VOLUME 27, ISSUE 2, PAGES 50–68 (2026)

Criminology, Criminal Justice, Law & Society

CRIMINOLOGY, CRIMINAL JUSTICE, LAW & SOCIETY

E-ISSN 2332-886X
Available online at
https://scholasticahq.com/criminology-criminal-justice-law-society/

The Extinction-Resurrection Paradox: Connecting Species Extinction and Resurrection to Criminology

James Gacek,[a] Jared Dmello,[b] Amin Asfari,[a]

[a] *Department of Criminology, University of Regina*
[b] *School of Society and Culture, Adelaide University*

ABSTRACT AND ARTICLE INFORMATION

We are living in an era of extinction the likes of which we have never seen before. There is no doubt that with the profound impacts on ecosystems, extinction remains a persistent issue. Questions of biodiversity have drawn significant attention in environmental ethics, yet there has been scant attention paid to it within criminology. Importantly, the main question we pose is as follows: as resurrection becomes increasingly possible, does it incentivize extinction? Drawing upon the environmental ethics and criminological literatures, we explore the ongoing challenges of extinction and resurrection, specifically how to both define and operationalize the terms and their complexities. Following on, we bridge extinction studies with criminology to produce critical insights into varied concerns related to the risk and harm produced by and through extinction and resurrection. We then bring together these challenges with our discussion of the extinction-resurrection paradox, a term we coin to refer to the potentially contradictory efforts to reconcile biodiversity conservation with the potentially risky and harmful considerations that resurrection (and advances towards a resurrection 'industry') poses. We believe the extinction-resurrection paradox is important to describe the current realities of the shifting relationship between humans, nonhumans, and nature. We contend our discussion of the paradox provides a useful, conceptual entry point for the analysis of species extinction and resurrection, and we conclude by arguing that the case for considering extinction and resurrection remain timely and warranted matters of criminological concern.

Article History:

Received: April 18, 2025
Received in revised form: May 8, 2026
Accepted: June 8, 2026

Keywords:

extinction; resurrection; criminology; ethics; species

© 2026 *Criminology, Criminal Justice, Law & Society* and The Western Society of Criminology
Hosting by Scholastica. All rights reserved.

Corresponding author: James Gacek, University of Regina, 3737 Wascana Parkway, Regina, SK S4S 0A2, Canada
Email: James.Gacek@uregina.ca

We are living in an era of extinction the likes of which we have never seen before. What do we mean by this? Extinction – "either as the extinction of single species or as mass extinction events on earth" (Wienhues et al., 2023, p. 1) – is not only a matter of inquiry, but also "a subject addressed by moral philosophy through questions concerning, amongst other things, the moral relevance and ontological status of species, moral responsibilities for human-caused extinctions, any moral obligations to avoid the loss of [nonhuman] species and so on" (Wienhues et al., 2023, p. 1). We are witnessing the expansion and acceleration of human activity; regardless of whether it is beneficial or detrimental, this activity is happening at increasing rates and preceding historical standards (European Environment Agency, 2015; Steffen et al., 2015). Such activity is unfortunately yet continuously manufactured to meet the predominant demands of human survival (European Environment Agency, 2015; Steffen et al., 2015), resulting in nonhuman and environmental destruction as byproducts.

For that matter, the global human population continues to increase, and so too do the global challenges facing them. As the number of people continues to rise, they require more food and land to populate and water to drink, which then requires more encroachments, if not violations to nonhuman species and their natural habitats (European Environment Agency, 2015; Seto et al., 2012). Similarly, let us not forget how pollution is expanding across the world, as does the increase in global warming temperatures. Indeed, anthropogenically-induced pressures on the planetary ecosystem continue to alert us to what humans can do to the detriment of our planet; whether we authentically heed this alert and take it seriously is another matter (see Brannen, 2017). One could make the case that, by responding to these signals now (and perhaps better late than never, we might add), policy changes and/or technological developments help provide future remedies for humankind (Ripple et al., 2017). Others, however, caution that we are past the point of no return; these arguments have some credence, as research has found that some changes we are making to our planet through human activity are already irreversible (see Ripple et al., 2017, for discussion).

Within this theoretical space, ecocriticism and environmental philosophy have emerged as vital interdisciplinary fields that interrogate the relationship between human society, culture, politics, science, and the natural world. At the core, these philosophies interrogate a fundamental challenge to traditional anthropocentric worldviews—the assumption that human beings occupy a privileged position at the center of moral and ontological concern. Harman's (2018) object-oriented ontology offers one influential reorientation, proposing that all objects, whether animate or inanimate, possess a kind of withdrawn, irreducible reality that cannot be exhausted by human perception or use. This perspective dissolves the hierarchical distinction between human subjects and nonhuman objects, a move that has proven generative for environmental thinkers seeking philosophical foundations for a more-than-human ethics. Logic dictates that a holistic approach would be more effective, given that humans and nonhumans alike are impacted by changes to the ecological landscape (Gacek & Jochelson, 2020; Kotarba et al., 2026). Within the current article, this framework thus necessitates thinking about the ethical and criminological implications of extinction-resurrection from both the human and nonhuman perspectives. Levi Bryant (2024) extends this theorization in his call for an ethics attentive to wild, nonhuman assemblages. He argues that ethical life must account for the agency and claims of ecological systems that exceed human intention and control. This is an interesting perspective, given that mass extinction and species-specific extinction events have long been separate to the human experience, occurring through the natural order, yet there is an increasing presence of human influence both from conservation perspectives but also through resurrection initiatives impacting these ecological processes. Such frameworks invite a radical rethinking of what counts as a subject worthy of moral consideration, pulling philosophy toward the material conditions of ecological existence.

While we focus on the discussion of ethics from a criminological lens, broader framings of ecocentrism and ecophilosophy directly inform this work. Ted Benton's (1991) foundational work in the sociology of nature urged social scientists to take biological reality seriously without collapsing into reductionism, arguing that an adequate social theory must reckon honestly with the natural conditions that enable and constrain human life. His later writing pressed further, contending that environmental values cannot be grounded in human purposes alone but must acknowledge the intrinsic worth of nonhuman nature (Benton, 2008). To that end, what are the political, criminological, and ethical considerations around making decisions around species resurrection based on human attitudes and perspectives? Within criminology, particularly the green criminological space, ecocentric sensibility has been used to challenge legal and institutional frameworks that treat environmental harm as incidental to human injury. For example, Rob White (2018) has argued that an ecocentric approach to criminal justice requires moving beyond anthropocentric legal definitions to

recognize harms to ecosystems, species, and nonhuman beings as wrongs in their own right. This thread has been popularized recently with more courts legally declaring animals as sentient beings. Similarly, Halsey and White (2017) have demonstrated that ecophilosophy opens new conceptual resources for understanding environmental harm as a structural and cultural phenomenon, not merely a catalogue of discrete offences. Within this interdisciplinary nexus, we seek to further examine the specific case of species extinction-resurrection, interrogating the role of humans in environmental and ecological harm but also the intentional re-birth.

There is no doubt that with the profound impacts on ecosystems, extinction remains a persistent issue. Questions of biodiversity have drawn significant attention in environmental ethics, yet there has been scant attention paid to it within criminology (with exceptions, see Brisman & South, 2020; Eski, 2023). Moreover, advances in nonhuman species resurrection[i] (or de-extinction) exist as a potential method to remedy human consumption systems and anthropocentrically-induced pressures to the planet. In April 2025, global headlines highlighted the return of the dire wolf, with Colossal Biosciences using ancient DNA and cloning and gene-editing technology to alter the genes of a gray wolf, the prehistoric dire wolf's closest living relative, to produce three dire wolf pups named Remus, Romulus, and Khaleesi (Hunt, 2025). Importantly, the main question we pose is as follows: as resurrection becomes increasingly possible, does it incentivize extinction? We draw upon the growing body of research on extinction and resurrection of species to contemplate other particular questions, such as the following: Is extinction truly permanent? Should we revive extinct species? And what are the criminological implications of reviving extinct species? We contend that these questions are interconnected and that their answers will most likely lead to increased (illegal and legal) harm and suffering toward populations (human and nonhuman alike), ecosystems, and our planet.

