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Reversing Extinction: Restoration and Resurrection in the Pleistocene Rewilding Projects

The insistence that one cannot construct wilderness as one might fabricate a shopping mall or engineer a vehicle, and thus must preserve the dwindling national parks that remain, is a long-held idea in American environmentalism. Aldo Leopold, for example, wrote in his influential essay on wilderness as land use: "wilderness certainly cannot be built at will, like a city park or a tennis court" (76). The answer, thus, is preservation: "The practical point is that if we want wilderness, we must foresee our want and preserve the proper areas against the encroachment of inimical uses" (76-7). Or as a series of advertisements proclaimed through blueprints of famous natural artifacts such as a Giant Sequoia tree or Yosemite Falls presented as technical specifications or "construction plans": "It's not like we can make new ones."

However, in the context of widespread habitat and biodiversity loss and extinction, for many the preservationist imperative has come to seem too little and too late. Most everywhere, the encroachment Leopold refers to has already happened, often long ago, and what remains is a continuum of more or less cultivated or degraded landscapes. If one retains the notion of wilderness as entirely "untrammeled," in no way impacted by human intervention, this leads to a depressing, even apocalyptic state of affairs often described as the "end of nature."[1] What if there is no such wilderness to preserve? Indeed, what if wilderness is long gone, destroyed by anthropogenic and/or climatic factors over ten thousand years ago, as in the case of the North American and Siberian steppe ecosystems and their charismatic megafauna? One challenging response to this situation is that proposed, and indeed begun, by scientists such as Paul Martin and Sergei Zimov, who insist that today the task is to create *new* wilderness through what is known as restoration or even resurrection ecology. For such "Pleistocene rewilders," it *is* as if we can, and indeed must, make new ones. To build wilderness is here no longer a contradiction in terms but an ethical obligation.

Such paradoxes have long been debated among environmental philosophers, conservation biologists, and their interlocutors. Decades ago, polymath Frederick Turner proposed "inventionist ecology" as a new environmental ethic that sought, not to segregate pristine areas from human defilement, but to actively create "synthetic

landscapes."[2] Today, the emerging paradigm in conservation biology challenges the conventional isolation of fragmented islands of wilderness with an ambitious model of regrown networks. The proponents of "rewilding" seek to re-establish long-term ecological resilience on a continental scale by restoring disrupted biological functions, such as natural fire regimes and regulation by predators and other highly interactive keystone species.[3] As Caroline Fraser puts it in her compelling album of "dispatches from the conservation revolution": "Rewilding is about making connections. Forging literal connections through corridors. Creating linkages across landscapes and responsible economic relationships between protected areas and people. Forging links between ourselves and the intact ecosystems we need to survive" (343). Worldwide, countless projects in restoration ecology assume a great degree of interventionist responsibility in seeking to understand and recreate otherwise degraded or vanishing ecosystems. Yet *Pleistocene* rewilding, which seeks to reconstruct *extinct, prehistoric* ecosystems, is different again; indeed, these "wildly imaginative, even romantic" proposals and experiments, fantastic or even impossible as they seem, make otherwise controversial rewilding efforts seem staid and "prosaic" (299).

There is a wonderful, oft-quoted line in Kim Stanley Robinson's important science fiction novel *Red Mars*: "a scientific research station is actually a little model of prehistoric utopia" (310). Nowhere does this statement seem more true than in Pleistocene Park, a self-described "experimental wildlife preserve" in north-eastern Siberia (Chapin n.p.). As its creator, Russian scientist Sergei Zimov, puts it, "We propose to create a grassland ecosystem maintained by large northern herbivores similar to that which existed in Siberia 10,000-100,000 years ago during the late Pleistocene" (Zimov, et al. "Pleistocene Park" 1). The hope is that the reintroduction of animals such as Yakutian horses, moose, reindeer, and bison will convert the moss-dominated tundra back to the grassy steppe that prevailed in the Ice Age. Most remarkably, the site is also envisaged by some as the eventual home of resurrected mammoths, should the controversial project to use cloning or backbreeding to bring the species back from extinction find success.

SERGEI ZIMOV
(Photo by Laurel McFadden)

Zimov's Pleistocene Park is the forerunner of a utopian proposal that has recently been debated among conservation biologists in the United States. Paul Martin and others have argued that populations of African and Asian elephants, among other "exotic" species, should be introduced into North America to fill the niches once occupied by mammoths and other extinct megafauna. Such Pleistocene rewilding projects represent a new modality in the process of civilizing nature that defines the history of wilderness areas, challenging many long-held preservationist assumptions. In particular, they stand opposed to the dominant paradigm for which the natural state of wilderness which must be protected is that encountered at the beginning of European colonization, suggesting on the contrary that what is natural is not simply "pre-European" but entirely "pre-human." While this vision retains the frontier ideology of a pristine nature, the baseline for such true wilderness is displaced much further back in time to the prehistoric period, before any human occupation. The irony is that this prehuman nature is conceived as something that modern humans must take it upon themselves to actively recreate.

