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THE ENDURING IMPORTANCE OF WILDNESS: SHEPHERDING WILDERNESS THROUGH THE ANTHROPOCENE

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Introduction

Wilderness and wildness have long been essential values at the heart of American conservation. Both have played critical roles in the formation of environmental ethics, providing a conceptual foundation for the belief that the non-human natural world is valuable for its own sake (Nash, 2001). After grounding and inspiring much of 20th century environmentalism, their influence in the current century has grown increasingly tentative. The arrival of what some have called the "Anthropocene epoch" – a term meant to capture the planetary scale impacts of human activity – now threatens the continued viability and relevance of wilderness and wildness to contemporary conservation. The challenges facing wilderness advocates are both physical and conceptual. Anthropogenic climate change, pollution, and the looming mass extinction crisis are all impacting the biophysical elements of wilderness areas (Stephenson & Millar, 2012; Long & Biber, 2015; Ceballos et al., 2015). At the same time, a growing chorus of "new conservationists" are calling for the abandonment of wilderness and wildness as useful values for guiding conservation (Marris, 2015; Kareiva et al., 2012).

As the codification of these values into American law, the Wilderness Act and the areas it protects are on the front lines of this philosophical and political struggle. Those convinced of the continued relevance and moral value of wilderness and wildness for conservation must work to adapt these values to the physical and philosophical backdrop of the 21st century. This challenging task must be accomplished without compromising the values of restraint and humility that give wilderness and wildness their meaning and substance.

The following three papers approach this challenge in several ways. The first identifies key insights in the writings of Aldo Leopold that help develop a general philosophical and ethical framework for the two papers that follow. Leopold valued wildness while also understanding the unavoidable role of management in conservation. His primary concerns were ecological ignorance and violent or overly disruptive techniques rather than the idea of management itself. The notion that wildness and management activity are potentially compatible rather than inherently oppositional – a key insight I draw from Leopold's work – can be applied to contemporary ethical and policy issues in wilderness stewardship. This insight allows me to avoid unnecessary dichotomies and absolutist thinking that can plague wilderness management discussions.

With this in mind, my second paper focuses on controversies over intervention in designated wilderness areas, while the third addresses apparent conflicts between the Wilderness Act and the Endangered Species Act. In both cases, taking a more nuanced and measured position allows for the adaptation of wilderness values without compromising the essential elements of humility and restraint. In the long run, this approach will help ensure that more landscapes are designated and protected from exploitation and degradation. This is one of the most important ways we can respond as conservationists to the unprecedented threats our species now poses to much of life on Earth.

1) The Lessons of "Wildness" in Aldo Leopold's Scientific and Philosophical Journey to the Land Ethic

Though only explicitly referenced a handful of times in his writings, wildness played an influential role in Aldo Leopold's development as a conservationist, land manager, and environmental thinker. Over the years, encounters with wildness in his work as both a practitioner and observer of land management drove significant changes in his views on conservation. Leopold's initial approach touted intense manipulation and control over the natural world, but would eventually give way to an attitude of humility and integration. Driven by lessons learned from the wildness of the non-human natural world, this evolution culminated in Leopold's formulation of the land ethic. Offering a moral framework that re-imagined the human place in nature, this influential articulation of environmental value incorporated wildness by respecting the roles played by fellow members in the biotic community. An attitude of respectful guidance in management, as opposed to one of control and coercion, is at the heart of the land ethic. Contemporary conservationists – some of whom are now clamoring for more human control of the planet – would do well to heed this approach, lest they risk having to relearn the limits wildness places on human managerial ambition.

2) Shepherding Wilderness Through the Anthropocene: The Intervention Dilemma and the Future of Wilderness Stewardship

This paper aims to restore and revitalize the relevance of wilderness and the Wilderness Act to 21st century conservation by addressing the controversy of ecological intervention. As human impacts on the naturalness of designated wilderness areas accumulate, the pressure to intervene in ecosystem processes grows. Any intervention undertaken to protect or restore the natural conditions of a wilderness area is in tension with the value of untrammeledness and the hands off approach to wilderness stewardship. Unfortunately, this tension has been mistakenly framed as a stark either/or choice between intervention and non-intervention – between either naturalness or untrammeledness. This framing has in turn fostered polarization in the environmental community, a situation that only serves to undermine the continued relevance of wilderness at a time when it is most needed. Rather than stay with this false choice between naturalness and untrammeledness, a third option is possible. Adopting a more comprehensive and balanced approach – one that sees naturalness and untrammeledness as interdependent wilderness values – will allow managers to adapt and, where necessary, to actively respond to undesirable changes while still maintaining the values of restraint and humility.

3) The Endangered Species Act and the Wilderness Act: Conflicting or Complementary Values?

This paper addresses the conflicts that can and do arise when an ESA-listed species requires active agency intervention in designated wilderness. The ethical imperative and legal obligation under the ESA to protect and recover endangered and threatened species can place it in tension with the Wilderness Act when significant ecological intervention is involved. It is crucial that conservationists and wilderness advocates anticipate these conflicts and work to foster compatibility between wilderness stewardship and species conservation. Fortunately, this compatibility is possible through a comprehensive interpretation of wilderness character that includes native wildlife as an essential component. An analysis of judicial and agency

interpretations of the issue offers the legal and conceptual foundation needed to support intervention in wilderness on behalf of endangered species. When the threat of extinction is introduced, interventions aimed at saving a species within a wilderness area are justified on the grounds that the loss of native flora and fauna is an *irreversible* loss of wilderness character. Fortunately, the needed interventions can be kept within the context of restraint and humility required in wilderness management.

The Lessons of "Wildness" in Aldo Leopold's Scientific and Philosophical Journey to the Land Ethic

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In 1918, at the age of 31, Aldo Leopold began his writings on wilderness preservation by confidently assuring the American public that it was unnecessary (1918). Placing full faith in the managerial prowess of Progressive Era conservation, Leopold (1918) touted the effectiveness of predator control and fire suppression while boldly claiming that nature had been "improved upon by civilization". Writing only 17 years later on the importance of wilderness and the newly formed Wilderness Society, Leopold (1935a) had the following to say: "The Wilderness Society is, philosophically, a disclaimer of the biotic arrogance of *homo americanus.* It is one of the focal points of a new attitude – an intelligent humility toward man's place in nature". In those 17 years, Leopold went from wilderness skeptic to leading advocate – from a firm believer in aggressive management to an ecologically humbled conservationist who saw in wilderness preservation the "intelligent humility" so crucial to redefining humanity's place in nature.

What accounts for this evolution in Leopold's thought on wilderness and on conservation more broadly? On one hand, Flader (1974), Meine (1988), and Callicott et al. (2009) attribute it to a radical philosophical conversion away from Progressive Era utilitarianism to an eco-centric (or non-anthropocentric) worldview. Conversely, Norton (1988, 2005) argues that though Leopold's approach to environmental management changed drastically, he never underwent such a conversion and instead simply modified the anthropocentrism of Gifford Pinchot's conservation ethic. There is much to learn from these competing interpretations of Leopold's development as a conservation thinker. However, this paper adopts a different approach to tell the story of his evolution. Looking to the role of "wildness" in Leopold's thought, I trace his growing commitment to this important environmental concept. Wildness slowly emerged over Leopold's career as a touchstone value that informed and underpinned his maturing approach to conservation.

Leopold's wilderness advocacy writings are the first and most obvious place where wildness appears as a conservation value. Part One begins with Leopold's early arguments for wilderness preservation, showing where he first created space in conservation for wildness as a

desired quality. Much like the designated wilderness areas he promoted, Leopold's early valuation of wildness was also bounded, focused narrowly on the recreational and cultural benefits it provided. It is only when Leopold takes wildness beyond wilderness area boundaries and begins conceiving of it more broadly that we see the fundamental role it played in his emerging ecological viewpoint. Part Two details this transition by looking to Leopold's later argument for the scientific value of wilderness preservation. Revealing a growing skepticism of intensive management and an increasing unease with scientific uncertainty, this argument grew out of Leopold's experience with a recalcitrant and bewilderingly complex natural world. Lessons gleaned from these encounters with wildness would fundamentally reshape Leopold's approach to conservation. Part Three shows how Leopold's regard for wildness grew to underpin the intellectual innovations that made him famous. Leopold's land ethic, and its complementary concepts of land health and the biotic community, each reveal a fundamental and expanded role for wildness. Ultimately, achieving land health and integration with the biotic community, both primary goals of the land ethic, demands an integration with wildness rather than violent rejection of it.

Part One: The Journey Begins -- The Recreational and Cultural Value of Wildness

Wildness and wilderness get off to a shaky start in Leopold's early writings. In "The Popular Wilderness Fallacy: An Idea That is Fast Exploding" (1918), Leopold expresses a strong skepticism of -- perhaps even contempt for—the idea that some places must remain wild and undeveloped in order for wildlife to flourish. Leopold deems wildness, and any wilderness areas that might preserve it, as unnecessary and essentially inferior to innovative and artificial human replacement of wild ecological processes. Employing several examples, Leopold (1918) contrasts the wild with the artificial, showing how things like dam-created wetlands, wildfire suppression, and predator control all "made an improvement on nature" – improvements capable of surpassing the achievements of the "original wilderness". At this early stage in his career, with his managerial optimism running high, Leopold leaves little room for wildness as a conservation value.

Three years after publication of "The Wilderness Fallacy", Leopold began his wilderness advocacy in earnest, developing his first argument for preserving wild places. In "Wilderness and Its Place in Forest Recreational Policy" (1921), Leopold argues for wilderness preservation

as an important component of the "highest use" principle that governed forest management at the time. Mentioning Gifford Pinchot by name, Leopold was clearly intent on squaring wilderness preservation – a distinctly novel proposal for its time – with the predominant approach to conservation espoused by this revered first chief of the US Forest Service.[1] To incorporate wilderness preservation into Pinchot's doctrine, Leopold (1921) appealed to the growing public interest in the primitive recreational opportunities to be found in "big stretches of wild country". As wise and responsible managers, Leopold and his fellow foresters were thus duty bound to preserve rapidly vanishing remnants of roadless wild country so that interested Americans may indulge their "instinctive craving for the wilderness life" (1925a). With managerial forethought, wilderness would be preserved as a matter of expedient and efficient recreational policy – a policy premised "wholly on highest recreational use" (Leopold, 1921).

In this early argument for wilderness preservation, Leopold was explicit about the limited scope and purpose of wildness as a conservation value – it was to be protected solely for the recreational benefits it provided to human users.[2] As Sutter (1998) has noted, Leopold had yet to expand the value of wildness and wilderness to include ecological considerations and, as Callicott (1998) bluntly puts it, he was primarily concerned with preserving a "few relics of the American frontier" where he and other "like-minded sportsmen might play at being pioneers". Another of Leopold's early wilderness advocacy essays lends support to this interpretation. In it, Leopold (1925b) again clearly states his narrow basis for wild lands preservation: "Wilderness is the one kind of playground which mankind cannot build to order". Though he had now assigned a value to wildness, it did not extend beyond the borders of the wilderness "playgrounds" he sought to preserve.

Leopold's desire to "play pioneer" underpinned what became another justification for setting aside wild country. In his second discernible argument for wilderness preservation, Leopold (1925c) buttresses recreational value with the additional cultural values derived from practicing the "more virile and primitive forms of outdoor recreation." Having their origin in

[1] As Meine (1988) has pointed out, Leopold often crafted arguments and positions to suit his audience. This particular essay was published in the *Journal of Forestry* and was likely tailored to match the tastes of his fellow professional foresters by adopting the utilitarian language most familiar to them.

[2] Leopold went out of his way to demonstrate the relative "uselessness" of wilderness areas in terms of economic values like timber and farmland (1924)

what Leopold termed the American "pioneering tradition", the primitive skills required for wilderness travel keep us in touch with the "indigenous part of our Americanism" (1925c). Invoking the names of famous American mountain men like Kit Carson and Jim Bridger, Leopold positions wild landscapes as the required material background against which America forged its distinct cultural identity. For this reason, protecting the wild environment where this identity was forged is not just an act of wise conservation, but also an imperative of American cultural preservation.

With the recreational and cultural value arguments, Leopold made his first foray into wilderness advocacy. In so doing, he also provided the initial foothold in his conservation thought for wildness as a quality worth preserving, albeit in a limited capacity. Wilderness and primitive area administrative boundaries would largely delimit the value of wildness and, with minimal consideration of ecological value, Leopold's preservation vision was more focused on curating recreational and cultural experiences than it was on advancing an environmentally enlightened land use policy.[3]

Despite the narrowly defined context within which wildness was valued in his early wilderness advocacy, Leopold was nonetheless laying the foundation he would later use to support expanding its importance. Particularly noteworthy are his intimations that wildness as a potentially valuable quality exists along a spectrum and that its presence is not necessarily confined to wilderness areas traditionally understood as large, relatively untouched landscapes. Leopold (1925c) claimed that wildness could be found in "all degrees", ranging from the "little accidental wild spot" in a Corn Belt woodlot, to "vast expanses of virgin country" approaching the size of a "whole national forest". Though he does not elaborate further on what this might mean for conservation as a whole, he appears to briefly push wildness outside of big wilderness areas and into more humanized landscapes. This gesture toward an expansive application of wildness cleared the space needed for its eventual growth into all aspects of Leopold's conservation vision.

