RESTRAINING YELLOWSTONE'S ROAMING BISON

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INTRODUCTION

The federal government is in the business of destroying *the* symbol of the American West - herds of bison roaming free across the Western landscape. This statement should not come as a surprise given the federal track record. Through federal action and inaction, Yellowstone's bison were almost driven to extinction despite primarily residing in the nation's oldest national park. The herd was reduced to a paltry twenty-five *individual* bison[1] despite numbering over sixty *million* at the time of European settlement.[2] The bison of the Greater Yellowstone Area (GYA)[3] are the last remnant of the free-roaming herds of plains bison.

The GYA has recovered when allowed to, but restraining the herd's ability to roam freely to forage for food has stifled restoration to natural historic levels. Sometimes this restraint is milder and in the form of hazing roaming bison back into the Yellowstone National Park (Yellowstone or the Park), but the current plan also allows for harsh restraint via Capture/Test/Slaughter (CTS).[4] Times change, but the basic conflict of interest remains the same: cattle ranchers want the land use rights to graze cattle, and conservationists want bison to solely occupy the same land.[5] The conflict between bison and livestock represents the broader conflict in the West when wildlife, people, and livestock all share the same land. Raising cattle is one of the economic powerhouses of the Mountain West region that includes the GYA, and has many advocates including its chief advocate — the State of Montana. The current power structure has led to cattle being protected at the expense of bison.

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1. Record of Decision for Final Environmental Impact Statement and Bison Management Plan for the State of Montana and Yellowstone National Park (Dec. 20, 2000), *at* http://www.nps.gov/yell/technical/planning/ [hereinafter Record of Decision].

2. *E.g.*, Dan Flores, *Making the West Whole Again: Historical Perspective on Restoration*, 18 J. LAND RESOURCES & ENVTL. L. 17, 20 (1998).

3. Robert B. Keiter, *An Introduction to the Ecosystem Management Debate, in* GREATER YELLOWSTONE ECOSYSTEM 3, 4 (Robert Keiter & Mark S. Boyce eds., 1991) (referring to the GYA as over 18 million acres of land in Wyoming, Idaho, and Montana).

4. Record of Decision, *supra* note 1, at 11 (citing one example of CTS, "[t]he agencies will use hazing, capture facilities, or shooting, if necessary, to prevent bison from leaving management Zone 2").

5. *See* Dean Leuck, *The Evolution of Property Rights: The Extermination and Conservation of the American Bison*, 31 J. LEGAL STUD. 609 (2002) (discussing bison and property rights in detail).

The issue of bison management became an issue of concern long ago, but its latest incarnation focuses on the current Bison Management Plan for the State of Montana and Yellowstone National Park (Joint Plan)[6] established in December 2000. Under the Joint Plan, bison are slaughtered.[7] Some are killed for wandering out of the national park boundaries, some are killed for testing positive for brucellosis, and some are killed indiscriminately because the herd is considered *too large* when left to current natural constraints.[8] Proponents (like the federal government, livestock industry, and Montana) of the current plan feel that it strikes a balance between the interests of ranchers to be free of the bison infringement. Opponents, like Greater Yellowstone Coalition and Fund for Animals, claim that it leaves bison severely unprotected and unable to behave naturally without being captured and/or killed.

The purpose of this paper is to evaluate the Joint Plan[9] for the Greater Yellowstone Area by testing its ecosystem management efficacy. The key inquiry will be whether the goals of ecosystem management are met. Furthermore, the paper will address whether an ecosystem management approach provides a viable solution. The answers to these questions are of paramount importance in determining the future preservation of "the largest wild, free-ranging population of bison in the United States."[10]

Part I is an overview of the history of bison management in the GYA. It traces the path toward a long-range bison management plan from the stage when bison were afforded almost no protection to the circumstances leading up to the current Joint Plan. Since the staggering failure to protect bison levels reached the historic low of twenty-five, federal management and protection has greatly improved. However, the inherent conflict of different federal agencies with different purposes produced a piece-meal approach to bison management. Montana's legal action against the federal regulation during this period proved to be a staunch obstacle to a more ecosystem-based approach to management.[11] Accordingly,

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6. Record of Decision, *supra* note 1.

7. *Id*.

8. *Id*. at 26 ¶10b (referring to population cap for bison).

9. Notice of Record of Decision for Final Environmental Impact Statement and Bison Management Plan for the State of Montana and Yellowstone National Park, 66 Fed. Reg 6665, 6665 (Jan. 22, 2001) [hereinafter Notice of Record of Decision].

10. *See, e.g.*, *id*.

11. For example, "in 1995, the State of Montana sued the National Park Service and [Animal and Plant Health Inspection Service], complaining of both NPS management of bison and the possibility that APHIS would change the state's brucellosis class-free status." Record of Decision, *supra* note 1, at 4.

bison were managed very differently depending on what legal jurisdiction they fell under. This led to the strong sentiment by all involved for a comprehensive bison management plan.

Part II describes the legal compromise and conflict between the federal agencies and the state of Montana. In addition, this part will examine the cooperation and tension between the different federal agencies — National Park Service (NPS), United States Forest Service (USFS), and Animal and Plant Health Inspection Service (APHIS) — with a stake in the bison management issue. Lastly, Part II will describe the economically driven rationale behind Montana's power within its jurisdiction to defend its interests through the use of force and its position against free-roaming bison within the borders of the state.

Part III is an in-depth discussion of the current Joint Plan, which was the product of a ten-year process to determine how best to accommodate all of the parties. Proponents of the plan would argue that it is a step in the right direction and a solid compromise that accommodates all interests to the extent possible under the current federal-state framework in which it must operate. Furthermore, they would argue that bison cannot be allowed to freely roam due to the risk of brucellosis infection and the grave threat it poses to the health of cattle, and the subsequent economic ramifications. Thus, the policy of capture/test/slaughter is warranted. In contrast, opponents claim that bison restraint still relies on artificial boundaries that do not correspond with the natural behavior of the bison within the GYA ecosystem. Furthermore, the methods for restraining migration and roaming are unnecessarily harsh and arbitrary, especially the indiscriminate slaughter of bison once the artificial population cap for total herd size is reached. Lastly, Part III will conclude with a discussion of the legal challenges to the Joint Plan.

Part IV is an analysis of the Joint Plan. It begins with a discussion of ecosystem management and its goals. Furthermore, an evaluation of where human use and ecological integrity fall within the hierarchy of interests is made. Next, Part IV focuses on the Joint Plan's foundation: threat of brucellosis transmission from cattle to bison in the wild. This discussion examines the viability of the foundation and alternative interests that may be at play, due to the lack of any scientifically documented evidence of transmission from bison to cattle in the wild.[12] In addition, the Joint Plan's focus on managing bison rather than cattle leads to an

12. National Research Council, Brucellosis in the Greater Yellowstone Area 67 (1998) [hereinafter NRC Report].

inquiry as to whether the focus is on the wrong ungulate. Lastly, the arguably excessive management of the Joint Plan and its artificial population cap on bison are analyzed under an ecosystem management approach.