Zimov admits that "the concept of Pleistocene Park might initially seem like a science fiction story" (Zimov, et al. "Pleistocene Park" 8). And as might be expected, journalistic reporting on Pleistocene Park, and particularly on the related attempts to resurrect the mammoth, has been unable to resist framing them by reference to *Jurassic Park*, the Crichton novel and Spielberg film. In his systematic review of the scientific and ethical controversy over mammoth cloning, Salsberg chastises the media for this "rash sensationalism," calling instead for "[r]easoned discourse on the ethical, legal and social implications of the resurrection of an extinct animal" (3). But exploration of the utopian (and dystopian) cultural narratives of science fiction, as well as other narrative modes of

thought such as myth, should not be excluded from reasoned discourse about these projects, precisely because they inform so much of the thinking and motivations involved. The establishment of wilderness areas simulating a prehistoric ecosystem in which anthropogenic extinctions have been reversed is nothing if not an exercise in scientific myth-making. Indeed the ecotopian tradition within science fiction shares much of the ethos of Zimov's Pleistocene Park project. Rethinking utopia in an environmental frame, imagining a future regressed beyond civilization, the "new ecotopias" described by Robinson in the introduction to his anthology *Future Primitive,* "cobble together aspects of the postmodern and the Paleolithic" (11). The scientific activity of Pleistocene Park is strongly tied to such increasingly germane literary themes.

Indeed it has often been argued that movements to protect wilderness areas, and the sciences that support them such as conservation biology, are saturated with mythic narratives and utopian desires. The idea of wilderness has always partaken of a certain utopianism, leading to no end of debates over the contradictions involved when humans attempt to define and manage areas of nonhuman wildness.[4] In order to take account of the utopian ambitions of the Pleistocene rewilding projects without losing sight of the historical and material dialectic in which these dreams are played out, I will conceptualize them as heterotopias, "real places … which are something like counter-sites, a kind of effectively enacted utopia in which … all the other real sites that can be found within the culture, are simultaneously represented, contested and inverted" (Foucault 24). Chaloupka and Cawley have argued that understanding wilderness areas as heterotopias allows us to deconstruct the binary divide between nature and culture without at the same time sacrificing all worthwhile conceptions of the natural and nonhuman to the omnipresence of artifice and construction. If we accept the "open secret" of the *designed* nature of wilderness as a site of the wild other, they argue, we can still take seriously the possibility of wilderness as "countersite"— a wild antagonist "at tension with modernity but also at tension with any romantic conception of the 'natural'" (14).

Zimov established Pleistocene Park in 1989 as a radical experiment in wildlife reintroduction and restoration ecology, with the ultimate goal of the reconstitution of the mammoth steppe ecosystem. It is run by a nonprofit organization, with governmental support from the Republic of Sakha-Yakutia, and administered by the Northeast Science Station in Cherskii, Russia, a base for research in arctic biology and

geophysics of which Zimov is director. The 160km^2 (40,000 acre) preserve is surrounded by an enormous buffer zone of 600 km^2, which will be used to augment the park as the animal populations grow. Consisting of one-third each of meadow, forest, and shrubland, it still retains populations of much of the Pleistocene flora and fauna, which, though presently marginalized by the dominant mosses, are predicted to thrive once again following experimental interventions into the composition of the ecosystem. This in large part consists of the reintroduction of "sufficient densities" of large herbivores such as horses, bison, reindeer, moose, musk-oxen and the like. It is expected that these grazing mammals will disturb the dominant moss and allow the grass to return, transforming the terrain from tundra-taiga back to steppe and thereby stabilizing the soil. Among the social and ecological benefits Zimov predicts are the provision of habitat for endangered predators such as Siberian tigers, "a sustainable food source for northern peoples and a model for reconstruction of grazing ecosystems throughout the world" (Zimov et al. "Steppe-Tundra Transition" 783). It is also intended to contribute to global warming counter-strategies, as stabilized grassland will help prevent the carbon reservoir held in the permafrost from being released into the atmosphere.[5]

The reintroduction of wildlife to Siberian habitats, like the proposed American translocations, is explicitly intended to test scientific theories about ecological relations among animals, vegetation, and climate, particularly the causes of Pleistocene megafauna extinctions. Zimov argues, in accord with Martin, that large mammals play a greater role in maintaining their ecosystems than has often been recognized; they are not determined by, but in fact in many ways determine the composition of flora. Against the climatic ("overchill") hypothesis, which proposes that ecosystem transformations as a result of climate change led to the mass extinctions at the end of the Pleistocene, Zimov accepts the controversial overkill hypothesis, which ties the extinctions to the expansion of human hunting. The loss of keystone herbivores as a result of overexploitation by *homo sapiens* could itself have unbalanced the ecological makeup of the region, precipitating a conversion from grassy steppe to mossy tundra. If Zimov is right, then the reintroduction of grazing mammals largely absent for ten millennia should in fact increase vegetation productivity, promoting a return to the steppe grassland that prevailed in the time of the mammoths (Zimov 798).

