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THE SOCIAL CONSTRUCTION OF YELLOWSTONE BISON BIOGEOGRAPHY: THE IMPACT OF STATIC STRUCTURES ON THE LANDSCAPE

A Thesis

Presented to the

Faculty of

California State University, Fullerton

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Geography

By

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ABSTRACT

Antithetical forms of stability and instability are juxtaposed in this thesis to highlight the manner in which modern social systems control biological organisms. Specifically, the discourse of stability, as represented by the conceptual frameworks supporting property and biodiversity, has played a critical role in the management of unstable bison herds inhabiting Yellowstone National Park. General acceptance of the discourse of stability has resulted in its incorporation into bison management policies and operations. As a result, Yellowstone bison that transgress designated park boundaries are removed from the landscape by various lethal and non-lethal methods. Over the past decade, such bison removal operations have intensified. Consequently, the Yellowstone bison population has been fundamentally transformed from its primordial state. Current bison management plans articulate a marginalized bison population that maintains a static range and stable population. Frequent and cyclical removals function to create a simulated bison herd that is no longer wild.

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ACKNOWLEDGEMENT

I would like to thank members of the faculty within the Department of Geography that assisted in the writing of this thesis. More specifically, I want to acknowledge the effort put forth by Robert Voeks, Robert Young, and John Carroll who served as committee members for this endeavor. Faculty assistance on this project commenced well before its writing with the introduction and application of fundamental geographical concepts. Simultaneously, this provided a ground within which to work and multiple methods with which to perceive that same ground. Support during the writing of this thesis was multifaceted, but most importantly sought to expand the breadth of the thesis in order to adequately analyze the chosen topic. This work greatly benefited from their assistance.

CHAPTER 1

INTRODUCTION

Concepts of order and stability have persisted throughout the rise of western civilization (Botkin, 1990). These concepts, being far from marginal, have played a primary role in the formation of scientific fields of knowledge such as physics (Markley, 1991) and ecology (Botkin, 1990). In addition, perceptions of order and stability have been strengthened by their association with religious beliefs. Order does not simply exist, it is a manifestation of the proper, divine state of nature. As such, the appearance of order in the physical environment is to be respected, while the emergence of disorder and instability is to be regarded as profane and improper. Moreover, it is generally conceded that disruption of the natural order (social or ecological) will result in dire consequences. This model of the universe has provided the justification for the human imposition of order on the landscape.

To the degree that this imposed stability varies from the transient state of nature, it can be considered a social artifact. Viewed from this perspective, stability is a creation of society, directed by the will of its various inhabitants. This image differs from the prototypical "social construction of nature" in that it does not necessarily involve physical manifestations produced by human technology (i.e. roads, structures). Rather, stability is an artifact in that it denies the constant nature of process.

Although stability undoubtedly exists in several forms, this thesis will focus on stability as represented by the concepts of property and biodiversity. In the former, stability is achieved through the right to exclude. Destabilizing elements are excluded, because they do not conform to the goals of the owner. In the latter, stability is achieved through the development and maintenance of biological diversity.

In particular, the present thesis will examine the effect of enforced stability on the bison herds of Yellowstone National Park. Currently, the region is the site of a land dispute which has intensified over the past decade. In recent years, Yellowstone bison have repeatedly migrated outside the park's boundaries and moved onto adjacent public and private property. Local ranchers, fearing economic losses, have demanded that the bison be restricted within park boundaries, and, should the bison exit the park, their physical removal by whatever means necessary to secure their livelihood.

The issue was of little concern until the 1980's, due to low bison numbers in the first half of the century, and past management policies thereafter. Few bison wandered outside park boundaries. Consequently, the removal of individual bison by lethal means did not attract much attention. However, in 1985, the number of bison removed increased significantly when 88 were shot by state wildlife authorities. Since this time, the number of bison removed has varied from year to year, at times remaining in single digits, other times exceeding 1,000.

Attempts to resolve this conflict have generally stressed the rights of the affected parties. Local land owners have stressed the importance of property rights, since they are perceived to be a prerequisite to the ranchers' economic livelihood. From their perspective, property rights should be given priority over

other considerations. In contrast, wildlife organizations have stressed the bisons' right to exist. The debate, however, has resulted in little, if any, movement. This is not surprising given that these beliefs form the foundation of entire value systems. To the interested parties, this is not a simple matter of accommodation.

This situation points to the inadequacy of negative rights in a system where growth is inherent. Negative rights, the backbone of the American legal system, assert that an individual has the right to remain free from harm resulting from another person's behavior. However, as the number of individuals with inalienable rights increases, and the amount of available space necessarily decreases, conflict is bound to arise. The prevailing political structure usually determines the manner in which these conflicts are resolved, with the dominant class securing greater rights, and access, to valued resources (Clark, 1982). Such is the case within the Greater Yellowstone Ecosystem region.

Yet, an inordinate focus on individuals (ranchers, bison, or otherwise), and their rights, skews the nature of the conflict. (See Figure 1.) When ranchers and environmentalists center their attention on the bison body, the fundamental issue is the manner in which this species is managed. Namely, what is to be done with this source of disorder? However, to redefine the struggle, and assert land as the primary point of contestation, fundamentally alters the dynamic of the situation. Land, and the processes it contains, is the ultimate concern. The control of land is fundamental to any mode of existence.

The discourse of property rights has been relatively successful in establishing the preeminent position of local residents. The result is the construction of Yellowstone bison biogeography through the right to exclude. This artifact differs considerably from the 19th century construction of bison

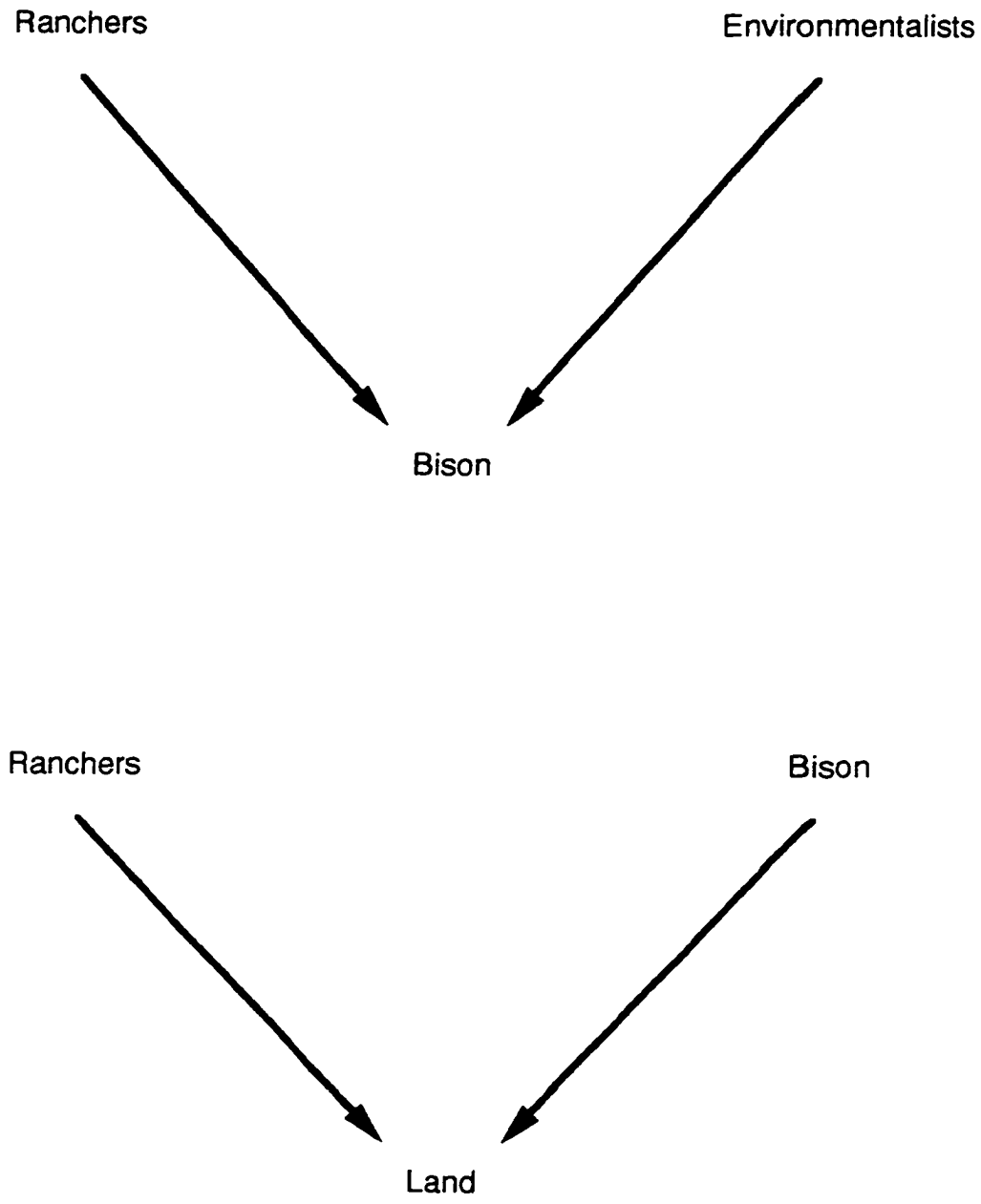


FIGURE 1. Diagrams Indicating Alternate Representations of Conflict in the Greater Yellowstone Ecosystem.

biogeography, which involved the aggressive eradication of the species, and the gradual reduction of its range. In contrast, by asserting their property rights and attempting to maintain order and stability, today's local ranchers have reconfigured the dialectic and assumed a defensive posture. In this context, by migrating beyond park boundaries, bison have been effectively redefined as a source of disorder. The restriction of the species, therefore, becomes a necessity, rather than an illustration of human excess.

From this perspective, land that is annexed by society becomes human property in perpetuity. Property does not readily revert back to wilderness. As with other forms of wildlife, the bison of Yellowstone have been denied the opportunity to reclaim land falling within property lines. The spatial void created by hunters of the 19th century is no longer accessible to bison. It has been converted into property and subsumed within the human domain.

At base, this is a conflict about the proper place of Yellowstone bison. Given the social, economic, and political context of the region, where do these creatures belong? Where shall these pockets of wilderness be allowed to exist? On another level, the current situation points to society's inability to coexist with an overabundance of wildlife. As in situations throughout the country, the optimum number of a species is not determined by available resources, but rather by its compatibility with adjacent human settlements.

The predicament of Yellowstone bison is ideal for a study of the circumscription of nature. The line which, in effect, determines use rights to the land is the well established park boundary. Various government agencies recognize the validity of this line, as well as the jurisdictional authority which accompanies it. Thus, the exclusion of bison has become, to some degree, institutionalized. In addition, this is not displacement through haphazard

development. The restriction of bison to areas within the park is the result of a concerted effort. The state of Montana has granted the livestock industry priority over land surrounding Yellowstone National Park.

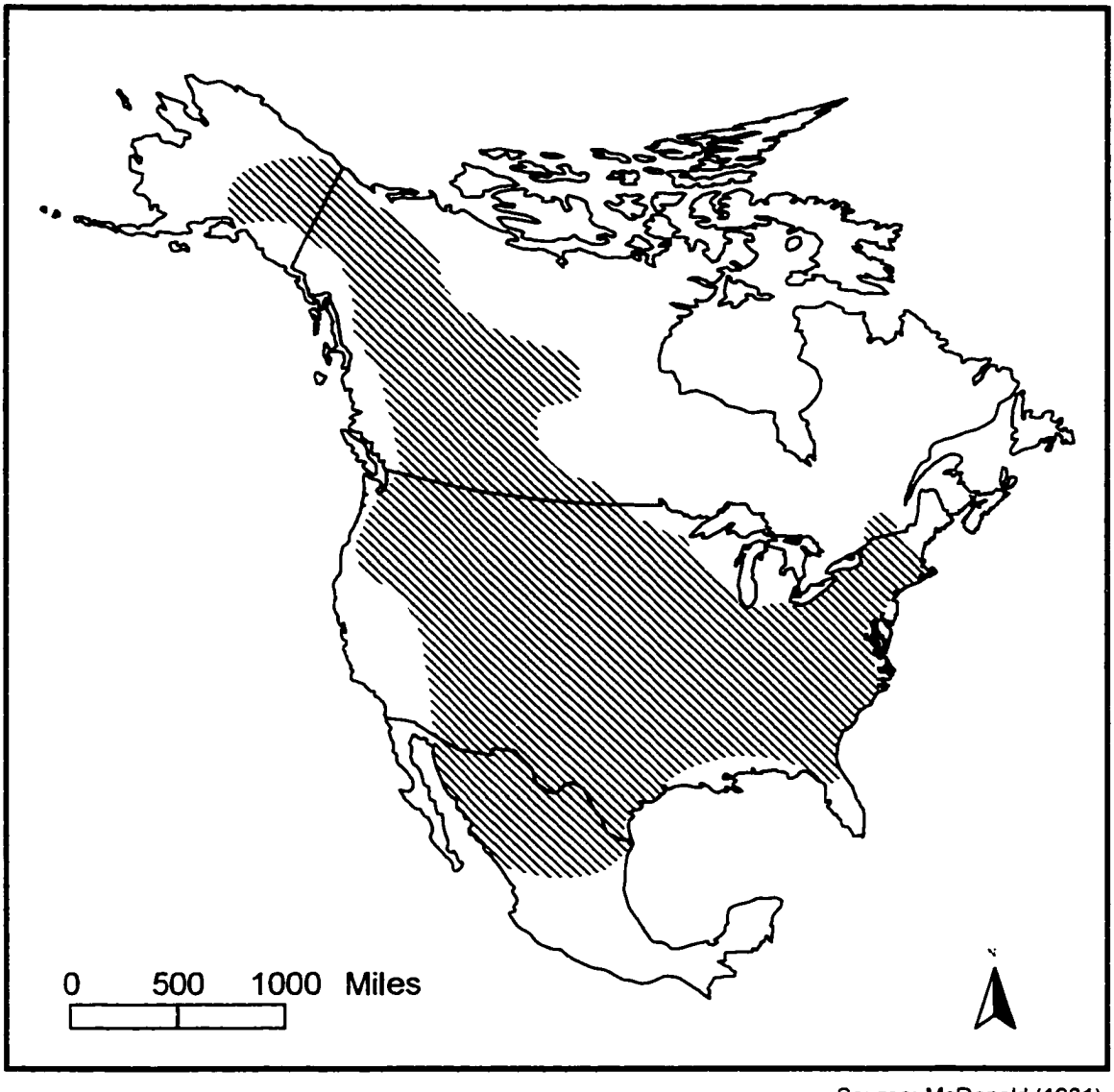
Understated in the political discourse surrounding the conflict, governmental agencies are attempting to eliminate instability through the restriction of bison movements. A seemingly modest goal, it is nevertheless critical. "Life is motion ...which is ambition, power, pleasure" (Faulkner, 1963, 138). Movement is the embodiment of motivation and desire. Thus, restricting movement has several ramifications.

The management of Yellowstone bison is one aspect of the modern attempt to subordinate North America's primordial past. Just as Native Americans, and their traditional economic and cultural systems, were relegated to reservations, bison are now restricted to the confines of Yellowstone National Park. The instability which the primordial past embodies must be constricted in order to preserve the efficiency of modern social systems.

The preceding concepts and themes will be emphasized in the present thesis to highlight the grip which human civilization has on certain elements of the landscape. Chapter 2 reviews theoretical models of the natural environment in order to substantiate the frequency of movement, instability, and disorder. Chapter 3 will site the conflict between stability and instability in the geographical setting of the Greater Yellowstone Ecosystem. Chapters 4 and 5 serve as a foundation for understanding governmental policies. Chapter 4 will attempt to establish stability as an overriding theme during the rise and spread of western civilization. Chapter 5 will examine bison as an inherent source of instability. This fundamental attribute will be presented as an inalienable

feature of the species. Chapter 6 equates biological exclusion with other social processes and movements. After establishing this new basis for conflict between bison and property (i.e. process and its representation on the landscape), Chapter 7 will present wildlife management policies as an attempt to maintain stability and achieve a balance between property and biodiversity. Chapter 8 will draw these inferences together in order to highlight the implications of this process.

In the process of reviewing the current land conflict, it should not be forgotten that the species Bison bison once ranged across vast stretches of the North American continent. According to McDonald (1981), the species covered the bulk of the continent from Canada down into Mexico. (See Figure 2.) On a smaller scale, Fryxell (1928) established the widespread distribution of bison in the Rocky Mountain region during the late 19th and early 20th century. It is relatively clear, however, that this expanse is no longer available to bison. At present, the niche of Yellowstone bison is largely predetermined and unchanging. This is the case, despite the fact that open fields are abundant beyond the park boundary, and the region is sparsely populated.



Source: McDonald (1981)

FIGURE 2. Prehistoric Range of Bison bison in North America.

CHAPTER 2

THEORETICAL SETTING: ORDER AND CHAOS

Models of the natural environment attempt to represent and define the spatial and temporal boundaries of natural phenomena. Such models are constructed images reflecting the social, political, religious, and scientific conditions present at the time and place in which they were created. Yet, models do not simply represent. Rather, as within a feedback loop, successfully propogated models reverberate through society, altering the perceptions and behavior of subsequent generations.

This chapter will briefly review the progressive transformation of theoretical models during the last two millennia. In particular, it will indicate the manner in which "order", as professed by Greek, Roman, and Christian scholars alike, has been gradually undermined by scientists and philosophers alike. Ultimately, these insights shall provide a basis for critiquing bison management policies within and around Yellowstone National Park.

Order Defined

Botkin (1990) identified three dominant themes prevalent within models of the natural environment: nature as divine origin, nature as organism, and nature as machine.[1] Each model depicts nature as deeply entrenched, fixed underneath the guiding principles of a cohesive universe. Although distinct, the

[1]The structure of this section is borrowed from Botkin (1990).

respective models are not mutually exclusive of one another. Rather, they frequently interpenetrate one another. For instance, nature as machine is heavily laden with the theology of divine origin. In general, early models of the natural environment are typified by their simplicity, unity, and infusion of religion. All three characteristics are well-suited to the conceptual formation of stability and order.

The earliest model of the natural environment was structured around the belief in nature as a reflection of the Divine Order. From this perspective, the landscape and its inhabitants were a direct manifestation of God's work. Physical features of the landscape were sited with purposeful intent. As a result, the natural environment was imbued with a rigidity and permanence that matched the eternal presence of its Maker.

Yet, it was readily apparent to early natural scientists and philosophers that the environment was not completely static. Weather systems and biological organisms traversed the landscape on a constant basis. To preserve the integrity of the model, therefore, the behavior of animals, for one, was expressed in terms of its cooperation and adherence to the Divine Order. Herodotus (1916) provides perhaps the most succinct and well-known example:

> Of a truth Divine Providence does appear to be, as indeed one might expect beforehand, a wise contriver. For timid animals which are a prey to others are all made to produce young abundantly, that so the species may not be entirely eaten up and lost; while savage and noxious creatures are made very unfruitful."

Clement of Rome echoed these sentiments, stating "All these creatures the Mighty Creator and Master of the Universe ordained to act in peace and concord, thus benefitting the universe..." (in Wildiers, 1982, 30). The degree of unity espoused by such statements is remarkable in that the respective species (predator and prey) have ceded any measure of individuality in order to

maintain the appearance of the Divine Order. As a result, stability is maintained. Species are but actors in a play, reproducing stability and verifying the existence of God.

Botkin's second model, nature as organism, portrays the earth as a self-regulating entity constantly striving to achieve homeostasis. The organic model is more fluid than the metaphor of divine origin. Cyclical variation within the environment is fundamental to such models. Nutrients are continually dissipated throughout the "ecosystem" in order to maintain a desired equilibrium. Unity results from the interplay of physical processes. In the aggregate, these processes serve to form a superorganism that regulates itself through feedback mechanisms. The organic model has the additional ability to account for such catastrophic natural disasters as floods and earthquakes.

Lucretius provides the classic example of the organic model. Nature is personified as an organic whole, an "unqualified Being" (Lucretius, 1977, 9). Lucretius states that "... earth won and keeps the name of mother, since she herself created mankind, and at its proper season birthed every wild beast that roams the cordillera, and every shape and color of bird that flies" (Lucretius, 1977, 132). While the organic model of nature is more fecund (and thus transient) than that of Divine Order, it too adheres to predictable change and stages. "And why in spring do we see roses, grain in summer, vines produce at autumn's call, if not because right atoms in right reason have streamed together to build each thing we see..." (Lucretius, 1977, 5). In the Atomist tradition, the disintegration of organic material is simply a precursor to atomic recombination and organic creation (Glacken, 1967, 64).

Importantly, many advocates of the organic model believe that nature undistrubed is nature in balance. Left alone, the earth has the regenerative

capacities necessary to reestablish stability and order. Natural phenomena will not proceed beyond designated thresholds. Although the organic model is able to accommodate environmental change, boundaries (e. g. climatic zones, territory) still function to limit the acceptable spatial extent of natural phenomena. Moreover, many advocates of the organic model believe the earth will not simply regenerate, but will also resume its progression toward an ideal form.

A rudimentary notion of nature as machine may have emerged during the rise of Greek civilization, with its juxtaposing of day and night, summer and winter (Furley, 1987), but an adequate exposition of its tenets was not evident until the 17th century, well after the other dominant models were securely established. Advances in physics played a significant role in its creation. The timely movements of celestial bodies, repetitive and predictable, lent itself to the mechanical metaphor. Objects in space followed an orderly path. In time, the mechanical model was applied to the terrestrial environment.

The mysticism of a previous age was replaced, in large part, by scientific and mathematic principles. Natural phenomena were regulated by the (scientific) laws of nature. The landscape was a manifestation produced by gravity, thermodynamics, and biological competition. Accordingly, Humboldt noted:

> We may easily comprehend how, on a given area, the individuals of one class of plants or animals limit each other's numbers, and how, after the long continued contests and fluctuations engendered by the requirements of nourishments ...a condition of equilibrium may have been at length established (in Botkin, 1990, 108).

Despite the current schism separating science and religion, nature as machine contained a robust strain of theological content. The bewildering

intricacy of nature was said to substantiate the existence of God. Newton, for instance, believed that:

> This most beautiful system of sun, planets, and comets, could ony proceed from the counsel and dominion of an intelligent and powerful Being. And if the fixed stars are the centres of other like systems, these being formed by the like wise counsel, must be all subject to the dominion of One... (in Markley, 1991, 136).

Such statements clearly indicate that the mechanical metaphor is, in many respects, compatible with the theory of divine order.

It is critical to recognize that the construction of order, in whichever model, was purposeful. Despite claims of objectivity, order and stability are not impartial. As numerous examples indicate, the divine order was structured to meet the needs of earth's human inhabitants. More recently, in the 17th century, the machine metaphor was utilized to resubstantiate the authority and privilege provided by divine order. Prior to this date, two "texts" were recognized as manifestations of God's work: the book of God (i. e. the Bible) and the book of Nature (i. e. the natural environment). When political radicals attacked the validity of the Bible, natural philosophers, such as Newton, sought to reassert the existence of God through greater reliance on the other authoritative text: the book of Nature. As Markley (1991, 127) noted, "For Boyle, Newton, and their contemporaries, the attempt to order the universe becomes an epistemological quest to invent or discover an authoritative -- and often self-consciously performative -- semiotics." Stated more succinctly, order served a purpose. When the validity of literary texts was questioned, material objects within the external environment were called into service.

Nevertheless, Newton was aware of the limitations of his models. For this reason, Newton supplemented his theoretical texts with theological texts. Yet many of Newton's successors avoided the theoretical gaps and

inconsistencies in his work. Consequently, "...theology [was] not exorcised from the corpus of science but repressed within it" (Markley, 1991, 143). The use of Newton's work by his successors illustrates the manner in which theological assumptions of divine order may remain embedded within scientific models.

The exclusive use of ancient and early Christian references, thus far, is intentional, as it serves two functions. First, these historical references reveal the depth of the human preoccupation with order and stability. Clearly, in all three models, the belief in order precedes the explanation of nature. Secondly, by comparing historical models to modern theories, the impact of these early models becomes readily apparent. A residue from the past continues to influence modern scientific models. As Furley (1987, 4) notes, "...after centuries of experimentation, the life sciences have not moved far beyond speculation on the origins of life, and their speculations sometimes read astonishingly like passages from Lucretius."

In the current century, models of the ancient past still persist. Although largely excluded from scientific literature, divine order continues to exist in popular literature. "In acceding to what is vastly larger than ourselves, we are not diminished, but exalted. We receive then our rightful place in the magnificent whole of nature" (Gruchow, 1997,19). "This universe itself, but especially the planet Earth, needs to be experienced as the primary mode of divine presence" (Berry, 1990, 120). And finally, "Living in our speech ...is an ancient system of analogies that clarifies a series of mutually defining and sustaining unities: of farmer and field, of husband and wife, of the world and God" (Berry, 1972, 159). It is through these avenues that divine order is reinvigorated in contemporary society.

A variant of the organic metaphor was proffered by Clements at the beginning of the 20th century. Clements popularized the conception of plant succession and plant associations. Plant sucessession is a process whereby the vegetation of a particular site passes through several stages (e. g. from grasses to shrubs to trees) until it reaches a final, climax formation. Accordingly, the progression of vegetative communities is relatively predictable, following a linear path of development. Left undisturbed by human activites, plant succession results in the formation of plant associations For Clements (1963, 125), this climax formation was an "organic entity." The plant associations which emerge are harmonious organisms, each species facilitating the growth of other compatible species. In the process of constructing his theory, Clements minimized the importance of biotic competition and disorder:

> The question of species and community values is much simpler than appears at first. It is not a matter of employing one to the exclusion of the other, but of taking advantage of their complementary relation. There can be no doubt that the community is a more reliable indicator than any single species of it (1963, 236).

Within each climatic zone, plant communities constantly develop to form an ideal organic form. In general, Clements expressed the unity and stability hypothesized by Lucretius centuries before.[2]

A recent manifestation of nature as machine is the Lotka-Volterra model. The model is named for A. J. Lotka and Vito Volterra, who studied, respectively, the dynamics of host/parasite dynamics and predatory fish and prey relations. According to this model, the interactions of predator and prey result in populations oscillating around a stable equilibrium. Predator and prey are coupled together, each checking the growth of the other. Thus, the prey population reaches its apex when the number of predators is at its lowest. In

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[2]A more recent manifestation of the organic model is the Gaia hypothesis.

turn, as the food supply grows, the predator population rises, eventually surpassing that of the prey. However, when the predator's resource base (i. e. prey) is exhausted and is no longer an adequate source of nourishment, the predator population crashes. Consequently, the prey population, unfettered by predators, increases once again until it reaches its maximum. The cycle then begins once more. Stability is achieved through the proposed unity of interrelated species (Scudo and Ziegler, 1978).

The Lotka-Volterra model continues to have a strong influence on biological theory. As is the case for many models, the original mathematical equation, which defined biological relationships in numeric terms, has been modified to incorporate additional environmental variables. Numerous studies currently fill the pages of theoretical journals (for example McLaughlin and Roughgarden, 1991; Takeuchi and Adachi, 1986).