In this article, we establish our exploration of what we deem the *extinction-resurrection paradox*. We argue that the *extinction-resurrection paradox* becomes an apt frame of reference to understand the ethics and challenges of both extinction and resurrection, while also examining the connection between species extinction studies and criminology (Brisman & South, 2020; Eski, 2023). We first set the context of our discussion, outlining preliminary considerations and clarity for the reader. Drawing upon the environmental ethics and criminological literatures, we then explore the ongoing challenges of extinction and resurrection while also exploring the complexities of these terms. Following on, we bridge the emerging, interdisciplinary field of extinction studies with criminology to produce critical insights into varied concerns related to the risk and harm produced by and through extinction and resurrection. We then bring together these challenges with our discussion of the *extinction-resurrection paradox*, a term we coin to help us interrogate the potentially contradictory efforts to reconcile biodiversity conservation with the potentially risky and harmful considerations that resurrection (and advances towards a resurrection 'industry') poses. We believe the extinction-resurrection paradox is important to describe the current realities of the shifting relationships between humans, nonhumans, and nature. We contend that our discussion of the paradox provides a useful, conceptual entry point for the analysis of species extinction and resurrection, and we conclude by arguing that the case for considering extinction and resurrection remain timely and warranted matters of criminological concern.

Setting the Extinction-Resurrection Context

As Wienhues and colleagues (2023) rightly recognize, there "is not a … consensus on the ethical dimensions of species extinctions" (p. 2). At the same time, we acknowledge that in evolutionary terms, there is a somewhat routine occurrence to extinction, in the sense that some nonhuman species have been already wiped off the face of the earth or are currently on a tragic trajectory leading to their ultimate demise (see Angelici, 2016; Sodhi et al., 2009). Current examples of tragic trajectories include Amur leopards, Sunda tigers, pangolins, mountain gorillas, and Bornean orangutans, among others (World Wildlife Fund, 2022). Yet, said recognition does not erase the anthropocentrically-induced pressures or global human consumption systems that have been and continue to detrimentally affect ecosystems the world over. Moreover, we note that not all nonhuman species or their extinctions (subsequent, inevitable, or otherwise) are alike, and certainly there are differences between them, not only across time, but also geographic settings and contexts. Yet, questions regarding the ethics of extinction and resurrection persist, as we discuss below.

We approach this discussion not only as criminologists, but as concerned citizens observing human-induced climate change and human consumption activities increasingly change the world around us. We maintain agnosticism in our discussion of the ethics of extinction and resurrection; in other words, determining whether extinction is "bad" or "good" demonstrates subjective value judgements, which we assert do little to add to the nuanced and complicated conversations regarding extinction and

resurrection.[ii] Ultimately, the moral judgements one finds reasonable or justified regarding extinction "will not only depend on one's empirical premises (and the quality thereof) but also on different metaphysical, ontological and normative premises and intuitions about how one sees the natural world and how one both relates to it and lives within it" (Wienhues et al., 2023, p. 2). Notwithstanding, we believe empiricism is needed, rather than subjective value judgements, to understand the complicated relationship between extinction and resurrection and to encourage continued effort and work in this area of inquiry. Drawing upon extensive literature from across the fields of extinction studies and green criminology, respectively, but also from cognate disciplines, we endeavour to outline the complicated relationship of extinction and resurrection in what follows.

What is Extinction?

There are three conceptual components we wish to highlight here that span across ethical discussions of extinction and resurrection. We explore each in turn. First, there are different ontological positions on what a "species" is, let alone nonhuman species, or the meaning associated with the term itself (Wienhues et al., 2023; see also Delord, 2007; Ereshefsky, 2022; Maclaurin & Sterelny, 2008). It follows that different meanings of the term will then have subsequent and varying ethical implications (such as in Gruen, 2011; Hull, 1978; Smith, 2016). Second, and in a similar vein, the term *extinction* can be understood in different ways, depending on who defines it, what it comprises, and its associated meanings (see Delord, 2007; Tanswell, 2024). As Wienhues and colleagues (2023) contend, this is of ethical relevance "because (1) it [extinction] frames what falls within the ethics of extinction and, in turn, (2) the way extinction is constructed in controversial cases is in itself subject to ethical scrutiny" (p. 4). Therefore, and given the context, one should be cautious to indicate *global* (i.e., all individuals of a species are gone) if they mean *local* (i.e., loss of a population) extinctions, and vice versa. Put differently, the species itself is not finally extinct but instead functionally extinct. For example, Preston (2021) examines the case of the whitebark pine and contends that "[t]he concern with this type of extinction is not that you will never see individuals of the taxon again. The concern centers on the *anthropogenic reordering of relationships*. Not a loss of life, but a loss of arrangement" (as cited in Wienhues et al., 2023, p. 4). Said another way, changing ecological relationships, rather than on circumstance, is important to note in the context of extinction and resurrection. Third and final, it is necessary to differentiate between mass extinctions and non-mass extinctions (Bendik-Keymer & Haufe, 2016). While beyond the scope of our paper, these differences exist as well, and it is because of these differences that "evaluative judgements about the current 'sixth mass extinction' event on earth seem to be often based on the intuition that mass extinctions are morally more problematic than single extinction events" (Wienhues et al., 2023, p. 4). We acknowledge this distinction as we endeavour to understand the competing challenges of extinction and resurrection, and the ethics therein.

What is Resurrection (i.e., De-extinction)?

When extinctions have already occurred, what could we (or should we) do? Even a cursory glimpse of the environmental philosophy and conservation literatures suggests there is no one answer to this question. There is, however, a growing discussion on the ethics of using current and developing biotechnologies for conservation purposes and beyond (see, for example, Basl & Sandler, 2013; Ehrenfeld, 2006; Kaebnick & Murray, 2013; Oksanen & Siipi, 2014; Preston, 2018). Increasing attention has recently been given to the possibility of engineering species (via gene drives, cloning, etc.; see Preston, 2021; Sandler, 2017, 2019, 2021; Thresher, 2022; Welchman, 2021). Engineering species have the potential to avoid particular species' potential (probable or inevitable) extinction. This is accomplished by genetically adapting nonhuman species to new climate conditions, increasing the genetic diversity of a particular species population (Preston, 2021; Sandler, 2017, 2019, 2021; Welchman, 2021), and/or eradicating invasive nonhuman species that threaten the particular population one might desire to protect from extinction (Thresher, 2022).

Indeed, what was once considered fantasy by many (for example, think of Jurassic Park, the American movie franchise) has become a scientific possibility.[iii] Per Eski (2023), the movie franchise "has been referred to as the best hyperbolic Hollywood entertainment, with an *underlying cautionary narrative of technological hubris that is very real* [emphasis added] (Maynard, 2022)" (p. 3). Moreover, this franchise "captures what happens when we ignore the 'dangers of unfettered entrepreneurship and irresponsible innovation' (Maynard, 2022, [para. 2]), and let science and technology play God with nature's genetic code, especially by resurrecting extinct species without any consensus on what ethical and responsible progress and advancement may look like" (Eski, 2023, p. 3). Here, too, is the perfect example of a cautionary tale for when resurrection could actually introduce new environmental disruptions, particularly when the

focus is centred on monetary gain. Certainly, cross-disciplinary debates on the ethics of animal captivity are directly impacted by species engineering and biotechnologies for conservation programs (one can also consider here breeding programs in zoos, aquaria, and animal sanctuaries; for further discussion, see Kagan et al., 2018; Miller et al., 2024). While some suggest that the facilities mentioned already provide opportunities both for nonhuman species conservation and for rehabilitation (Hutchins et al., 2003; Minteer & Collins, 2013), this does not mean these facilities are isolated from limitations. For instance, one can surmise the ethical challenges surrounding the forced removal of animals from their natural habitats to be placed in the aforementioned facilities (Keulartz, 2015), while noting that these spaces also provide necessary retreat to protect animals from the anthropocentrically-induced environmental destruction of their native habitats.

