A Defense of Integrity as a Conservation Concept

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Abstract

In this paper, I consider in detail one proposal specifying the nature we should care about, namely, biological or ecological integrity (or "integrity" for short). In its paradigmatic formulation, integrity refers to a property of landscapes that are relatively unmodified by human activity and that have their native biota largely intact. After making several conceptual clarifications regarding how integrity is best understood, including some qualifications of the paradigmatic characterization, I consider and defuse three objections to the concept and its normative relevance. In the course of my discussion, I explore and defend epistemological, instrumental, and non-instrumental reasons to care about integrity. I conclude with a consideration of some challenges that remain for the aim of respecting integrity as an ethical-political goal.

I. INTRODUCTION

An environmental ethic needs to have an answer to two basic questions: what nature should we care about, and why? A number of proposals have been made about how to answer these questions. In this paper, I consider in detail one such proposal, namely, biological or ecological integrity (or "integrity" for short). Different characterizations of integrity can be found in the literature, but I will treat the following one as paradigmatic. Integrity refers to a property of landscapes that are relatively unmodified by human activity and that have their native biota largely intact (Angermeier and Karr 1994; Karr 1996 and 2000).[1] By "native biota," I mean the native plant and animal life in a particular place, and whatever ecological relationships these instantiate.

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In what follows, I begin by making a number of conceptual clarifications regarding how integrity is best understood, including some qualifications of the paradigmatic characterization given above. After noting epistemological and instrumental reasons to value integrity, I consider and defuse three objections to the concept and its normative relevance. I then explore and defend multiple non-instrumental reasons to care about integrity, concluding that its value is supported by a number of weighty reasons. I close with a consideration of some challenges that remain for the aim of respecting integrity as an ethical-political goal.

Before turning to the main discussion, I want to introduce a distinction that will be useful to have in mind and that I will return to later. The distinction is between, on the one hand, a baseline of environmental concern, and on the other, overall goals for environmentalism. I understand the baseline as referring to a minimum of environmental protection that we ought to maintain in our collective interactions with nature over time. The specification of a baseline is particularly relevant to public policy and to the clarification of our basic ethical obligations to each other (understood intra- and intergenerationally). In contrast, the question of overall goals for environmentalism is less directly relevant to public policy and to the clarification of our basic ethical obligations, but instead raises more expansive questions of value and of our possible ethical obligations. The question of overall goals is also more controversial, and perhaps more philosophically interesting. An environmental ethic should aim to specify a baseline of concern as well as contribute to the imagining of overall goals for environmentalism. The defense of integrity is relevant to both aims, but for different reasons and based on different motivations.

A final preliminary remark will help to situate the discussion that follows. I assume we need to examine carefully and make use of multiple conservation concepts, normative principles, values, ethical constraints, and ideals in order to think clearly about the nature that matters. A one-dimensional approach here is inappropriate and unhelpful. Not least this is because we need to consider, and deal with practically, different environments that fall along a spectrum ranging from human-dominated to paradigmatically wild. Here "paradigmatically wild" refers to environments in which naturally evolved objects, organisms, and designs dominate; in which natural processes are allowed to unfold according to their own dynamics; and which, in general, are free of human involvement.[2] My defense of integrity is meant to contribute to our thinking about

normatively relevant nature, in particular, nature more on the wild end of the spectrum just noted. Such a defense cannot stand alone in clarifying a baseline of environmental concern or in envisioning overall goals for environmentalism. Yet I believe integrity is an important and distinctive concept, one that is still very relevant. Our discussions of what matters and why, environmentally speaking, would be seriously impoverished if we left no conceptual space for integrity, or something like it.

II. CONSERVATION CONCEPTS AND INTEGRITY: SOME CONCEPTUAL CLARIFICATIONS

Any plausible conservation concept will make reference to both elements and processes (for discussion, see Angermeier and Karr 1994; Wood 1997; Callicott et al. 1999; Wilson 1999; and Hobbs et al. 2009). The relevant elements include genes, species, populations, and various biotic assemblages, while the relevant processes include genetic mutation, nutrient cycling, disturbance regimes, and so on, which occur at different spatiotemporal scales.[3] Potentially significant differences between distinct conservation concepts emerge when we consider the question of whether particular elements or processes are emphasized or thought to be crucial to defining the normatively significant nature.

Whether or not a site manifests integrity is primarily a matter of whether or not that site exhibits appropriate compositional elements and processes.[4] Before turning to how "appropriate" is to be understood here, note that the characterization of integrity involves both historical and non-historical (or functionalist) aspects. In its paradigmatic formulation, integrity refers to a property of landscapes that are relatively unmodified by human activity and that have their native biota largely intact. Both of these aspects have a historical dimension and will be discussed further below. If, however, integrity is understood to consist primarily in the presence of certain compositional elements (e.g., a diversity of species capable of performing various ecosystem functions), together with the occurrence of certain processes (nutrient cycling, disturbance regimes, etc.), then this suggests a view of integrity focused on the good functioning condition of a site (as per, e.g., Harris et al. 2006, 174). Such a view decenters, as I think is apt, the historical property of being relatively unmodified by human beings. However, even a conception of integrity that is functionalist in emphasis still has a historical dimension. In fact, it is one of the distinctive marks of the conceptualization of integrity that historical properties figure in significant ways.

We can begin to appreciate the relevance of history here by returning to the question of how to understand the "appropriate" elements and processes. Typically, theorists of integrity have viewed the relevant elements and processes as those that are native to a given site (see, e.g., Angermeier and Karr 1994). However, if we assume, following a suggestion from conservation biologist Michael Soulé, that the relevant processes are largely generic, in the sense that they occur in nearly every terrestrial or aquatic ecosystem on earth, then a plausible candidate for the most important elements would seem to be native plant and animal species in particular places.[5] A native species refers, in the paradigm case, to a species that is long-standing in a given place (where "long-standing" means hundreds of years) and well integrated into the local ecology. A species can be native in the relevant sense and coexist with, and even be supported by, human activity. Further, some native species can be invasive, thus we should not assume that being native necessarily means being good or beneficial from an ecological point of view.

The contrast class to native species is non-native or so-called "exotic" species. The theorist of integrity generally avails of the native/non-native dichotomy, yet a number of writers have criticized this distinction (e.g., Callicott et al. 1999, 26–27; and Jamieson 2002).[6] One notable worry here is that if the native/non-native dichotomy is used to exclude non-native species from landscapes that are said to have integrity, this risks freezing nature in a questionable sense. The defender of integrity needs to somehow avoid this.

Callicott, Crowder, and Mumford (1999) suggest a helpful response here. Rather than view any non-native species as necessarily integrity compromising, we should ask whether the non-native is potentially a "good citizen" of its new biotic community or locale. If the species in question displaces and adversely affects its native or naturalized neighbors, then it could be considered problematic according to this ecological and context-dependent criterion (for this line of reasoning, see Callicott et al. 1999, 27; also Callicott 2002, 416, and 2011, 319). It follows that if a non-native species is problematic, it is not because it is a non-native but because it negatively impacts other native or naturalized species, or is disruptive of the ecological relationships that obtain in a given place.[7] This reasoning also explains when a native species is problematic.

Of course, informed interlocutors can disagree about how much disruption is too much. I do not see any easy way to address this issue, given a host of contingent factors and the question of which spatiotemporal

scale is appropriate for making this judgment (an issue I will return to below). Thus, even if one appealed to something like a criterion of "good biotic citizenship" in judging newly arrived or introduced species, or reintroduced native species (as may be the case), this criterion will remain recalcitrant to precision.

The plausibility of the view just sketched rests on certain assumptions about appropriate spatial and temporal scales.[8] The relevant temporal scale seems best understood in ecological terms (i.e., a hundred or more years), as opposed to evolutionary terms (i.e., thousands of years). The reason, in short, is that evolutionary timeframes may be too long, in the sense that they are either irrelevant or impractical for many contemporary contexts. Using such temporally extended timeframes to guide environmental preservation and restoration efforts may also increase the risks of adverse ecological effects, or decrease the chances of successful preservation or restoration (Callicott 2011, 315).[9] The concerns here might be especially pressing when we are thinking about preservation, restoration, and environmental management under conditions of climate change or other anthropogenic stresses on environments.[10]

There are multiple issues at play when we consider ecosystems or landscapes that might be substantially, perhaps irreversibly, altered—whether due to human activity or some other cause. For example, if we judged native by an evolutionary timeframe of thousands of years, a species formerly native to a place may be extinct, or threatened with extinction. Even when this is not the case, a given place may no longer provide suitable habitat for the previously native species due to ecological changes (which may or may not be human-induced). It could also be that the ecological relationships that obtain in a given place may be seriously disrupted by the reintroduction of a previously native species that has been absent from the place for an extended period. A further complexity is that what the relevant ecological spatial scale is—whether patches, ecosystems, landscapes, biomes, etc.—depends on the species we are considering. Some species are wide-ranging, while others are quite restricted spatially (for discussion, see Callicott 2002, 416, and 2011, 318). And, of course, there may be climatic, edaphic, or other constraints that need to be acknowledged when thinking in general about the norm of integrity in practice, and in particular about the appropriateness of including native species in the realization of that norm. In reflecting on these matters, it seems best to avail of the shorter, but still temporally extended, ecological timeframe—one that extends a hundred or hundreds of years into the past.

