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Cooperative Ecosystem Management: Can an Ecosystem Approach Succeed in Wyoming

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Comments

COOPERATIVE ECOSYSTEM MANAGEMENT: Can an Ecosystem Approach Succeed in Wyoming?

I. INTRODUCTION

Twentieth century resource management has been plagued by disagreements among public land managers, adjacent landowners, environmentalists, commodity groups, and various others who have an interest in the land.[1] Rather than following logically structured and scientifically supported management plans, managers have struggled to balance these incongruous interests.[2] Short-term, commodity-production-oriented management approaches have undermined both the ecological well being and the economic productivity of the land.[3]

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1. Darryll R. Johnson & James K. Agee, *Introduction to Ecosystem Management, in* ECOSYSTEM MANAGEMENT FOR PARKS AND WILDERNESS 3 (James K. Agee & Darryll R. Johnson eds., 1988). Instead of being able to create management plans that protect species from endangerment or protect habitats from degradation, managers end up attempting to remedy the damage that has already occurred. *Id. See also* STEVEN L. YAFFEE ET AL., THE UNIVERSITY OF MICHIGAN AND THE WILDERNESS SOCIETY, ECOSYSTEM MANAGEMENT IN THE UNITED STATES: AN ASSESSMENT OF CURRENT EXPERIENCE 3 (1996) [hereinafter ECOSYSTEM MANAGEMENT IN THE UNITED STATES].

2. *See generally* Johnson & Agee, *supra* note 1 (noting that poor communication among individuals with an interest in the land as well as a general lack of information about plant, fish, wildlife and human populations in and around parks and wilderness areas often force managers to operate in a reactive mode).

3. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 3 (listing various ecosystem stresses caused by humans despite the use of modern management techniques). Such stresses include agricultural practices, disruption of fire regime, exotic species, grazing and range management, hydrolic (water) alteration, mining, overfishing and hunting, non-point source pollution, point source pollution, recreation, roads, timber and forest management. *Id.* at 69. Assorted combinations of these stresses are the reason for most ecosystem management efforts. *Id. See also* Johnson and Agee, *supra* note 1, at 3 (noting that near destruction of certain species, such as grizzly bears and wolves as well as serious pollution problems have significantly impacted the nation's park land); Robert B. Keiter, *Beyond the Boundary Line: Constructing a Law of Ecosystem Management*, 65 U. COLO. L. REV. 293, 298 (1994) (noting that "scientists generally agree that existing park and wildlife reserves, often imperiled by development occurring on adjacent lands are too small to protect against species loss").

Perhaps the most pervasive shortcoming of present management policies is lack of sensitivity to the natural ecology.[4] Since species preservation and resource sustainability are dependant upon ecosystem health, ecosystem health should be the focus of contemporary conservation efforts.[5] Management policies should address the fact that vegetation and wildlife ecosystems that need protection within park land or wilderness areas frequently overlap with adjacent (often private) land.[6] In 1949, forest researcher and pioneering conservationist Aldo Leopold explained that "conservation is going nowhere because it is incompatible with our Abrahamic concept of the land. We abuse the land because we regard it as a commodity belonging to us."[7] Thanks to Aldo Leopold and many who have followed him, our society is recognizing that humans are an integral part of the environment.[8] One important scientific observation that has been a driving force behind management is that focusing on one level of an ecosystem, such as genes, species, or populations, is not enough.[9] The relationship among these different levels of biodiversity means that management policy must account for the fact that a change at any one level has an impact on all other levels.[10] In essence, such environmental interdependence dictates that management of one species or

4. *See* Gary E. Davis & William L. Halvorson, *Long-Term Research in National Parks: From Beliefs to Knowledge, in* SCIENCE AND ECOSYSTEM MANAGEMENT IN THE NATIONAL PARKS 3-4 (Gary E. Davis & William L. Halvorson eds., 1996). The early approach to land management by the National Park Service was guided by the belief that fire and predators were "bad," so managers suppressed fire and removed predators to protect animals that were perceived as "good" such as elk and deer. *Id.* Scientific ecology is slowly replacing these preconceived notions of good and bad. *Id. See also* Ervin H. Zube, *Management in National Parks: From Scenery to Science, in* SCIENCE AND ECOSYSTEM MANAGEMENT IN THE NATIONAL PARKS 11 (Gary E. Davis & William L. Halvorson eds., 1996) ("National Park Service managers have been trying to manage our national parks without knowing all the physical, biological, and cultural pieces; their interrelationships; and the management implications for individual pieces and for the ecosystems and landscapes of which they are a part."). WEBSTER'S NEW INTERNATIONAL DICTIONARY 814 (2d ed. 1954) defines "Ecology" as the branch of biology which deals with the mutual relations among organisms and between them and their environment.

5. Keiter, *supra* note 3, at 299; *see also* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 3.

6. Johnson & Agee, *supra* note 1, at 5.

7. ALDO LEOPOLD, A SAND COUNTY ALMANAC AND SKETCHES FROM HERE AND THERE viii (1949).

8. *See* LYNTON K. CALDWELL, ENVIRONMENT: A CHALLENGE FOR MODERN SOCIETY 8 (1970) ("Since 1960, however, a new formulation of public responsibility has been taking shape in American Society. By the end of the decade, it was evident that the condition of the environment was in the process of becoming a national responsibility."). Leopold's perspective about the human relationship with and responsibility to the environment began to gain widespread public support in the 1960s. *See id.*

9. R. Edward Grumbine, *What is Ecosystem Management?*, 8 CONSERVATION BIOLOGY 27, 29 (1994) ("When working on a problem at any one level or scale, managers must seek the connections between all levels. This is often described as a 'systems' perspective.").

10. *Id.* at 29.

population simply will not work. As noted environmentalist and author, John Muir emphasized, "when we pick out anything by itself, we find it hitched to everything else in the universe."[11] The general public is also beginning to observe environmental interdependence and consequently take a greater interest in the protection of the environment.[12]

For many land managers, ecologists, and legal scholars, the great hope for improved resource management is ecosystem management.[13] Generally, ecosystem management describes the practice of using scientific data and public involvement to delineate and manage an environmental zone where living organisms, water, atmosphere, and earth are interrelated components.[14] Public involvement in ecosystem management comes from many sources; private landowners, nonprofit organizations, industry, universities and private citizens have all participated in ecosystem management projects.[15]

Aside from NEPA[16] and a few other enactments,[17] federal public land and natural resource management policy has been dictated by juxtaposed utilitarian and preservationist traditions ambivalent toward sci-

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11. John Muir, *quoted in* U.S. DEP'T OF AGRIC. - FOREST SERV., A NATIONAL FRAMEWORK: ECOSYSTEM MANAGEMENT (April 1994).

12. Keiter, *supra* note 3, at 300; *see also* ECOSYSTEM MANAGEMENT IN THE UNITED STATES *supra* note 1, at 28. Public input is very important; the ability of the public and managers to learn from past failures is critically important to ecosystem management. *Id.*

People who enjoy outdoor activities have an expectation that the aesthetic beauty of the area that they enjoy will be maintained in the future. When environmental degradation occurs as a result of their activities, extractive uses, and other exogenous agents, not only does the environment suffer, but the level of enjoyment that these various users realize begins to decline. Public support for environmental protection laws demonstrates that many land users are willing to compromise and accept that some land may need to be set aside and managed for the protection of sensitive species and their habitats. *See id.*, *supra* note 1, at 22 (noting that ecosystem management projects have been initiated by local citizens who believe that agencies are not adequately addressing natural resource problems). Public support eventually prompted congressional action when the 91st Congress, along with President Nixon, enacted the National Environmental Policy Act of 1969 (NEPA). *See* National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4370 (1994).

13. *See generally* Keiter, *supra* note 3.

14. *See infra* note 21 and accompanying text; *see also* Duncan T. Patten, *Defining the Greater Yellowstone Ecosystem, in* THE GREATER YELLOWSTONE ECOSYSTEM 19-23 (Robert B. Keiter & Mark S. Boyce eds., 1991); ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 15.

15. See ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 15. Ecosystem management projects have sprung up in every state. The University of Michigan and the Wilderness Society Study recognized four ecosystem management projects in Wyoming alone. The states surrounding Wyoming also have ongoing ecosystem management projects. Colorado has seven active projects, Idaho has four, Montana has four, Nebraska has three, and Utah has one. *Id.* at 53-54.

