

5-31-2013

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Steinhoff, Gordon (2013) "Ecological Integrity in Protected Areas: Two Interpretations," *Seattle Journal of Environmental Law*. Vol. 3: Iss. 1, Article 6.

Available at: <https://digitalcommons.law.seattleu.edu/sjel/vol3/iss1/6>

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Ecological Integrity in Protected Areas: Two Interpretations

Gordon Steinhoff[†]

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I. INTRODUCTION

Federal environmental legislation and policy in the United States require that managers seek to maintain natural conditions or “naturalness” within national parks, wilderness, and other protected areas.¹ A number of experts in protected area management have argued, however, that naturalness should be abandoned as a mandatory goal in these areas. In the recently published book, *Beyond Naturalness*, leading management experts strongly recommend changes in protected area law and policy to allow alternative goals.² One goal recommended by these experts for many management situations is maintaining ecological integrity.³ Indeed, ecological integrity is currently the management goal required by law in Canadian national parks.⁴

“Ecological integrity” has no uniformly accepted meaning, however. At least two different interpretations can be found in the

[†] Gordon Steinhoff is an Associate Professor of Philosophy at Utah State University. His research interests include environmental philosophy and environmental policy.

1. See, e.g., Wilderness Act of 1964, 16 U.S.C. §§ 1131-1136 (2012).

2. DAVID N. COLE & LAURIE YUNG, *BEYOND NATURALNESS: RETHINKING PARK AND WILDERNESS STEWARDSHIP IN AN ERA OF RAPID CHANGE* 50-51, 57-58 (Island Press 2010).

3. *Id.* at 106-22.

4. See Canada Nat’l Parks Act, S.C. 2000, c. 32.

literature. In one interpretation, an ecosystem has ecological integrity if it is either pristine, existing entirely free of human influence, or it has been only minimally influenced by humans.⁵ An ecosystem with ecological integrity may serve as a standard or benchmark for assessing the degradation of natural ecosystems by human activities.⁶ Authors of *Beyond Naturalness*, and other environmental management experts, have in mind the second interpretation in which humans are considered an essential component of an ecosystem.⁷ An ecosystem is thought to have ecological integrity if it satisfies preferences within society concerning how that ecosystem is structured and functions.⁸ Under this interpretation, the focus is on desired attributes rather than natural conditions.⁹

In this article, after describing the two interpretations in detail in sections II and III, I will argue that ecological integrity, understood in the second way, is at odds with the fundamental goal in protected areas of preserving native biodiversity. In section IV, I will present examples of threats or potential threats to native biodiversity that arise as open-ended preferences are imposed onto nature. As I will then show in sections V and VI, in spite of the development of wilderness, national parks, and other protected areas to meet human needs and satisfy visitor preferences, these ecosystems are managed to remain pristine or only minimally influenced by humans. This is mandated by environmental law and policy. These ecosystems are managed, that is, to maintain “ecological integrity” in accordance with the first interpretation. The second interpretation has merit, however, and cannot be ignored. In the conclusion, I will explain how the two interpretations of “ecological integrity” properly fit together in the management of protected areas.

II. NATURE APART FROM HUMANS

“Ecological integrity” is most broadly characterized by use of dictionary definitions of integrity.¹⁰ “Ecological integrity” means, most broadly, that an ecosystem is “whole, intact, sound, unimpaired, and well

5. Laura Westra et al., *Ecological Integrity and the Aims of the Global Integrity Project*, in *ECOLOGICAL INTEGRITY: INTEGRATING ENVIRONMENT, CONSERVATION, AND HEALTH* 19, 23-26 (David Pimental et al., eds., Island Press 2000).

6. *Id.* at 25.

7. See, e.g., COLE & YUNG, *supra* note 2, at 107, 110, 112-13, 121, 122.

8. *Id.*

9. *Id.* That “ecological integrity” has two distinct interpretations in the literature has been discussed by other authors, though descriptions of the two interpretations are somewhat different. See, for example, Shaun Fluker, *Ecological Integrity in Canada’s National Parks: The False Promise of Law*, 29 WINDSOR REV. LEGAL & SOC ISSUES 89 (2010), available at http://law.ucalgary.ca/system/files/Fluker_EcologicalIntegrityFalsePromise.pdf.

10. See COLE & YUNG, *supra* note 2, at 108; see also Westra et al., *supra* note 5, at 20.

functioning.”¹¹ The two interpretations arise from different ways of understanding what it means for an ecosystem to be whole, intact, sound, unimpaired, and well functioning. In the first interpretation, an ecosystem possesses these properties, and so has ecological integrity, if it is either pristine, existing entirely apart from human influence, or it has been only minimally influenced by humans.¹² The goal of maintaining ecological integrity is understood as the goal of protecting an ecosystem from significant human influence.¹³

An ecosystem that possesses ecological integrity (or simply “integrity”) may serve as a standard for assessing the human-caused degradation of natural ecosystems.¹⁴ The Index of Biological Integrity (IBI), for example, is used to assess the degradation of aquatic ecosystems.¹⁵ IBI is a measure of biological degradation as a site is compared to a standard, a minimally disturbed site or sites. According to the inventor of IBI, James Karr, “[t]he biota of minimally disturbed sites—those with integrity—provides a benchmark, a standard by which others are measured.”¹⁶ Karr adds that national parks are among the few places that have been set aside for the purpose of protecting minimally disturbed sites that can be used as standards.¹⁷

In this interpretation of ecological integrity, nature is conceived in its purest state as existing apart from humans. An ecosystem is considered perfectly whole, intact, sound, unimpaired, etc. if it exists entirely unaffected by human influence. Any human influence represents degradation, bringing nature down from its purest state.¹⁸ Many reject this general conception of nature. Authors of *Beyond Naturalness*, and others, insist that humans are an essential component of many natural ecosystems.¹⁹ In their view, human influence does not necessarily degrade nature, but establishes and maintains many natural ecosystems.²⁰

It must be acknowledged, however, that neither way of conceiving nature is correct in an absolute sense. Nature may be conceived as

11. COLE & YUNG, *supra* note 2, at 108; Westra et al., *supra* note 5, at 20.

12. Westra et al., *supra* note 5, at 23-26.

13. See *id.*

14. *Id.*

15. *Id.*

16. See James R. Karr, *Health, Integrity, and Biological Assessment: The Importance of Measuring Whole Things*, in ECOLOGICAL INTEGRITY: INTEGRATING ENVIRONMENT, CONSERVATION, AND HEALTH, *supra* note 5, at 209, 214.

17. *Id.*

18. In his analysis Fluker writes, “[c]ommentators who define ecological integrity as natural ecological integrity view human activity as a disturbance that necessarily compromises ecological integrity....” Fluker, *supra* note 9, at 12.

19. See, e.g., COLE & YUNG, *supra* note 2, at 107, 113, 121-22.

20. *Id.*

existing (in its purest state) apart from humans, or it may be conceived as including humans and dependent on them. Each conception has support, and there is no ultimate, metaphysical truth to the matter. The conception of nature we adopt depends upon our interests and purposes. This point of view arises from the writings of philosopher Hilary Putnam, who argues that the world in itself—independent of human conceptualization—does not come pre-packaged in distinct natural kinds.²¹ Humans divide objects in the world into different categories, and our divisions reflect our interests and purposes. In certain contexts, we properly include humans within nature. A catalogue of the Earth's biota includes humans (*Homo sapiens*) alongside other species. We understand that humans are subject to natural processes of aging and death. In certain other contexts, including discussions of the preservation of nature, we separate humans from nature. Neither way of conceiving nature is correct in an absolute sense.

In support of the conception of nature as existing in its purest state apart from humans, biologists and philosophers eloquently describe the extensive damage humans have inflicted upon the natural world. Karr writes, for example,

Living systems worldwide are collapsing. . . . [C]hange is fast, fueled by unconstrained population growth and advancing technologies. "Human dominated ecosystems" are not simply farm fields but the entire planet. The ecological footprint of modern human society is huge. The result is global ecological disruption and biotic impoverishment.²²

Further, Westra, Karr, and others write,

Indeed, the present human population at current average consumption levels is dismantling and dissipating the ecosphere. We are currently losing biomass, species, and ecosystem structure on all scales. . . . Humans can be part of natural systems, but with our present beliefs and values, technologically "enhanced" humans, the consumers in so-called advanced affluent societies, are aliens in nature whose expanding ecological footprints threaten the basic life-support needs of all for the sake of satisfying an escalating plethora of wants. We have derailed the natural evolutionary processes in the landscapes we have come to dominate—and we dominate almost everywhere.²³

21. See 3 HILARY PUTNAM, *Why There Isn't a Ready-Made World*, in *REALISM AND REASON: PHILOSOPHICAL PAPERS* 205, 205-28 (Cambridge Univ. Press 1983).