A similar proposal has recently received significant attention in the United States. Paul Martin, the foremost proponent of the overkill theory of Pleistocene megafauna extinction, has made the counterintuitive suggestion that we "bring back the elephants!" Martin argues that the elephants' Proboscidean cousins, mammoths and mastodons, were essential to the ecology of North America. Their anthropogenic

extinction as the result of overhunting by the Clovis culture has left a glaringly empty environmental niche, unfilled for millennia and awaiting replenishment.[6] A prominent commentary piece in *Nature* (followed by another in *American Naturalist*) by a number of scientists (including Martin, Dave Foreman, and Michael Soulé) has put this idea square on the agenda of conservation biology: "we advocate Pleistocene rewilding — reinstituting ecological and evolutionary processes that were transformed or eliminated by megafaunal extinctions — as a conservation priority in North America" (Donlan et al., "Pleistocene Rewilding" 661; Donlan et al., "Re-Wilding" 913). This plan, which clearly falls within the genre of utopian thought, proposes the establishment of large-scale nature preserves in places such as the Great Plains, where the large mammals lost to human hunting in the Pleistocene will be returned or replaced with suitable surrogates. For Pleistocene rewilders, ecological configurations previously considered intact are in fact, in relation to prehistoric baselines, lacking component species with important roles (such as predation, seed-dispersal, or browsing), the loss of which led to ecosystem decline. They thus propose interventions in wildlife reintroduction and ecosystem restoration on an enormous scale, both spatially and in terms of evolutionary time, such as relocating endangered African megafauna to American plains to rebuild Pleistocene fauna assemblages, a Serengeti of the New World.

This proposal, along with Zimov's Pleistocene Park, has received a significant amount of attention from the press as well as dissenting scientists. Their explicit aim was to reinvigorate ailing, doom-and-gloom environmentalism with a positive proposal for thriving, reconstructed wildlands, rather than reserves operating as little more than palliative hospices. They have been criticized on a number of points: as taking attention away from more pressing conservation and reintroduction tasks, and undermining attempts to address the complex political problems impacting on wildlife preservation in Africa; as potentially exposing humans and livestock to dangerous predatory animals; as taking the design and management of nature to a new level of hubris; as focusing on charismatic megafauna to the detriment of smaller species; as threatening indigenous animals and potentially causing harmful ecological effects (such as diseases) through introducing exotic species.[7] Such controversy shows the potential for this debate to interrogate forcefully the values and practices of conservation science.

There is much in these Pleistocene rewilding projects that is familiar from the history of wilderness preserves and national parks. The major justification for Pleistocene Park is, of course, the scientific project of studying an extinct ecology. It is the ethically

interested science of conservation biology that frames the rewilding proposals; while the methods and scale may differ, their ultimate goal is still the conservation of biodiversity. And both parks also envisage the potential for ecotourism, once sufficient number and variation of animals has been established. Considering the declining numbers of visitors to national parks, and the greater numbers attending zoos, they argue that the draw card of appealing charismatic megafauna in a semiwild state will have significant economic effects in creating an ecotourism industry: "Pleistocene rewilding would probably increase the appeal, social benefits, and economic value of both private and public parks and reserves" (Donlan et al., "Pleistocene Rewilding" 666). Even the Siberian park, despite its forbidding distance and severe weather, has been imagined as a tourist destination, a unique safari park to which adventure tourists will no doubt journey. Yet these proposals also differ in significant ways from the parks and wildlife refugia with which we are familiar.

According to the title of William Cronon's controversial paper, "the trouble with wilderness" is "getting back to the wrong nature." This "wrong nature" is the "wilderness myth" of a pure, pristine environment entirely separate from the corrupting influence of humanity; in the words of the US 1964 Wilderness Act, "an area where the earth and its community of life are untrammeled by man." This critique of the wilderness myth by thinkers such as Cronon and Callicott is well-established, and among environmental philosophers, conservation biologists and restoration ecologists, debate continues as to precisely what is the "right nature" to be "gotten back to" in the establishment of reserves.