[3] Leopold's early wilderness preservation vision displayed a museum-like quality. Each state in the US would preserve a wilderness area ("not to exceed one in each state") that was "representative of some type of country of distinctive recreational value" (1921). Preserving a "good big sample" of wild country, these proposed wilderness areas were more like interactive outdoor exhibits than ecological preserves (1921).

Part Two -- Three Lessons In Wildness

Leopold spent the rest of the 1920's writing and publishing various iterations of his recreational and cultural arguments for preserving wilderness. It would be more than a decade before he would reimagine a new and ultimately more important role for wild landscapes – their profound scientific value. In this reimagining, wilderness became a cornerstone in Leopold's vision of a new and much needed "science of land health" (1949). Defined as the "capacity for self-renewal" in the "land organism", land health would become one of Leopold's most important conservation concepts, ultimately forming the bedrock upon which his land ethic was built (1946, 1949). Needing a "base-datum of normality" against which to measure and assess land health, Leopold recommended that wilderness areas assume the role, as they offered the "most perfect norms" available for study (1949).[4]

Having prioritized the scientific and ecological value of wildness and wilderness areas, Leopold was now explicit that "recreation is not their only, or even their principal utility" (1949). Playing pioneer had taken a backseat to the necessity of preserving wild places for what they can teach us about the requisite conditions for land health. Most noteworthy in this reordering of value was the accompanying shift in Leopold's perspective on management. By acknowledging that wild, largely intact landscapes were a picture of land health, Leopold made it clear that he had reconsidered the effectiveness and desirability of active and intense human management. The implications of this reconsideration stretched far beyond wilderness proper, fundamentally reshaping his conservation thought as a whole. Though disagreement persists about whether this signaled a radical change in Leopold's metaphysical or moral views, none dispute that years of keen observation and experience in conservation were the primary motivating factors (Norton, 1988; Callicott et al., 2009). What was it about these experiences that prompted such a change of heart? A closer look reveals that encounters with wildness ultimately led Leopold to adopt a philosophy of "intelligent humility" regarding management and "man's place in nature" (1935a). The following sections look to three specific areas where wildness helped to shape Leopold's

[4] To head off the inevitable knee-jerk charges of the "pristine myth" at work here, it should be noted that Leopold was *explicit* about the fact that even the largest wilderness areas were already impacted by human activity (1941, 1949). He was simply pointing out that relatively intact areas had something worthwhile to teach us about how to maintain healthy land, which was of particular importance given our overall failure to do so (Leopold,1941;1949).

evolving views – predator control, ecological complexity, and the ineffectiveness of violent land use techniques.

Wild Transition: From 'Intelligent Control' to 'Intelligent Humility'

Throughout the 1920's and into the mid-30's, Leopold maintained his strong faith in contemporary scientific knowledge and his belief in active, often aggressive environmental management. In "The Conservation Ethic" (1933a), his confidence in the human ability to control and beneficially reshape the natural world was on full display: "Given, then, the knowledge and the desire, this idea of controlled wild culture or 'management' can be applied not only to quail and trout, but to *any living thing* from bloodroots to Bell's vireos"[original emphasis]. This was a strong statement in favor of intense human management of wild nature – a statement made boldly and explicitly applicable to "any living thing" (Leopold, 1933a). At this stage, wildness was still something that could be easily usurped and successfully emulated, and even improved upon through human artifice. Assuming that ecology could provide all necessary knowledge, Leopold held that predators could be controlled or eliminated, and habitat artificially created or modified with the "same tools and skills already used in agriculture and forestry." (Leopold, 1933a). Nonetheless, in relatively short order, he would drastically change course on all counts.

Observers have noted a confluence of factors driving this change. Meine (2004) attributes it to Leopold being "humbled by a growing appreciation of the complexity of population ecology", while Flader (1974) notes that Leopold's "three decades of experience trying to 'control' wildlife populations" through manipulation of the environment had come to have a "profoundly sobering effect" on the once confident manager. Norton (1988) similarly observes that Leopold learned through practice that "violent methods of management and control were inappropriate" because they caused unforeseen effects and "damaged the biotic community." Leopold's subsequent experience with heavily managed German forests – forests meticulously planned and shorn of predators -- would add to his growing skepticism regarding human attempts at control (Leopold, 1935b). Rounding out the list, by the mid-1930's the Dust Bowl years were in full and catastrophic swing, serving as a powerful and humbling reminder of human ecological ignorance and managerial failure. In the inaugural issue of *The Living*

Wilderness, a publication of the newly created Wilderness Society, Leopold (1935a) summarized the stark lesson learned from these experiences:

> "The long and the short of the matter is that all land-use technologies – agriculture, forestry, watersheds, erosion, game, and range management – are encountering unexpected and baffling obstacles which show clearly that despite the superficial advances in technique, *we do not yet understand and cannot yet control* the long-time interrelations of animals, plants, and mother earth." [original emphasis] (1935a)

As Meine (2004) points out, the word 'yet' in the above statement would "evaporate" shortly thereafter. Leopold would subsequently come out against predator eradication, express bafflement and awe at the continually unfolding complexity of the natural world, and sharply criticize not only belief in human control, but also the "violent" and ineffective means employed to achieve it (1939). Driving each of these radical shifts was Leopold's newly expanded respect for and appreciation of wildness. These values were now prominently woven into the fabric of his maturing ecological viewpoint.

Humility and the Wildness of Predators

One of the most recognizable manifestations of wildness on a landscape is the existence of large predators. This is true in two related senses: wildness understood as autonomy or unhindered volition, and wildness as a descriptor for a self-sustaining ecological integrity marked by rich biodiversity. Regarding the former, Woods (2017) asserts that wildness can be thought of as "an internal capacity for autonomous, authentic, and spontaneous expression". In this sense of wildness, species like wolves and mountain lions exercise volition and will – a capacity for autonomous expression that, particularly in predators, can evoke fear, anger, humility, and admiration. Kahn & Hasbach (2013) see this capacity as a "check [on] our hubris" arising from the "large powers of volition" inherent in wild predators. These species epitomize wildness not only due to their autonomy, but also due to their size and their capacity to harm human economic interests and physical well-being. This capacity for harm often results in violent and sustained efforts to eradicate predators– to assert control over and destroy the wildness they embody.

In a more ecological sense of wildness, the presence of large predators on a landscape contributes to a healthy and well-functioning ecosystem (Sherman, 2007), and links have been established between their presence and the richness of biodiversity in a given area (Terborgh et

al., 1999; Ripple & Beschta, 2005, Beschta & Ripple, 2009).[5] Moreover, this capacity to enrich is also 'wild' in the sense that it is self-sustaining -- human intervention is largely unnecessary to maintain it. Exerting a powerful top-down influence, predators and the "ecology of fear" they bring with them (Laundre et al., 1999) can enhance biodiversity in places where they have been reintroduced, and maintain that same biodiversity where they are already present (Ripple et al., 2014). As autonomous harbingers and supporters of robust self-sustaining ecosystems, predators both embody and bolster the wildness of a landscape.[6]

Predators were seen by most game and forest managers of Leopold's time as competitors and destroyers – as "wild" natural forces only in the same pejorative sense applied to floods and forest fires. In need of taming, these wild forces were obstacles to be overcome via intensive management and manipulation of ecosystems and their constituent species. Initially Leopold differed little from his contemporaries in this regard and was a leading voice in the campaign to eradicate wolves, mountain lions, and other large predators (Allin, 1987). Evident in essay titles like "The Varmint Question" (1915), Leopold's initial hostility towards these "pests" and "vermin" was open and unabashed. Writing on wolves and mountain lions in New Mexico, he favored complete eradication, claiming that catching and killing the "last wolf or lion in New Mexico", though difficult and expensive to achieve, must be done before the "job can be called fully successful" (Leopold, 1920). In three short years of leading eradication efforts, Leopold could proclaim a ninety-percent reduction in the wolf population of New Mexico, from three hundred to a mere thirty (Lorbiecki, 1996).

By the late 1920's implementation of predator control policies in the Southwest (and elsewhere) began to spectacularly backfire. With eradication undertaken to protect and grow herds of deer and other favored game, the absence of predators now caused these species to overrun their ranges, destroying tree and plant communities while causing severe erosion of

[5] To be clear, there has been some question about precisely how much of a top-down influence predators have on ecosystem health and functioning (see Allen, 2012 or Kauffman et al., 2010). However, this dispute is less about whether or not predators exert influence – this has been widely accepted – and more about whether or not the notion of "trophic cascades" is a problematic oversimplification of a much more complicated process (see Marris, 2014).

[6] Known as "trophic rewilding", the re-introduction of predators in places where they were previously extirpated has garnered increasing interest and attention in ecosystem restoration efforts (see Svenning et al., 2016). Bringing predators back to a landscape is thus viewed as part and parcel of bringing back a crucial component of its wildness.

fragile desert topsoil. The attempt to violently yoke wild ecological processes to the narrow whims of sportsmen, stockmen, and range managers resulted, somewhat ironically, in a further loss of control. Operating under what Leopold (1934) would later call an "iron-heel mentality", this violence only brought instability to the deer herds it was intended to help, and degradation to the habitat they and other species depended upon.

In subsequent years doubts about the efficacy and wisdom of predator eradication would surface in Leopold's writings (Flader, 1974), but it would be travel abroad, particularly in Germany, that provided the catalyst for his about face on the issue. Recounting what he observed of German conservation practices, Leopold made a strong and explicit connection between wildness as a desirable quality and the presence of predators on a landscape. In the opening line to a prepared speech on German forests, Leopold observed that one of the most "insistent impressions" taken from this landscape was its "lack of wildness" (1935b). Leopold described this lack as the deprivation of a "certain exuberance which arises from a rich variety" of species jostling and vying for space (1935b). Singling out the "near-extirpation" of predators as the primary driver in this "deficit of wildness", Leopold not only definitively links predators and wildness, he dismisses the practice of eradication as "over-artificialized land use" that can only lead to "unnatural simplicity and monotony" in the forest ecosystem (1935b).

By way of this new insight regarding predators, wildness had secured a privileged position in Leopold's emerging ecological perspective. Now spurned as "highly artificial", talk of eliminating "varmints" was replaced with a concerted push to look to the "collective total of wild things" in what Leopold called the necessary "transition to ecological thought" (1939). This transition meant abandoning the notion that human management could usurp and replace the critical ecological value of wildness provided and sustained by large predators.

Wildness and Bewildering Complexity

Wildness carries with it connotations of the unexplored, the unpredictable, and the inscrutable (Bennett, 1994; Vogel, 2015). These characteristics are what simultaneously motivate and arise from ongoing ecological research. Attempting, as ecology does, the discernment of relationships and connections that hold between species and the biotic and abiotic

elements of ecosystems is unfathomably complicated.[7] As a consequence, ecological research exposes both the complexity and fundamental indeterminacy of natural systems (Keller & Golley, 2000). Wildness understood in the context of this complexity not only defies control, it also defies full comprehension. As the ecologist Frank Egler once put it: "Ecosystems are not only more complex than we think, they're more complex than we *can* think." (Noss, 1994) While this does not obviate the need for continued scientific research, it highlights what may prove to be a perpetual gap in our knowledge and a limitation in our capacity for comprehension. Understood in this context, wildness is the asymptotic space opened up by the complexity inherent to ecology and its object of study.

Leopold maintained an unwavering, lifelong commitment to ecology and its foundational importance to conservation (Meine, 1988). However, the confidence he placed in its capacity to generate immediately actionable knowledge, while initially strong, waned considerably over the course of his life. Steeped as he was in the Pinchot school of conservation, he began his career with a strong faith that science provided all necessary tools for wise and active management of resources. As Flader (1974) observes, at an earlier stage the "compelling idea for Leopold was not the idea of ecology so much as the idea of management", something he defined at the time as "the coordination of science and use" (1933b). This utilitarian approach, driven primarily by economic considerations, applied "rudimentary ecological science" to support Leopold's "faith in the possibility of intelligent control" (Flader, 1974). This reliance on rudimentary science entailed an equally rudimentary program of environmental management. Species and other elements of the biota would be biologically assessed based on their perceived utility or harmfulness and managed accordingly – the harmful parts are removed and the desirable parts cultivated (e.g. predators and game). Though he expressed early fascination and admiration for the science of ecology, Leopold had yet to grasp the complexity of connections and relationships that rendered this management approach not only ineffective, but ultimately destructive.

As unruly ecological forces repeatedly frustrated attempts at control, and as unexpected outcomes increasingly became the norm rather than the exception, Leopold began to question the adequacy and extent of current ecological understanding. By 1935, he was openly expressing

[7] Wildness in this sense can also be viewed as akin to chaos, a concept that has played an increasingly central role within ecology (See Worster, 1990). This shift towards chaos and stochasticity is in many ways a response to the ever increasing complexity and indeterminacy encountered in ongoing ecological research.

bafflement at the failure of game management to understand the role of predators, and was perplexed by human inability to prevent or predict catastrophic irruptions and collapses of multiple species. Summarizing this frustration, Leopold linked it rather colorfully to ecological complexity: "We know almost as little about the ecological mechanism of these United States as a hen knows about the cosmic chemistry which controls her life and her productivity." (1935c).