22. Karr, *supra* note 16, at 209.

23. Westra et al., *supra* note 5, at 33.

Peter Miller and William Rees write (colorfully),

[H]umans, as large social animals with high material/energy demands, are inherently destructive; like elephants, we trash the locales we exploit to live. ...[O]ur destructive impact is so amplified by our numbers, industries, and level of consumption that only by pulling back can we hope to retain, to some degree, our life-sustaining natural inheritance.²⁴

As these authors emphasize, human welfare is dependent upon the goods and services natural ecosystems provide. For example, trees produce oxygen and wetlands provide important water filtration services.²⁵ Humans can be part of nature, Westra and others acknowledge.²⁶ The problem, they add, lies with our burgeoning population, our “present beliefs and values,” and our technologically-enhanced abilities.²⁷ It is the sheer destructiveness of modern, technological humans that, in the minds of these authors, motivates distinguishing humans from other aspects of nature, and supports the conception of nature as existing, in its purest state, entirely apart from human influence. Such a conception, and natural areas that exist in a pristine state or only minimally influenced by humans, are essential for the measurement of human impacts on natural ecosystems. Given our ultimate dependence on well functioning natural ecosystems, according to these authors, we must make attempts to quantify such impacts.²⁸

In this context, it would be inappropriate to reply that humans are simply part of nature. The refusal to distinguish humans from other aspects of nature would leave one unable to discuss critical human-induced environmental problems such as pollution, invasions of many exotic species, and global climate change. One would be left saying that nature affects itself, which is hardly helpful.

III. SATISFYING SOCIETAL PREFERENCES

According to the second interpretation, an ecosystem has ecological integrity if it satisfies societal preferences for how that ecosystem is structured and functions. This is essentially one characterization offered

24. Peter Miller & William E. Rees, *Introduction*, in *ECOLOGICAL INTEGRITY: INTEGRATING ENVIRONMENT, CONSERVATION, AND HEALTH*, *supra* note 5, at 3, 13.

25. *See, e.g., Water Quality and Hydrology*, U.S. ENVTL. PROT. AGENCY, <http://water.epa.gov/type/wetlands/wqhydrology.cfm> (last visited Mar. 6, 2013).

26. Westra et al., *supra* note 5, at 33.

27. *Id.*

28. *See* Karr, *supra* note 16, at 209-223; Westra et al., *supra* note 5, at 23-39.

by James Kay.²⁹ Concerning ecological systems in general (not only those in protected areas), Kay writes: “[W]e must have some state, in which we wish these systems to be. The term ‘integrity’ has become the name we use for this state.”³⁰ According to Kay, an ecosystem has ecological integrity if it is in the state we wish it to be in—that is, if it satisfies societal preferences for that ecosystem. Under this interpretation, as managers seek to maintain the ecological integrity of an ecosystem, of primary importance is the “sum total of human preferences and concerns” with respect to that system.³¹ As Kay, Stephen Woodley, and other management experts will acknowledge, most protected areas have been established for the purpose of conserving native biodiversity.³² But these experts believe that at the level of individual ecosystems, other preferences and concerns must be considered as well.³³ Concerning protected areas, Woodley writes that ecological integrity “forces the use of ecosystem science, in combination with societal wishes, to define and decide on ecosystem goals.”³⁴ For a given ecosystem, ecological integrity is a state that is to be precisely defined using good science with the aim of accommodating the total preferences and concerns for that ecosystem.

Kay, Woodley, and others assume that humans are essential components of most ecosystems, even in protected areas.³⁵ In their view, the presence of humans does not necessarily degrade nature, but often establishes and maintains it.³⁶ For most ecosystems, ecological integrity is defined not only in terms of satisfying societal preferences, but also in terms of humans and the essential roles they are to play within the system. “[I]ntegrity can only be defined clearly for specific ecosystems,” Kay writes, “in the context of the humans which are an integral part of the ecosystem.”³⁷ And Woodley writes, “humans always have been integral to most of the ecosystems that are conserved by protected areas.”³⁸ According to these experts, a vital aspect of the ecological integrity of most ecosystems, even in protected areas, is managers who

29. James J. Kay, *On the Nature of Ecological Integrity: Some Closing Comments*, ECOLOGICAL INTEGRITY AND THE MANAGEMENT OF ECOSYSTEMS 201 (Stephen Woodley et al. eds., 1993).

30. *Id.*

31. *Id.* at 210.

32. See, e.g., Stephen Woodley, *Ecological Integrity: A Framework for Ecosystem-Based Management*, in BEYOND NATURALNESS: RETHINKING PARK AND WILDERNESS STEWARDSHIP IN AN ERA OF RAPID CHANGE 106, 110 (David N. Cole & Laurie Yung, eds., Island Press, 2010).

33. *Id.* at 107, 113, 121; Kay, *supra* note 29, at 210.

34. Woodley, *supra* note 32, at 122.

35. *Id.* at 107, 121; Kay, *supra* note 29, at 203.

36. Woodley, *supra* note 32, at 107, 113, 121, 122; Kay, *supra* note 29, at 201, 203, 210.

37. Kay, *supra* note 29, at 203.

38. Woodley, *supra* note 32, at 107, 121.

are actively engaged in reconstructing and maintaining an ecosystem to accommodate societal preferences. “[H]umans have always influenced and managed many ecosystems,” Woodley writes, “even in protected areas.”³⁹

This is a highly interventionist approach. Woodley adds that ecological integrity “provides the framework” for “dramatic” management interventions into protected areas.⁴⁰ He explains that the focus should not be on whether a given attribute is natural or is of human origin. The focus, he writes, should be on whether that attribute is desired.⁴¹ Woodley and other experts acknowledge the importance of preserving native biodiversity in protected areas, but they accept responsibility for preserving regional biodiversity rather than the native biodiversity of a given site.⁴² Managers may successfully maintain native biodiversity, these experts accept, even though at a given site “community structure and composition is no longer natural.”⁴³ Managers should have much discretion, they believe, to shift species composition and abundances. This highly interventionist approach is in opposition (as Woodley points out) to the current emphasis in United States environmental law and policy on preserving natural conditions in protected areas.⁴⁴ Under this approach, national parks and other protected areas become artifacts, products of human preferences and designs.

Here is an example discussed within *Beyond Naturalness*. In Kootenay National Park in British Columbia, decades of fire suppression had led to altered species distributions in the park.⁴⁵ Coniferous trees had significantly expanded their ranges. Landscapes that, in the early twentieth century, were open forests with meadows and grassy slopes had become even-aged blankets of mature forest.⁴⁶ This shift brought about changes in distributions of many of the area’s plants and animals.⁴⁷ A major problem, managers believed, was that the forest had become susceptible to catastrophic crown fires, which would have significantly altered the ecosystem and put humans at risk.⁴⁸ Another problem was that a herd of Rocky Mountain Bighorn Sheep (*Ovis canadensis*) lacked

39. *Id.* at 113.

40. *Id.* at 120.

41. *Id.* at 107, 113.

42. *Id.* at 110; see COLE & YUNG, *supra* note 2, at 192.

43. David N. Cole et al., *Naturalness and Beyond: Protected Area Stewardship in an Era of Global Environmental Change*, 25 GEORGE WRIGHT FORUM 36, 45 (2008), available at <http://www.georgewright.org/251cole.pdf>.

44. Woodley, *supra* note 32, at 112-13.

45. *Id.* at 119.