Part V gives recommendations based upon the shortcomings of the Joint Plan to provide an effective ecosystem-based solution to management of Yellowstone's roaming bison. The recommendations will focus on real-world viable solutions rather than idealistic solutions that are unachievable given the current legal, economic, political and social framework surrounding this issue and land use issues in the West. In particular, the "free roam zone"[13] needs to be extended to all federal lands. A change in the focus of management toward an emphasis on cattle rather than bison is needed. Cattle, rather than bison, can be managed to protect them from brucellosis transmission through buffer zone separation and vaccination to avoid any potential commingling and brucellosis transmission. This "free roam zone" could be extended to private leases on federal land and private land neighboring federal land by utilizing the variety of techniques discussed in Part V. In addition, Montana state lands could be included if the state is given the proper incentives and assurances.

Obviously, the Joint Plan's purpose to reduce the risk of brucellosis transmission would become moot if an effective brucellosis vaccine was developed. The NPS could then administer the vaccine to the bison. If everyone's brucellosis concerns were sincere, the elimination of the disease would leave opponents of free-roaming bison no reason for continued opposition. Lastly, Part V will examine the possibility of having the genetically and behaviorally distinct Yellowstone herd listed as an endangered species by virtue of it being a distinct population segment within the meaning of the Endangered Species Act (ESA).[14] This protection may not be imminent, but is worth examining given the enormous potential effect it would have on the future of bison management in the GYA and its value as a bargaining asset.

PART I: HISTORY OF BISON MANAGEMENT: THE PATH TOWARD A LONG-TERM PLAN

The history of bison management in the GYA is a tragic one. It has seen the once common sight of large bison herds roaming free across the picturesque landscape reduced to a memory. Bison management has become more protective since the historic lows at

13. Record of Decision, *supra* note 1, at 26 (referring to Zone 1).
14. 16 U.S.C. § 1531 (2004).

the turn of the 20th century. However, Montana's pursuit of state's rights led to a divergence of priorities and management philosophies between it and the NPS, USFS, and APHIS, which incidentally have a similar gap amongst them.

A. The Herd of 25

Yellowstone's bison herd was "nearly eliminated" within the boundaries of the park in 1901, due to "market hunting and poaching".[15] Another reason for the sharp decline was the federal government's desire to weaken the Native American tribes by killing bison, their main source of sustenance, in order to force them onto reservations.[16] This stark reduction of population occurred despite the establishment of Yellowstone as the nation's first national park in 1872, with the purpose to "provide for the preservation, from injury or spoliation . . . natural curiosities, or wonders within said Park, and their retention in their natural condition."[17]

The Park responded to the harsh reality of the herd of twenty-five by adopting a protectionist approach which included augmenting the herd with two captive herds, enforcement of poaching laws, and protection from predators and harsh environmental conditions.[18] As a result of these efforts, the Yellowstone herd grew to over 1,000 bison by 1930.[19] However, the recovery of the Yellowstone herd came at the cost of it losing its identity to some degree. Bison were no longer a completely independent, wild, free-roaming herd, but rather reduced to a form of livestock in that they were branded, fed, and otherwise treated accordingly.[20] This treatment included human implementation of slaughter as a means of reducing the herd size to the tune of 9,016 slaughtered bison between 1925 and 1967.[21]

Since the late 1960's, the NPS shifted away from artificial population controls in favor of allowing natural forces to affect and

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15. *See, e.g.*, Record of Decision, *supra* note 1, at 3.

16. *Sole Survivors: The Bison of Yellowstone* (Animal Planet television broadcast, 2004) [hereinafter Animal Planet].

17. 16 U.S.C. § 21 (2004).

18. Record of Decision, *supra* note 1, at 3.

19. *See* National Park Service, U.S. Dept of the Interior, Draft Environmental Impact Statement for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park 145 (1998) [hereinafter DEIS].

20. *Id*. at 12.

21. *See* Margaret E. Meyer & Mary Meagher, *Brucellosis in Free-ranging Bison in Yellowstone, Grand Teton, and Wood Buffalo National Parks: A Review*, 31 J. WILDLIFE DISEASES 579, 580 (1995).

determine herd size.[22] Due to this shift in managerial philosophy away from direct management, the herd increased population to over 4,000 bison.[23] As of the Record of Decision in December 2000, the herd population was down to "about 3,000 bison, due in large part to actions by NPS and the State of Montana to control the bison when they roam outside the park, and due to winterkill inside the park."[24] Currently, estimates place the herd's population somewhere between approximately 3,000-4,500 bison.[25]

B. Brucellosis and Bison

Brucella abortus is a non-indigenous bacterial organism that infects some of Yellowstone's wildlife, including bison, and causes the disease brucellosis.[26] It is also commonly found in domesticated livestock, such as cattle. It can cause abortion, birth of non-viable calves, and infertility.[27] It is transmissible from livestock and wildlife to humans, but only through consumption of milk or contact with contaminated parts of an infected carcass.[28] It can cause undulant fever, which despite being difficult to treat is not typically fatal.[29]

Park managers identified brucellosis at the turn of the 20th century.[30] Early on, Park managers placed emphasis on the potential of the disease being transmitted to cattle, because cattle share much of the same grazing areas.[31] Cattle grazing is permitted on USFS lands adjacent to Yellowstone under federal permits, as well as on private lands.[32] Bison occasionally migrate from the Park onto these lands, especially during the winter.[33] The potential economic effect on the cattle industry led Congress, in

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22. *See* Record of Decision, *supra* note 1, at 3.
23. Record of Decision, *supra* note 1, at 3.
24. *Id*.
25. *See* Allison A. Freeman, *Montana Agency Recommends Limited Bison Hunt*, LAND LETTER (June 10, 2004) (stating, "in May 2003, Montana Gov. Judy Martz (R) signed a bill to authorize bison hunting as a means of controlling the size of Yellowstone's herd of more than 4,200.").
26. *See, e.g.*, Record of Decision, *supra* note 1, at 3; E. Tom Thorne, Mary Meagher & Robert Hillman, *Brucellosis in Free-Ranging Bison: Three Perspectives, in* GREATER YELLOWSTONE ECOSYSTEM, *supra* note 3, at 284; Robert B. Keiter & Mark S. Boyce, *Greater Yellowstone's Future: Ecosystem Management in a Wilderness Environment, in* GREATER YELLOWSTONE ECOSYSTEM, *supra* note 3, at 280-85.
27. DEIS, *supra* note 19, at 15-16.
28. NRC Report, *supra* note 12, at 2.
29. *Id*.
30. *E.g.*, Record of Decision, *supra* note 1, at 3.
31. *E.g.*, *id*. at 3-4.
32. *E.g.*, *id*. at 3.
33. *E.g.*, *id*.