By 1939 Leopold would fully recognize his misplaced faith in the capacity of current ecological knowledge to justify efforts at control (1939). He now expressed a new, more cautious attitude towards land, one that sought to implement a more holistic approach – an approach that incorporated recognition of the complexity inherent in what Leopold increasingly referred to as the "land organism" (1939). This demanded an abandonment of what he now disparaged as "economic biology" (1939) – his previous management framework – in favor of an approach that conceived of the biota as a single living system.[8] Leopold explicitly linked this new perspective with the discovery of ecological complexity:

> "The emergence of ecology has placed the economic biologist in a peculiar dilemma: with one hand he points out the accumulated findings of his search for utility, or lack of utility, in this or that species; with the other he lifts the veil from a biota so complex, so conditioned by interwoven cooperations and competitions, that no man can say where utility begins or ends." (Leopold, 1939)

The error in economic biology lay in the assumption that the "biotic function and economic utility of species was partly known and the rest could be shortly found out" (Leopold, 1939). Leopold now humbly observed that the "function of species is largely inscrutable, and may remain so" and that the land organism is "too complex to be understood, and probably always will be" (1939, 1944). With an unambiguous and definitive nod to the ecological complexity of the land organism, Leopold declared it the "outstanding scientific discovery of the twentieth century" (1938).

Rather than disappointment, the discovery of this vast gap in human understanding prompted Leopold to embrace ecological complexity. Particularly noteworthy was how this was incorporated into his new approach to management. Though he doubled-down on the need for deeper ecological research (Meine, 1988), he did not simply view complexity as one more barrier

[8] There is some dispute about how literally Leopold took this organicist view. Norton (1988) sees it being employed mostly as a useful explanatory metaphor, while Callicott et al. (2009) and others find some deeper significance to it in terms of Leopold's moral and metaphysical beliefs.

to human control that must be surmounted. Rather, he embraced *complexity itself* as a new and important quality in the land organism – a quality to remain largely unaltered if already present, or restored if previously degraded. With an increasing focus on the importance of "land health" in his work – defined as that "capacity for self-renewal" – Leopold reoriented conservation practice towards *allowing* for wild complexity, rather than constant attempts to control it (1946). Emerging from ecological revelation, wildness took its place as an integral value in what was now Leopold's rewilded vision of the land organism.

Wildness and the Failure of "Violence in Land Use"

With the concept of wildness involving notions of autonomy, complexity, and unpredictability, it follows that efforts at control or replacement – especially if violent or heavy handed – will encounter strong resistance, often followed by undesirable management outcomes. That which is wild, by definition, is not easily controlled – whether it be the annual flood cycles in a watershed, or the predator-prey dynamics in a given ecosystem. Contemporary ecologists have recognized the inevitability of "ecological surprises" in landscape management and have counseled "substantial humility" and "precautionary strategies" when acting upon research (Doak et al., 2008). While change of some kind will result from violent alteration of wild processes, predicting the type of change, along with its desirability, is often a game of chance.

Much like Leopold's early approach to both predators and ecological complexity, his initial attitudes about radical modification of the land organism displayed limited sensitivity to violence. Whether pruning predators from the top of the food chain or applying the "idea of controlled wild culture…to any living thing", Leopold initially believed in the effectiveness of drastic physical alteration of the biota (1933a). Control could be effectively achieved by "modifying the environment" with the "same tools and skills already used in agriculture and forestry." (Leopold, 1933a). This approach echoes his bold claim, offered as an early rebuke to wilderness preservation, that humans can and have "improved upon" nature (1918).

With his reversal on predators and his embrace of ecological complexity came the inevitable realization that "violent methods of management" – those that irreversibly and drastically convert the biota – are risky, often ineffective, and ultimately naïve (Leopold, 1939, 1946; Norton, 1988). The narrowness of economic biology – characterized by intense management for production of resources -- failed to meet its own goals. This was due to the

bankruptcy of its most fundamental assumption – that landscapes and ecosystems are easily coerced with axe, plow, gun, and bulldozer. Whether draining wetlands, plowing up native prairie, or damming and straightening rivers, each action labored under this assumption and, as Leopold would repeatedly observe, often lead to destruction and degradation. He critiqued the mindset driving these actions as a "philosophy of violence", a doctrine that assumed "control of nature by concrete and steel" was "inherently superior to natural or biotic controls." (Leopold, 1946).

In "Engineering and Conservation", Leopold (1938) offers an instructive comparison. Engineering, as the "dominant idea of the industrial age", is contrasted with the emerging discipline of ecology – which he heralds as "one of the contenders for a new order." In the difference between the two, Leopold locates the line that separates a conservation beholden to the "philosophy of violence" from conservation that respects "ecological wisdom" (1946, 1938). What had thus far proven unconquerable and unruly – that quality of wildness inherent in the land organism -- does not require an escalation of violence and the wielding of bigger and more powerful tools, but rather a fundamental change in attitude that is more deferential and less controlling: "If such tools are to fall short of achieving our ecological suicide, it is time for us to learn caution and restraint in our power to eradicate wild things." (Leopold, 1944).

Resisting conquest and imposed order, wildness assumed its role in Leopold's conservation thought as a robust and vital force worthy of respect. Unreflectively hacking away with axe, plow, and bulldozer in a crude attempt at control and conquest was not only ineffective, it mistakenly presupposed that human intervention was a necessary condition for land health. Leopold now understood wildness as both a stand-alone quality and as a potential contributor to healthy landscapes. The lessons of wildness allowed Leopold to evolve beyond the philosophy of violence and control and instead develop a philosophy of intelligent humility. This new philosophy would reach its highest expression in the land ethic.

Part Three: The Journey's End -- Bringing the Lessons of Wildness to the Land Ethic

When he eventually made his case for the scientific value of wilderness, Leopold would invoke the above lessons, offering a frank admission that "the effort to control the health of land has not been very successful" (1949). This concise statement was a definitive *mea culpa* on behalf of conservation as it had been practiced thus far. Furthermore, the fact that it was cited as

the primary rationale for wilderness preservation reveals the prominent role wildness now played in his maturing ecological viewpoint. In other words, given that a singular, unreflective emphasis on control had failed to ensure the health of the land, Leopold urged us to look to those places still remaining that were not subject to control, the wilderness areas he dubbed "monuments to wildness" (1935b).

Wildness thus went from adversary and object of conquest to teacher, guide, and potential partner in a conservation relationship that swore off "biotic arrogance" and reconceived of "man's place in nature" (1935b). This was the "new attitude" of "intelligent humility" Leopold announced as he ushered the fledgling Wilderness Society into the conservation world (1935a). The conservation of the future would be built upon knowledge gained from and respect given to the wildness and wisdom inherent in the land organism. Not surprisingly, as a blueprint for this future conservation, Leopold's land ethic would incorporate wildness as a core value.

Considered the "most prominent American articulation of an environmental ethic" by some (Freyfogle, 2009), Leopold's "The Land Ethic" (1949) was the distillation of a lifetime spent managing, observing, and thinking about land and the human relationship to it. Reflecting the emergence of what he called an "ecological conscience", the central concern of the land ethic was a "responsibility for the health of the land" (Leopold, 1949). As he articulates this vision of an ethical relation to land, Leopold draws upon several of the key conservation concepts and themes he had spent years developing and refining. Chief among these are the notions of "biotic community" and "land health". Using these as foundational concepts, he urges us to reconceive of ourselves as "plain members and citizens" of the biotic community rather than as its conquerors and controllers. This is all to be done in the spirit of integration and harmony -- a spirit characterized by a humble approach to management rooted in a respect for both our "fellow members" and for the "community as such" (Leopold, 1949). The achievement of "land health" is only possible within this context of mutual interdependency, a fundamental component of the community concept. As he develops and fills in these details of the land ethic, Leopold implicates the lessons in wildness that helped him generate the new duties of biotic citizenship.

In "The Land Ethic" Leopold laments the fact that though "predators are members of the [biotic] community", the "enlightened view" required to understand this is unfortunately still in the "talk stage" (1949). Instead, when it comes to management, the older and unenlightened

view still prevails while the "extermination of predators goes merrily on" (1949). It was of course not so long ago that Leopold could have counted himself among the unenlightened when it came to his attitude regarding predators. Nonetheless, lessons learned from his years of experience dealing with them – including his once enthusiastic complicity in their eradication – had lead him to understand the integral role of predators in regulating the health of both their prey species and the land that sustained them. Acknowledging their contribution to the wildness of a landscape Leopold now described – much as he did for the German forests – the undesirable ecological outcomes and loss of wildness that results from predator eradication. As "larger predators are lopped off the apex of the pyramid [of life]", domestic or economically "useful" species replace "wild ones" while food chains become "shorter rather than longer" (1949). As a result, in the absence of predation some species get "out of bounds as pests", much like the irruptions of deer he had earlier witnessed in a Southwest shorn of its wolves (1949). In a powerful affirmation of their value as wild members of the community, Leopold now spoke of predators as having a "biotic right" to continued existence, claiming that no "special interest has the right to exterminate them for the sake of a benefit, real or fancied" (1949). Complete eradication of predators and the wildness they bring with them – regardless of reasons given -- was now considered a violation of biotic rights and a moral failure.

Throughout "The Land Ethic" Leopold upholds his previous insight, forged in the face of overwhelming ecological complexity, that the human capacity to fully comprehend the "biotic mechanism" is inherently limited (1949). The wise scientist therefore recognizes that this biotic mechanism is "so complex that its workings may never be fully understood" (1949). However, as before, this recognition does not preclude the need for further ecological study and, also as before, Leopold celebrates ecological complexity by highlighting its value and its important role in cultivating land health. Now tying complexity directly to ecological evolution, he observes that the trend in the biota is to "elaborate and diversify" (1949). The crucial "flow of energy" in the land pyramid is directly tied to what he calls the "complex structure of the plant and animal community" – a structure enriched by unhindered evolution within diverse communities (1949). Echoing his earlier description of wildness as a "certain exuberance which arises from a rich variety" of interacting species (1935b), Leopold now connects wildness directly to land health: "The interdependence between the complex structure of the land [community] and its smooth functioning…is one of its basic attributes" (1949). Furthermore, this smooth functioning

"depends on the co-operation and competition of its diverse parts" (1949). Wildness in the biotic community – consonant with its degree of complexity -- is now more than just an aesthetic concern, it is an essential contributor to land health and thus to upholding the land ethic.

Violence in land use is anathema to the central tenets of the land ethic. By articulating this new ethical framework, Leopold hoped to facilitate a transition in perspective away from "man the conqueror" and towards "man the biotic citizen" (1949). With an emphasis on biotic citizenship, integration, and interdependence, its extension of ethical criteria to land use expands the moral universe to include all members of the community. Thus, under the land ethic, violence in land use becomes anti-social behavior subject to censure and criticism. While Leopold's previous critique of biotic violence centered primarily on pragmatic considerations of managerial ineffectiveness, he now used the outlines of an ethical framework as a way to condemn it on moral grounds. The pushback that results from the application of violence to land – manifest as failure to achieve control – is the pushback from a complex biotic community averse to drastic, large scale alteration.[9] In short, the biotic community as a real and robust entity can be and often is wild in the sense of being recalcitrant and unruly. Most importantly, as we are "members of the biotic team", respecting the roles played by our fellow community members means allowing for this wildness to play out in some capacity (1949). As a characteristic of the biotic community, wildness is not incidental, but *integral* to its smooth functioning.

Leopold's approach to conservation and land management followed a discernible trajectory over his lifetime. Beginning with an overconfident belief in control and conquest, it evolved to embrace an attitude of humility and integration. Encounters with and lessons learned from the wildness of the natural world are what catalyzed this transition. Leopold's recognition of and commitment to wildness first emerged, albeit in a limited form, via his wilderness recreation argument. This commitment would later expand as Leopold reflected on and absorbed years of conservation success and failure. Prompting a wholesale reconsideration of management methods and assumptions, these experiences lead Leopold to recast the value of

[9] The choice of words here veers admittedly close to ascribing actual volition or conscious intent to the biotic community. Nonetheless, that is not the purpose of the language used here. The point is simply to give some indication that a substantive "force" (or forces) -- in the form of unexpected and undesired outcomes – "resists" violent and uninformed attempts at large scale control. The inherent limitations of language – something Leopold himself acknowledged (1923) – sometimes forces us to push the boundaries of traditional usage.

wildness and wilderness, this time as essential to the scientific understanding of land health. The implications of this recasting stretched beyond the boundaries of wilderness areas, fundamentally reshaping his conservation thought as a whole while also providing the ecological cornerstone upon which he would construct his land ethic. As the definitive expression of Leopold's mature ecological viewpoint, the land ethic was imbued with a respect for wildness – a value carefully woven into each line of this seminal work in conservation thought.