The models described above embrace the notion of a closed world. The realm of possibility is defined and confined within predetermined limits. From this perspecitve, the natural world endures in its original state. Through scientific observation, the state of the environment may be discovered.

Chaos Emerging

Chaos was not unknown to the ancient world. Chaos was noted in Greek and Roman stories of creation. "First of all was Chaos born..." Hesiod declared, affirming it as the original state of existence (as quoted in Furley, 1987, 18). And later, Ovid (1968) stated:

> Before the ocean was, or earth, or heaven,
> Nature was all alike, a shapelessness,
> Chaos so-called, all rude and lumpy matter,
> Nothing but bulk, inert, in whose confusion
> Discordant atoms warred.

Yet, this condition did not last long, as it was essentially expunged by the literature of divine order and its descendents. Only recently, after centuries of submission, has the natural order begun to decay. Observations in several scientific fields now portray nature as transient and irreversible. As such, a growing trend in science is the recognition of disorder (Worster, 1995). In the following section, multiple forms of disorder and instability will be reviewed, as well as new paradigms governing environmental perceptions and dynamics. Disorder is manifest in the distention of nature, catastrophe, and biological failure.

Noted change within vegetative communities provides an example of nature distended. With the advent of palynology, change within floral communities has been quantified. Davis (1963), among others, has shown that plant communities do change over time in response to climatic fluctutations. Species commonly migrate to new locations in an effort to adapt to altered environmental conditions. More importantly, individual species react differently to specific environmental changes. While some species may remain unaffected by climatic fluctuations (thus remaining stationary), other species may become locally extinct as they settle land in new sites. These observations conflict directly with Clements' theoretical model of unified plant associations. Pollen records support the hypothesis that plant species are individualistic, adapting to their best advantage. The equilibrium of the plant community appears illusory. To date, any return to a primordial plant community remains unsubstantiated.

Exotic species are the paramount manifestation of such a disorder. Currently, research examining exotic species focus predominantly on the role humans play in their introduction. Yet, this preoccupation obscures the fact that long-distance dispersal is a natural phenomenon. Organisms have developed several mechanisms to facilitate dispersal. Although such events are rare, they may have a significant impact on regional biota. Moreover, distance may not be the critical factor inhibiting the successful transplantation of organisms. As Carlquist (1981) notes, "...adverse ecological conditions may be a greater obstacle to the establishment of a species in a new location than transport itself."

Animals, mobile and varied, provide other possibilities for instability. Competitive in the extreme, expansionist tendencies (exotic or otherwise) portend a world in transition. The formation of the Central American Isthmus is indicative. Riding along shifting tectonic plates, mammals of the Nearctic and Neotropical world converged on one another, devastating biotic communities after the fusion of North and South America. Relatively isolated until that point in time, South America's mammalian population suffered greatly. In South America, the native fauna experienced higher extinction rates than immigrants from North America. Today, as a result of immigration and subsequent speciation, 50% of South America's extant mammalian genera originated in North America. Conversely, only 21% of North America's mammalian genera originated in South America (Marshall et al., 1982).

In the short term, fire frequently decimates, alters, and reconfigures vegetative communities. Unpredictable in many respects, fire regularly prevents the realization of Clements' climax formation. Wildfire location and intensity varies according to local environmental conditions. Fire does not

simply remove vegetation, but also promotes the growth of fire-tolerant species. As a result, landscapes are often in a state of disrepair, comprised of multiple successional stages. In many settings, disclimax characterizes the extant vegetative community.

As such events indicate, "catastrophes" may play a significant role in the subsequent manifestation of the remnant environment. Cataclysmic events effectively reorder the physical environment. Catastrophes, moreover, may leave no trace of previous states of order. When the past is obliterated (biologically, seismically, volcanically), the present accrues the venere of eternity. In this way, catastrophic events may not betray the stability and rigidity of the divine order.

Failure is prevalent within nature. According to Reed Noss, "99 percent of all species that ever lived are now extinct" (in Takacs, 1996, 52). The life-span of species is limited. Again, the unity espoused by advocates of order is refuted. Mass extinctions, for one, have decimated flora and fauna, while simultaneously providing new opportunites for speciation.

The validity of order and stability has been attacked on two broad fronts: the mathematics of so-called chaos theory[3] and postmodern philosophy. Although both embrace the critical element of uncertainty, chaos theory and postmodernism are nevertheless fundamentally distinct. "While deconstruction subverts efforts to make itself into a universal system, chaos theory -- as the term itself suggests -- is expectantly regarded as a basis for a new foundational synthesis" (Knoespel, 1991, 102). As such, chaos theory and postmodernism are not interchangeable.

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[3]The term is a misnomer. Clearly, chaos theory embodies laws which are fundamental to its structure.

Bai-Lin (1984) defines chaos as "...a new regime of nonlinear oscillations, as a compromise between competing periodicities, as overlap of resonances, as accumulation of instabilities, as the prelude to turbulence." Chaos theory attempts to incorporate increasingly complex phenomena within a mathematical domain. Fluctuations previously excluded from scientific analysis are viewed as indicators of the non-linearity of natural processes. Small changes in environmental conditions may have large ramifications, as the trajectory is altered, culminating in a bifurcation point and pushing phenomena in new directions[4]. As a result, uncertainty is central to chaos theory:

> ...unless the initial conditions are stated with infinite precision, the smallest uncertainty in a strange attractor can quickly translate into macroscopic chaos. Because most real numbers are random, however, they cannot be stated with complete accuracy. (Hayles, 1990, 162)[5]

Moreover, "...infinite information is indistinguishible from total incomprehensibility ..." (Hayles, 1990, 163).[6] This paradigm differs considerably from Newtonianism, which claims the future is ultimately predictable when given initial environmental conditions.

Essentially, chaos theory legitimates the "noise" which was formerly banished from scientific consideration. Noise, here, has two meanings. First, of course, noise is a scientific abstraction, asserting that which is statistically invalid. Secondly, and more importantly for the present issue, noise signifies sound, and, in other words, movement from the statistical norm. As such,

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[4]In many respects, this coincides with the catastrophism mentioned above. Wilson (1981, 1) defines catastrophe theory as "...concerned with sudden and discrete changes in system state variables resulting from a slow, smooth and small change in one or more parameters."

[5]In a related context, it is difficult, if not impossible, to determine the "stable" primordial nature of the landscape. In North America, for example, the prehistoric landscape of Native Americans is commonly understood to represent "initial" natural conditions. Yet, it is now clear that Native Americans modified the landscape significantly (Denevan, 1992). Choosing a baseline is contentious (Graber, 1995).

[6]Theoretically, this situation is commensurate with a map that physically covers the entire earth. Precision and detail revoke the utility of the map.

statistical noise is a representation of auditory noise created by biological movements within the natural environment. Noise is the transient phenomena which has heretofore reverberated against theoretical models. Chaos theory is an effort to absorb aberrant behavior.

Conversely, postmodernism questions the validity of metanarratives (Lyotard, 1984). As every individual is spatially and temporally located within the environment, personal observations are inherently subjective. Consequently, perception and knowledge is biased. From this condition, instability arises. New metanarratives often signal the emergence of a new social, political, or scientific regime. This framework may be extended to account for natural processes. Biological organisms dominate the landscape until their adaptive capacities are superceded by another species. Thereupon, the onset of a new biotic community commences.

The appearance of stability (or instability) is directly correlated with the conceptual frameworks (e. g. metaphors) which guide human perception. The simplicity of stability belies its construction. Under closer inspection, it becomes evident that stability is dependent upon the perceptions of the observer. More precisely, the existence of stability is confirmed (or denied) by the length of time and spatial extent under consideration. These variables are not predetermined, but are instead defined by the previous experiences (knowledge) and predilections of the observer. The importance of these two variables cannot be overstated. In the former, the environment is theoretically stable if devoid of change for a single instant. Yet, as Foucault (1986, 23) noted in the context of Galileo's mobile earth, "...a thing's place was no longer anything but a point in its movement, just as the stability of a thing was only its movement indefinitely slowed down." In the latter variable, phenomena occurring outside the study

area may be ignored, even though they may be of special relevance to the situation at hand. As a result, the observer may unknowingly construct stability by restricting the data to be considered.

Importantly, a lack of stability is not equivalent with a lack of form. To the contrary, instability is defining the niche as temporal rather than predetermined. Expansion and contraction are central to this perspective. N. Katherine Hayles (1995) has termed this condition the "flux". The term is appropriate here, because it simultaneously implies form and movement. The "flux" of any given moment may not apply to any other point in time. In many respects, the term is antithetical to intellectual and political domination and control.

Thesis Position

Models of a static, ordered universe undoubtedly contain accurate observations of the natural environment. Plant succession often does proceed along a reasonably predictable trajectory of vegetation change. Predators do influence the quantity and spatial extent of prey species. In general, inter- and intraspecific competition regulates biological communities. Chaos theory and postmodernism do not catagorically refute the importance of such influences. Yet, to imply that biotic (and abiotic) relationships are locked within these structures is to take a leap of logic which is not substantiated by recorded observations. In no way does competition, in its multiple forms, necessitate regulation.

Numerous studies have shown that "nature" continually reinvents itself. The current manifestation of organisms is not the result of a natural symbiosis, but rather a reflection of past competitive struggles for resources within the

environment. It is life, in its various forms, transgressing old boundaries, creating new geographies, and redefining itself in order to gain a competitive advantage. As such, nature is not simply an object, but more importantly a process in a constant state of becoming.

The present thesis rejects models of order and stability in favor of recent models of uncertainty. As noted above, instability occurs at various temporal and spatial scales. In general, widespread phenomena should be more resistant to fluctuations and instability. Due to the difficulty of analyzing the natural environment, scientific studies often examine phenomena occurring at the macro-scale. Unfortunately, macro-scale stability may obscure chaotic movements at the micro-scale.[7] This thesis will focus primarily on natural events occurring at the micro-scale.

The preceding discussion illustrates a dichotomy in which disorder and instability are defined as the natural state, and in which order and stability are defined as an artificial condition. Therefore, to the degree that human social practices direct the landscape toward a state of stability, it may be considered a social construction. As the processes that define nature are obstructed and denied, they increasingly reflect human will rather than any concept of wildness. Thus, stability is a yardstick by which the rigidity and imperviousness of the socially-constructed earth can be measured. In the modern world, barriers in the form of social rules and regulations determine the acceptable behavior of nature.

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[7]For example, Figure 2 shows the prehistoric spatial range of Bison bison. Yet, such a diagram reveals nothing about the spatial behavior of individual members of the species within specific environments. The map is devoid of the biological imperatives which dictate bison life.

CHAPTER 3

GEOGRAPHIC AND HISTORIC SETTING

The present thesis will explore the impact of enforced stability within and around Yellowstone National Park. The region is an admixture of social and biological systems embodying stability and instability.

Physical Environment

Yellowstone National Park is situated in the northwest corner of the state of Wyoming. Northern and southwestern sections of the park also extend into Montana and Idaho, respectively. The vast interior of Yellowstone National Park encompasses approximatly 3,472 square miles of land. The park itself comprises one segment of a region known as the Greater Yellowstone Ecosystem (GYE). The GYE also includes Grand Teton National Park, several national forests, and scattered private settlements.[1]

Yellowstone National Park is nestled within the mountainous terrain of North America's continental divide. (See Figure 3.) Elevations vary considerably within the park, surpassing 11,000 feet in the east and descending to nearly 5,300 feet at the park's northwest entrance. The Absaroka Mountain Range runs the length of the park's eastern border. This region consists of steep peaks and narrow valleys. In the southwestern and central sections of the

[1]National forests include Beaverhead National Forest, Bridger-Teton National Forest, Custer National Forest, Gallatin National Forest, Shoshone National Forest, and Targhee National Forest.

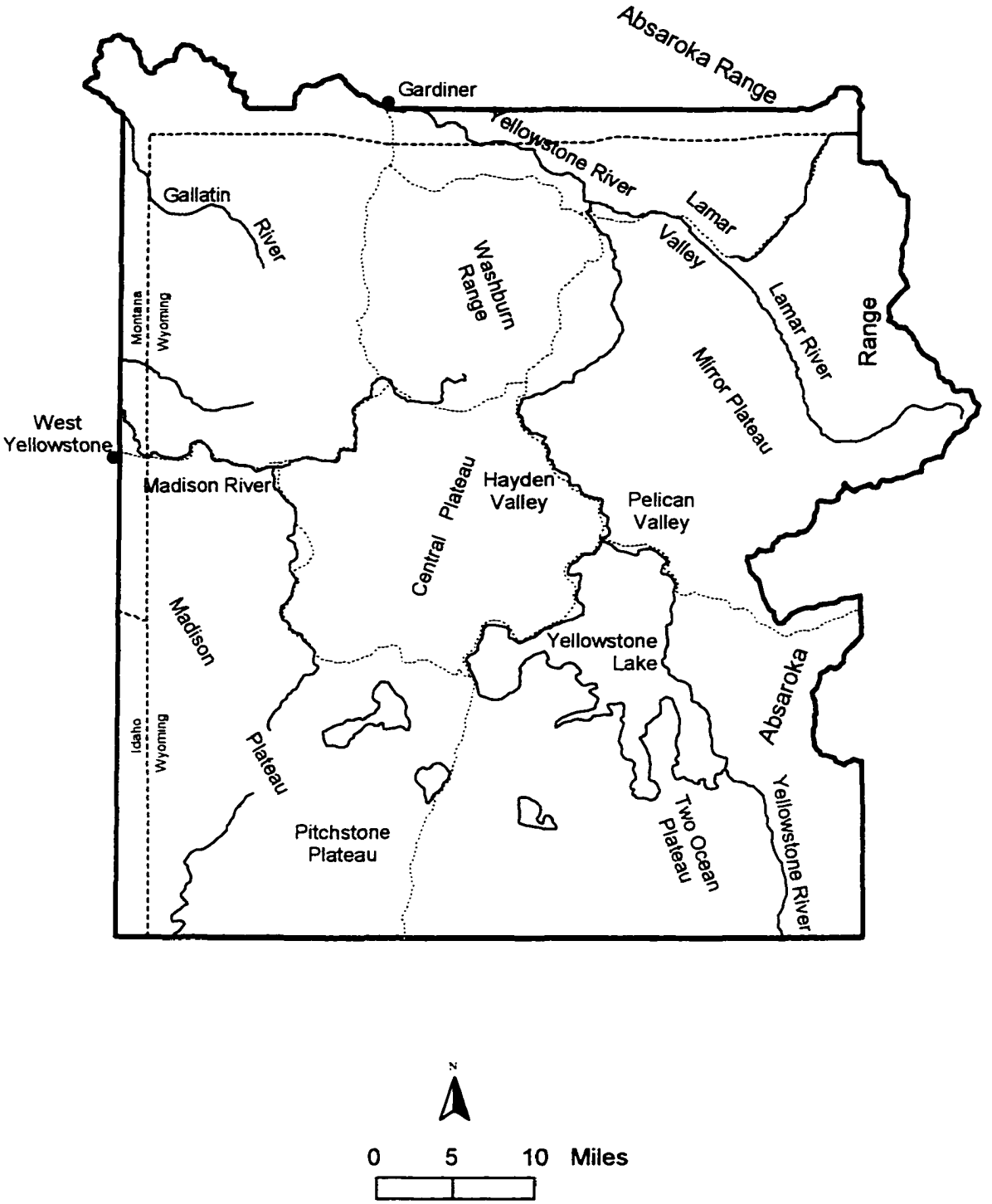

FIGURE 3. Yellowstone National Park.

park, plateaus predominate. To the north, stretching west from the Lamar River to the outlet of the Yellowstone River, low-lying valleys predominate.

Climatic conditions within Yellowstone National Park are typified by long, cold winters and short, cool summers. Mean monthly temperatures range from 10 F (- 12 C) in January to 55 F (13 C) in July (Yellowstone National Park, 1993). Annual precipitation, mostly in the form of snow, varies by location within the park. The southwestern region of the park recieves the greatest amount of precipitation (70 inches; 182 cm), while only 10 to 12 inches (26 - 31 cm) of precipitation fall at Yellowstone's northern entrance (Yellowstone National Park,1997). Mountain passes are usually covered by heavy snow during the winter, while some valley sites are lightly covered. Northwest of Yellowstone, near the town of Gardiner, Montana, the ground is often free of snow throughout the year.

Numerous rivers and creeks flow through the landscape. Chief among these is the Yellowstone River, which runs from Yellowstone Lake through Gardiner, Montana, and down the Yellowstone River Valley north of the park. The Madison River is the primary outlet to the west of Yellowstone. Several smaller rivers also exit the park, forming gradual slopes in the terrain.

In addition to these features, much of Yellowstone National Park is the caldera of a former volcano. As a result, thermal features, such as geysers, hot springs, and fumaroles, are abundant within the park. The majority are located in the southern half of the park, and at Mammoth Hot Springs. During winter, the ground surrounding thermal features often remains snow-free as hot water prevents the accumulation of snow (Meagher, 1973, 98).

Approximately 80 percent of Yellowstone National Park is covered by forested habitat types. Grassland and shrubland habitats predominate in the

remainder of the park. The primary factors influencing the distribution of plant species are precipitation, temperature, and soil type. The predominant rock types are rhyolite and andesite. The latter is relatively rich in nutrients. Sedimentary deposits formed during glacial periods are also distributed in several regions throughout the park.

Forest stands predominate in the park's mountainous regions and plateaus. Subalpine fir (Abies lasiocarpa) and lodgepole pine (Pinus contorta) are the most abundant species. Despain (1990,14) classified these as the climax and seral species, respectively. Subalpine fir is distributed at moderate and high elevations (above 8,000 feet) on both rhyolitic and andesitic soils. In moist locations, subalpine fir may descend to lower elevations (6,000 - 7,000 feet). Lodgepole pine is most abundant in drier, mid-elevation (7,000 - 8,000 feet) sites with rhyolitic soils. Douglas fir (Pseudotsuga menziesii) occupies similar sites (6,000 - 7,000 feet) on andesitic soil.

Grassland and shrubland are most commonly found at lower elevations, particularly in the northern regions of the park. Nonforested habitat types occur mostly on andesitic and sedimentary soils. Idaho fescue (Festuca idahoensis) and bearded wheatgrass (Agropyron caninum) comprise the park's largest grassland habitat type (7,500 - 10,000 feet), situated in the park's northern regions. Many of Yellowstone's large animal populations utilize this particular habitat. Big Sagebrush (Artemesia tridentata) and Idaho Fescue provide another important habitat in the Lamar Valley (6,800 - 9,500 feet). To the south, silver sage (Artemesia cana) grows on the sedimentary rock of Pelican and Hayden Valleys (7,000 - 8,000 feet).

Currently, Yellowstone National Park is home to the most diverse community of mammals in the lower 48 states of the U. S. Among these are

included antelope, bears (grizzley and black), bighorn sheep, elk, moose, mountain lions, and bison. However, the abundance of wildlife within the park during prehistoric times has been a subject of debate. Several authors have claimed that wildlife was sparse within the region (Yellowstone National Park, 1997, 22-29). Yet, new evidence appears to support the position that wildlife was, at minimum, well-distributed.

Concerning bison, Hadley (1990) found their remains within Yellowstone dating at least 960 $\pm$ 60 B.P. In a compilation of paleontological sites, Cannon (1992) listed several locations, inside and outside current park boundaries, containing bison remains. Analysis of blood residues left on prehistoric stone artifacts also indicated the lengthy presence of bison within Yellowstone (Yellowstone Science, 1995)[2]. In addition to fossil evidence, bison were also observed in the region by several explorers prior to 1900. During his exploration of the Yellowstone Valley in 1858-1860, General W. F. Raynolds described the region as "...literally black with buffalo, grazing in an enormous herd whose numbers defy population" (in Beal, 1950, 4). In June, 1870, A. Bart Henderson observed "...thousands of buffalo quietly grazing..." above Hellroaring Creek at a location now called Buffalo Plateau (in Haines, 1977, 81). In 1875, William Ludlow reported that bison were "abundant in the Yellowstone Park" (Ludlow, 1876, 71). Schullery and Whittlesey (1992) reviewed numerous other bison sightings within the region from 1806 to 1881.

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[2]The only date listed for bison blood residue was 9,000 B. P. The date is curious as it predates estimates of the origination of the extant bison species (see Chapter 5). The article notes that the method of blood analysis is as yet unable to distinguish between closely related species. As such, blood residue may be from an ancestor of the modern species.

Historic Setting

With the support of railroad interests, Yellowstone National Park was established by Act of Congress on March 1, 1872. The park was the first designated wilderness reserve in the world. The creation of the park resulted in the transformation of the landscape, as settlement patterns and wildlife communities changed during the following century. The protection of wilderness effected the creation of a tourist destination.

Prior to the establishment of Yellowstone National Park, Indian populations undoubtedly passed through the terrain and utilized its resources. Yet their presence was probably less than in other regions (Yellowstone National Park, 1997, 26). The mountainous terrain which comprised much of the park's lands was not as hospitable as other regions across North America. During the 1700's and 1800's, Indian tribes that inhabited the region included the Blackfeet, Crow, Shoshone-Bannock, and Sheepeaters[3] (Janetski, 1987). After 1872, Indian tribes that had maintained a presence within the general vicinity of the park were discouraged from entering the park by a U. S. military presence (Bartlett, 1985, 21-28).[4]

A handful of settlements emerged in the years following the park's creation. Chief among these was Gardiner, Montana, located outside the northwest corner of the park. The town, officially established in 1880, served as a source of goods and labor for personnel within Yellowstone National Park. Gardiner's prominent position within the region was solidified when the

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[3]Sheepeaters were a specific group of Shoshone speaking Indians that hunted bighorn sheep within Yellowstone National Park.

[4]The paradoxical situation of bison and Indians is both ironic and disconcerting. While Indians of various tribes were prohibited from entering Yellowstone National Park, bison have been prohibited from leaving the park. The prehistoric relationship which existed between these two populations has been dissolved by government management policies.

Northern Pacific Railroad arrived, after years of migrating up the Yellowstone Valley, and established a Park Branch in 1903 (Haines, 1977).

The town of West Yellowstone, which was relatively isolated in comparison to Gardiner, was established in 1908 when the Union Pacific Railroad arrived. Located just south of the Madison River, and adjacent to the park's western boundary, West Yellowstone also served as entrance and source of supplies. As in Gardiner, stagecoaches carried tourists into Yellowstone National Park.

Both Gardiner and West Yellowstone have grown since their origination. According to Bartlett (1985, 44), in 1883 Gardiner contained a "...heterogenous population of nearly two hundred souls, most of whom were living in tents." In addition, several stores were conducting business. In West Yellowstone, three permits were granted to construct stores, hotels, and residences in the original six block townsite (Eagle, 1978). Today, the population of each town has increased, but only slightly. Permanent residents number approximately 1,000 for Gardiner and West Yellowstone. However, the local population fluctuates throughout the year as tourists enter the region to visit Yellowstone National Park.

To the northeast of Yellowstone, Cody, Wyoming (affiliated with Burlington Railroad) and Cooke City, Wyoming, also emerged. Regions to the south and southeast of the park were largely inactive until recently, as the mountainous terrain was thought to be impassible. Consequently, early road construction was concentrated in the northwestern and western sections of the park.

Although these towns emerged, in large part, due to the prospect of tourism, the ranching of livestock took place coincidentally or soon thereafter.

According to Whittlesey (1995), cattle were grazed in the Greater Yellowstone Ecosystem as early as 1869. Several ranches were located north of the park, some of which held bison (usually no more than a couple) as well as cattle. In addition, cattle were permited to graze, on several occasions, within Yellowstone National Park. The Yellowstone Park Association, for one, brought 91 cattle (and 300 sheep) into the park in 1887. (Many "incompatible" activities were permitted within the park until after the turn of the century.) On one occasion, a bison calf was observed feeding directly from a domestic cow (Whittlesey, 1995). Thus, by the beginning of the 20th century, cattle and bison had multiple opportunites to intermingle.

Yellowstone's bison population was substantially reduced by the turn of the century. By 1902, only 23 bison lived within the Greater Yellowstone Ecosystem. Fearing the eventual extinction of the species, the United States Calvary was charged with the responsibility of protecting the park's bison. In addition, bison from Plains states (Montana and Texas) were transported to the park to augment the herd. The bison were ranged like livestock at Lamar Ranch until the population was deemed viable. In time, as the herd grew in numbers, the National Park Service adopted a management policy of periodic herd reductions on the northern range. By 1954, the total bison population was 1,477. According to park scientists, however, rangeland within the park was not capable of maintaining a bison population of that size. As a result, bison were periodically removed throughout the park.[5] By 1967, the last year of removals within Yellowstone National Park, bison census estimated a population of 397 bison in the park (Meagher, 1973).

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[5]Determining the carrying capacity of a range is, in many respects, a subjective process. Depending on the background of a management employee (e. g. wildlife manager, range manager), the definition of carrying capacity changes. See Coughenour and Singer (1991).

Park policy changed following the recommendations of the Leopold Report (Leopold et al., 1963). This report advocated a change in park wildlife management which would create a "vignette of primitive America" (Leopold et al., 1963, 32). For the park service, this meant that human intervention should be avoided, and population reductions should be achieved through natural processes. As a result, the bison population increased in subsequent decades, surpassing 2,100 by 1985.

Cattle production within the GYE also increased during this time period. According to Day (in United States Senate, 1995, 69), over 400,000 head of livestock are permitted to graze on National Forest Land within the GYE, of which 143,000 are cattle and calves.[6] As of 1997, in Gallatin National Forest alone, there were 132 grazing allotments with approximately 35,000 cattle animal unit months (Quane, 1997).[7]

Summary

The simultaneous growth of cattle and bison populations has culminated in conflict. The social, economic, and biological systems presented above are now in the process of redefining their relationship. This fusion of diverse biological and social functions within a single region has coalesced into a discourse on the disease brucellosis (Keiter and Froelicher, 1993; United States General Accounting Office, 1992; United States Senate, 1995).[8] Brucellosis is a disease that causes pregnant bison to abort their fetuses. The

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[6]The total also includes 265,000 sheep and 1,300 horses.

[7]An AUM (Animal Unit Month) is defined as the amount of forage needed to sustain one cow, five sheep, or five goats for a month.

[8]This is true despite the fact that there has not been a verified transmission of brucellosis from bison to cattle in a natural setting. The only verified transmission of brucellosis from bison to cattle occurred in a laboratory setting (Davis et al., 1990).

disease may be transmitted through contact with infected reproductive materials (such as reproductive organs), aborted fetusus, or forage contaminated by fetal material. The orginal source of the disease is still a matter of debate, but it is now believed that Yellowstone's bison contracted brucellosis from domesticated cattle (Meagher and Meyer, 1994). The mixing of cattle and bison, as noted by Whittlesey (1995), supports this contention. The presence of brucellosis within the Yellowstone bison population has been the basis for spatial restriction of the species.[9]

At a more basic level, this is a conflict between stability and instability. Within the Greater Yellowstone Ecosystem, the risk inherent in the movement and fecundity of bison is contrasted against the efficiency and security of production and habitation. These conflicting forces must be understood in greater detail in order to analyze and critique the structure and function of bison management policy.