1954, to appropriate funds for a coordinated effort to eradicate the disease in cattle.[34]

The transmission of brucellosis is generally thought to occur through the ingestion of bacteria contained in the birth materials at the time of calving or abortion from an infected female.[35] However, there is no scientific evidence of the disease being transmitted from bison to cattle in the wild.[36] Furthermore, research has failed to prove definitively how the bacteria are transmitted among wild ungulates, and the Record of Decision states only that "[w]ithout agency actions to minimize the risk, transmission *could* occur."[37] One thing the research has proven is that some of the elk of the GYA are also infected with the disease.[38] However, the Record of Decision claims that behavioral differences between elk and bison during calving make transmission from elk a lesser threat.[39]

C. Recent Conflict: Montana's Clear Stance

Public controversy over the intentional killing of thousands of bison as a management tool over the years, coupled with Montana's desire to protect their cattle-ranching constituency from brucellosis, led to an unresolved conflict of interests.[40] In 1990, the conflicting parties — NPS, USFS, and Montana — formally recognized the need to cooperate in the preparation of a long-range bison management plan.[41] At that time, the parties filed a "Notice of Intent" to prepare an environmental impact study (EIS)[42] under the NEPA[43] to create and examine alternatives for bison management. Two years later, the federal agencies signed a "Memorandum of Understanding" with the state of Montana to "work together" to develop a plan that addresses their "varying and sometimes contradictory objectives."[44]

From 1990 through 1995, three interim plans called for the shooting of bison that migrated from Yellowstone into Montana by

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34. *E.g.*, *id*.
35. *E.g.*, *id*.
36. *See* NRC Report, *supra* note 12, at 42-43.
37. *See* Record of Decision, *supra* note 1, at 3.
38. *E.g.*, *id*.; Peter Morrisette, *Is There Room for Free-Roaming Bison in Greater Yellowstone?*, 27 ECOLOGY L.Q. 467, 482-87 (2000).
39. Record of Decision, *supra* note 1, at 3.
40. *Id*. at 4.
41. *Id*.
42. 42 U.S.C. § 4332(c) (2004).
43. *Id*.
44. Record of Decision, *supra* note 1, at 4.

agency personnel from Montana and the NPS.[45] "In 1995, the State of Montana sued the National Park Service and APHIS, complaining both of NPS management of bison and the possibility that APHIS would change the state's brucellosis class-free status."[46] Class-free status means that the State has successfully eradicated the disease from its livestock. The parties settled the suit by adopting a "schedule for the completion of the long-term bison management plan and [EIS]."[47] The settlement included a provision that "the court would dismiss the suit upon the issuance of the records of decision or if a party terminated the Memorandum of Understanding, whichever occurred first."[48]

After the settlement, a fourth interim plan was issued in 1996 by NPS and Montana.[49] This plan provided for slaughter of bison outside the park in West Yellowstone and even un-tested (for brucellosis) bison within the Park near the north boundary in the Stephens Creek area.[50] The only pro-bison concession provided that bison would not be removed from the Eagle Creek/Bear Creek area northeast of Gardiner, Montana.[51] However, it is arguably not a concession being that those "lands are not grazing areas for domestic cattle."[52]

The fourth interim plan also called for the capture and testing of bison captured within the Park and Gallatin National Forest and subsequent slaughter of pregnant and positive-testing bison.[53] "Two lawsuits challenged the legal basis for the agency implementation of the interim plan."[54] However, the actions of the NPS under the interim plan were held to be within the authority and discretion of the agency.[55]

In 1998, the agencies released the Draft Environmental Impact Study (DEIS) that received public comment.[56] Following the analysis of the DEIS and subsequent comments, the federal agencies adopted a new strategy that would allow "greater tolerance" for bison roaming outside the Park under "stringent conditions that would continue to control the risk of transmission

45. *Id*.
46. *Id*.
47. *Id*.
48. *Id*.
49. Record of Decision, *supra* note 1, at 4.
50. *Id*.
51. *Id*.
52. *Id*.
53. *Id*.
54. Record of Decision, *supra* note 1, at 4.
55. *Id*.
56. *Id*. at 5.

of brucellosis from bison to cattle."[57] This strategy was known as "a possible modified preferred alternative for the final EIS" (FEIS) that provided for "a larger bison population than the preferred alternative in the DEIS."[58]

PART II: COMPROMISE AND CONFLICT BETWEEN FEDERAL AGENCIES AND MONTANA

Following the submission of the modified preferred alternative for the FEIS, the federal agencies debated Montana's agencies about the various aspects and provisions of the strategy for several months.[59] Both sides dug in and an understanding could not be reached regarding "the ages and classes of bison to be vaccinated, the criteria used to decide when bison would be allowed outside the park, and how to use spatial and temporal separation in an adaptive management approach to managing the risk of transmission of brucellosis."[60] In fact, the only thing they agreed on was that "the agency discussions had reached an impasse."[61]

In December 1999, federal agencies informed the governor of Montana that they were withdrawing from the Memorandum of Understanding.[62] This action terminated the Memorandum of Understanding, which triggered the dismissal of the 1995 suit under the terms of the settlement.[63] Montana objected to the federal agencies' request to dismiss the case, but the court agreed with the federal position that they could terminate the Memorandum of Understanding.[64] However, the parties agreed on mediation before formal dismissal of the suit, which occurred during the spring, summer and fall of 2000.[65] The mediation "slightly altered" the modified preferred alternative into what is now referred to as the Joint Plan that "initiates the long-term management of Yellowstone bison."[66]

A. Federal Regulatory Conflict

The NPS, USFS and APHIS all have very different purposes.[67] These differing purposes and interests inherently cause

57. *Id.*
58. *Id.*
59. *Id.*
60. Record of Decision, *supra* note 1, at 5.
61. *Id.*
62. *Id.*
63. *Id.*
64. *Id.*
65. Record of Decision, *supra* note 1, at 5.
66. *Id.*
67. *See* Karen J. Budd, *Ecosystem Management: Will National Forests be "Managed" into*

contention and conflict between them. The dispute over bison management in Yellowstone is a perfect illustration of the conflict caused when these federal agencies are all attempting to further their respective purposes and accomplish their goals. The National Environmental Policy Act (NEPA)[68] is a welcome go-between in the process and sets up the framework for minimizing conflict.[69] Here, the NEPA's EIS requirement facilitated the final resolution, where previously the parties had reached impasse.[70]

1. National Park Service

The NPS, which is organized under the U.S. Department of the Interior, is mandated with managing park resources in a manner that will leave them "unimpaired for the enjoyment of future generations"[71] while at the same time is prohibited from "managing units of the National Park System in derogation of the values and purposes for which the various areas have been established . . . ."[72] The values and purposes for which Yellowstone were established are clear; "preservation, from injury or spoliation . . ." of all the natural wonders of the park "and their retention in their natural condition."[73] Thus, the NPS operates under a dual non-impairment, non-derogation mandate, which is essentially a preservation mandate that should be prescriptive regarding its approach to bison management.

2. United States Forest Service

The USFS, which is organized under the U.S. Department of Agriculture, has a much different purpose than the NPS in that it is not conservation centered, but rather economically based. The

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National Parks?, *in* GREATER YELLOWSTONE ECOSYSTEM, *supra* note 3, at 65 (referring to the different management styles, objective and agendas of the NPS and USFS due to the NPS's emphasis on a more ecosystem-based approach under its protection of natural resources mandate unlike the USFS's multiple use mandate in which it grants leases for timber, oil, gas, mineral exploration and open pasture grazing). Also, the APHIS is solely concerned with the eradication of brucellosis in livestock in this context. APHIS, *at* http://www.aphis.usda.gov (last visited Apr. 9, 2005).

68. 42 U.S.C. §§ 4321-4370e (2004).

69. NEPA section 102(c) requires the preparation of an environmental impact statement for "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(c) (2004).

70. Record of Decision, *supra* note 1, at 5 (stating "eventually, the federal agencies and the governor of Montana agreed that the agency discussions had reached an impasse").

71. National Park Service Organic Act, 16 U.S.C. § 1 (2004) (citing Record of Decision, *supra* note 1, at 9).

72. General Authorities Act, 16 U.S.C. § 1a-1 (2004) (citing Record of Decision, *supra* note 1, at 9).

73. 16 U.S.C. § 21 (2004).

USFS is mandated to manage the National Forests under the Multiple-Use Sustained-Yield Act of 1960, which provides for utilization of renewable surface resources.