Relatedly, a second camp of scholarship explores methods, including but not limited to back-breeding, cross-species cloning, and genetic engineering, and how these methods could be used to redress extinctions. Indeed, the possibility of bringing a nonhuman species back from extinction (or de-extinction) has been underexplored in the criminological community yet continues to be raised in discussions within the environmental philosophy community (see, for example, Diehm, 2015; Kasperbauer, 2017; Katz, 2022; Minteer, 2015; Oksanen & Siipi, 2014; Sandler, 2017; Sandler et al., 2022; Turner, 2014). One concern arising from de-extinction methods, however, is how and in what ways differing moral values might be supported or hindered by de-extinction projects (e.g. Cohen, 2014; Haught, 2017; Rohwer & Marris, 2018; Welchman, 2017). In other words, motivations to proceed with the de-extinction of certain species, such as motivations based off of their economic and/or scientific value, among others, may make us question what is incentivizing us to consider bringing species back to life (a discussion we set out below).

Of course, neither the concept nor the process of resurrection/de-extinction is immune to critique. First, "it is important to note that the resulting [nonhuman] species is not the same species as the previously extinct species, but only constitutes a copy" (Wienhues et al., 2023, p. 9), which concerns the species' 'identity,' (see also Blockstein, 2017; Lean, 2020; Siipi & Finkelman, 2017). For example, proponents of resurrecting the woolly mammoth, the dodo bird, or the passenger pigeon propose a resurrection plan based upon both genetic engineering and cloning; however, this would result in a creation that is not a perfection replication of these animals but rather, one that mostly aligns with them (Campbell, 2016; Swedlow, 2015). Others argue that "de-extinction technologies should not be understood as aiming to re-create extinct [nonhuman] species in the first place … which weakens this critique aimed at de-extinction while also reducing its intuitive appeal" (Wienhues et al., 2023, p. 9; see also Lean, 2020). Yet, this raises a host of ethical (if not criminological) questions: What incentive would there be to bring back a perfect replica and/or a mostly aligned species? Will replication perfection ever be achieved, and what does this say about society to (legally or illegally) pursue such a goal? If replication perfection is not achievable, who will still be incentivized to attempt and try, and what do humans gain (or lose) from trying? Given the artificiality and superficiality currently embedded in human consumption systems, what would humans do to (legally or illegally) create an authentically replicated (if not resurrected) species? What harm and/or suffering may be caused in the process?

Second, concerns about nonhuman animal welfare are noteworthy (Browning, 2018; Browning & Veit, 2022; Gamborg, 2014; Kasperbauer, 2017; Oksanen & Siipi, 2014; Turner, 2017). This includes, for example, "the welfare of the animals used for laboratory testing, of the animals that are (re)introduced into ecosystems, and of the animals already living in the target ecosystems" (Wienhues et al., 2023, p. 9). Beyond ethical considerations, this concern also connects with criminology, such as animal cruelty, or put simply, if species are subject to inhumane conditions within a laboratory setting (Frasch, 2017; Groves, 1994) or the lengths to which animal rights movements and/or activists/extremists will go to protect species from testing and/or manipulation by humans (Agres, 2005; Hadley, 2009; Liebman, 2005). There are also concerns regarding "the ecological risks of (re)introducing species into ecosystems and, in effect, what this means for ecosystems beyond the de-extinct species" (Wienhues et al., 2023, p. 9; see also Oksanen & Siipi, 2014). Third and final, the issues of de-extinction as it pertains to the human–nonhuman-nature relationship persists (Katz, 2022; Kohl, 2017). This can be linked to issues about what 'naturalness' means in society writ large (Gamborg, 2014; Katz, 2022).

Philosophical Considerations

As we have seen, issues of extinction and resurrection are deeply complicated. We also contend that such issues are equally philosophical. While our article is not intended to be a philosophical tome, we believe it prudent to briefly outline these implications. Therefore, we will examine them through the lenses of deontology, consequentialism, and virtue ethics, discussed below.

Deontology

To begin, deontology focuses on the human duty to act morally. Any policy developments should consider our responsibility to protect those over whom we have stewardship. Said another way, by recognizing the need to preserve nonhuman species for future generations, for example, we implicitly accept our role as caretakers over our world, alongside any stewardship that requires our roles to be performed appropriately and ethically. Thus, a deontological approach considers (1) the moral duty to preserve life, (2) respect for the natural order, and (3) adherence to legal and moral obligations. A utilitarian approach asks us to consider the positive and negative utilities of de-extinction as well as the use of criminal sanctions against those whose actions result in the extinction of species. Lastly, we turn to virtue ethics to understand the role of character in decision-making.

Duty to Preserve Life

Immanuel Kant's categorical imperative compels us to consider the sanctity of life and respect species' right to life as an end, not as a means to other ends. His famous principle is that one ought to "act only on that maxim through which you can concomitantly will that it should become a universal law" (Kitcher, 2004, p. 555). Following this, conservation efforts then should not be pursued for instrumental reasons such as economic, aesthetic, or other selfish pursuits. Moreover, resurrection efforts should be undertaken to rectify past harms and restore ecological balance. Such an approach, however, is admittedly overly simplistic because it assumes we can fully understand the ramifications of resurrection, including its implications for other species. When a species becomes extinct, it is crucial to study how an ecosystem adapts and compensates for such a loss; we should strive to appreciate the delicate balance of the natural world and our limited understanding of it. It is precisely this complexity that leads some to reject the idea that we are duty-bound to resurrect extinct species, arguing that "the case for retributive justice [is] unconvincing and…acting as if we have a duty to resurrect extinct species will result in a world with less species" (Lean, 2020, p. 571).

Respect for Natural Order

This categorical imperative asserts that we should treat people, and by extension all living beings, as ends in themselves (and not as means to an end). While this may include respecting the natural processes and diverse ecosystems of the world, Lean (2020) contends that doing so is unrealistic. Lean (2020) states the following:

> Duties to extinct species demands us to act in the interests of non-existent, modally fragile non-agents, whom our current actions cannot influence as they currently do not exist. They are extremely abnormal recipients of duties. While we may accept that we have duties to populations of people, future people, extant species, or future species, it seems implausible to entertain duties to extinct species. (p. 586)

Moreover, permitting the extinction and resurrection of nonhuman species without fully understanding the effects risks serious disruptions to the natural order (presuming of course there is a consensually agreed upon understanding of how we define 'naturalness'; see Gamborg, 2014; Katz, 2022). How will said disruptions upset the human–nature relationship (Katz, 2022; Kohl, 2017)? In doing so, we violate our duty to respect life and the balance imbued in the natural order.

Legal and Moral Duties

Finally, imposing criminal sanctions on those who violate regulations leading to species extinction reinforces our duty to uphold justice. These sanctions against offending individuals and corporations affirm our collective commitment to environmental protection and serve as deterrents to further harm. Here, we run into the problem of what Lean (2020) refers to as the "epistemic burden" (p. 583) of determining who is at fault for the extinction of a species. Moreover, as suggested prior, how can we establish moral duties to a species that is extinct? From a practical standpoint, what resources are required to determine the proximate cause(s) and establish the guilt of individuals or corporations? Who would provide these resources and justify their use (Lean, 2020)?

Utilitarianism/Consequentialism

Utilitarianism, a common form of consequentialism, asks us to ensure the greatest good as a consequence of our actions. A common ethical dilemma in using this approach is its future orientation, meaning we cannot be certain of the outcomes of our actions. Despite this epistemic hurdle, we highlight the potential positive and negative outcomes of engaging in species resurrection.