[9]If Meagher and Meyer are correct, the social construction of Yellowstone bison biogeography develops another layer. As a result of the introduction of brucellosis, management policies become self-fulfilling and mandatory. The irony, of course, is that cattle ranchers are now seeking to protect their livestock against a disease which they themselves may have introduced.

CHAPTER 4

THE CREATION OF STABILITY

Recalling Hesiod's and Ovid's stories of creation, Chaos was the original state of existence. Therein was presented a binary opposition juxtaposing chaos and civilization.[1] In order for civilization to emerge, Chaos had to be vanquished. Order and stability must be carved out of the pre-existent materials of the natural environment.

Although stability may undoubtedly be constructed in numerous ways, the present thesis will analyze two forms of enforced stability in particular: property and biodiversity. In this chapter, the theoretical link between property, biodiversity, and stability will first be established. Thereafter, the manner in which the concepts of property and biodiversity limit the range of Yellowstone bison will then be illustrated.

Property and its Role

Property is defined as any object that comes under the recognized authority of a single individual or collection of individuals. In the present context, property includes livestock, housing, and the land upon which these stand. Because land contains other forms of property, many of which are

[1]This may have been a literary technique designed to augment the grandeur of Greek and Roman civilization by means of stressing the disorder of earlier ages.

perceived to be essential to the maintenance of life, it often becomes the object of primary concern. As such, it is also a source of struggle and conflict.

At this point, it should be noted that the common distinction between private property and public property will not be stressed here. Although they are not identical, private and public property are both subject to the will of their controlling authority. Accordingly, they will be characterized as sister species, more similar than dissimilar. While it is generally accurate to assume that private property has greater meaning (and value) to its owner, it is also true that governmental authorities have a vested interest in the use (and productivity) of public property. The relationship between owner and land is simply more distant in the case of public property. As such, private property may be classified as core entities, or "hot zones". In the current situation, these core entities are represented by the ranches bordering Yellowstone National Park. These private ranches are the focal points around which the conflict is centered. For its part, adjacent public land is managed by state authorities to enhance the social and economic environment within the region. Thus, public land embodies local interests, exhibiting the parochial interests of state authorities, such as the Department of Fish, Wildlife, and Parks, or the Department of Livestock. Public land is not free from the general directives of society.

The roots connecting property, stability, and order extend far back into history.[2] Liiceanu (in Korosec-Serfaty, 1985, 70) tied these concepts together through the etymological origins of the word *oikos*:

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[2]Glacken (1967,293) noted that Early Christian thinkers viewed human settlement as the final stage in the creation of the natural order. "The idea that man lived as God's helper in finishing the creation, in a finite, created, and destructible world, could be easily expressed by rural figures of speech of the Bible.... The occupations of towns and rural life - tilling, cutting of trees, irrigation, grafting, building stone fences, quarrying - could easily persuade men they were partners of God in improving the creation." Conversely, the present thesis does not contend that property facilitates the construction of the "natural order" as presented in Chapter 2. This idea, in general, appears to have been discredited.

> It was the order in which took place and unfolded the fundamental actions of life. Oikos meant birth, childhood, kinship, all possessions, their management, the conception of descendants, and the framework for their birth.

Korosec-Serfaty (1985, 70) states it differently. "For the Greek, we read that the *oikos* (house) did not refer to the dwelling as building but was a guarantee of stability." From this perspective, property ensures the predictable nature of events to come.

In time, the justification of property was correlated with its ability to bring about order (and thus efficiency). St. Thomas Aquinas claimed that property was necessary for the maintenance of human life. Property was essential "...because human affairs are conducted in more orderly fashion if each man is charged with taking care of some particular thing himself, whereas there would be confusion if everyone had to look after any one thing indeterminately" (Aquinas, 1929, 66). Locke (1967, 304) continued this line of reasoning in stating that the appropriation of resources was justified as long as they were used "...to the best advantage of Life and convenience." More recently, Adam Smith (1976) incorporated this into the capitalist mode of production.

The preceding statements establish a link between property and stability, but they do not explain the manner in which property creates stability. For this, it is necessary to understand the historical setting of Locke's writings. In the 17th and 18th centuries, monarchs were invested with the divine right of kings. Rulers possessed virtually unlimited authority, which legitimated, when necessary, intrusion into the daily lives of citizens. Thus, uncertainty prevailed. Within this social structure, Locke sought to protect individuals against the vagaries of kings by establishing "natural rights". Natural rights provided a metaphysical barrier to repel the divine right of kings. Land which supplied the basic needs of an individual thus became untouchable. The right to exclude

external threats was essential to Locke's theory. In this manner, internal stability was created through the construction of rigid property lines. Property lines became virtually impervious via the moral authority of "natural rights". Subsequent theorists adopted the logic of Locke's writings. Adam Smith (1976, 136), for example, classified property as "most sacred and inviolable". Papal authorities subsequently followed this trend (Fortin, 1992). It is through these sanctions that property has retained its impervious quality.

Perhaps the simplest way to comprehend the strength and imperviousness of property lines is to examine the relation between the body (and "self") and property. Viewed in this manner, property lines are transformed into the metaphorical equivalent of the skin of the body. Intrusion is strictly prohibited without the consent of the person or property owner involved. Locke understood this when he stated that "...every man has a Property in his own Person. This no Body has any right to but Himself" (Locke, 1967, 305). In this manner, concepts of self-preservation and self-defense were transferred from the body to property.

Property and body are also related through the process of appropriation. Locke provides an early example of this conceptual link:

> The Labour of his Body, and the Work of his Hands, we may say, are properly his. Whatsoever then he removes out of the State that Nature hath provided, and left it in, he hath mixed his Labour with, and joyned to it something that is his own, and thereby makes it his Property." (Locke, 1967, 305-306)

In the process of transforming an element of the landscape, ownership is transferred from the state of nature to the authority of the laborer. In addition, labor provides the justification for private use: "[Property] being by him removed from the common state Nature placed it in, it hath by this labour something annexed to it, that excludes the common right of other men" (Locke, 1967, 306). This is warranted since "...Land that is left wholly to Nature, that hath no

improvement of Pasturage, Tillage, or Planting, is called, as indeed it is, waste;..." (Locke, 1967, 315). As a result, "...labour makes the far greatest part of the value of things..." (Locke, 1967, 315). The altered landscape is thus positioned closer to the individual than to the state of nature.

Other than its role in providing sustenance and ensuring self-preservation, Locke's appropriated land appeared to hold little meaning for its owner. In the next few centuries, however, property was transformed from a utilitarian object into an extension of one's personal identity. While Locke's labor theory certainly had (and continues to have) a profound influence on the American landscape, subsequent perspectives on environmental interaction may be more influential, since they fuse an individual and his or her possessions into a single, inseparable entity.

One strength of these modern theories is their grounding in objects of the physical environment. Through the process of dwelling and habitation, an individual becomes linked to his or her surroundings. By manipulating objects, and thereby "generating order" (Korosec-Serfaty, 1985), a place gradually becomes associated with its resident. A new order is constructed which serves the needs of its inhabitant. Over time, an individual's physical surroundings are incorporated into his or her identity. The distinction between an object and the self becomes blurred. In this vein, Lang (1985, 203) called the home the "second body". Moreover, following this logic, physical objects (property) are a prerequisite for self-development and the attainment of personhood (Radin, 1982).

Establishing a dichotomy that separates what is owned (inside) from what is not owned (outside) has additional psychological value. Through this distinction, one's identity is extracted from the surrounding milieu. This identity

is preserved by withholding access from, and "keeping secrets" from, outsiders. Conversely,

> To demand "a full confession", that is, in the case of the home, total availability, openness, and transparency, amounts to demanding a complete surrender from the dweller. Hidden things and places help to situate the boundaries of the self and help to gain confidence in one's own capacity to control one's "inner self". (Korosec-Serfaty, 1985, 74)

Disclosure is equivalent to abdication of authority, as boundaries are dissolved and possessions are subsumed by the world-at-large. One's personality is maintained by this division, since it differentiates an individual, and his or her possessions, from all others. In contrast, personal identity is impossible without this construction.

It is evident that social theorists have successfully developed and promulgated the means to legitimate the accumulation of property. Whether through the metaphysics of "natural rights" or appropriation through habitation, the link between man and property is widely accepted and deeply felt. Indeed, this union appears to have become more complex over time. For many, the fate of the individual is intertwined with the fate of his or her possessions. The goals of exclusion, stability, and self-preservation apply equally to body and land. As such, the acknowledged right of property owners to exclude may in fact be an attempt to induce homeostasis on the landscape.

In many respects, the theoretical link between person and property is legitimated by the American legal system. The influence of John Locke is clearly evident in the writings of America's founding fathers. As James Madison (1961, 339) asserted, "Government is instituted no less for protection of the property than of the persons of individuals." From this perspective, property necessitates the formation of government. The Bill of Rights emphasizes the inviolable nature of property in the third, fourth, and fifth amendments. The

Supreme Court, in defining the limits of these amendments, has generally upheld the importance of property in the daily lives of individuals.

Of particular significance are the fourth and fifth amendments.[3] The fourth amendment, which protects the individual against unlawful search and seizure, illustrates the ambiguous nature of person and property. Although the amendment is generally associated with the sanctity of private property, court rulings have extended its historical meaning to include the protection of the individual. In Warden v. Hayden, the Supreme Court stated "...that the principal object of the Fourth Amendment is the protection of privacy rather than property,..." (in Radin, 1982, 999). More explicitly, in Katz v. United States, the court ruled that "...the Fourth Amendment protects people, not places" (in Radin, 1982, 997). In legal matters, the protection of "papers" may be the apex of the person/property relationship. "Papers", in this context, represent the physical manifestation of human consciousness. The ambiguity of the language, in which "person" and "property" are virtually interchangable, indicates the intense degree of cohesion that binds the former to the latter.

The fourth amendment also validates the previously mentioned inside/outside dichotomy. In Payton v. New York, the Supreme Court ruled that warrantless arrests in public were constitutional, while those conducted in the suspect's home were unconstitutional. While the right to privacy is far from absolute, it is evident that the home, in all of its manifestations, is beyond the reach of governmental authority in many situations.

While the fourth amendment protects the individual against intrusion, and thus the "threat of discontinuity", the fifth amendment protects individuals from the unlawful "taking" of property. In these situations, the rupture between owner

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[3]The third amendment, prohibiting the quartering of soldiers, is not relevant here. Nevertheless, the amendment expresses the sanctity of property rights in another context.

and property is permanent. Thus, due to the finality of these schisms, and strong attachments to personal possessions, the Court requires the government to follow specific procedures to ensure due process. Before exercising the power of eminent domain, the government must show that there is a "compelling state interest", and that the proposed project is the least intrusive of all available alternatives. Furthermore, when these criteria are met, the government is required to pay the affected individual or group "just compensation" for the taking of their property (generally land). The advent of just compensation has a long history in the United States, preceding the writing of the Constitution and dating back to the 1600's (Ely, 1992). Yet, despite the provision of monetary compensation, the transfer of ownership commonly takes the form of a struggle. In some instances, the power of eminent domain may resemble the brutish intrusions of kings and queens. For this reason, the government may be reluctant at times to exercise the power of eminent domain.

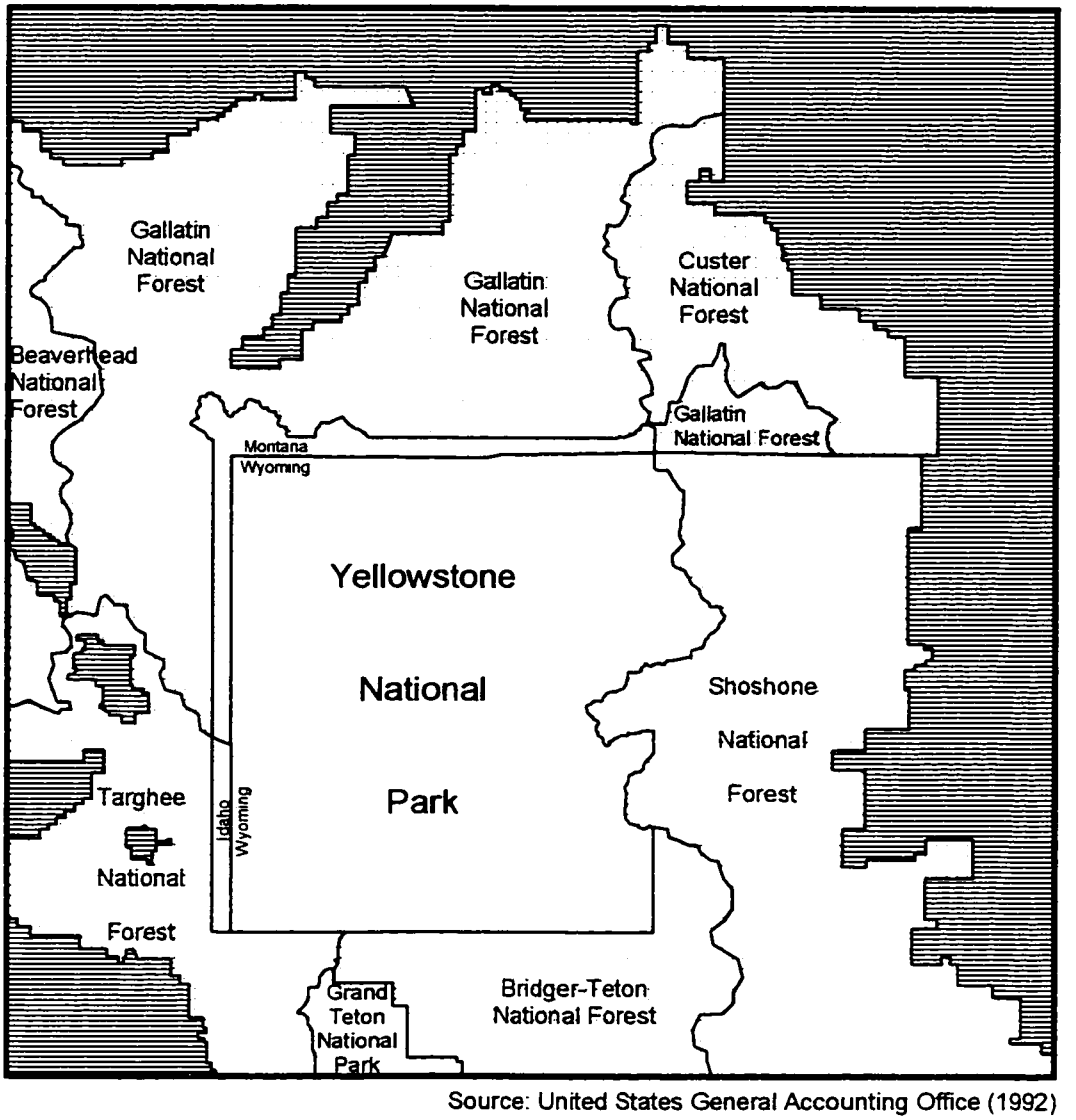
To this point, I have focused on the internal stability of property. Yet, property is also stable in its relation to other elements within the environment. In the first place, by virtue of its abstraction, property is impervious to the destructive forces of nature. Secondly, by eliminating use (or physical presence) as a requirement for establishing (and maintaining) property rights, property has been transformed into an immobile entity. Territory no longer migrates with its possessor. Property is thus geographically located, and essentially locked onto the physical terrain. Finally, via the rules of inheritance, property can (and generally does) outlive its owner. It has the potential to persist through time.

The combination of internal and external stability, and its implicit recognition in the American legal system, have placed a heavy burden on the

existing remnants of North American wildlife. By design, the function of property is to overcome, rather than accommodate, nature. As Sax (1991, 77) brashly noted, "... A fundamental purpose of the traditional system of property law has been to destroy the functioning of natural resources." To the extent possible, land is redirected toward the will of its owner. In the current situation, Reading et al. (1994) found that nearly two-thirds of the residents of the Greater Yellowstone Ecosystem believed that ecosystem management would result in increased governmental control over the region. More specifically, 70% of the respondents thought the adoption of these management principles might, in fact, be an attempt to control development in the region's lower elevations. (Such lands are critical, as they may provide snow-free winter range for Yellowstone bison.) Clearly, ecosystem management implies a loss of control and a loss of stability.

The end result of the human accumulation of property is the reduction of land available to wildlife. Certain species, such as Bison bison, are restricted to areas unappropriated by society. Rigid property lines limit a species' potential to expand its range. Thus, property has a direct causal impact on the biogeography of selected, undesirable species.

How, then, do these factors manifest themselves in the current conflict between bison and rancher? Figure 4 is a general illustration of land ownership within the Greater Yellowstone Ecosystem (GYE). Figures 5 and 6, respectively, indicate the present status of land ownership in the critical regions surrounding Gardiner and West Yellowstone, Montana. Land within Yellowstone National Park is managed by the National Park Service. Bison, and other wildlife, are given priority over economic and social issues within this



Source: United States General Accounting Office (1992)

FIGURE 4. General Distribution of Land Ownership in the Greater Yellowstone Ecosystem.

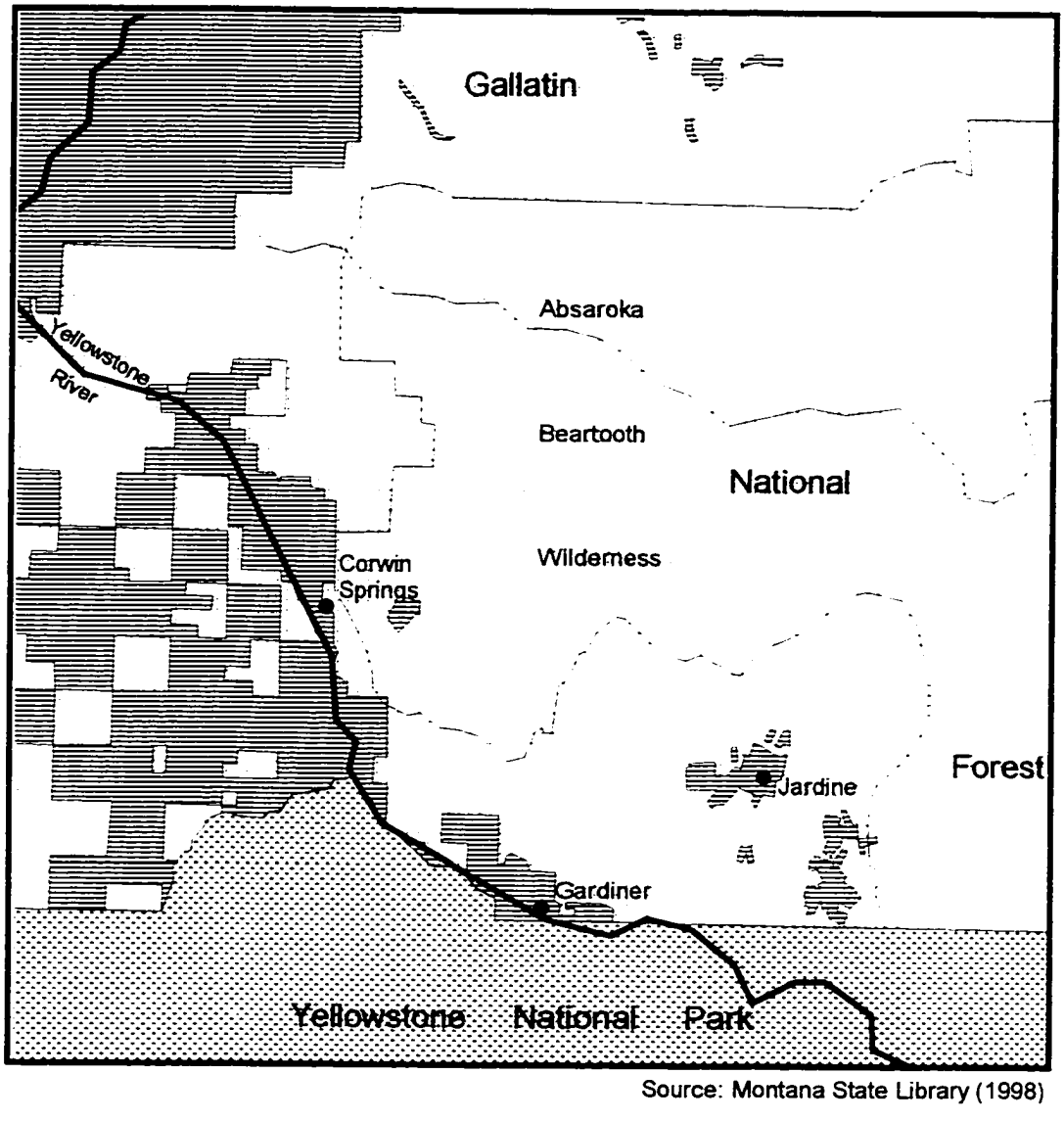


FIGURE 5. Land Ownership in the Region of Gardiner, Montana.

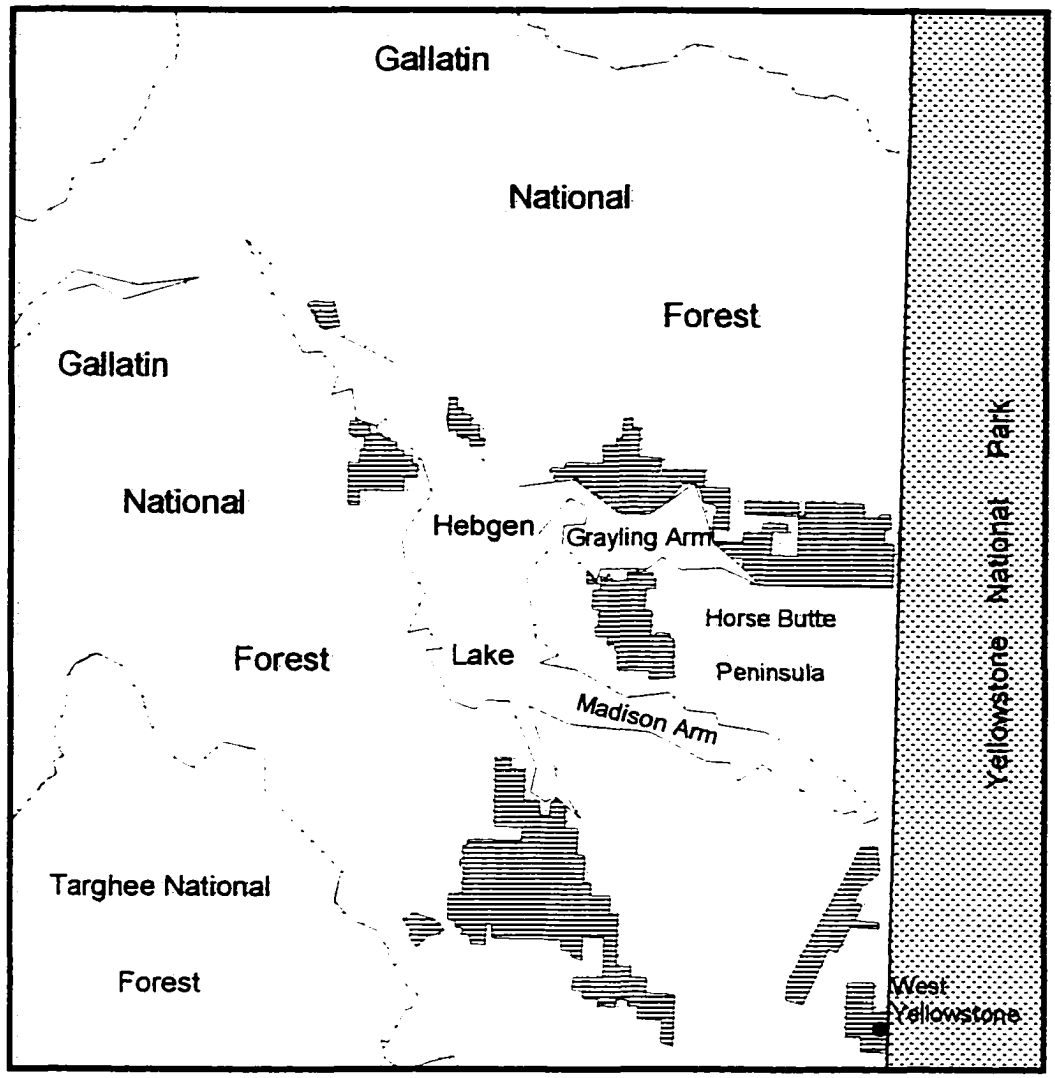


FIGURE 6. Land Ownership in the Region of West Yellowstone, Montana.

region. Federal law states that the National Park Service's primary goal is to "...conserve the scenery and the natural and historic objects and the wild life therein..." (Montana Department of Fish, Wildlife and Parks et al., 1990, 5).[4] Activites that threaten this objective are prohibited within the park. Hence, this law effectively establishes a "place" for bison to exist, unfettered by the encroachment of civilization.

The national forests which surround the park are managed for "multiple use". This includes forestry, mining, and petroleum extraction (Power,1991). Economic activities maintain a strong presence in these regions. As noted earlier, a substantial amount of cattle (and other domesticated animals) are grazed in the national forests (Chapter 3). These numbers indicate that national forests within the GYE have been appropriated, to some extent, by the livestock industry. Furthermore, while grazing allotments are situated on public land, they contain private property in the form of livestock. Thus, the identification of allotments as "public" or "private" land is debatable.

Private land comprises a small percentage of the GYE. Nevertheless, debate over these sites has dominated public discourse. In addition to the ardent protests of local residents, the state commonly emphasizes its role as the defender of local property rights. Thus, the concept of property rights may be "called into action" even when they are not applicable. In this manner, the state's interests are minimized by asserting the inalienable rights of individuals.

Local "fear" of bison centers on the potential transmission of brucellosis to grazing cattle (Bozeman Daily Chronicle, 1994; McMillion, 1995b). However, the removal of bison is legitimated by other concerns. These include protection of structures (such as fences and houses), protection of horses (from being

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[4]The Organic Act was ratified in 1916.

gored), livestock feed, and personal safety (McMillion,1997a; Haines, 1997). In 1991, 90 bison-related complaints were filed with the Montana Department of Fish, Wildlife and Parks (National Park Service, 1997a). For this reason, the eradication of brucellossis (if at all possible) would not necessarily result in the free reign of bison[5].

Quite distinct from its national image, many local residents consider the bison a scourge. The aesthetic value which many people ascribe to bison are overwhelmed by the spectre of economic devastation. These feelings are evident in the comments of one local rancher:

> If the U. S. Government cannot or will not clean up the diseased buffalo, elk, or whatever animals or people have brucellosis in Yellowstone Park and get Yellowstone Park brucellosis-free like Montana, Wyoming, Idaho and other surrounding brucellosis-free States, then just send in the U. S. Marine Corps with infantry and planes and helicopters and kill every buffalo, elk, until there's no more brucellosis left, just like when a ranch gets brucellosis.... (Gibbs, in United States Senate, 1995)

While these comments may not represent the majority of local residents, they do reflect a desire to limit the range of Yellowstone bison. Ranchers are demanding the creation of a buffer zone, which effectively separates bison and cattle. With the support of the government, property rights are extended by the creation of this buffer zone. For many, this buffer zone should extend into Yellowstone National Park.