> Multiple use means the management of all the various renewable surface resources of the national forests in the combination that best meets the needs of the American people. Sustained yield means the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of various renewable resources of the national forests without impairment of the productivity of the land.[74]

This management includes the use of National Forest for timber extraction, cattle grazing, outdoor recreation, et cetera.[75] Obviously, the USFS's Multiple-Use Sustained-Yield mandate conflicts with the NPS's dual purpose mandate to preserve such resources through non-impairment and non-derogation.[76] Bison management poses a problem because bison do not heed jurisdictional boundaries of the two agencies. Furthermore, how each agency manages bison affects the other.

3. Animal and Plant Health Inspection Service

The APHIS, which is organized under the U.S. Department of Agriculture, has pursued the eradication of brucellosis from livestock for more than sixty years.[77] "Federal law requires the APHIS to control and prevent the spread of communicable and contagious diseases of livestock."[78] The APHIS exerted powerful influence in the process and led to the Joint Plan's commitment to the "eventual elimination of the disease."[79] However, the agencies' claim that the Joint Plan is not "a plan for the eradication of brucellosis"[80] is questionable given the profound impact the threat of the disease had on shaping the new policy. The economic potency of a APHIS certification of brucellosis class-free standing combined with the "billions of dollars spent by federal, state and the [livestock] industry"[81] undoubtedly made the APHIS such a strong

74. 16 U.S.C. § 528 (2004) (citing Record of Decision, *supra* note 1, at 9).
75. Budd, *supra* note 67, *in* GREATER YELLOWSTONE ECOSYSTEM, *supra* note 3, at 65.
76. *See id.*
77. APHIS, *supra* note 67 (citing Record of Decision, *supra* note 1, at 14).
78. *Id.* (citing Record of Decision, *supra* note 1, at 6).
79. *Id.* (citing Record of Decision, *supra* note 1, at 14).
80. *Id.*
81. *Id.*

player despite the somewhat preservationist setting under the NPS and NEPA.

B. Montana's Power and Position

Montana has made it clear that it has a purely economic interest in protecting its ranching constituency from roaming bison.[82] Bison typically migrate during the harsh winter months along the natural corridors that the Yellowstone and Madison Rivers provide to search for areas to graze.[83] Most of the roaming bison follow the Yellowstone River in the direction of Gardiner, Montana,[84] however some follow the Madison River towards West Yellowstone, Montana.[85] In addition, some bison have begun to follow the winter-groomed snowmobile/snowcat trails out of the Park's boundaries.[86] When bison roam out of the Park's boundaries or off USFS land into Montana, "the management responsibilities and authorities change."[87] Montana has an exceptionally poor track record with its use of that authority and its cavalier disregard for its responsibility as a steward of native bison.[88]

Montana game wardens and authorized public hunts are the tool used to keep roaming bison from grazing on state lands.[89] The numbers taken under Montana jurisdiction have varied over the years, but two winters — 1988-89 after the fire and harsh winter of 1996-97 — are of note for the devastating effect on herd population.[90] During the post-fire winter of 1988-89 the herd's food sources were depleted due to the extent of the fire.[91] Accordingly, more bison left the park to search for additional food sources.[92] This gave Montana hunters the opportunity to kill 569 bison.[93] This number was so upsetting that the public outcry shamed the Montana legislature to repeal its authorization of the bison hunt in 1991.[94] During the winter of 1996-97, Montana officials killed a truly grotesque number of bison, which totaled 1,084 individual

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82. *See* Record of Decision, *supra* note 1, at 4 (referring to Montana's suit against the NPS for its bison management and the APHIS for the possibility changing its brucellosis class-free status).
83. DEIS, *supra* note 19, at 15; Morrisette, *supra* note 38, at 476.
84. Morrisette, *supra* note 38, at 476.
85. *Id*.
86. *Id*.
87. Record of Decision, *supra* note 1, at 6.
88. *See* Morrisette, *supra* note 38, at 468-71.
89. *See id*. at 476-80.
90. *Id*.
91. *Id*.
92. *Id*.
93. *Id*.
94. *See* Morrisette, *supra* note 38, at 468-71.

bison. The onslaught of slaughter combined with a harsh winter, reduced the herd by 40% in those 5 months — November 1996-April 1997 — and left the herd with only 2,000 bison.[95] Despite these past failures, Montana's FEIS and bison management plan (MT's Plan) contained some significant anti-bison protection differences — dealing with the retention of public hunting rights — from the Federal FEIS and Joint Plan (that will be addressed in Part III), even though the plans are largely the same.

PART III: THE CURRENT JOINT MANAGEMENT PLAN FOR BISON

The current last-word on bison management in the GYA is the federal Joint Bison Management Plan (Joint Plan).[96] Montana adopted its own bison management plan (MT's Plan), but it originated from the federal FEIS and is virtually the same as the Joint Plan. The Joint Plan was the product of a ten-year process to finally solve the bison management problem in a manner that was acceptable by all. The Joint Plan aspires to be a collaborative effort between the parties but maintains many of the disparate jurisdictional treatments of bison. Bison protection is put on a type of sliding scale where inside the Park they are given the most protection digressing to Montana state lands in which they are the least protected with other federal lands, like USFS lands, falling somewhere in between.[97] In addition, the Joint Plan sets a target population for the whole herd at 3,000 bison.[98] This target is effectively an artificial cap on population being that "if the late-winter/early-spring bison population is above the 3,000 target, specific management actions may be undertaken at the Stephens Creek capture facility or outside the park in the western boundary area to reduce its size."[99] An example given for specific management actions is the slaughtering of bison rather than hazing them back into the Park.[100]

A. The Joint Management Plan's Zones of Management

The Joint Plan controls all federal agency management of bison on federal lands and was extremely persuasive in the formation of Montana's slightly altered version. The Joint Plan created three management "Areas" — Western Boundary Area (WBA), Northern

95. *Id*.
96. Record of Decision, *supra* note 1.
97. *Id*. at 21-34.
98. *Id*. at 32 ¶28.
99. *Id*.
100. *Id*.

Boundary Area-Reese Creek to Yankee Jim Canyon (NBA-RC), and Northern Boundary Area-Eagle Creek to Bear Creek (NBA-EC) — and three different management "Zones" within the WBA and NBA-RC in which bison have varying levels of protection while roaming within each particular zone. The Zones have "progressively more intense management to ensure temporal and spatial separation between bison and cattle."[101] Accordingly, the management in Zone 1 is less excessive than Zone 2, which is less excessive than Zone 3. Thus, bison management differs greatly depending on the management area and zone.

The Joint Plan also contains three "Steps" for the progression of the plan that employ a limited form of adaptive management over the space of one or two years.[102] This includes continuing research during Step 1 regarding the viability brucellosis transmissibility in the environment that "will last one to two years."[103] This research will be "sufficient to allow agencies to determine an adequate temporal separation period."[104] Other details included in the Steps deal with bison levels in each Zone at different time periods in the inception of the plan over its first four years.[105]

1. Western Boundary Area

Bison come to the WBA along the Madison River and groomed winter roads towards the town of West Yellowstone, Montana. Here, "[b]ison will be hazed back into the park . . . by May 15, and captured or shot after May 15 to ensure none remain outside the Park . . . during the applicable temporal separation period,"[106] which lasts from May 15 until cattle are removed in the fall.[107] While winter migration to this area is not as extensive as the northern migration, it still provides a critical habitat.