46. *Id.*

47. *Id.*

48. *Id.*; see also COLE & YUNG, *supra* note 2, at 248.

natural foraging areas, and had become habituated to foraging in the nearby town and on the grassy borders of roads, resulting in high sheep mortality.⁴⁹ Through use of management-ignited fire and other means, managers have restored the open forest structure and historic species distributions. They have attempted to mimic the fire regime historically maintained by natural causes and (it is believed) by native peoples.⁵⁰ Managers have placed other desired features into the area, for example, fireguards for the campground and the town.⁵¹

In this approach to management, again, the important issue is not whether a given attribute is natural or human-caused. Woodley emphasizes that the fire regime managers seek to mimic was at least in part human-caused.⁵² Rather, managers have sought to accommodate the total preferences and concerns for this ecosystem. According to Woodley and others, humans are (and have been) essential components of the forest ecosystem in Kootenay National Park, actively maintaining desired attributes.

IV. IMPOSING SOCIETAL PREFERENCES ONTO WILDERNESS AREAS

Let us consider another example. In this example, managers seek to maintain an unnatural (human-caused) yet desired attribute in federally-designated wilderness areas. There are aspects here of managing for ecological integrity, as interpreted by Woodley, Kay, and others. Yet this example illustrates a major difficulty with this approach.

The Utah Division of Wildlife Resources has introduced Rocky Mountain goats (*Oreamnos americanus*) into federal wilderness areas in Utah.⁵³ Apparently, Rocky Mountain goats are not native to the state. There is no direct evidence, including fossil evidence that these goats ever lived in Utah prior to the first introduction in 1967.⁵⁴ The Utah Division of Wildlife Resources has declared that the goats are native, however, based on speculation concerning the migration of goats during the Pleistocene.⁵⁵ The federal agency with responsibility for these wilderness areas, the U.S. Forest Service, gives the state wildlife agency responsibility for making this determination.⁵⁶

49. COLE & YUNG, *supra* note 2, at 248.

50. Woodley, *supra* note 32, at 119-20; COLE & YUNG, *supra* note 2, at 248.

51. *Id.* at 248-49.

52. Woodley, *supra* note 32, at 119-20.

53. UTAH DIV. OF WILDLIFE RES., MANAGEMENT PLAN FOR UTAH ROCKY MOUNTAIN GOAT (2008), available at http://wildlife.utah.gov/hunting/biggame/pdf/rocky_mtn_goat_plan.pdf.

54. *See id.* at 7-10.

55. *See id.* at 4, 7-10.

56. U.S. FOREST SERV., FOREST SERVICE MANUAL, TITLE 2600, AMENDMENT NO. 2600-95-3 § 2641 (1995), available at <http://www.fs.fed.us/im/directives/fsm/2600/2640.txt>.

According to the state agency's goat management plan, the goats are thriving in their new home, an indication of suitable habitat.⁵⁷ The shaggy white mountain goats are extremely popular with wilderness visitors. For many people, viewing mountain goats perched on precipitous ledges is the highlight of a wilderness visit.⁵⁸ The goats are also extremely popular with hunters.⁵⁹ The state wildlife agency awards mountain goat hunting permits through an annual drawing, and the fee for a goat-hunting permit is substantial.⁶⁰ The state agency indicates concern, however, with possible goat impacts to sensitive vegetation. The agency plans to closely monitor the goats' use of plants in these areas.⁶¹ The agency has committed to regulating numbers of goats as needed.⁶²

Utah is home to a large number of rare and endemic plants.⁶³ Yet there is no indication that possible impacts to these plants were studied prior to the introduction of mountain goats into wilderness areas in the state.⁶⁴ In a report on the status of plant species of special concern, the Utah Division of Wildlife Resources acknowledges actual or possible goat impacts to several of these species.⁶⁵ Forest Service personnel are reported to have observed mountain goats creating trails through habitat of one rare and endemic plant, Utah ivesia (*Ivesia utahensis*).⁶⁶ Biologists and Forest Service managers have expressed concern that mountain goats threaten or potentially threaten several other rare and endemic species, including Garrett's bladderpod (*Lesquerella garrettii*)

57. UTAH DIV. OF WILDLIFE RES., *supra* note 53, at 8.

58. *Id.* at 2-3.

59. "The mountain goat is a highly sought after trophy." *Id.* at 6.

60. The fee for a goat-hunting permit for a Utah state resident is \$413; the fee for a non-resident is \$1,518. *Licenses and Permits*, UTAH DIV. OF WILDLIFE RES., <http://wildlife.utah.gov/dwr/license-permit.html> (last visited Feb. 13, 2013).

61. UTAH DIV. OF WILDLIFE RES., *supra* note 53, at 3.

62. *Id.* at 3-5.

63. UTAH DIV. OF WILDLIFE RES., INVENTORY OF SENSITIVE SPECIES AND ECOSYSTEMS IN UTAH: ENDEMIC AND RARE PLANTS OF UTAH: AN OVERVIEW OF THEIR DISTRIBUTION AND STATUS 3 (1998), available at <http://wildlife.utah.gov/pdf/animals/plantprt.pdf>.

64. According to the historical account by Carter, managers simply transported the goats into, or near to, wilderness areas without adequate studies. See Dick Carter, *Maintaining Wildlife Naturalness in Wilderness*, 3 INT'L J. WILDERNESS 17, 19 (1997), available at <http://www.wildernes.s.net/library/documents/carter.pdf>.

65. See UTAH DIV. OF WILDLIFE RES., PUBLICATION NO. 05-40, PLANT INFORMATION COMPILED BY THE UTAH NATURAL HERITAGE PROGRAM: A PROGRESS REPORT (2005), available at http://wildlife.utah.gov/pdf/animals/Plant_Report_2005.pdf. The report acknowledges "limited" goat impacts to creeping draba (*Draba sobolifera*) and Belknap Peak draba (*Draba ramulosa*). *Id.* at 69, 71; see also *id.* at 99. According to this report, mountain goats are present in the high elevations of the Tushar Mountains, but no information is available on the status of the rare and endemic plant that grows high in these mountains: Tushar gilia (*Ipomopsis tridactyla*). *Id.* at 95.

66. *Id.* at 99.

and king woody aster (*Aster kingii* var. *kingii*).⁶⁷ “The vegetation has been impacted all over the place,” a Forest Service spokesperson is quoted as saying. “The goats are eating it; they’re walking on it.”⁶⁸ Mountain goats have been a problem in other protected areas as well. National Park Service biologists are concerned that introduced, non-native Rocky Mountain goats threaten the existence of rare and endemic plants in Washington’s Olympic National Park.⁶⁹ The Park Service is considering the controversial solution of eliminating all goats within the park through aerial shooting.⁷⁰

Presumably Woodley, Kay, and other experts would not agree that the Utah wilderness areas, with goats, are a good example of maintaining ecological integrity. The problem is threats or potential threats to native biodiversity. But, there are elements here of ecological integrity. Especially interesting is how well accepted the mountain goats are within Utah. According to the state wildlife agency: “Viewing mountain goats is one of the most exhilarating and memorable experiences available to users of high alpine areas in Utah. Public perception of goat viewing opportunities is overwhelmingly positive.”⁷¹ According to the local newspapers, the goats are thriving and are extremely popular.⁷² From the

67. See *id.* at 107; see also *Experts Study Goats’ Impact on Forest Plants*, DESERET NEWS, Aug. 8, 1998, <http://www.deseretnews.com/article/645848/Experts-study-goats-impact-on-forest-plants.html?pg=all>. In a report on rare plant species in the Bear River Range, Mosely writes that “known threats” to king woody aster include introduced mountain goats. ROBERT K. MOSLEY, THREATENED, ENDANGERED AND SENSITIVE PLANT INVENTORY OF THE BEAR RIVER RANGE, CARIBOU NATIONAL FOREST: SECOND YEAR RESULTS 5 (1991), available at https://fishandgame.idaho.gov/ifwis/idnhp/cdc_pdf/moser91c.pdf.