Royal Teton Ranch, the residence of the Church Universal and Triumphant, is perhaps the focal point of the land conflict. The 12,000 acre ranch is located just north of the Park, sharing 4 1/2 miles of common boundary. State authorities have been called to the site on several occasions to remove bison (Associated Press, 1995a; McMillion, 1997c). Upon the request of

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[5] Elk within the region also carry brucellosis. Any serious attempt to eradicate the disease from the GYE would have to consider the potential impact of local elk herds. To date, this has been largely ignored.

Church authorities, hundreds of bison have been shot on the ranch over the past decade. The Church has repeatedly stated their dissatisfaction with the Park Service's management of Yellowstone's bison herds. In 1995, the Church won permission to erect a fence along its borders if it was not satisfied with the government's management of Yellowstone bison (Associated Press, 1995c).

Despite these events, not all residents of the GYE support the removal of bison. Many residents, particularly those employed in the tourist and service industries, believe that abundant wildlife is critical to the economic health of the region. Some residents express their opinions by denying state wildlife authorities access to their property. In another manifestation of the fourth amendment, state authorities cannot shoot bison on private land without the consent of the property owner. Some officials bemoan this constitutional "right", since owner denial of consent effectively supercedes state law and directives. Nevertheless, wandering bison invariably leave these refuges, and are ultimately removed by state authorities.

Biodiversity and its Role

The concept of biodiversity has also been successfully propagated by its adherents. Theories developed in scientific circles during the past two decades are now understood (to varying degrees) by the general public. Moreover, society has internalized these concepts, and recognized the limitations they place on growth and consumption. In this context, stability is spatially extended from the home to the ecosystem.

In a sense, "biodiversity" is the end result of ecological concepts produced during the last century (Takacs, 1996). During that time, scientists

observed biological interdependence in myriad species and divergent settings. Accordingly, simple predator/prey relationships were expanded to include seemingly irrelevant species. Species survival was now predicated upon a multitude of direct and indirect factors. Species at the highest trophic levels became dependent upon species at the lowest trophic levels. As the number and intensity of biotic relationships increased, species were redefined as components of an interlocking web of life. Eventually, the structure and function of this web superseded its constituent species as the subject of primary concern.

Scientists generally agree that the processes, or interactions, taking place within an ecosystem are the source of its health and integrity. Nevertheless, these processes emerge through the behavior of discrete organisms. Thus, the ecosystem and its constituent species are mutually dependent. The removal of a species has the potential to disrupt an entire ecosystem. Vital functions, previously performed by a species, are left undone. Consequently, the stability of the ecosystem is reduced as symbiotic relationships are broken by altered environmental conditions.

Predating the term "biodiversity", Aldo Leopold expressed similar beliefs when he recounted (at a later date) the effects of the government eradication program on the Kaibab Plateau of northern Arizona. From 1906 to 1931, government employees hunted mountain lions, wolves, coyotes, and bobcats in an attempt to eliminate predators from the region. Although Leopold supported these management procedures at the time they were implemented, he subsequently blamed them for the mule deer irruption which followed. The mule deer population soared from 4,000 in 1904, to an estimated high of 100,000 by 1930. Clearly, the removal of predators had brought about

disorder.[6] For Leopold, this outcome was the result of a misdirected management policy. In his opinion, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community" (Leopold, 1966, 240).

Further detail on the growth and acceptance of these principles goes beyond the scope of this paper. The relevant aspects of biodiversity have already been implied. Nature undisturbed progresses in an orderly fashion. Biological diversity enhances the stability of the ecosystem. The loss of biological diversity should be avoided, as it may result in unexpected consequences.

Fear of dire consequences has led to caution. As Hugh Iltis (in Takacs, 1996, 89) stated, "It is just enormously stupid to throw away the parts. I mean, why destroy something that is irreplacable and just throw it away when we don't even understand what it's all about?" Here again, the implications of disorder take precedence. These concerns, while certainly valid, allude more to the unknown ramifications of biological loss than the actual extinction of a species.

Despite the scientific support which "biodiversity" provides for the defense and protection of individual species, this thesis does not intend to portray it as a worthy adversary of public and private property. Such a position would ignore the political context in which "biodiversity" must operate. Although most biologists may relish the prospect of species growth and prosperity, these ideals are commonly subverted under the realm of economic efficiency and social justice. The concept of biodiversity itself may be manipulated by interested parties to control the "harmful" effects of wildlife.

For species that come under the purview of management agencies, the concept of biodiversity may have a significant impact on their spatial extent.

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[6] It should be noted that Botkin (1990) questions Leopold's conclusions. He believes the irruption may have resulted from the reduction of livestock in the region.

Biodiversity: 1) ensures (to the extent possible) the continued existence, and geographical location, of a species; 2) may restrict the spatial range of a species through the numeric definition of the Minimum Viable Population; and 3) may restrict the spatial range of a species through the exclusion of exotic species. In the context of the dispute between ranchers and bison, the first and second impacts are relevant.

Like all other species, bison fall within the theoretical domain of biodiversity. Apart from their national image, bison have value in their biological and genetic uniqueness. As such, should bison numbers fall below a designated threshold, they would be legally protected by the Endangered Species Act. The Act, in addition to protecting species, has provisions "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved" (Montana Department of Fish, Wildlife and Parks et al., 1990, 6). Thus, the land which endangered species require is preserved[7].

Bison are in little danger of becoming extinct, however. Even if the bison of Yellowstone were to be eliminated, bison would still exist in numerous enclaves such as Custer State Park, South Dakota, Wichita Mountains Wildlife Refuge, Oklahoma, Fort Niobrara Refuge, Nebraska, National Bison Range, Montana, and numerous private ranches. Currently, the national bison population is estimated to be 200,000 (United States Department of the Interior, 1995). These dispersed herds, in effect, weaken the land claims of Yellowstone bison. Virtual reservoirs, these herds could be enlisted to restock Yellowstone if necessary. In such a case, biological diversity would not be significantly reduced if the Yellowstone herd were removed. In Fund for Animals, Inc. v.

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[7]In a sense, this concession mimics Locke's right to property, in that land is equated with preservation and is thus undeniable.

Lujan (1992), the court validated this viewpoint in stating that bison reductions were legal since the Yellowstone herd was not genetically distinct from other herds.

While "biodiversity" serves as a buffer against human encroachment, it also provides the means by which society may alter a species' range to accommodate valued economic and social practices. The Minimum Viable Population (MVP) states the level at which a species is reasonably safe from the prospect of extinction. Stability is potentially threatened when a species' population falls below this level. Conversely, population changes that occur above the threshold of the MVP do not jeopardize ecosystemic stability. Accordingly, abundant species can be "harvested" for financial gain, or "cropped" to avoid economic loss, as long as their numbers are not brought below the MVP. Furthermore, these removals can be targeted at specific geographical locations.

Of course, the MVP has to be determined. Although scientific matters, and their official pronouncement, are commonly couched in objective terms, they are, in fact, often subject to the political atmosphere in which they exist. While scientific uncertainty boosts the MVP, economic and social activites pare it down to a workable level. Interested parties negotiate to arrive at a final definition of the MVP. Such a discussion took place at one of the recent meetings between federal and state officials, and including concerned political organizations . The goal of the meeting was to devise a new bison management plan:

> For nearly 15 minutes, they discussed the word "viable" and how it might be used in a mission statement. Various factions feared some other side might exploit an advantage with "viable"... (Hutchinson, 1997).

Thus, within the context of the prevailing economic and social structure, the power of "biodiversity" (as a concept) is limited. It can protect a core population, but is, nevertheless, unable to contest the encroachment of society. The strength which biodiversity acquires from its association with stability is diluted by the designation of a lowest common denominator. Sustainability takes precedence over fecundity.

Stability: a Summary

Property and biodiversity attempt to construct and maintain stability at the individual and community level, respectively. Despite this similarity, these concepts are inherently unequal. Property, which is commonly associated with the body and personal identity, is in most instances an irreducible entity. Property cannot be taken or altered without the consent of its owner. Protection of this "natural right" is virtually absolute. On the other hand, under the aegis of biodiversity, species protection is conditional. Species that reproduce successfully, raising their numbers above the designated MVP, become mutable and subject to the will of the surrounding economic and social structure. Simultaneously, stability ensures the security of the individual, and the utility of the species.

Against this background, species such as bison assert themselves through innate and learned behavior.

CHAPTER 5

BISON AS INSTABILITY

Despite the restrictions that society has placed on their spatial extent, Yellowstone bison have repeatedly migrated beyond park boundaries to utilize available resources. As environmental conditions change, and biological needs arise, Yellowstone bison adapt to the surrounding "flux" by abandoning depleted habitats and exploiting emergent niches. Individual and group behavior results in a degree of unpredictability. Consequently, the niche of the bison is transient rather than predetermined. The words of Paul Schullery (1989) serve as a prelude:

> ...bison, because of their gregariousness, are more likely to suddenly move en masse to a different part of the available range... These are not uniformly stable movements, and one should not have the impression that the bison and elk are engaged in stately, picture perfect textbook migrations.

This chapter will review the instability which bison bring to the landscape.[1] In the first section, the behavior of the species, irrespective of geographical location, will be summarized. In the second section, the behavior of Yellowstone bison will be analyzed. Both sections will reveal a force which is in direct conflict with socially constructed stability.

[1]The focus herein will be directed at the spatial instability of bison. Numeric instability (i. e. an irruption) is not particularly relevant to the management of Yellowstone bison.

The Species

More than most species, Bison bison embodies the principle of movement. Originating in Asia during the late Pliocene-early Pliestocene, the genus Bison is the only member of the Bovidae family to become well established in the Western Hemisphere (McDonald, 1981). While the spatial range of other genera was limited by the cold climatic conditions prevailing in northeast Asia, Bison were able to disperse northward and, eventually, utilize the Bering Land Bridge. Formed during glacial periods of the Pliestocene, the Bering Land Bridge was a narrow strip of land connecting the continents of Asia and North America. After their arrival in North America, the genus Bison, in its multiple specific incarnations, dispersed south from present-day Alaska eventually occupying much of the continent.

Bison evolution is complex, and the subject of much debate (Guthrie, 1970; McDonald, 1981). In the process of range expansion from Asia to North America, several species emerged and subsequently went extinct. Bison bison, the only extant North American species, probably originated in the northern and central plains approximately 5,000 years ago (McDonald, 1981; Wilson, 1980). Thereafter, the species dispersed to the north and south. Dispersal into the western United States most likely resulted from migrations across the Rocky Mountains. The population may have peaked 2,500 years ago. Two subspecies are currently recognized: Bison bison bison (plains bison) and Bison bison athabascae (mountain bison).[2]

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[2]The bison of Yellowstone National Park is a hybrid of these two subspecies. The native mountain bison have interbred with bison plains bison introduced from Texas and Montana shortly after the turn of the century. (See Chapter 3.) The validity of the distinction between subspecies has been contested. Refer to Van Zyll de Jong et al. (1995) and Geist (1991) for opposing viewpoints. If Geist is correct the plasticity of the species is significant.

In reconstructing bison evolution, McDonald (1981) concluded that Bison bison has a smaller body size and maintains higher population densities than other extinct bison species. Both characteristics are typical of r-selected species. Frequently, r-selected species are well-adapted to disturbed sites. Small body size, for one, often signifies rapid maturation, a characteristic which is advantageous in rapidly changing environments. While McDonald's conclusions are admittedly hypothetical, they indicate that bison may be suited to life within unstable environments.

Early historical accounts of bison also indicate spatial instability. Lewis and Clark provided the first sustained documentation of bison while travelling across the western half of the North American continent. During their journey, bison sightings were sporadic at best. In reviewing their account, Botkin (1995, 116) found that Lewis and Clark observed bison only 15% of the days they were within "buffalo country". In addition, many of these sightings occurred on consecutive days. Botkin suggests (and rejects) explanations for this paucity of bison observations. For example, a significant reduction of the bison population had taken place prior to the Lewis and Clark's expedition. In addition, some bison observations may have been omitted. Yet, personal accounts, written decades later, attest to an abundant bison population, and the importance of bison as a source of food and clothing reduce the likelihood of ommission. Instead, Lewis and Clark's observations may reflect the transient spatial patterns of bison populations.

Roe (1970, 543-600) supports this supposition with a detailed review of bison sightings during the 19th century. On numerous occassions, bison counts at specific locations varied significantly from year to year, ranging from "abundant" to "scarce". The noted vicissitudes of bison populations, however,

appears to have been a reflection of the species proximity to explorers, settlers, and hunters, rather than an accurate account of their numbers. Human populations reaped the benefits or suffered the consequences of their dependence on bison, as they relied, in large part, on chance meetings with bison herds. Francis Parkman, for example, stated, "Four days on the Platte, and yet no buffalo! Last year's signs of them were provokingly abundant..." (in Roe, 1970, 555). On the effect of spatial heterogeneity, Maximillian noted, "It is true, these Indians [the Mandans] sometimes suffer hunger when the buffalo herds keep at a great distance, and their crops fail;..." (in Roe, 1970, 561). Even experienced hunters were often unable to locate (better yet, identify) "traditional" bison grazing land. In 1840, for example, Alexander Ross stated, "...and the hunters do not so much as know in what direction they may find the buffalo, as these animals frequently shift their ground" (in Roe, 1970, 379). Both Botkin and Roe used historical accounts to refute the uniformity of movement and spatial placement of bison.

In the most general terms, bison herds have been described by the "thunder" they create. Indeed, the frequency of such descriptions is a familiar image of the American West. General Sam Steele related, "...they were disturbed one night by mysterious rumblings, which were explained when morning came by vast masses of bison, which stretched as far as the eye could see" (in Roe, 1970, 137). Nathaniel Langford described a similar event, "The sky was perfectly clear, when we heard a distant rumbling sound, which we thought was thunder but our guide exclaimed, 'Buffalo!' and as we could see no sign of them, he said that they were a few miles away" (in McHugh, 1972, 15). This noise, of course, is generated by rapid movement. As a result, bison may

be more recognizable by their movement in space rather than their physical form.

Recent studies examining the morphology and behavior of bison provide additional information to substantiate the inherent flux of the species. Of primary interest are characteristics which affect the geographic distribution of the species. This includes foraging behavior, dispersal mechanisms, and social behavior.

In tracing the evolution of ruminant digestive systems, Hofmann (1989) classified bison as "grass and roughage eaters". In comparison to other ruminants, this group exhibits greater efficiency in digesting low quality fibrous forage. As such, bison foraging behavior may be driven by forage quantity rather than forage quality (Wallace et al., 1995). The "specialized" niche, which effectively restricts other species, does not play a dominant role in the life of bison.

Bison dispersal varies by age and sex (Gates and Larter, 1990). Mature male bison commonly exhibit nomadic behavior, often moving to peripheral locations when population density and intraspecific competition is low. These movements are generally solitary, consisting of a single bison or small group. For whatever reason (perhaps an increased chance of finding a mate or locating a new resource), this wandering is fundamental to the male of the species. Gates and Larter classify this behavior as "innate".

The impetus for female bison and calf dispersal appears to be more closely related to environmental change and stress. These mixed groups migrate when available resources are depleted. While Gates and Larter found mixed groups to be "relatively sedentary", Meagher (1973) found that these groups moved more frequently as their large size depleted resources more

quickly. (Gates and Larter's conclusion may refer more to centrality than length of stay.) Female bison and calves also tend to disperse in larger numbers than mature males.

The familiar image of great bison herds may imply a form of social cohesion that does not exist. Lott and Minta (1983) found that bison associations are essentially random. Even the strong bonds between cow and calf lasted only 8 to 19 months. After this initial period, the parental relationship was severed and replaced by a random association. Large aggregations of bison were attributed to "environmental funneling". Primary funnels were topographic, phenological, and reproductive. Thus, bison herds may in fact be loose congregations created by the temporal biological needs of individual bison. Bison may separate from one herd and join another as the need for water and nutrients arise.

Bison of Yellowstone National Park

Yellowstone bison are generally grouped into three herds: Lamar Valley (northern), Pelican Valley, and Mary Mountain. (See Figure 7.) These designated herds represent core winter ranges located within the park. They also may serve as starting points for movements into less-favored locations (Meagher, 1973, 32). Despite the distinction, these bison herds are not isolated. Bulls occasionally migrate between herds in the winter, and Lamar and Pelican Valley herds have mixed considerably during the summer in past years (Meagher, 1989b). In summer, the scattered bison population has indicated no preference for specific sites. These findings support the conclusions of Lott and Minta (1983).

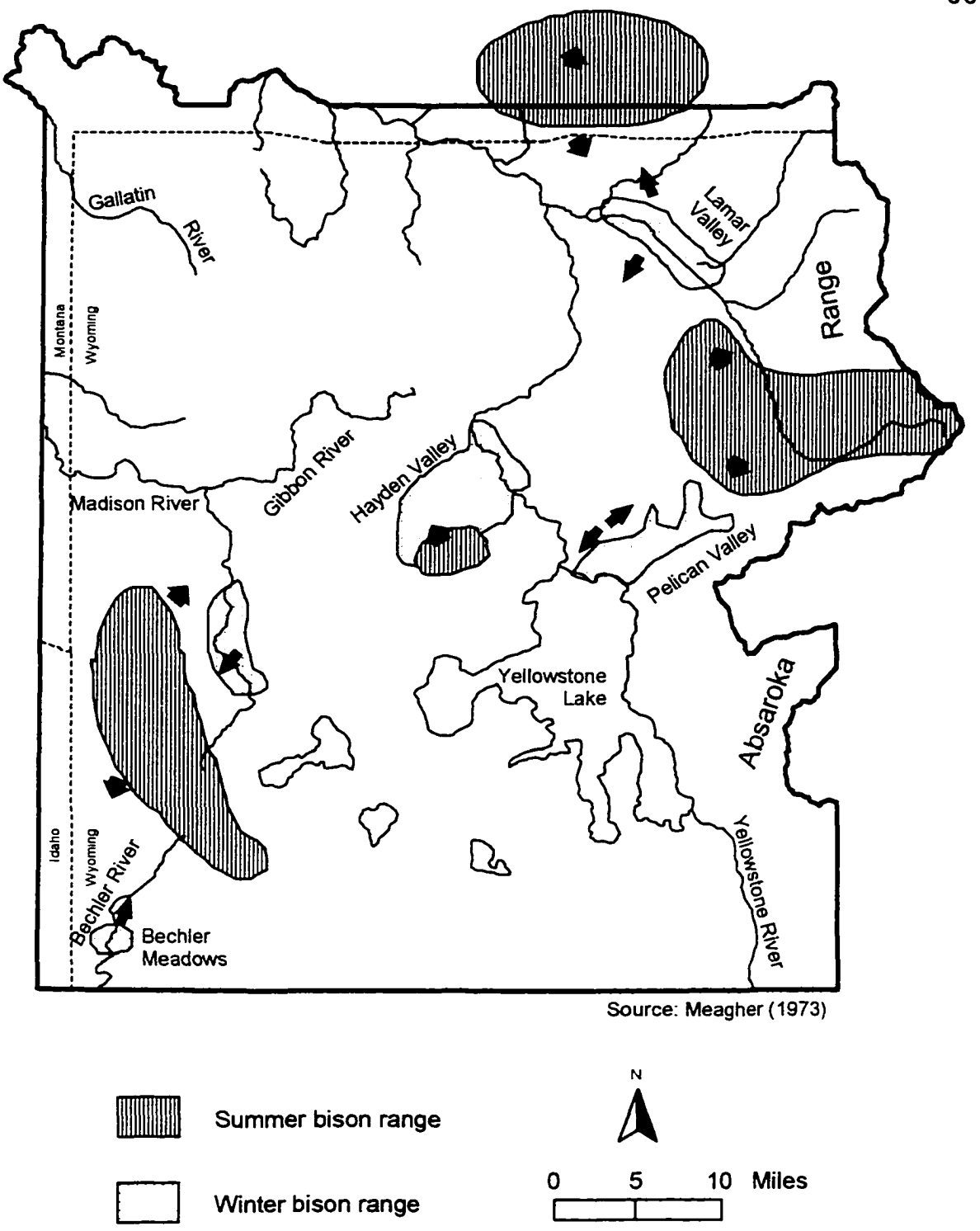

FIGURE 7. General Distribution of Mixed Bison Herds During Historic Times.

Due to low bison numbers and park management policies, this internal mixing resulted in limited movement beyond park boundaries prior to the 1980's. (See Table 1.) Observations indicated that approximately 660 bison migrated from the park between 1942 and 1985. From 1947 to 1982 (excluding the apparent anomaly of 1942-1943 and 1985 [the beginning of the recent migrations] only 272 bison left the park, an average of 8 per year. Figure 8 illustrates the multiple paths used by bison to exit Yellowstone.

The migrations of this earlier period indicate a migratory preference for the northern and western boundaries of the park. The northwestern corner of Yellowstone is comparatively low in elevation, and thus remains free of snow longer than other sites within the region. Available forage attracts bison to these locations. Conversely, the eastern boundary is comprised of mountainous terrain that surpasses 10,000 feet in elevation. The topography of this region hinders migration in this direction.

This directional propensity has continued up to the present date. Since the mid-1980's, approximately 66% of the bison leaving Yellowstone National Park exited to the north, while 34% moved to the west (Mack,1997). This tendency, however, does not entail predictability, nor does it preclude alternate paths of dispersal. Since 1988, both the frequency and quantity of bison migrating to the east of the park has increased. In perhaps the largest movement, from September 1994 to February 1995, 32 bison moved east from Yellowstone National Park into Shoshone National Forest. Bison have been sighted as far east as Cooke City (Wyoming Game and Fish Department, 1995). In 1996, three male bison moved south of the park toward Grand Teton National Park. Migratory movements in this direction are considered rare (Associated Press, 1996).

TABLE 1

Summary of Known Bison Movements Beyond Yellowstone National Park Boundaries

Year	West	South	North	East	Total
1942			few		
1942/43 (Winter)			130		130
1943 (Aug)		4	150		154
1947			31		31
1948			68		68
1951	2		6		8
1955	3				3
1956			8		8
1957	6				6
1959	1				1
1962			10		10
1963	34				34
1964	2	2	1		5
1965	23				23
1966	8			some bulls	8
1967	2		few	few	2
1970	2				2
1971		2			2
1973		1			1
1974		1			1

1975	6				6
1976	3	1	14		18
1977	3				3
1979			43		43
1981	5				5
1982	few				
1985			88		88
Total	100	11	549	few	660

Source: Clark and Kopec (1985)

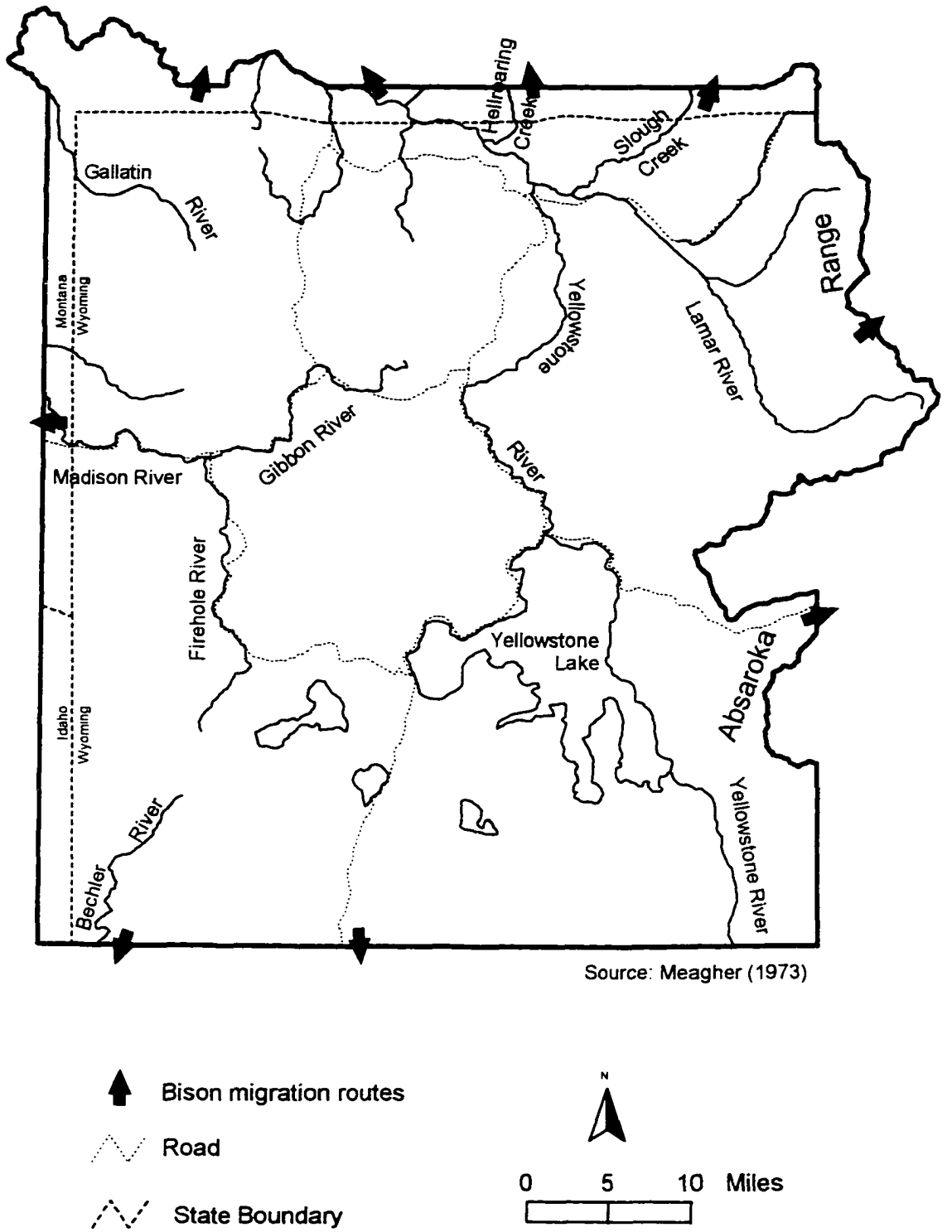

FIGURE 8. Location of Known Historic Bison Movements Beyond Yellowstone National Park.

This broad analysis of bison movements may actually wash out some of the unpredictability which bison embody. The large-scale pattern of bison movements is the culmination of numerous decisons made by numerous bison. By examining the manner in which bison have adapted to changes in their environment, it becomes evident that new opportunites (e.g. emergent patches of vegetation) would most likely alter bison land-use patterns. Neither the timing or location of these changes is fixed.

With the elimination of reductions in 1967, bison numbers increased during the following decades. On the northern range, bison gradually extended their winter range to include sites west of its traditional locations. The initial movement was instigated by the severe winter of 1975-76. In that year, bison travelled from the core winter range (from Tower to Lamar Canyon) to Blacktail Deer Creek (Meagher, 1989b). (See Figure 9.) Several bison migrated beyond park boundaries in the area of Eagle Creek. In Meagher's (1976) opinion, migratory movements of this scale could be expected to occur every 25 to 50 years. The range was extended again in 1982-83, and thereafter, to Mammoth and Gardiner (Meagher, 1989b). By the late 1980's, bison winter range had increased by 300% (Singer and Norland, 1994).