According to the Pleistocene rewilding projects, the "right nature" is that lost at the Pleistocene/Holocene border, about 12,000 years before the present. As Denevan and others have shown, the North American environment was not a pristine wilderness prior to European colonization in 1492, having been extensively modified by its native inhabitants. The pre-Columbian era is thus not the ideal goal for conservation efforts; the previously universal assumption of precolonial wilderness has been dislodged by studies in evolutionary ecology informed by an awareness of longer time scales. Donlan et al. argue that if we take into account what the paleontological record tells us about the ecological history of a region, we must recognize the major impact made not just by European colonizers but by *homo sapiens* as such: "The late Pleistocene arrival of the very first Americans and the contemporaneous extinctions constitute a less arbitrary benchmark" ("Pleistocene Rewilding" 664). Relying on an image of "man the hunter" as having contributed heavily to the global extinction of megafauna, they seek thus to redefine the yardstick for true wilderness in prehistoric terms.[8] This temporal overhaul

has not gone unchallenged. Callicott, for example, argues that their evolutionary timescale should be refined to an ecologically more appropriate scale of centuries. Yet there is something almost inevitable about the lure of this prehistoric, prehuman wilderness.

In exposing one myth, the Pleistocene rewilders simultaneously double-down on another. The utopian conception of wilderness is not relinquished but pushed back in time and populated with remarkable prehistoric beasts. For example, Martin writes:

> I define "the last entire earth" differently than did Thoreau. Prehistorians find that any given land begins to lose its wilderness not when the first Europeans arrive, but when the very first humans do. In the Americas true wilderness was more than 10,000 years gone by the time Columbus reached our shores. It disappeared with the megafauna, whose calls gave voice to the forests and prairies. (*Twilight* 183)

Though he may refine Thoreau, Martin still draws from him: there is still such a thing as the "last entire earth," and it is *this* untouched wilderness, prior to *all* human contact, that must be esteemed. This is hardly Turner's "inventionist" gardening, which in accepting the responsibility of humanity to steward the world of which it is a product, thereby placed trust in the capacity of our species to recognize, create and indeed be natural beauty. Rather, Pleistocene rewilders are charged with producing their own erasure. In their judgment, our species' own anthropocentrism warrants this misanthropy. To this extent the Pleistocene rewilding project represents the ultimate realization of the wilderness ideal, taking the dualistic divide between humanity and nature to its extreme.

Indeed, 12,000 B.P. is a much more fertile scene for the mythical exploration of the relation of "man" to the natural world. The Columbian threshold of 1492 was always complicated by the presence of Native Americans, who, despite being ideologically defined as leading ecologically harmonious lives, it was still found necessary to incarcerate on reservations to provide land for settlement and to ensure that the wilderness would fit its "untrammeled" definition. Contemporary rewilders are careful to avoid being seen to pass judgment on indigenous peoples; instead they transfer responsibility "to our species as a whole" (Martin, *Twilight* 54). Such visions of *homo sapiens* as in itself environmentally destructive evade the political and economic

distinctions that conservationists have often found troubling. This universalized insistence that the very presence of humanity despoils nature obscures the modern development of industrial and global capitalism and its profound intensification of anthropogenic environmental impacts. Contemporary Pleistocene rewilding thus perpetuates, even completes, the myth of depoliticized wilderness and its corollary metaphysics of man.

The Pleistocene epoch here provides the ideal milieu for a drama of human origins. In another twist of what Giorgio Agamben calls the "anthropological machine" (37-8), Western civilization once more puts into question its very humanity through a narrative of hominization, of the becoming-man of man: "his" (pre)historic emergence, the attendant extinctions and environmental destruction, and the redemptive chance to reverse this. Scientists' efforts to restore the natural balance reiterate the central mythical structure of Christianity (the paradise-fall-redemption narrative) in the familiar guise of wilderness preservation. Though a significantly secularized, scientific version of this story, informed by our contemporary consciousness of eco-apocalypse, it is no less mythic in the manner in which it encompasses the entire history and responsibility of an originally sinful humanity — indeed, the very emergence of human historicity through the sacrifice of the "animal."

The enormous present-day cultural significance of anthropogenic environmental destruction, species extinction, and climate change gives the scientific overkill hypothesis a distinctive narrative appeal. This is the story of humanity as briefly told by Zimov:

> Starting with unpretentious ambitions to survive in a hostile environment, Homo ended up assuming the powerful role of ecosystem terminator. The mammoth ecosystem was the first large-scale victim, but the global destruction of grasslands only accelerated in the Holocene when people invented agriculture and began raising cattle. (Zimov 797)

This narrative is given more extensive and nuanced attention elsewhere, but the fundamental coordinates remain in place: the emergence of *homo sapiens* as hunter constituted an ecological event that fundamentally altered the ecology of the world, producing extinctions wherever this new super-species traveled.[9] Stoczkowski has analysed the recurring configurations of such narratives of hominization and their easy ideological manipulation. Our contemporary awareness of environmental destruction intensifies our reception of this distinctive fable of humankind's power to make extinct.