68. See *Experts Study Goats’ Impact on Forest Plants*, *supra* note 67.

69. The goats were introduced into the area in the 1920s, apparently by the state wildlife agency. Douglas B. Houston et al., *History, Distribution, and Abundance*, in MOUNTAIN GOATS IN OLYMPIC NATIONAL PARK: BIOLOGY AND MANAGEMENT OF AN INTRODUCED SPECIES ch. 4 (1994); see also Bruce B. Moorehead & Victoria Stevens, *Introduction and Dispersal of Mountain Goats in Olympic National Park*, in ECOLOGICAL RESEARCH IN NATIONAL PARKS OF THE PACIFIC NORTHWEST 46, 49 (E. Starkey et al. eds., 1982). According to Park Service biologists, 43 percent of the park’s rare and endemic plants occur within mountain goat summer range. Biologists have observed that the goats harm and actually kill individual plants through grazing, trampling, and wallowing. E. G. Schreiner et al., *Rare Plants*, in MOUNTAIN GOATS IN OLYMPIC NATIONAL PARK: BIOLOGY AND MANAGEMENT OF AN INTRODUCED SPECIES ch. 12 (1994). Studies have shown that the goats have altered abundances of three rare and endemic plant species in the park. *Id.*

70. D. B. Houston et al., *Mountain Goat Management in Olympic National Park*, in MOUNTAIN GOATS IN OLYMPIC NATIONAL PARK: BIOLOGY AND MANAGEMENT OF AN INTRODUCED SPECIES, *supra* note 69, at ch. 14.

71. UTAH DIV. OF WILDLIFE RES., *supra* note 53, at 3.

72. See Brett Prettyman, *Wildlife: State to Hold Viewing of Rocky Mountain Goats*, SALT LAKE TRIB., Apr. 11, 2012, <http://www.sltrib.com/sltrib/outdoors/53887424-117/goats-mountain-utah-canyon.html.csp>; Amy Donaldson, *Goat Gazing: Herds Thrive in Southern Utah’s Tushar Mountains*, DESERET NEWS, Aug. 27, 2009, <http://www.deseretnews.com/article/705326029/Goat-gazing-Herds-Thrive-in-southern-Utah’s-Tushar-Mountains.html?pg=all>; Ray Grass, *Goats Get a Foothold in Utah*, DESERET NEWS, Apr. 16, 2004, <http://www.deseretnews.com/article/595056360/>

perspective of the state wildlife agency and many Utah residents, these wilderness areas are now whole, intact, sound, unimpaired, and well functioning. These ecosystems are now in the condition (borrowing language from Kay) that many people wish them to be in.⁷³ Woodley writes that under ecological integrity the focus is on whether or not a given attribute is desired,⁷⁴ and these goats are definitely desired. Managers are now an essential component of these wilderness areas, regulating goat numbers (hopefully) to protect the native plants. Yet this is arguably an appalling situation. Given the status reports, and the example of Olympic National Park, there is a definite risk of losing rare plant species that grow nowhere else in the world.

This example highlights a major difficulty with the management approach recommended by Kay, Woodley, and others. Managers lack the ability to accommodate open-ended societal preferences and concerns, and also maintain native biodiversity in a given area. Preserving native biodiversity is a fundamental management goal in wilderness and other protected areas (see below).⁷⁵ This goal necessitates the preservation or restoration of natural conditions (including, in this example, no goats), and severely constrains management actions within these areas.

Here is another example. Biologists have long wondered why amphibian populations are in decline in rugged, isolated mountainous terrain that is relatively unaffected by humans.⁷⁶ Knapp and Matthews conducted a survey of high wilderness lakes in Kings Canyon National Park and the John Muir Wilderness Area. They conclude that introduced, predaceous fish is a primary cause of declines in mountain yellow-legged frogs (*Rana muscosa*) in the Sierra Nevada Mountains.⁷⁷ Extensive stocking of Sierra Nevada lakes with various nonnative trout species has been ongoing since the 1850s. The focus has been on planting trout in high lakes above 6,000 feet, nearly all of which were naturally fishless.⁷⁸

Goats-get-a-foothold-in-Utah.html?pg=1; *Mountain Goat: Oreamnos americanus*, DESERET NEWS, Aug. 20, 1998, <http://www.deseretnews.com/article/647611/MOUNTAIN-GOAT--Oreamnos-americanus.html?pg=all>.

73. See Kay, *supra* note 29, at 201.

74. Woodley, *supra* note 32, at 113.

75. See, e.g., *id.* at 110.

76. Roland A. Knapp & Kathleen R. Matthews, *Non-Native Fish Introductions and the Decline of the Mountain Yellow-Legged Frog From Within Protected Areas*, 14 CONSERVATION BIOLOGY 428 (2000).

77. *Id.* at 435.

78. Roland A. Knapp, *Non-native Trout in Natural Lakes of the Sierra Nevada: An Analysis of their Distribution and Impacts on Natural Aquatic Biota*, in SIERRA NEVADA ECOSYSTEM PROJECT: FINAL REPORT TO CONGRESS, VOLUME III: ASSESSMENTS, COMMISSIONED REPORTS, AND BACKGROUND INFORMATION (1996), available at http://pubs.usgs.gov/dds/dds-43/VOL_III/VIII_C08.PDF.

Fish stocking was entirely eliminated in the national parks (Sequoia, Kings Canyon, and Yosemite) by 1991, but stocking by the California Department of Fish and Game continues in high lakes in the John Muir and other designated wilderness areas.⁷⁹ Knapp and Matthews explain that introduced, predatory trout and mountain yellow-legged frogs have similar habitat requirements and cannot coexist.⁸⁰ They write, “[t]he habitats in which mountain yellow-legged frog larvae were historically most common and abundant are now generally occupied by predatory trout and as [a] result are no longer suitable.”⁸¹ The frogs have been pushed into marginal and isolated habitats in which they are (according to these authors) “slowly going extinct.”⁸² Mountain yellow-legged frogs have been eliminated from 50 percent of their historic range.⁸³ In a separate review of the literature, Knapp writes, “[i]ntroduced trout are having considerable deleterious effects on native fishes, amphibians, zooplankton, lake macroinvertebrates, and probably stream macroinvertebrates.”⁸⁴

This is a good example of imposing societal preferences onto wilderness areas, with definite threats to native biodiversity. Fish were initially planted by sporting groups (Bishop Fish Planting Club, Sierra Club, etc.), and Knapp expresses concern that any efforts to remove fish from wilderness lakes in the Sierra Nevada will be met with intense opposition from anglers and community groups.⁸⁵ There are elements here of managing for ecological integrity, as interpreted by Kay, Woodley, and others. With the introduction of trout into high wilderness lakes, the state agency and many anglers will presumably agree that these lakes are whole, intact, sound, unimpaired, and well functioning. These lakes are in “the state in which we wish them to be.”⁸⁶ Managers are essential components of these ecosystems, stocking many of these lakes on a regular basis (with use of aircraft).⁸⁷ The focus is on desired, although not natural, attributes. Knapp and others are concerned that

79. *Id.* at 6.

80. Both taxa require lakes and ponds that are at least two meters deep for protection against summer drying and winter freezing. Knapp & Matthews, *supra* note 76, at 435-36.

81. *Id.* at 436.

82. *Id.*

83. *Id.* at 429.

84. Knapp, *supra* note 78, at 19.

85. *Id.* at 8, 20, 21.

86. Kay, *supra* note 29, at 201.

87. Knapp, *supra* note 78, at 8-9, 21; *see also* NAT'L PARK SERV., DEPT. OF THE INTERIOR, PRELIMINARY RESTORATION OF MOUNTAIN YELLOW-LEGGED FROGS, ENVIRONMENTAL ASSESSMENT 7 (2001), available at <http://www.nps.gov/seki/parkmgmt/upload/frogea1.pdf>.

mountain yellow-legged frogs will soon be placed on the federal endangered species list.⁸⁸

This example well illustrates the point made above. Preserving native biodiversity, including native fish, amphibians, aquatic macroinvertebrates, rare and endemic plants, and many other species necessitates the preservation or restoration of natural conditions (including, in this example, fishless lakes). This severely constrains management actions in protected areas, limiting the accommodation of societal preferences and concerns in these areas. The recommendation by Kay, Woodley, and others to maintain ecological integrity, understood as accommodating societal preferences and concerns, left open-ended, with possible shifts in species distributions and abundances, is at odds with the fundamental goal in protected areas of maintaining native biodiversity.