The means by which Yellowstone bison increase their range have been both natural and artificial. (See Figure 8.) Several park riverbeds provide gentle slopes which bison groups can traverse with minimal difficulty. In the north, bison have utilized Yellowstone River, Blacktail Deer Creek, Hellroaring Creek, and Reese Creek among others. To the west, Madison River has provided a means of dispersal. Bison exit to the east near the Cache River and, further south, Sylvan Pass.

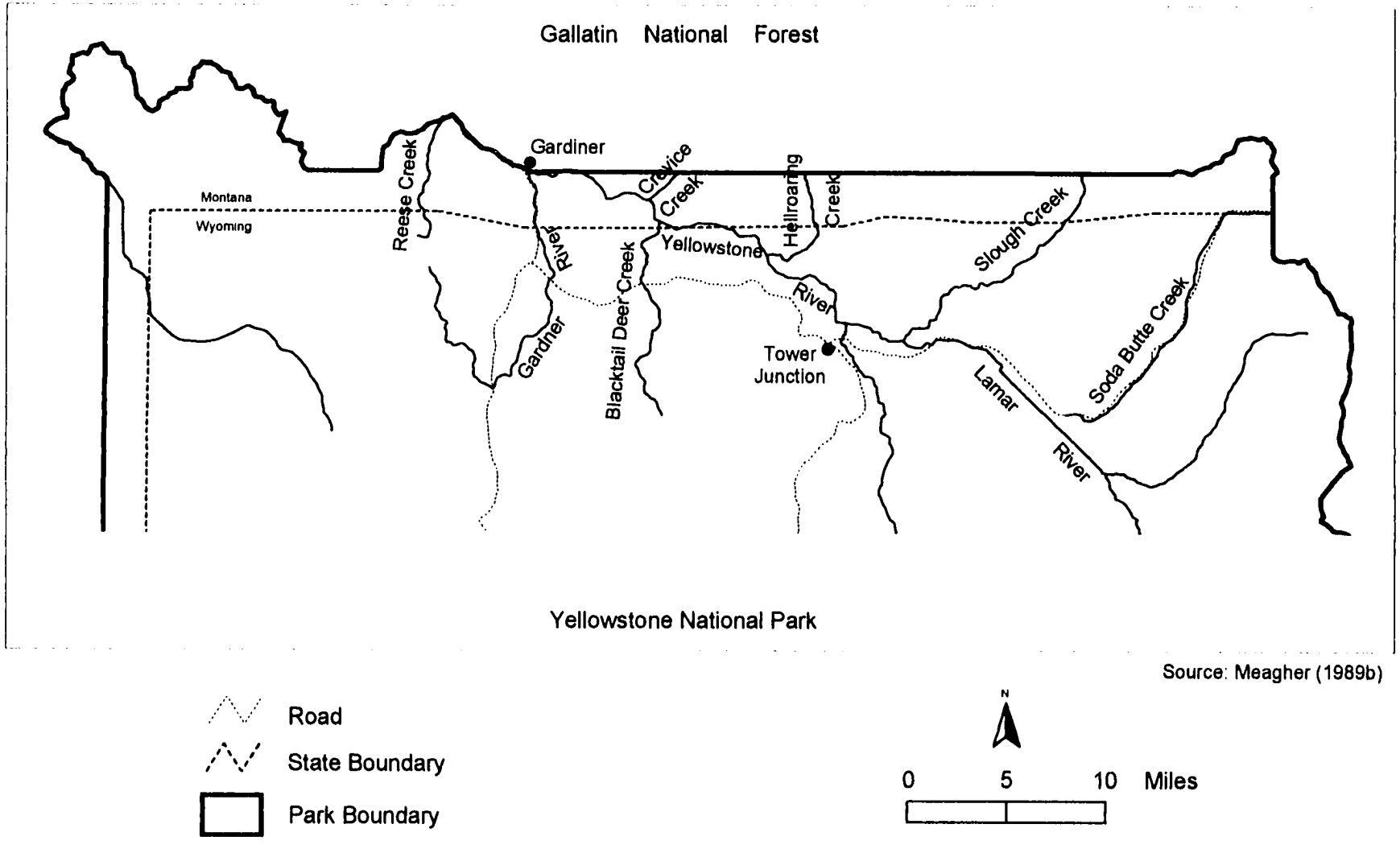

FIGURE 9. Northern Region of Yellowstone National Park.

Bison also use foot trails and roads constructed within the park (Mack, 1997). The roads, which are cleared of snow during the critical winter period, are of particular importance. The bison have learned to utilize these roads to lead them to distant foraging sites (Meagher, 1989b). Such learned behaviors have, in effect, increased the range of individual bison and the herds in general.

The critical issue here is the ability of the species to adapt to new and altered conditions in a manner which utilizes these changes to their best advantage. By connecting natural and artificial travel routes, bison have managed to increase their presence on the landscape. This result was unexpected by some (Meager, n. d.). Moreover, newly acquired knowledge about travel routes and foraging sites is transfered from group leaders (older females) to younger group members. Shifting group structure may facilitate the dispersal of acquired knowledge throughout the herd (Meagher, 1989b).

Bison have also shown flexibility in their habitat use. With the adoption of "natural regulation", several species, including bison, increased in numbers. As a result, forage had to be partitioned among a growing wildlife base. For their part, bison increased their use of vegetation type by 10%. They also consumed fewer sedges and more grasses than previosly observed (Singer and Norland, 1994; see also Buffalo Chip, 1988). The use of deep-snow terrain also increased (Singer and Norland, 1994).

Not surprisingly, bison have also shifted their range in response to sudden environmental changes, such as fire and severe winter storms. After the Yellowstone fires of 1988, bison moved to winter ranges earlier than expected (Coleman, 1988). More recently in the winter of 1997, heavy snowfall, followed in succession by a brief warm spell and severe cold, turned a permeable layer of snow into an impervious sheet of ice. Many bison

responded by exiting the park in order to locate available forage (McMillion, 1997b).

Given time, bison that exit the park occasionally return without the inducement of hazing operations. In some of the more remote regions, such as Eagle Creek and Bear Creek, where park policy has been more tolerant, there is fairly good evidence of this behavior (Mack, 1997). Bison often leave the park in the evening only to return early the next morning (McMillion, 1995a).

It is evident that bison respond to fluctuating environmental conditions, yet it would be incorrect to ascribe all movements to the search for resources. During the winter of 1997, hundreds of bison died within the boundaries of Yellowstone National Park. At the same time, over a thousand bison exited the park. From this, the conclusion could be drawn that bison were fleeing the depleted regions of the park's interior. However, it has been observed that bison exiting Yellowstone are often in a healthy physical state. After examinig 15 bison that had been shot upon exiting the park, a representative of the Montana Department of Fish, Wildlife and Parks stated that all of the bison had "good fat reserves" (McMillion, 1997b). This situation had been noted previously. Following the wet summer of 1986, bison extended their range during the winter despite the appearance of ample forage (Meagher, 1989b).

Whether directed by necessity or opportunity, the range of Yellowstone bison has exhibited a considerable amount of variation since the elimination of mandated population reductions. By 1989, Meagher believed that northern Yellowstone bison represented "...an intermediate stage between a migratory and a nomadic pattern of land use" (1989b, 764).[3] The adoption of "natural

[3]Joel Allen,one of the primary early researchers of bison, used this term more than a century ago in 1876. "The buffalo is quite nomadic in its habits..." (in Roe, 1970, 76).

regulation" provided a window through which the innate and learned behavior of bison could be observed.

The expansion and contraction of the bison range within and around Yellowstone National Park is, in many respects, a dialectic between the local bison herd and the local environment. This is a dialectic of movement, occurring at a pre-linguistic stage. Attempts to expand the species range, however, are hindered by biotic and abiotic factors which clearly impinge upon the bison's ability to dominate the landscape. Severe climatic conditions, steep topography, and interspecific competition limit the actual range of the bison. The defining aspect of this situation is interactivity. The bison are immersed within a (eco)system consisting of innumerable relationships. Through the process of interacting with the local environment, the species' range expands or contracts. The end result is the unknowable "flux".

Yet, as Lefebvre (1991, 70-71) noted, "To say 'natural' is to say spontaneous. But today nature is drawing away from us, to say the very least. It is becoming impossible to escape the notion that nature is being murdered by 'anti-nature' - by abstraction, by signs and images, by discourse...."

CHAPTER 6

CONTESTED SPACE

In the preceding chapters, two concepts of stability -- property and biodiversity -- have been juxtaposed against recorded observations of bison movements and behavior. In many respects, it has been shown that these theoretical and biological structures are conflictual. Within the Greater Yellowstone Ecosystem (GYE), the integrity of property lines has been repeatedly subverted by the movements of bison. As such, the preceding text serves as a foundation for examining the resolution of the current land conflict.

The present chapter will borrow from the literature of social theory to highlight the similarities between this conflict and other social struggles and processes. In essence, this entails redefining the visible structures of property lines and migratory movements in order to comprehend their current role within the space known as the GYE. Additionally, this involves transforming what has been traditionally known as the "biological" into the "social." Lefebvre's reconstruction of space, and Foucault's critique of the French penal system will be particularly important to this effort.

Lefebvre and Foucault

A quick reconceptualization of space (and thus the landscape) is necessary at this point. As Lefebvre (1991) noted, traditional conceptions of space are not adequate to explain the distribution of objects within the

environment. In the traditional Cartesian construction, space is a segmented, geometric container within which objects exist. Space is detached from its inhabitants and is thus perceived as neutral. Contrary to this conception, Lefebvre has asserted that space is produced by social forces. Because space is required for the functioning of social processes, it has become an object of significant concern. Thus, space is no longer neutral, but rather political as forces seek to manipulate space to accommodate valued social functions. Space is not secondary, but primary. Again from Lefebvre (1991, 410), "Space is becoming the principal stake of goal-directed actions and struggles."

Space is produced, and controlled, through several means. In introducing concepts of stability, I have focused on the method of discourse. Discourse is a process whereby theoretical constructs become fixed in the social consciousness through the propagation and reiteration of signs, symbols, and language in general. The ultimate function of discourse is to construct an ideological framework which dominates social perception. Discourse, and its constructs, delimits the range of valid statements, establishes scientific and moral standards, and prescribes the direction of future social projects.

The work of Foucault illustrated the manner in which discourse has been institutionalized by society. In turn, Foucault focused on the French penal system, mental institutions, and alternative forms of sexuality. The conceptual link between these institutions and behaviors is the social process of exclusion and segregation. Foucault emphasized the manner in which these institutions were used to organize the fluctuating social milieu of the European continent in order to facilitate economic and political functions.

Several elements, or stages, typify the process of spatial control. First, a standard or ideal is constructed, and, if successful, adopted as the social norm.

This becomes the standard by which alternative modes of existence are measured, compared, and contrasted. Secondly, abnormalities are identified. Abnormalities are deviations from the stated social norm. As such, abnormalites are "problems" which must be rectified, since they pose a danger to the structure and continued endurance of the social norm. Finally, when possible, abnormalites are eliminated. The latter process is essential. As Foucault noted, "Space is fundamental in any form of communal life; space is fundamental in any exercise of power" (Foucault, 1984, 252).

"Abnormalities" must be further refined here to understand its relevance to daily life. Abnormalitites include individuals, their behavior (cultural and economic), and their beliefs. More specifically, it is the Other, the unknown, and perhaps the unknowable. Often, it is defined as deviant and abnormal. As such, the Other is undesirable, unwanted, reprehensible.

In general, space (the landscape, its constituent elements and their interactions) is produced in an effort to minimize the access and freedom of the Other. The Other, in its various forms, is displaced from valued, central locations and pushed to peripheral, marginal locations, as the dominant social order assumes greater spatial control. In severe situations, the Other is prohibited from existing or restricted to specified regions (e.g. prisons, mental hospitals).

For Foucault, control of the body, and its location, is essential to maintaining power. Prisons render the body (the Other) docile by confinement. Conversely, and simultaneously, the imprisoned body is maintained to secure any utility (e.g. labor) that it may provide. Thus, even among the subjected, power attempts to absorb all elements which may be used to augment its

strength and control. The completion of power involves the incorporation of all assimilable functions.

When necessary, discipline is metted out to sustain spatial control:

> [Discipline] could reduce the innefficiency of mass phenomena: reduce what, in a multiplicity, makes it much less manageable than a unity; reduce what is opposed to the use of each of its elements and of their sum; reduce everything that may counter the advantages of number. That is why discipline fixes; it arrests or regulates movements; it clears up confusion; it dissipates compact groupings of individuals wandering about the country in unpredictable ways; it establishes calculated distributions. (Foucault, 1977, 219)

Although Foucault is refering to the body, a collection of individuals and behaviors, his ultimate concern is the reduction of opposition to dominant social norms.

Surveillance is another critical element of spatial control. Monitoring the Other increases the power of established forces by increasing knowledge of the Other. In this manner, the tendencies of the Other are revealed. Surveillance protects the social order against transgressions. In essence, surveillance is a feedback loop which helps determine where and when discipline should be applied.

In reviewing the French prison system, Foucault identifed the methods by which the state maintained control of its domain. Discourse, confinement, discipline, and surveillance are integral to the process of spatial control. These are the policies which oppositional forces, the Other, must combat.

Representational Spaces

To endure, the Other must occupy interstitial regions which have not yet been appropriated by the dominant order. Within such cracks, alternative

beliefs are reiterated and unconventional modes of existence carried out. Lefebvre (1991) termed these sites "representational spaces."

Representational spaces are critical. As with other processes, opposition (political, cultural, or otherwise) requires space within which to operate and function. Such sites are points of dissent and negation, offering alternative paths for future development. In urban settings, the debate surrounding the proper role of "public space" reflects this concern. Namely, should public places, such as parks, plazas, and streets, be sites of unmediated political and social interaction or highly controlled spaces to be utilized for "legitimate" purposes only? The former may embody a risk to the dominant order (homelessness, crime), while the latter may result in stagnation and repression. Representational spaces are nesessary for change to occur. "Revolutions entail a taking to the streets and a taking of public space" (Mitchell, 1995, 124). Accordingly, representational spaces are sites which spawn change, and from which change is dispersed.

Due to the danger which some representational spaces pose, the boundaries which surround these sites become increasingly significant. Borderlands are sites where opposites coexist and engage one another, yet reaffirm their fundamental differences. Borders mark the point of inclusion and exile. Borders are the physical or metaphysical lines beyond which validity is denied.

Postcolonial literature and border theory provide insight into this condition of political domination and oppression. These fields of analysis focus particularly on subjugated groups embedded within the dominant social structure. The literature attempts to deconstruct the multitude of economic, cultural, and linguistic barriers which prevent indigenous, ethnic, religious, and

various other social groups from gaining access to land they once ruled. In many respects, postcolonial literature and border theory is an effort to reassert the rights of the dispossessed. Under the current social structure, these groups are defined as "primitive", "illiterate", and "ignorant." Their marginalization is justified by the "outdated", "irrational" social practices which they continue to perform. Anzaldua (1987, 3) expressed these beliefs in discussing the meaning of the U.S.-Mexico border:

> Borders are set up to define the places that are safe and unsafe, to distinguish *us* from *them*. A border is a dividing line, a narrow strip along a steep edge. A borderland is a vague and undetermined place created by the emotional residue of an unnatural boundary. It is in a constant state of transition. The prohibited and forbidden are its inhabitants. *Los atravesados* live here: the squint-eyed, the perverse, the queer, the troublesome, the mongrel, the mulato, the half-breed, the half dead; in short, those who cross over, pass over, or go through the confines of the "normal."

Postcolonial literature attempts to redefine and augment the status of indigenous, premodern cultures. From this perspective, the border represents the potential site of political, cultural, and religious liberation. As such, postcolonial literature is regularly infused with optimism.

Yet, in the process of emphasizing opportunities for social change, postcolonial literature and border theory commonly minimize the impact of prevailing power structures. Rather than the site of cultural production, borders are often the location of ideological reentrenchment. In a Foucauldian sense, political power attempts to reestablish control whereever the containment of opposition is breached. As Castronovo (1997,197) has noted, "As the site of difference, the border becomes strategic in promoting the desire for sameness." Similarly, the border identifies the location where homogeneity and stability is preserved and intensified. In most instances, access is only possible when the "norm" of the colonizer is incorporated into the body of the colonized.

Despite their differences, both perspectives portray borders and borderlands as critical regions in the formation of social and cultural geographies. The former stresses the emergence of opposition, while the latter reiterates the consolidation of power. Both perspectives indicate that the analysis of border regions can provide meaningful insights into the creation of material, spatial phenomena.

Biological Restriction

Although these works are limited to consideration of social systems and social relationships, they are nevertheless applicable to biological systems and their management. Biological species are the quintessential Other. In both physical structure and behavior, biological organisms represent a significant departure from humanity. Their relation to modern civilization is not historical (as is the case with indigenous cultures), but rather evolutionary.

This section will attempt to enumerate some of the apparent similarities between social systems and biological systems. Certainly, differences exist. However, these differences do not justify an absolute separation of these systems. When appropriate, the wording of Foucault and others will be applied to the bison of Yellowstone National Park.

The discourse of property, stability, power was largely presented in Chapter 4. That property is political is well understood. The right to property establishes priorities and represses others. As much was noted by Hobhouse (1913, 9) when he stated, "...a man's property is not merely something which he controls and enjoys,...but something whereby he can control another man and

make it the basis of that man's labour and the scene of activites ordered by himself."

Yet, this image of property and its power is limited in scope, extending no further than the land it represents. Property is not simply a place, but, in addition, a vision. As such, the notion of property garners all available societal tools -- machinery, technology, information -- to realize this goal. More importantly, the ideal of property has the ability to generate and legitimate an entire set of official governmental policies, and start them in motion.

In the GYE, the risk (physical and economic) which bison represent has led to calls for their spatial restriction. Indeed, the body of Yellowstone bison is a two-fold danger. First, bison movements (migratory, nomadic, expansionist) rupture the integrity of static property lines. Second, the body itself is the transmitter of the organism (brucella abortus) that causes brucellosis. The latter only becomes significant when accompanied by the former. This point should not be underestimated, as even extremely virulent entites present little danger once immobilized. The body, as much as the species, is the point of concern.

The similarity between Yellowstone National Park and Foucault's penitentiaries is not unintentional. Confinement has been imposed upon bison in order to render the species docile, impotent, and incapable of disrupting the established order. As Faulstich (1994, 166) notes, "Wilderness reserves are the expression of an adversarial relationship...." The population cannot be eliminated, however, as it has utility, providing valuable ecological services. In similar fashion to the labor which prison inmates provide, park bison reproduce and thus contribute to the region by maintaining genetic diversity. Again, power seeks to absorb from the Other all elements which are perceived to have value.

The boundaries of postcolonial literature focus on the personal identity of the disenfranchised. As such, many aspects of the literature do not apply to the bison of Yellowstone. Yet, several commonalities do exist. Like the colonized, bison share the low status of an uprooted population in a state of exile. Within the GYE, a multiplicity of borders segment the landscape, defining "safe and unsafe" zones. The park boundary and property lines present a gauntlet which park bison must navigate successfully in order to persist within the borderlands. These borders, physical and metaphysical, demarcate regions in which park bison are the "forbidden." Clearly, bison exist in a state of deprivation, as available resources are denied for the purpose of stability.

Inasmuch as it represents "otherness" and opposition, bison movements are political movements. This is undoubtedly a contentious claim. For some, a measure of self-conscious reflection is a prerequisite of a political act. Yet, this exclusionary principle is more likely another means for invalidating the priorities of others. Accepting such an argument is to refute the position that "thinking" (and subsequently behavior) is first and foremost a response to biological requirements. Moreover, such a position validates the religious severance of "man and beast."

Physical appropriation of space is the first visible manifestation of a political movement. Protests, such as Tiananmen Square (as noted by Mitchell [1995]) testify to the importance of material space. One's physical presence establishes dominance over the site which it occupies. Bison migrations must also be viewed from this perspective. While certainly unintentional and disorganized, the thrust of bison movements (direction, timing, intensity) is an attempt to establish a representational space. Such meanderings expand the region in which the functions of the biological Other (foraging, mating, etc.) can

be performed. In a corollary to Mitchell's "taking to the streets", Yellowstone bison take to river valleys and mountain passes to reclaim and control land.

As with prisoners, Yellowstone bison are intensely monitored. Surveillance operations are concentrated in the northern and western regions of the park, where border transgressions are not uncommon. As of October, 1996, an agreement between the Montana Department of Livestock, National Park Service, and several other governmental authorities (Montana Department of Livestock et al., 1996) established the following schedule for monitoring operations:

Lamar Valley to Hell Roaring Overlook - Once weekly
Hell Roaring Overlook to Entrance to Blacktail Plateau Drive - 3 times/week
Entrance to Blacktail Plateau Drive to North Entrance - Daily
Mammoth to North Entrance - 2/daily when bison present
Madison Junction to Seven Mile Bridge - As necessary
Seven Mile Bridge to Barns Road - Daily
Barns Road to Park Boundary - Daily when bison west of Barns Road

Bison movements toward park boundaries prompt government agencies to assume a state of readiness. The National Park Service informs state agencies when transgressions appear imminent.

Finally, when warranted, discipline is applied to Yellowstone's bison herds. More specifically, when borders are transgressed by Yellowstone bison, discipline is dispensed in order to dissipate "...compact groupings of individuals wandering about the country in unpredictable ways" (Foucault, 1977, 219).

CHAPTER 7

BISON MANAGEMENT

In the modern age, with its focus on the rights of the individual, the indiscriminate use of power is no longer acceptable. Force, and in particular lethal force, requires justification. For such purposes, the discourse of stability is well-suited. As noted earlier, the discourse of stability is closely allied with notions of self-defense and preservation. Unwarranted attacks on the ecosystem and property are recast as assaults on the body and mind. Consequently, government action (violent or otherwise) in the name of preservation and the common good may be conducted with "good conscience." In many instances, the application of force becomes a necessity:

> ...entire populations are mobilized for the purpose of wholesale slaughter in the name of life necessity: massacres have become vital. It is as managers of life and survival, of bodies and the race, that so many regimes have been able to wage so many wars, causing so many men to be killed. ...the power to expose a whole population to death is the underside of the power to guarantee an individual's existence. The principle underlying the tactics of battle - that one has to be capable of killing in order to go on living - has become the principle that defines the strategy of states. (Foucault, 1978, 137)

Through this reconstruction, the aggressor is transformed into the defender. In the present context, stability is undermined by instability, and ranchers are threatened by bison. For habitation and production to continue, these conditions must be rectified.

This chapter will examine the extent to which governmental agencies, and their constituents, have endeavored to protect the stability of human

settlement and production in the GYE. In sum, governmental policies have indicated a process of increasing rigidity and severity. Of critical significance, the sanctity of Yellowstone National Park, which was once staunchly protected, has been punctured by changes in bison management policy during recent years.

Management and the Preservation of Stability

As the preceding chapters indicate, bison within the Greater Yellowstone Ecosystem present a risk to the stability of valued social and economic activities. In this respect, bison are similar to predators, fortified with destructive capacities. Bison management must be viewed from this perspective. In this context, nature is not benign, but rather a feature of the landscape that necessitates control. The unlimited growth of Yellowstone's bison population is not an option.

Foregoing scientific definitions, wildlife management is a political tool.[1] Wildlife management is the means by which the directives of society are brought to fruition. In contrast to technical assessments of carrying capacity (the stalwart quantification of land area, range productivity, and minimum nutritional requirements of the species concerned), management policies are embedded within the socio-political discourse that molds society's attitudes, opinions, and beliefs. As such, the articulation of wildlife policies is a manifestation of the political rather than the scientific.

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[1] In Chile and Argentina, internal subversion (communist or otherwise) was suppressed by the use of military force. Pockets of resistance were equated with "...cancerous cells, which must be excised by the state so that the entire organism may endure" (Pion-Berlin, in Hepple, 1992, 149). The metaphor of "cancer" functions in a similar fashion to brucellosis in Yellowstone bison, as it implies the potential growth of destructive (i. e. malignant) political opposition. In South America and the Greater Yellowstone Ecosystem alike, government officials asserted that the growth of oppositional forces would result in the decline of the state.

Much like the concept of property, wildlife management is intricately connected with the goal of preservation and the generation of order. Simultaneously, there exists the object to be managed (i. e. biological species and instability) and the object to be preserved (i. e. property, biodiversity, stability). Indeed, management operations are unnecessary unless juxtaposed against an object of preservation. Thus, while wildlife management policies actively combat selected (usually noxious) species, the driving force behind management operations is the object to be preserved. This concept may be difficult to understand, since the impetus for management operations is spatially segregated from the location where management operations take place. Therefore, management operations (such as herd reductions) conducted in undeveloped, interstitial regions, are explained by social and economic practices which occur elsewhere. In general, management policies are determined by the minimum spatial requirements necessary to preserve stability in its various forms.

In the current context, management entails the elimination of noise -- the statistical aberration and the movement -- of wandering bison herds. To do otherwise, and allow nomadic bison movements, would be to concede the eventual transformation of the landscape. "Though noise may destroy one system, this destruction permits the emergence of another, potentially more complex system in its place" (White, 1991, 268). Clearly, unfettered bison movements would lead to a more heterogenous, complex landscape. Such a condition is not amenable to preservation. Wildlife management seeks to restrict alternate geographies.

Bison management policies within the GYE reflect this condition. Federal and state policies are largely determined by the minimum requirements of

property and biodiversity. Moreover, management policies are a balancing act between these two forms of stability. Accordingly, property and biodiversity are juxtaposed against one another. Management policies that ignore the imperatives of either form of stability are subject to reversal by public opinion and court decisions.

This construct of environmental management differs from the usual framework presented by the news media and governmental agencies. In most instances, the needs of wildlife are juxtaposed against the needs of society. This dialectic is not adequate, however, in that it grants equal status to the Other (i. e. wildlife) which exists outside of society. By contrasting the two forms of stability, the provisional existence and subserviant status of bison is augmented and becomes readily apparent. That Yellowstone bison are tolerated reflects their utility as a species and genetic resource.

Wildlife management functions by creating material space for valued social and ecological processes. It accomplishes what discourse, by itself, cannot do alone. This entails, first, space as a void, a region in which there is a complete absence of the Other. Secondly, management produces space by altering the relationships that exist within a region. Space is "...the outcome of a sequence and set of operations" (Lefebvre, 1991,73). Specific ecological processes are replaced by specific social processes. The essence of a particular site is thus altered, produced, and subsequently controlled.[2]

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[2]An argument can be made here that this process is simply another form of biological competition. Such a position is difficult to refute, as it is general in nature and encompasses all human activities. Nonetheless, "biological competition" generally implies the physical interaction of species within the material environment. The discourse of property rights and natural rights functions to invalidate physical competition among species on the basis of the metaphysical superiority of humanity. In addition, as noted earlier, the stability which property rights enforce is definable as a lack of process (i. e. competition).