16. National Environmental Policy Act of 1969, 42 U.S.C. § 4332(2)(c) (1994). An environmental impact statement (EIS) is mandated by NEPA. An EIS uses scientific information to assess the impact of a particular action on the environment. *Id.*

17. Other enactments include the Wilderness Act of 1964, the Federal Land Policy and Management Act of 1976, and the Endangered Species Act of 1973.

ence.[18] Creating policy to solve one dilemma, without regard to science, may result in a myriad of unforeseen problems.[19] Our current management practices are failing, and we now face the loss of entire ecosystems as a result.[20] At this stage, it appears that a fresh approach with a broader management perspective is needed.

This comment will advance the ecosystem management approach espoused by R. Edward Grumbine. "Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and value framework toward the goal of protecting native ecosystem integrity over the long term."[21] Next, it will explore the feasibility of ecosystem management for two ecosystems in Wyoming—the Greater Yellowstone Ecosystem and the Buffalo Resource Area.[22] This comment will examine the issues raised by existing environmental statutes. This

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18. Keiter, *supra* note 3, at 296. Management policies are not directed by science since both utilitarians and conservationists desire to manage land without any scientific observation. Utilitarianism calls for using natural resources to maximize human benefits; it has evolved into the modern multiple use management standard. Preservationists prefer to see man largely divorced from nature. *Id.* at 296-97.

19. *See* Luther P. Gerlach & David N. Bengston, *If Ecosystem Management is the Solution, What's the Problem?*, J. FORESTRY, Aug. 1994, at 19; *See also* Otto T. Solbrig, *Biodiversity: An Introduction, in* BIODIVERSITY AND GLOBAL CHANGE 15-18 (O.T. Solbrig et al. eds., 1994). Predator elimination decreases biodiversity; biodiversity is characterized as the property of living systems being distinct. Decreased biodiversity, characterized as the property of living systems being distinct, can have aesthetic impacts on the environment as well as more significant impacts such as irreversible disruptions in food chains. *Id. Cf.* David J. Parsons & Jan W. Van Wagtendonk, *Fire Research and Management in the Sierra Nevada National Parks, in* SCIENCE AND ECOSYSTEM MANAGEMENT IN THE NATIONAL PARKS 40 (William L. Halvorson & Gary E. Davis eds., 1996) (noting that fire suppression in national parks can have severe detrimental effects on the natural ecology). Over the years, research in the Sierra Nevada mountains has shown that fire suppression increases fuel hazards and suppresses giant sequoia reproduction. *Id.*

20. Grumbine, *supra* note 9, at 35. *See also* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 22 (noting that one-third of the ecosystem projects studied by the University of Michigan and the Wilderness Society were motivated by environmental damage and the risk of further damage). A proposed airport was the impetus for a comprehensive management plan for New Jersey's Pinelands. *Id.* at 209. In Colorado, increased pressures from recreational users was an important factor in the creation of the Ruby Canyon and Black Ridge Ecosystem Management Plan. *Id.* at 247.

21. Grumbine, *supra* note 9, at 31. Grumbine formed this definition from a list of dominant themes that characterize ecosystem management. *Id.* Grumbine generated the list of dominant themes by organizing the attributes that thirty-three authors "identified as explicitly critical to the definition, implementation, or overall comprehension of ecosystem management." *Id.* at 29. *See also* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 3. The Forest Service also provides a simple definition of "ecosystems" as "naturally occurring assemblages of species, living in and interacting with the same environment; these species are mutually sustaining and interdependent." A NATIONAL FRAMEWORK: ECOSYSTEM MANAGEMENT, *supra* note 11 (page number not available).

22. *See infra* note 100-01 and accompanying text (the Buffalo Resource Area is part of a larger Great Plains Ecosystem). For years, scientists, policymakers and various other stakeholders have been developing ecosystem-based management for these two areas.

comment will also explore scientific concerns that are raised by ecosystem management. Lastly, this comment will advocate the implementation of ecosystem management as a viable alternative to present land management techniques.

II. THE PARAMETERS OF ECOSYSTEM MANAGEMENT

Ecosystem management is defined differently by the various people who have a stake in management policies. Commentators from various disciplines agree that no consensus of opinion on a precise definition of ecosystem management exists.[23] Grumbine's definition is the best available because it is the product of a variety of definitions.[24]

Some warn that many definitions of ecosystem management are so abstract that they may be deceptive.[25] The best way to overcome the dangers associated with such abstraction is to ensure that the focus of any ecosystem management project[26] is interdependence.[27] Most definitions of ecosystem management either refer explicitly to interdependence or imply it with different language.[28] Since people are an integral part of many eco-

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23. *See, e.g.*, Mollie Beattie, *Biodiversity and Ecosystem Management, in* BIODIVERSITY AND THE LAW 3 (William J. Snape III ed., 1996); Thomas R. Stanley, Jr., *Ecosystem Management and the Arrogance of Humanism*, 9 CONSERVATION BIOLOGY 255, 256 (1995); Grumbine, *supra* note 9, at 28; Keiter, *supra* note 3, at 300.

24. *See supra* note 21.

25. Robert Devine, *Management and the Uncertainty Principle*, WILDERNESS, Winter 1994, at 10, 12. One discrepancy among definitions of ecosystem management is that some analysts emphasize an anthropocentric, or human, view of management and others emphasize a biocentric, or non human, focus on management. *See, e.g.*, Stanley, *supra* note 23, at 256; Grumbine, *supra* note 9, at 32. *Cf.* WEBSTER'S NEW INTERNATIONAL DICTIONARY, *supra* note 4, at 270 (defining biocentric as "taking life as a central fact").

26. The University of Michigan and the Wilderness Society study noted that a management policy qualified as an ecosystem management project if project managers endeavor to "extend management across property or political boundaries, . . . if they attempted to shift management priorities away from emphasis on a single resource or species to consider ecosystem processes or landscape as a whole." ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 4. Through contacting various public and private agencies and institutions, the study identified 619 ecosystems that met their criteria. *Id.* Ecosystem management projects have been undertaken in every state. The projects also consisted of a variety of different landforms and vegetation. Many of these projects are host to various endangered species. Forty-one percent of all projects studied were entirely or predominantly on private land, twenty-seven percent were on mixed public and private land, and thirty-one percent were entirely or predominantly on public land. *Id.* at 7-8.

27. *See generally* Devine, *supra* note 25, at 10-22; *see also* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 3; *see infra* notes 45-47 and accompanying text. Grumbine's definition of ecosystem management embodies the notion of interdependence by stressing the importance of "ecological relationships." *See supra* note 21.

28. *See, e.g.*, Grumbine *supra* note 9, at 31; *Beyond the Boundary Line*, *supra* note 3, at 302-03; ALSTON CHASE, IN A DARK WOOD: THE FIGHT OVER FORESTS AND THE RISING TYRANNY OF ECOLOGY 189 (1995); BUREAU OF LAND MANAGEMENT WYOMING, IMPLEMENTATION OF ECOSYS-

systems,[29] this paper will analyze ecosystems in Wyoming where some human presence is evident. Many authors characterize ecosystem management as the maintenance of natural ecological processes and healthy interdependence.[30]

In Wyoming, like many other areas, an anthropocentric[31] management plan is probably the only feasible one. The anthropocentric view of management also stands a better chance of success because it stresses healthy human involvement in the environment.[32] Environmental author R. Edward Grumbine compared articles and books from thirty-three different commentators, including ecologists, legal scholars, and administrative agency representatives.[33] Twenty-four of the authors agree that humans must be considered part of nature.[34] In two Wyoming ecosystems, the Greater Yellowstone Ecosystem[35] and the Great Plains Ecosystem,[36] extractive uses and human involvement are very important historical as well as contemporary features.[37] The conservative political climate in the state also suggests that human interaction and economics must play a role

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TEM MANAGEMENT: CONCEPT REPORT 3 (June 1994) [hereinafter IMPLEMENTATION OF ECOSYSTEM MANAGEMENT].

29. *See Beyond the Boundary Line*, *supra* note 3, at 300.

30. *See* Grumbine, *supra* note 9, at 30 (noting that 27 of 33 authors who have written on ecosystem management stated that ecosystem patterns and processes are important to ecosystem management).

31. *See supra* note 25.

32. *See* Beattie, *supra* note 23, at 12. As director of the U.S. Fish and Wildlife Service, Beattie emphasized that cooperation between managers, biologists and private landowners helped avoid encroachment on private landowners freedom to manage their land. *Id.* Collaborative efforts between landowners and government agencies helped quell landowners apprehension about ecosystem management. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 28.

33. Grumbine, *supra* note 9, at 30; *see infra* note 44.

34. Grumbine, *supra* note 9, at 30.

35. *See generally* TIM W. CLARK & STEVEN C. MINTA, GREATER YELLOWSTONE'S FUTURE (1994); *see infra* notes 79-81 and accompanying text.

36. IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 10; *see infra* notes 62-63, 100 and accompanying text.

37. In the 1800s, when white settlers first moved to Wyoming, ranching and farming became the primary uses of the area. Currently, logging and mineral extraction are also important industries in the state. Many Wyomingites consider these industries an integral part of their heritage. *See generally* GEORGE W. ROLLINS, THE STRUGGLE OF THE CATTLEMAN, SHEEPMAN, AND SETTLER FOR CONTROL OF THE LANDS OF WYOMING (1965); *cf.* IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 10. The petroleum and ranching industries are still particularly important in Wyoming. In 1994 47.7 million barrels or 40.1% of the oil produced on federal land in the United States was produced in Wyoming. PHIL ROBERTS ET AL., WYOMING ALMANAC 323 (4th ed. 1996). In 1994, 455.7 trillion cubic feet or 26.6% of the total natural gas produced on federal land was produced in Wyoming. In 1994, federal land in Wyoming produced more oil and gas than any other state. In 1994, there were 1.39 million cattle in Wyoming, and the state was the second largest wool producing state. *Id.* at 9. The Buffalo Resource Area, part of the Great Plains Ecosystem is a known for oil and gas production. *See infra* note 109 and accompanying text. In 1985, 157.23 million board feet of timber was produced in the Greater Yellowstone Area. CLARK & MINTA, *supra* note 35, at 28.

in any management plan.[38] Even the consummate conservationist, Aldo Leopold, felt that humanity should be part of the environmental community.[39] Not only do humans add to the diversity of ecosystems, they are an important part of many ecosystems.[40]

In 1970, policy analyst Lynton Caldwell published an article that advocated the use of ecosystem management as the basis for public land policy.[41] Since the 1970s, hundreds of ecosystem management projects have been started;[42] however, public pressure has not been strong enough to make ecosystem management the basis of public land policy.[43] In the last twenty-six years, a number of dominant themes that characterize ecosystem management have emerged. Ecologists, legal scholars, and administrative agencies agree on at least four important objectives.[44]

First, managers and policy makers must seek connections at all levels of an ecosystem and manage land in a systemic[45] fashion.[46] Managers should strive to use available scientific data to predict cause-and-effect relationships among the various components of an ecosystem, rather than attempting to focus on only one level of the ecology.[47]

Second, ecosystem management must transcend traditional political boundaries.[48] This means that scientifically and not politically established

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38. CLARK & MINTA, *supra* note 35, at 36.

39. LEOPOLD, *supra* note 7, at viii (noting that "we must see the land as a community to which we belong").

40. Keiter, *supra* note 3, at 303.

41. *See* Lynton K. Caldwell, *The Ecosystem as a Criterion for Public Land Policy*, 10 NAT. RESOURCES J. 203, 210 (1970) (setting forth the basic ecosystem management criteria: holistic management, scientific knowledge, and administrative agency cooperation); *see also* Grumbine, *supra* note 9, at 28.

42. *See generally* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1.

43. Grumbine, *supra* note 9, at 28.

44. These four objectives stand out among ten dominant themes which Grumbine observed in the works of 33 authors. *See* Grumbine, *supra* note 9, at 29-31. The 10 dominant themes noted by Grumbine are managing land with a systems perspective, working across administrative and political boundaries, protecting total native diversity, data collection, monitoring, adaptive management, interagency cooperation, organizational change, humans imbedded in nature, and values. *Id.* These four objectives were also important to the University of Michigan and the Wilderness Society study. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 3-5. In fact, the study adopted Grumbine's definition. *Id.* at 3.

45. *Cf.* WEBSTER'S NEW INTERNATIONAL DICTIONARY, *supra* note 4, at 2562 (defining systemic as "of or pertaining to the general system or the body as a whole").

46. Grumbine, *supra* note 9, at 29.

47. *Id.* In essence, management should be prospective rather than reactive. By using scientific knowledge to predict environmental damage before it occurs, efforts to protect the environment may not have to rely on extreme and complicated devices such as the ESA.

48. *Id.*

public and private land boundaries must define management areas.[49] Steps need to be taken to overcome the legal system's propensity to adhere to traditional boundary lines in defining management.[50] In regions where much of the land is owned privately, an ecosystem management plan can survive only with the support and participation of private land owners.[51]

Third, land management agencies will need to change their focus or even their structure to adopt a new management policy.[52] Some agencies have already begun to incorporate ecosystem management principles into their management policies.[53] The BLM has even begun to train its personnel to embrace ecosystem management.[54] The Forest Service also claims to recognize a need for change and that land managers should utilize ecosystem management to blend environmental values with human needs.[55]

Finally, any ecosystem management plan must reflect the fact that humans are imbedded within nature.[56] Again, the words of Aldo Leopold embody the spirit of ecosystem management. Leopold believed that humankind must recognize itself as part of a larger environmental community, and therefore adjust its behavior to respect its ecological community.[57] For managers to properly manage an ecological community, the surrounding and affected human community must have a voice.[58] Constructive public input is important to the success of ecosystem management. Public support is one of the most important factors helping existing management projects move forward.[59]

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49. *See, e.g.*, IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 7; Grumbine, *supra* note 9, at 29-31. *See generally* CLARK & MINTA, *supra* note 35, at 18.

50. Robert B. Keiter, *Natural Ecosystems Management in Park and Wilderness Areas: Looking at the Law, in* ECOSYSTEM MANAGEMENT FOR PARKS AND WILDERNESS 16-17 (James K. Agee & Darryll R. Johnson eds., 1988).

51. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 28; *see infra* notes 114-16 and accompanying text.

52. Grumbine, *supra* note 9, at 31 (noting that changes in land management agencies may range from the simple, such as forming an interagency committee, to the complex, such as changing professional norms and altering power relationships).

53. Keiter, *supra* note 3, at 316 (noting that the Forest Service and the BLM have begun to use ecosystem management techniques).

54. IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 1.

55. U.S. DEP'T OF AGRIC. - FOREST SERV., GENERAL TECHNICAL REPORT RM-246, AN ECOLOGICAL BASIS FOR ECOSYSTEM MANAGEMENT 1-3 (May 1994) [hereinafter USDA-FOREST SERVICE].

56. Grumbine, *supra* note 9, at 31; *see also* USDA-FOREST SERVICE, *supra* note 55, at 3.

57. LEOPOLD, *supra* note 7, at viii.

58. "Ecological community," for the purposes of this comment, means the non-human components of the environment, and "environmental community" includes humans.

59. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 27-28. According to the University of Michigan and the Wilderness Society study, public support was an important

In addition to having distinct dominant themes, ecosystem management is sometimes referred to as having more than one different level or tier.[60] These different levels are sometimes referred to as macro and micro, and denote the size of a management area.[61] Macro ecosystems, as defined by the Wyoming Bureau of Land Management, are the "ecoregions[62] that cross Wyoming" (e.g., the Great Plains Ecosystem).[63] Another macro ecosystem is the Greater Yellowstone Ecosystem. The Greater Yellowstone Coordinating Committee[64] determined that the Greater Yellowstone Ecosystem is a region of approximately nineteen million acres, which includes large areas of private, state and Indian reservation land[65] (Map 1.)

Micro management is defined as management of a local ecosystem.[66] Local ecosystems vary greatly in size. The Buffalo Resource Area offers a good example of micro management. The administering agency, the BLM, has developed a plan for its management.[67] (Map 2.) The Buffalo Resource Area is in the northwestern Wyoming portion of the Great Plains Ecosystem. The Buffalo Resource Area includes the northeastern Wyoming counties of Campbell, Buffalo and Sheridan, as well as parts of

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factor for fifty-nine percent of the ecosystem management projects. The study also noted that in regions where a large portion of the land was privately owned, ecosystem management efforts succeeded only with the help of private landowners. *Id.*

60. *See, e.g.*, IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 29; *cf.* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 3-5, 67-69 (noting that ecosystem management areas can vary greatly in size, from a few hundred or a few thousand acres up to several million acres).

61. *See* IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 8.

62. The term "ecoregion" simply denotes an area larger than an ecosystem. It seems that the distinguishing characteristic between an ecosystem and an ecoregion is that an ecosystem is often designated by habitat, while an ecoregion is designated by geographic boundaries, e.g., mountains, plains, watersheds, etc. *See* IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 7-9.