This timeframe also seems less vulnerable to concerns about feasibility, compared to the evolutionary timeframe, though whether that is so will depend on the details of particular cases.

A different, and perhaps deeper, issue that arises here is whether the reliance on a "good biotic citizenship" criterion is at odds with a post-Darwinian view of natural ecosystems and landscapes as radically contingent assemblages of different species that are always in flux. "Good biotic citizenship" is judged relative to a given community or configuration of plants and animals. The worry is that the citizenship criterion relies too heavily on what is merely a contingent product, one that will no doubt change in the future, becoming a different community or configuration. Here I anticipate an objection—concerning questionable teleological assumptions informing the conceptualization of integrity—which I will address more fully later. At the moment, I will note that one of the motivations for viewing the native/non-native distinction in the flexible and non-dogmatic way I suggested above is precisely to avoid attributing to any given biotic community or configuration more permanence and stability than is appropriate. Yet, contingent biotic communities do appear in nature and from the perspective of an ecological—not to mention, human—timeframe these communities are quite enduring. Thus, it does not seem inappropriate to use such contingent biotic configurations as the context that sets the standard for whether a newly arrived or introduced species, or one that is being considered in a restoration effort, is or would be disruptive in a problematic sense. But we need to keep in mind that this context is clearly a moving target.

One important implication of the foregoing considerations is that with respect to a particular site, integrity does not necessarily consist exclusively or primarily in the presence of native elements. However, the presence of native plants and animals is often very relevant to whether or not a site manifests integrity, or could come to (e.g., post-restoration). Considering these matters in the practical context of conservation and restoration efforts, it seems reasonable, other things being equal, to maintain a presumption in favor of historical fidelity. Here historical fidelity means aiming at preserving or restoring relevant historical properties of a site, notably, the historical biota and related ecosystem processes and functions. The appeal to history does not require or support the view that integrity consists in a particular historical state or condition obtaining, where this is understood in a snapshot or static way. Rather, historical fidelity means aiming to preserve or restore relevant properties that fall within a historical range of variability, thus taking into account ecosystem

and landscape change.[11] In this respect, history figures as a guide in conservation and restoration efforts, but not as a blueprint for replicating particular historical sites or for maintaining sites in a fixed state.[12]

"Being sensitive to historical considerations is important for several reasons." Appreciating the historical variability of particular ecosystems and landscapes provides a framework for better understanding ecological contexts. Such understanding is crucial for being able to identify the processes and mechanisms that drive ecological change, which in turn positions us to better evaluate and predict the outcomes of different ecological management or restoration actions and options (for discussion, see Landres et al. 1999 and Higgs 2012). Historical fidelity is important because it helps to check our tendencies to project our own desires and aspirations onto landscapes. Further, it curbs our tendency to think that, in a world increasingly modified by human beings, we should be liberated from ecological and evolutionary histories and thus free to modify ecosystems or landscapes as we see fit. These tendencies encourage hubris and incaution. They also encourage too much focus on human needs and interests (and often on impoverished or narrow interpretations of both), as well as insensitivity to the good of nonhuman others that do not complement our currently understood needs and interests.[13] While these concerns are serious and should be kept in mind, I think the preference for native species, and for historical fidelity more generally, needs to be understood in a qualified and context-sensitive way when we are thinking about integrity as a goal for conservation or restoration. Aiming to maintain or restore historical properties may sometimes be impossible or inappropriate (e.g., due to ecological or climatic changes [Harris et al. 2006; Hobbs et al. 2009]), prohibitively costly even when technically feasible, or socially unacceptable for other reasons.[14]

Let me highlight a final dimension of how integrity is best conceptualized. This is the idea that the property of integrity should be understood as one that admits of degrees. If this is plausible, then even if integrity in the fullest sense does not—and perhaps in the contemporary world cannot—obtain, the concept would not be rendered irrelevant. For one could still specify significant degrees of integrity for conservation purposes. These degrees should be judged along at least two axes. One is the type and extent of human influence on a given site. The second is the presence of appropriate elements and the occurrence of appropriate processes (where "appropriate" assumes, in both cases, sensitivity to relevant spatiotemporal scales and to a relevant range of historical variability). Assigning a degree of integrity may often be complex and difficult. If, for example,

integrity were understood entirely in terms of the absence of human activity in a given place, then things would be easier. Once humans have modified a place, integrity would be by definition compromised. Though even if human modification were the sole criterion, we could still argue about how much integrity is compromised given the kind or degree of modification. I have suggested, however, that integrity is best conceived as a concept that refers to the presence or occurrence of appropriate elements and processes, both of which are compatible with many human modifications of ecosystems and landscapes. Accordingly, the fact of human impacts, either in the past or present, is not decisive for determining whether integrity obtains. Insofar as integrity is our concern, what matters is that the human modifications do not make it impossible for the appropriate elements and processes to exist or occur, and (as relevant) adapt and evolve in their own way. Acknowledging this point is crucial for addressing worries about integrity's value in a world that has been significantly modified by human beings.

In light of these considerations, the degree of integrity that is manifest in a given place is clearly subject to change over time. Even in cases where integrity-compromising (human) impacts have occurred, and were agreed by all to be very significant in extent or kind, integrity can often re-emerge as a property of sites (e.g., post-restoration). In fact, it is reasonable to suppose that many problematic impacts, whether human-induced or not, would either "wash out" from a site or be incorporated into it, given enough time and relevant restoration efforts.[15]

It is worth noting that many of the landscapes that exhibit a high degree of integrity have an ecological character that reflects prior human modifications and ongoing human involvement. In some cases, these modifications may have significantly affected the ecological histories and trajectories of the site in question.[16] The defender of integrity can, and should, recognize this fact. Indeed, we often have good reasons to maintain human involvement with the landscapes in question. Such involvement might be critical to maintaining or successfully restoring integrity. It might also promote other important values, such as community engagement with local landscapes.

III. EPISTEMOLOGICAL AND INSTRUMENTAL REASONS TO CARE ABOUT INTEGRITY

For the defender of integrity, there is one clear sense in which nature is taken as a standard. The reason is a bluntly evolutionary one: "The

complex biological systems that evolved at a site," writes biologist James Karr, "have already demonstrated their ability to persist in, even modify, the region's physical and chemical environment. Their very presence means that they are resilient to the normal variation in that environment" (1996, 101). It follows that a basic reason to care about integrity is that landscapes with their integrity intact provide paradigms for how nature functions successfully (i.e., resiliently) in a given place. I take this point to be an epistemological one: we need areas of integrity so that we can understand what successful ecological functioning consists in. Having this understanding is relevant to our assessment of ecological functioning in integrity areas but also in other areas, such as those we inhabit or use (Karr 2000, 215; cf. Leopold 1949, 196–98, and 1991, 288–89). With this idea in mind, it is important to preserve a range of different ecosystem or landscape types that exemplify integrity since nature is not everywhere the same. This would preserve a variety of paradigms of ecological functioning.

I need to introduce a new concept here in order to make a further point about integrity. American conservationist Aldo Leopold argued that we should collectively aim to maintain what he called "land health" (see, e.g., Leopold 1999a; 1999b; and 1949, 221).[17] Leaving aside some nuances that are not crucial for the present argument, we can regard Leopold's notion of land health as more or less the same as contemporary conceptualizations of "ecological health" or "ecosystem health" (I will use "ecological health" hereafter). Ecological health designates a distinct conservation concept, one that refers primarily to two functional properties of natural (or partly natural) systems: (1) the counteractive capacity to withstand stress or change (often glossed in terms of "resilience"), and (2) the capacity to function well over the long term, thereby providing a range of so-called ecosystem services (e.g., nutrient cycling, pollination, carbon sequestration, etc.).[18] Given the functionalist focus of ecological health, an ecosystem or landscape can be ecologically healthy even if it fails to instantiate historical properties (of the sort discussed in §II). Compared to integrity, ecological health is a less stringent, hence more flexible and accommodating, conservation concept.

As touched on in the previous section, a number of theorists have questioned the appropriateness of ecological management or restoration efforts that lean heavily on historical criteria. A primary worry here is that aiming at historical fidelity might increase the failure rate of ecological management or restoration under conditions of significant climate

change or other anthropogenic stresses on environments.[19] I spoke to this concern above; here I want to make a different point. I assume that integrity areas—particularly the larger, more numerous, and connected they are—have a vital role to play in mitigating some of the problematic impacts of global climate change or other anthropogenic stresses. For example, integrity areas can provide carbon sinks, buffer zones to decrease the intensity of storms, migration corridors for threatened species, and much else.[20]

A further point is important here. Many theorists defend ecological health as the normative baseline for those parts of the world that humans inhabit or use (see, e.g., Leopold 1949, 210–14, 221–26, and 1999a; Callicott 1999, 363; and Freyfogle 2006, 20–23, 93–94, 128, 182). I think this idea is basically right. The relevance of integrity for ecological health is that landscapes with their integrity intact are thought to have causally effective properties that human-dominated systems lack, or might lack (Holland 2000, 51; Karr 2000, 212; Callicott et al. 1999, 32; Angermeier and Karr 1994, 693). The idea is that integrity areas are a storehouse of resources that ecologically healthy areas might need in order to be replenished and kept vital over time. In this respect, the preservation or restoration of integrity would contribute to the goal of creating conditions for the adaptation of biotic elements and for evolutionary development (Angermeier and Karr 1994, 692–94). For these reasons, integrity is instrumentally important to ecological health.[21] Now, even if one thought preserving ecological health, or some similarly functionalist concept, was the right answer to the question of what nature we should be primarily concerned with—and many theorists seem to think this—maintaining integrity would still matter because it is instrumentally important to ecological health. But I want to argue for something stronger than this. I will return to that argument in §V.