As Turner argues, this account of mankind's "original sin" provides the context for modern attempts at redemption through recreating the lost Eden: "Zimov's plan for Pleistocene Park, though modest on the surface, strongly dramatizes the mythos of human beings standing in for the divine in caring for nature, including the salvific work of recreating it" ("Stories" 61). Sayre summarizes the logic succinctly: "if the mammoth was driven extinct by humans, as Paul Martin believes, it follows that humans might atone for that sin by reintroducing the Proboscidean order to North America" (83). Indeed, the ethical language of guilt and atonement, loss and redemption, is explicit in the arguments of Pleistocene rewilders: "humans were probably at least partly responsible for the Late Pleistocene extinctions in North America, and our subsequent activities have curtailed the evolutionary potential of most remaining large vertebrates. We therefore bear an ethical responsibility to redress these problems" (Donlan et al., "Re-Wilding" 913). The perception of human culpability for the extinction of prehistoric animals such as the mammoth is at the base of the desire to resurrect or simulate them today.

In order for such a narrative to function, its narrators must be able to suggest a qualitative distinction between the environment "then" and "now." For restoration or rewilding to be justified, the area at present must be seen as relatively impoverished. Zimov wants to restore the boggy tundra and taiga to the glory of the Pleistocene steppe. The current mossy environment is understood as unproductive, indeed "almost lifeless," in comparison to the bountiful grassland it once was, capable of supporting large populations of herbivores and their predators. Similarly, Donlan et al. speak of "degraded systems" dominated by "pests and weeds," in comparison to the "reinvigorated" ecosystems they envisage. Justifying such distinctions is a complex task in the context an ecological paradigm that no longer accepts the Clementsian telos of natural balance or an "original" condition, describing instead a flux of ever-changing nature. While they assert the scientificity of their Pleistocene benchmark, rewilders inevitably draw on cultural values in its justification.

Sayre situates Martin's project (and by implication the broader Pleistocene rewilding) within the history of American colonialism and nationalism, and particularly the eighteenth- and nineteenth-century obsession with the mammoth as an original, charismatic, even totemic inhabitant of the continent. He describes how "Euro-Americans claimed God's favor for their progress and used the mammoth as a totem for

their appropriation of the continent's ancient natural history" (79).[10] Plans today to rewild America must be seen in continuity with the late eighteenth-century "dispute of the new world," which saw naturalists like Jefferson defending the size and vigor of American fauna against its European detractors like Buffon. There is a long history of the American environment, for all its sublime and impassable beauty, being seen as in some way lacking (even "impotent," in this masculinist discourse of virility) — particularly in terms of its capacity to conceive and nourish charismatic megafauna.

Though Thoreau would elsewhere bemoan his "tamed" and "emasculated country" (*I to Myself*, 261), there is in his famous essay on walking an interesting polemic directed against Buffon's denunciation of the poverty of American nature, of its degraded and emasculated flora and fauna. After quoting a claim to the contrary that New World landscapes are larger and more vibrant than those of the Old (everything being higher, bluer, more intense, larger, and longer than those of his rival), Thoreau remarks: "I think that in this country there are no, or at most very few, Africanæ bestiæ, African beasts, as the Romans called them, and that in this respect also it is peculiarly fitted for the habitation of man" (*Walking*, 15). The embarrassing North American lack of megafauna becomes in Thoreau's rhetoric a rather convenient superiority that allows one the comfort of an outdoors lifestyle free of predation. But contemporary Pleistocene rewilders can no longer accept such rationalizations; for them, the land is so "peculiarly fitted" for human habitation precisely because the first wave of human overhunting made it so: exit mammoths, lions, and those wonderful sloths. For Sayre, "Martin in effect argues that Buffon was right after all. Holocene (that is, post-Ice Age) America, as measured by the size of its native quadrupeds, *is* impoverished compared to Eurasia" (80). As Martin would later put it, "Lewis and Clark should have found 'great claw,' just as Jefferson hoped" (*Twilight* 55). This lack, which, contra Thoreau and Jefferson, they join Buffon in bemoaning, brings them not only to imagine, but to seek to bring about, a rewilded North American landscape where one might indeed encounter some Africanæ bestiæ in one's walks through what might once again become the New World.