V. CULTIVATION AND PRESERVATION IN PROTECTED AREAS

According to the Wilderness Act of 1964, designated wilderness areas “shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character....”⁸⁹ The Act explicitly mandates the preservation of “wilderness character,” yet the Act does not state the meaning of wilderness character. The Act provides, rather, a definition of wilderness. The Wilderness Act is properly interpreted as mandating the preservation of “wilderness character” understood in terms of the Act’s definition of wilderness.⁹⁰ According to this definition:

A wilderness, in contrast with those areas in which man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of

88. Knapp, *supra* note 78, at 19; NAT’L PARK SERV., *supra* note 87, at ii. Efforts have been made to restore mountain yellow-legged frog habitat by removing fish from selected high wilderness lakes in the Sierra Nevada. The National Park Service reports that with the removal of fish in three lakes, there has been a 10,000 percent increase in mountain yellow-legged frogs and tadpoles! *Giving Mountain Yellow-Legged Frogs a Fighting Chance*, NAT’L PARK SERV., DEPT. OF THE INTERIOR, <http://www.nps.gov/seki/naturescience/mountain-yellow-legged-frogs.htm> (last visited April 5, 2013). The agency is now proposing to eliminate fish from a larger number of high wilderness lakes. *Id.*

89. 16 U.S.C. § 1131(a) (2012).

90. See Peter Landres, *Developing Indicators to Monitor the “Outstanding Opportunities” Quality of Wilderness Character*, 10 INT’L J. WILDERNESS 8, 9 (2004); see also JOHN C. HENDEE & CHAD P. DAWSON, WILDERNESS MANAGEMENT: STEWARDSHIP AND PROTECTION OF RESOURCES AND VALUES 263, 269-270 (3d ed. 2002).

wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions, and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation....⁹¹

The Wilderness Act, then, mandates that wilderness areas remain untrammelled and in their natural conditions. Wilderness areas are to appear to have been affected primarily by natural forces; "man's work" is to be substantially unnoticeable. These areas are also to offer outstanding opportunities for solitude and for primitive and unconfined recreation.

Federal-agency policies properly interpret the Wilderness Act as mandating the preservation of natural conditions in designated wilderness areas. According to the U.S. Forest Service's policy document, the *Forest Service Manual*, the Wilderness Act requires that the agency "preserve natural ecological conditions" in designated wilderness areas.⁹² According to the Bureau of Land Management's (BLM) *BLM Manual*, the Act mandates that wilderness ecosystems, ecological processes, watersheds, and soils be maintained in their "natural conditions."⁹³ National Park Service managers are also required to maintain "natural conditions" in agency-managed wilderness areas.⁹⁴ These agencies interpret "natural conditions" not as pristine or entirely free of human influence, but as generally free of human influence.⁹⁵

As well as mandating the preservation of natural conditions, the Wilderness Act mandates that wilderness areas be maintained "unimpaired for future use and enjoyment as wilderness," and "to

91. 16 U.S.C. § 1131(c) (2012).

92. U.S. FOREST SERV., U.S. DEPT. OF AGRICULTURE, *FOREST SERVICE MANUAL*, TIT. 2320 6 (2007), available at <http://www.fs.fed.us/im/directives/dughtml/fsm2000.html>.

93. BUREAU OF LAND MGMT., U.S. DEPT. OF INTERIOR, *BLM MANUAL 6340, MANAGEMENT OF DESIGNATED WILDERNESS AREAS 1-5* (2012), available at http://www.blm.gov/pgdata/etc/media/lib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.22269.File.dat/M6340_WildernessMgt_Final%20071312.pdf.

94. NAT'L PARK SERV., U.S. DEPT. OF THE INTERIOR, *MANAGEMENT POLICIES 36* (2006), available at <http://www.nps.gov/policy/mp2006.pdf>; see also U.S. FISH & WILDLIFE SERV., 610FW1, *GENERAL OVERVIEW OF WILDERNESS STEWARDSHIP POLICY 1.13* (2008), available at <http://www.fws.gov/policy/610fw1.html>.

95. See NAT'L PARK SERV., *supra* note 94, at 36. Forest Service policies require that a wilderness area be managed "to ensure its character and values are dominant and enduring." U.S. FOREST SERV., *supra* note 92, at 6. U.S. Fish and Wildlife Service policies state that wilderness is properly conceived as "a place where human uses, convenience, and expediency do not dominate." U.S. FISH & WILDLIFE SERV., *supra* note 94, at 1.13D.

provide for the protection of these areas.”⁹⁶ Consistent with these legislative mandates, federal-agency policies are highly protective of the native plants and animals within wilderness areas. The Park Service’s *Management Policies* states, for example,

The National Park Service will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems.⁹⁷

The Service will successfully maintain native plants and animals by preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur.⁹⁸

Managers are directed to “restor[e] native plant and animal populations in parks where they have been extirpated by past human-caused actions.”⁹⁹ The *BLM Manual* states, “[m]anagement must foster a natural distribution of native wildlife, fish, and plants by ensuring that natural ecosystems and ecological processes continue to function naturally.”¹⁰⁰ Forest Service policies direct managers to “protect fish and wildlife indigenous to the area from human caused conditions that could lead to Federal listing....”¹⁰¹

Yet the Wilderness Act and agency policies allow human activities within wilderness areas that compromise, to some extent, wilderness character. Mining is allowed in designated wilderness areas under certain restrictions.¹⁰² Livestock grazing is allowed on allotments for which a valid grazing permit existed prior to designation of an area as wilderness.¹⁰³ The Wilderness Act and agency policies allow fences, watering facilities, and other structures necessary for livestock grazing.¹⁰⁴

96. 16 U.S.C. § 1131(a) (2012).

97. NAT’L PARK SERV., *supra* note 94, at 42; *see also id.* at 83.

98. *Id.* at 42.

99. *Id.*

100. BUREAU OF LAND MGMT., *supra* note 93, at 1-5.

101. U.S. FOREST SERV., *supra* note 92, at 30. U.S. Fish and Wildlife Service policies require managers to protect wilderness character, which includes “[p]roviding environments for native plants and animals.” U.S. FISH & WILDLIFE SERV., *supra* note 94, at 1.13B(2); *see also id.* at 1.13A, 1.14B.

102. U.S. FOREST SERV., *supra* note 92, at 41; BUREAU OF LAND MGMT., *supra* note 93, at 1-34; NAT’L PARK SERV., *supra* note 94, at 87; U.S. FISH & WILDLIFE SERV., 610FW2, WILDERNESS ADMINISTRATION AND RESOURCE STEWARDSHIP 2.14E (2008), *available at* <http://www.fws.gov/policy/610fw2.html>.

103. U.S. FOREST SERV., *supra* note 92, at 22-27; BUREAU OF LAND MGMT., *supra* note 93, at 1-28; NAT’L PARK SERV., *supra* note 94, at 87-88, 116. The U.S. Fish and Wildlife Service is an exception. This agency does not allow commercial livestock grazing in wilderness areas under its jurisdiction. *See* U.S. FISH & WILDLIFE SERV., *supra* note 102, at 2.18.

104. U.S. FOREST SERV., *supra* note 92, at 22-26; BUREAU OF LAND MGMT., *supra* note 93, at 1-28, 1-29; NAT’L PARK SERV., *supra* note 94, at 116-17.

The Act and agency policies allow construction of temporary roads within wilderness areas, the use of motorized equipment and mechanical transport, and placement of structures and installations if such otherwise prohibited uses are necessary for “administration and protection” of the wilderness area.¹⁰⁵ Trails and bridges are allowed in wilderness areas.¹⁰⁶ A recent trail construction guidebook, published by the Forest Service, recommends locating trails so that visitors are able to observe wildlife, and are able to enjoy scenic vistas with views of lakes and rivers.¹⁰⁷ Agency wilderness policies allow managers to place directional signs for visitor safety, designate campgrounds, artificially stock fish in wilderness lakes and ponds, cut trees, use management-ignited fire (to mimic a natural fire regime and eliminate an excessive buildup of fuels), control unwanted fires, remove exotic species, defend against outbreaks of insects and diseases, control predators, and control ungulate populations.¹⁰⁸

Designated wilderness areas have been carefully cultivated or developed to accommodate needs within our society for such natural areas. Indeed, the primary author of the Wilderness Act, Howard Zahniser, argued for passage of the Act by pointing out that wilderness experience is essential for avoiding the neuroses that arise in modern city life.¹⁰⁹ The Act makes clear that wilderness areas have been set aside for the “use and enjoyment of the American people.”¹¹⁰ Wilderness areas have been cultivated, also, to accommodate various needs and visitor preferences within these areas.¹¹¹ But the cultivation of wilderness is strictly limited. The Act mandates that these areas remain “unimpaired

105. 16 U.S.C. § 1131(c) (2012); *see also* U.S. FOREST SERV., *supra* note 92, at 19, 48-50, 53; BUREAU OF LAND MGMT., *supra* note 93, at 1-16, 1-40; U.S. FISH & WILDLIFE SERV., *supra* note 102, at 2.5B, 2.6, 2.7, 2.8; NAT’L PARK SERV., *supra* note 94, at 84, 87.