IV. THREE OBJECTIONS TO INTEGRITY

The first objection I will consider concerns the idealization of the absence of humans in nature that is implied by the concept of integrity. There are different ways of pressing this objection. Some argue that this idealization assumes a questionable dualism between humans and nature, one that embodies our alienation from nature or the environment (see, e.g., Vogel 2012 and 2015, Ch. 3). Others reject any view that starkly separates concern for human well-being from concern for environmental preservation or restoration (see, e.g., O'Neill et al. 2008, Ch. 9–11).[22]

A basic claim that seems to subtend these perspectives is that we are part of the living totality that is nature. Abstracting us away from this reality, or trying to minimize our presence in it, is thus misguided and may even represent a kind of collective self-abnegation.[23]

The first thing to note in response is that it is not accurate to say humans are idealized as absent by the defender of integrity. This would only be true if integrity were defined as consisting solely or primarily in the absence of humans. But this is not how integrity was defined above. Further, the characterization of integrity I have defended does not depend on excluding human activities *as such*, but only those activities that are at odds with the continued existence or occurrence of the appropriate elements and processes outlined above.

This response does not address a different construal of the objection concerning how humans fit into the ideal of integrity. There is no question that humans are allotted a humble place in landscapes that exhibit integrity. Yet a growing human population has a moral claim (let's assume) to meet its vital needs from nature. This claim is in tension with the aim of respecting integrity.[24]

I think two different issues need to be separated here. First, the claim that humans need to meet their needs from nature is not an objection to integrity *per se*, but an objection to the importance of integrity relative to other things that matter. No one, to my knowledge, defends the view that integrity can stand on its own either as a way of specifying a baseline for public policy, or as a way of specifying overall goals for environmentalism. Integrity needs to be supplemented by appeal to other considerations, such as the aim of maintaining ecologically healthy landscapes for people to use and inhabit. That said, integrity might be the right norm for some places, such as biodiversity reserves, actual or potential wildlife areas, and the like (more on this later).[25]

Secondly, integrity can be defended on human-centered grounds for reasons already given. If it is true, as James Karr and others have argued, that areas of integrity are necessary as part of an integrated view of healthy functioning landscapes, then to pit human needs against the preservation or restoration of integrity is misleading. The preservation or restoration of integrity may actually be a necessary element of ecological management practices that aim to meet human needs, now and in the future. The reasoning here is that the productivity and life-support properties of the environments we intensively use or inhabit are directly or indirectly connected to the existence of landscapes that have their integrity intact (Karr 1996, 101).[26]

The worry, of course, is that if the human population is or becomes too large, it will not be practically feasible to maintain healthy functioning landscapes, let alone areas that have their integrity intact. On this issue, it seems to me that the main problem we face is unconstrained consumption by the global rich and a maldistribution of resources, not overpopulation *per se*. If we were serious about preserving or restoring relevant nature, then shifting away from consumptive lifestyles and aiming for a more socially just world would be the obvious solution.

Let me turn to a second objection that has been made against integrity. This is the idea that integrity, understood as a property of natural systems, presupposes a notion of design and purpose in nature that assumes an outdated ecology, or perhaps one that is theologically inclined. Mark Sagoff (1995, 1997, and 2000) has been most forceful in making this criticism, though a number of writers share Sagoff's concerns. The following two statements from Sagoff give expression to the line of objection I want to consider.

> (1) To be sure, species are shaped by natural selection. Evolution accounts for their structural and functional properties. No such organizing force or principle, however, applies to the arrangement of plants and animals in communities or ecosystems. From this perspective, nature pursues no purpose, embodies no end, and develops in no direction. Unifying principles and concepts in ecology, such as "autocatalysis," "homeostasis," "exergy," and "integrity," may have theological but not biological significance. (2000, 62)[27]
>
> (2) Ecologists in this century—like theologians and poets in previous centuries—have argued that the diversity of living things results not from mere contingency or chaos but serves larger purposes, instantiates universal principles and ideas, follows law-like general principles, or expresses an intelligible order or plan. (1995, 168)[28]

Two claims are especially important here. The first is that living systems do not have an innate tendency to develop toward some goal, such as homeostasis, climax states, or greater complexity and diversity. For Sagoff, the attribution of such tendencies to nature is a bogus form of teleological thinking. A second claim is that ecologists do not discern law-like principles that govern living systems. This fact, as I understand Sagoff, makes implausible any attribution of design or purpose to nature.

Several points can be made to defuse this line of objection. First, the question of whether or not ecologists discern law-like principles is separate from the question of whether or not nature aims at some goal or

serves a larger purpose. There does not seem to be any contradiction in holding that ecological phenomena are law-like, while rejecting the idea that ecological systems aim at or tend toward some particular goal, such as homeostasis or greater complexity and diversity. The relevant laws, if there are any, could simply govern what happens next with no final state toward which things are heading.

That said, I think Sagoff is right to point out that ecology does not identify, or has yet to anyway, law-like general principles that can explain biological and ecological phenomena and predict (with high probability) the possible futures of these phenomena.[29] This point has been made clearly by biologist E.O. Wilson.[30] Wilson emphasizes that law-destroying idiosyncrasies are common in living systems. A consequence is that the future of such systems remains largely unpredictable. But it does not follow that the contingency of living systems is so profound that there are no stability regimes, emergent patterns, or operative physical principles that constrain how nature functions in particular places. To give one example: food webs almost invariably exhibit a pyramidal structure due to available energy as it moves through the food chain.[31]

Let me turn to the idea that regarding nature as exhibiting design and purpose is akin to a theological commitment. It seems to me that Sagoff's real target here, or at least a central part of it, is the belief that there is a way things are supposed to be in nature. Sagoff appears to view this belief as conceptually allied with the belief that nature aims at homeostasis, greater complexity, or some such goal. But, again, these two beliefs need not occur together. For example, there is no contradiction in holding the belief that nature is radically contingent and chaotic (as per the reigning "flux-of-nature" paradigm in ecology), while also holding the belief that whatever states of affairs have emerged from contingent and chaotic natural processes are just the way things are supposed to be.[32] So Sagoff's objection does not seem aimed at the idea that there is a way things are supposed to be, but rather at the idea that nature has a tendency toward homeostasis, complexity, or some such *telos*. While we can distinguish two elements here, presumably Sagoff wants to oppose both.

I think the most important point to make in response to Sagoff's line of objection is this: our view of integrity should be consistent with what science tells us about the way the world is. This requirement will rule out certain beliefs that some who are attracted to the concept of integrity may associate with it. This includes the belief that ecosystems aim at homeostasis, climax states, and so on. It also includes the belief that such

goals—homeostasis, etc.—constitute the way things are supposed to be. Further, it includes any mistaken assumptions about the role of laws (if there are any laws) in complex ecosystems. What this amounts to is an argument against outdated or wrongheaded ideas being incorporated into a conception of integrity. But it is not an argument against integrity *per se*, at least not a good one.[33]

The two objections considered above are objections to integrity as a concept. The third objection is different. This objection arises when we are considering implementing integrity, for example, in an ecological restoration. The issue here is defining a historical benchmark or reference condition for judging when integrity obtains. It is easy to see how the problem is generated. Nature is dynamic; therefore any ecosystem or landscape we might consider has undergone change. The change may be considerable, particularly when we take an extended temporal view. So what benchmark or reference condition is appropriate for judging when a site exemplifies integrity?[34]

There are various implausible responses that might be made here, such as appealing to hypothetical integrity, but I want to explore a response that I think holds some promise. The strategy is to distinguish between different types of human impact on nature, and thereby attempt to establish a usable benchmark. Thus, we can distinguish integrity-compatible and integrity-compromising impacts. The integrity-compatible criterion would be satisfied if humans inhabited and used landscapes in such a way that the appropriate elements and processes (discussed in §II) could continue to exist or occur, and (as relevant) adapt and evolve in their own way. In contrast, integrity-compromising impacts refer to those whose character, rate, or scale is destructive of the relevant elements or processes. Employing this distinction, it is evident that integrity-compromising activities began in earnest with industrialization, given the rate and spatial scale of industrial modifications of the world. This supports the view that the condition of landscapes in the preindustrial era provides a benchmark for judging when integrity obtains.[35] How plausible is this view?