The debate over reintroducing surrogates of extinct species from other bioregions is in large part a contest over the meaning of "native." This discourse of nativeness and its troubling racial undertones has long been a contested and controversial element of environmentalism.[11] In Pleistocene rewilding, "deep time lags" in ecological readjustment make possible the introduction of would-be native proxies (Barlow 171). As part of what Turner calls "the family restoration drama of extinction reversal narratives" ("Stories" 63), the rewilding proposals speak of "restor[ing] equid species to their evolutionary homeland" (Donlan et al., "Re-Wilding" 914), and "initiating a North

American repatriation" (Donlan et al., "Pleistocene Rewilding" 670). Their arguments are permeated with the language of belonging, arguing for a more fundamental "nativity" conceived not in hundreds but rather tens of thousands of years: "even in strictly genealogical terms, it is clear that certain supposedly 'alien' mammals have a valid prior claim to the continent. At higher taxonomic levels, some of the 'natives' are considerably less American than certain 'foreigners'" (Martin, "Pleistocene Niches" 219). Martin even speaks of empty ecological niches as "job opportunities" for foreign animals, though he does stop short of invoking the Statue of Liberty's credo ("Give us your endangered, your near-extinct, your huddled masses yearning to breathe free…"). As Soulé once put it, while "[f]or many North American ecologists, the psychological adjustment to biogeographically recombined communities will be painful … [a] cheerful way of viewing such faunal mixing is that it represents the restoration to the Nearctic of the great paleomammalian megafauna" (235). While there are attempts to undermine this discourse of nativity, such as Callicott's argument that "place of evolutionary origin, far from being a necessary condition of a species nativity, is not even a sufficient condition" (415), the Pleistocene rewilders' critics draw equally on these tropes. For example, Rubenstein et al. seek to reassert the accepted meaning, repeatedly applying the title "natives" only to species present in Columbian historical time; they propose instead that "one might consider expanding reintroductions of some of North America's own megafauna … to other portions of their known recent (i.e., historical) ranges." (235). Thus while both sides of the debate might disagree over the precise composition of a "native" ecosystem, their dispute remains within this discourse of bioregional purity.

The attempt to reimagine elephants as flagship species of North America, of enormous symbolic as well as material worth, thus draws on this long-held desire to restore to American nature — and thus to the overall health, vitality, and esteem of the people and nation — some of its lost grandeur. With similar nationalist enthusiasm (Stone, *Mammoth* 40; Turner, "Stories" 68), Russian news reports on Pleistocene Park consistently emphasize that the current U.S. projects are following in the footsteps of Russian science. Siberia is conceived as the mammoth's homeland, haunted by an extinct creature who belongs to the landscape, a terrain that is incomplete without its flagship species. In both cases, the notions of public good and environmental commonwealth are familiar from the discourse of national parks for the enjoyment of the people. Flora and fauna are understood as a public heritage, part of their "birthright," the soul of the nation. But rather than, as previously, being conceived as a

legacy that was pristine at the sovereign moment of the nation's institution, this national heritage is one of which the people were robbed before they even arrived on the land. This retrojection of responsibility for ecological imperialism onto the earliest human immigrants obscures the enormous environmental impact of western colonialism and the contemporary capitalist civilization that would remake the world according to the dictates of its science.

Much environmental philosophy has argued that wilderness areas are as much technological artifacts as natural objects. The proposals of the Pleistocene rewilders bear this familiar contradiction: for all their Thoreauvian emphasis on a last entire earth, they plan to bring this lost state back into being through unprecedented intervention. While Pleistocene Park's utopian goal is an ecology representative of the Siberian steppe before human impact, this end can only be achieved through the most sophisticated of scientific and technological activities, such as terraformation and species reintroduction.

This is in itself nothing new; as Soulé predicted in 1990, "Restoration ecology and conservation biology will tend to merge because most so-called wild places on the planet will be relatively denatured and will need intensive rehabilitation and management." (234). Noss similarly argued that, "In almost all cases, representing ecosystems in protected areas of sufficient size to assure viability is possible today only through restoration. For future parks or wilderness areas to represent the diversity that greeted the first European visitors, they will have to be 'grown rather than decreed'" (529-30). He thus encouraged restoration ecologists (whose initial tendency and capacity had been relatively small-scale) to "think big." But in order to represent the diversity that greeted the first *human* (rather than European) "visitors," Pleistocene rewilders must think more than big; they must think mammoth. Eschewing the "hands-off approach" (Donlan et al., "Re-Wilding" 914), they propose not just preservation, nor indeed restoration, but the resurrection of the ecosystem itself — the Siberian and North American mammoth steppe in all its primeval grandeur.

The extent of intervention could be understood in terms of Baudrillard's conception of "simulacra." While Zimov began with the use of sophisticated computer modeling of ecosystems, he progressed by seeking to repeat his models in the ecosystem itself: "A large-scale reintroduction of mammalian grazers to tundra would be the best experimental validation of our simulation model" (Zimov et al., "Steppe-Tundra Transition" 782). As he states elsewhere, "[s]cientifically, Pleistocene Park is important because it directly tests the role of large herbivores in creating and maintaining grassland ecosystems, something that can only be surmised but not proven from the

paleorecord" (Zimov 798). It is precisely through real-life, full-size simulation of a Pleistocene ecosystem that he sought to test his hypotheses about the functioning of said ecosystem. Here, indeed, the map and the territory entirely coincide.