Coda: The Lessons of Wildness and the "New Conservation"

Though it has been nearly 70 years since "The Land Ethic" was published, some conservationists appear to be forgetting the lessons that inspired it. There are troubling parallels in contemporary conservation with the rhetoric of the earlier and ecologically unchastened Leopold. A growing chorus of voices enthusiastically informs us that "nature could be a garden" (Kareiva et al., 2012) if only we would "give up our beloved wilderness and wildness" and focus on improving our ability to "consciously control" the Earth (Marris, 2015). Further, since we are "already running the whole Earth" in what is now a "post-wild" world (Marris, 2011), we must take on the "responsibility of planetary management" and embrace the "environmentalism of the future" (Thompson, 2009, 2010). Though positions like this have been given the moniker of "new" or "neo-conservationism", there is nothing all that new about the beliefs that ground them. Always the trailblazer, Leopold was promoting a nearly identical approach back in 1933 when he confidently claimed that the "idea of controlled wild culture" could be successfully applied "to any living thing" (1933a). Though separated by nearly eighty years – a period replete with examples of egregious managerial failures – the doctrine of control Leopold eventually disavowed is once again resurgent. If conservation is to avoid regression into "biotic arrogance", then it would do well to heed the lessons in wildness that inspired one of its most celebrated figures.

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Shepherding Wilderness through the Anthropocene: The Intervention Dilemma and the Future of Wilderness Stewardship

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The continued viability and importance of wilderness to American conservation has grown increasingly uncertain. While anthropogenic impacts like invasive species, pollution, extinction, and climate change are physically affecting wilderness areas (Zellmer, 2014; Long & Biber, 2014; Stephenson & Millar, 2012), the wilderness idea itself faces growing criticism from scholars (Vogel, 2015; Callicott; 2008) and conservationists (Kareiva et al., 2012; Marris, 2015a). These physical and conceptual challenges have converged in a dilemma and debate surrounding ecological intervention in wilderness areas. Given the new environmental realities of the Anthropocene and global climate change, sustaining the natural conditions of a wilderness area may no longer be possible without human intervention – something at odds with the more traditional hands-off or untrammeled approach to wilderness management (Kaye, 2014a; Landres, 2004).[10] Wilderness managers are now ostensibly faced with choosing which of these two values – natural or untrammeled – will take priority in their stewardship decisions.

Whether the intervention dilemma spells the end of the wilderness idea, as some have suggested (Marris, 2015a), depends upon how effectively wilderness proponents are able to address it. This paper defends the continued relevance of wilderness to 21st century conservation by showing that the logic of this dilemma is based on a misinterpretation of wilderness values. Interpreting natural and untrammeled as independent and absolute states obscures the possibility of a third choice based on a more comprehensive approach. Rather than being wholly distinct, untrammeledness and naturalness are interdependent wilderness values that can guide effective and thoughtful wilderness stewardship.

[10] Due to the immense increase in human impacts on the planet stemming from industrialization and exponential economic and population growth, some earth scientists (Waters et al., 2016) propose identifying and declaring a new geologic epoch – the Anthropocene. Humans have now become an elemental force of change acting upon the biological and physical systems of the Earth, with major implications for our species and for the rest of life on the planet.

Part One defines the key wilderness values at stake – untrammeled and natural -- followed by a brief explanation of the intervention dilemma. Part Two examines and critiques what are two overly polarized positions on intervention that either deliberately or inadvertently undermine the continued viability of wilderness. Avoiding the unnecessary dichotomies underlying these positions, Part Three develops the foundation for a third option that maintains a comprehensive rather than a fragmented understanding of wilderness value. Finally, Part Four offers a look at how this third choice applies to and clarifies the issue of intervention in wilderness. Rather than being ill-equipped to handle the Anthropocene epoch and its attendant threats to biodiversity and ecosystems, wilderness and the Wilderness Act afford us the opportunity to imagine the *right* kind of ecological intervention by being appropriately limiting without being prohibitive.

Untrammeled and Natural: Essential Wilderness Values

The Wilderness Act defines wilderness as "an area where the earth and its community of life are untrammeled by man" (§1131(c)). Called the "quintessential flourish" of the Wilderness Act and the "unquestionably central" element of wilderness character, 'untrammeled' means to be unhindered, unrestrained, or unrestricted (Greenberg, 2016; Kammer, 2013).[11] Requiring the "utmost humility and restraint", managing for untrammeledness means minimizing control or interference with plants, animals, soils, water bodies, and natural processes within designated wilderness (Landres et al., 2015). As a principled practice aimed at cultivating the proper relationship to wilderness -- rather than any particular physical outcome -- untrammeledness in stewardship serves as a check on the strong human impulse to manipulate and control (Holling & Meffe, 1996).

Upon designation, wilderness areas are to be "protected and managed so as to preserve" their "natural conditions" (§1131(c)). What 'natural' or 'naturalness' means, especially in the context of protected area management and stewardship, has been a topic of debate and extensive discussion.[12] 'Natural' often means different things to different people and is likewise employed

[11] Note: Many view 'untrammeled' as more or less synonymous with 'wild' and often use them interchangeably (see Kammer, 2013; Cole et al., 2016; Zellmer, 2014; Landres et al., 2000). Though this interchangeability makes sense, in order to avoid confusion and remain consistent with the Wilderness Act (which does not include the words 'wild' or 'wildness'), this paper uses 'untrammeled' whenever possible.

[12] For a thorough treatment of the issue, see *Beyond Naturalness: Rethinking Park and Wilderness Stewardship in an Era of Rapid Change* (David N. Cole & Laurie Yung eds., 2010).

in a variety of different and somewhat unrelated contexts (Hobbs et al., 2010a). In terms of wilderness and protected area management, it may indicate an area that is "pristine" (Aplet & Cole, 2010), or adheres to some "sense of historical fidelity" (Stephenson & Millar, 2012). Problems have been found with each of these definitions and the continued viability of 'naturalness' as a stewardship concept has been seriously questioned (Hobbs et al., 2010; Aplet & Cole, 2010; Ridder, 2007; Cole & Yung, 2010).

Despite criticism of naturalness and recommendations that it be dropped as a stewardship principle, wilderness managers are bound by the statutory language in the Wilderness Act and cannot ignore it when formulating policy.[13] Though not wholly free of the limitations highlighted in critiques of naturalness, a recent interagency effort by Landres et al. (2015) to define the term provides a useful guide. This definition encompasses "all naturally occurring biological and physical elements of wilderness" including indigenous plant and animal communities, soil, air, and water, as well as "naturally occurring disturbance processes" like fire and flooding (Landres et al., 2015). Providing managers a framework for evaluating and monitoring the biophysical state of a wilderness ecosystem, no matter how imperfect, is crucial for a well-rounded and comprehensive approach to stewardship. Speaking of, meaningfully monitoring, or otherwise evaluating a given wilderness area without reference or recourse to its biophysical conditions would be strange at best and, at worst, would severely limit the ability of managers to coherently address issues like ecological degradation and species loss. As such, references to the 'naturalness' or 'natural conditions' of a wilderness area throughout this paper will adopt this interagency definition.

Outdated Assumptions and the Roots of a Dilemma

The Wilderness Act reflects an underlying assumption that an area kept untrammeled would necessarily preserve and protect its natural conditions (Aplet & Cole, 2010; Landres et al., 2000). Stephenson & Millar (2012) have remarked that natural and untrammeled were "usually conflated" at the time of the Act's passage and Zellmer (2014) speculates that sponsors of the

[13] Though philosophers, theorists, and other commentators operating outside the legal parameters of the Wilderness Act are only limited by logical possibility, the managers legally responsible for discharging the mandates of the Act are much more constrained and so less able to dismiss the language used in the statute.

Act may have seen the two as synonymous. In other words, an untrammeled wilderness simply entailed a natural wilderness -- keeping it wild and untrammeled meant keeping it natural.

Unfortunately, given the rapidity, scale, and scope of human impacts in the Anthropocene – most notably climate change – naturalness and untrammeledness are no longer unquestionably complementary wilderness concepts. Untrammeled wilderness areas are now subject to ecological impacts originating largely outside and beyond the control of managers charged with preserving and protecting the natural conditions of these special places (Long & Biber, 2014; Cole & Landres, 1996). In short, the environmental realities of the 21st century force us to recognize that keeping it wild and untrammeled may not always be enough to keep it natural.

With this marked increase in anthropogenic impacts to wilderness area ecologies, in some cases sustaining naturalness may no longer be possible without human intervention (Cole & Yung, 2010; Stephenson & Millar, 2012). Whether responding to the growing crisis of species extinction (Ceballos et al., 2015), or to massive shifts in ecosystems brought about climate change, protecting or maintaining the natural conditions of a given wilderness area may require active ecological intervention. Given the legislated goal for wilderness to be both untrammeled and natural, managers face a "unique and central dilemma" -- not intervening may allow natural conditions to further degrade, but taking action destroys the symbolic value of restraint at the heart of the wilderness idea (Landres, 2004).

This dilemma has become the defining issue in wilderness management, even making its way into the popular press (Solomon, 2014; Ferguson, 2014). How managers, conservationists, and the general public respond will determine to a large degree the future of wilderness in America. As one might expect, there is considerable disagreement regarding the appropriateness of intervention in wilderness, and the tendency has been towards polarization. Tracking the conceptual schism that has opened up between untrammeled and natural – increasingly characterized as a stark dichotomy – this polarization threatens the continued relevance of the Wilderness Act to 21st century conservation. Shepherding wilderness through the Anthropocene demands an effective response to these polarized positions before an alternative can be offered.

Keeping it Wild at all Costs: Extreme Untrammeledness

In response to the prospect of ecological interventions in designated wilderness, some have advocated the absolute primacy of untrammeledness and non-intervention. Cole et al. (2016) assert that wilderness character is "fundamentally about wildness" and that any actions that "trade off degradation" of the untrammeled quality of wilderness in order to restore naturalness unacceptably violate this fundamental principle.[14] Kammer (2013) holds that even threats posed to ecosystems and their constituent species do not provide justification for interventions into wilderness area natural processes – wilderness must simply be kept beyond our "manipulative reach altogether". Zellmer (2014) claims that such "intrusions and manipulations" will make the land into "something other than wilderness" and Phillips (2015) calls intervention the "opposite of humility", equating it to nothing more than a "gentler" and "more enlightened means of conquest".[15]

Untrammeledness functions as an important and deeply moral concept at the heart of wilderness stewardship, placing a strong emphasis on intangible and symbolic values like humility and restraint. The physical condition of a wilderness ecosystem becomes less important than the nature of our relationship to it and untrammeledness as an abstract moral principle is at least as important as the actual physical places to which it is applied. Calling biophysical elements like native flora and fauna "important but not central to wilderness character", Cole et al. (2016) clearly favor these intangible ethical principles over more tangible wilderness values. Noting that humility has become an "endangered virtue", Kammer (2013) urges strict managerial restraint in wilderness out of "proper respect for the natural world". Similarly, Zellmer (2014, 2012) recommends untrammeledness as the most appropriate approach to wilderness, claiming that "deliberate non-intervention", though an "admittedly…extreme stance", serves to enrich "our relationship with the natural world". Finally, Phillips (2015) holds that we must "humbly let the wilderness be wild" and "favor its freedom over its naturalness".

[14] Cole et al. (2016) do make room for smaller scale actions like restoring impacted campsites or removing "evidence of humans". Their prohibition applies to actions aimed at "manipulating wilderness ecosystems", which of course applies directly to larger scale actions that may be required to address the most serious degradation of these ecosystems (e.g. removal of invasives, native species re-introduction, etc.).

[15] Like Cole et al. (2016), Zellmer (2012) does allow that certain "minimal restoration activities" may be appropriate in wilderness when "necessary to counteract previous or present human interventions". Nonetheless, the value of non-intervention is still given primacy, "even if other important values are diminished over time"(Zellmer, 2012).

Despite its inarguable importance, granting absolute primacy to untrammeledness can foster a limited and incomplete perspective when it comes to wilderness values. The word 'wilderness' itself implicates not just freedom and autonomy in abstract isolation, but also the physical organisms and processes that express this self-willed character.[16] It is the *combination* of both abstract and physical elements that are constitutive of wilderness as idea and place. Wilderness properly understood involves a combination of both the untrammeled and the natural. Speaking of or exclusively favoring one without the other risks the adoption of a truncated or incomplete picture of wilderness value – a picture that misses the chance for a more robust and comprehensive view. In focusing so heavily on the moral principles of humility and restraint, we risk demoting considerations of the natural conditions in a wilderness ecosystem. In other words, wilderness areas are reduced to mere symbolic status, serving only as the vehicle through which we realize our higher moral aspirations of humility and restraint.

The limitations inherent in this perspective can have real repercussions for wilderness and wilderness stewardship. This is especially true in the context of wildlife species, where the untrammeled approach can pose increased risk to specific elements of biodiversity (Landres, 2010). In cases of threatened or endangered species, strict adherence to untrammeledness may require that we forego needed intervention and watch as extinction or extirpation overtakes a struggling population. Beyond the loss this would entail for the character of a specific wilderness area, the strong biocentric values that inform much of environmentalism would have been arguably (and counterintuitively) undermined by wilderness designation. As one ardent supporter of untrammeledness puts it, we will "need to accept" that in wilderness "some species will decline or be replaced" and that "whatever happens, happens" (Kaye, 2014b; Mark, 2014). Many conservationists would likely view this attitude as an abandonment of our fellow species and an abdication of our moral responsibility to them (Soule, 2001; Wilson, 2017; Cafaro & Primack, 2014).