106. U.S. FOREST SERV., *supra* note 92, at 20; BUREAU OF LAND MGMT., *supra* note 93, at 1-40, 1-41; U.S. FISH & WILDLIFE SERV., *supra* note 102, at 2.5D, 2.6; NAT’L PARK SERV., *supra* note 94, at 84-85, 134.

107. U.S. FOREST SERV., ROCKY MOUNTAIN REGION, GUIDE FOR MOUNTAIN TRAIL DEVELOPMENT 12-13 (1990).

108. *See* NAT’L PARK SERV., *supra* note 94, at 47-50, 83-85, 135-37; U.S. FOREST SERV., *supra* note 92, at 19, 31, 32, 34, 38, 45-50; BUREAU OF LAND MGMT., *supra* note 93, at 1-5, 1-25, 1-26, 1-41, 1-46, 1-47, 1-48, 1-57, 1-60, 1-61; U.S. FISH & WILDLIFE SERV., *supra* note 102, at 2.5, 2.17, 2.19-2.23.

109. *See* Howard Zahniser, *The Need for Wilderness Areas*, in WHERE WILDERNESS PRESERVATION BEGAN: THE ADIRONDACK WRITINGS OF HOWARD ZAHNISER 59 (Edward Zahniser, ed., 1992); *see also* MARK HARVEY, WILDERNESS FOREVER: HOWARD ZAHNISER AND THE PATH TO THE WILDERNESS ACT 67-68, 121, 146-48, 149-50, 251 (2005).

110. 16 U.S.C. § 1131(a) (2012).

111. Authors of *Beyond Naturalness* have criticized the Wilderness Act for ruling out all intentional control or manipulation of wilderness areas. According to these experts, the Wilderness Act was intended to “protect nature by keeping our hands off.” COLE & YUNG, *supra* note 2, at 17. Such criticism is based on a misinterpretation of the Act.

for future use and enjoyment as wilderness,” that these areas be protected, and that wilderness character be maintained.¹¹² There have been compromises (for example, mining and livestock grazing), but generally these areas must remain in their natural conditions, understood as generally free of human influence.

Assuming wilderness areas are managed in accordance with the Wilderness Act and agency policies, it is fair to say that these areas are whole, intact, sound, unimpaired, and well functioning. Wilderness areas incorporate “desirable attributes,” including natural conditions, solitude, outstanding opportunities for primitive and unconfined recreation, etc. The “desirable attributes” are determined by society as we support candidates for office who champion the protection of wilderness, or as we participate in letter writing campaigns in support of a wilderness area threatened by inappropriate development. Wilderness areas are in the state in which we “wish these systems to be.”¹¹³ But within wilderness areas, rather than managers being essential components of ecosystems, establishing them and maintaining them through time, “man himself is a visitor who does not remain” (as the Wilderness Act states).¹¹⁴ Wilderness areas are “undeveloped,” relatively speaking, and retain their “primeval character and influence” (again, relatively speaking). These areas exist without human habitation. They are managed to preserve their natural conditions, “with the imprint of man’s work substantially unnoticeable.”¹¹⁵ Agency policies require that management interventions in wilderness areas be as minimal and infrequent as possible. According to a jointly-issued Forest Service and BLM policy document, “[m]anagement activities will be guided by the principle of doing only the minimum necessary to conserve and, if necessary, to enhance fish and wildlife resources, and to manage the area as wilderness.”¹¹⁶ According to National Park Service policies, “[t]he Service will not intervene in natural biological or physical processes, except...,” for example, “to restore natural ecosystem functioning disrupted by past or ongoing human activities.”¹¹⁷ “Any such intervention,” these policies add, “will be kept to the minimum necessary....”¹¹⁸

112. 16 U.S.C. § 1131(a) (2012).

113. COLE & YUNG, *supra* note 2, at 201.

114. 16 U.S.C. § 1131(c) (2012).

115. 16 U.S.C. § 1131(c)(1).

116. ASS’N OF FISH & WILDLIFE AGENCIES, U.S. FOREST SERV., BUREAU OF LAND MGMT., POLICIES AND GUIDELINES FOR FISH AND WILDLIFE MANAGEMENT IN NATIONAL FOREST AND BUREAU OF LAND MANAGEMENT WILDERNESS 5 (2006), available at http://www.blm.gov/pgdata/et/c/medialib/blm/wo/Information_Resources_Management/policy/im_attachments/2007.Par.31564.File.dat/im2007-052attach1.pdf.

117. NAT’L PARK SERV., *supra* note 94, at 37.

118. *Id.*

This is “ecological integrity” in a different sense, as this expression is understood by Karr and other biologists. Within the Wilderness Act and agency policies, nature is conceived as existing, in its purest state, entirely apart from humans. “Man is a visitor who does not remain” is intended to convey that while humans may visit and observe wilderness, they must exert no influence, or only minimal influence, on its components and processes. Human influence is conceived as necessarily degrading nature. Peter Landres and others write, insightfully, that the Wilderness Act is “legislation born of dichotomy between nature and culture.”¹¹⁹ In wilderness areas we find (as Karr claims for national parks) places that have been set aside for the purpose of protecting pristine or minimally disturbed sites that can be used as standards for assessing biological integrity and in other measures.¹²⁰

Philosopher Mark Sagoff has written that federal environmental legislation goes beyond personal preferences (“what is good for me”) to express beliefs held by citizens as they consider what is good for society as a whole. The Wilderness Act and other federal environmental laws reflect shared values, Sagoff claims, “not what we want but who we are.”¹²¹ Americans envision national parks, wilderness, and other protected areas as places that retain their natural conditions and processes, complete with their native plants and animals. As further evidence of this, consider this moving letter written by citizens opposed to a proposed fish removal and restocking project in a Montana wilderness area. Citizens write,

We feel that this plan goes against all that is held sacred in a wilderness area. Wilderness areas were established in order to hold those areas in a pristine state without interference from human beings. We believe the “Wilderness Act” should be respected and these areas should not be tampered with.¹²²

119. Peter B. Landres, et al., *Naturalness and Wildness: the Dilemma and Irony of Managing Wilderness*, in U.S. FOREST SERV., PROCEEDINGS RMRS-P-15-VOL-5, WILDERNESS SCIENCE IN A TIME OF CHANGE CONFERENCE: WILDERNESS ECOSYSTEMS, THREATS, AND MANAGEMENT 377, 378 (2000).

120. Karr, *supra* note 16, at 214.

121. MARK SAGOFF, THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW, AND THE ENVIRONMENT 27 (2008).

122. U.S. DEPT. OF ENERGY & BONNEVILLE POWER ADMIN., SOUTH FORK FLATHEAD WATERSHED WESTSLOPE CUTTHROAT TROUT CONSERVATION PROGRAM, FINAL ENVIRONMENTAL IMPACT STATEMENT 1-6 (2005). In the Bob Marshall Wilderness Area, the Montana Fish, Wildlife, and Parks Department is currently engaged in poisoning hybrid trout in twenty-one high wilderness lakes. Once the hybrid trout are eliminated, the agency plans to stock these lakes with genetically pure westslope cutthroat trout (*Oncorhynchus clarki lewisi*). The project is intended to protect the genetic purity of this rare subspecies. *See id.* at S-1 to S-3.