Any positive utility and justification for resurrecting an extinct species may include (but is not limited to) the restoration of ecosystems, the advancement of scientific knowledge, enhanced cultural and educational benefits, recreational benefits (i.e., such as the novelty of seeing a resurrected species), as well as technological advancements (Cohen, 2014). Conversely, the negative utility of

resurrecting species includes the potential that funds allocated to such an endeavor could better be used elsewhere. For example, there could be health concerns to humans as de-extinct nonhuman species may be disease vectors; said de-extinct species may become invasive and overtake other species; and finally, if considered to be sentient beings, relying on procedures such as cloning and the use of surrogates may expose some animals (sentient and non-sentient alike) to undue pain and suffering. Yet, this begs the question: Is it ethical to resurrect species that may cause unethical pain and suffering in other sentient and non-sentient beings? Taken together, de-extinction then may be a moral dilemma to be avoided (Cohen, 2014).

It is also important to consider the utility of relying on criminal sanctions. Current punitive measures aim to deter individuals and corporations from engaging in environmental harms. However, these harms continue to exist and are expanding in many parts of the world where policies are too relaxed or oversight and enforcement are insufficiently robust. Additionally, private (corporate) interests significantly influence policy and law creation and are less likely to support laws that could implicate them in wrongdoing. Therefore, a utilitarian approach to formal sanctions must be independent of corporate interests and sufficiently broad to target wrongdoing beyond national boundaries.

Virtue Ethics

Rooted in Aristotelian ethics, virtue ethics urges us to consider the role of character in guiding our decision-making. While often focused on individual character, we must also consider the importance of collective moral character in our decisions regarding extinction and resurrection. This raises several questions that, while beyond the scope of this article , should be briefly mentioned for context. First, what steps do we take to shape society's moral character so that it acts in a virtuous manner? Second, in a heterogeneous and increasingly complex world, who defines virtue? With these questions in mind, let us address the issues of extinction and resurrection through a virtue ethics framework.

Cultivating Compassion and Responsibility

Cultivating compassion involves embedding empathy throughout primary and secondary socializing institutions such as schools, religious organizations, media outlets, and political organizations. Empathy here refers to both passive and active forms. Passive empathy allows individuals and groups to understand the need to protect existing species and potentially resurrected ones, while active empathy motivates them to change the conditions that lead to ongoing extinction. Resurrection of species can be seen as an act of compassion aimed at repairing prior harms.

Exercising Practical Wisdom

A crucial aspect of virtue ethics involves employing practical wisdom, known as phronesis, to make prudent decisions. Therefore, a virtuous society meticulously evaluates the ecological and ethical ramifications of resurrecting extinct species before proceeding. If a policy has the potential to cause harm, a virtuous society takes measures to prevent such actions. Since society is composed of its members, it is imperative to have political systems and institutions guided by virtuous individuals. Here, we are reminded to acknowledge the limits of humans as a species themselves. Practical wisdom involves exercising caution in our actions. As Minteer (2014) suggests,

> [attempting to revive a lost species] is in many ways a refusal to accept our moral and technological limits in nature…. That is why there is great virtue in keeping extinct species extinct. Meditation on their loss reminds us of our fallibility and our finitude. We are a wickedly smart species, and occasionally a heroic and even exceptional one. *But we are a species that often becomes mesmerized by its own power*. [emphasis added] (as cited in Jennings, 2017, p. S58)

Promoting Justice and Accountability

The use of criminal sanctions against those responsible for harms resulting from the extinction and resurrection of species demonstrates a commitment to just principles. We argue that legal and political mechanisms must embody virtue and remain free from interference by elites. Indeed, some have argued that de-extinction is a form retributive justice because "we owe a mortal debt to the extinct population" (Lean, 2020, p. 571).

Advancing the Connection Between Extinction, Resurrection, and Criminology

Brisman and South (2020) rightly contend and state the following,

> whether we can resurrect extinct species—and how we might do so or which methods we might use—remain important scientific questions for wildlife biologists and geneticists. Should we do so—or why we might bring back extinct

> species—are ethical questions that have relevance for criminology. (p. 924)

So, what might be the reasons why we bring back extinct species? And why should the discipline of criminology scrutinize extinction and resurrection? Drawing upon Brisman and South's (2020) seminal work on a criminology of extinction, as well as Ledec and Goodland's (1988) understandings of why biological diversity should be preserved (of which Brisman and South, 2020, too, draw upon as well), we extensively use these important motivations to demonstrate how such reasons for preservation can align with criminological concerns for extinction and resurrection. We note Eski's (2023) recent exploration of a criminology of the human species, wherein they contend that "the stubborn belief that we will overcome environmental problems through technology is hindering us from addressing the issue of mass extinction realistically. Imaginably, the human species is capable of causing, accelerating, and at the same time denying its own extinction" (p. 39). Criminology is more than just the study of crime, criminals, and criminality; it encompasses a comprehensive scale of exploring and understanding harm, punishment, sanction(s), and associated societal reaction(s), requiring a certain lens that scopes unlawful and 'lawful yet awful' activity (Gacek & McClanahan, 2021). So while the discussion of extinction is not relatively new in the criminological field, the rise of the resurrection industry, and the extinction-resurrection paradox therein, begets us to progress the discussion further than criminological and environmental philosophy scholarship, respectively, anticipated.

Ledec and Goodland (1988) contend that "there exists convincing aesthetic, economic, scientific and ethical reasons to preserve biological diversity – all of which rest on the assumption that the extinction of species is 'completely irreversible' and that, as such, 'preserving biological diversity keeps open important options for the future'" (as cited in Brisman & South, 2020, p. 921). First, the aesthetic justification is that "many wild species of plants and animals are an irreplaceable source of wonder, inspiration, and joy to human beings because of their beauty, intriguing appearance, variety, or fascinating behavior" (Ledec & Goodland, 1988, as cited in Brisman & South, 2020, p. 921). Second, the economic justification for preserving biodiversity rests on the belief that many species of wild plants and animals can be conceptualized as "undeveloped resources… [with] significant economic potential that is currently undiscovered, undervalued, or underutilized" (Ledec & Goodland, 1988, as cited in Brisman & South, 2020, p. 921). Certainly, a resource-oriented view may sound familiar: Biodiversity, per Brisman and South (2020) "underpins agriculture, fishing, forestry and modern food security, as well as necessary products and secondary services" (p. 921; including but not limited to medical, pharmaceutical, tourism, etc.).

Third, the scientific case for preserving biodiversity affirms recognition of "unique biochemical, physiological and population characteristics of non-human species and the benefits to humans that follow from increasing our understanding of basic life processes" (Brisman & South, 2020, p. 921; see also Ledec & Goodland, 1988, pp. 13–14; The Stanford Environmental Law Society, 2001, pp. 3–4).[iv] As Herbig (2010) contends, humans should refrain from engaging in practices that "could lead to the loss of species from peoples' daily lives, customs and conceptual world, thus leaving a culturally and emotionally poorer world for their children" (as cited in Brisman & South, 2020, p. 921). Fourth, the preservation of biological diversity and protection of the environment "for future generations of *humans* is a common refrain in environmentalism" (Brisman & South, 2020, p. 921; see also Brisman & South, 2015a, 2018a).