As one of the foundational values of American environmentalism, a deep moral concern for other species and their habitat – codified in powerful statutes like the Endangered Species

[16] The word 'wilderness' is believed to have been derived from the combination of 'wild' (meaning "willed", or more accurately, "self-willed") and 'deor' (meaning 'beast' or 'deer'), leaving us with "wild-deor-ness", or the place of the wild beast (Nash, 2001). These etymological roots indicate that the *combination* of both abstract and physical elements are constitutive of the wilderness concept.

Act – is a core motivation for supporters of protected area designations.[17] The advent of an anthropogenic sixth mass extinction (Ceballos et al., 2015), combined with the fact that habitat loss is the single biggest threat to species (USFWS, 2005), makes the strong protections afforded by wilderness designation an appealing and pragmatic option. Recent studies (Gray et al., 2016; Miraldo et al., 2016) have suggested that protected wild places are important for the long term well-being of species, marking the clear need for significantly more wilderness acreage to address the effects of climate change and the extinction crisis (Heller & Zavaleta, 2009; Wilson, 2016; Wuerthner et al., 2015).

If the Wilderness Act is perceived as an inflexible barrier to species conservation in the Anthropocene, then less protective designations will likely end up filling the role of habitat preservation. When otherwise well-meaning wilderness advocates preclude the possibility of restitutive interventions on behalf of species in these areas, they risk reducing the relevance and appeal of future designations – designations that require strong and sustained grass roots support and activism (Turner, 2012). The Act and its advocates will likewise diminish in relevance and importance, leaving the National Wilderness Preservation System to stagnate at its current 109 million acres.[18] This would be a loss for wilderness supporters and for struggling species that will need much more of the uncompromising habitat protections provided by additional designations.

Out With the Old: Giving up on Untrammeled Wilderness

In contrast to those who maintain the centrality of untrammledness and restraint sits a growing contingent of conservationists who – citing the ubiquity and scope of human influence on the planet – advocate for a new paradigm of human control and ecosystem engineering. Under this new conservation paradigm, "nature could be a garden" (Kareiva et al., 2012) wherein humans now "shoulder the responsibility of planetary management" (Thompson, 2009) and work to increase their ability to "consciously control" the Earth (Marris, 2015a).

[17] Ghimire et al. (2015) note recent surveys of the general public where more than 80% of respondents indicated that "protecting wildlife habitat" and "preserving unique wild plants and animals" were either "very" to "extremely important" wilderness values.

[18] http://www.wilderness.net/NWPS/fastfacts

In this reimagining of conservation, the wilderness paradigm – with its valuation of restraint and humility – does not fare well. Characterized as being "no less human constructions than Disneyland", wilderness and other protected area concepts are dismissed as "idealized notions" based largely in myth and bad science (Kareiva et al., 2012). In place of wilderness, parks, and other protected areas, Janzen (1998) advocates for what he calls "wildland gardens" that "grow" biodiversity and ecosystem services. Conservationists are urged to "jettison" idealized notions of wilderness to make room for a new "environmental goodness" that is "distinct from nature's autonomy" (Kareiva et al., 2012; Thompson, 2010). In other words, as we move forward into an era of increasing human control of the biosphere, untrammeledness in management – understood as humility and respect for nature's autonomy – ought not to inform conceptions of environmental value.

Given this diminishment of untrammeledness as a value, some conservationists take a more permissible stance regarding intervention in designated wilderness areas. In service to the naturalness quality of wilderness – described as a biocentric ethic – some have asserted (Marris, 2015a) that we must "sometimes give up our beloved wilderness and wildness" and get to the business of saving those species that we have pushed to the edge of oblivion. In the debate over wilderness intervention, this position holds that saving species or degraded ecosystems – maintaining naturalness – trumps the value of keeping it wild and untrammeled. Considered in isolation from the broader perspective that underlies it, this approach – with its strong moral concern for species – has much to recommend it and is in keeping with some of the values defended here. As previously stated, adhering to absolute untrammeledness in the face of species loss becomes ethically problematic and exceptions – with important limits and caveats – ought to be made.

Unfortunately these reasonable assertions are taken far beyond what is warranted and are used as a basis for a broader attack on the relevance of the wilderness idea in general. Rather than work to find compatibility between what ought to be two complementary environmental values – species conservation and wilderness preservation – the opportunity is taken to advocate for a paradigm shift in environmental thought that abandons untrammeledness and restraint in favor of becoming "more effective at managing the Earth" (Marris, 2015a). Calling wilderness the traditional "moral heart" of conservation, Marris (2015a; 2015b) advocates its wholesale

replacement with a more hands-on "gardening" approach that dispenses with concerns about "relinquishing our will to manage". This "environmentalism of the future" holds a significantly diminished place for valuing the "good of the autonomy in nature" (Thompson, 2010) – a value integral to the wilderness idea.

Employing simple dichotomies often avoids the messier task of finding areas of compatibility or opportunities for reconciliation. Marris (2015a) sets up just such a dichotomy when she contrasts an environmentalism "in thrall to wildness" – which she equates with the wilderness idea – and one in which we work to increase our "gardening prowess" and our "ability to consciously control" the Earth. Placing the continued survival of species in the balance, our choices are framed to match this either/or scenario – either we abandon wilderness ethics and values (particularly untrammeledness), or we shirk the moral duties we have to species and "withdraw…with blood on our hands" (Marris, 2015a). Relying on strong non-interventionist positions as a foil – not to mention reliance on familiar anti-wilderness straw man arguments – the "gardening" paradigm mounts a direct challenge to the value of untrammeledness, finding very little moral space for it in 21st century conservation (Kareiva et al., 2012; Marris, 2015a).

Concerns that a rigid adherence to non-intervention will "open the window" to unacceptable large-scale impacts are legitimate and must be carefully considered (Marris, 2015a). However, adopting the corresponding extreme – that of "gardening", controlling, or managing the Earth – also opens the window to something equally undesirable; managerial caprice and human arrogance unchecked by any serious valuation of restraint or precaution. Valuing untrammeledness and restraint is not, as some would have it, simply a "dignity trip" based in arrogant "human exceptionalism" (Marris, 2015a), but instead embeds a precautionary principle meant to inform (rather than dictate) managerial decision making. Intervention need not be precluded when the value of untrammeledness is taken seriously, but instead must simply be held to a higher standard of justification (Landres, 2004).

The recommendation that we discard untrammeled wilderness as a central environmental value – replacing it with the mindset of a gardener – risks entrenching the cultural "action bias" that the Wilderness Act was intended to mitigate. Detailing the prevalence of this action bias in environmental management, Iftekhar & Pannell (2015) found that decision makers often "choose

to take actions even when a "rational" decision maker would prefer to delay actions to allow further information collection, or take no action". The urge to hastily act or intervene when facing a potential ecological problem is often quite strong among managers. Given this, humility in the face of uncertainty, and in the face of processes and scales of time that we are only now beginning to grasp, is not merely an indulgence meant to make us feel better about ourselves. Nor is it, as some claim, an elevation of the "condition of the human soul" above the needs of other species (Marris, 2015b). Rather, being rooted in a valuation of untrammeled nature, this humility is both moral and rational, addressing our obligations to other species while seeking to do so in a way that acknowledges our limited understanding and the real potential for causing rather than preventing further environmental damage.

The Wilderness Act and the limitations it places on managerial actions is neither outdated nor superfluous, but as important as ever in an age of rapidly changing climatic conditions and accompanying environmental uncertainty. Directly attacking and undermining the foundation of wilderness – the value of untrammeled nature – is unnecessary and counterproductive, especially if driven by concern for species. What species require is the adoption of the careful, cautious, and thoughtful approach that wilderness values demand. More importantly, species need the kind of habitat protections afforded by more wilderness designations (Gray et al., 2016; Miraldo et al., 2016; Wuerthner et al., 2015). Without wilderness and the Wilderness Act, neither of these needs can be effectively met.

A Path Forward: Moving Beyond a False Dilemma

The above two positions represent starkly different and polarized responses to the fact that the untrammeled and natural qualities of wilderness are no longer unquestionably complementary. Though each position takes a different path away from this schism, both ultimately forego the possibility of reconciliation in their adoption of absolutist stances. In defense of naturalness and biodiversity, some advocate intervention and intensive management while rejecting the continued viability of untrammeledness -- and of wilderness itself -- as environmental values (Marris, 2015a; Thompson, 2010). Conversely, others defend the primacy of untrammeledness in wilderness management, adopting an inflexible non-interventionist stance, even in the face of continued ecological degradation and potential extinction (Cole et al., 2016; Kammer, 2013). Both positions threaten the continued relevance of wilderness and the

Wilderness Act -- one by directly attacking and undermining its foundational values, the other by elevating an abstract and symbolic principle over the value of species and other biophysical elements of wilderness. Neither is acceptable -- on both ethical and pragmatic grounds -- and both do a disservice to wilderness and the Wilderness Act at precisely the time when they are most needed.

Lost in this polarization is the possibility of a third option that knits the untrammeled and natural qualities of wilderness back together. This reconciliation is not only possible, it is also necessary if the Wilderness Act is to remain relevant in an Anthropocene epoch of unprecedented environmental challenges. This path to reconciliation begins by articulating what these important wilderness values share in common.

Untrammeled and Natural: Process and Product of Wild Autonomy

It is useful to distinguish between untrammeledness and naturalness when monitoring and measuring wilderness character. Wilderness managers need some way to quantify the elements that comprise this important stewardship concept and agencies have developed a useful framework for doing so (Landres et al., 2015). Problems only arise when this distinction is taken too far. By virtue of being treated as a dilemma, the undeniable tension between untrammeledness and naturalness escalates into mutual exclusivity and opposition. This is an inaccurate and unhelpful characterization. It much is more accurate to view them as different ways of valuing what is ultimately the same thing; the wild autonomy of the non-human natural world.

Where and how value is attached to wild autonomy is what largely determines where we position ourselves in the debate over wilderness intervention. This choice can be cast as one of *process versus product*. Choosing to value untrammeledness over all other wilderness qualities means valuing wild autonomy solely as an abstract and creative *process* of ecological evolution that demands absolute restraint and non-interference. Conversely, exclusively valuing the biophysical elements constitutive of a wilderness (i.e. its naturalness) means valuing the physical *products* of wild autonomy – things like indigenous species and ecological processes. A full appreciation of wilderness and wild autonomy, if it is to be robust and consistent, demands a merging of both ways of valuing that considers process and product together.

Creative processes and forces largely beyond our will and control – the wild autonomy of the natural world – are responsible for most non-human lifeforms and the landscapes that have supported them. Some take issue with such a sentiment and point to clearly anthropogenic elements like climate change as evidence of our "control" of the planet and its processes (Marris, 2015b) -- or even as evidence that we have "made", "built", or "constructed" it (McKibben, 1989;Vogel, 2015). The absurdity of such claims is succinctly addressed by Mark (2015) when he says that there is a "world of difference between *affecting* something and *controlling* it". Claiming that climate change or other human influence constitutes human "control" of the planet is akin to saying the bull "controls" the china shop as he careens and blunders through it. With perhaps the exception of domesticated plants and animals, claiming a significant role in the creation or existence of a species like the grizzly bear (or its forest home) would be preposterous and scientifically impossible to demonstrate. We do however face the real possibility of claiming a primary role in its demise, which *can* be scientifically supported.

The Wilderness Act recognizes the role of non-human wild autonomy in creating environmental value and constitutes a moral and legal response to it. As key wilderness values stipulated by the Act, untrammeledness and naturalness each manifest appreciation for this wild autonomy. To value untrammeledness is to value wild autonomy as a creative *process* – without focusing on what it creates, has created, or will create. Maintaining untrammeledness and restraint as a wilderness management principle is the most direct and most obvious means of ensuring the perpetuation of wild autonomy by allowing ecological processes to remain unhindered and unmanipulated.

In contrast, to value naturalness is to value wild autonomy in terms of its *products* – to focus value on what it creates. In other words, as elements of naturalness, and as unique physical results of wild autonomy, wilderness species and ecosystems are not only valued for what they are in themselves, but also for what they implicate by their very existence. As Mark (2015) puts it, these species offer us a "portal into wildness" – a portal that embodies and expresses millennia of evolutionary, climatic, and ecological processes operating largely beyond human control. Thus, in the call of a Wisconsin crane, Aldo Leopold (1949) heard no "mere bird", but "wildness incarnate", a "trumpet in the orchestra of evolution", heralding the "incredible sweep of

millennia which underlies and conditions the daily affairs of birds and men".[19] To fully appreciate and value a species – whether crane or crayfish -- demands an acknowledgment and appreciation of its origin in the wild autonomy of ecological processes.

Untrammeledness and naturalness as core wilderness values are not nearly as opposed as the management dilemma might suggest. Opposition only arises when wilderness values are unnecessarily and unjustifiably narrowed into mutually exclusive categories that preclude a more comprehensive understanding. Untrammeledness and naturalness are interdependent and relative states, not absolutes. Adopting an exclusively process-oriented view of wild autonomy, as some do (Cole et al., 2016; Phillips, 2015), means venerating untrammeledness, even to the exclusion of native species and ecosystems – those physical expressions (or products) of wild autonomy that are integral to appreciating it as a process. What value is there in an absolutely untrammeled wilderness shorn of its native species and intact ecosystems?[20] Untrammeledness is inarguably a necessary condition for wilderness, but in some cases it will not be a sufficient one.