Protected areas that are managed in accordance with relevant legislation and agency policies fulfill the desires of society, based on shared values, for how these natural ecosystems are to be maintained. Such protected areas are in the state in which we “wish these systems to be.”¹²³ Protected areas have indeed been cultivated in various ways to meet needs and satisfy visitor preferences, but this has been accomplished within strict limits set by legislation and policy. The conception of nature as existing in its purest state entirely apart from humans, and as degraded by human influence, is found within the Wilderness Act, other protected area legislation, and agency policies, and this conception is appropriate and indeed necessary in this context of setting these areas aside for the preservation of nature. As biologists emphasize, humans are (by virtue of our numbers and technological abilities) enormously destructive of nature. Another important consideration is that many species, including amphibians and rare and endemic plants, are extremely sensitive to human-caused alterations of their habitats.¹²⁴ The goal of maintaining ecological integrity within protected areas, conceived as maintaining ecosystems in a pristine state or only minimally influenced by humans, is essential if the desires of society for these areas are to be fulfilled.

Here is another interesting example. According to the National Park Service Organic Act of 1916, “the fundamental purpose” of national parks and monuments is to “conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”¹²⁵ As the Organic Act is interpreted within the Park Service’s *Management Policies*, the fundamental mandate given to agency managers is “to conserve park resources and values,” while “providing for the enjoyment of park resources and values by the people of the United States.”¹²⁶ According to these policies, however, in case of conflict between conservation and the enjoyment of park resources “conservation is to be predominant.”¹²⁷ Park Service policies are extremely protective of park resources, mandating that:

123. Kay, *supra* note 29, at 201.

124. As ecologists Smith and Smith write in a recent text, “[s]ome species have very specialized habitat requirements making them extremely susceptible to habitat alterations.” THOMAS M. SMITH & ROBERT L. SMITH, *ELEMENTS OF ECOLOGY* 571 (Pearson, 8th ed. 2012). Their example is an endemic plant species that grows only in limited areas in the eastern U.S. *Id.*

125. NAT’L PARK SERV., *supra* note 94, at 10.

126. *Id.*

127. *Id.* at 11.

Natural resources will be managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities. The Service...will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and the genetic and ecological integrity of the plant and animal species native to those ecosystems.¹²⁸

Further,

The Service will successfully maintain native plants and animals by preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur.¹²⁹

Yet national parks have been carefully cultivated or developed in special ways to meet needs within our society for such protected natural areas, and to meet various needs and satisfy visitor preferences within the parks. For example, agency policies allow the construction of permanent roads in the non-wilderness areas of national parks.¹³⁰ The intent of park roads is not fast and convenient transportation. Park roads are required to be narrower, with sharper curves and slower driving speeds, than are typically found in other locations.¹³¹ According to policies, park roads are intended to “make it easier or safer to see park features” with “minimal or no impacts on natural or cultural features.”¹³² Roads should be located, according to these policies, to take “maximum advantage of interpretive opportunities and scenic values,” and to offer new or improved recreational opportunities.¹³³

Park Service policies also allow construction of trails and walkways. These may be “hardened” or surfaced in more heavily used areas to protect against rutting and problems with erosion.¹³⁴ Trails that cross wetlands must be spanned, if possible, using a boardwalk or other means.¹³⁵ Backcountry trails must be designed and located to offer users

128. *Id.* at 36.

129. *Id.* at 42.

130. *Id.* at 132.

131. *See id.*; *see also* NAT'L PARK SERV., U.S. DEPT. OF INTERIOR, ROAD CHARACTER GUIDELINES: SEQUOIA AND KINGS CANYON NATIONAL PARKS 3 (1990) (“National park roads...are planned for leisurely sightseeing, are located with sensitive concern for the environment, and are designed with extreme care. They are often narrow, winding, and hilly....”).

132. NAT'L PARK SERV., *supra* note 94, at 132.

133. *Id.*

134. *Id.* at 133.

135. *Id.* at 134.

“a primitive outdoor experience.”¹³⁶ Trail bridges are allowed, but only where necessary. Bridges must be minimal in size, and constructed and placed to be as unobtrusive as possible.¹³⁷ Signs are allowed, but are limited to the minimum number and size necessary to fulfill their informational and interpretive functions, and must be designed to fit well into their natural and historic settings.¹³⁸

Park Service policies allow the construction of visitor centers, but only where “necessary to provide visitor information and interpretive services.”¹³⁹ Visitor centers are generally not to be placed near major park features.¹⁴⁰ Campgrounds may be developed if this is “determined to be necessary.”¹⁴¹ Campgrounds may offer (where considered appropriate) fire pits, electrical hookups, showers, play areas for children, informal areas for field sports, lighted pathways, toilets, and sanitary dump stations.¹⁴²

Finally, overnight accommodations, including hotel-style lodging, may be provided at “kinds and levels necessary and appropriate to achieve each park’s purposes.”¹⁴³ One calls to mind the enormous rustic lodges within Yellowstone and Zion National Parks, with gift shops and restaurants—all run by contracted concessioners.¹⁴⁴ According to agency policies, overnight accommodations and food services are generally provided within a national park only where they are not provided by the private sector within reasonable proximity to the park.¹⁴⁵

The cultivation allowed in national parks (in the non-wilderness areas), with permanent roads, visitor centers, developed campgrounds, lodges, etc., significantly exceeds that allowed in designated wilderness areas. National parks fulfill the desires of society for highly scenic natural areas that are readily accessible to, and enjoyable by, all citizens. But the focus within the parks is not desirable attributes or societal wishes, left open-ended. In accordance with the Organic Act and agency policies, the overriding consideration in national park management is the preservation of natural ecosystem components and processes, including all native species. The conception of nature as existing in its purest state entirely apart from humans, and as degraded by human influence, has

136. *Id.*

137. *Id.*

138. *Id.* at 135.

139. *Id.* at 136.

140. *Id.*

141. *Id.*

142. *Id.* at 136-37.

143. *Id.* at 136.

144. *Id.* at 136, 144.

145. *Id.* at 136.

been adopted by the Park Service and is necessary in this context. According to Park Service policies:

[N]atural processes and species are evolving, and the Service will allow this evolution to continue—minimally influenced by human actions.¹⁴⁶

The Service manages the natural resources of parks to maintain them in an unimpaired condition for present and future generations....¹⁴⁷

The Service will successfully maintain native plants and animals by...minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them.¹⁴⁸

Management interventions in park ecosystems must be as minimal and infrequent as possible. “Any such intervention,” these policies state, “will be kept to the minimum necessary to achieve the stated...objectives.”¹⁴⁹ The goal of maintaining ecological integrity as conceived by Karr and others—maintaining ecosystems in their pristine state or only minimally influenced by humans—is essential if the parks are to fulfill the desires of society for these areas.

Again, Woodley and others discuss the example of Kootenay National Park, in which managers use management-ignited fire in an attempt to mimic the historic fire regime maintained by natural causes and (it is believed) by native peoples.¹⁵⁰ The fire regime in an area determines the distributions of many plants and animals.¹⁵¹ This effort represents significant human influence in a national park. The appropriate conception of nature in protected area management, Woodley and others argue, is nature in which managers are essential components of ecosystems, actively involved in maintaining desired, if not natural, attributes.¹⁵² Woodley points out that the majority of protected areas are too small and are located within highly fragmented landscapes. They cannot effectively support native species without extensive management interventions.¹⁵³

146. *Id.* at 36.

147. *Id.*

148. *Id.* at 42.

149. *Id.* at 37.

150. Woodley, *supra* note 32, at 119-20.

151. HENDÉE & DAWSON, *supra* note 90, at 292-96.

152. This conception “advances” the management of these areas, Woodley claims. Woodley, *supra* note 32, at 120-22.

153. *Id.* at 110, 113.