Yellowstone Policy

Strictly speaking, the management of Yellowstone bison is a task which has involved, and continues to involve, several state and federal agencies. This includes the National Park Service, Montana Department of Fish Wildlife and Parks, Idaho Fish and Game Department, Wyoming Fish and Game Department, Montana Department of Livestock, and, for a brief period, wildlife enthusiasts. In addition, intense bison management is supported by the Animal, Plant, and Health Inspection Service. Accordingly, bison management is truly an agglomeration of policies.

Bison management policy has shifted several times during the past century. (See Table 2.) Until 1967, bison management policy in Yellowstone National Park adhered to the modernist, perhaps militant, perspective promulgated by Chase (1986). This perspective advocates a "hands on" approach, keeping individual species "in line" in order to preserve the integrity of the entire system. Species within the park were culled when their numbers were deemed hazardous to the balance of the ecosystem. It was a managerial utopia, highly controlled.

In 1967, however, National Park Service policy changed, adopting the "natural regulation" policy suggeseted by Leopold et al. (1963). In essence, this policy change provided a window of opportunity for bison, and other species, to follow the dictates of their biology. In many respects, this entailed emancipation, providing species the chance to succeed or fail. Yet, to some degree, this opportunity was predicated on the assumption of order within the ecosystem. It was believed that the interaction of species would prevent

TABLE 2

Yellowstone Bison Management Policy

Year	Method of Removal	Site of Removal
1908 -1967	Periodic culling of bison herd by park staff	Park interior
1967-1996	Elimination of bison migrating beyond park boundaries by state wildlife authorities and licensed hunters	Land adjacent to park boundaries
1997	Bison herded into capture pens and sent to slaughter; removal of migrating bison continues	Park interior near park boundaries & park exterior
1998 (Proposed)	Periodic culling of bison herd by park staff	Park interior near park boundaries & park exterior

Source: Meagher (1973); National Park Service and State of Montana (1996); National Park Service (1997a)

individual species from getting "out of control." Meagher (n. d.), the research biologist most familiar with Yellowstone's bison, expressed this belief when she stated, "Research conducted during the past 10 years indicates that because of habits and distribution, nearly all the bison can be expected to remain within the park throughout the year." By most criteria, however, this assertion would appear to have been incorrect. Frequent border transgression have occurred. As a result, in an effort to mitigate against the potentially damaging impacts of wandering bison, the policy of "natural regulation" has been gradually eroded since its inception.[3] The ability of Yellowstone's bison to define their own biogeography has met with increasing resistance over the past 25 years.

The first indications of a problem emerged during the late-1970's and mid-1980's. Sporadic movements beyond park boundaries were observed during this period. An arsenal of non-lethal boundary control weapons were administered by the Park Service to restrict bison migrations. Methods included hazing by helicopters, herding by park personnel, installation of cattleguards, construction of fences along known travel routes, playing tape-recorded wolf howls, use of noise-making devices such as "cracker shells", firing of rubber bullets, and baiting bison with hay among others. For various reasons, these techniques were largely ineffectual. Bison learned to turn underneath hazing helicopters. Over time, bison became increasingly resistant to herding by park personnel. Bison climbed slopes and used alternate paths to move beyond fences and cattleguards. On one occassion, bison ascending a slope pushed snow onto an adjacent cattleguard, allowing 30 bison to pass directly over the rails. Noises, of various sorts, lost their impact (if there ever was any) as bison

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[3]It may be argued that the "opportunity" for self-determination, which the natural regulation policy provided, never existed, as it was contigent on the bison's adherence to a nonexistent "natural order".

grew accustomed to their occurrence (Meagher, 1989b). In similar fashion to their migratory behavior, bison revealed a significant degree of adaptability when encountering boundary control measures.

As the intensity and frequency of border transgressions increased, and the inadequacy of non-lethal control methods became apparent, the use of lethal control measures was expanded.[4] Essentially, this entailed shooting bison that migrated beyond park boundaries. Technically, the elimination of bison from regions adjacent to Yellowstone National Park was, and is, defined as "removals". Undoubtedly, this term was adopted to minimize, in the mind of the public, the violence through which order is sustained. Yet simultaneously, "removal" lends itself to geographical analysis in general, and the creation of space in particular. This terminology is an overt expression of a concerted effort to re-articulate the landscape. Figure 10 shows the location of recent bison removals around Yellowstone National Park.[5]

Since 1985, the number of bison removed annually has been substantial. (See Table 3.) During this period, an average of 237 bison have been removed per year. Annual totals have ranged from 4 (1989-1990) to 1083 (1996-1997). The percentage removed has varied significantly, ranging from 0.1% (1993-1994) to 32% (1996-1997). In years following substantial removals (>50), the total number of removals dropped by an average of 48%.

Bison management policy during the 1970's and 1980's was relatively nondescript. Land beyond park boundaries was generally treated as one and

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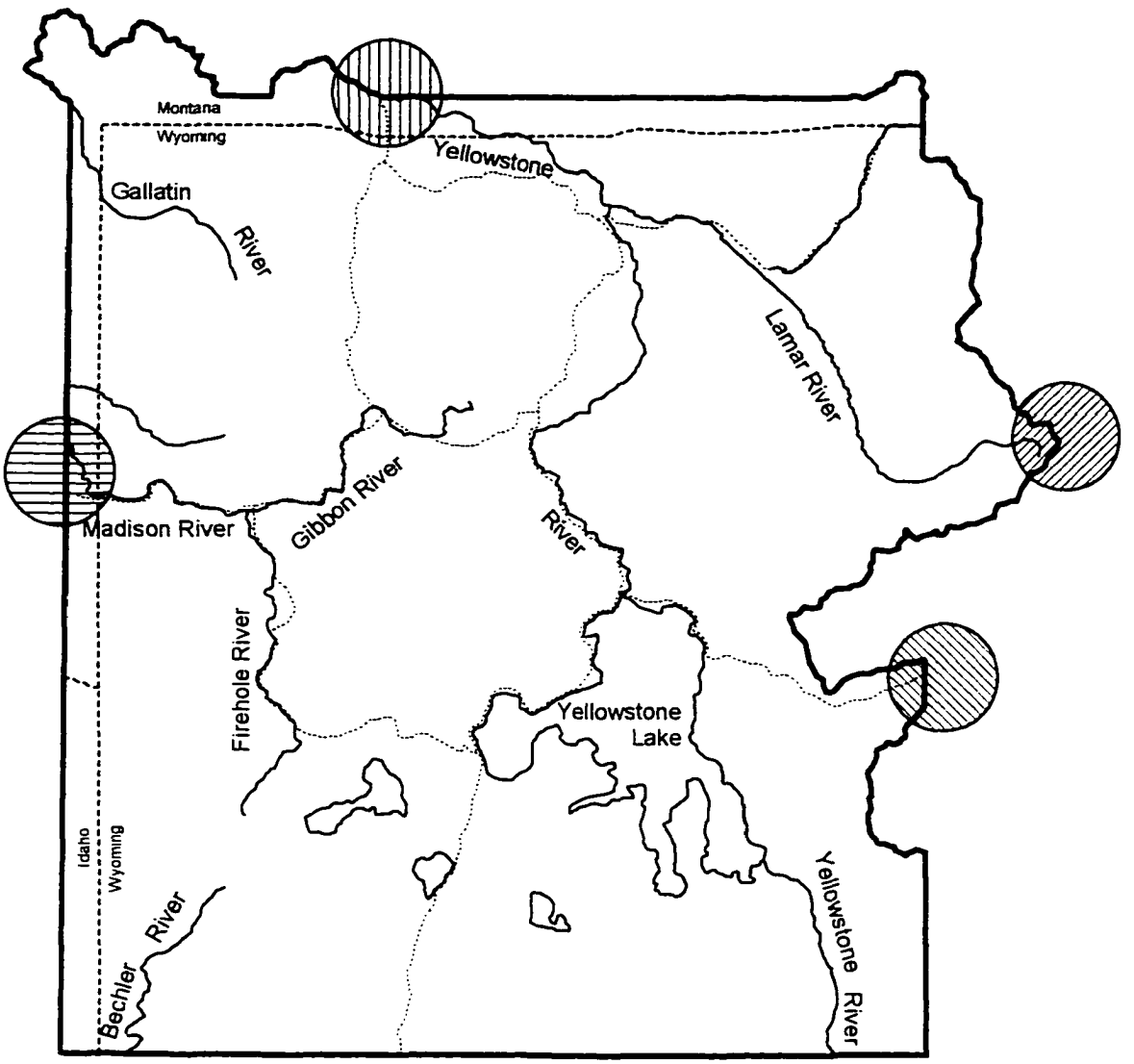
[4]"...subversion [e. g. migration] always runs the risk of being reframed within less threatening articulations: insurgent traffic along the border flows in several directions, never reaching a final point of liberation or domination" (Castronovo, 1997, 210).

[5]The absence of bison removals to the south of Yellowstone National Park should not be viewed as an exception. First, bison migrations in this direction are comparitively rare. Second, bison migrating southward into Grand Teton National Park fall within the domain of another bison management policy. The number of bison permitted to reside within Grand Teton National Park is limited within specific numeric parameters.



Source: National Park Service and State of Montana (1996); Emerick (1998)

FIGURE 10. General Location of Recent Bison Removals Outside Yellowstone National Park.

TABLE 3

Bison Removals During Natural Regulation Policy, 1967-1997*

Winter of Year	Bison Population	Bison Removed	Percentage Removed
1967-68	418	4	--
1968-69	556	0	0
1969-70	592	0	0
1970-71	565	0	0
1971-72	713	0	0
1972-73	837	0	0
1973-74	873	0	0
1974-75	1,068	0	0
1975-76	1,125	8	--
1976-77	1,252	nc**	na
1977-78	1,626	nc**	na
1978-79	1,727	nc**	na
1979-80	1,803	nc**	na
1980-81	2,396	nc**	na
1981-82	2,239	0	0
1982-83	2,160	0	0
1983-84	2,229	0	0
1984-85	2,114	88	4
1985-86	2,291	57	2
1986-87	2,433	6	--
1987-88	2,644	35	1

1988-89	3,159	569	18
1989-90	2,606	4	--
1990-91	3,178	14	--
1991-92	3,426	271	8
1992-93	3,304	79	2
1993-94	3,551	4	--
1994-95	3,956	427	11
1995-96	3,398	433	13
1996-97	3,436	1083	32

nc = no count
na = not applicable due to no count
*Totals do not include bison removed from locations south and east of Yellowstone National Park.
**During the period 1976-1981, a few bulls were removed.

Source: National Park Service (1997a)

the same. The location of bison migration patterns were duly noted, but variation in the landscape, as well as variation in the human settlement it accommodated, was largely ignored. The simplicity of early bison management policies may have been a reflection of the recent emergence of a crisis affecting habitation and production.

The first substantial change in management policy occurred in 1985, when the state of Montana reclassified bison as a big game animal. Bison hunting was thus legalized. While effective in halting bison at the park's entrance, the legislation was politically disastrous. Media coverage accompanying the event resulted in a national backlash.[6] In subsequent years, anti-hunting activists disrupted local hunters by physically obstructing hunting opportunities. Eventually, the legislation legalizing bison hunts was repealed in favor of less sensational management procedures.

The violent means by which stability was enforced resulted in national public outrage. In response to these objections, bison policy during the early 1990's attempted to accommodate some of the natural variation that existed within the Yellowstone bison population. Not surprisingly, the increased complexity of recent bison management policies drew a more direct connection between the vital interests of property and bison management operations. Unlike earlier policies, management in the 1990's attempted to incorporate the cultural landscape of ranching within its framework.

In perhaps the clearest definition of bison policy, the stated goal of bison management was "...to conduct operations ...to provide spatial and seasonal separation of bison and domestic cattle..." (National Park Service and State of Montana, 1996, 1). To accomplish this desired result, "site-specific"

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[6]News footage of hunters shooting bison at the park's entrance belied any notion of the "sport" of hunting.

management strategies were developed for specific regions within the park. The rigidity and severity of individual management strategies corresponds to the percieved risk of bison border crossings. Four management zones have been designated: 1) Reese Creek, 2) West Yellowstone, 3) EagleCreek/Bear Creek, and 4) Other areas.

In the Reese Creek area, near the town of Gardiner, Montana, management policy is stringent. Cattle ranches border the park in this region. Bison that cannot be hazed back into Yellowstone National Park are shot. In the 1990's, a substantial percentage of all removals have occurred in this management zone. (See Table 4.) In 1992 and 1995, 92% and 78%, respectively, of all management removals took place in the Reese Creek area.

In West Yellowstone, bison management operations vary by time of year. From May 1 to October 31, all bison exiting Yellowstone National Park are immediately removed or hazed back into the park. From November 1 to April 30, bison are granted a greater degree of latitude. Male and non-pregnant female bison which have tested negative for brucella antibodies are permitted on public land adjacent to Yellowstone National Park; namely Gallatin National Forest. However, bison moving onto private land are removed. From 1985 to 1997, 1,006 bison were removed from Yellowstone's western boundary, approximately 50 % of the total removed from the northern boundary. With the exception of 1995-96, bison removals are significantly greater at the northern boundary during years of heavy migration. The lower totals may result from the use of thermal areas by bison in southern sections of the park.[7]

[7]Kirkpatrick (1996) believes the southern (Mary Mountain) bison herd is currently closer to carrying capacity than the northern herd. Migrations across park boundaries appear to contradict this finding. The use of thermal areas by the Mary Mountain herd may explain this discrepancy.

TABLE 4

Geographic Location of Bison Removals, 1984-1996*

Winter of Year	West Boundary	North Boundary
1984-85	0	88
1985-86	16	41
1986-87	7	0
1987-88	37	2
1988-89	2	567
1989-90	3	1
1990-91	14	0
1991-92	22	249
1992-93	79	0
1993-94	5	0
1994-95	119	307
1995-96	344	26
1996-97	358	765

*Totals do not include bison removed from sites south and east of Yellowstone National Park.

Source: National Park Service and State of Montana (1996); National Park Service (1997b)

Around Eagle and Bear Creek, bison are permitted to expand their range beyond park boundaries with minimal interference. Land-use restrictions in this region prohibit cattle grazing. In addition, topographic barriers limit the extent to which bison may expand their range. Accordingly, border transgressions present little risk to human settlement and production. As noted previously, bison exit and enter the park at this location on a frequent basis. However, should any bison succeed in overcoming local topographic barriers and approach private property, management operations will commence.

Bison exiting Yellowstone National Park in other areas are permitted on public land (National Forest land) surrounding the park. In general, border transgressions in these areas present little risk as these sites are remote and comprised of steep terrain. In addition, border transgressions are infrequent in these locations. This management zone includes land surrounding Hellroaring Creek, Slough Creek, and Lee Metcalf/Cabin Creek. While lengthy penetrations into this region of the Montana landscape are unlikely, management operations will be enacted should bison near private property.

Although unstated, this management zone includes the Absaroka Mountains and Shoshone National Forest, located to the east and southeast of Yellowstone National Park. Bison wandering into this region come under the jurisdiction of the Wyoming Game and Fish Department. Managerial priorities include the conservation of other wildlife species (such as elk, mule deer, and bighorn sheep), eliminating the transmission of brucellosis, and reducing property damage (Wyoming Game and Fish Department, 1995). To achieve these goals, stated management policies include: 1) a maximum of 15 bison bulls will be permitted to use the North Fork of the Shoshone River Drainage. This number reflects the estimated carrying capacity of the land. 2) All cow

bison entering from Yellowstone National Park will be removed immediately. Removing cow bison minimizes the potential for the transmission of brucellosis, and prevents the establishment of a breeding population. 3) Removal of bull bison nearing cattle or moving off wilderness areas. 4) Uncontrollable bison causing property damage will be removed upon request, regardless of the number of bison present.

The number of bison removed from lands east of Yellowstone National Park is minor in comparison to the quantity removed north and west of the park. In the North Fork region, 5 cows and one calf were removed in 1995-96. Another 12 bulls were eliminated the following year. In 1996-97, 14 bulls, one cow, and one calf were removed. In the Crandall Creek/Sunlight Creek area, one bull was removed in July of 1994, and another in January of 1997 (Emerick, 1998). Altogether, in a three-year period, 36 bison were removed from the region. Bison movements to the east are considered unusual, and thus receive limited political attention. As a result, bison removals to the east of Yellowstone National Park are not included in most published government documents.

Again, the current land conflict between bison and ranchers resembles other political events. Bison management attempts to reduce opposition to the dominant social and political regime by eradicating other forms of "knowledge." Bison removals do not simply eliminate the body of the Other, but in addition extinguish any acquired knowledge and learned behaviors relating to migratory pathways which have been passed among herd members during the preceding years. It is, in a sense, an obliteration of the past. Thus, the impetus for appropriation and the progenitor of contestation is removed. As such, bison removals may preempt bison migrations in subsequent years. This may

account, in part, for small migrations beyond park boundaries in years following substantial reductions (e. g. 1987, 1990, 1993, and, it appears, 1998).

From 1967 to 1997, bison removals were strictly prohibited within Yellowstone National Park. To this point, the Organic Act, which established the preservation of wildlife as the top priority of the National Park Service, proved a formidable barrier against the intrusion of wildlife management operations. Despite repeated boundary transgressions by Yellowstone bison, the integrity of Yellowstone National Park had not been compromised by consideration of such social issues as property rights and livestock production. By 1997, however, in the face of political pressure emanating from the state of Montana and the Animal and Plant Health Inspection Service (APHIS), the National Park Service conceded to bison management operations within the park's interior. Bison management moved into a new phase, and the window of opportunity afforded Yellowstone bison was closed slightly.

The newly adopted management policy entailed a process of capturing, testing (for brucellosis), and slaughtering bison that migrated near the park boundary at Gardiner. Under the management of the National Park Service, a capture pen was sited at Stephens Creek, two miles south of the northern park boundary in the aforementioned Reese Creek Area. Bison that tested positive for brucellosis were sent to slaughter at a designated facility. Bison testing negative, which eventually totaled 147, were retained inside the capture facility. In March, 39 of the uninfected bison were sent to Idaho and Montana for research purposes. The remaining 107 were released in April to return to the northern range (National Park Service, 1997b).

In addition, two capture facilities were constructed in West Yellowstone immediately adjacent to the park's boundary. These capture pens were

managed by the Montana Department of Livestock and APHIS. One hundred and thirteen bison were captured at these facilites, of which 65 were marked and released onto public land. Unexpectedly, some of the released bison were mistakenly shot after migrating to locations around Gardiner (McMillion, 1997d).

Of the 1,083 bison removed from the GYE, 510 were processed through the capture pens and slaughterhouses. Of these, 462 were captured at Stephens Creek. (Due to changing migratory behavior, the capture facility at West Yellowstone was largely ineffective. Only 48 removals occurred at this site.)[8] Thus, 43% of all removals occurred as a result of management operations within park boundaries. Moreover, of the 726 bison removed in the region of Yellowstone's northern boundary, 64% resulted from the implementation of the Stephens Creek capture facility.

While the impact of this new management policy may appear trivial, the significance of the transition was not lost on wildlife advocates. The sanctity of Yellowstone National Park had been ruptured. Five conservation groups sued the National Park Service in order to halt capture and slaughter operations. The suit failed. In upholding Yellowstone's management operations, U. S. District Court Judge Charles C. Lovell stated that, "The integrity of the YNP bison herd is in no way threatened" (Associated Press, 1997). Again, bison fecundity and meandering was effectively undercut by the conceptual stability of biodiversity. Thus, spatial control was augmented and intensified.

Clearly, many of the bison captured at Stephens Creek would have been removed from the landscape had the facility not existed. Most, if not all, of the bison would likely have pushed forward beyond Yellowstone's boundary. As such, objections to the newly adopted management procedures are symbolic

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[8]When utilized again, this capture pen will be relocated to increase the efficiency of management operations.

rather than quantitative. The legislated division between wilderness and civilization was perceptibly dissolved. Essentially, a long-held agreement was revoked, signaling the beginning of a new regime.

Remarkably, data indicating the precise location of bison removals outside Yellowstone National Park is minimal. Given the controversy which surrounds bison management operations, it is astonishing that government agencies (federal or state) have not documented, in detail, the various sites where bison removals have taken place. Table 4 is a typical representation of published data indicating the location and intensity of bison management operations. The two columns (Northern Boundary and Western Boundary), in general, correspond to the towns of Gardiner and West Yellowstone, respectively. This data is vague at best, illustrating none of the variation which exists within the region. The image presented is two-dimensional.[9]

The best available documentation of specific bison removal operations was provided by Montana Department of Livestock (1996, 1997) media releases. While descriptions of geographic locations are still vague in these documents, they do offer significant insights that previous sources have ignored.[10] By analyzing these media releases, the depth and girth of management operations can be clarified. Together with the data from capture facilities, a reasonble approximation of bison removals can be illustrated.

A total of 56 bison removal operations were conducted from December 13, 1996 to April 15, 1997. The number of bison removed during individual management operations ranged from 1 to 38. According to Montana

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[9]At least during the period of legalized bison hunting (1985-1991), the specific location of "big game" removals was of secondary importance.

[10]This may be the result of the Department of Livestock's treatment of bison as a "quarantined" animal. Since bison are potential hosts of an infectious disease, the specific location of bison removals becomes more critical.

Department of Livestock (1996, 1997) media releases, removal operations were initiated in several locations. (See Table 5.) Specific sites listed are readily definable spatial units. A conservative classification system was utilized, reflecting the detail of published media releases. Thus, in the case of geographical uncertainty resulting from an inadequate geographical description, individual bison removal operations were grouped with the nearest definable spatial unit.

Despite the use of the Stephens Creek capture facility, most bison removals and management operations were conducted in the vicinity of Gardiner, Montana. The large number of bison removed from the site most likely arises from its proximity to the park and the relatively dense agglomeration of households. Further to the north, another significant cluster of removals occurred within the valley that leads to the town of Livingston. Two removal operations were conducted in the town of Corwin Springs. In another management operation, three bison were removed 15 miles north of the park. This appears to be the furthest intrusion of bison in a northerly direction.

To the west of Yellowstone National Park, bison removals took place in multiple locations. Many of the bison migrating westward along the Madison River were removed in the Horse Butte region. A total of 147 bison were shot at Horse Butte. The average herd size (18) was the largest of all identified geographical locations.

In West Yellowstone, 88 bison were removed. This includes bison removed within the area stretching north from West Yellowstone to the Madison River. Twenty-four bison were removed from geographically vague locations "south of the Madison River." Bison at these locations most likely migrated down the west entrance to Yellowstone National Park and/or the Madison River.

TABLE 5

Bison Removals, 1996-1997*

Location	Descriptions	# of Removal Operations	Total Bison Removed
Gardiner	Gardiner Eagle Creek	21	209
Horse Butte	Horse Butte Madison Rim	8	147
W. Yellowstone	W. Yellowstone South of Madison River	9	88
North of Gardiner	North of Gardiner Corwin Springs Yellowstone Valley	9	46
South Fork of Madison River	South Fork Madison River	3	41
Hwy 287 & 87 Intersection	Hwy 287 & 87	2	18
Madison Valley	Madison Valley	1	9
West of West Yellowstone	West of W. Yellowstone	1	3
Madison Arm	Madison Arm	1	2
Big Sky	Big Sky	1	1

*Totals do not include bison shot at capture facilities due to injury or research purposes.

Source: Montana Department of Livestock (1996, 1997)

As in the case of Gardiner, physical proximity to the park and dense residential settlement explain the West Yellowstone cluster.

Several other locations west of Yellowstone National Park have been the site of bison removals. Two bison were removed near the Madison Arm of Hebgen Lake. Another 41 bison were eliminated in the vicinity of South Fork of the Madison River. Three bison were removed from 6 miles west of West Yellowstone. While spatially distinct, management operations conducted at these sites are in the same general region as those occurring in Horse Butte and West Yellowstone. Other removals took place at a substantial distance. On separate occassions, 13 and 5 bison were shot near the intersection of Highway 287 and Highway 87. Further still, 9 bison were eliminated in the Madison Valley, a location estimated as 25 miles west of Yellowstone. This bison movement was the furthest transgression to the west or north of the park. Finally, a single bison was removed 15 miles south of Big Sky.

The data provided by media releases indicate that bison removals are directly correlated with distance from Yellowstone National Park. (See Table 6, Figure 11 & 12.) Conservative estimates would place all removals occurring at Gardiner and West Yellowstone within three miles of the park's boundaries. Fifty-three percent (297) of the total removals outside Yellowstone took place within this region. Two hundred and thirty-three (41%) bison occurred on land located three to seven miles from the park. This included bison removed north of Gardiner[11], Corwin Springs, Horse Butte, South Fork Madison River, Madison Arm, and an unspecified location six miles west of West Yellowstone. The number of bison removed from locations greater than 7 miles from

[11]This does not include 6 bison previously classified as "north of Gardiner". Three bulls were removed 10 miles north of Gardiner, and two cows and one bull were removed 15 miles north of Gardiner.