Likewise, a product-oriented view focused exclusively on naturalness takes species and ecosystems out their original context – their origin in the wild autonomy of ecological processes – and fosters a truncated and ecologically obtuse view. Wilderness areas are not merely "wildland gardens" managed to "grow biodiversity services" (Janzen, 1998), nor are they simply cageless wildlife parks curated for our pleasure and wholly at our whim. Rather, wilderness is about respecting the millennia of complex wild processes – many of which we do not fully understand – that drive speciation and long-term ecological change. The usurpation of wild autonomy entailed by a gardened Earth made up of "consciously controlled" landscapes (Marris, 2015a) removes needed limitations on managerial overreach and fails to adequately consider enormous gaps in our ecological knowledge.

Acknowledging the shared roots of untrammeledness and naturalness as wilderness values softens the tension between them. As two integral qualities of wilderness character, and

[19] Leopold makes this connection between wild processes and their products in other places as well. In "The Grizzly" (2013), he says valuing this iconic species means valuing both the "pageant of evolution" that produced this "outstanding achievement", as well as the wilderness "theatre" upon which it played out.

[20] Taking absolute untrammeledness to its logical conclusion, a desolate and desertified landscape brought on by anthropogenic climate change, stripped of most or all of its species, would still qualify as an exemplar of appropriate wilderness management so long as humans did not intervene. Though an admittedly hyperbolic example, it is hard to see how this would not follow from the adoption of absolutism regarding untrammeledness.

as two ways of valuing the wild autonomy of the natural world, they are often more complementary than conflicting.

Ecological Intervention in Wilderness Revisited:

A more suitable approach to ecological intervention in wilderness begins and ends in untrammeledness – an approach characterized by restraint and humility. Wilderness stewardship ought to *begin* with the question of whether an opportunity for restraint presents itself. As Landres et al. (2015) have stated, "when there is an *opportunity* for restraint, wilderness legislation directs the managing agency to scrutinize its actions and minimize control or interference" [emphasis added]. A lightning-caused wildfire in a designated wilderness offers just such an opportunity. If not deemed a direct threat to human safety, opting for restraint in this situation is most in keeping with minimizing control and interference and allows for the continuation of a natural fire regime.

Not meddling with or otherwise manipulating populations of non-threatened wildlife or game species in wilderness is another example where the opportunity for restraint exists and ought to be taken. Wilderness areas do not present opportunities for agencies to enhance game species populations through artificial feeding, watering, or predator control (Jones, 2015). The abundance and fate of these populations, or the dynamics of the predator-prey relationship are, with very few exceptions, appropriately off limits to managerial interference. Whether through fire suppression or predator control, the strong human urge to manipulate or otherwise control a landscape is recognized and a non-intervention alternative is kept constantly visible.

In the context of managing wilderness in the face of both climate change and scientific uncertainty, beginning with restraint can also be an effective management strategy (Long & Biber, 2014). In assessing whether species and ecosystems require intervention to facilitate adaptation to climate change, often the best option is to simply leave the area alone (Stephenson & Millar, 2012). Given the compounding effects that climate change will likely have on scientific uncertainty, assessing scientific assumptions that underpin wilderness intervention proposals is crucial (Naficy et al., 2016; Noss, 1994). If these assumptions are found lacking in scientific rigor and clarity, then the best course of action is restraint. If wilderness management did not begin with restraint, the impetus to assess these assumptions would be less likely to arise,

leading to the potential for serious and undesirable ecological consequences (Doak et al., 2008) – consequences much more likely if a gardening approach is the default paradigm.

In cases where intervention becomes necessary to protect or maintain naturalness, the search for an opportunity to adopt restraint can become the search for a method, duration, and extent that minimizes impacts when taking action in a wilderness landscape. The history of litigation regarding wilderness intervention shows that the courts adopt a similarly conservative approach (Appel, 2010). At issue in several cases were the methods used and the justifications given for a particular intervention. More often than not, the judiciary has struck down proposals that do not take restraint and minimization of impacts seriously.[21] Understood properly in the context of wilderness intervention, restraint does not entail absolute prohibition, but rather represents the foregrounding of precaution at every step. Most importantly, this understanding still sees untrammeledness as both starting position and end goal.

The restoration of untrammeledness must not only consistently inform intervention in wilderness, it must be an explicitly planned end point. Woods (2005) has argued for what he terms "diachronic wildness", setting it as the proper approach to the goal of ecological interventions. This approach recognizes what is a crucial point when conceiving of untrammeledness and intervention – that trammeling actions can be implemented at one point in time and then be halted or withdrawn at a later point. Vogel (2015) articulates a similar view, with interventions that ultimately aim to "transcend intentionality" – to initially intervene with the ultimate goal of allowing "nonintentional natural processes" to resume without hindrance. Human influence and intention can then, as Hettinger (2014) terms it, eventually "wash out" of natural systems, returning them to an untrammeled state.

Unlike the extinction of a species, or something like a type-conversion from forest to grassland, untrammeledness can always be returned to and is not irreversibly curtailed or revoked. In wilderness stewardship we begin and end with untrammeledness, despite some necessary detours along the way that may require thoughtful and measured interventions. The uniqueness and importance of untrammeledness as a value is never rejected or abandoned, and is

[21] See *Wilderness Watch, Inc. v. U.S. Fish & Wildlife Serv. (2010)* and *Californians for Alternatives to Toxics v. U.S. Fish & Wildlife Service (2011)* for cases where the courts rejected agency proposals that fell short of the high bar required to justify wilderness intervention.

instead kept as a recognition of our limited knowledge and as a check on our potential for overconfidence and hubris in management.

Wilderness and the Wilderness Act: Still Needed in the Anthropocene

When we move away from limiting pictures of wilderness value and cease trafficking in absolutes, then the issue of ecological intervention becomes considerably more manageable. This does not mean that the tension entailed by managing for an untrammeled and natural wilderness is eliminated. It simply frees up some space and energy for managers to address the pressing business of grappling with climate change, the pending extinction crisis, and other looming environmental problems. This is done not only with humility and restraint, but also with compassion and concern for species and ecosystems we have pushed to the brink. As we enter the Anthropocene, the Wilderness Act presents the opportunity for the *right* kind of ecological intervention precisely because it is limiting without being prohibitive. Far from being irrelevant and outdated, wilderness and the Wilderness Act have a significant and important role to play in 21st century conservation.

"The richest values of wilderness lie not in the days of Daniel Boone, nor even in the present, but rather in the future" –Aldo Leopold

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The Endangered Species Act and the Wilderness Act: Conflicting or Complementary?

"Wilderness without wildlife, and wildlife without the freedom of wilderness, are virtually unthinkable" (Hendee & Dawson, 2002).

"Wilderness without its animals is mere scenery" –Eileen Crisler (Scott, 2004)

The presence of wildlife on a landscape plays a vital role in both the perception and the ecological reality of wilderness. Buried deep in the very roots of the word itself is the notion that wilderness is the "place of wild beasts" (Nash, 2001), indicating a strong connection that inextricably links these landscapes with the wildlife that inhabits them.[22] The intuition for many is that wilderness areas and other protected landscapes must also be good for wildlife. There are also some ecologically grounded reasons to trust this intuition. A recent study (Gray et al., 2016) comparing species richness and abundance both inside and outside of protected areas found on average that these two important indicators of overall wildlife health are significantly higher within protected areas than in their unprotected counterparts. Another recent study (Miraldo et al., 2016) found that habitats more affected by human activity hold less genetic diversity than the "wilder regions" of our planet. By several measures wild and protected areas are good for wildlife.[23] As the world hemorrhages both species and wilderness at an alarming rate – and with climate change sure to exacerbate these losses -- the need for effective policies and laws that protect both has reached a crisis level.[24]

Meant to protect both wilderness and wildlife respectively, the Wilderness Act and the Endangered Species Act (ESA) seem the perfect tag-team of US environmental law, ready to

[22] The word 'wilderness' is believed to have been derived from the combination of 'wild' (meaning "willed", or more accurately, "self-willed") and 'deor' (meaning 'animal' or 'beast'), leaving us with "wild-deor-ness", or the place of the wild beast (Nash, 2001).

[23] Both studies were massive in scale, covering multiple continents, with the Gray et al. (2016) study being the largest of its kind ever undertaken.

[24] See Ceballos, et al., (2015) for the advent of a human-caused sixth mass extinction. See Watson et al. (2016) for recently observed "catastrophic" global declines in wilderness. See Pacifici et al. (2017) for the powerful impacts of climate change on endangered species globally.

tackle the problem of habitat destruction and species loss.[25] Taken together, they represent what Mark (2015) has called the "highest legal expression" of American environmental values. This is made evident not only by what these statutes protect, but also in the legal potency accompanying these protections. By legally protecting the ecological value of species, the ESA grants to federal agencies significantly broad regulatory power and authority over both public and private lands. In protecting their wilderness character, the Wilderness Act places stringent land use restrictions on designated wilderness areas, protecting them in perpetuity from most human disturbance and manipulation.

The values protected in both statutes appear complementary and mutually entailing, mirroring the close conceptual relationship between wildlife and wilderness. However, wilderness and species values have already come into conflict, and there is a strong likelihood that these conflicts will only grow in frequency as species are increasingly impacted by human activity (Graber, 1995). By mandating that agencies work to recover threatened and endangered species, the ESA may require management intervention in a designated wilderness where a listed species is present (Zellmer, 2012; Hendee & Dawson, 2002; Nickas & MacFarlane, 2001). However, the Wilderness Act generally prohibits interventions or manipulations that would violate the wilderness character of these landscapes, even those undertaken on behalf of wildlife (Kammer, 2013). As human encroachment on wildlife habitat continues apace, and climate change takes its toll, the need for such actions will only grow in urgency, increasing the tension and likelihood of conflict between these two powerful statutes (Long & Biber, 2014; Zellmer, 2012).

This tension has recently led some to observe that conservation of wildlife and conservation of wilderness are not necessarily compatible objectives (Bleich, 2016). Some have gone further, essentially claiming that intervention on behalf of wildlife is and ought to be prohibited in wilderness, regardless of the motives for doing so (Kammer, 2013). Still others suggest that efforts to protect endemic species through wilderness interventions will leave us losing more than we gain, making the land into "something other than wilderness" (Zellmer, 2014). In some cases, actively intervening to protect native flora and fauna simply takes a back

[25] The US Fish & Wildlife Service cites habitat loss as the *number one* cause of species extinction in the United States, ostensibly making strong land protection statutes like the Wilderness Act vitally important for species survival (USFWS, 2005).

seat to the singular goal of preserving the wild or untrammeled quality of wilderness (Cole et al., 2016). Finally, a survey of federal land managers in Washington state revealed that 41% of respondents perceived the Wilderness Act as a potential hindrance to their ability to preserve native species (Jantarasami et al., 2010).[26] The key elements of conflict are certainly present here, but need we so starkly separate a wilderness from its native wildlife when making management decisions, forcing upon us a tragic choice between species values and wilderness values?

This paper contends that, rather than conflicting goals, saving ESA listed species and preserving wilderness character are ultimately two sides of the same conservation coin. Wilderness and wildlife are complementary and ultimately inseparable environmental values. Understanding this close connection will allow the development of effective management and policy without the need to favor one over the other. Part I offers a brief overview of the values expressed and protected by the ESA and the Wilderness Act, giving some necessary background while also laying a foundation for their compatibility. Part II begins with a legal case where proposed intervention for an ESA listed species conflicted with the Wilderness Act mandate to preserve wilderness character. The court opinion in this case is instructive, offering a legal foundation for intervention on behalf of listed species while also illuminating a strong link between wilderness character and native wildlife. A subsequent look at a recent interagency effort by Landres et al. (2015) to define and monitor wilderness character further strengthens this connection, clarifying the role that wildlife species play in this important wilderness stewardship concept. Building on these legal and agency interpretations, Part III argues that a proper understanding and consideration of wilderness character, combined with an appreciation of the unique moral problem that extinction presents, will provide the crucial elements needed to avoid conflict. Ultimately, an action aimed at saving a native species from extinction is also an action aimed at saving a fundamental and *irreplaceable* element of wilderness character. Finally, with some concluding remarks Part IV addresses impacts to untrammeledness and sets some practical limits on intervention for species preservation.

[26] The survey questions were situated in the broader context of climate change adaptation and addressed whether or not managers felt empowered or held back by the Wilderness Act and other federal environmental statutes (Jantarasami et al., 2010).