The WBA contains three management Zones with varying degrees of bison protection. Zone 1 consists of Yellowstone Park habitat where bison are always allowed, but subject to "limited hazing" back into the Park during the pre-fall removal period.[108] This Zone is clearly the most bison-friendly Zone in the WBA, in contrast to Zone 3 in which bison are always "subject to lethal

101. Record of Decision, *supra* note 1, at 26 ¶7.
102. For a detailed discussion refer to Record of Decision, *supra* note 1, at 21-34.
103. Record of Decision, *supra* note 1, at 23 ¶3.
104. *Id*. at 26 ¶6a.
105. *Id*. at 21-34.
106. *Id*. at 26 ¶7.
107. *Id*. at 26 ¶10a.
108. Record of Decision, *supra* note 1, at 26 ¶10a-c.

removal."[109] Zone 2 falls between Zones 1 and 3 in terms of how excessive management is employed.[110] It consists of "USFS winter habitat with some private property."[111] Zone 2 has a bison tolerance limit of 100 upon which bison are subject to lethal removal, which is also employed if Park bison size exceeds the population cap of 3,000.[112] Each of these triggers for lethal removal are independent, which means that even if there are less than 100 bison in Zone 2, but the population in the Park exceeds 3,000, all of the bison in Zone 2 are subject to lethal removal.[113] However, the Record of Decision frequently states that management actions in Zone 2 "*could* include tolerating, hazing, capturing and testing, vaccinating . . . or removing for use in jointly approved research as set forth in this plan."[114]

2. Northern Boundary Area-Reese Creek to Yankee Jim Canyon

The NBA-RC contains some of the most used winter habitat for foraging bison in the GYA. The Zones of the NBA-RC contain more variation depending on the Step of implementation of the Joint Plan than the WBA. Zone 1 in the NBA-RC's has the most variation of management depending on which step of the Joint Plan is being implemented. Zone 2 is composed of the "[a]rea north of the park boundary in the Reese Creek Area, West of Yellowstone River, and South of Yankee Jim Canyon.[115] Zones 2 and 3 have the same management techniques as their counterparts in the WBA, including Zone 3 being a Zone of no refuge that utilizes lethal removal.[116]

Zone 1 is composed of "[Yellowstone National Park] winter habitat in the Reese Creek vicinity that bison normally occupy."[117] During Step 1, bison are subject to every management technique — "hazing, capture, testing and vaccination, or lethal removal"[118] — *other than tolerating* if attempting to exit the Park.[119] During Step 2, bison are only subject to the aforementioned available management techniques if the number of brucellosis negative bison

109. *Id*.
110. *Id*.
111. *Id*. at 26 ¶10b.
112. *Id*.
113. Record of Decision, *supra* note 1, at 26 ¶10b.
114. *Id*.
115. *Id*. at 30-31 ¶23a-c.
116. *Id*. at 30-31 ¶23b-c.
117. *Id*. at 30 ¶23a.
118. Record of Decision, *supra* note 1, at 26 ¶23a..
119. *Id*.

tolerated in Zone 2 exceeds 25 bison in the first year (increasing to 50 tolerated bison if agencies are able to successfully manage — "enforce temporal and spatial separation" — with the 25 or less). "During Step 3, bison attempting to exit the Park . . ." are also subject to those techniques after the threshold number of 100 untested bison in Zone 2 is reached.[120]

3. Northern Boundary Area-Eagle Creek to Bear Creek

"In all steps of [the Joint Plan], agencies would allow untested bison into [this] region of the northern boundary area."[121] Bison in this Area will be allowed up to the Little Trail Creek/Maiden Basin hydrographic divide boundary.[122] This boundary is maintained through hazing bison that approach the divide and subjecting those bison that actually cross the divide to lethal removal.[123]

4. Contingency Measures

The Joint Plan contains various contingency measures that deal with Montana not following the plan, to ineffectiveness of the "in-Park vaccination program" and the possibility of brucellosis being spread to more cattle herds. Should Montana not tolerate bison outside the Park in Zone 2 in both the WBA and NBA during the designated times, "the federal agencies will cease endorsing and participating in activities leading to lethal control measures and may withdraw from other joint management actions outside the Park . . . ."[124] Montana has its own recourse, if it deems the in-Park vaccination program as inadequate, to cease tolerating untested bison outside the park and its withdrawal from other joint management actions.[125]

Another interesting contingency measure deals with the scenario in which brucellosis is actually discovered in a cattle herd and traced back to bison within a management area. "Upon disclosure of (1) brucellosis-affected cattle herd in a management area, [Zone 2 plus 5 miles within Montana,] or (2) a brucellosis-affected herd outside the management areas . . . that the source is traced back to the management area, the agencies will implement

120. *Id*.
121. *Id*. at 31 ¶25.
122. *Id*.
123. Record of Decision, *supra* note 1, at 31 ¶25.
124. *Id*. at 34 ¶34.
125. *Id*.

modified management measures."[126] The modified management measures are thus an implementation of adaptive management at that point.[127]

B. Montana's Version of the Joint Bison Management Plan

Montana's plan is almost entirely the same as the Joint Plan, as is illustrated in its incorporation by reference of volumes 1-3 of the federal FEIS. However, Montana's Plan is based on its FEIS, which is not based on the final version of the Joint Plan, but rather "analyzes [it] as it existed at one point during the federal-state mediation."[128] The most important difference between the two plans is "[Montana's] intent possibly to request the [state] legislature to authorize . . . the public hunting of bison"[129] in an area and manner inconsistent with the Joint Plan. If approved by the Montana legislature, a public hunt could undermine the Joint Plan. For example, if the public hunt amounted to Montana not tolerating untested bison under the Joint Plan's contingency measures it could lead to federal agencies withdrawing from the plan and not cooperating with Montana on lethal control measures.[130]

PART IV: ANALYSIS

The title of the agencies efforts, the *Bison* Management Plan for the State of Montana and Yellowstone National Park, is really on point, being that bison are managed instead of cattle. The Joint Plan is positive in that it is a step towards cooperative bison management, but it falls short in providing a bison management plan that conforms to the boundaries of the Yellowstone ecosystem in which the bison roam. The Joint Plan even missed the opportunity to merely extend the "free roam zones" to encompass all federal lands, which would not even include the entire winter habitat. Furthermore, the Joint Plan under-utilizes adaptive management and over-utilizes traditional front-loaded management. Lastly, it is based upon the perceived threat of brucellosis despite no documented cases of transmission from bison to cattle in the wild.

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126. *Id*. at 32-33 ¶32.
127. *Id*. at 32-33 ¶32-33.
128. Record of Decision, *supra* note 1, at 15.
129. *Id*.
130. *Id*. at 33-34 ¶34.

A. Goals of Ecosystem Management

Virtually everyone involved with the Joint Plan says they support and utilize ecosystem management,[131] but they are clearly not all referring to the same thing. The distinction between the different versions can be reduced to where their respective emphasis is placed: human use/resource extraction or maintenance of the integrity of the ecosystem. In other words, where in the hierarchy of interest is human use? This is the key inquiry, because there is inevitably a point where human use is in conflict with ecosystem integrity.

R. Edward Grumbine states: "Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term."[132] In Grumbine's hierarchy of interests, human use and occupancy must be accommodated *within* the constraints of maintaining ecological integrity.[133] In contrast, the Forest Service's concentration on sustaining the "processes of ecosystems for the benefit of future generations, while providing goods and services for each generation"[134] under its "multiple-use/sustained yield" mandate, implies a human use being further up the hierarchy than in Grumbine's paradigm.