Fifth, and in a slightly different vein, another ethical or moral justification for biodiversity preservation "begins with the recognition that humans are the one species with the ability to annihilate all other species (intentionally, recklessly, negligently or accidentally) and thus humans not only should exercise restraint with respect to this awesome power but have a duty of stewardship – an obligation not to engage in acts or omissions of ecocide that have significant consequences for biodiversity" (Brisman & South, 2020, p. 921). As Brisman and South (2020) contend, "the human capacity to create systems of production, operating locally but with global impacts, should demand that humans exercise a serious degree of responsibility to, as White (2013: 12) suggests, 'ensure that such production methods do not exceed the ecospheric limits of the planet (White, 2007)'" (p. 921). Other ethical and/or moral justifications for preserving biodiversity suggest that "animals have intrinsic value and that, as such, they should not be conceptualized or treated as economic resources" (Goyes & Sollund, 2016, as cited in Brisman & South, 2020, p. 922). Indeed, as Goyes and Sollund (2018) remark in their study on animal bioprospecting,

> one way to point out the complexities of an issue is by referring to its philosophical substrata, by which we mean the sense of an issue viewed in relation to the wider universe of phenomena … what we consider the meaning of life, whether there is a (morally) right way to live and behave, and what the role of humans is in the universe. (p. 373)

We note, however, "the *aesthetic, economic, scientific* and *ethical* reasons for ensuring continued biological diversity on Earth reflect different – and sometimes competing – ecophilosophies" (Brisman & South, 2020, p. 922; see also Goyes & Sollund, 2018; Halsey & White, 1998; White, 2013). Moreover, Goyes and Sollund (2018) contend that "no matter how one decides to position oneself concerning criminological studies of the acts encompassed by biotechnological use of nonhuman animals, one should assess each case specifically and individually on the grounds that their complexity, and the diversity of practices developed, *calls for caution against making generalized moral evaluations*" (p. 377). While Goyes and Sollund (2018) primarily focus on bioprospecting, the case of abstention from moral evaluations rings true for criminologists wishing to engage in discussion about extinction and resurrection. As Brisman and South (2020) remind us, criminology on the whole "tends to be anthropocentric in its approach and orientation" (p. 928), especially as it continues to emphasize "'the biological, mental and moral superiority of *humans* over all other living and non-living entities,' and viewing non-human nature '*instrumentally* – as something to be appropriated, processed, consumed and disposed of in a manner which best suits the immediate interests of human beings' (Halsey and White 1998: 349; emphases in original)" (as cited in Brisman & South, 2020, p. 928). This "dismissal or denial of the deterioration … of [our] planet will eventually confront us with the ultimate challenge – how to avoid our own extinction (Stephens, 2018)" (Brisman & South, 2020, p. 928). Indeed, how to avoid our own extinction (even whether we are willing to admit it or not) has become a central goal to human survival (see Eski, 2023). The ethics of survival fit hand in glove to extinction and resurrection, for if we are able to resurrect without consequence (bracketing off the legal, moral considerations for a moment), what does surviving extinction mean to human beings and our connection to nature? A similar justification that may resonate with criminologists is outlined by Brisman and South (2020), who suggest the consequences of extinction become important now more than ever before:

> Without biodiversity, the stability, strength, and interdependence of ecosystems are weakened and crucial processes of, for example, photosynthesis, water retention and soil nutrition, are therefore threatened (Tilman 1999). The fundamental risk, then, is that the pace of species extinction gathers momentum to the point of endangering the existence of all life. (p. 922)

Especially now, a criminological lens upon extinction and resurrection remains necessary. The prospect of extinction contradicts "the vision of everlasting human progress … on Earth, which further contributes to the denial of … extinction" (Eski, 2023, p. 45). As Eski (2023) contends,

> we, the human species, are confronted with the gravest (self-inflicted) still not criminalized crime imaginable to us: mass extinction. It is the most annihilating and exploitative act the human species has managed to bring upon itself and the entire planet [emphasis added]. … And still, as we are becoming extinct, the human survival narrative still dominates the public debate. (p. 4)

In a similar vein to cases of denial (Cohen 2001; see also, Brisman & South, 2015a, 2015b; Wyatt & Brisman, 2017), or ignorance (Gacek & Jochelson, 2024), humans are "unwilling to fully comprehend or appreciate what biodiversity loss may mean for the ecosphere and that we may be 'imperiling our own tenure on this planet' (Dawson 2016: 10)" (Brisman & South, 2020, p. 922). For instance, "criminological attention to poaching, trafficking and related animal abuse is now substantial" (Brisman & South, 2020, p. 919) and regularly discussed in the mainstream. Said attention increasingly contributes to enhancing conservation efforts (see Lee et al., 2014; Schneider, 2012; Shepherd et al., 2017, for examples). However, as Brisman and South (2020) contend, although these efforts

> represen[t] a welcome shift, attention to the dynamics of the illegal market for a particular species or the investigation of the scope, extent and geographical range of the international trade in specific wildlife as live bodies or as harvested 'parts and products' has perhaps overshadowed – and may have come at the expense of – broader criminological considerations of biological diversity loss, decline and extinction, of which wildlife crime is but one cause. (p. 919)

Nonetheless, many gaps remain in the extant research linking anthropogenic damages to broader issues, such as terrorism (Dmello & Neudecker, 2024), biodiversity loss (Brisman & South, 2020), or broader criminal offending (Reyes 2007), among others.

If nonhuman beings become 'means to an end' (Goyes & Sollund, 2018, p. 377) to (re)produce the extinction-resurrection industry, our fear is that capitalist and consumerist tendencies will win the day, and criminologists will be left questioning what more they could have done to combat the extinction-resurrection industrial campaign. A criminological exploration of extinction and resurrection, therefore, is quite controversial—perhaps taboo even—because, like a criminology of the human species, the extinction-resurrection paradox "considers the possibility of the *entire human species being deviant* [emphasis added]" (Eski, 2023, p. 6). Should humans survive extinction if we are the deviant actors causing

the era of extinction to happen, or should we have the power to 'play God' by deciding which species can or cannot come back from extinction?

Presenting the Paradox

Now that we have explored the definitional and operational complexities of extinction and resurrection, where does that leave us? To begin, and as Brisman and South (2020) contend,

> this brings us back to the question … regarding why we might attempt to revive extinct [nonhuman] species. From a scientific perspective, it is obvious that studying living species is likely to be more illuminating than studying those that are extinct. The commercial attraction lies with the willingness of consumers (collectors, pet-owners) to pay high prices for resurrected species, with price sensitivity regulated if the technology is also controlled, creating availability but maintaining scarcity. (p. 926)

Given our predominant practices of exploitive capitalist consumerism and anthropocentrically-induced consumptive pressures, what might species extinction and resurrection mean for us as humans and the socio-natural world around us? Currently, and should our consumerist and consumptive practices remain, we (still) face an "age of extinction" (Roman & Li, 2018, as cited in Brisman & South, 2020, p. 926). As Brisman and South (2020) state,

> in a case of hubris and myopia, buying the cosmetic and clothing products of nature, or owning the exotic and rare, can be believed to be a reaffirmation of a benign relationship between humans and nature. But these activities do not really help with the revering or preservation of nature, nor do they really help to protect or conserve wild animal species. (926)

The repeating cycle of extinction-resurrection-extinction-resurrection (and so on) contributes to a culture of consumption of nature "rather than extending empathy or engaging in conservation" (Brisman & South, 2020, p. 926; see also Brisman & South, 2013, 2014). The possibility then arises that species resurrection opens up not just a set of benefits for settler-colonialist opportunities to seize and secure opportunities for colonization to persist but "new markets based on a consumer embrace of faux conservation and the narcissism and vanity of human belief that science can reverse the mistakes of the past" (Brisman & South, 2020, p. 926). Extinction then becomes not the true death of species but a newfound industry to be instrumental in further exploitation of species, intimately connected to securing settler colonization now and in the future (Comack, 2018). The denial of human extinction resembles the dread and fear that burden us on a daily basis, but now on a much larger scope and scale. As Eski (2023) contends,

> living with the fear of extinction and then becoming extinct is a way of life that does not fit into the twenty-first century of the everyday global interconnectedness, of climate change awareness, or of the highly advanced technological progress, through which we as a species imagine ourselves … to be an immortal species. … Our urge to survive has, in a sense, become an existential exercise through which we culturally embed ourselves in our existence as an 'eternal' species. (p. 45)

It will no longer mean the fear of losing species but the fear of losing profits should species not become part of the industrial cycle of extinction and resurrection. Extinction ultimately becomes a moneymaking enterprise, fueling corporate colonialism (Comack, 2018) and no matter the cost to species involved, humans or otherwise. Indeed, a peculiar paradoxical paradigm unfolds here.