TABLE 6

Number and Percentage of Bison Removed According to Distance from Yellowstone National Park, 1996-1997

Distance (miles) from park	Location	# of bison removed	% of removed bison	Cumulative removed
0-3	Gardiner West Yellowstone	297	53	53
3-7	Corwin Springs Horse Butte Madison Arm North of Gardiner S. Fork Madison River West of W. Yellowstone	233	41	94
7-15	Big Sky North of Gardiner	7	1	95
15-20	None	0	0	95
20-25	Hwy 287/87 Madison Valley	27	5	100

Source: Montana Department of Livestock (1996, 1997)

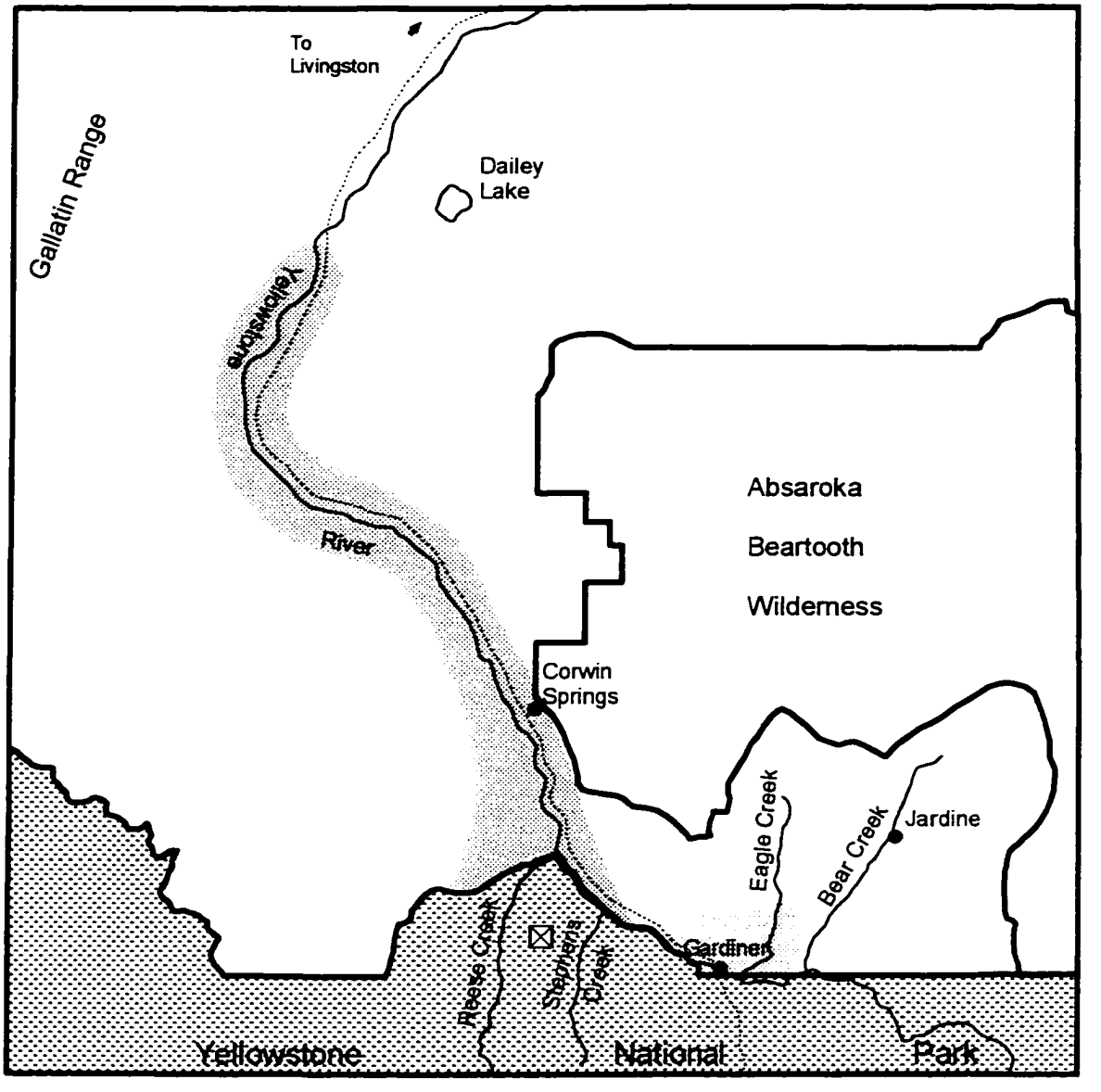

FIGURE 11. Location of Bison Removals North of Yellowstone National Park, 1996-1997.

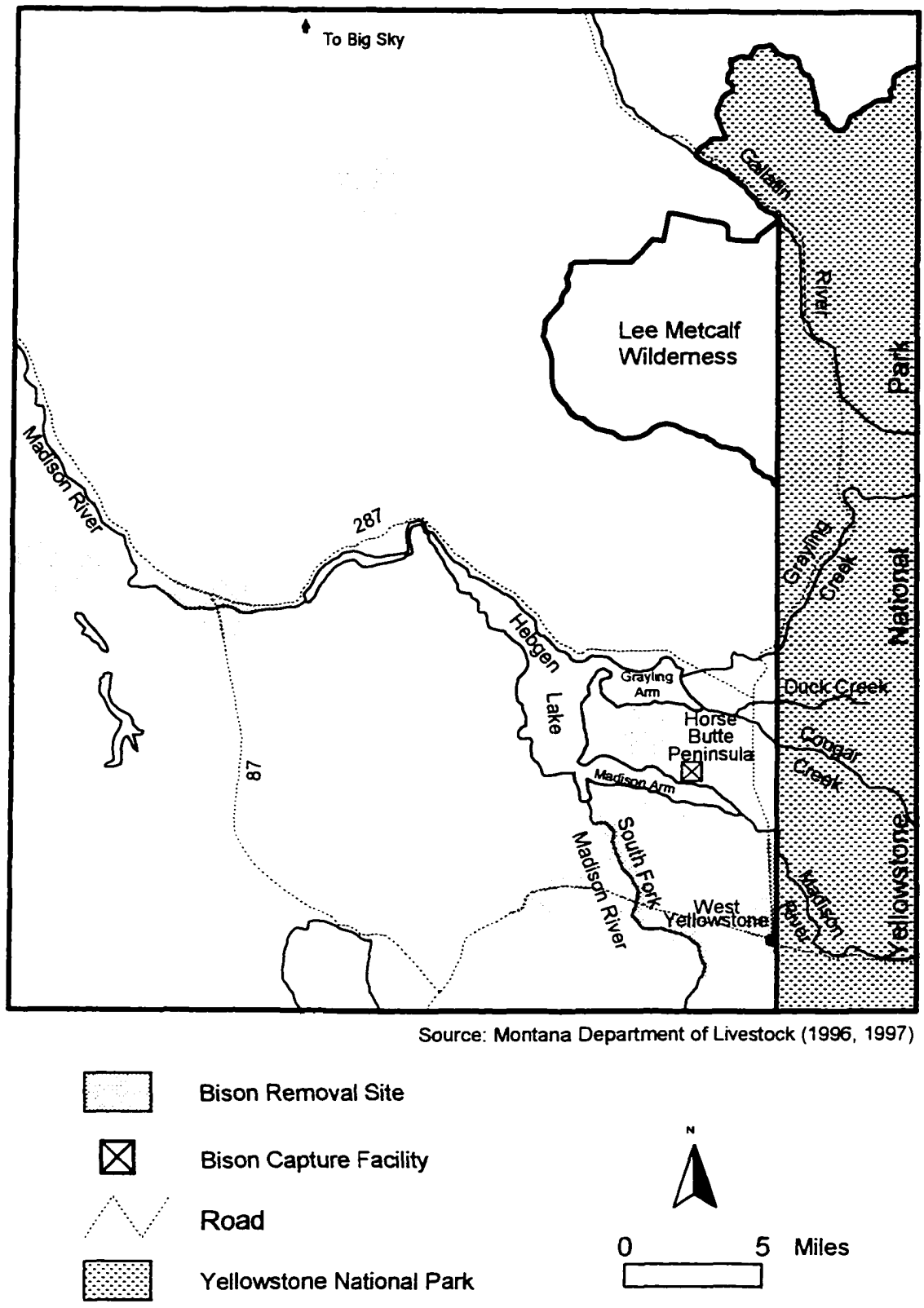

FIGURE 12. Location of Bison Removals West of Yellowstone National Park, 1996-1997.

Yellowstone's boundary drops considerably. Seven bison (1%) were eliminated from sites 7 to 15 miles from the park. These removals occurred north of Gardiner and south of Big Sky. The next set of removals occurred approximately 22 (on 2 separate occasions) and 25 miles from the park. A total of 27 (5%) bison were removed from these locations.

These data substantiate the rigidity of Yellowstone bison biogeography, and the production of stability through state and federal management operations. If the bison removed via capture facilites (occurring both inside and immediately adjacent to Yellowstone's boundary) are added to those shot at Gardiner and West Yellowstone, the rigidity of property lines and biogeographic boundaries is magnified. Of 1,083 bison removals, 75% (816) took place at these locations.

Despite the apparent success of current management policies in maintaining stability, the management of Yellowstone bison is undergoing another transformation. The environmental impact assessment, which is currently being written, confirms what has already been articulated by the material removal of bison detailed above. In no uncertain terms, the document states that "The agencies have agreed that all [management] alternatives must include a "management boundary" beyond which bison are not tolerated in the state of Montana." Furthermore, "None of the alternatives envisions a 'no management' strategy, that is, letting bison roam wherever they want with no agency actions... (National Park Service, 1997a, 42). Proposed plans include the strict regulation of the bison population within the park. If approved, various methods will be utilized to restrain members of the bison population.

The focus of the "preferred" management alternative is enforcement of a range of bison population numbers. Management operations will attempt to

maintain the bison population between 1,700 and 2,500. The size of the bison population would impact management operations. When the population nears the lower extreme (approximately 1,700), extensive hazing operations would be enacted to restrain bison. Shooting bison would be avoided if possible. Capture facilites would release uninfected (seronegative) bison, or, under severe environmental conditions, hold bison to prevent their starvation or slaughter. In addition, hay baiting and road closures may be utilized.

Should the bison population near the upper extreme (approximately 2,500), management procedures would change. Hazing operations would be reduced, and, if necessary, the number of hunting permits would be augmented. In some instances, uninfected bison within capture facilities would be released to Indian tribes and other requesting organizations. Additionally, uninfected bison may be sent to slaughter.

Summary

Since the adoption of natural regulation in 1967, bison management within the GYE has undergone a gradual process of intensification. In recent years, amorphous management plans have been replaced by policy documents delineating management zones. Simultaneously, the correlation between private property and the permitted range of Yellowstone bison has been clarified. Management agencies, such as the National Park Service and the Montana Department of Livestock, which had once operated under conflicting mandates, are now in the process of coordinating their management efforts. As a result, governmental agencies have broadened the comprehensiveness of

bison management and increased the efficiency with which bison are removed from the landscape.

The spatial range of Yellowstone bison is permitted to expand only after the risk that they embody is removed. (See Appendix A.) When bison are removed from the landscape by lethal means, their remains (i. e. carcass) are donated to organizations and individuals that are interested in possessing the meat, skulls, and hides of the animals. Individual bison are thus dispersed to distant communities. This presents no problem since their removal has, in essence, immobilized them. At this point, bison no longer have the ability to destabilize the local and regional landscape. As a result, the posthumous range of Yellowstone bison entails a considerable expansion of the herd's range.

CHAPTER 8

IMPLICATIONS

By enumerating the lethal means by which Yellowstone bison have been contained within a strictly defined region, the conclusion may be drawn that the imposition of death is the primary topic of this thesis. Yet, as Benton (1993, 160) noted, even the most benevolent, pacifist lifestyle is predicated on death. Not in the political sense expressed by Foucault, which fabricates the necessity of death, but rather in a fundamental sense relating to one's physical placement on the earth. At minimum, the collision of bodies is bound to result in the demise of some individuals.

The removal, elimination, and/or slaughter of Yellowstone bison is the conclusion of a life which has been substantially altered by human social practices. Thus, the ultimate topic of this thesis is the life of bison that inhabit Yellowstone National Park. The present chapter will describe the manner in which stability, as defined in Chapter 4, breeds stability. In the process of stabilization, the Other is transformed into what it formerly was not. More specifically, the focus centers on the multiple ways in which discourse and management changes the nature of existence.

Perpetual Range

The land conflict between ranchers and bison indicates that internal stability requires external stability. Chaotic processes cannot be left

unattended. Therefore, the lifestyle which property owners seek to enforce dictates the behavior of the external Other. Cronon (1983, 118-119) recognized this dynamic in the colonial relationship between European settlers and Indians of the Northeast:

> Colonists thus modified the Indians' practice of large-scale communal burning in order to accommodate it to European notions of fixed property boundaries; fire was not to tresspass across such boundaries under penalty of law.... Such restrictions... made earlier Indian uses of fire increasingly difficult to continue as colonial settlement advanced.

(Just as national parks are, in some respects, analgous to prisons, policies affecting Native Americans [e.g. reservations] are analogous to those accorded bison. This association will be alluded to again.) In the current context, fire is replaced by unpredictable waves of migratory movement.

Migration, in many instances, is directly correlated with the expansion of a species' range. The cattle industry within the GYE has attempted to prevent migratory processes through the right to exclude. With the governmental support of Montana, Idaho, and Wyoming, local residents have actively pursued the restriction of the range of Yellowstone bison. The inviolable nature of property has resulted in a population range which mirrors the configuration of Yellowstone National Park. Indeed, this very point has been the thrust of this thesis. The bison range is a manifestation of management policies adopted in the 1970's, 1980's and 1990's. To this extent, the current population range is a temporal phenomenon. Yet, through the auspices of inheritance, this condition can be stretched well into the foreseeable future. A once transient range is fixed onto the landscape in perpetuity. The range is predetermined, year after successive year, by metaphysical authority of the "natural right" to property, rather than biological competition.

To avoid this static future, the regime of property would need to relinquish its authority. At present, this occurrence appears unlikely. Even the National Park Service, the most ardent supporter of Yellowstone bison, grants the supremacy of property rights. To do otherwise, and concede the equal status of bison, would entail an abrogation of power (Birch,1995).

Paradoxically, advocates of bison rights have also been complicit in the restriction of Yellowstone bison. The Fund for Animals, an organization in support of animal rights, worked busily to construct a fence along the northern border of Yellowstone National Park to prevent bison from migrating outside the park. The project was intended to save the lives of bison. (The fence was never completed. Segments were constructed, but gaps persisted throughout.) However, despite good intentions, the Fund for Animals was an accomplice in the subjugation of Yellowstone bison. In order to reduce the number of deaths, the organization was willing to surrender the land and resources which lie beyond the park's boundaries.

The conflicting interests of wildlife management agencies and animal rights organizations reveals the manner in which opposites work to substantiate a reality. Clearly, the effort to eradicate bison from the landscape fostered the organization of political opposition. Consequently, in response to this growing political resistance, management agencies redoubled their attempts to rid state lands of bison. As is the case in many political scenarios, the threat of subversion (real or imagined) serves to legitimate the authority of political institutions. In this way, both the border of Yellowstone National Park and the subserviant status of Yellowstone bison has been further solidified.

Core Population

The latitudinal and longitudinal bounds imposed on bison migratory behavior are paralleled by quantitative restrictions on bison reproductive behavior. Both judicial decisions and proposed management plans have effectively pursued the enforcement of an equilibrium which simultaneously mitigates against either abundance or paucity of bison. Stability is thus numerical as well as spatial.

It has been well documented that one of the strengths of Bison bison is its prolific capacity to reproduce. Repeatedly, bison have exhibited a resilience uncommon among many species. The majority of female bison reach sexual maturity (i. e. begin breeding) at three to four years of age. In Canada's Mackenzie Bison Sanctuary, Gates and Lartner (1990) found that 70% of examined adult female bison (n=44) were pregnant. In Yellowstone National Park, Meagher (1973) estimated a pregnancy rate of 50%.[1] Kirkpatrick et al. (1993) calculated a pregnancy rate of 48%. An additional study conducted by Kirkpatrick et al. (1996) found that 39.8% of bison in the Mary Mountain herd, and 51.6% of the bison in the Northern herd were pregnant. All of these pregnancy rates indicate that mature female bison are impregnated, on average, every two to three years. It is this form of biological hardiness, and the propensity for growth which it engenders, that management operations must confront and control.

To date, the bison population of Yellowstone National Park has been constrained within prescribed numerical boundaries. At minimum, the herd is

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[1]Meagher (1973, 60) found that males comprise "less than 60%" of Yellowstone National Park's adult bison population. However, Meagher states that bison reductions may have altered the sex ratio of the herd. She suggests that a natural sex ratio may be the invrese (i. e. 60% female, 40% male).

protected from dipping below an, as yet, unspecified numerical threshold dictated by the edicts of biodiversity and sentiments embodied in the Endangered Species Act. Conversely, an overabundance of bison is admonished for exceeding the park's carrying capacity. In upholding the Park Service's use of capture pens, U.S. District Judge Charles C. Lovell stated that Yellowstone National Park contained 1,000 more bison than it could sustain (Associated Press, 1997).[2]

The proposed bison management plan is an explicit acceptance of these parameters. The stated ideal population, defined as 1,700-2,500 bison, permits a maximum fluctuation of 800 bison. Importantly, the proposed bison management plan extends into the future. Table 7 lists the predicted bison population for the next 10 years. If approved, bison management operations will no longer simply react to bison growth and expansion, but will also precede its occurrence.

Consequently, Yellowstone's bison herd is, in many respects, frozen in time. Much like the bison's range, the numerical herd may soon be locked into a model state.

Compartmental and Marginal

The previous chapter illustrated the attempt to restrict the amount of space appropriated by Yellowstone bison. Yet, recognizing the utility of the species, other spatial processes are occurring simultaneously. In addition to spatial confinement, bison are compartmentalized and marginalized. This

[2]At that time, approximately 3,400 bison resided within Yellowstone National Park.

TABLE 7

Estimated Bison Population and Bison Removals under Proposed Management Plan

Year	Early Winter Population	Rate of Increase	North Boundary	West Boundary	Total Removals
1997	2,156	--	--	55	55
1998	2,266	0.051	--	57	57
1999	2,381	0.051	80	23	103
2000	2,465	0.035	98	23	121
2001	2,536	0.029	100	23	123
2002	2,611	0.030	103	32	135
2003	2,679	0.026	105	32	179
2004	2,705	0.010	106	31	205
2005	2,705	0.000	106	30	205
2006	2,705	0.000	106	29	205
2011	2,705				

Source: National Park Service (1997a)

impacts not only the amount of land appropriated, but also where it is appropriated.

A fundamental goal of bison management is the thorough disengagement of bison from the daily life of local residents. By means of monitoring, regulating, and repressing bison reproductive and migratory behavior, bison are segregated from social structures and processes. This involves, at minimum, a dis-integration of ecological systems. The social and biological milieu that exists within the landscape is funnelled through the authority of governmetal agencies and reprocessed. The spontaneity of biological life is broken down and subdivided into component parts. If the unity embodied in ecosystemic theories or the "landscape as organism" ever existed in the past, it is now the express goal of bison management to prevent this condition.

As in other situations, the landscape is literally disassembled. Much as a cog in a machine, the bison of Yellowstone are sited where they can be of the most efficient use. Their role is both limited and specified. Accordingly, in addition to incarcerating bison, Yellowstone National Park also serves as a reservoir to be utilized when necessary. Like land-use zones, bison, and the park in which they exist, carry out vital functions which may be simultaneously hazardous and beneficial to valued social processes.[3]

The hazardous characteristics which bison embody have garnered the bulk of attention within management discussions and withn this thesis. These include physical damage to property, reduction of forage, threat to personal safety, and, most importantly, the potential transmission of an infectious

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[3]The pairing of "hazardous" and "beneficial" is in many respects interchangable with Foucault's "docility" and "utility". One function of discipline is "...to increase the docility and the utility of all the elements of the system" (Foucault, 1977, 218).

disease. Restricted within the unincorporated, interstitial region of Yellowstone National Park, the risk which these attributes present is minimized.

Despite the negative images circulated by the local media, Yellowstone's bison are an important commodity. Their utility is extracted when necessary to bolster the strength of the prevailing social and economic systems. Yellowstone's bison are valued for their genetic, historic, and aesthetic attributes. The historical and (visual) aesthics of bison were noted expressly in Greater Yellowstone Coalition v. Babbit (1997). The suit was filed by the Greater Yellowstone Coalition in order to stop the implementation of the 1996 Interim Bison Management Plan. The organization argued that the bison management plan was illegal since it violated the Organic Act of 1916. The Act mandated the federal government to "...conserve the scenery and the natural and historic objects and the wild life therein... for the enjoyment of future generations" (Montana Department of Fish, Wildlife and Parks et al., 1990, 5).[4]

The large number of tourists exploring Yellowstone National Park attest to the degree that bison, and other wildlife, have been disengaged from modern daily life. Approximately three million people visit Yellowstone National Park each year. Tourists visit the region for numerous reasons, but primarily to view unfamiliar artifacts of the past. In general, the biological processes that occur within Yellowstone National Park no longer poses deep personal meaning for the modern citizen. Rather, due to its segregation from modern social activities, the landscape has become alien. Therein lies its attraction.

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[4]The suit was dismissed. Whether or not the aesthetic and historic value of bison was the true impetus for the suit is debatable. Nevertheless, these factors clearly play a role in the discourse surrounding bison management.

Wildness and Simulacra

The preceding text has attempted to illustrate the multiple ways in which Yellowstone bison are controlled by various federal and state agencies. Bison migration, the initial source of risk to human settlement and production, has been regulated for decades. In turn, migration has spawned an attempt by governmental agencies to control bison reproduction. Should the latest management plan be approved, both migration and biological reproduction will be severely restricted. Simultaneously, Yellowstone bison are tapped as a source of genetic diversity, thus becoming an element furthering the stability of social systems. As such, bison are one part among many which must be managed to keep the system operating. Thus, they are overseen for the protection and benefit of residents within the region.

These conclusions must be reconciled with the frequently stated, and politically motivated, definition of the Yellowstone bison herd as the world's last "wild, free-ranging bison herd" (Meagher, 1973; United States General Accounting Office, 1992; National Park Service, 1997a). The image presented by this depiction is a fundamental contradiction of the bulk of the present thesis. It conjures memories of the primordial past to which many Americans are drawn:

> As the broken television in the jungle has the virtue of power (mana) as fetish, for us the fetish is reversed. Stripped of its function - in rite and ceremony - the bygone object (of anterior or primitive society) ramifies our own myth of origin, of the continuity and survivability of our own society. (Pefanis, 1991, 63-64)

Consequently, the preservation of a free-ranging herd, or at least its appearance, has significance to the American public. Thus, an effort must be made to discern between the definition presented in the current thesis -- a

stagnant bison herd -- or the definition articulated in numerous documents -- a wild, free-ranging bison herd. In other words, have past, present, and future bison management plans produced the primordial past or simply a "vignette of primitive America" (Leopold et al., 1963, 32).

The following will attempt to substantiate the claim that current bison management policies seek to eradicate wildness when and where it occurs. Two issues will stressed; namely that of law and its relation to wild life[5], and secondly the cyclical reproduction of Yellowstone's bison herd. In both instances, self-determination is denied to bison. Until this condition is rectified, any definition of Yellowstone's bison herd as "wild" and "free-ranging" should be critiqued as an inauthentic interpretation of the landscape.

To this point, the fabrication of Yellowstone bison biogeography has centered on stability enforced through lethal and non-lethal measures. This has generally highlighted the material aspects of this phenomenon. As such, it is tangible and visually evident. However, the laws and legislation which accompany this process are vital. Rules are the means by which bison have become incorporated into the human domain.

An illustration of the incorporation of bison into the human system of law is a letter written by Horace M. Albright, former Superintendant of Yellowstone National Park from 1919 to 1929. Written in 1922, the letter concerned wandering bison:

> We have in Yellowstone National Park, several "outlaw" buffalo, that is buffalo that do not run with the herd, but graze alone in the hills. Two or three of these buffalo, all bulls are dangerous to man and animals alike. One of these buffalo killed two horses during the summer, and the chief ranger has just written me that he became so dangerous and unmanageable that he had to kill him.

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[5]The use of "wild life" is intended to emphasize and convey a mode of existence. "Wildlife" is generally understood as a biological organism.

Later, Albright speculated on the further need for such measures:

> We will not kill any more of these animals than we have too, but with the herd increasing so fast, it is likely that each year we will have to dispose of several "outlaw" bison. (Albright, 1922)

Albright's letter indicates the manner in which wildlife is subsumed under the moral and legal authority of government agencies. In the most direct fashion possible, Albright classified bison according to their adherence to the law of the land. Bison which escaped the purview of managers were declared outside the law. Therefore, despite the fact that bison were unaware of legal restrictions placed upon them, they were nevertheless subject to the legal restrictions. Cronon (1983) made a similar point concerning wolves: "Because... wolves were incapable of distinguishing an owned animal from a wild one, the drawing of new property boundaries on the New England landscape inevitably meant their death." Cronon, however, stopped at this adversarial perspective. He did not see, or did not state, that by extending moral claims to other species, wildlife is assimilated into the human domain of settlement and production.

Another remarkable element of Albright's letter is that, over 75 years later, the sentiments it contains are still applicable. Even though Yellowstone's bison population was relatively small at the time (647 in 1922), and in the process of rebounding from near-extinction, an overriding concern for the preservation of property rights still prevailed. Today, bison are classified according to the same spatial criteria.[6] The simultaneous growth of Yellowstone's bison population and the local cattle industry during the subsequent decades has only intensified restrictions on bison spatial dynamics.

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[6]Albright's letter is also significant in that the risk presented by bison is limited to potential property damage. Although brucellosis was recognized within Yellowstone's bison herd in 1917, the disease was not mentioned by Albright.

Applying law to wild creatures alters the dynamic that exists in the landscape. Wildness is not a form of Otherness that can be legislated and restricted. While other cultures (indigenous, subversive, or otherwise) may retain some cultural integrity in a subjugated, restricted state of existence, wildness is inherently incompatible with such a codified relationship. The moment that wild life, in any form, adheres to the law, it ceases to be wild life. By its very nature, wild life is not subject to any governing authority. Wildness is inherently capricious, transgressionary, and insurgent. It does not obey, but rather is defined by the chaos which it creates.

These observations allude to a critical distinction. "Wilderness is a place; wildness is a condition" (Faulstich, 1994, 168). Unfortunately, the two terms are commonly used interchangeably, as though they were identical in meaning. Yet, this casual use of terminology obscures a significant difference. Simply because a region is designated as a wilderness zone does not necessarily entail that it is autonomous.

In the current context, an argument may be put forth that Yellowstone's bison are still wild since the law (i. e. management) is not applied until individual members of the herd breach delineated boundaries. Following this logic, bison inhabiting the vast interior of Yellowstone National Park are unfettered by civilization. Thus, behavior is not mediated until members of the species contact recognized borders. Yet, this appears as much a matter of chance as biological autonomy.

To substantiate the claim that internal spatial freedom is not commensurate with wildness, one need only look at the multitude of biological organisms which inhabit zoos. Certainly, most would consider such animals to be captive. Zoos are based on the principle of enclosure and control. Yet, even

in such tight quarters, surrounded by moats, bars, or glass, zoo animals are able to carry out the basic functions which constitute life. Food intake, digestion, and sleep are primary activities which regularly occur within zoological parks. Vital social activites, such as play and the establishment of dominance, also take place within these controlled settings. Given suitable circumstances, mating and reproduction may occur. Of course, migration of any significant extent is denied. However, in many instances, migration is also denied to Yellowstone bison. Thus, the alternate environmental settings entail a difference in degree, rather than a difference in kind. To accept the argument that internal spatial freedom is equivalent to wildness is to claim that zoo animals are wild.[7] Rather, it is the boundaries which are constructed and the lack of self-determination which invalidate the characterstic of wildness.[8]

As the latest definition of "wild" and "free-ranging" indicates, the various state and federal agencies managing Yellowstone bison appear to be unaware of this spatial paradox. "A wild, free-ranging bison is defined as one that is not routinely handled and that can move without restrictions within specific geographic areas" (National Park Service, 1997a, 42). The official definition is itself a contradiction. Stated more clearly, bison are permitted to move freely as long as they remain within specified regions. The potential use of force to

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[7]The correlation beteween zoos and wilderness areas espoused here mimics Baudrillard's (1983, 25) observations of Disneyland: "Disneyland is presented as imaginary in order to make us believe that the rest is real [i. e. free of control and manipulation], when in fact all of Los Angeles and the America surrounding it are no longer real, but of the order of the hyperreal and of simulation." In the current context, it is generally acknowledged and accepted that zoos are infused with social power and are thus artificial. Conversely, wilderness areas are perceived to be free of such restraints. This thesis seeks to eliminate this distinction.

[8]Ultimately, the restriction and control of species is predicated on three factors: the ability to monitor individual members of the species, the technology to remove individual members of the species, and the desire to eliminate (numerically or spatially) the species from designated areas. Importantly, reasonalbe expectations would predict that the ability to monitor a species is directly linked to the size of individual members of the species. As one of the few extant megafauna on the North American continent, bison are relatively "easy" to monitor.

maintain or regain control of the landscape is implied within the official definition.