If the overall goal of ecosystem management is really sustaining ecological integrity, it is difficult to believe that preservation of ecological integrity must be accommodated *within* the constraints of human use. Such a limitation would significantly impair accomplishment of the goal, because the human use interest would be superior. Many scenarios present zero-sum games; occasionally, there are only winners and losers. At this point, human use must be subordinate to the overall goal of sustaining the integrity of the ecosystem.

Within the context of bison management, it is evident that the agencies have a different hierarchy of interests. The Joint Plan constrains the interests of bison within the human interest in raising livestock. The plan is clearly a victory of human use over ecological integrity. Bison, a native species, have been forced to accommodate cattle, a non-native species, even on federal lands.

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131. *Id*. at 8 (stating "[c]ooperative management of Yellowstone bison requires an ecosystem approach" and a goal of the Joint Plan is the "maintenance of a viable population of wild bison in Yellowstone National Park from biological, genetic, and ecological terms.").

132. *What is Ecosystem Management?*, 8 CONSERVATION BIOLOGY 27, 31 (1994).

133. *Id*.

134. *Id*. at 32 (citing USDA Forest Service, East Side Forest Ecosystem Health Assessment (1993)).

Furthermore, the Yellowstone herd, which is the only genetically and behaviorally wild herd of bison left in America, is being subjugated to the existence of cash cattle in the bison's ecosystem. The functional effect of these actions underlines the priorities of the Joint Plan and calls into question where the "[maintenance of] a viable, free-ranging population of Yellowstone bison"[135] really falls within the plan's hierarchy of interests.

B. Brucellosis: the Foundation of the Policy

The main argument given by proponents for limiting bison's ability to roam has been the threat of spreading brucellosis to livestock.[136] The Joint Plan's stated objective is the following:

> This plan is not intended to be a brucellosis eradication plan, but rather is a plan for the management of bison, intended to prevent the transmission of brucellosis from bison to cattle. Nevertheless, it sets forth actions to address brucellosis within the bison herd.[137]

Furthermore, brucellosis seems to be the sole justification given by state or federal agencies for restraining bison from their natural roaming behavior.[138]

Brucellosis' prominent position in the policy behind the Joint Plan would lead a reasonable person to the conclusion that the science behind the threat must be overwhelming. A reasonable person would conclude that there must have been scientific studies showing that brucellosis-positive bison transmit the disease to the livestock in the wild via common grazing territory. Furthermore, that the rate of wild transmission is significant enough to restrain native wildlife at the expense of domesticated cash cattle. Furthermore, that there is scientific evidence that clearly prescribes the differential treatment of bison and elk under the Joint Plan, despite the fact that both are carriers for brucellosis and both share grazing territory with livestock.[139]

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135. *See* Mark Derr, *Genetically, Bison Don't Measure up to Frontier Ancestors*, N.Y. TIMES, Apr. 23, 2002, at F2.

136. Record of Decision, *supra* note 1, at 8 (stating "goals [of Joint Plan] include . . . eventual elimination of brucellosis in bison; protection of livestock from the risk of brucellosis; actions to help protect the brucellosis class-free status of Montana . . . .").

137. *Id*. at 22.

138. *Id*. at 8.

139. *Id*. at 3 (stating "Brucellosis also occurs in elk . . . [but] the risk of transmission from those elk to cattle is lower than that of bison.").

Proponents of the Joint Plan are quick to point to the study of transmission in captivity that showed bison could transmit brucellosis to cattle in that setting.[140] However, there is an ongoing debate in the scientific community about brucellosis transmission among ungulates in the wild and there is currently no scientific evidence of brucellosis transmission from bison to cattle in the wild.[141] Furthermore, the Joint Plan itself implicitly acknowledges the lack of evidence of transmissibility in its contingency section that modifies the plan *if* bison within management areas are shown to be the trace of a *single* cattle herd infection.[142]

Clearly, brucellosis may seriously injure the livestock industry of Montana if the state were to lose its brucellosis class-free status under the APHIS, which incidentally cannot occur solely because wildlife that carry the disease are present in the state.[143] Montana's fear and conservative attitude are somewhat justified by the devastating economic impact that a brucellosis outbreak would have on the livestock industry. However, the lack of scientific support leads to the conclusion that brucellosis was the only thing that Montana and the federal agencies could agree on with the regard to bison management. Furthermore, the basis of the policy may be any number of things including, but not limited to, an old-fashioned state land use/property rights issue or the general nuisance bison can pose to private property.[144] Regardless of Montana's real interest, its use of fear surrounding the threat of brucellosis allowed it to accomplish its goal of exerting control over bison within its borders as it sees fit with limited federal interference. Furthermore, if it was stipulated that brucellosis really is the foundation of the policy behind the Joint Plan, elimination of the disease could be approached differently with an emphasis on adaptive management to be discussed in the next section.

C. Excessive Management, the Artificial Population Cap and the Wrong Ungulate

Yellowstone's bison have proven to be extremely resilient when allowed to operate under natural conditions. The herd recovered from virtual oblivion at the turn of the 20th century.[145] Their initial survival following the low of twenty-five bison in the herd was in

140. Morrisette, *supra* note 38, at 484 (citing NRC Report, *supra* note 12, at 42-45).
141. *See id.*
142. *See* Record of Decision, *supra* note 1, at 32-33 ¶32.
143. APHIS, *supra* note 67.
144. *See* Leuck, *supra* note 5.
145. Record of Decision, *supra* note 1, at 3.

large part due to human aid.[146] However, once the herd was re-established and allowed to roam wildly, the human interference did not stop. This excessive management is clearly seen in the artificial population caps — currently 3,000 bison[147] — that have been placed on total herd population throughout the idioms of bison management over the years. The cap has restrained bison from existing at the natural levels dictated by the environmental conditions of the GYA ecosystem, which includes infamously harsh winters, fires that destroy habitat, and predators — including the reintroduction of wolves — among other factors. Even the Park Service believes that these natural conditions "would maintain the population within the natural range of 1,700 and 3,500 animals."[148]

PART V: RECOMMENDATIONS

The Joint Plan can be salvaged, as it has already provided a framework for the inter-agency and inter-jurisdictional cooperation between the federal government and the State of Montana. Both sides know that bison management cannot be handled by any of them alone, but requires a cooperative effort. Furthermore, each agency's management of bison affects the others' interests. A more ecosystem management-based approach could accomplish this with incentives for state and private parties to cooperate.

An ecosystem management approach would strike a far better balance between the natural range and needs of the bison to migrate during the winter and the needs of cattle ranchers than the existing Joint Plan. This approach would focus on the bison's natural range along the Madison River towards West Yellowstone and along the Yellowstone River into the area around Gardiner, Montana and the Gallatin National Forest. This approach could be implemented through the extension of "free roam zones" to all federal lands and across some state and private lands. The federal government could accomplish this through attrition of private leases on federal land, acquiring bison easements over otherwise state or private land through purchases, land swaps or other incentives, and assurance from the APHIS that these bison easements will not affect Montana's brucellosis class-free status.

Despite the emphasis on bison management in the Joint Plan, cattle management is more effective. It is more effective because cattle roam less than bison and are more likely to graze under one entity's jurisdiction. Furthermore, cattle are already contained,

146. *See id*.
147. Record of Decision, *supra* note 1, at 26 ¶10b.
148. DEIS, *supra* note 19, at 73.

being domesticated livestock, unlike wild bison. Therefore, separating cattle from bison is logically an easier proposition than separation of bison from cattle.