Moreover, if extinction is understood "not as the demise of the last individual of a population, but as the disappearance of a way of life, some contend de-extinction projects are doomed to fail, as they do not seem capable of capturing the deeply relational nature of life (Friese, 2013; Jørgensen, 2013)" (Wienhues et al., 2023, p. 10). Can we reconcile our past consumptive practices with our current ones so that we are free in conscience to resurrect species? Or have we learned nothing about our past and thereby are doomed to repeat it? Coupled with the failure of extinction prevention and "the magnitude of the biocultural losses produced by the disappearance of these ways of life, some indicate the importance of mourning and remembrance as a proper response to extinction (de Massol de Rebetz, 2020; van Dooren and Rose, 2017)" (Wienhues et al., 2023, p. 10). Is it ethical to undo the loss we felt when we lost species because of extinction in the first place? How will our loss be lessened through resurrection? And if resurrection is achievable, will the intrinsic value of species loss be lessened in the process? Will the lessening of the loss be for the betterment of humanity or to line the pockets (through legal and/or illegal opportunities and means) of those who can afford to bring back species, with no regard for the impact of other humans and/or ecosystems? What does it say about our society if only the affluent are incentivized and/or able to resurrect extinct species? Perhaps instead of "undoing loss, the moral significance of reflecting – remembering, mourning, grieving and imagining – the disappearances of deeply interwoven ways of life is underlined" (Wienhues et al., 2023, p. 10), demonstrating how complicated the moral and socio-cultural aspects to extinction continue to be. A

criminological exploration of the extinction-resurrection paradox, then, calls upon us to challenge the field of criminology to free ourselves from the "criminological straightjackets that may exist" (Eski, 2023, p. 6), especially those who engage in state-funded criminological research. The powerful, in this case, may be the entire human species itself and its associate unlawful and 'lawful yet awful' activities (Gacek & McClanahan, 2021). Per Brisman and South (2020), "protecting a species – to say nothing of bringing back a species – requires more than just preservation (or de-extinction) of that one species. It necessitates safeguarding (or, in the case of an extinct species, ensuring) the availability and appropriateness of habitat and food supply" (p. 927). Further, protection requires a coordinated interdisciplinary effort – engagement with the topic in law, criminal justice, technology, politics, sociology, and more are needed to provide a holistic response to ethical species protection. To both recognize and combat the entire human species' annihilating and exploitative tendencies becomes a central goal of criminological examinations of the extinction-resurrection paradox and helps us begin to coordinate such efforts. If we believe humans are worth saving from (or surviving) extinction, then more needs to be done to see this salvation materialize.

Of course, the extinction-resurrection paradox raises more questions than we can answer here. Notwithstanding, our conceptual thought-experiment-of-sorts offers a chance to study these questions and the ethical and moral interconnectedness of extinction and resurrection. This paradox equally serves as a call for research to further engage in the topic within the academic discourse and related realms.

Recommendations for Future Research and Policy

To begin, future research in this area should delve into how intersecting identities and communities understand issues of extinction and resurrection. This is necessary, given the interconnected nature of environmental racism and its closeness to environmental hazards (Lynch & Barrett, 2017) and corporate colonialism (Comack, 2018). Future studies may also wish to evaluate government legislation and/or corporate policies on species extinction and resurrection, determining whether (i) laws protect biological diversity in their respective jurisdictions and (ii) whether policies, specifically those from companies and/or industry wishing to engage in extinction and resurrection, are engaging in direct or indirect criminal acts, and/or producing harm on human populations (and our nonhuman counterparts). Said legislation and policies should be evaluated to determine whether they should be progressed, amended, or retracted altogether.

We also recommend several avenues of research into species extinction and resurrection, such as (1) the relationship between humans and nonhuman species extinction/resurrection and (2) reporting requirements to law enforcement agencies where the possibility of crimes of extinction and/or resurrection may arise. Other points of interest for research include (3) the influence of species extinction and resurrection on various systems, including but not limited to justice, economy, education, and health; (5) perceptions of legitimacy of government and corporate actions to conserve biological diversity and ways to increase accountability of said actions alongside public transparency; and (6) community oversight into preservation/conservation efforts conducted by governments and/or companies.

As evidenced from the proceeding discussion and theorization, the need for research in this area transcends disciplinary borders. To encourage innovation, we call for interdisciplinary collaborations and partnerships within this space. Researchers have long examined the legal status of non-humans within the Anthropocene (Brown, 2022; Ezra, 2017; Gellars, 2021; Gacek & Jochelson, 2020). For example, the case has long been argued that personhood rights should extend beyond humans to animals as well (Ross, 2019; Staker, 2017; Jochelson & Gacek, 2018). Indeed, if we begin to conceptualize nonhumans as persons, then debates and discussions related to animal cruelty, sexual consent, or homicide, among others, become applicable here as well. Moreover, the legal and ethical challenges posed of species resurrection are similar when understanding cryonics (e.g., Best, 2008; Erte & Efimkova, 2019; Huxtable, 2018; Safari & Bouzari, 2020). In other words, saving DNA material and genomes of at-risk, near-extinct, or extinct species to be brought back at a later date and time is part of the larger ethical and moral debate, too. Relatedly, considering place and geographic integration from respective fields of environment studies and anthropology, for example, are necessary as well. Certainly, one can consider reintroducing species into the wild and its associated risk assessment work (e.g., Beck et al., 2007; Genovesi & Simberloff, 2020).

Beyond academia, scrutiny of the extinction-resurrection paradox by policymakers, activists, and practitioners is also of the utmost importance. While relevant to global audiences, areas with high levels of biodiversity are of greatest risk. For example, reports indicate that approximately "85% of Australia plant species are endemic" (Australian Government, 2021, n.p.). Within this context, policymakers should be of greater concern because the local ecosystems are more susceptible to higher order effects from either extinctions or resurrections of individual species.

More broadly, within ongoing discussions about decolonization and Indigenization, consideration should also be given to how topics around environmental justice relate. For example, Indigenous legal orders in Canada, in particular contexts, assign personhood to some animals (Deckha, 2020; Legge & Robinson, 2017). Thus, considerations about resurrection or potentially varying the legal status and associated protections of animals directly impacts relations with First Nations and/or Indigenous Peoples.

Conclusion

As Brisman and South (2020) rightly contend, "humans bear the responsibility for extinctions" (p. 929). While humans are remarkable beings in many respects, we must forgo the fantasy that we are the centre of the universe. Despite the varied justifications for preserving biological diversity, it remains clear that "biological diversity continues to be reduced at an unprecedented rate" (Brisman & South, 2020, p. 922). Our paper endeavours to spark further intrigue into the interconnectedness between extinction, resurrection, and criminology, and we concur with Brisman and South (2020) that "the development and use of technologies of de-extinction require scrutiny and caution" (p. 929; see also Brisman & South, 2017, 2018b).

Indeed, interrogating the intricate coupling of species extinction and resurrection is no easy task. Yet, our focus here on the extinction-resurrection paradox provides us a unique and conceptual entry point to embark on examining other and increasing ways in which extinction and resurrection connect with criminological inquiry. Given our exploration, perhaps greater scrutiny and caution must be considered now more than ever before. Not only is reviving particular species easier said than done, but there is still legal, moral, and ethical ambiguity tied to resurrection—more than previously anticipated.

Questions of justice and criminological inquiry complicate these philosophical commitments in important ways, particularly when the costs of environmental degradation fall unevenly across human communities. Robert Figueroa's (2022) work on environmental justice insists that any adequate environmental ethics must address the disproportionate exposure of marginalised communities (defined by race, class, and geography), to pollution, resource depletion, and ecological risk. This emphasis on distributional equity and recognition creates a productive tension with more strictly ecocentric positions, demanding that the move beyond anthropocentrism not come at the expense of attention to human vulnerability and structural injustice. Bryant's earlier pedagogical writing gestures toward a similar urgency, arguing that thinking in the Anthropocene requires forms of critical education that disrupt comfortable assumptions about nature, society, and human exceptionalism (Bryant, 2015). Together, these perspectives suggest that ecocriticism and environmental philosophy are most powerful not when they choose between human and nonhuman concern but when they hold both in view. Thus, when considering the extinction-resurrection paradox, it is imperative to critically examine the potential capitalistic human gains in conjunction with the impact of species revival on the broader natural order; this aligns with broader arguments from green criminology urging serious consideration in this space (Brisman & South, 2020).