Thus, through a linguistic turn, the initial grounds for asserting Yellowstone bison as one form of a simulated wildness is established. The fundamental nature of the bison's existence is altered. Definitions such as "Yellowstone National Stockyard" (Souvigney in United States Senate, 1995, 44) attempt to articulate this phenomenon. Wildlife is thus domesticated by management policies. Furthermore, the notion of domesticity is strengthened by the changing jurisdiction of state agencies. In the past 5 years, the Montana Department of Livestock and the Idaho Department of Agriculture have taken over the responsibility of managing Yellowstone's migrant bison from their state's respective Game and Fish Departments (Keiter, 1997).

Another basis for advancing the idea of a simulated wildness is the process of reproduction. Most commonly observed in the reproduction of historical and cultural settings, in the reinstatement of architecture and landscapes, the process of reproduction may also include the reproduction of animate life. In such an instance, "reproduction" entails both labor and biology. In the current context, the issue is the cyclical reproduction of Yellowstone National Park's bison population.

The ability to reproduce, in many respects, grants the ability to expunge. Artifacts lost to eradication are revived in their physical appearance through reproduction. Thus, the loss is not permanent, but rather temporary. The risk previously associated with certain behaviors and practices is removed when reproduction becomes imminent. The ability to reproduce, therefore, implies the power to control.

Under such conditions, natural vicissitudes are dictated by the individuals and agencies who reproduce. Baudrillard (1983, 22-23) illustrated this point as it related to North America's native Indian population:

> ...Americans flatter themselves they brought the number of Indians back to what it was before their conquest. Everything is obliterated only to begin again. They even flatter themselves they went one better, by surpassing the original figure. ...By a sinister mockery, this overproduction is yet again a way of destroying them: for Indian culture, like all tribal culture, rests on the limitation of the group and prohibiting any of its "unrestricted" growth.... Demographic promotion, therefore, is just on more step towards symbolic extermination.

"Symbolic extermination" refers to the sterile existence which the reproduction, the simulacra, leads. As a product of social forces, simulacra contain little of the energy of the original. Simulacra are profoundly impotent, as they are constantly faced with the prospect of elimination and subsequent reproduction (Birch, 1995).

The case of Yellowstone bison mimics Baudrillard's assertion of a reality within control. The reproduction manifested by management policies (labor) is followed by the (biological) reproduction of the resident bison. Originally, at the turn of the century, bison management entailed protection of the herd within a ranch. Mating within the population coincided with these management operations. Thus, the initial reproduction of the species entailed an augmentation of the population's size. Conversely, in subsequent decades, the reproduction entailed a reduction in the bison population. Again, mating behavior follows management operations. The result is a cyclical reproduction of Yellowstone's bison population.

In recent decades, records of annual bison removals inside and outside of Yellowstone National Park quantify the ceaseless reproduction of the herd. (See Table 3.) Since the winter of 1989, Yellowstone's bison herd has been reduced by 10% or more on five separate occasions. In the most aggressive

reduction of the species, nearly a third of the park's bison were removed.[9] In each case, an ideal herd is reinstated on the landscape.

The correlation between managerial reproduction and biological reproduction is not coincidental. In its formulation, managerial reproduction takes biological reproduction into consideration. In The Fund for Animals Inc. v. Lujan, the federal district court essentially stated that managerial reproduction was legitimated by biological reproduction. Specifically, the court upheld the use of lethal methods to control Yellowstone's bison, since they had not as yet decimated the population. In fact, the population had continued to increase, or, more appropriately, reproduce (Keiter and Froelicher, 1993, 36). Thus, unrestrained biological reproduction should not be equated with the demise of the managerial reproduction. Rather, biological reproduction has been incorporated into the structure of managerial objectives. Table 7 is a further manifestation of this process.

Simulacra are not wild. In truth, simulacra are antithetical to wildness. They are designed in such a manner as to facilitate control. "...Power must create its own world, defined in its own terms, by means of models that are simulations of realities..." (Birch,1995, 149).

Currently, the national regard for the aesthetic and historic value of bison places limitations on the content of such a simulacra. In discussing the options available for eliminating brucellosis from the region, William J. Barmore (1968, 16), research biologist at Yellowstone National Park, suggested the following:

> "The park bison herd could be killed off and replaced with brucellosis-free bison. Of course, this would be completely unacceptable from the park standpoint, but it probably would stand the best chance of eliminating the

[9]Each year, the total herd reduction is actually greater when death by natural causes and other such factors are included. For example, in 1997, hundreds of bison died of natural causes within Yellowstone National Park. 41 bison died outside park boundaries as the result of road accidents. An additonal 39 bison were removed for research purposes.

> threat of bison transmitting brucellossis to cattle - unless the bison were reinfected by other park wildlife[10]. Then the eradication program might have to be repeated.

At present, the genealogy of Yellowstone bison must remain intact. Management procedures may alter considerably Yellowstone's bison herd, but they may not entirely replace it.

Maintaining the appearance of wildness is critical to Yellowstone's bison management policies. Again, the early history of Yellowstone National Park provides an example. According to Schullery (1997, 144):

> In the 1920's Superintendent Albright arranged for the construction of several miles of carefully placed corral in the Antelope Creek drainage on the lower north slopes of Mount Washburn. Much of the fencing was obscured by trees, giving an effect of open range. Every year some bison were turned out in this enclosure, to graze in the creek's bottomlands and be "sighted" by motorists, most of whom had no idea that the encounter had been carefully staged.[11]

If successful, the primordial past is simultaneously retained, garnered as a fount of social robustness, and recalled to prove the legitimacy of social structures. To do otherwise, would be to concede an irrevokable loss. Moreover, it would require an admission of failure. Still further, to recognize the inauthenticity of Yellowstone's bison herd is to invalidate its existence.

Accordingly, should the calculated management of bison within and around Yellowstone National Park overstep conceptual thresholds and contradict the appearance of wildness, government agencies may attempt to redefine management operations as nothing more than the reinstatement of the primitive hunt. As Secretary of the Interior, Bruce Babbit, recently commented, "I

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[10]Namely, elk. Eradicating brucellosis may require eliminating elk as well as bison. There are approximately 100,000 elk in the region. According to one scientist, such an achievement would be impossible without devastating consequences (Associated Press, 1995b).

[11]Similarly, in 1903, the gate at the park's northern entrance was inscribed with the motto: "For the enjoyment of the people". While a greater appreciation of the environment has certainly emerged during the past century, vouyerism still undoubtedly plays a significant role in the public's fascination with Yellowstone's wilderness.

think the -- the primary method of management ought to be to allow this wildlife [i. e. bison] to range off the park, to accept the idea of hunting" (NBC Nightly News, 1997). Babbit's comment was expressed with full recognition of the proposed management plan explicitly limiting the spatial range and quantity of Yellowstone bison. Through such discourse, the wildness of Yellowstone's bison herd is reinforced. The unpredictability of the "hunt" is paralleled by the unpredictability of the hunted. Uncertainty is prevalent. Yet, the image is patently false. The hunt does not exist, and will not exist, as there is nothing uncertain about the outcome of bison management operations. As Ortega y Gasset notes (1972), "To exterminate or to destroy animals by an invincible and automatic procedure is not hunting."

Both legal strictures and cyclical reproduction warrant a reexamination of Yellowstone's bison herd as an authentic representation of a "wild and free-roaming" entity. Such definitions may reflect a desire for an imagined past, rather than a serious consideration of regional dynamics.

Summary

This chapter has presented four basic features of the phenomenon known as the Yellowstone National Park bison herd. First, Yellowstone's bison herd is currently confined within a static range, as management policies work to prohibit bison movements from fluctuating beyond predetermined boundaries. Second, Yellowstone's bison population is diligently maintained (implicitly or explicitly) between specific numeric parameters. Third, the Yellowstone bison herd is a disengaged entity, spatially removed from the organic landscape and serving as a reservoir for valued resources. Finally, Yellowstone's bison herd is

no longer an autonomous biological phenomenon, as members of the population are subject to legal restrictions, ceaseless reproduction and cyclical reconstruction.

If the paradigm of stability is accepted, the phenomena presented above represent a suitable environmental setting. No theoretical precepts have been violated. Although a species, such as Bison bison, may endure a muted life, its place is fixed, secure from the vagaries of natural processes. The species is preserved for the foreseeable future.

Scientific objections to such a reality have, at best, a limited impact. When necessary, the long-term incompatiblity of static biological ranges and climatic fluctuations may be reiterated. Yet, objections of this kind are speculative and distant. Thus, they can be denied or ignored. Consequently, opposition to enforced stability must arise from subjective evaluations. This is, indeed, a tenuous position, easily deflected by governmental and scientific authorities. Nonetheless, however uncomfortable, it is the only recourse. To begin, opposition may originate from the judgement that there is something "unnatural" about ranges that do not change and populations that do not substantially vary. It is an opposition based on fundamental perceptions, rather than quantitative verification. It is a belief in animate life escaping the half-dead articulations of management.[12]

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[12]In a literary context, Faulkner (1990) explored static and transient forms of existence within the social setting of the American South. Alternately (and among others), Faulkner tells the story of Joe Christmas and Lena Grove. The trajectory of Joe Christmas' life is essentially determined at birth. Joe's reputed racial (black) ancestry dictates the way in which he percieves himself as well as the way in which local residents interact with him. Joe is simultaneously self-conscious of this process yet unable to alter its direction. For this reason, Joe is continually infused with anger, unable to break free from the model which dictates his life. The fact that he may in reality be white is irrelevant. The belief in his "blackness" is enough to send his life in a spiral which results in his eventual, pre-determined, demise. He is, in essence, frozen in time and space. To the contrary, Lena Grove is constantly in motion, moving from location to location. She is accepting of help offered by strangers, no matter what direction this may lead. In addition, she is pregnant with child. Lena Grove is a symbol of fecundity and possibilty.

CHAPTER 9

CONCLUSION

The examination of bison management policies contained within the present thesis was designed to emphasize aspects of the current land conflict which are generally ignored. Commonly, literature analyzing management polices attempts to estimate the risk embodied by Yellowstone's bison. The underlying presumption, therefore, is that spatial restriction is warranted if an inherent risk is substantiated. This issue has been largely ignored here. The point here is not to deny or invalidate the risk that bison may embody, but rather to recognize that there are myriad reasons (disease, personal safety, property damage, aesthetics, etc.) to restrict wildlife in the name of habitation and production. Thus, the focus herein has been to establish alternative forms of confrontation, and to elucidate consequences which arise from the management of this real or imagined threat. The following is a reiteration of new insights provided by the present thesis.

First, the preceding text has redefined and emphasized property as a process rather than a material object. Indeed, the corellation between property and the spatial range of bison has been previously noted. Matthews (1992) followed Frank and Deborah Popper in their attempt to establish a Buffalo Commons within the interior of the United States. The Popper's vision included a bison range which stretched longitudinally from the eastern edge of the Rockies to the 98th Meridian, and latitudinally from North Dakota to Texas. According to the Popper's, as the aging population of the region decreased,

sections of the Great Plains would become suitable for the reinstatement of bison. A decrease in population entailed a decrease in land area committed to property.

The Popper's logic is accurate in that it describes a potential void which may emerge within the United States during the upcoming decades. Yet, their analysis does not explain the true nature of property. In most respects, the Popper's appear to view property simply as an object which must be contended with, and when necessary, dissolved. As such, property is material, a fetish, incorporating none of the dynamics that exist in social and biological relationships.

In contrast, it has been the primary goal of the present thesis to define property by the processes which it contains, and by the processes which it restricts. In general, activities associated with human habitation and production have comprised the majority of permitted processes. Alternatively, harmful processes, including biological movements, are frequently denied access to land which has been classified as "property". Property is thus an attempt to inflict stability on the landscape to further the objectives of specific individuals.

This static condition differs significantly from cultural practices of the past. Unlike modern property regimes, New England Indians, for example, moved their homesite to adapt to changing environmental conditions. "To take advantage of their land's diversity, Indian villages had to be mobile" (Cronon, 1983, 54). Today, the tail wags the dog, commanding it where to go and what to do. Reconstructing property in such a manner opens alternative possibilities for analysis, interpretation, and criticism.

Second, in contrast to popular conceptions, community stability (biodiversity) is not diametrically opposed to individual stability, but rather is, in

many respects, complicitous in the attempt to control space. Certainly, stability at the level of the individual must be juxtaposed against community stability. The conceptual framework of biodiversity must be taken into consideration. Recognizing that stability often requires the preservation of hazardous elements and processes serves to place limitations on the excesses of individual stability. However, the two forms of stability presented herein are fundamentally unequal. Consequently, ecosystemic process may be substantially altered in order to promote the stability of the individual.

Together, the two forms of stability function to construct a landscape which is theoretically and materially rigid. Social and economic systems must remain unhindered by harmful influences. In addition, biological species which, in part, consitute functioning ecosystems must remain intact. Government agencies attempt to enforce a static equilibrium between these often contradictory forces.

Observations from several scientific fields have illustrated that the landscape is not static. Rather, the environment is in a constant state of flux. Moreover, rates of change vary according to the types of phenomena under consideration. As such, stability is a human construction which is profoundly ideological.

Despite such observations, forms of wildlife that breach constructed stability are redefined as the aggressor. Hence, for some local residents of the GYE, bison are both "scourge" (Schullery, 1986) and "villain" (Keiter and Froelicher, 1993). In the 20th century, biogeographies are no longer constructed by the profligate exploration of unmapped terrain, but rather a strict adherence to stability.

Third, several articles and documents have emphasized the economics of the livestock industry (Hagenbarth et al., 1994; Keiter and Froelicher, 1993; United States General Accounting Office, 1992). Such analyses focus on the capitalist mode of production to explain Yellowstone's bison management policies and the construction of space. Yet, as Power (1991) noted, the importance of ranching in the GYE has decreased in recent decades, while tourism has flourished. More importantly, productive forces do not reveal the static nature of existence that currently defines Yellowstone National Park's bison population. This aspect should not be overlooked, for it provides a basis for establishing the artificiality of Yellowstone bison biogeography.

Migration corridors and land acquisitions do not remedy this problem. Although such governmental actions may alleviate wildlife conflicts, they are still based on the strict division of wilderness and civilization. Access to land is still predicated on its classification. Thus, under such modified circumstances, the range of individual species continues to be pre-determined. The legal status of land prohibits the flux that is essential to life. In addition, property rights which survive the construction of migration corridors and wilderness areas may garner further substantiation. Conversely, concessionary policies may weaken the claims of wildlife.

Fourth, given the prohibition against range expansion, the preceding text has attempted to reveal ways in which biological movements and subsequent land appropriation resemble political movements. Applying postcolonial literature to the issue of conflicting land interests accentuates the political aspects of migratory behavior. With its focus on the subjugated status of indigenous exiles, postcolonial literature emphasizes the spatial marginalization of the disenfranchised. Furthermore, calls for the reinstatement

of indigenous cultural and economic practices may entail the adoption of alternative legal codes. By redefining Yellowstone National Park as a penitentiary for bison, the political nature of bison movements is reinforced.

Fifth, the present thesis has augmented the literature on bison management by ascertaining the location of bison removals and indicating its relation to politically-enforced stability. Previously, published reports had concentrated on quantitative data and provided scant geographical information. To date, debate concerning the efficacy of management policies has primarily emphasized the number of bison removed from the region. Yet, by fixating on quantitative data, issues of spatial production and spatial control are obscured. The coarse data provided by the Montana Department of Livestock substantiates both the current rigidity of a specific biological phenomenon, and the social commitment to stability.

Finally, the social production of stability not only results in the death of individual bison, but additionally alters the dynamic of the Yellowstone bison herd. While the range of Yellowstone bison has been circumscript for several decades, new management plans seek to restrict the size of the herd's population within a fixed equilibrium. Utilized for society's best advantage, bison are subjugated simultaneously by laws prohibiting specific behaviors, and by cyclical reproduction. Despite its primordial appearance, Yellowstone National Park's bison herd is managed much like domesticated cattle.

The status of Yellowstone bison is not unique. Perhaps it is the rule rather than the exception. Numerous biological organisms face the same barriers and restrictions. Mountain lions in California, alligators in Florida, and moose in Massachusetts are just a few examples of wildlife denied access to designated areas. The news media frequently reports occurrences of nature

out of place. Perhaps, the circumstances impacting Yellowstone bison are unique only in their clarity. While the circumscription of other species is haphazard (de facto), Yellowtone bison are restricted by legal mandates to sites within recognized boundaries. In both cases, spatial control is achieved.

The symbol of the National Park Service is the bison. Yet, much as they are revered, bison are currently unable to transcend the physical and metaphysical boundaries inscribed by man. They are, in essence, frozen in time. The model of habitation and production that has been constructed by society precedes the biological reality of the species. Bison fecundity and dynamism must conform to the static structure of society in order to persist. Alternate biogeographies are denied. It is life fatally pre-determined.

APPENDIX A

ORGANIZATIONS RECEIVING BISON CARCASSES

In 1996-1997, Bison carcasses were donated to various diverse organizations. Organizations included Indian tribes, local churches, community outreach, and cultural societies. Below is a list of the organizations receiving carcasses. The spatial data indicates: 1) despite negative local images, the national appeal of bison is strong; and 2) once the perceived risk (mobility) of Yellowstone bison is eliminated, the range of the bison body expands. Figure 13 illustrates the posthumous bison range.

Organization	Location
American Indian Science and Engineering Society	Billings, MT
Blackfoot Tribe	Browning, MT
Bozeman Shelter Care	Bozeman, MT
Community Church	West Yellowstone, MT
Crow Tribe	Pryor, MT
Fort Belknap Indian Community (3)	Fort Belknap
Fort Peck Indian Reservation (3)	Poplar, MT
Gold Hill Lutheran Church	Butte, MT
Helena Indian Alliance (3)	Helena, MT
Little Shell Indians (3)	Butte, MT

Little Shell Indians	Hays, MT
Livingston Food Bank (3)	Livingston, MT
Montana Guides and Outfitters	Helena, MT
MSU Indian Alliance (11)	Bozeman, MT
MSU Indian Club (3)	Bozeman, MT
Native American Indians of Gardiner	Gardiner, MT
Navajo Nation (2)	New Mexico
Nez Perce Tribe	Idaho
Powell County Senior Citizens Group	Deer Lodge, MT
Rosebud Lacota Sioux Tribe (2)	Rosebud, SD
Saint Labree Mission	Lame Deer, MT
Salish-Kootenai Indian Tribe (4)	Flathead Indian Reservation, MT
Shoshoni-Bannock Tribe	Fort Hall Reservation, ID
St. Mary's Catholic Church	Livingston, MT
St. Paul's Lutheran Church	Harlowtown, MT
Turtle Mountain Tribe	Undetermined*
Umatilla-Yakima Indians (2)	Oregon
West Yellowstone Food Bank	West Yellowstone, MT
Whitefish Food Bank (2)	Whitefish, MT

*The Turtle Mountain Tribe has members located in North Dakota and Montana.

Source: Montana Department of Livestock (1997)

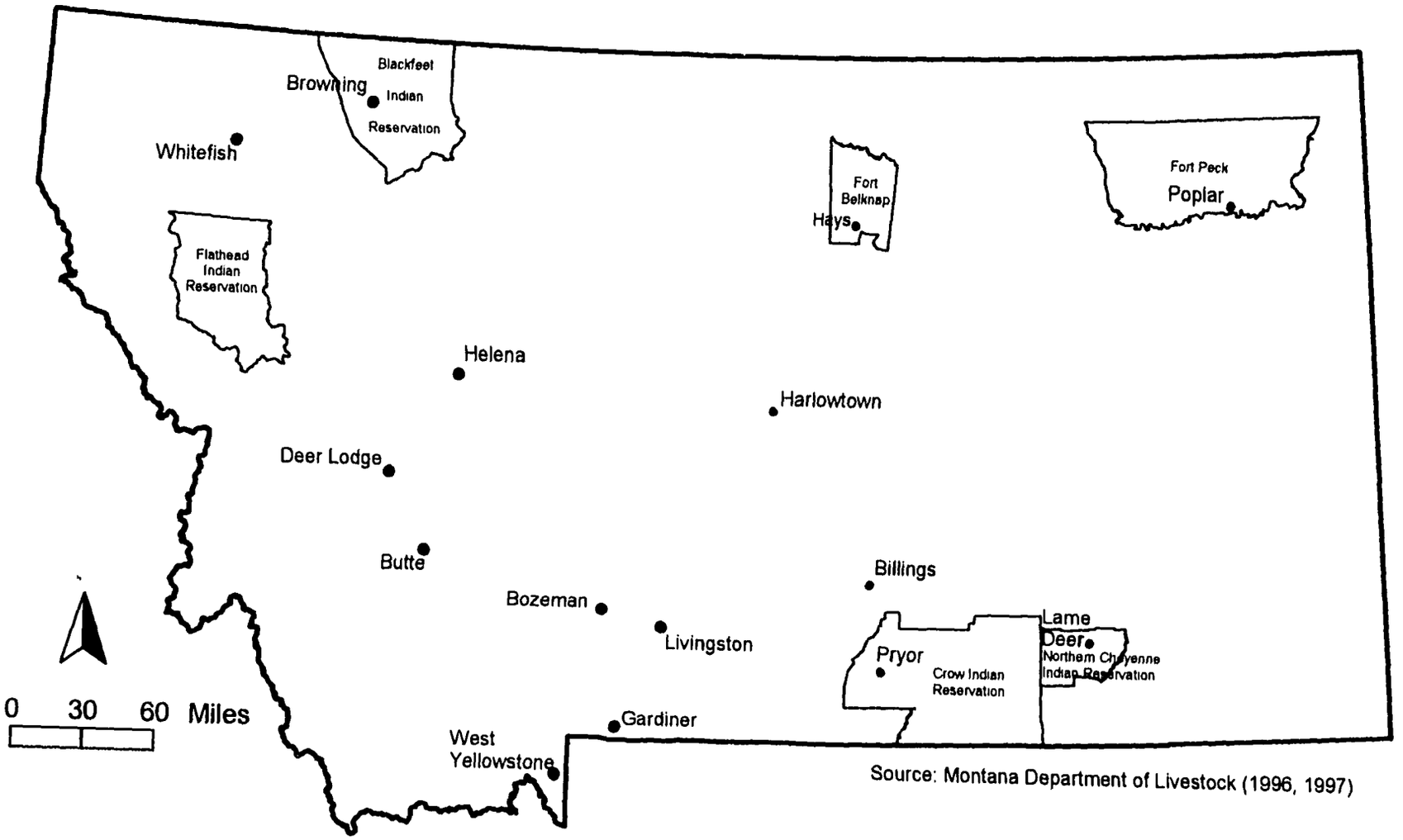

FIGURE 13. Location of Organizations Within Montana that Received Donated Bison Remains, 1996-1997.

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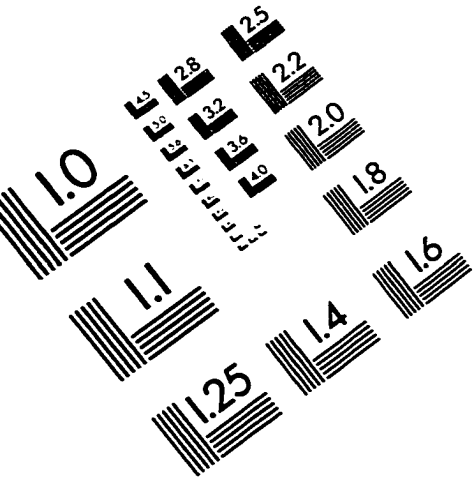
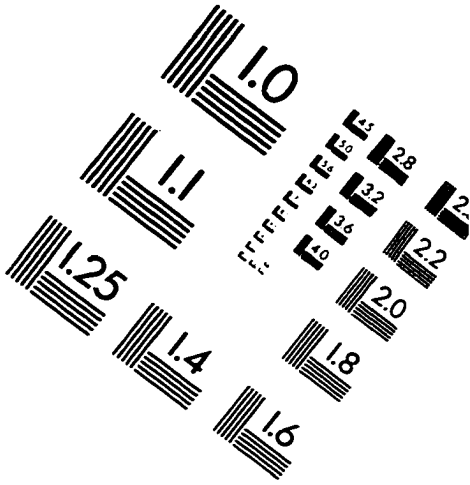
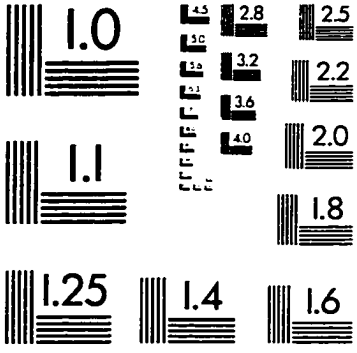
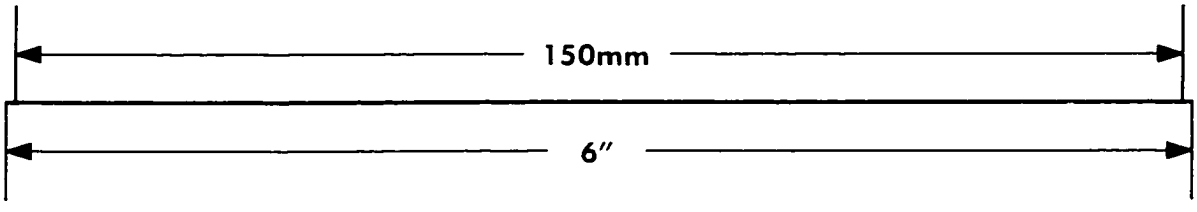
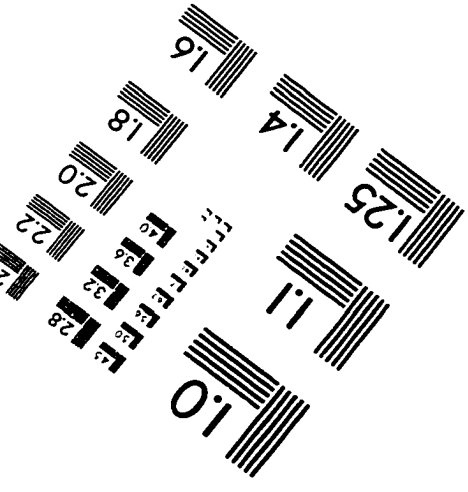
IMAGE EVALUATION TEST TARGET (QA-3)

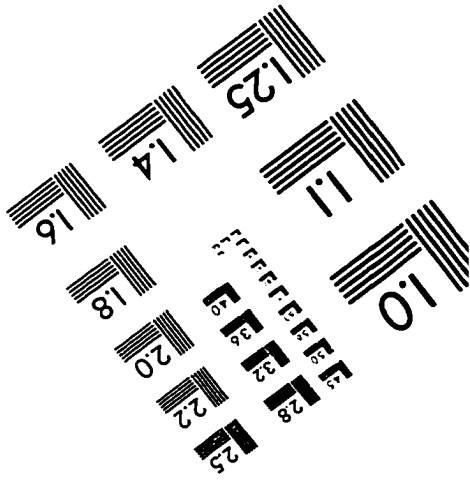












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