An initial stumbling block is that identifying integrity-compromising impacts with industrialization overlooks the fact that preindustrial humans have had very significant impacts on their environments. To give one example, there was a mass extinction of North American megafauna around 11,000 to 12,000 years ago. This extinction is believed to have been the result of multiple factors, including climate change, disease, and predation by Clovis hunters (Callicott et al. 1999, 26; Wilson 1999, 249;

Callicott 2002, 412–13, and 2011, 308). If the cause of this event was primarily anthropogenic, which seems to be the consensus among scholars, then this suggests a problem for the preindustrial benchmark.

In reply, I would note that such extinction events were relatively rare and typically geographically isolated, compared to the pervasive compromising of integrity brought about by industrialization and its various social forms.[36] Acknowledging this does not mean preindustrial humans are assimilated into the operations of nature and viewed like wildlife (as, e.g., Callicott [1999, 362] worries). Rather, it means acknowledging that a number of human activities may be consistent with integrity, while others may not be.[37] Interacting with nature in ways that intentionally mimic ecological or other relevant processes that we (i.e., industrial humans) have disrupted can be understood as compatible with integrity. Hunting as a way of mimicking predation of deer by wolves is an example. Another is performing controlled burns in order to replicate naturally occurring, or previously anthropogenic, fires that contribute to the resilience of the biota in question.[38] If these considerations are plausible, then there is no inherent incompatibility between landscapes having integrity and humans using or managing those landscapes (as argued in §II). Indeed, I take it to be obvious that in the contemporary world, considerable human management of landscapes is necessary for preserving or restoring nature's integrity. Highlighting the compatibility of human activity and the existence of integrity also positions us to appreciate certain justice-based considerations at play in conservation debates and struggles. For example, justice calls for social and political recognition of the beneficial ecological management practices of indigenous (and other relevant) communities, which have promoted integrity, among other environmental goals.[39]

Another reason that favors a preindustrial era benchmark is that this sidesteps the indeterminacy problem that would be generated by appeal to a benchmark far back in the recesses of human or natural history. The indeterminacy problem is generated by identifying integrity with some specified starting point, with whatever conditions obtained at that point, then trying to sort out what nature would be like now on a particular site had it not been modified by human activity. This generates indeterminacy because of the myriad contingent factors that would inevitably have had a hand in what nature would be like now.[40] The problem here can be largely avoided by appealing to a preindustrial benchmark, since we actually have enclaves of preindustrial nature left. In cases where this is not so, or where climate change or some other significant variable would

make using this benchmark implausible, restoration efforts should put less weight on historical frames of reference when conceptualizing the elements and processes relevant to facilitating the return of something like integrity.[41] Here the idea of integrity as a property that can be manifest to different degrees is very useful to keep in mind.

Admittedly, there is a certain arbitrariness in using a preindustrial benchmark for judging when integrity obtains. I do not think this can be entirely avoided. But for the reasons given, and noting the qualifications made, the preindustrial benchmark is neither totally impractical, nor otherwise ill-advised. No assumption is being made here that one is identifying an "original" state of nature. There does not seem to be any plausible way to define such a state—at least not for purposes of specifying a benchmark for judging integrity. But the defender of integrity does not need to identify an "original" state of nature. What is needed is careful historical research that reveals a relevant range of variation, and hence possible future trajectories, for ecosystems or landscapes. Such research is indispensible for helping us to clarify relevant compositional elements and supporting processes, though it is of limited use for thinking about how to manage or restore novel ecosystems, or irreversibly degraded landscapes (for the reasons given by Hobbs et al. [2009] and Higgs [2012, 87–89, 96]). When a site exemplifies appropriate compositional elements and supporting processes, together with the property of being relatively unmodified by human beings, we have the clearest sense of how nature functions, adapts, and evolves in its own way. But something less than this standard is sufficient for ascribing a meaningful degree of integrity to a site.

V. BEYOND THE INSTRUMENTAL DEFENSE OF INTEGRITY

Earlier (§III) I suggested two instrumental reasons to care about integrity. One is that landscapes with their integrity intact can help to mitigate negative impacts related to climate change or other anthropogenic stresses on environments. A second is the instrumental importance of integrity to the maintenance of ecological health. If ecological health is viewed as valuable because it supports human well-being, then integrity is also instrumentally valuable for human well-being.

The instrumental defense of integrity has the virtue of calling into question a facile and misleading dichotomy between preserving or restoring integrity and using nature to satisfy various human needs and interests. Yet I think this line of defense raises problems of its own. Perhaps the most basic issue is that the instrumental argument reduces the ideal

of integrity to something practically necessary for human welfare, and thereby ignores, or at least pushes to the background, non-instrumental reasons to care about integrity. However, before elaborating on non-instrumental reasons I want to consider some further problems with the instrumental defense.

The instrumental view of integrity's value focuses attention on certain aspects of nature, namely, those that provide the various goods and services we need or desire. Clearly, the relevant goods and services will be a function of changing human needs, interests, and technology (Sagoff 1995, 165, 173). This point is perhaps most pressing in the case of technology. Suppose that technological means were developed that could provide adequate substitutes for whatever goods and services are (or would be) provided, directly or indirectly, by integrity areas. There are, of course, complexities accompanying the idea of what would count as an adequate substitute. But suppose that the adequacy criterion would be satisfied if the substitutes served the same function in the narrow sense that, for example, potable water from desalination plants would be a substitute for potable water from intact watersheds.[42] Accordingly, there would appear to be no reason to continue defending integrity, insofar as the value of integrity is ultimately instrumental.[43] It is, of course, difficult to take this argument seriously, since it is premised on what seems to me a dangerous fantasy, namely, thinking that we will find, through technological innovation, substitutes for whatever environmental goods we might need or want.[44] Even if we could find substitutes of the relevant sort, which is ultimately an empirical question, entrenched inequalities of wealth and power would likely mean that many people and communities would lack access to the relevant substitutes. That said, reflection on the undoubted successes of certain technological innovations, together with an acknowledgement of human ingenuity, suggests that we ought to question how much work the instrumental defense of integrity can, and should, do.

Another reason to seek a non-instrumental defense is that it might be empirically questionable whether sites with integrity are *in all cases* instrumentally important to maintaining ecological health, where the latter is understood as instrumentally important to human well-being. More specifically, integrity areas may necessarily be ecologically healthy (in the sense specified in §III), but not all ecologically healthy areas are equally supportive of human interests.[45] It follows that there is nothing inherent in the idea of integrity to suggest that a state in which integrity obtains would necessarily conduce, whether directly or indirectly, to

human well-being.[46] In general, it seems plausible to assume that integrity areas would conduce to human ends in a whole host of ways, as has been emphasized by various writers. But I think the defender of integrity ought to guard against making this assumption too easily, or relying on it to the exclusion of other considerations.[47]

Suppose integrity does not conduce to human well-being, at least not in the straightforward way imagined by some theorists. Is this necessarily a problem? I don't think so. If it is true that integrity does not straightforwardly conduce to human well-being, all this shows is that the instrumental reasons to care about integrity provide an incomplete, if still meaningful, line of defense. To supplement such a defense, we should consider non-instrumental reasons. Alan Holland gives expression to a thought I want to explore: "It may be worth holding out for the point that what is important [about integrity] *is* precisely the fact that nature goes its *own* way—not which way it goes—and that this is important even if, and probably because, it makes things uncomfortable for humans" (2000, 51). While I resist the idea that there is one single consideration or thought that makes integrity important, I think Holland makes an apt and provocative suggestion here. The question is what reasons can be given in support of this view. It seems to me we are not likely to find one basic reason here, but instead a cluster of mutually supporting reasons that, taken together, provide a robust non-instrumental view of integrity's value. In what follows, I explore what I take to be the most relevant reasons.[48]

One group of considerations is broadly aesthetic.[49] Landscapes that have their integrity intact exhibit a number of properties that merit and sustain an aesthetic response. Some relevant properties include intricacy, multi-faceted complexity, variability, elegance, grandeur, uniqueness, and uncanniness. The value of the aesthetic experience of nature is not trivial (though it can of course take trivial forms). Such experience enables us to cultivate certain significant human capabilities, for example, our powers of perception and discernment, the exercise of which I take to be an intrinsic good. It also provokes, gives content to, and sustains our imagination. Further, it affords us release from the stress and pressures of practical and instrumental relations with natural beings and the environing world. The aesthetic experience of nature also involves notable cognitive or thought elements. These elements modify, and add depth and texture to, our sensuous perceptions of, and related reflections on, the natural world (or aspects of it). For example, the aesthetic experience of observing animal forms can involve a number of thought-laden components: appreciation

of the distinctive and varied ways animals cope with their environments; recognition of continuities among forms of animal life; and poignant acknowledgement of shared vulnerabilities and fragilities. More generally, the contemplation of the existence and variety of natural forms positions us to appreciate the remarkable diversity of life, its evolutionary history, and our own intimate involvement with this history.