Some solutions for modifying the Joint Plan could be made easily under the framework, while others would be a hard-sale for some of the federal or state agencies. Extension of the "free roam zone" would be difficult, but hesitance could be overcome with proper compensation through federal incentives. Likewise, more management of cattle would face opposition if the economic burden were placed upon the livestock industry. Thus, changes to the Joint Plan must provide real-world benefits to those afforded incentives in return for the concessions necessary to foster a more ecosystem management-based version of the Joint Plan.

A. Less, Adaptive, Ecosystem Management of Bison

It is interesting that adaptive management is truly only utilized upon a finding of brucellosis transmission from bison in a management area to a cattle herd.[149] The agencies could better utilize the immense potential of adaptive management, if implemented at the outset before potentially unjustified restraint and slaughter of bison. Instead, the agencies participated in a typically front-loaded evaluation that only re-evaluates the plan over its first four years. Although the plan states that "future management actions could be adjusted, based on feedback from implementation of the proposed risk management actions."[150]

A better solution would have been to protect bison during their natural winter migration and evaluate if brucellosis transmission could be scientifically documented in the wild. The agencies could then use the millions of dollars spent on hazing, capture, testing and slaughtering to compensate the owners of any subsequently infected cattle herds.[151] Furthermore, adaptive management could be used to change the plan to restrict roaming on a dynamic basis. This would ensure the plan only restricts the areas identified as possible transmission points rather than bison restraint with an overly broad impact.

Excessive management also has a negative impact on other wildlife. Currently the effect of bison management helicopters on the some of the endangered and threatened species of the GYA is

149. *See* Record of Decision, *supra* note 1, at 32-33 ¶32.
150. Record of Decision, *supra* note 1, at 22.
151. *See* Morrisette, *supra* note 38, at 483 (stating "[t]he NRC estimates that since 1934, the national effort to eradicate brucellosis has cost $3.5 billion"). The NPS spends millions on bison management in Yellowstone. *See id*.

being studied.[152] Clearly, less management of bison would be a welcome change from the excessive management of past and current bison management plans that are only effective if intrusive on the ecosystem.

1. Extension of the Free Roam Zone

The "free roam zone" under the current plan overly restrains bison movement because it does not correspond with their natural behavior within the ecosystem. Thus, the logical next step is to extend to the match their natural range to the extent possible. However, this is somewhat difficult to ascertain.

The "free roam zone" could be extended to include all federal lands, especially all of the Gallatin National Forest just north of the Park. This may be done fairly easily because the USFS is already a participant in the Joint Plan and has jurisdiction over that area. Any area that is within the bison's winter range and not held by private lease could be immediately included in the "free roam zone" under the Joint Plan.

One often cited problem is private grazing leases and islands of private land ownership. Many of these conflicts between private citizens and the federal government could be rectified with purchase easements to allow bison to roam along their natural winter range. Another solution is to merely buy the land altogether and add it to Yellowstone or Gallatin National Forest. Government purchases like these are not uncommon. In 1999, $13 million from the Federal Land and Water Conservation Fund was used by the federal government to purchase over 7,800 acres of private land along the west side of the Yellowstone River, north of the Park.[153]

Private leases for grazing and other uses on federal land could also be bought out or compensated for a bison easement until completely eliminated along bison range through attrition. It is remarkable that bison protection on federal land has been so compromised by the presence of private grazing leases, especially in the Gallatin National Forest. These leases could be bought out or condemned under eminent domain, if the lease-holders are unwilling to participate in bison easement compensation incentives. The remaining leases along bison range could then be eliminated through attrition.

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152. Eryn Gable, *Bison: Enviros Ask Judge to Stop Use of Helicopters to Control Yellowstone Herd*, *in* GREENWIRE (Jan. 9, 2003) (stating that use of helicopters to haze bison back into the park harms bald eagles, trumpeter swans, and their habitat in violation of their protection under the ESA).

153. Morrisette, *supra* note 38, at 501-02.

Land and lease swaps could also be used. This can be an effective alternative to all out attrition on leases or land purchases because it gives land owners and lease holders an ability to swap their bison range land for non-range land, if they do not want to participate in bison easement compensation or incentives. Anecdotally, my family's private land lease on USFS land, which was used for a cabin just outside West Yellowstone, expired in one location due to conservation demands but the USFS offered another lease in a nearby area. This swap of locations left a much better taste than an all out attrition of our ability to occupy, use and enjoy USFS land. Obviously, my family is not the multi-million dollar livestock industry, but the concept has some transferability.

The "free roam zone" obviously cannot be extended infinitely. Thus, some limited management in the form of hazing may be needed to keep bison within this expanded range. However, the correspondence of this new zone with the bison's natural range should greatly reduce the need for management to a small fraction of the level currently needed to restrain bison under the artificial jurisdiction of the Joint Plan. Furthermore, bison levels will be dictated by natural factors to establish the natural equilibrium dictated by the environmental conditions of the GYA ecosystem.[154] Thus, it could potentially lead to a more functional ecosystem with greater ecological integrity than under the excessive management and artificial population cap imposed by humans under the Joint Plan.

2. More Management of Cattle

The agencies have chosen the wrong ungulate to manage. The threat of brucellosis transmission could be more easily pacified through management of domesticated cattle rather than bison. The agencies could isolate livestock from bison grazing lands with both spatial and temporal separation. In contrast, the Joint Plan does the exact opposite. It places artificial boundaries that restrain bison rather than restricting livestock. This policy does not makes sense given the fact that bison have a natural inclination to roam

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154. Leuck, *supra* note 5, at 610.

> Bison, like many species, exhibit density-dependent population dynamics; that is, as a population increases within a well-defined environment, the rate of population growth declines. Because of this characteristic, bison can be usefully described by a logistic growth function. This population model makes it possible to generate historical population estimates and understand the details of the bison's extermination and conservation.

Id.

while foraging for food in the winter, as opposed to cattle that are already subject to artificial restrictions. This is the classic example of the boundaries of an ecosystem not matching artificially human-created borders. The bison's ecosystem overlaps and crosses the artificially created jurisdictional boundaries between government entities.

Montana could clearly isolate livestock, which is under their complete control, rather than bison that roam in and out of their jurisdiction. The only thing missing is what is in it for them. Proper federal incentives could sway their cooperation and would benefit all involved. The risk of brucellosis transmission would be even less than under the current plan if cattle were managed and separated from bison, because cattle are much more controllable. Thus, management of livestock would be more effective since the framework for containing cattle already exists in the livestock industry, unlike the ineffective containment of free-roaming bison. Furthermore, if Montana and the livestock industry were persuaded to abandon their perceived attack on bison, while still remaining profitable, they could shed the negative image that surrounds their position on bison management, which would greatly enhance their good will with both consumers and wildlife conservationists at the same time.