The most spectacular interventionist undertaking associated with Pleistocene rewilding is the project to resurrect the extinct woolly mammoth itself. It was the discovery of mammoth bones that was in part responsible for raising, in Victorian science, the very possibility of the extinction of an entire species, previously considered impossible on theological grounds.[12] Having since been prominent in debates over the mechanisms of extinction (the overkill, overchill, and overill hypotheses), mammoths are now central to plans to overturn it. Cloning has been proposed as an important technology in the conservation of endangered animals.[13] Others hope that extracting DNA from frozen mammoth carcasses emerging from the Siberian tundra will enable them to return the species to the world. Many have expressed concern at the ethical implications, while others have insisted that it is simply not possible, with the DNA being too fragmented and degraded.[14] While not central to either the Russian or American rewilding initiatives, this project does crystallize their logic of redemption and renewal, in which extinct species and ecosystems are no longer incontrovertibly lost; rather than an eternal end, extinction is now seen as reversible.

For Turner it is the conceptual framework of genetic science that makes it possible to imagine escaping the black hole of extinction. She describes the impact of "genome time," where what was once articulated as a long, irreversible evolutionary process is now seen as an endless stream of data, of permutations subject to human control. In allowing animal species to be conceived as made up of information — which, despite the extinction of the species, can still be found in the frozen carcasses of mammoths — genetics performs a significant epistemological revolution: "In genome time, evolutionary histories, including extinction narratives, are revised, forestalling or even reversing absolute endpoints in the endless reproducibility of the DNA code" ("Stories" 59). Extinction thus becomes "open-ended"; what once was lost can now be returned.

This applies not only to the more speculative mammoth resurrection, but also the pragmatic measures of Zimov, Martin, and the like, who lobby for the replacement of extinct animals through the introduction of surrogate species as "taxon substitutions." Zimov's logic is that since "the area near Cherskii formerly supported large herds of bison, a large-bodied bison that was morphologically similar to the present wood bison

of northern Canada" (Zimov, et al., "Pleistocene Park" 2), then the introduction of Canadian bison to fill this now-empty ecological niche is justified. Martin and others make similar claims for the role of elephants in the Great Plains. The capacity of anthropogenic climate change to put certain species of plants and animals at risk of extinction makes translocation or "assisted migration" of nonhuman environmental refugees to suitable habitat an unfortunate necessity. As Barlow puts it, "As climate shifts regionally (and globally), where might threatened species be encouraged to go, and how will they get there?" (167). Turner argues that in the prevailing discourse of "genome time," genetic similarity is enough to render two species "equivalent" in terms of their suitability to inhabit an environment. However, it is not such internalities, but in fact the externalities of ecology — which defines animals in terms of their functions within an ecosystem — by which such arguments are framed. Similar functional roles in an ecosystem (such as eating moss or weeds) are seen to qualify species as proxies or "ecological analogs." Once again, while these controversial proposals do undermine a certain idea of bioregional purity (which only considers animals as native if they were present in the historical memory of current inhabitants), they in fact do so by reference to a purity of a deeper kind.

And yet, for all their managerial character, underlying these species reintroduction proposals is a robust conception of ecology that considers animals to be important agents in managing ecosystems precisely through their "intensive disturbance." Zimov argues that "[g]rowth of grasses in the current tundra environment is stimulated by … intensive disturbance by humans … or animals" (Zimov et al., "Steppe-Tundra Transition" 774). Such intervention might be conceptualized, following Foucault's work on governmentality, as a form of "environmentality," the management of nature through its particular, nonhuman forms of agency, so as to encourage its own self-sufficiency. Certainly, the wild becomes considered as programmable, and governed according to scientifically defined elements.[15] Yet as Foreman puts it, "The goal of wilderness designation is not only to prevent destruction of untrammeled places, but also to help ecosystems become self-regulated (self-willed, untrammeled) again" (194). Eschewing the apocalyptic logic of zoological gardens and frozen genetic archives that function as perpetual arks, the rewilding projects refuse to wait for the cessation of habitation destruction. Instead, they make the utopian claim that *if you bring them, it will grow*. It is through the return of the animals — and their intensive impact on what are considered degraded ecosystems — that their habitat is to be restored.

Indeed, the importance placed on the reintroduced animals' strenuous environmental interventions is such that ecologist Paul Koch suggests that "it may not be radical

enough" if "bison and other grazers won't inflict sufficient damage on the mosses. Mammoths and woolly rhinos … were more effective landscapers, clearing snow, rooting up vegetation, and knocking down bushes and small trees" (Stone, "A Bold Plan" 33). Thus Koch advocates introducing Asian elephants and white rhinos to Pleistocene Park, a proposal that he imagines would drive ecologists "apoplectic." But though the mammoth's possible extant surrogates might not be suited to the Siberian climate, and though the attempts to resurrect living mammoths to inhabit the park might never come to fruition, Zimov has his own method of replicating the enormous beast's impact on the vegetation. At the pragmatic scientist's disposal is another, rather atypical surrogate for the effect of the mammoth on his neo-Pleistocene ecosystem: listed among the park's facilities is a decommissioned Soviet tank.