Furthermore, our current and predominant capitalist consumptive practices suggest we may not have learned the lessons of the past. If true, then humankind may not be able to progress with certainty towards the marvels—or nightmares--of de-extinction advancements and technologies. It is equally uncertain that those in power—be they political, scientific, or corporate—will be incentivized to use these advancements and technologies fairly or transparently or for the betterment of our earth. Perhaps reflecting upon our current and detrimental consumerist and capitalist situation would be better than dashing hastily towards de-extinction projects with little of the ethical, moral, and legal ramifications in mind. We must recognize that an ecological crisis is simultaneously a crisis of justice, ontology, and collective responsibility. Consequently, species justice is an essential consideration within this space (Fitz-Henry, 2022; Goyes & Sollund, 2018), and it must be critically examined in the context of de-extinction, but also further legal mechanisms are needed to ensure the protection of animals from intentional extinction as well as welfare initiatives post-resurrection (Azvedo & Magalhães-Sant'Ana, 2025). Only time will tell how the extinction and resurrection debate will unfold, but as we demonstrate, such a debate would benefit from criminological insight and for criminologists to consider.

References

Agres, T. (2005). Fighting back against terror: tactics of researchers and extremists change as attacks against animal labs rise. *The Scientist*, *19*(17), 44–45.

Angelici, F. M. (Ed.). (2016). *Problematic wildlife: A cross-disciplinary approach*. Springer.

Azevedo, A., & Magalhães-Sant'Ana, M. (2025). Reviving the dire wolf? A case study in welfare ethics, legal gaps, and ontological ambiguity. *Animals, 15*(13), 1839–1862. https://doi.org/10.3390/ani15131839

Australian Government. (2021). *State of the Environment*. Commonwealth of Australia. Available at: https://soe.dcceew.gov.au/biodiversity/environment/flora-and-fauna.

Basl, J., & Sandler, R. L. (Eds.). (2013). *Designer biology: The ethics of intensively engineering biological and ecological systems.* Lexington Books.

Beck, B., Walkup, K., Rodrigues, M., Unwin, S., Travis, D., & Stoinski, T. (Eds.). (2007). *Best practice guidelines for the re-introduction of great apes* (No. 35). International Union for Conservation of Nature. https://iucn-ctsg.org/wp-content/uploads/2018/02/Guidelines-for-the-Reintroduction-of-Great-Apes.pdf

Bendik-Keymer, J., & Haufe, C. (2016). Anthropogenic mass extinction: The science, the ethics, and the civics. In S. M. Gardiner & A. Thompson (Eds.), *The Oxford handbook of environmental ethics* (pp. 427–437). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199941339.013.38

Benton, T. (1991). Biology and social science: Why the return of the repressed should be given (cautious) welcome. *Sociology, 25*(1), 1–29. https://doi.org/10.1177/0038038591025001002

Benton, T. (2008). Environmental values and human purposes. *Environmental Values, 17*(2), 201–220. http://dx.doi.org/10.3197/096327108X303855

Best, B. P. (2008). Scientific justification of cryonics practice. *Rejuvenation Research*, *11*(2), 493–503. https://doi.org/10.1089/rej.2008.0661

Blockstein, D. E. (2017). We can't bring back the passenger pigeon: The ethics of deception around de-extinction. *Ethics, Policy & Environment 20*(1), 33–37. https://doi.org/10.1080/21550085.2017.1291826

Brannen, P. (2017, September 9). This is how your world could end. *The Guardian*. https://www.theguardian.com/environment/2017/sep/09/this-is-how-your-world-could-end-climate-change-global-warming

Brisman, A., & South, N. (2013). A green-cultural criminology: An exploratory outline. *Crime Media Culture*, *9*(2), 115–135. https://doi.org/10.1177/1741659012467026

Brisman, A., & South, N. (2014). *Green cultural criminology: Constructions of environmental harm, consumerism and resistance to ecocide.* Routledge.

Brisman, A., & South, N. (2015a). 'Life stage dissolution', infantilization and anti-social consumption: Implications for de-responsibilization, denial and environmental harm. *Young, 23*(3), 209–221. https://doi.org/10.1177/1103308815584876

Brisman, A., & South, N. (2015b). New 'folk devils', denials and climate change: Applying the work of Stanley Cohen to green criminology and environmental harm. *Critical Criminology, 23*(4), 449–460. https://doi.org/10.1007/s10612-015-9288-1

Brisman, A., & South, N. (2017). Consumer technologies, crime and environmental implications. In M. R. McGuire & T. J. Holt (Eds.), *The Routledge handbook of technology, crime and justice* (pp. 310–324). Routledge.

Brisman, A., & South, N. (2018a). Green Criminology, zemiology, and comparative and inter-relational justice in the Anthropocene era. In A. Boukli & J. Kotzé (Eds.), *Just harm? Rethinking zemiology and the broader context of social harm* (pp. 203–221). Palgrave Macmillan.

Brisman, A., & South, S. (2018b). Perspectives on wildlife crime: A green criminological approach. In W. D. Moreto (Ed.), *Wildlife crime: From theory to practice*) pp. 17–37). Temple University Press.

Brisman, A., & South, N. (2020). A criminology of extinction: Biodiversity, extreme consumption and the vanity of species resurrection. *European Journal of Criminology, 17*(6), 918–935. https://doi.org/10.1177/1477370819828307

Brown, R. (2022). Not-So-Human rights? A case for granting non-humans legal personhood. *Manchester Review of Law, Crime & Ethics*, *11*, 147-163.

Browning, H. (2018). Won't somebody please think of the mammoths? De-extinction and animal welfare. *Journal of Agricultural and Environmental Ethics, 31*(6), 785–803.

Browning, H., & Veit, W. (2022). More than zombies: Considering the animal subject in De-extinction. *Ethics, Policy & Environment, 25*(2), 121–24. https://doi.org/10.1080/21550085.2022.2071552

Bryant, L. R. (2015). For an apocalyptic pedagogy. *Chiasma: A Site for Thought, 2*(1), 46–60.

Bryant, L. R. (2024). An ethics of the wild. In B. Olsen, S. Farstadvoll, & G. Godin (Eds.), pp. 25-38, *Unruly heritage: Archaeologies of the Anthropocene.* Bloomsbury Publishing.

Campbell, D. (2016). A case for resurrecting lost species. [Review of the book *How to clone a mammoth: The science of de-extinction* by Beth Shapiro]. *Biology & Philosophy*, *31*(5), 747–759. https://doi.org/10.1007/s10539-016-9534-2

Cohen, S. (2001). *States of denial: Knowing about atrocities and suffering*. Polity.

Cohen, S. (2014). The ethics of de-extinction. *NanoEthics, 8*(2), 165–178. https://doi.org/10.1007/s11569-014-0201-2

Comack, E. (2018). Corporate colonialism and the 'crimes of the powerful' committed against the Indigenous peoples in Canada. *Critical Criminology*, *26*(4), 455–471. https://doi.org/10.1007/s10612-018-9414-y

Deckha, M. (2020). Unsettling anthropocentric legal systems: Reconciliation, Indigenous laws, and animal personhood. *Journal of Intercultural Studies*, *41*(1), 77–97. https://doi.org/10.1080/07256868.2019.1704229

Delord, J. (2007). The nature of extinction. *Studies in History and Philosophy of Biological and Biomedical Sciences, 38*(3), 656–667. https://doi.org/10.1016/j.shpsc.2007.06.004

Delord, J. (2014). Can we really re-create an extinct species by cloning? A metaphysical analysis. In M. Oksanen & H. Siipi (Eds.), *The ethics of animal re-creation and modification* (pp. 22–39). Palgrave Macmillan. https://doi.org/10.1057/9781137337641

Diehm, C. (2015). Should extinction be forever? Restitution, restoration, and reviving extinct species, *Environmental Ethics, 37*(2), 131–143.