63. *Id.* at 8. The Great Plains Ecosystem, as designated by the BLM, encompasses several western Wyoming counties ranging from the southern border of the state and into Montana. *See infra*, Map 2. The Wyoming BLM divides the state into four ecoregions, the Wyoming Basin North, Wyoming Basin South, the Rocky Mountain Forest (three separate areas including the Greater Yellowstone Ecosystem, the Bighorn mountains and the Medicine Bow mountains), and the Great Plains. *See* IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 5. According to the Wyoming BLM, the Great Plains Ecoregion includes most of the western third of Wyoming. *Id.*

64. The Greater Yellowstone Coordinating Committee (GYCC) is comprised of federal officials in charge of the various federal lands in the Yellowstone region. Kurt Repanshek, *Working Within the System*, WYOMING WILDLIFE, Dec. 1996, at 19. The GYCC has been developing an ecosystem management plan for the Greater Yellowstone Ecosystem. *See* Keiter, *supra* note 3, at 322. By using an ecosystem approach, the orientation of the GYCC is very different from the Wise Use Movement which is based on the proposition that federal land managers are obligated to conform resource management policy to the desires of local communities. *Id.*

65. CLARK & MINTA, *supra* note 35, at 14-15, 40.

66. IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 8.

67. *Id.* at 10-22.

eastern Washakie, Big Horn and Hot Springs Counties.[68] Another micro management project in Wyoming is the East Fork Management Plan, currently in its formative stages.[69] The following case studies provide examples of management on these two different scales.

III. ECOSYSTEM CASE STUDIES IN WYOMING

The Greater Yellowstone Ecosystem

Several factors indicate that ecosystem management may be an appropriate management model for the Greater Yellowstone Ecosystem. The core area defined by the GYCC as the Greater Yellowstone Ecosystem is on predominately public land.[70] While the National Park Service is not required to implement ecosystem management, according to the Organic Act which guides the agency's actions, it must administer the National Park System to ensure that parks are left "unimpaired for future generations."[71] Such a mandate provides a legal basis for the Park Service to commence ecosystem-based management.

Systemic management is the first of four important objectives of ecosystem management,[72] and public participation is one of the best ways to influence government agencies to adopt holistic, system-wide management.[73] The Greater Yellowstone Coalition[74] (GYC) has not only garnered public support, it has also been active in evaluating the complex scientific data defining watersheds, carnivore and herbivore ranges, and other

68. *See* IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 13.

69. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 129-30. The East Fork Management Plan is defined primarily by two large former ranches purchased by the Wyoming Game and Fish Department. The area is in the northwestern part of the state near Dubois. The East Fork Management area extends north from the Horse Creek Drainage to the continental divide and south to the Crow Creek on the Wind River Indian Reservation. *Id.*

70. *Id.* at 147. The University of Michigan and the Wilderness Society study indicated that 80% of the Greater Yellowstone Ecosystem is administered by the U.S.D.A. Forest Service and the National Park Service. *Id.*

71. National Park Service Act of 1916, 16 U.S.C. § 1 (1994).

72. *See supra* notes 45-46 and accompanying text.

73. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 29. *Cf. Natural Ecosystem Management*, *supra* note 50, at 36-40 (discussing the historical and philosophical development of public support for conservation and the subsequent passage of environmental laws).

74. *See* CLARK & MINTA, *supra* note 35, at 35. Unlike the Greater Yellowstone Coordinating Committee, the Greater Yellowstone Coalition established in 1983 is a non-governmental entity. It has more than 3,000 members including 75 national and regional organizational members. The coalition is the principle advocate for ecosystem management in Yellowstone. The coalition has worked vigorously to limit many traditional commodity extraction activities which it sees as detrimental to the ecosystem. *Id.*

information associated with identifying ecosystem boundaries.[75] Being the nation's first national park, Yellowstone also receives considerable support and attention from the general public.[76] The creation of an ecosystem management scheme for its protection is on the agendas of several national conservation organizations, including the Wilderness Society, National Wildlife Federation, and Defenders of Wildlife.[77] When people and organizations come together to create new solutions to resource management problems, successful collaborative efforts can result.[78]

The second important objective of ecosystem management is that management must transcend traditional political borders. The Park Service administers the core ecosystem as Yellowstone Park and the J.D. Rockefeller Parkway.[79] By far the largest portion of the Greater Yellowstone Ecosystem is administered by the U.S. Department of Agriculture-Forest Service.[80] Nine million of the approximately nineteen million acres of the ecosystem are managed by the Forest Service.[81] In a 1994 report, the Forest Service emphasized the importance of cooperation.[82] Managers were urged to interact with all administrative units, including federal, state, and local agencies responsible for land or resource management, and private landowners.[83]

The third important objective for successful ecosystem management in the Yellowstone area is improved agency structure and focus. The Park Service appears committed to focusing on the Yellowstone ecosystem as a whole rather than continuing single species manage-

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75. *Id.*

76. *See, e.g.*, CLARK & MINTA, *supra* note 35, at 10-12; *see also* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 148.

77. *See, e.g.*, CLARK & MINTA, *supra* note 35, at 40.

78. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 27; *see infra* notes 112-16 and accompanying text.

79. CLARK & MINTA, *supra* note 35, at 26 (citing the Greater Yellowstone Coordinating Committee). The Park Service administers 2.5 million acres of the ecosystem. *Id.*

80. *Id.*

81. *Id.* The remaining parts of the ecosystem are managed by the National Park Service (2,554,445 acres), Idaho, Montana and Wyoming state agencies (685,000 acres), the Wind River Indian Reservation (880,000 acres), and private landowners (4,838,000 acres). *Id.* These acreage estimations come from the GYCC which has employed computer modeling to study the Greater Yellowstone Ecosystem. *See* Repanshek, *supra* note 64, at 23. One of the GYCCs most recent tasks is collecting and organizing its data into a comprehensive database. *Id.* Another independent research group suggests that the Greater Yellowstone ecosystem is "an island of mountains in the high dry plains" and that the total area of the ecosystem is "14 million acres." CLARK & MINTA, *supra* note 35, at 40 (quoting material submitted to the Committee of Interior and Insular Affairs, U.S. House of Representatives).

82. USDA-FOREST SERVICE, *supra* note 55, at 12.

83. *Id.* Some critics of the forest service caution that the Forest Service's optimistic suggestions consist of more "PR" than substance. *See* Devine, *supra* note 25, at 11.

ment approaches that dominated past management efforts.[84] The Park Service also recognizes the need to manage park service land in conjunction with the surrounding Forest Service and private land.[85] The Forest Service has historically placed less emphasis on Greater Yellowstone's natural values than has the Park Service.[86] Since 1986, the GYCC has provided a forum in which the Park Service and Forest Service can coordinate their management efforts.[87] Agency support for ecosystem management is also important since various land management agencies often provide research, authorization, flexibility, funding and technical assistance necessary to promote management.[88] A promising collaborative effort between the Forest Service and Park Service has already begun in another region.[89]

Congressional action would be very helpful to aggregate and organize agency interests with private interests. A congressional mandate would also speed up the process of cooperation and eventual creation of a management plan. A separate agency with the express purpose of managing and protecting ecosystem could prove very helpful.[90]

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84. Patten, *supra* note 14, at 10.

85. *Id.*

86. *Id.*

87. *See* Patten, *supra* note 14, at 10-11 (noting that the existence of the GYCC is the result of an unprecedented coordination effort). In 1990, the GYCC released a report that outlined three goals: conserve a sense of naturalness and maintain ecosystem integrity, conserve opportunities that are biologically and economically sustainable, and improve coordination. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 147-48. An enormous outcry from resource extraction interests threatened to stifle the GYCC's efforts. *Id.* But, since 1994, the GYCC has begun to revive its ecosystem management focus. *Id.*

88. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 37.

89. The Clinton administration has helped the Forest Ecosystem Management Assessment Team (FEMAT). Jack Ward Thomas, *Forest Ecosystem Management Assessment Team: Objectives, Process and Options*, J. FORESTRY, April 1994, at 14. FEMAT's objectives are to attain the greatest economic and social contributions from the forests of the Pacific Northwest, consistent with meeting the requirements of the applicable laws and regulations. *Id.* FEMAT is comprised of scientists and technical experts from the Forest Service, BLM, National Park Service, and National Marine Fisheries Service. More than 600 support personnel are also contributing to FEMAT. Some of the current objectives of FEMAT are to restore and/or maintain the habitat of the spotted owl and the Marbled Murrelet, and restore the habitat of other species in old growth forests along the northern Pacific coast line. *Id.*

While a FEMAT-type program has not yet been assembled in the Yellowstone area, an organization that is structured similarly to FEMAT might work well there. The intricate scientific models crafted by FEMAT, which shows various habitat boundaries and watershed areas in the northern forest areas, is truly amazing. *Id.* at 15-17. The team has created several sophisticated diagrams and maps that illustrate various habitat ranges, watersheds, and management areas. *Id.* If FEMAT proves to be successful, it could provide a model for such areas as Yellowstone or, further down the road, the Great Plains Ecoregion.