It seems to me that integrity areas exemplify, to a very high degree, the aesthetically engaging character of the natural world. Of course, parts of the world that exhibit something less than integrity can still be aesthetically interesting. But they often fail to display the distinctive types and range of elements and processes, and their dynamic interplay, which are generally exhibited by integrity areas.[50]

Let me turn to a different consideration—one I am not sure how to categorize. Integrity refers to landscapes that, at least in many cases, are largely the product of processes that do not embody or reflect human designs, purposes, or aspirations. Part of the normative appeal of integrity is the idea that integrity areas exemplify a world that is unmade and largely independent of us, one that is not "for" anything, yet enigmatically *there*.[51] As a shorthand, we might refer to the relevant property here as nature's "otherness."[52]

The significance of nature's otherness can be elucidated in different ways. One possibility is to say that nature as other refers to that which lies beyond the domestication of our relations to each other, and is valuable for that reason (Bernard Williams [1995, 237] suggests this kind of argument). Although I think there is something to this idea, this reasoning risks reducing the value of integrity areas to a negative property, namely, not being domesticated in the ways human relations apparently are.

Another possibility is to say that the value of nature's otherness consists in the fact that nature as other exhibits qualities that are a unique source of surprise, challenge, and mystery. The fact that nature—perhaps especially nature with something like its integrity intact—can also be a source of significant fear and terror no doubt partly motivates our interest as well.[53] Of course, such interest might involve considerable ambivalence, and hence not support a straightforward affirmation of nature. With respect to nature's fearful and terror-inspiring aspects, as well as its more comforting and gratitude-inspiring characteristics, a crucial part of the explanation of our interest in nature is that without these emotional responses to the world and others, and to the values at issue, we would likely lead seriously diminished lives.[54]

Apart from its relevance for our flourishing, and for deepening our reflections on the meaning and significance of nature, cultivating our sensitivity to nature as other has another benefit. I assume that recognizing nature's foundational and inescapable significance for present and future human well-being is itself hugely important. Yet this recognition is often absent, or nominally present, in a world in which many of us lack direct contact with living and varied nature, and are therefore perhaps especially prone to think or act as though we can evade nature as a condition of existence. If, by hypothesis, the recognition of nature's foundational significance for human life presupposes that we embody a certain way of being—one that involves a complex set of attitudes, emotions, forms of responsiveness, and motivations—then we have good reason to cultivate the relevant way of being, and not just for its possible intrinsic value or contribution to our flourishing (which may provide further reasons). My claim is that cultivating a keen sense of nature as other, which requires that the relevant object exist, is a good way to develop a much-needed respect for nature's power and presence, for its foundational significance in and for our lives.

In thinking about these matters, it is important to see the natural world accurately. This involves acknowledging it to be an incredibly complex, often opaque and unpredictable, other with which we must engage if we are to get on successfully in the world. Nature in this sense is too easily pushed to the background when we focus, understandably though perhaps regrettably, on our own pressing projects and concerns. The connection of these thoughts to the defense of integrity is that integrity areas exemplify nature's (often daunting) unpredictability, immensity, and power to a very high degree.[55] We avoid trivializing the nature that matters, and our relationship to it, when we resist the comfortable selectivity that would only protect or restore nature that pleases and comforts us, or that serves as a means for our ends.[56]

This thought can be connected to some distinctly ethical concerns not yet discussed. As characterized above, integrity consists partly in the presence of various (often native) species of plants and animals living in suitable ecological contexts. Maintaining the existence of these forms of life *in situ* is a central focus of defenders of integrity. In this regard, integrity tracks the idea of a variety of other forms of life flourishing in their own way. The fact that these forms of life have a good that is not necessarily our good is something the defender of integrity recognizes and views positively. We do not feel the force of the idea and value of integrity if

we understand this to mean nature playing by our rules, or nature necessarily conducing to our needs and interests. Rather, grasping the idea and value of integrity involves appreciating the normative significance of nature going its own way (to recall Holland's locution from above). Of course, in one sense, nature will always go its own way, even in the most unlikely or degraded of places.[57] The point I want to emphasize is that the defender of integrity thinks, or should think, that we do something wrong when we degrade the world in such a way that we make it impossible for a variety of other forms of life to flourish given their specific character and capabilities. Areas that have their integrity intact exemplify this specific sense of nature going its own way.

I think this point is particularly compelling when we consider the case of sentient beings. By "sentient beings" I mean animals—gorillas, dolphins, wolves, crows, and so on—that can experience the world. For all animals that are paradigmatically sentient, there is something it is like to *be* the animal in question. This means that such animals can care (in some meaningful sense) about what happens to them, regardless of whether or not anyone else does. I regard this fact as one that is also a value. Which is to say, this fact generates an impersonal (or agent-neutral) reason for ethically sensitive beings like us to care about the lives and goods of sentient animals. This reasoning applies to animals across the wild-domesticated spectrum, but the case of wild animals is most relevant to the defense of integrity.

Giving a prominent place to nonhuman sentient animals in the defense of integrity connects to what I regard as the right view to hold concerning our obligations to animals in the wild. In practice, what it means to show due concern for wild animals is to give them the space to live their lives in their own way. Basically, this amounts to a noninterference view.[58] I understand the notion of an animal "living its life in its own way" to mean each animal engaging in the characteristic activities of its kind or those appropriate given its ecological niche.[59] This way of viewing sentient animals shifts attention away from the specific content of an animal's subjective experience, and focuses instead on the context in which animals make their way in the world.[60] On such a view, the ethical significance of animal subjectivity is intimately tied up with living a certain kind of life. The notion of an appropriate ecological and (as relevant) social context is crucial to filling out what this idea means.

When nonhuman animals live a life characteristic of their kind, or characteristic of a life in an ecologically appropriate habitat, this exemplifies

one clear sense in which nature goes its own way. For example, a wolf in the wild is going to respond on its own terms, insofar as it can, and this response is partly remarkable and valuable as an expression of nature's independence. So one clear sense in which we can leave room for nature to go its own way is to preserve or restore extensive habitat for animals so they can live their lives more or less free from human meddling. This is exactly what the defense of integrity calls for.

Let me note a final consideration here by returning to a point touched on earlier. When I discussed the idealization of the absence of humans as an objection to integrity, I suggested that an aspect of this objection was the idea that we are part of a living totality—nature. The motivation for the objection was, at least partly, the thought that because we are embedded in this living totality it is implausible to think humans cannot modify and use nature to meet their needs and create culture. I grant, as argued earlier, that we are justified in modifying nature toward these ends (more on this below). But in doing so, I think we should be guided by the thought that we are part of a living totality that includes all of the elements and dimensions discussed above: great complexity, uniqueness, and variability both at the level of species and of ecological systems; myriad organisms, objects, and patterns that exhibit an otherness that is daunting and compelling; diverse forms of life that have a respect-worthy good that is not necessarily our good; and nonhuman forms of life that are experiencing subjects, which raises the stakes of concern.

VI. CONCLUSION: REMAINING CHALLENGES FOR THE DEFENSE OF INTEGRITY

I have argued that we have serious epistemological, instrumental, and non-instrumental reasons to care about integrity. I believe these reasons support the view that the preservation or restoration of significant portions of the world to a state of integrity, or something like it, should be part of an overall goal for collective action with respect to the environment. Importantly, the defense of integrity gives clear expression to the idea that nature makes a claim on us beyond the call of human needs and interests. What this means, in practice, is that we should constrain the pursuit of our good (however understood) out of respect for nature's integrity.

Of course, even if one is sympathetic to the argument so far, a number of challenges remain for the defense of integrity. I will limit myself to commenting on three issues in particular: first, how concern for ecological

health and integrity should be integrated with concern for human well-being; second, how much ecological health and integrity it is appropriate to aim at preserving or restoring; third, the relative importance of concern for ecological health and integrity.

With regard to the first issue, it seems to me reasonable, as an initial approximation, to regard ecological health as the conservation norm for areas that humans need to use or inhabit. As a complement, integrity is plausibly viewed as the norm for a substantial portion of the rest of the world (a claim I will refine further below).[61] A sufficient reason to care about ecological health is that maintaining (or restoring) this property in relevant areas is practically necessary if we are to preserve the capacity, now and in the future, for human beings to meet their needs from nature. Maintaining or restoring some areas of integrity is necessary even if our goal is only, or primarily, maintaining the ecological health of areas humans need to use or inhabit (as argued in §III). Of course, I am unsatisfied with this instrumental argument for the reasons given in the previous section. But the instrumental argument is nonetheless important.

How many (merely) ecologically healthy areas of nature we need will be a function of how many people there are, and what they need to live decent lives.[62] The question of how much integrity we need is somewhat different. Actually, the question itself is ambiguous. This question might be asking any of the following: How many different areas with their integrity intact should we aim to preserve or restore? How extensive should integrity areas be? What degree of integrity is necessary for an area (of whatever size) to qualify as having integrity? I think each of these questions is relevant, though it seems reasonable to assume that in some contexts one of these questions may have more salience than the others. This issue needs careful discussion in light of the details of particular cases.

Some defenders of integrity seem to think we cannot ultimately answer the question of how much integrity we need.[63] This strikes me as implausible. We can in fact sketch what an adequate answer would look like, and we need to if the practical meaning of respect for integrity is to be brought into focus. (In what follows, "respect for integrity" is shorthand for "maintain and, as relevant, restore" integrity. The same point applies to ecological health.)