Part I: Expressing American Environmental Values: The ESA and the Wilderness Act

The Endangered Species Act of 1973

The Endangered Species Act has been deemed the "cornerstone of U.S. biodiversity policy" and is routinely called America's strongest piece of environmental legislation (Davis et al., 2006; Callicott & Grove-Fanning, 2009). The U.S. Supreme Court referred to the ESA as "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation" (*TVA v. Hill*, 1978). The primary purpose of the ESA, to "provide a program for the conservation of endangered and threatened species", is considerably strengthened by a complementary purpose that aims to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved" (ESA, Section 2(b)). Beyond simply mandating that endangered and threatened species be saved from extinction, Congress added the further stipulation that the habitat upon which these organisms depend shall also be conserved.[27] Added to this are the stringent prohibitions in the Act against the "taking" of endangered species, as well as the ban on "jeopardizing" these species or adversely modifying their critical habitat (§1538(a) & §1536(a)). By drafting legislation that carried with it such regulatory force, it is clear that Congress sought to assert and strongly defend emerging national values regarding species.[28]

The Wilderness Act

The Wilderness Act of 1964 represents a milestone in the evolution of American attitudes towards wild nature. Deemed one of the "signature accomplishments of the American environmental movement" (Mark, 2015), its passage marked a seismic shift in the way modern humans conceived of their relationship to the natural world. The Wilderness Act codified into law a new kind of land designation meant to protect certain areas in perpetuity from most human development and manipulation. In poetic language that is "atypical of congressional legislation" (Kammer, 2013), the Act defines wilderness as "an area where the earth and its community of

[27] If ecosystem protection and conservation were not a stated purpose of the ESA a species could ostensibly be "conserved" in a zoo or in some other artificial capacity (e.g. frozen genetic material). By including the ecosystem conservation mandate, Congress made it clear that these species were to be conserved *in situ* (i.e. conserved in the wild along with their native habitat).

[28] In an astonishing show of political unity rarely seen in today's Congress, there was a grand total of 4 dissenting votes across both houses of Congress when the ESA was passed in 1973.

life are untrammeled by man, where man himself is a visitor who does not remain" (§1131(c)). As a landscape where "man and his works" are largely absent, a designated wilderness area is intended to be a place where the "free play of natural forces" continues unhindered and unrestrained (§1131(c); Zahniser, 1959).

Imposing some of the most restrictive land management constraints found in federal law, the Wilderness Act strives to retain the "primeval character and influence" of a landscape and in so doing prohibits road building, resource extraction, development, and commercial enterprise (§1131(c); Zellmer, 2012).[29] This represents in many ways the very antithesis of modern industrial society and challenges a deeply ingrained cultural paradigm of active management and manipulation in natural areas. The deliberate closing off of certain landscapes to nearly all forms of development establishes limits on the reach of human will and control, instilling in its place an attitude of humility and restraint towards the "earth and its community of life" (§1131(c)). The default approach to management in wilderness ideally involves a "hands-off" policy that, in setting a "goal of wildness", emphasizes nature's autonomy over active manipulation and intervention (Landres, 2010). By ensuring the continued self-willed character of wilderness wildlife and ecosystems, the Act recognizes a dignity inherent in the wildness of the non-human world and places value in its continuation.

Part II: Wildlife and Wilderness: Legal and Agency Interpretations

As expressions of a strong national interest in species protection and wilderness preservation, the ESA and the Wilderness Act both guide and inform federal land management policy. In their efforts to preserve and protect both of these values, federal agencies encountered conflict when they proposed to restore an ESA listed species (the Paiute cutthroat trout) within designated wilderness (the Carson-Iceberg). Detailed below, the outcome in this particular case provides a template for navigating potential conflict while still remaining true to both species and wilderness values.

The Paiute Cutthroat Trout

[29] Certain pre-existing uses like livestock grazing have been allowed to continue in wilderness areas, though no additional grazing is permitted after designation. Additionally, temporary roads are allowed in very special circumstances and some pre-existing mining claims must still be honored.

The Paiute Cutthroat Trout (PCT) is a distinct subspecies of cutthroat indigenous to California's Sierra Nevada mountain range and is currently an ESA listed species. PCT have the most restricted range of all cutthroat trout subspecies and have historically only occupied a small 11 mile stretch within a single creek drainage in the Carson-Iceberg Wilderness (USFWS, 2013). Significantly, all historical and currently occupied PCT habitat occurs in designated wilderness areas (USFWS, 2013). A limited and isolated range leaves the PCT especially vulnerable to competition and hybridization with introduced non-native trout which, when taken together, are the primary threats to their continued survival (USFWS, 2013).

Citing the above threats, both USFWS and the US Forest Service (USFS) approved a plan to eradicate non-native trout in the Silver King Creek watershed through the use of rotenone (a piscicide), followed by the reintroduction of genetically pure PCT to the fish-free stream (2010a). The agencies claimed that these actions would prevent the extinction of the PCT and thereby satisfy their obligations under the ESA (Calif. v USFWS, 2011:996). Though they acknowledged the project would negatively impact wilderness character in the short term, they nonetheless concluded that poisoning and restocking the stream was "consistent with wilderness values" (USFWS, 2010a) and would result in "improved long term natural conditions of wilderness character through restoration of a native species" (USFWS, 2010b).

Opponents of the recovery plan disagreed and filed suit to halt its implementation (Calif. v. USFWS, 2011). Arguing that the project unjustifiably favored one competing value (conservation of the PCT) over another (the preservation of wilderness character), the plaintiffs claimed a violation of the Wilderness Act (Calif. v. USFWS, 2011:1024). A US District Court agreed, finding that despite their claims to the contrary, the agencies' proposal would degrade rather than improve wilderness character, hence violating the Wilderness Act mandate to preserve it (Californians v USFWS, 2011:1019).

Wilderness Character and Wildlife Species in the PCT decision

When weighing the impacts of the methods employed to achieve PCT recovery -- in this case the use of a relatively indiscriminate aquatic poison – the court indicated that a *net gain* to wilderness character must also be demonstrated to avoid violating the Wilderness Act (Calif. v. USFWS, 2011:1019). This is precisely where the agencies failed to justify their proposal. At issue were non-target species that would be eradicated along with the non-native trout. Citing

the agencies' own assessment of rotenone impacts, the court noted that if the project was successful, "all living [aquatic] organisms within the project area would be eradicated" (Calif. v. USFWS, 2011:1020). More importantly, the agency analysis also determined this to include "rare or as yet unidentified species endemic to Silver King Creek" (Calif. v. USFWS, 2011: 999). These rare and endemic species could be eradicated for a "number of years or indefinitely", presenting the real possibility for the loss or extinction of one or more native species (Calif. v. USFWS, 2011: 999, 1019). Citing the failure of the agencies to consider this potential loss, the court concluded that rather than improve the "long term natural conditions" of the area, the project would "impede progress towards preserving the overall wilderness character" of the Carson-Iceberg Wilderness, leading to a "net negative impact" (Calif. v. USFWS, 2011: 1019-1020). Thus, the agency "violated the Wilderness Act by failing to consider the potential extinction of native invertebrate species" and the net loss to wilderness character that would result (Calif. v. USFWS, 2011:1019).

Setting aside the methods used, restoring wilderness character through the act of restoring and conserving a native species are both legitimate purposes under the Wilderness Act.[30] Where courts have determined that intervention on behalf of a species was proposed for purposes inconsistent with the preservation of wilderness character, those proposals were rejected.[31] Examining the PCT proposal, the court found that "reestablishing a native species in a wilderness area, independent of the means for reaching that goal, enhances the primitive character of an ecosystem and serves a conservation purpose (not a recreational purpose), permissible under the [Wilderness] Act." (Californians v. USFWS, 2011:1016). In other words, intervention proposed in a wilderness area specifically for the sake of a native species can potentially enhance wilderness character, representing a net positive impact on this integral

[30] In *Putting the Wild back in Wilderness,* Lindsay Jones (2015) examines the legal record and finds that both conserving species and restoring wilderness character are legitimate purposes under the Wilderness Act. Rohlf & Honnold (1988) adopt a similar position, finding a de facto mandate in the Act to actively restore wilderness character when necessary.

[31] See *High Sierra Hikers Association v. US Forest Service, (2006)* (where the sole purpose of bolstering a recreational trout fishery through the maintenance of human constructed dams was found to be at odds with wilderness character, violating the Wilderness Act). Also see *Wilderness Society v. USFWS, (2003)* (where interventions in wilderness to benefit commercial salmon operations were found to be an unacceptable degradation of wilderness character and hence, of the Wilderness Act). In both cases, intervention was proposed for instrumental purposes (recreation and commerce, respectively) and not for the sake of preventing extinction or extirpation.

wilderness stewardship concept. The court accepted the link the agencies made between restoring a native species and restoring wilderness character, thereby affirming the close relationship between a wilderness area and its native wildlife. Though the PCT proposal was ultimately rejected by the court, its goal or purpose – to improve the natural conditions of wilderness character via active restoration of a native species – was acknowledged as legitimate.

Providing a legal interpretation of wilderness character that incorporates native species as integral components, the PCT decision establishes an important link between a wilderness area and its wildlife. Additionally, it opens up the possibility of intervention for imperiled species that also remains sensitive to the preservation of wilderness character. This possibility ironically emerges from the rejection of just such an intervention plan. Establishing an appropriately high bar, this rejection serves as a guide for agencies seeking to meet the species protection goals of the ESA while also remaining true to the spirit of the Wilderness Act and its mandate to preserve wilderness character. Recent federal agency efforts to develop a working definition of wilderness character complement the findings of the PCT court. Of particular importance is the role assigned to native species in this definition, further reinforcing the strong connection between a wilderness and its wildlife.

Keeping It Wild: An Interagency Effort to Define Wilderness Character

Section 2(a) of the Wilderness Act states that wilderness areas "shall be administered…so as to provide for the protection of these areas" by means of "preserving their wilderness character". What constitutes "wilderness character" is something Congress did not define in the Act itself, so the task of interpreting this has fallen to the various agencies that administer wilderness areas. Using the statutory language of the Wilderness Act, an interagency team identified five qualities of wilderness character: untrammeled, natural, undeveloped, solitude or primitive and unconfined recreation, and "other features of value" (Landres et al., 2015).[32] Of these five, the natural quality is most relevant to native wildlife species and their central role in wilderness character.

Naturalness and Native Wildlife Species: Integral to Wilderness Character

[32] This effort involved representatives from the four federal agencies that manage wilderness in the United States: The US Forest Service, Bureau of Land Management, US Fish and Wildlife Service, and the National Park Service.

The Wilderness Act stipulates that wilderness areas are to be "protected and managed so as to preserve [their] natural conditions" (§1131(c)). Landres et al. (2015) describe these "natural conditions" as encompassing all of the "indigenous species and natural ecological conditions and processes" within a wilderness area. As elements of the native biophysical environment, indigenous wildlife species are an integral component of naturalness within a designated wilderness area. The "earth and its community of life" referenced in the Wilderness Act captures the scope of this biophysical environment and includes the native plant and animal communities found in wilderness landscapes (§1131(c)). Being uniquely adapted to local environmental conditions, native wilderness plant species "contribute to the maintenance of those conditions" by providing such things as soil nutrients, erosion control, and food and habitat for indigenous animals (Landres et al., 2015). Likewise, native animal species play "specific roles in the larger community of life" within a wilderness and provide food for other animals while also regulating the populations upon which they feed (Landres et al., 2015). Adopting indicators to measure naturalness, Landres et al. (2015) explicitly cite the loss of wildlife species as the principal threat to the naturalness of wilderness character.

Given that the loss of a native species would significantly degrade the wilderness character of an area, it follows that the successful restoration or recovery of such species through human intervention would represent an improvement. Though actions like this can potentially degrade other qualities of wilderness character – especially untrammeledness – any effort that effectively restores or recovers a native species would lead to an *increase* in the naturalness of a designated wilderness. Landres et al. (2015) indicate as much when they state that the natural quality of a wilderness area "may be improved…by restoring ecological conditions". Being fundamental elements of these ecological conditions, native species can likewise be restored for purposes of improving the natural quality of a wilderness area.

Much like the court opinion in the PCT case, Landres et al. (2015) establish a strong link between the presence and preservation of native species and the wilderness character of an area. In addition, the possibility of *improving* wilderness character through the restoration of an extirpated or vulnerable native species is given credence, much like it was in the PCT opinion.[33]

[33] There are additional legal cases supporting this. The court in *Wolf Recovery Foundation v. US Forest Service* (2010) offered a similar opinion, permitting agency actions (helicopter flights) that were narrowly "focused on

Equally important is that neither approach constitutes a carte blanche for agencies to engage in any and all methods of manipulation. After all, the court rejected the PCT proposal on the grounds that it degraded wilderness character, and Landres et al. (2015) acknowledge the likelihood of trammeling when actions are undertaken for ESA listed species.[34]

Both cases demonstrate that wilderness character and its preservation are to be taken seriously. The burden of proof lay not in justifying the goal of conserving native species through intervention – a goal not in dispute -- but rather in showing how the actions taken to accomplish this goal give proper deference to the preservation of wilderness character *as a whole*. The importance of this holistic approach is evident in the PCT case, where the court explicitly cited the need to preserve the "overall wilderness character" of the Carson-Iceberg Wilderness as the primary grounds for rejecting the agency proposal (Calif. v. USFWS, 2011: 1019-1020). Landres et al. (2015) are likewise explicit about this need for holism, repeatedly stressing its importance when evaluating proposed actions in wilderness.