B. Brucellosis Vaccine

The development of a brucellosis vaccine would greatly lessen the risk of transmission. Delivery of the vaccine may prove difficult, however the current NPS staff is already familiar with tranquilizing bison to fit them with radio collars to track their movement. This training and experience would allow them to vaccinate the large majority of the bison population. However, even if all bison are vaccinated, elk also carry the disease and may have to be vaccinated if brucellosis is still found in the bison population. Vaccination of bison and elk would only be necessary if the brucellosis vaccines used on cattle remained ineffective as they are currently, despite the Fund for Animals claiming that vaccinated cattle are "unlikely to develop an infection even if exposed to the *Brucella abortus* organism."[155]

Vaccine development is being done in coordination with Russian biochemical-military scientists.[156] These scientists are

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155. Fund for Animals, *Response to Record of Decision for the Final EIS and Bison Management Plan for Montana and the Yellowstone National Park*, *at* http://www.fund.org/library/documentviewer.asp?ID=271&table=documents (last accessed Dec. 7, 2004).

156. Animal Planet, *supra* note 16.

familiar with the *Brucella abortus* bacteria due to their utilization of it in USSR's chemical weapons of mass destruction program during the Cold War.[157] During their development of *Brucella*-based chemical weapons, the former-Soviet scientists also developed five different vaccines for brucellosis.[158] These vaccines are in the process of being adapted to eradicate brucellosis in the bison population.[159]

The development of a viable brucellosis vaccine would likely be able to address the concerns of the brucellosis transmission from roaming bison to grazing cattle that are shared by ranchers, the State of Montana, and the APHIS. In addition, this is a better means of eradicating brucellosis, which is the goal of the APHIS, but not the Joint Plan. However, one of the purposes of the Joint Plan is to "ensure that brucellosis is not transmitted from bison … to brucellosis-free cattle" and "its activities demonstrate a commitment to the eventual elimination of the disease in the bison of Yellowstone National Park."[160] That purpose would be greatly furthered by the development and delivery of a brucellosis vaccine. Thus, a vaccine is one of the most desirable solutions to the perceived problem of roaming bison, due to its ability to strike at the core of the stated reasons behind the Joint Plan.

C. Are Yellowstone's Bison a Distinct Population Segment?

If Yellowstone's herd were to be held a distinct population segment under the Endangered Species Act (ESA),[161] it would provide a new solution for protection of Yellowstone's bison and their right to roam freely across jurisdictional boundaries.[162] This new managerial philosophy would be completely out of the current Joint Plan framework and frankly would be much more effective at protecting bison and their habitat. Getting listed under the ESA is a difficult process.[163] Thus, even if listing is not readily or immediately attainable, perhaps the mere fight over listing and possible victory by conservationists, like the Greater Yellowstone

157. *Id*.
158. *Id*.
159. *Id*.
160. Record of Decision, *supra* note 1, at 14 ¶3.
161. 16 U.S.C. § 1531 (2004).
162. *See, e.g.*, Joshua M. Duke & Laura A. Csoboth, *Increased Scientific Capacity and Endangered Species Management: Lessons from the Red Wolf Conflict*, 8 DRAKE J. AGRIC. L. 539, 545 (2003) (stating "[d]istinct population segments have been a popular vehicle for offering enhanced protection for species").
163. *See, e.g., id*.

Coalition (GYC),[164] the Fund for Animals[165] or the Buffalo Field Campaign,[166] could be used as a bargaining chip to bolster protection of bison under the Joint Plan.

The definition of species in the ESA differs from some other definitions[167] in that it includes subspecies and distinct population segments.[168] The definitions of "species" and "subspecies" are not found in the ESA.[169] The lack of these definitions is further complicated by the option of creating distinct population segments.[170] An oft-cited example of distinct population segments is "the grizzly bear, which has several separate 'species' listings for various distinct population segments."[171]

Wood bison are protected under the ESA,[172] but plains bison are no longer considered threatened as a result of protection efforts and domestication measures undertaken prior to the enactment of the ESA.[173] However, Yellowstone's bison are the only genetically and behaviorally distinct population segment that remains true to the free roaming plains bison ancestors.[174] The large numbers of domesticated bison are vastly different from their free-roaming counterparts that occupy the GYA in both behavior and genetic structure.[175]

The evidence of behavioral and genetic dissimilarity between the bison of the GYA and domesticated bison bolsters the argument that they should be protected under the ESA as a distinct population segment. This would mark a radical shift in bison management policy, because the capture/test/slaughter regime, as

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164. http://www.greateryellowstonecoalition.com.

165. http://www.fund.org.

166. http://www.buffalofieldcampaign.org.

167. *See, e.g.,* JOHN COPELAND NAGLE & J.B. RUHL, THE LAW OF BIODIVERSITY AND ECOSYSTEM MANAGEMENT 125-29 (Robert C. Clark et al. eds., Foundation Press 2002); Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 WASH. U. L.Q. 1029, 1130 (1997); Holly Doremus & Joel E. Pagel, *Why Listing May be Forever: Perspectives on Delisting Under the U.S. Endangered Species Act*, 15 CONSERVATION BIOLOGY 1258 (Oct. 2001); Philip Kline, *Grizzly Bear Blues: A Case Study of the Endangered Species Act's Delisting Process and Recovery Plan Requirements*, 31 ENVTL. L. 371, 371-73 (2001).

168. 16 U.S.C. § 1532(16) (1994) (stating "[t]he term 'species' includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature . . . .").

169. *See* NAGLE & RUHL, *supra* note 167, at 126.

170. *See id.* at 127.

171. Kline, *supra* note 167, at 380.

172. *See* 50 C.F.R. § 17.11(h) (2004).

173. Omar N. White, *The Endangered Species Act's Precarious Perch: A Constitutional Analysis Under the Commerce Clause and the Treaty Power*, 27 ECOLOGY L.Q. 215, 240 (2000).

174. *See, e.g., supra* note 135.

175. *See, e.g., id.*

well as the limitations on bison movement out of the park, would be eliminated. For bison protectionists, this is the Holy Grail, given the potent effect of an ESA listing. However, the threat of listing could be used by one of the bison protectionist groups as a bargaining chip to alter the current Joint Plan to a more palatable form. The use of the *in terrorem* effect of a listing suit has greater real-world plausibility of success than listing of bison as a distinct population segment given the strong opposition from ranchers and the state of Montana that are already upset about the reintroduction and protection of wolves in the GYA under the ESA.[176]

CONCLUSION

The capture/test/slaughter method employed by the NPS over the years and carried on in the Joint Plan is not the most effective way to manage Yellowstone's roaming bison. The artificial population cap that limits the total bison population to 3,000 disregards the principles of ecosystem management. In addition, the Joint Plan fails to extend the "free roam zones" to correspond with the bison herd's natural behavior in the winter to migrate out of the park to seek food sources due to harsh conditions inside the Park. The Joint Plan places too much emphasis on bison management at the expense of exploring cattle management options that would be easier to implement, because cattle are domesticated and contained, unlike free-roaming wild bison that do not heed artificial jurisdictional boundaries.

Instead, the Joint Plan should be changed to comply with less and adaptive management of bison according to the principles of ecosystem management. Following the above recommendations would allow the bison to behave naturally without penalty and operate within the natural conditions of the ecosystem. This would allow bison to aid in ensuring that the ecological integrity of the GYA ecosystem is viable for the use and enjoyment of future generations. With a more ecosystem-based approach, the iconic image of bison roaming free across the landscape of the West could be restored from memory to reality.

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176. *See, e.g.*, Daniel R. Dinger, *Throwing Canis Lupus to the Wolves:* United States v. McKittrick *and the Existence of the Yellowstone and Central Idaho Experimental Wolf Populations Under a Flawed Provision of the Endangered Species Act*, 2000 B.Y.U.L. REV. 377 (2000).