Recall one of the arguments I gave for integrity in the preceding section. I suggested that a reason to care about integrity is that this gives expression to the ethical aim of respecting sentient animals in the wild.

Whatever else it means, respect for wild animals surely must include maintaining or restoring their habitat so that they can maintain viable populations and live their lives in their own way. As a focus for discussion here, consider that integrity includes respect for large predators, which are native to virtually all naturally evolved ecosystems.[64] It follows that we need areas of integrity sufficiently large as to maintain viable populations of whatever large predators—bears, cougars, wolves, and so on—are native to, or functionally relevant for, different ecosystems.

Obviously, the habitat requirements will vary according to the species we consider, and estimates can range widely. Two scholarly estimates suggest the shape of an answer here. Conservation biologists Reed Noss and Allen Cooperrider (1994, 161–65) argue that the historically and ecologically appropriate habitat necessary for large predators would range from twenty five to seventy five percent of the total land area of the earth. The recent work of E. O. Wilson further supports this view. Wilson (2016, 3–4, 185–87, 229–31) argues that protecting wild or native biodiversity will require preserving, or restoring in relevant ways, half of the surface of the earth (understood to include land and sea surfaces).[65] For the sake of simplicity, let's say that an area sufficient to support the aim of respecting integrity will be something like fifty percent of the earth's surface area.

This percentage is supported by a second consideration. The focus on integrity includes concern for the preservation or restoration of a range of ecosystem types (of nontrivial size). The preservation or restoration of the relevant range may be valuable for a variety of reasons (e.g., instrumental value to ecological health, preservation of biodiversity, scientific value, aesthetic value, habitat for a diversity of respect-worthy forms of life, etc.). If we were serious about maintaining a meaningful range here, then this too will mean maintaining or restoring something like fifty percent of the earth's surface area, maybe more (Noss and Cooperrider, 165–67; Wilson 2016, 3–4). Of course, the percentage necessary for particular ecosystem types will vary, as in the case of large predators. But in general we cannot maintain an ecosystem type unless we maintain areas sufficiently large as to allow disturbance-recovery regimes to operate within these ecosystems. So the fundamental design of any program of respecting integrity will have to make due allowance for this.

To give some perspective here, the total number of protected areas worldwide, as of 2015, occupies about fifteen percent of the earth's landscapes and 2.8 percent of the oceans (Wilson 2016, 186).[66] The fifty

percent proposal is therefore extremely ambitious, even radical. This, of course, might lead many to reject it out of hand. But I think that reaction is too simple. In thinking about what it means to maintain and restore integrity, we obviously have to distinguish between short-term and long-term goals. Restoring fifty percent of the earth's surface area to a state of integrity is a long-term goal. Although this goal, if endorsed, would require considerable adjustment in the way human beings collectively live, I believe we should nonetheless keep this goal in mind. Whether one agrees, of course, will depend on how one evaluates the strength of the reasons I have offered in support of integrity. That said, in the short term, our conservation goal should probably be to maintain or restore ecological health in a relevant number of areas that people need to use or inhabit. This would be a considerable challenge in its own right.

Importantly, one could achieve the goal of maintaining or restoring ecological health in ways that are more or less conducive to the long-term goal of restoring integrity. If a long-term goal is to restore integrity, then this goal should guide the way we maintain or restore ecological health. Thus, we could maintain or restore ecological health in ways that leave open the possibility of restoring more, rather than less, integrity in the long term. If integrity is not on our ethical-political radar, then it cannot guide the restoration of ecological health. Further, having the restoration of integrity in mind as a long-term goal could support a number of other efforts. For example, it might encourage small local restorations and many other steps in the direction of restoring integrity, even if our main focus in the short term were on maintaining or restoring ecological health (or something less stringent than that).

Obviously, we face profound challenges here in trying to bring our cultural ideals, values, private property regimes, decision-making structures, and more, into alignment with the dual goal of respecting ecological health and integrity. In closing, I want to consider some additional complexities relating to goals and policies aimed at promoting ecological health and integrity. Specifically, I am interested in the question of the relative importance of these two normative concepts. At issue is the weight of the reasons we have to aim at preserving or restoring ecological health and integrity as goals for collective action. I believe a plausible way to regard these reasons is basically as follows. Maintaining (and as necessary, restoring) ecological health to a relevant portion of the world that we need to inhabit and use should never be traded off against any other goal, economic or otherwise. Which is to say, the goal of maintaining

ecological health (at a nontrivial spatiotemporal scale) should provide a fundamental constraint on how we collectively inhabit and use the world. Maybe in some emergency situations, say of urgent socio-economic hardship, ecological health can be sacrificed in some places, to some degree, and over the relatively short term.[67] But I think we should be very cautious about opening the door to thinking that it is acceptable to compromise (or continue to compromise) ecological health. The reason is that maintaining ecological health at nontrivial spatiotemporal scales is a condition of humans being able to meet their needs now and in the future. Preserving ecological health is, or at least ought to be, a matter of prudential collective concern in the present. It is also a matter of intra- and intergenerational distributive justice (assuming that maintaining the capability of human beings to meet their needs is a central concern of any plausible view of what justice requires).

Setting aside the question of the relative importance of ecological health, consider the case of integrity. Is the aim of respecting integrity best understood as an absolutist constraint on how we use nature? Or is it better understood as a serious constraint, but one that is defeasible? Or should the aim be understood in a weaker way? My view at present is that the aim of restoring integrity (to the fifty percent of all surface areas goal) should be understood as a defeasible constraint on, and as a long-term goal for, collective action with respect to the environment. Integrity is meant to be a constraint in the sense that we need some serious reason to compromise or fail to restore integrity.

It seems to me that the most obvious barrier to our taking respect for integrity seriously, whether as a defeasible constraint or as a long-term goal, is that such respect is likely to entail substantial economic losses, or foregone development opportunities, for certain people and perhaps entire nations. If true, this reality will likely raise questions of justice. Indeed, the question of justice here is magnified in those cases where the people or nations that incur a loss, or are expected to possibly forego a development opportunity, are currently impoverished and in need of some sort of meaningful development. Things are complicated here by the fact that in the contemporary world many areas that exemplify a fairly high degree of integrity are in parts of the world that are also socio-economically impoverished. While I believe respect for integrity in general is a very worthwhile aim, there is reason to prioritize maintaining areas of integrity that exemplify a high degree of biodiversity or other valuable properties, such as uniqueness, rarity, or contribution to a representative

range of ecosystem types (Angermeier and Karr 1994, 696; Callicott et al. 1999, 32; Wilson 2016, 133–53). This makes the matter at hand even more urgent. This is because, as has been noted by many writers (e.g., Wells 1992, 237; Dowie 2009, xxvii), developing countries contain a disproportionately large share of the world's biodiversity.

These are very difficult issues and I do not have the space to address them here. Suffice it to say, a full defense of the value of integrity would require addressing issues of the sort indicated. I have not aimed in this paper to address all the issues relevant to such a defense. My goal has been more modest: to establish that preserving or restoring integrity is an important aim for collective action. I have argued that the concept of integrity is not vulnerable to objections commonly raised against it, and that the value of integrity is supported by a number of weighty reasons. If we ignore integrity, we needlessly impoverish our discussions of the ethical constraints, values, and goals that should inform environmental thought and action.

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NOTES

1 A variety of conservation thinkers and philosophers have endorsed the view of Angermeier and Karr, or something like it. For example, see Westra 1995 and Holland 2000; also Soulé 1995 (where Soulé speaks of "living nature" not integrity, but living nature is defined as "the native species of plants and animals in their native settings" [at 137], which is essential to what Angermeier and Karr mean by integrity) and Soulé 1996 (where "ecological integrity" is explicitly defended). Higgs's characterization of ecological integrity (2003, 95) also resonates with the view of Angermeier and Karr. It is tempting to regard the work of Elliot (1995, 1997) as relevant to the question of how integrity might be specified and what its value consists in. For Elliot, the crucial (if not all-important) value-adding property of natural systems is having a nonhuman causal origin and history—in short, being unmodified by human activity. This amounts to placing almost exclusive emphasis on the first of the two properties noted above, which I regard as an inadequate way of conceptualizing integrity. For an alternative characterization of ecological integrity—one

focused on what the authors refer to as the "proper functioning condition of a site"—see Harris et al. 2006, 174.

2 My characterization of paradigmatically wild environments is informed, in particular, by the discussion in Elliot 1997, 108–09 and 125–26. Paradigmatically wild environments have many distinctive properties that are, or might be, normatively relevant. Of particular note is the property of leaving open myriad ecological and evolutionary possibilities. While human-dominated environments are subject to various natural processes and forces that operate free of human intentional activity (just as any other environment is), such environments often close off, or highly circumscribe, ecological and evolutionary possibilities.

3 On the complex connections between elements (such as species) and the processes that generate and maintain them, see Angermeier and Karr 1994, 692–94.

4 "*Biological integrity* refers to a system's wholeness, including presence of all appropriate elements and occurrence of all processes at appropriate rates" (Angermeier and Karr 1994, 692).