90. Keiter, *supra* note 3, at 315 (noting that congress has considered creating an agency to protect and manage ecosystems).

The final objective of ecosystem management is human involvement in the ecosystem. Participation by private landowners should be encouraged during the early planning stages of a management project.[91] Approximately 4.8 million acres of the Greater Yellowstone Ecosystem are private land.[92] Accordingly, managers cannot effectively implement ecosystem management without the cooperation of private landowners.[93] Mutually beneficial partnerships among managers and private landowners are an important aspect of ecosystem management that cannot be overlooked.[94] Since a large portion of the Greater Yellowstone Ecosystem is on private land, the early involvement of private landowners will help insure that a successful project develops. Several ecosystem-based management successes outside Yellowstone have involved Wyoming ranchers.[95]

In addition to involvement by private landowners, public support from other sources can also promote ecosystem management in all management areas.[96] Cooperative management efforts utilizing public involvement have been successful in Wyoming.[97] An organization which is concerned with public support and funding of ecosystem management is the Association of Ecosystem Research Centers (AERC).[98] Educating managers and the public in the ways of ecosys-

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91. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 36.

92. CLARK & MINTA, *supra* note 35, at 26 (citing the Greater Yellowstone Coordinating Committee).

93. *See* Donald Leal, *Saving an Ecosystem: From Buffer Zone to Private Initiatives, in* THE YELLOWSTONE PRIMER 26 (John A. Baden & Donald Leal eds., 1990); *see also* Beattie, *supra* note 23, at 12; *cf.* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 28.

94. Patten, *supra* note 14, at 397-98 (noting that if the GYCC's ecosystem initiatives are to succeed, the GYCC must convince private landowners that protecting the ecological integrity of the Greater Yellowstone Ecosystem is in their best interest).

95. *See infra* notes 114-16 and accompanying text.

96. According to The University of Michigan and the Wilderness Society study, public support was an important factor in 59% of the ecosystem management projects studied. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 28. *See* LYNTON K. CALDWELL, *Introduction* to CITIZENS AND THE ENVIRONMENT at xiii (Lynton K. Caldwell et al. eds., 1976) (noting that when citizens organize into committees and coalitions seeking to protect or improve the environment, they can be successful).

97. *See* Katharine Collins, *Babbitt Pushes Consensus: Urges Congress to Get on Board,* CASPER STAR-TRIB., Dec. 29, 1996, at A6 (noting that the Green River Basin Advisory Committee involves various stakeholders in a management plan); *see also infra* notes 114-16, and accompanying text; *cf.* Jason Marsden, *Cooperative Management Doesn't Always Work,* CASPER STAR-TRIB., Dec. 30, 1996, at A1 (noting that most cooperative management groups begin with public talk of reaching a consensus, whereas most management efforts are created by regulatory pressure).

98. *See* Tim Seastedt, *Ecosystem Science and Society,* 46 BIOSCIENCE 370 (1996). The AERC is a consortium of 43 groups of scientists in academic, government, and private organizations across the country. *Id.* The AERC is also concerned with the need to communicate scientific findings so that the public may make informed decision regarding environmental issues. *Id.*

tem management is also an important step toward fostering participation that will make management projects successful.[99]

Buffalo Resource Area

Implementation of ecosystem management in a low-profile area like the BLM's Buffalo Resource Area may indicate whether ecosystem management can occur as a result of agency initiative. The Buffalo Resource Area is in northwestern Wyoming.[100] Predominately dry plains,[101] the Buffalo Resource Area is part of the Great Plains Ecosystem, which includes a large portion of eastern Montana as well as eastern Wyoming. (Map 2.)

The BLM has initiated the first step of studying the connections at all levels of the Buffalo Resource Area's ecosystem. The Wyoming offices of the BLM have delineated this "micro" portion of the Great Plains Ecosystem, and have begun researching the vegetation, wildlife habitat, and ranges of endangered species in this area.[102] Starting an ecosystem management approach at the micro level can be the first step to applying the same management techniques to an entire region.[103] The BLM emphasizes that the Buffalo Resource Area is a prototype for expansion to the other ecoregions of the state.[104]

The BLM has also begun to extend management beyond traditional political boundaries and change its management focus. For example, in the Buffalo Resource Area, interagency and landowner cooperation, as well as public participation, are very important attributes of micro ecosys-

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99. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 43 (noting that educational outreach is needed to inform and motivate groups in the general public).

100. *See supra* notes 62-63 and accompanying text.

101. IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 12.

102. *Id.* The BLM studies seem to be significantly more than just good public relations or promises for the future. In fact, the BLM has already contracted with the University of Wyoming to provide scientific analysis of the Buffalo Resource Area. *Id.* These data include geology, vegetation, wildlife habitat, and endangered species. *Id.* at 12-18.

The Buffalo Resource Area, a micro ecosystem, qualifies as an ecosystem management project because the BLM plans to meet all four of the objectives. *See supra* notes 45-59 and accompanying text. The physical size of the project does not determine whether or not it is a valid ecosystem management project. The University of Michigan and the Wilderness Society study concluded that a valid ecosystem management project commences when management focuses on ecosystem management or processes as a whole. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 4; *see also supra* note 26 and accompanying text.

103. *See* Jason Patlis, *Biodiversity, Ecosystems and Endangered Species, in* BIODIVERSITY AND THE LAW 48-49 (William J. Snape III ed., 1996); *see also* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 42 (noting that project management groups have succeeded by managing small pieces of a larger management puzzle and managing adaptively).

104. IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 22.

tem management. The BLM recognizes that, in order to effect ecosystem management, it must change its image from a traditional "bureaucratic" institution to an agency that is more receptive to public input.[105] Specifically, the BLM intends to involve all interested parties when establishing the goals and objectives for the management of a given ecosystem.[106] The BLM places a great deal of emphasis on cooperation among different agencies and private landowners.[107] The Buffalo Resource Area also includes a small amount of state land interspersed throughout the area.[108] To construct an effective ecosystem management project, the BLM must also involve the State.

Finally, the notion that humans are a part of the ecosystem must also be explored. The Buffalo Resource Area is a high-intensity oil, gas, and coal development area.[109] Development and management of these resources are particularly important to the residents of the area. The BLM and other managers need to create a management plan that takes into account the importance of these resources. Public input will be important in determining a reasonable level of mineral development.[110]

Since the Buffalo Resource Area is not as high-profile as the Yellowstone area, public pressure probably will not have as much impact on agency action. In 1984, when the BLM was assessing the possibility of designating parts of the Buffalo Resource Area a wilderness area, the agency received only sixty-two oral or written comments.[111] However, the BLM is working to improve public participation by stressing the importance of working cooperatively with landowners and other interested groups.[112] Nevertheless, political pressure from the State can present an impediment to ecosystem management.[113]

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105. *Id.* at 7.

106. *Id.* at 8.

107. *Id.* at 7.

108. BUREAU OF LAND MANAGEMENT, BUFFALO RESOURCE AREA, WYOMING: WILDERNESS STUDY REPORT, 5 (July 1986) [hereinafter WILDERNESS STUDY REPORT].

109. *See* IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 10. Campbell County, which is entirely within the Buffalo Resource Area, produced 1.9 million MCF of natural gas in 1991. STATE OF WYOMING, *State Land Office, in* 1991 ANNUAL REPORT, VOL. VI 25 (1991). In 1991, Campbell ranked sixth among gas producing counties in Wyoming. *Id.* Campbell County has consistently been the largest oil producing county in the state. In 1991, over 1.8 million barrels of oil were produced in Campbell County. *Id.* In 1991, nearly one third of the state's oil production came from Campbell county. *Id.*

110. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 28 (emphasizing that people are more receptive and helpful to ecosystem management efforts if individuals who work in the local community are involved in management planning).

111. WILDERNESS STUDY REPORT, *supra* note 108, at 7.

112. *See* IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 2-3.

113. *See New Approach Emerges to Solving Public-Land Conflicts*, CASPER STAR-TRIB. Dec. 29, 1996, at A1, A6 (reporting that Governor Geringer is proposing to make money available to

Some Wyoming ranchers and land managers have been experimenting with Coordinated Resource Management (CRM), which is very similar to ecosystem management.[114] CRM can be a good model for an ecosystem approach in the Buffalo Resource Area. Some CRM efforts initiated in Wyoming have involved ranchers, environmentalists, the Wyoming Game and Fish Department, and BLM in an effort to improve management techniques.[115] Some Wyoming ranchers have a positive outlook for cooperative management, while others are less optimistic.[116] As ranchers, land managers and others continue to work together to solve management conflicts on a small scale, the ecosystem approach will be more likely to succeed on a larger scale.