Yet federal-agency policies governing national parks and other protected areas in the United States allow extensive and ongoing interventions. As discussed, agency policies governing wilderness areas allow managers to use management-ignited fire, control unwanted fires, remove exotic species, control predators, control ungulate populations, control outbreaks of insects and diseases, etc. Management interventions are viewed as unfortunate deviations from naturalness, however, that must be kept as minimal and infrequent as possible. Agency policies call on managers to seek to alleviate external impacts on protected areas, and so further minimize intrusions into these areas, through additional land acquisitions or cooperative agreements with other agencies and private landowners.¹⁵⁴ It is argued here that the management goal mandated by agency policies of maintaining natural conditions and processes, and the underlying conception of nature as existing in its purest state apart from human influence and as degraded by human influence, are essential in the management of protected areas if societal desires concerning these areas are to be fulfilled. To abandon natural conditions as a fundamental mandate within national parks and other protected areas (as recommended by authors of *Beyond Naturalness*), only to focus on “desirable attributes” or “societal wishes” left open ended, ignores the desires of society for these areas. Naturalness, in itself, is desired by American citizens for national parks, wilderness, and other protected areas. Such a move would leave these areas too open to inappropriate actions that threaten native biodiversity.

Finally, it should be mentioned that (as Woodley points out) the Canada National Parks Act explicitly mandates the preservation of ecological integrity within Kootenay and other Canadian national parks. Woodley claims that “ecological integrity has replaced naturalness” in the management of Canada’s national parks, and he suggests that the Canada National Parks Act provides a model for the revision of protected area legislation in the United States.¹⁵⁵

Yet the Canada National Parks Act defines ecological integrity in terms of natural conditions. According to the Act, “‘ecological integrity’ means, with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and

154. “The Service will act to protect natural resources from impacts caused by external activities by working cooperatively with Federal, state, and local agencies; tribal authorities; user groups; adjacent landowners; and others to identify and achieve broad natural resource goals.” NAT’L PARK SERV., *supra* note 94, at 36-37.

155. Woodley, *supra* note 32, at 112-13.

biological communities, rates of change and supporting processes.”¹⁵⁶ According to the Act, “[m]aintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks.”¹⁵⁷ Under the banner of “ecological integrity,” Canadian park managers are required to maintain natural conditions and processes in the parks.¹⁵⁸ This presumably reflects the desires of Canadian citizens for the preservation of naturalness in Canada’s national parks.¹⁵⁹ Contrary to claims made by Woodley, there is no hint within the Canada National Parks Act that the management focus has shifted from natural conditions to desired attributes.¹⁶⁰ Within the Act’s definition, ecological integrity is tied to a condition considered characteristic of the park’s natural region, not to societal desires or wishes.

VI. NATURAL/CULTURAL ECOSYSTEMS

Henry Regier distinguishes a “natural/cultural ecosystem” from a fully natural ecosystem.¹⁶¹ A natural/cultural ecosystem is an ecosystem that humans have substantially reconstructed and actively maintain through time, not with the goal of maintaining natural conditions, but with the goal of maintaining desired attributes.¹⁶² It may be, Regier explains, that the ecosystem has been so badly degraded by human actions that natural conditions are no longer attainable. Species may have been lost, for example, that cannot return or be reintroduced. Regier writes, “[r]estoration of highly degraded locales to a state resembling the pristine is seldom possible....”¹⁶³ Humans are essential components of such an ecosystem, as Regier describes it, entering into ecosystem processes to maintain the system within desired limits of change.

156. Canada Nat’l Parks Act, S.C. 2000, c. 32, § 2(1) (Can.).

157. *Id.* at § 8(2).

158. In his analysis of the Act, Fluker writes, “section 8(2) and the legislated ecological integrity definition in section 2(1) aligns most closely with natural ecological integrity....” Fluker, *supra* note 9, at 16. As evidence, he mentions “the emphasis on natural conditions and native species in the...definition....” *Id.* Concerning the policies of the Parks Canada Agency, Fluker writes, “[e]cological integrity in the national parks is clearly segregated from humans by Parks Canada, who categorizes human activity as a disturbance or ecological stressor.” *Id.* at 23.

159. Fluker writes, “Canadians expect protected areas to shoulder a significant environmental load whether as sanctuaries for endangered species, a baseline for measuring effects of climate change, or as opportunities to escape the gloom of urban life.” *Id.* at 13.

160. See Woodley, *supra* note 32, at 113.

161. Henry A. Regier, *The Notion of Natural and Cultural Integrity*, in *ECOLOGICAL INTEGRITY AND THE MANAGEMENT OF ECOSYSTEMS*, *supra* note 29, at 6-8.

162. *Id.* at 8.

163. *Id.*

“Desirable structural and process features,” he writes, “will need to be specified, in part, through a cultural planning and decision process.”¹⁶⁴ Regier offers as an example aquatic ecosystems in the Great Lakes located near major industrialized cities such as Buffalo, Chicago, Cleveland, Detroit, Hamilton, and Toronto. The formerly natural ecosystems have undergone “pathological disintegration,” he writes.¹⁶⁵ It would not make sense to speak of restoring these ecosystems to natural conditions. According to Regier, efforts are underway to reconstruct or “reintegrate” these ecosystems to bring them closer to desired states.¹⁶⁶ A natural/cultural ecosystem may be the result of efforts to reconstruct a severely damaged natural ecosystem, or it may be the product of the development of a natural ecosystem for desired ends such as economic gain.¹⁶⁷

One may be tempted to agree that national parks, wilderness, and other protected areas are natural/cultural ecosystems, as described by Regier. As discussed, national parks in the United States have been cultivated or developed to fulfill the desires of society for highly scenic, readily accessible and enjoyable natural areas, and to accommodate needs and visitor preferences within the parks. Considering the massive rustic lodges in Zion and Yellowstone National Parks, the restaurants and gift shops, the networks of roads, extensive parking areas, and the concrete-surfaced trails, it may seem obvious that the parks are a fusion of nature and modern American culture. In accordance with policies, park managers control fires, ignite fires, control insects and diseases, seek to eradicate exotic species, etc. The parks are surely, one may think, natural/cultural ecosystems. But this would not be correct. Even with the development within national parks, wilderness, and other protected areas, and management interventions in these ecosystems, protected areas lie much closer to fully natural ecosystems. These areas are not similar to Great Lakes ecosystems that have been chronically abused and are being reconstructed to meet a different standard (as Regier describes this), which is simply to make them more desirable. Protected areas have been cultivated or developed, but to a limited extent and in ways appropriate to each type of area, and, in accordance with law and policy, natural conditions and processes are to prevail in these ecosystems.

164. *Id.*

165. *Id.* at 9.

166. *Id.*

167. *Id.* at 8.

VII. CONCLUSION: THE ECOLOGICAL INTEGRITY OF PROTECTED AREA ECOSYSTEMS

Kay, Woodley, and others characterize ecological integrity in a number of different ways. Kay writes concerning ecosystems:

[W]e must have some state, in which we wish these systems to be. The term “integrity” has become the name we use for this state.¹⁶⁸

Ecological integrity is about our sense of the wholeness and well being of ecological systems and, in this, must reflect our sense of what we value in them.¹⁶⁹

“Ecological integrity,” understood in this basic way, is surely an important concept in the management of protected area ecosystems. Let us borrow the expression “socio-ecological integrity,”¹⁷⁰ and agree that an ecosystem has socio-ecological integrity if it fulfills the desires of society for how that ecosystem is structured and functions. There is no essential tie, however, between socio-ecological integrity conceived in this basic way, and other aspects of the highly interventionist approach to management described under the label “ecological integrity” and recommended by Kay, Woodley, and others. Given that an ecosystem has socio-ecological integrity in this sense, all we know is that it fulfills the desires of society concerning that ecosystem. Issues of whether or not humans are essential components of that ecosystem, and whether or not natural conditions is the appropriate management goal, are left entirely open. Much depends on what those desires are.

Outside protected areas, managers step in and tightly control many ecosystems to achieve desired ends. This is true of the Great Lakes, zoological gardens, timber plantations, golf courses, and Walt Disney World. But in the case of national parks, wilderness, and other protected areas in the United States and Canada, it is the socio-ecological integrity of these ecosystems—their reflection of societal desires for naturalness and the preservation of native biodiversity—that severely constrains what can be done within these areas. Kay, Woodley, and other management experts entirely miss this. The two interpretations of “ecological integrity” properly fit together within protected areas in this special way. The socio-ecological integrity of these ecosystems clearly necessitates managing them so they remain pristine or only minimally influenced by humans. This is “ecological integrity” as interpreted by Karr and other biologists.

168. Kay, *supra* note 29, at 201.

169. *Id.* at 203.

170. This expression is borrowed from Fluker, *supra* note 9, at 9.