5 Soulé writes: "The processes, including photosynthesis, nutrient transport, fixation of nitrogen, the water cycle, the decomposition of organic matter by invertebrates and microorganisms, the sequence of seasonal events (like budding, flowering, and seed dispersal), and disturbances by fire and floods—occur in nearly every terrestrial or aquatic ecosystem on Earth. They are generic. They can be performed by weedy [i.e., non-native or "exotic"] species" (1996, 59). See also Hobbs et al. 2009, 599. A complexity here is that while process occurrence might be generic and not subject to much variation across different ecosystems or landscapes, process rates can vary dramatically. Thus, we might understand "appropriate" processes in terms of process rates, rather than process occurrence. For discussion of this issue, see Angermeier and Karr 1994, 692.

6 Simberloff (2012) offers a useful discussion of the differing worldviews that animate disputes about the native/non-native species distinction.

7 Availing of this line of argument, it follows that the defender of integrity need not endorse the view that a species is only native in its place of evolutionary origin, which would be unduly restrictive. Here I agree with Callicott 2002, 415, and 2011, 316.

8 My account of the scalar assumptions implicit in the conceptualization of native species (as well as the conceptualization of integrity) is indebted to the discussion in Callicott 2002, 414–17, and 2011, 311–19. I am grateful to an anonymous reviewer for urging me to address this issue more fully.

9 Such concerns are central to debates about possible Pleistocene rewilding in North America.

10 These worries would also seem to apply to the management, if not the restoration, of ecosystems—such as those Hobbs et al. call "novel ecosystems"—that have crossed relevant biotic or abiotic thresholds. For discussion of the

relevant system thresholds, see Hobbs et al. 2006, 3; and Hobbs et al. 2009, 603–04.

11 For discussion and defense of the historical range of variability concept (or what the authors prefer to call "natural variability"), see Landres et al. 1999.

12 For this framing of the importance of history, I am indebted to the discussions in Landres et al. 1999, Throop 2012, and Higgs 2012.

13 Others have raised similar worries. See, e.g., Throop 2012, 56–59; Sandler 2012, 72; Higgs 2012, 93, 95, 97–98; and Harris et al. 2006, 171, 175.

14 For example, extreme disturbance events may have structured ecosystems in the past, but the occurrence of such events now may be socially unacceptable in many contexts, at least in the near term. For discussion, see Landres et al. 1999, 1185.

15 I borrow the "washing out" notion from Robert Elliot (1997, 93). On the idea of ecologically incorporated human impacts, see Callicott 2011, 322.

16 Consider, for example, the ecological impacts that Native Americans are understood to have had on many North American landscapes, given their seasonal burnings, hunting practices, agriculture, and so on. (For discussion of such impacts, see Callicott 2002, 412–13; also 2011, 307–09.) Recognizing the ecological impacts of Native Americans is crucial, and helps us to problematize the wilderness myth that has enthralled some colonists and environmentalists, among others. That said, we should not overstate the extent of the impacts in question. "Although native people burned and otherwise altered floral and faunal compositions," write Landres et al., "they did not occupy all areas or all ecosystems, nor impose broad-scale and intense impacts in all the areas they did occupy" (1999, 1183; references omitted). Illustrating this point in the North American context, Willers notes that there were "vast human-free expanses between recognized tribal territories, such as the area between the Yellowstone and Upper Missouri basins" (2000, 571). While these areas "changed in size and configuration through the centuries," they "allowed for substantial flows of nonhuman genetic information over the continent" (ibid.).

17 For thoughtful discussion and defense of Leopold's notion of land health as the overall goal for conservation, see Freyfogle 2006, 20–23, 47, 93–94, 128, 180–82.

18 In *A Sand County Almanac*, Leopold defined land health as "the capacity of the land for self-renewal" (1949, 221; cf. 1999b, 219). This characterization maps onto the first property I highlight. Leopold says other things that suggest the second property as well (see, e.g., the section entitled "The Land Pyramid" in 1949, 214–20). My conceptualization of ecological health in the text above is indebted to Callicott (1999) and Rapport (1995, 2007). Nothing in my characterization of ecological health requires or supports the belief that ecological systems are superorganisms that are somehow conscious (say, in the manner of a sentient animal).

19 Two philosophers who press this worry forcefully are Sandler (2012) and Light (2012). See also Hobbs et al. 2006; Harris et al. 2006; and Hobbs et al. 2009.

20 The point about migration corridors holds insofar as the aim of preserving/restoring integrity will involve expanding, and as relevant connecting, wildlife areas and other nature reserves. On the importance of taking a broad landscape perspective that incorporates connectivity as a critical conservation goal—e.g., by creating wildlife corridors to connect currently fragmented nature reserves—see Harris et al. 2006, 174; and Wilson 2016, 3, 179.

21 It is common to defend ecological health as instrumentally important to human well-being. But this is not a necessary normative commitment. Ecological health can be defended for non-instrumental reasons. So, if one is arguing that integrity is instrumentally important to health, this does not commit one to the view that integrity is necessarily instrumentally important to human well-being.

22 O'Neill et al.'s position elaborates a central concern of critics like Wendell Berry, Ramachandra Guha, and William Cronon, who have argued that any account of environmental ethics that marginalizes our modifications of nature in order to meet our needs and create culture is theoretically deficient. For discussion, see Berry 1996, 27–30; Guha 1997a, 16–21, and 1997b; and Cronon 1996.

23 Hettinger (2012, 33) discusses the worry that environmental preservationism involves self-abnegation.

24 Intensive agriculture, for example, seems clearly incompatible with the maintenance of integrity.

25 Callicott and Mumford (1997) argue for the dual endorsement of ecological health and integrity that I suggest in this paragraph.

26 Though ostensibly defending nonanthropocentrism, Westra (1995) could be read as providing an anthropocentric defense of integrity similar to Karr's. See also Freyfogle 2007, Ch. 1.

27 "The difference between Linneaus and contemporary theorists, is that the latter have dropped references to a Creator but left everything else as it was; they continue to argue that nature exemplifies a purposive design—an equilibrium, homeostasis, or orderly strategy of development—that human beings disrupt at their peril" (Sagoff 1997, 939–40).

28 Elsewhere, Sagoff writes: "The faith that the ecological is orderly—that it manifests an intelligible design to be captured by general mathematical models—is consistent with centuries of theological doctrine" (2000, 72).

29 Should we assume that if there are law-like general principles that we can make predictions? An affirmative answer assumes we can understand such principles. Should we assume this?

30 According to Wilson (1999, 163), any study of biological and ecological phenomena yields at best principles that can be written in the form of rules or statistical trends, but not in the form of laws as understood by physicists or

chemists. This means, for example, that the future trajectories of ecosystems remain in crucial respects unpredictable. For Wilson, this is a consequence of the particularity of the species that compose any ecosystem (1999, 182). "Each species," writes Wilson, "is an entity with a unique evolutionary history and set of genes, and so each species responds to the rest of the community in a special way" (ibid.).

31 Or, to take an example from Stephen Jay Gould, the physical principle of surfaces and volumes constrains the relations between size, shape, and surface area from the level of organisms to planets. Holland (2000, 49) makes this point, as well as the one in the text above. (The relevant examples are discussed in Gould 1977, Ch. 21 and 24.) Further supporting this line of argument, Earnest Partridge remarks on "the universal pattern that describes the relationship between producers, consumers, and decomposers," and the way the genomes of individual organisms (e.g., wolves) are shaped by ecosystems, and how, in turn, individual organisms shape the ecosystems of which they are a part (2000, 86). A paradigm case is the cooperative symbioses between the bee and the blossom (ibid., 89). Partridge concludes: "All this is described by rules and concepts of ecology that are falsifiable" (ibid., 86). In this regard, it seems right to say, as Alan Holland does, that what the study of nature reveals "is not contingency merely, but contingency constrained" (2000, 49).

32 I am not endorsing this particular conjunction of beliefs, but merely pointing out that there is no contradiction here. For my part, I regard the first belief as true (i.e., that nature is contingent and chaotic), but I do not endorse the second belief. For relevant discussion of the "flux-of-nature" paradigm in ecology, see Callicott 2002 and 2011.

33 I take my response to Sagoff's line of objection, together with my discussion in §II, to also address the concern that the "flux-of-nature" paradigm in ecology makes concepts like integrity obsolete. (An anonymous reviewer raised such an objection to my argument.)

34 Different writers touch on the problem of defining the benchmark or reference condition. For a relevant sampling from the literature, see Higgs 1997, 339, 343, 345 (discussing the benchmark for ecological restoration, not when integrity *per se* obtains, but the issue is similar); Callicott et al. 1999, 26 (discussing the target for ecological restoration); Sagoff 2000, 74 (discussing the concept of an "original ecosystem"); Callicott 2002 and 2011 (discussing the target for ecological restoration); O'Neill et al. 2008, 158 (discussing the idea of a "natural state," not integrity *per se*, but the same issue is at stake); Higgs 2012 (discussing the relevance of history for determining reference conditions for ecological restoration); and Wilson 2016, 181–82 (discussing the baseline for biodiversity restoration).

35 Karr writes of "the pristine environments of the pre-industrial era," which I take to be an endorsement of the preindustrial benchmark (1996, 101; cf.