"challenge and litigate, if necessary, federal land, water, air, mineral and environmental policies which adversely affect leasehold rights, land uses, private property rights or water policy in Wyoming"). *Cf. infra* note 127 and accompanying text.

114. *See* Tom Mast, *Bighorn Basin Teams Learning Cooperation*, CASPER STAR-TRIB., Jan. 1, 1997 at A1 (noting that CRM areas may consist of several ranches or even extend to cover an entire watershed).

115. *See id., supra* note 114, at A1 (discussing a CRM effort in the Bighorn Basin); *see also* Tom Rea, *CRMs: Seeking Consensus at the Grassroots*, CASPER STAR-TRIB., Dec. 29, 1996, at A6 (noting, "A consensus approach to range management has been growing at the grassroots level around Wyoming in recent years").

CRM meets a key goal of ecosystem management; it provides a means for addressing resource management issues across administrative and ownership lines. *See* Tom Mast, *Health of Wildlife, Ranching Go Hand-in-hand*, CASPER STAR-TRIB., Jan. 26, 1997, at A6. Rancher Bob Curtis helped initiate the Wapiti Ridge CRM which now includes nine area ranches and landowners, the BLM, the Wyoming Game and Fish Department, the Natural Resources Conservation Service, and the Greater Yellowstone Coalition. Curtis felt that a "holistic resource management" approach in which planning treats people and the environment as a whole rather than on a piecemeal basis, is the best approach. *Id.*

116. *See* Rea, *supra* note 115, at A6; *see also Bighorn Basin Teams Learning Cooperation, supra* note 114, at A1. Cooperative Resource Management successes in Wyoming include the Sun Ranch project southeast of Casper. Rea, *supra* note 115, at A6. In the Bighorn Basin area, near the Buffalo Resource Area, several CRM programs have been successful as a result of diligent efforts by area ranchers. *See Bighorn Basin Teams Learn Cooperation, supra* note 114, at A1, A7. Paula Grigsby, owner of the Hyattville Ranch at Hyattville, became interested in CRM as a means to resolve a grazing conflict with the U.S. Forest Service. Bruce Weeter, who owns the Double H ranch near Ten Sleep is involved in CRM. The Double H CRM includes public and private land. Various stakeholders are involved in the effort including the Nature Conservancy, Farm Credit Services, Wyoming Stockgrowers, Wyoming Game and Fish Department, as well as the state and federal agencies responsible for public land in the area. Twenty-thousand acres of both public and private land are involved in the CRM. All of the Double H project is open to non-motorized recreational use. *Id.*

Some ranchers are more skeptical of CRM efforts. *See* Rea, *supra* note 115, at A1. Frank Shepperson, who owns a ranch north of Casper, stated that the CRM he has observed at Red Canyon, initiated by the Nature Conservancy, is "'kind of a big study' on a piece of ground whose main purpose is not to make a living for the rancher." *Id.* at A6. Shepperson noted that "CRMs have worked well resolving disputes, but only when all sides can stay flexible and ready to compromise." *Id.* Doug Cooper, another Casper area rancher and long time critic of the BLM and federal land-use policies in general noted, "As a way to find common ground to proceed, I think (the CRM process) is good," "[b]ut as a way to resolve conflict, it's not." *Id.*

The BLM claims that after completing the preliminary work in the Buffalo Resource Area, it will help extend ecosystem management to the Wyoming Great Plains Ecosystem and follow up with a management plan for the interstate Great Plains Ecoregion (which extends into Montana).[117] Given the detail and sophistication of the maps and other scientific information that the BLM has generated for the Buffalo Resource Area,[118] it seems that the agency has a genuine interest in the success of ecosystem management. If the BLM combines public support with scientific data, its chances for success with a large-scale management plan are much greater.

IV. THE VIABILITY OF AN ECOSYSTEM APPROACH

Several issues need to be resolved before holistic ecosystem management of the Greater Yellowstone Ecosystem and the Buffalo Resource Area can be effective. The first issue relates back to the difficulty of defining the area that constitutes an ecosystem. Since the Greater Yellowstone Coordinating Committee has scientific studies of the area, its spatial definition is arguably the most well reasoned, and should be used.[119] The BLM has already provided a scientifically supported geographic description of the Buffalo Resource Area.[120]

Another concern related to the definition of an ecosystem is the temporal aspect of management.[121] Planning for the protection of endangered species is often done in periods of 100-200 years.[122] However, many government programs and agencies have conflicting timetables that are not amenable to such scientifically constructed management plan timetables.[123] Perhaps an answer to this dilemma would be to allow timetables to be set by a designated management body.

Since scientific data are important to defining particular ecosystems, funding is critical to determining the appropriate management plan for an area. Lately, the Republican-dominated Congress has been reducing funding for many scientific, ecological assessments.[124] For example, Congress

117. IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 9.

118. *See id.* at 15-18.

119. *See supra* note 79 and accompanying text.

120. IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28, at 10.

121. CLARK & MINTA, *supra* note 35, at 44.

122. *Id.* at 46 (noting that population viability assessment, a technique used to estimate survival probabilities for threatened species is commonly measured in 100 year intervals).

123. *Id.* at 44; *see, e.g.*, ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 41 (noting that government budget cycles can ensure funding for only one- or two-year project cycles).

124. Kathie Durbin, *Apathy?, Not Around Here!*, NATIONAL WILDLIFE, Dec./Jan. 1996, at 40.

recently reduced the funding for the newly created National Biological Service.[125] In addition to temporal and funding problems, lack of personnel also tends to inhibit the efficient implementation of ecosystem management.[126] Enough scientific data may exist to pursue ecosystem management in the Greater Yellowstone Ecosystem and Buffalo Resource Area, however, efficient implementation of management plans may be slowed by a reluctant bureaucracy which is unwilling to commit the needed personnel and funding to ecosystem management.

Other political opposition to environmental regulation comes from Wyoming's congressional delegation.[127] While Wyoming's congressional representatives have demonstrated their reluctance to embrace some environmental regulatory proposals, they are more likely to support a management approach that leaves the private property rights of their constituency intact. Such cooperative ecosystem-based management efforts have already commenced on several Wyoming ranches.[128] When ranchers are an integral part of these management plans, they will feel more secure about the integrity of their private property rights.

The Wyoming Legislature may also present a contentious obstacle to ecosystem management.[129] The Wyoming Legislature passed a resolution demanding that the original Vision Document created in 1990 by the Greater Yellowstone Coordinating Committee be retracted.[130] The legislature claimed that the Vision Document would diminish or totally exclude multiple-use activity in the forests surrounding Yellowstone National Park.[131]

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125. Pub. L. No. 104-19, 109 Stat. 212 (1995).

126. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 42.

127. *See, e.g.*, Todd Wilkinson, *Snowed Under: The Roar of Snowmobiles in Many National Parks Has Replaced the Solitude and Quiet That Once Defined the Winter Landscape*, NATIONAL PARKS, Jan. 1995, at 4 (noting that Senator Simpson has been opposed to any caps on winter use in Yellowstone). Representative Cubin has also expressed concerns about environmental regulation interfering with private property rights. *See Congress Reauthorizes Clean Water Act*, Congressional Press Release, May 16, 1996, *available in* LEXIS, News Library, CURNWS File. Cubin noted the importance of a clean environment, "We can . . . have clean water and a safe environment while keeping private property rights from being bottled up by overzealous and sometimes harmful federal rules and regulations." *Id.* A bill sponsored by Wyoming Senator Craig Thomas would convey BLM management to state control. *See* The Economist, *Good Stewardship of Western Lands A Matter of Trusts*, Nov. 9, 1995, *available in* LEXIS, News Library, CURNWS File. *See supra* note 113.

128. *See supra* notes 114-16 and accompanying text.

129. *See* Michael D. Smith, Perceptions and Concerns of the Principal Stakeholder Groups in the Greater Yellowstone Region Toward Ecosystem Management Proposals 9 (1994) (unpublished M.A. Thesis, University of Wyoming) (on file with the University of Wyoming Coe Library); *see also* CLARK & MINTA, *supra* note 35, at 36.

130. CLARK & MINTA, *supra* note 35, at 36.

131. *See* Smith, *supra* note 129, at 9. The Vision Document was a product of Yellowstone's regional federal agencies working together to create a outline of their vision for the future of the region. *Id.* at 7.

Inherent differences among government entities, including land management agencies, present an additional obstacle to ecosystem management.[132] Management approaches also vary considerably between state and federal agencies.[133] Unifying agency goals is an important step toward the implementation of ecosystem management.[134]

V. ECOSYSTEM MANAGEMENT VIABILITY UNDER THE LAW

Many agencies understand the concept of ecosystem management and are beginning to embrace it as sound management policy for all areas.[135] Various statutes lend legal support to the concept of ecosystem management and can be helpful to agencies in the creation of management projects.