If wilderness character is approached holistically, the only acceptable outcome of an intervention is one in which an overall net gain to this stewardship concept can be demonstrated. In both the PCT ruling and the interagency framework, wilderness character preservation is the overarching theme, setting the terms and boundaries for what is and is not permissible. Even though there is a legal and theoretical foundation for the *possibility* of intervention in wilderness on behalf of native wildlife, a heavy burden of proof still remains for any proposed action (Landres, 2004). In designated wilderness, there is a "thumb on the scale" that strongly favors restraint in most situations and meeting this burden is made appropriately difficult. Nonetheless, when facing the threat of species extinction, this scale is tipped in favor of intervention.

Part III: Species Extinction and Wilderness Character

restoring the wilderness character" of an area. The court was careful to note that this was not a "stamp of approval" for helicopters in wilderness more generally.

[34] A strong deference to wilderness character appears to be the default approach in the judiciary. In *Wilderness and the Courts* (2010), Peter Appel found that, statistically, courts rule heavily in favor of agency actions that are challenged for being overly protective of wilderness character (agencies have an 88% success rate here). Conversely, agency actions challenged for being a threat to wilderness protection are more than 50% likely to be rejected by the courts (much like the PCT case previously discussed). Appel describes this as a "one-way judicial ratchet in favor of wilderness protection".

Introducing the risk of extinction shifts the conversation considerably and infuses a sense of moral urgency, setting it apart from other issues in wilderness management. When the finality of extinction is considered, choosing restraint can no longer claim to necessarily be in the interest of preserving wilderness character. If wilderness character is viewed holistically, then anthropogenic extinction represents a *permanent* and *irreversible* degradation that goes beyond what might otherwise be considered natural change in a wilderness landscape.

Preventing Extinction in Wilderness through Intervention

In the context of a designated wilderness, the permanent loss entailed by the extinction of a native species translates into a permanent degradation of wilderness character. The fact that it was the consideration of possible extinction that prompted the court to rule as it did in the PCT case supports this. The court was simply unwilling to trade the possible extinction of one species for the protection of another, recognizing the implications this would have in the long term for wilderness character. Adopting the wilderness character concept advanced by Landres et al. (2015), it follows that the extinction of a native species would likewise mark an irreversible loss.

Thus, to protect and restore a species at risk of extinction within a designated wilderness is to protect and restore a fundamental and *irreplaceable* element of its naturalness. As this quality of wilderness character encompasses the "indigenous species compositions, structures, and functions" of an area, the permanent loss and extinction of any native species would entail a permanent degradation of its naturalness (Landres et al., 2015). Beyond the direct loss of the species itself, the broader ecological reverberations could negatively impact the suite of other species that together form the "community of life" that the Wilderness Act was enacted to protect (§1131(c)).[35] These reverberations would likewise be irreversible and permanent as this distinct member of the community no longer plays a role in the processes that help to continually shape that community.[36]

Extinction presents a uniquely grave threat to the naturalness quality of a wilderness area and therefore demands an accordingly unique moral response. The finality of extinction is what

[35] See Ripple et al. (2014) for a study showing the particularly powerful cascading effects that large carnivores like wolves have when they have been either extirpated or re-introduced.

[36] In detailing the importance of species to the naturalness quality of wilderness, Landres et al. (2015) state that "alterations in the occurrence or abundance of [species] may result in cascading changes within the animal community as well as associated plant communities".

drove Congress to craft and pass a law as powerful and universally applicable as the ESA – a law enacted in response to economic growth and development that was "untempered by adequate concern" for those species "in danger of or threatened with extinction" (§1531(a)). A similar concern with permanent loss underlies the Wilderness Act. As a response to "expanding settlement and growing mechanization", Congress sought to ensure that those areas not yet occupied or modified would be set aside "for preservation and protection in their natural condition" (§1131(a)). In the case of restoring an ESA listed species within designated wilderness, the continued existence of a unique species -- the concern motivating the ESA – aligns with the concern in the Wilderness Act to preserve and protect natural conditions. Thus, the values of both statutes converge when it comes to preventing extinction and conserving listed species. Active intervention undertaken in wilderness for this purpose should not be precluded, but instead tempered by due deference to the long term preservation of wilderness character as a whole. Rather than cast the ESA and the Wilderness Act as incompatible statutes, this shows that it is in the interest of preserving both listed species and wilderness character that actions be taken.

Part IV: Acknowledging Untrammeledness and Setting Limits

Untrammeledness, Natural Change, and Extinction

The quality of untrammeledness is essential to designated wilderness and is viewed synonymously with the "wildness" of these landscapes. Landres et al. (2015) describe the 'untrammeled' character of wilderness as one of "unique importance" and recommend the avoidance of trammeling as an "essential principle of wilderness stewardship". To be 'untrammeled' is to be unhindered, unrestrained, or unrestricted, and the term expresses what many view as the primary quality or essence of a true wilderness landscape (Kammer, 2013; Cole et al., 2016). For the community of life in a wilderness to remain untrammeled, the dynamic ecological processes that characterize the landscape must be allowed to operate independently and free from human intervention.

Though undertaken to improve the natural quality of wilderness character, an intervention on behalf of endangered or threatened wildlife within a wilderness area has the potential to simultaneously degrade its untrammeled quality (Kammer, 2013; Landres et al., 2015). A species may require significant habitat restoration and manipulation within its

wilderness home in order to pull it back from the brink of extinction. Moreover, as wilderness areas will function more and more as refugia for increasingly rare and sensitive species (Mattson, 1997), proposals to intervene on their behalf will increase, adding to the likelihood of future trammeling.

Ultimately untrammeledness as a wilderness value is about restraint in the face of change. It is about controlling the urge to manipulate or direct ecosystem processes in order to meet our desires (Landres, 2010). The object is not to stop change, but instead allow nature to "roll the dice and accept the results with interest and scientific curiosity" (Lucas, 1973). Under the Wilderness Act, dynamic ecosystem processes are embraced and change is observed and appreciated, rather than resisted. However, in the context of listed species facing extinction, we ought to distinguish between two types of change. Unlike processes of erosion or wildfire, the blinking out of existence of an entirely unique genome is a definitive and irreversible event likened to an act of "superkilling" that halts speciation and "stops the historical flow in which the vitality of life is laid" (Rolston, 1985). Vegetation grows back, hillsides eventually stabilize or simply wear away, but no amount of time can replace a lost species.[37]

Though the disappearance of species has always been a feature of the natural world, the clearly anthropogenic factors driving extinction demand an ethical response. Are we willing to sit back and view such staggering losses with only "interest and scientific curiosity" for the sake of a principle? Untrammeledness is about allowing wildness to persist on a landscape, but does this make sense when, because of our actions, there is one less creature able to embody such wildness? A landscape denuded of species diversity may still be wild in some sense, but is it still wilderness? No longer the place of "wild beasts", I argue that something essential to wilderness will have vanished.

Qualifications and Limitations

[37] I acknowledge that in the context of climate change there will likely be major shifts where vegetation may not grow back or that what does grow back will not be the same (e.g. type conversion shifts from forest to grassland, or vice versa). The emergence of so-called "novel ecosystems" has received a lot of recent attention, especially in the context of ecological restoration (see Hobbs et al., 2009). However, the point about the irreplaceable uniqueness of species still stands, regardless of the growing concern with and increasing prevalence of these novel ecosystems.

Though this paper takes a clear stance on the issue of intervention in wilderness for listed species, some qualifications are in order. First and foremost is the need to reiterate and further elaborate on the narrow applicability of the argument presented here. Not only does this apply exclusively to listed species, it ought only to apply in cases where it has been clearly shown that action within wilderness (rather than outside of it) is of critical importance in preventing extinction. Wilderness is not a place to experiment with conservation techniques, but a place where wildness is the default managerial approach. If preventing extinction can be reasonably accomplished outside of designated wilderness, then it is likely more appropriate to do so there (Long & Biber, 2014). This paper simply recognizes that the coming flood of imperiled species, along with the high quality habitat found in many wilderness areas, will likely result in more instances where these landscapes will play a critical role in preventing extinction. Getting out in front of this issue, so to speak, is important for those who value wilderness preservation and wish to maintain its relevance in a new century of unprecedented environmental change and turmoil.

Facing the unsettling fact that we will likely be unable to address all species in need of attention, a case by case approach must be taken – especially when intervention in wilderness is being considered. The PCT case offered an example of wilderness intervention where the parameters were fairly easy to discern. The Silver King Creek drainage was relatively small and the primary threat to the species had been identified. This may not be the case in other instances where the scale and scope of the actions needed may simply be too much. There may be added complexity in terms of untested methods and scientific uncertainty, multiple and varied threats to the species in question, and the prospect that the impacts to a wilderness landscape may go beyond what is reasonable. If, for example, it was determined that the survival of a particular species required removal of an invasive organism that has proven to be ineradicable, then subjecting a wilderness area to perpetual poisonings or other extremely disruptive measures is not only pointless, but an egregious violation of wilderness character.[38] Wilderness certainly has a critical role to play in saving what species we can in the coming century, but it cannot and should not bear the full burden of conservation.

[38] See Norton (2009) for a study showing the sobering limits on the prospect of permanently removing invasive species. In many cases, the limitations on our knowledge and technology entail perpetual *management* of invasive species rather than permanent removal. The implications that perpetual management actions like this would have for untrammeled wilderness are serious and must at least be considered, if not rejected outright.

The ESA and the Wilderness Act: Complementary, not Competing Values

Some have cast the choice between protecting species values and wilderness values as an inevitable dichotomy (Marris, 2015). We either sacrifice the possibility of intervening on behalf of a struggling species, leaving nature to sort things out, or we dispense with romantic ideas of wild landscapes and get to the business of managing the planet effectively to stem the coming tide of species loss. Functioning primarily as fodder for anti-wilderness polemics, this dichotomy ultimately obscures the compatibility of environmental values enshrined by the Wilderness Act and the ESA. Marris (2015) has made the controversial assertion that we must prioritize species survival and "give up our beloved wilderness and wildness", else we prohibit intervention and end up with "blood on our hands". In other words, either we let go of antiquated notions of wilderness, or we sit idly by while species blink out of existence before our eyes. This perspective fails to appreciate the compatibility demonstrated above and likely confuses or conflates the difference between the "idea" of wilderness -- a perennial and rather easy target for many critics due to its conveniently vague definition -- and the legally designated and defined wildernesses that make up the National Wilderness Preservation System created and governed by the Wilderness Act. As shown above, courts and agencies have found room in this powerful statute for *incorporating* species values into wilderness values rather than excluding them. The dichotomy between saving species and protecting wilderness is ultimately unnecessary and unhelpful.

There are other commentators who adopt a no exceptions approach, precluding most (if not all) intervention in wilderness, regardless of the reasons given for doing so (Kammer, 2013; Phillips, 2015). Holding steadfast to the belief that we ought to keep "some areas beyond our manipulative reach altogether", Kammer (2013) explicitly includes intervention on behalf of wildlife as an inappropriate activity in designated wilderness. While in most cases this is indeed the proper approach – especially where actions are taken for game species enhancement and recreational or commercial purposes – Kammer (2013) makes no meaningful distinction between wildlife generally and those species facing the real threat of extinction (i.e. ESA listed species).[39]

[39] In a thorough and informative paper on wildlife restoration and wilderness, Kammer (2013) directly addresses the PCT case, but only mentions its ESA listed status in passing, appearing to place the PCT in the same category as unlisted game species like desert bighorn sheep (which he also discusses). Painting with such a broad brush not only glosses over the unique moral import of extinction and its potential impacts to wilderness character, it also

As shown above, the need to make this distinction is paramount – not only for the long term preservation of wilderness character, but also out of proper deference to the value of species survival codified in the ESA.[40]

As this paper has shown, the Wilderness Act does not present insurmountable barriers to the species preservation mandated by the ESA. The integral role of native species in the wilderness character of an area fosters a convergence of values when the consequences of extinction are considered for listed species. Conceiving of wilderness character holistically offers the proper framework within which to understand extinction and the irreversible impact it would have on this important stewardship principle. Though other wilderness qualities rightfully demand equal consideration – especially the crucial quality of untrammeledness – the unique moral import of the growing extinction crisis changes the playing field.

Rather than a barrier to species conservation, we ought to see the Wilderness Act as presenting us with a rewarding challenge for environmental stewardship in the 21st century. It requires that we filter our thinking on management through the holistic lens of wilderness character and its many elements. In short, it keeps us ecologically honest in our approach to stewardship, requiring increased awareness of unintended consequences beyond the typically narrow scope of our focus. We may yet hang on to the humility fostered by wilderness values while learning how to work with - instead of against - ecological processes in our efforts to right past wrongs. Adherence to an absolutist or skewed interpretation of wilderness character at the expense of an entire species is not an instance of humility, but rather an example of callousness in the face of tragic and irrevocable loss. I could think of nothing further from the spirit and intent that gives meaning and purpose to wilderness preservation.

"Of what use are wild areas destitute of their distinctive faunas?"

-Aldo Leopold

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seems to ignore the ESA as an equally powerful federal statute at play in the case. Zellmer (2012) hints at the possibility of the ESA superseding the Wilderness Act altogether in some cases.

[40] Kammer (2013) also appears to question the notion that restoring a listed species (the PCT) is even "necessary for wilderness preservation", essentially treating a wilderness and its native wildlife as more or less separate and unrelated entities.

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