2000, 212). While not defending a benchmark for integrity *per se*, Callicott (2002, 2011) endorses a target for ecological restoration that is earlier than the preindustrial one—specifically, the condition of a site prior to "settlement" (i.e., prior to colonization by Europeans in the case of North American landscapes). Though in the concluding paragraph of his 2011 essay, Callicott appears to endorse the preindustrial benchmark. The reason: "Disturbances wrought by industrial *Homo sapiens* exceed the limitations of ecological temporal and spatial scales" (Callicott 2011, 323). Regardless of whether he is defending the preindustrial target, or a somewhat earlier one, Callicott sees such a target as still justified by the reigning "flux-of-nature" (or "postmodern") view in ecology.

36 In support of this claim, consider the fact that of the truly apocalyptic mass extinction events that have occurred on earth, only the one currently underway is anthropogenic. It seems clear that the industrial pattern is an important driver of the Sixth Extinction, as it is now commonly called. Needless to say, the North American extinction event that occurred 11,000 to 12,000 years ago also compromised integrity. I believe, however, that it is plausible to think integrity reemerged as a property of North American landscapes after that event. This was so once relevant elements and supporting processes were sufficiently manifest, and the landscapes in question were able to incorporate ongoing modifications (hunting, small-scale agriculture, seasonal fires, etc.) by indigenous peoples, among others.

37 I would go further and say that a defender of integrity could endorse the paradoxical view that some of nature's own events can be integrity compromising. I have in mind meteor strikes (and the like) that wipe out whole species or ecosystems, and impair the processes that generate and maintain them.

38 For relevant discussion of what I am calling integrity-compatible human activities, see Dowie 2009, Ch. 10. Dowie focuses on cases of environmentally beneficial "disturbances" caused by indigenous communities.

39 For discussion of concerns of this kind in the context of global conservation conflicts, see Dowie 2009.

40 My presentation of the problem of indeterminacy is indebted to the discussion in O'Neill et al. 2008, 158–59.

41 In thinking specifically about the implications of climate change for restoration efforts and goals, it may be that our best choice will often be to focus on functional success, rather than historically appropriate compositional elements and processes. For defense of this view, see Light 2012, 115–18. Of course, there are a number of other things to consider here, such as the rarity of the ecosystem or site in question, which could conceivably justify concerted, maybe even heroic, efforts that aim to respect historical fidelity in our collective restorations. Higgs (2012, 93), for example, endorses such a view. See also the relevant discussion in Sandler 2012, 75 and 78 (notes 5 and 7). On the value of (ecological) rarity, see Elliot 1997, 46, 141. Higgs (2012,

90–98) offers a thoughtful discussion of how history remains important for thinking about ecological restoration and other adaptive interventions, even under conditions of anthropogenic environmental change.

42 A host of normative issues are raised by this specific example (and others like it), but these issues are irrelevant to the present argument.

43 Sagoff makes this point: "As technology advances, natural objects, communities, and systems become epiphenomenal to economic activity or may be viewed as an obstruction to it. Instrumental or prudential concerns, then, would provide at best a poor and ephemeral basis for the value of integrity of the natural world" (1995, 173).

44 Consider, for example, the abysmal failure of Biosphere 2. See Cohen and Tilman 1996 for discussion.

45 For example, shrub-dominated semi-deserts in the southwestern U.S. might be ecologically healthy, but they are not as supportive of human activities as the ecologically healthy savannah-like environments that preceded them. For discussion of this example, see Callicott 1999 and Callicott et al. 1999.

46 In a similar vein, consider Rapport's remark about wilderness (as the base-datum for Leopold's conception of land health): "there may be no reason to accept in all cases that *a priori* wilderness is healthy in the broad sense of being supportive of human health and economic activity" (1995, 297).

47 In this respect, prominent defenders of integrity—e.g., James Karr and Laura Westra—seem to assume a reason to care about integrity that is perhaps empirically questionable, and as such, normatively vulnerable.

48 I give a truncated version of the following discussion in Scoville 2015, 14–16.

49 My account in this paragraph is particularly indebted to the discussion in O'Neill 1993, 68–81, 98–101, 107–09, 159–67; Hepburn 1993; Elliot 1997, 58–73, 93–97; and Brady 2006.

50 In thinking about the aesthetic relation to nature as a practice, it is worth keeping in mind an observation from Aldo Leopold: "The outstanding characteristic of [aesthetic] perception is that it entails no consumption and no dilution of any resource" (1949, 173).

51 The idea of nature as "enigmatically *there*" is discussed in Hepburn 1993, 67.

52 My discussion in this paragraph and the next is indebted, in particular, to the accounts in Williams 1995, 237–40; and Elliot 1997, 59–62.

53 On the importance of fear and terror in our experience and valuation of nature, see Williams 1995, 238–40. The issues here connect, of course, to classic philosophical accounts of nature's sublimity. See, e.g., Kant 2000, 143ff. (Academy edition, 5: 260ff.).

54 This kind of argument is sketched in Williams 1995.

55 Would a severe storm that impacts one's neighborhood suffice to lead one to the relevant insight and sensitivity here? If we answered affirmatively, then that would be so much the worse for the defense of integrity. In response, I would note that we have a number of reasons to care about integrity and the

foregoing considerations map only one set of reasons. Thus, if the preceding discussion proved problematic or unconvincing, that is not necessarily a problem for the overall defense of integrity.

56 Exploring the connection between "comfortable selectivity" and trivialization in our (aesthetic) attitudes toward nature is a compelling theme in Hepburn 1993.

57 Chernobyl comes to mind, or the site of the former Hanford nuclear plant in Washington State (one of many Superfund sites in the U.S.).

58 To anticipate a possible objection here, noninterference is the guiding ideal, but it is one that will typically require, in practice, considerable human management of nonhuman animal populations and their habitats.

59 My view here is indebted to Jennifer Everett's deontological form of animal welfarism. See Everett 2001, 54 and 66 (note 13).

60 I take a cue here from the discussion in Norton 2003, 383.

61 My view, on this count, is similar to the conclusion defended by Callicott et al. 1999, 31–32.

62 I assume that the relevant sense of "decent" should mean, at minimum, people being able to meet their basic or vital needs. I assume, further, that the relevant notion of "basic" or "vital" needs includes absolute and relative needs, as commonly discussed in the philosophical literature. Thus, we can be confident about including all absolute needs (e.g., for nourishment, shelter, clean air and water, a share of the atmospheric "sink," etc.), as well as some relative needs (e.g., social bases of self-respect). In contrast, we might be less confident about other relative needs (e.g., for certain types of transportation or technology). In any case, I assume we can specify a core group of basic or vital needs, even if we continue to debate whether other needs should be included in the core.

63 For example, this appears to be the view of Alan Holland (2000, 54–56). Holland supports his reticence with a number of reasons. I will mention the two that seem most crucial. First, he thinks it is misleading to believe or to suggest that it is possible to attain precision and accuracy about how much integrity we need. Here Holland appeals to the unpredictability of natural systems and our impacts on them. He is also concerned that harms to nature are becoming less and less specific, as are the assignable agents of such harm. I agree that nature is in many respects unpredictable, and that many human actions have or may have cumulative and insidious effects. I also share Holland's worry that the causes of negative effects in particular can be very hard to trace and understand, or to assign to particular agents. But I think Holland overstates the implications of these claims in his discussion. Holland's second reason is that the question of how much integrity we need cannot be determined, not because integrity is "unfathomable" (Holland's word choice) but because human needs are. The point is that the answer to the question of how much integrity we need depends on our conceptions of what makes life worthwhile.

Thus, Holland appears to think that integrity, in the end, is really about us and our needs. I think this way of thinking about integrity reflects only one sense in which integrity matters, and totally misses nonanthropocentric reasons to care about integrity. Holland's discussion is, in the end, puzzling. Following his discussion that includes the reasons just mentioned, Holland says some things that suggest he would agree with the points I go on to make above. (On this, see Holland 2000, 56, last paragraph.)

64 I assume we are only talking here about ecosystems of nontrivial size and of the sort we can reasonably maintain or restore. This means that we have no reason (or very weak reasons) to consider restoring ecosystems for which the relevant predators are now extinct. But when members of the relevant species still exist (e.g., in captivity or in wildlife parks), then it is a meaningful question whether such species might be restored to their historic landscapes, or at least to ecologically appropriate ecosystems.

65 Though Wilson is defending this figure for the sake of preserving/restoring wild or native biodiversity, not integrity *per se*, the figure is nonetheless very relevant to the defense of integrity. This is because wild or native biodiversity figures prominently in the defense of integrity. Personally, I think this fact is a reason to prefer integrity over biodiversity as the relevant conservation norm. However, this is not a major point of contention, for defenders of biodiversity (such as Wilson) and defenders of integrity are often in common cause when it comes to conservation goals.

66 I am leaving aside here the issue of the different degrees of integrity exemplified by the areas in question.

67 There are complexities here relating to scale. In general, ecological health ought not to be compromised at a large or nontrivial spatial scale, while it might be justifiably compromised at a more local spatial scale. This issue requires more discussion.

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