The Wilderness Act of 1964 does not specifically provide for the implementation of ecosystem management, but it does mandate the protection of areas that have been designated as wilderness.[136] The Act provides that a designated wilderness area is "untrammelled by man" and that "man is a visitor who does not remain."[137] Wilderness designation emphasizes that certain areas should be respected for their ecological value.[138] The Wilderness Act can be used to promote an ecosystem management plan only in an area designated as wilderness.[139]

The BLM researched the possibility of designating certain parts of the Buffalo Resource Area as wilderness,[140] but the final recommendation

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132. *See, e.g.*, Repanshek, *supra* note 64, at 18. The Greater Yellowstone Ecosystem is comprised of six national forests, each with its own management plans. Yellowstone Park and Grand Teton Park are both administered by the National Park Service which also has a different management agenda. *Id.*

133. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 33-34. Federal agencies responsible for initiating ecosystem management projects include the Forest Service, Natural Resources Conservation Service, Fish and Wildlife Service, Bureau of Land Management, National Park Service, National Biological Service, Geological Survey, Environmental Protection Agency, Army Corps of Engineers, and the Tennessee Valley Authority. *Id.* at 55.

134. Repanshek, *supra* note 64, at 18 (noting that the federal government has even recognized the need to blend various agency plans in the Yellowstone area). In the early 1960s the federal government created the Greater Yellowstone Coordinating Committee to help unify the management agencies in the area. *Id.*

135. *See supra* text accompanying notes 87 and 114-16; *see generally* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1; U.S.D.A.-FOREST SERVICE, *supra* note 55; IMPLEMENTATION OF ECOSYSTEM MANAGEMENT, *supra* note 28.

136. Wilderness Act of 1964, 16 U.S.C. §§ 1131-1136 (1994).

137. *Id.* § 1131(c)

138. *Id.* § 1131(c)(4).

139. *Id.* § 1131(a).

140. *See generally* WILDERNESS STUDY REPORT, *supra* note 108.

was that none of the areas studied qualified.[141] Wilderness area designation may be inappropriate for ecosystem management in many areas, such as the Buffalo Resource Area, because it severely limits human interaction with the land.[142]

Another act provides a more flexible legal basis for the BLM. The Federal Land Policy and Management Act (FLPMA)[143] has been construed to impose some ecosystem management responsibilities on the BLM with regard to the administration of public lands.[144] Specifically, FLPMA directs the BLM to give priority to designating areas of critical environmental concern.[145] Designating areas of critical environmental concern can be the first step in creating an ecosystem management project. If the BLM pursues ecosystem management, a successful management project can result from managing an area as an area of environmental concern.[146]

Strong pressure from environmental groups resulted in the passage of the Endangered Species Act (ESA),[147] a powerful legal mechanism designed to protect animal and plant species from extinction. The ESA is evidence that mankind is slowly beginning to understand its role in the environment. Leopold considered the importance of human self awareness to interaction with the environmental community: "When we see land as a community to which we belong, we may begin to use it with love and respect."[148] The ESA is strong legislation, but it does not mandate a detailed plan for the conservation, management, and protection of entire ecosystems. Yet, the ESA comes close to ecosystem-style management because it protects the ecosystems of designated endangered species.[149]

The National Environmental Policy Act (NEPA)[150] is another broad statute that can promote the protection of ecosystems. By requiring an environmental impact statement (EIS) for any major federal action, NEPA complements other statutes that promote ecosystem management objectives. NEPA is a good instrument for applying scientific data to new pro-

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141. *Id.* at 1.

142. *See supra* text accompanying note 131.

143. Federal Land Policy and Management Act of 1976, 43 U.S.C. §§ 1701-1784 (1994).

144. *Keiter, supra* note 3, at 311.

145. 43 U.S.C. § 1701(a)(11).

146. Keiter, *supra* note 3, at 312. Designating an area of critical environmental concern gives agencies federal statutory support for engaging in ecosystem management.

147. CHASE, *supra* note 28, at 9-10.

148. LEOPOLD, *supra* note 7, at viii.

149. 16 U.S.C. § 1531(b) (stating that "The purposes of this chapter are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.").

150. 42 U.S.C. §§ 4321-4370(a) (1994).

jects. However, NEPA's requirements are procedural instead of substantive; it does not require protection of the environment.[151] Environmental impact statements are a source of scientific information which can be helpful to managers in the process of developing ecosystem-based management plans.

VI. ECOSYSTEM MANAGEMENT AND SCIENCE

Two important scientific issues are implicated in ecosystem management. The first, and perhaps most critical, concern is whether science has been able to generate sufficiently acceptable knowledge about specific ecosystem functions.[152] Isolated experiments and data collection provide different information about cause-and-effect relationships than study of an ecosystem comprised of millions, or even thousands, of acres.[153] Second, the scientific recommendations that are used in the formulation of an ecosystem management policy must be as clear and unambiguous as possible.[154]

In areas where scientists have not spent much time gathering information, social and economic data as well as scientific and biological data are often lacking.[155] In areas such as popular national parks, more data are available. Managers in lesser known areas, such as the Buffalo Resource Area, need to develop a greater understanding of how ecosystems are affected by the social and economic characteristics.[156] Since ecosystem management is an emerging concept, the interaction of biological, social, and economic factors needs to be further studied in all areas.

Numerous areas still exist where, even after considerable scientific data are analyzed, conclusions are hard to draw.[157] Sometimes even the most thorough information is not adequate. For example, even though sustaining viable populations (of animal and plant species) is a clear goal of ecosystem management, scientific definitions of

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151. *See Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519, 558 (1978). When a governing statute provides no specific procedural mandates, the reviewing court need not apply substantive requirements. *Cf. Pension Benefit Guaranty Corp. v. LTV Corp.*, 496 U.S. 633, 653-54 (1990).

152. Stanley, *supra* note 23, at 258-59.

153. *See id.* at 259.

154. Andy Kerr, *Ecosystem Management Must Include the Most Human of Factors*, 45 BIOSCIENCE 378, 378 (1995).

155. *See* D. Scott Slocombe, *Implementing Ecosystem-based Management*, 43 BIOSCIENCE 612, 617 (1993).

156. *Id.*

157. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 37.

what constitutes a viable population are limited.[158] The Forest Service approach to ecosystem management will allow for naturally occurring fluctuations in population.[159]

Scientists and managers need to realize the importance of collaboration.[160] Disagreements about scientific data will not undermine the concept of ecosystem management as long as managers are conscious of the fact that, while there are many different ways to interpret scientific data, the goal remains holistic management.[161]

The rationale for congressional inaction has focused on the various gaps in scientific knowledge.[162] One gap in the Greater Yellowstone Ecosystem is the failure of the various stakeholders to agree on a boundary line for the area.[163] Organization of scientific data is also a problem since the various agencies responsible for the management of the Yellowstone area have voluminous amounts of raw data that have yet to be organized into a combined data base and, eventually, a cogent plan.[164] The study conducted by the University of Michigan and the Wilderness Society advocated action in spite of uncertainty: "Rather than wait for complete scientific information before moving ahead with ecosystem management projects, project managers should begin activities based on information at hand and be ready to shift management approaches and undertake activities as new information becomes available."[165]

History has shown that the implementation of conservation policies seldom comes easily.[166] One possible reason for the difficulty in designing ecosystem management plans is that, as the human population continues to grow, so does the demand to extract and harvest natural resources.[167] Thus, it could become more difficult, rather than easier, to protect ecosystems.[168]

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158. U.S.D.A.-FOREST SERVICE, *supra* note 55, at 4. Additionally, ecosystem management cannot assure that rare animals and plants will reproduce and thrive, even though their protection is an important goal in many ecosystems. *Id.*

159. *Id.*

160. See ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 41 (noting that collaborative efforts between managers, stakeholder groups, and scientists are often difficult because each group has strong feelings about how management decisions are to be made).

161. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 37-38.

162. CLARK & MINTA, *supra* note 35, at 47-48.

163. *See* CLARK & MINTA, *supra* note 35, at 48.

164. *See Id.* at 48.

165. ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 37-38.