THE TANK
(Photo by Laurel McFadden)

This obsolete piece of military equipment is today reused for the purposes of scientific *devenir-mammouth*. Laurel McFadden gives an account on her blog of her time at Pleistocene Park as part of an Arctic photography project, in which she describes a trip she took on the recycled war machine:

> Sergei drove like a man with a vendetta against trees. Oblivious to old pathways in front of us, he chose instead to verve off and pulverize everything in our path. The entire purpose of the tank is to mimic the damage that a mammoth would cause, so, in Sergei's words, "the mammoth is not careful, we are not careful."

The tank episode confirms in dramatic fashion that Pleistocene Park is not your ordinary conservation project. Zimov's mad mammoth jaunt perfectly dramatizes the conflicts endemic to resurrection ecology, juxtaposing the hard-headed ecologist's perception of the degraded tundra needing "disturbance" with the landscape photographer's sentiments at the ripping up of trees. In the employment of a tank as the surrogate for the mammoth's dominant and vigorous role as ecosystem engineer, the ghosts of Soviet military strength and the ghosts of Siberian megafauna overlap at the forefront of Russian science. In the absence of revivified mammoths brought back from the abyss of extinction, it seems, a tank will have to do.

EXPLODING SOME TREES
(Photo by Laurel McFadden)

Pleistocene Park, and the analogous sites proposed for North America, are fascinating contemporary heterotopias, "other spaces" of biological practice and ecological dreaming. In our age of technological globalization, these uncanny reconstructions of ancient ecologies present a striking anachronism, strung between the prehistoric and the futural. Rather than simply conserving the dwindling remains of a supposedly pure wildness, they imagine and conjure the future return of dislocated and even extinct animals and plants, or their representatives from other regions, and situate these animals and their habitats as themselves productive agents in the process of rewilding. In this peculiar biogeography, what we naively understand as "native" and "exotic" species are deliberately combined according to a scientific plan that aspires to

prehuman plenitude. Fully accepting of anachronistic and anatopistic floral and faunal mixing, and at the same time nostalgic for a pristine and impossible humanless utopia, they embody and intensify the famous contradictions that inhabit wilderness philosophy. As heterotopias that "effectively enact" a prehistoric utopia in a real geographical place, they put in question, not any particular element of society, but rather history and civilization themselves, and their subject the human species. But just to that extent, we must wonder how far they are the product of a culture that has yet to fully confront the natural history of that species, and the ecological history of its own colonial and capitalist modernity.

In our tinkering with the anthropological machine after the end of nature, we can no longer be content simply to highlight the performative contradiction of recreating wilderness through human technology. Yet the sacrificial anthropology of Pleistocene rewilding hoards to the human such power and blame that it can only imagine and assent to a nature redeemed from humanity as such — which remains, ironically, an overkill of anthropology.

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Notes

1. The touchstone statement of this position is McKibben.

2.Turner's provocative essays in *Harper's* include "Cultivating" and "Field Guide." For discussion, see Baldwin, de Luce, and Pletsch; and O'Sullivan and Pletsch.

3. A recent plea for rewilding comes from the somewhat mellowed pen of once notorious monkey-wrencher Dave Foreman. For analysis of rewilding the world over, see Fraser.

4. See, for example, Baldwin, de Luce, and Pletsch; Cronon; Callicott and Nelson; Nelson and Callicott.

5. See Zimov, Schuur, and Chapin.

6. See Martin, "The Last Entire Earth"; Martin and Burney; Martin, *Twilight*.

7. For a sample of criticisms and defences of Pleistocene rewilding, see "Back to the Future"; Rubenstein et al.; Caro; Hintz; Barlow 169-173; Fraser 294-299.

8. On the motif of "man the hunter" in post-war anthropological thought, see Cartmill.

9. On the overkill hypothesis, see, for example, Martin and Klein; MacPhee; Flannery 173-205; Foreman 25-44; Martin, *Twilight* 48-57.

10. For more on the mysterious beasts sought by frontiersmen, see Semonin.

11. See, for example, Coates; O'Brien.

12. On the scientific upheavals caused by mammoth remains, see Van Riper.

13. See Lanza, Dresser, and Damiani; Chrulew.

14. For accounts and analysis of the mammoth resurrection projects, see Stone, *Mammoth*; Salsberg; Tschentscher.

15. On the government of nature, see Darier; Rinfret.

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