sup>Robert Keiter, Taking Account of the Ecosystem on the Public Domain: Law and Ecology in the Greater Yellowstone Ecosystem, 60 U. Colo. L. Rev. 923, 959-960 (1989).

<sup>93</sup>Grand Canyon Visibility Transport Commission, Work Plan 2 (June 1992).

<sup>94</sup>Personal communication, Brace Hayden, Scientist, Glacier National Park (March 12, 1992).

governments . . . universities, private organizations (e.g. The Nature Conservancy), ranchers, farmers, and any other entities or individuals that own and manage land."<sup>95</sup>

A recent effort toward cooperative management in the Greater Yellowstone Ecosystem failed to meet many observers' and participants' high expectations. The Greater Yellowstone Coordinating Committee (GYCC), formed in the 1960s, set out in the mid-1980s to improve coordination between the Forest Service and the National Park Service.<sup>96</sup> The first step was an "aggregation report," which consolidated information from various resource management plans.<sup>97</sup> Next, the GYCC began preparation of "Vision for the Future" document to define coordinated management priorities for the region. The 60-page draft "vision" document released in August 1990 met with public controversy: thousands attended public hearings or wrote letters to the GYCC; the Wyoming congressional delegation protested the document to the Secretary of the Interior, complaining that the proposed management goals would disrupt local economies and curtail multiple uses on public lands; and governors of three states requested the GYCC to redraft the document.<sup>98</sup> The final document was to be released in 1991, but instead the GYCC issued an 11-page "framework" for the region, which omitted much of the original detail about ecosystem approaches.<sup>99</sup> National Park Service Regional Director Lorraine Mintzmyer, one of the drafters of the "vision" document, claims that the revision was based on political -- rather than scientific -- concerns.<sup>100</sup>

James K. Agee and Darryl R. Johnson provide a useful (and frequently quoted) cautionary note about the value of cooperative efforts in their introduction to ecosystem management:

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<sup>95</sup>Salwasser et al., supra note 11, at 166.

<sup>96</sup>Keiter, supra note 95, at 987.

<sup>97</sup>Id.

<sup>98</sup>Clark, supra note 19, at 418.

<sup>99</sup>"Framework" replaces "vision," 23 High Country News 11 (Oct. 7, 1991).

<sup>100</sup>Testimony of Lorraine Mintzmyer reprinted at 23 High Country News 10-11 (Oct. 7, 1991).

Interagency coordination is often a key element of successful ecosystem management, but it is not an end in itself. Success in ecosystem management is ultimately measured by the goals achieved, not by the amount of coordination.<sup>101</sup>

One illustration of this point is the proliferation of interagency coordination committees in the Yellowstone area that the Congressional Research Service noted in a 1986 report.<sup>102</sup> Although there were at least 20 committees in place, the agencies that supposedly were participating could not agree as to their meeting frequency, names, or purposes.

### **Coordination Through New Land Management Designations**

Interagency coordination may require more than agreements to cooperate. In some instances, new land management designations or consolidation of responsibilities under an "umbrella" management team are appropriate.

Hal Salwasser et al. propose a series of "conservation networks," within which management activities would be coordinated to protect species of concern (such as the spotted owl) as well as the ecosystem as a whole.<sup>103</sup> The authors illustrate this proposal with a description of ten potential networks which might be formed among adjacent national parks, national forests, and national wildlife refuges. The North Cascades conservation network, for example, would include Mount Rainier and North Cascades National Parks, Gifford Pinchot, Mt. Baker/Snoqualamie, Okanogan, and Wenatchee National Forests; and Lake Chelan and Ross Lake National Recreation Areas.<sup>104</sup> Within such a conservation network, some activities (such as clear-cutting, road-building, or high-density camping) might be curtailed; other activities might be

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<sup>101</sup>James K. Agee and Darryl R. Johnson, Introduction to Ecosystem Management, in Agee & Johnson, supra note 1, at 7.

<sup>102</sup>Oversight hearing report, supra note 91, at 166-168.

<sup>103</sup>Salwasser et al., supra note 11, at 166.

<sup>104</sup>Id. at 169.

shifted to areas where impacts on sensitive species are less likely.<sup>105</sup> The basic idea, as presented in this model, is to broaden the management focus to include the whole ecosystem.

Special designations such as administratively-created Areas of Special Ecological Concern (ACECs) or congressionally-designated National Conservation Areas (NCAs) on BLM lands may help land managers from different agencies coordinate their efforts. For example, 262,600 acres of BLM lands surrounding the El Malpais National Monument in New Mexico were designated as an NCA, thus effectively (although not explicitly) creating a buffer zone between the National Park Service monument lands and the BLM's multiple-use lands. Managers deny any intention to create a buffer zone, but describe the NCA as a means for the BLM to retain authority over sensitive lands.<sup>106</sup> In Arizona the NCA designation has been used to protect important riparian and cultural resources of the San Pedro River. The BLM entered into cooperative agreements with The Nature Conservancy (which helped acquire lands for the NCA) and the San Pedro Natural Resources Conservation District (which works with private landowners to obtain federal funds for soil and water conservation) to establish a process of coordinated resource management in the San Pedro ecosystem. The primary drawback of ACECs is their small size; they are drawn to encompass limited areas rather than complete ecosystems.

## CONCLUSION

Public land managers are challenged by the conflict between the operations of natural systems and the reality of political and jurisdictional boundaries. As scientific understanding of ecosystems and species interdependence grows, so too does the pressure on resource professionals to transcend borders and pursue integrated natural resource management. This concept is coming to be known as ecosystem management.

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<sup>105</sup>Id. at 166.

<sup>106</sup>Personal Communication, Dave Mensing, Wilderness Coordinator, Bureau of Land Management, Santa Fe, New Mexico (October 15, 1992).

As illustrated by the uncertainty about the Forest Service's recently announced policy, "ecosystem management" is still an emerging idea. Commentators have articulated possible components of ecosystem management, but most of these are not reflected in the agency's policy statements. Nonetheless, it is encouraging to hear professionals acknowledging the need for broader, more integrated approaches to public land and resource management. Rather than a national policy, ecosystem management is likely to arise and gain meaning in dozens of locations in dozens of different forms. It is a concept that, above all, mandates consistency of resource management with the parameters of the place in which the resources are located.