166. Stanley, *supra* note 23, at 260.

167. *Id.*

168. *Id.*

VII. CONCLUSION

As an alternative, ecosystem management has some scientific shortcomings, as well as political obstacles, but the status quo is not working.[169] Clearly, a need for change exists. Ecosystem management is preferable to draconian environmental laws that severly limit uses of the land and operate in a lethargic and inefficient manner. As the case studies illustrate, ecosystem management stands a better chance of success in Wyoming than current management approaches because it creates dialogue between people with very different goals and interests. Various stakeholders will be more likely to support an ecosystem-based management approach when each is directly involved with management decisions. Since both stakeholders and managers are active participants in the management process, ecosystem management may result in reconciliation and the protection of troubled ecosystems.[170]

The ecosystem management alternative may get a chance, as agencies are beginning to change business-as-usual approaches and incorporate ecosystem science into their land management policy.[171] Difficult decisions regarding resource supply and demand and the protection of ecosystems will continue to confront agencies that administer the nation's lands. Examination of past policies reveals that timber harvest and many other extractive uses depend on a healthy ecosystem.[172] Ecosystem management may well prove to be the right option because it puts the health of the ecosystem first.[173]

Despite scientific and governmental uncertainty, scientists and managers can collaborate in ways that are productive.[174] Ecosystem management will not occur overnight; it is a process of experimentation and policy adaptation.[175] The wait may be worthwhile, however, because the success of ecosystem management may be the ultimate test of whether or not people will learn to accept their role as part of nature.[176]

SCOTT J. OLHEISER

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169. *See supra* notes 1-3 and accompanying text; *see also* Johnson & Agee, *supra* note 1, at 3.

170. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 39 (noting that ecosystem management is helping to break the inertia of past resource management polices and allowing groups and individuals to try new strategies not possible in the past).

171. *See* Keiter, *supra* note 3, at 333.

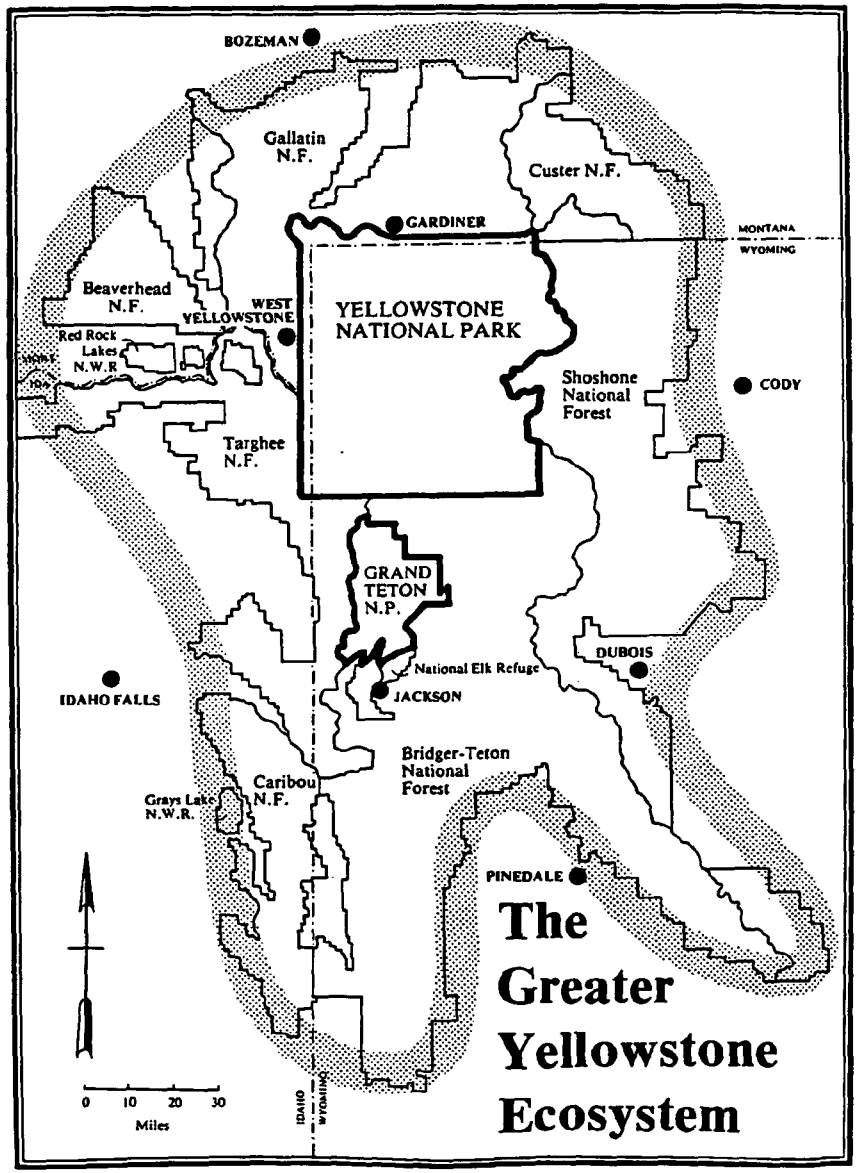
172. *See* Devine, *supra* note 25, at 18.

173. *Id.*

174. *See* ECOSYSTEM MANAGEMENT IN THE UNITED STATES, *supra* note 1, at 42.

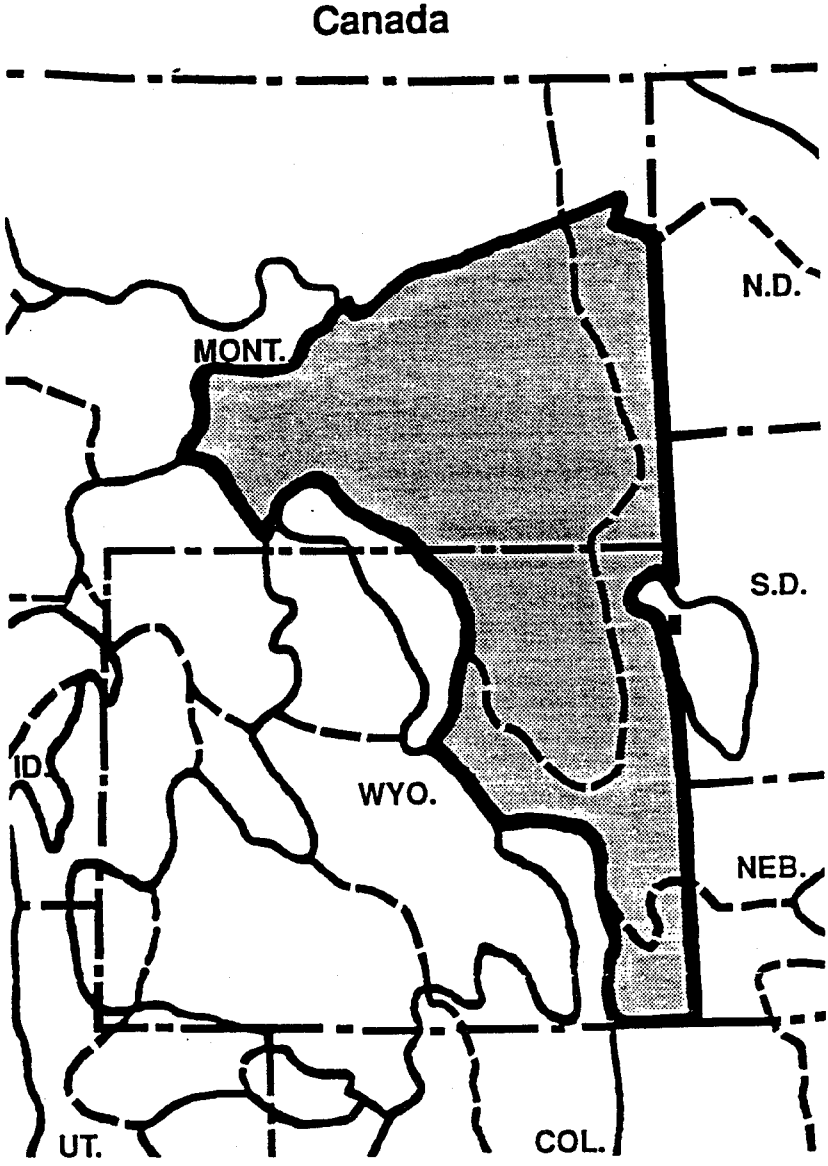
175. *Id.*

176. Grumbine, *supra* note 9, at 34.


BOZEMAN
Gallatin N.F.
Custer N.F.
GARDINER
MONTANA
WYOMING
Beaverhead N.F.
WEST YELLOWSTONE
YELLOWSTONE NATIONAL PARK
Red Rock Lakes N.W.R
Shoshone National Forest
CODY
Targhee N.F.
GRAND TETON N.P.
DUBOIS
National Elk Refuge
IDAHO FALLS
JACKSON
Bridger-Teton National Forest
Caribou N.F.
Grays Lake N.W.R.
PINEDALE
The Greater Yellowstone Ecosystem
0 10 20 30
Miles
IDAHO
WYOMING

MAP 1

Great Plains Study Area



MAP 2