Dmello, J. R., & Neudecker, C. H. (2024). Monsoon marauders and summer violence: Exploring the spatial relationship between climate change and terrorist activity in India. *Journal of Applied Security Research*, 1-26.

Ehrenfeld, D. (2006). Transgenics and vertebrate cloning as tools for species conservation. *Conservation Biology, 20*(3), 723–732. https://doi.org/10.1111/j.1523-1739.2006.00399.x

Ereshefsky, M. (2022). Species. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy*. https://plato.stanford.edu/archives/sum2022/entries/species/

Erte, L. A., & Efimkova, K. S. (2019). Cryonics: legal and ethical aspects. *Bioethics Journal*, *12*(2), 30–36. https://doi.org/10.19163/2070-1586-2019-2(24)-30-36

Eski, Y. (2023). *A criminology of the human species: Setting an unsettling tone*. Springer.

European Environment Agency. (2015). *The European Environment State and Outlook 2015: Assessment of Global Megatrends*. https://www.eea.europa.eu/en/analysis/publications/the-european-environment-state-and-outlook-2015-synthesis-report/global-megatrends/@@download/file

Ezra, O. (2017). The rights of non-humans: From animals to silent nature. *The Law & Ethics of Human Rights*, *11*(2), 285–304. https://doi.org/10.1515/lehr-2017-0010

Figueroa, R. M. (2022). Environmental justice. In B. Hale, A. Light, & L. Lawhon (Eds.), *The Routledge companion to environmental ethics* (pp. 767–782). Routledge.

Fitz-Henry, E. (2022). Multi-species justice: a view from the rights of nature movement. *Environmental Politics, 31*(2), 338–359. https://doi.org/10.1080/09644016.2021.1957615

Francione, G. L. (2009). *Animals as persons: Essays on the abolition of animal exploitation*. Columbia University Press.

Frasch, P. D. (2017). Gaps in US animal welfare law for laboratory animals: perspectives from an animal law attorney. *Institute for Laboratory Animal Research Journal*, *57*(3), 285–292. https://doi.org/10.1093/ilar/ilw016

Gacek, J. & Jochelson, R. (2020). Animals as Something More than Mere Property: Interweaving Green Criminology and Law. *Social Sciences* 9(122): 1-16. Gacek, J. & Jochelson, R. (Eds.) (2024). *Justice in the Age of Agnosis: Socio-Legal Explorations of Denial, Deception, and Doubt.* Switzerland: Palgrave Macmillan.

Gacek, J. & McClanahan, B. (2021). Learning about the Illegal and the 'Lawful yet Awful': Progressing Public Criminology in the University Classroom. *Journal of Criminal Justice Education,* 32(4): 495-512. https://doi.org/10.1080/10511253.2021.1916051

Gamborg, C. (2014). What's so special about reconstructing a mammoth? Ethics of breeding and biotechnology in re-creating extinct species. In M. Oksanen & H. Siipi (Eds.), *The ethics of animal re-creation and modification: Reviving, rewilding, restoring* (pp. 60–76). Palgrave Macmillan.

Gellers, J. C. (2021). Earth system law and the legal status of non-humans in the Anthropocene. *Earth System Governance*, *7*, 1–8. https://doi.org/10.1016/j.esg.2020.100083

Genovesi, P., & Simberloff, D. (2020). "De-extinction" in conservation: Assessing risks of releasing "resurrected" species. *Journal for Nature Conservation*, *56*, Article 125838. https://doi.org/10.1016/j.jnc.2020.125838

Goyes, D. R., & Sollund, R. (2018). Animal abuse, biotechnology and species justice. *Theoretical Criminology*, *22*(3), 363–383. https://doi.org/10.1177/1362480618787179

Groves, J. M. (1994). Are smelly animals happy animals? Competing definitions of laboratory animal cruelty and public policy. *Society & Animals*, *2*(2), 125–144. https://doi.org/10.1163/156853094X00144

Gruen, L. (2011). *Ethics and animals*. Cambridge University Press.

Hadley, J. (2009). Animal rights extremism and the terrorism question. *Journal of Social Philosophy*, *40*(3), 363–378. https://doi.org/10.1111/j.1467-9833.2009.01457.x

Halsey, M., & White, R. (2017). Crime, ecophilosophy and environmental harm. In N. South (Ed.), *Green criminology* (pp. 195–222). Routledge. https://doi.org/10.4324/9781315093390

Halsey, M., & White, R. (1998). Crime, ecophilosophy and environmental harm. *Theoretical Criminology, 2*(3), 345–371. https://doi.org/10.1177/1362480698002003003

Harman, G. (2018). *Object-oriented ontology: A new theory of everything*. Penguin UK.

Haught, P. (2017). Integral value and the virtue of hospitality: A response to Kasperbauer. *Ethics, Policy & Environment, 20*(1), 29–32. https://doi.org/10.1080/21550085.2017.1291830

Hull, D. (1978). A matter of individuality. *Philosophy of Science, 45*(3), 335–360. https://doi.org/10.1086/288811

Hunt, K. (2025, April 8). *Scientists say they have resurrected the dire wolf.* CNN. https://edition.cnn.com/2025/04/07/science/dire-wolf-de-extinction-cloning-colossal/index.html

Hutchins, M., Smith, B., & Allard, R. (2003). In defense of zoos and aquariums: The ethical basis for keeping wild animals in captivity. *Journal of the American Veterinary Medical Association*, *223*(7), 958–966. https://doi.org/10.2460/javma.2003.223.958-2

Huxtable, R. (2018). Cryonics in the courtroom: Which interests? Whose interests? *Medical Law Review*, *26*(3), 476–499. https://doi.org/10.1093/medlaw/fwx045

Jennings, B. (2017). The moral imagination of de-extinction. *Hastings Center Report, 47*(4), S54–S59. https://doi.org/10.1002/hast.753

Jochelson, R. & Gacek, J. (2018). 'Ruff' Justice: Canine Cases and Judicial Law Making as an Instrument of Change. *Animal Law Review,* 24(1), 171-195. https://lawcommons.lclark.edu/alr/vol24/iss1/9

Kagan, R., Allard, S., & Carter, S. (2018). What is the future for zoos and aquariums? *Journal of Applied Animal Welfare Science*, *21*(sup1), 59–70. https://doi.org/10.1080/10888705.2018.1514302

Kaebnick, G. E. & Murray, T. H. (Eds.). (2013). *Synthetic biology and morality: Artificial life and the bounds of nature*. MIT Press.

Kasperbauer, T. J. (2017). Should we bring back the passenger pigeon? The ethics of de-extinction. *Ethics, Policy & Environment, 20*(1), 1–14. https://doi.org/10.1080/21550085.2017.1291831

Katz, E. (2022). Considering de-extinction: Zombie arguments and the walking (and flying and swimming) dead. *Ethics, Policy & Environment, 25*(2), 81–103. https://doi.org/10.1080/21550085.2022.2071550

Keulartz, J. (2015). Captivity for conservation? Zoos at a crossroads. *Journal of Agricultural and Environmental Ethics*, *28*, 335–351. https://doi.org/10.1007/s10806-015-9537-z

Kitcher, P. (2004). Kant's argument for the categorical imperative. *NOÛS, 38*(4), 555–584. https://doi.org/10.1111/j.0029-4624.2004.00484.x

Kohl, P. (2017). Using de-extinction to create extinct species proxies; natural history not included. *Ethics, Policy & Environment, 20*(1), 15–17. https://doi.org/10.1080/21550085.2017.1291832

Kotarba-Morley, A., Westra, S., Andrews, G., Bardsley, D., Baum, F., Bi, P., Connell, S., Daniels, C., Delpin, M., Dmello, J., Drew, G., Eagle, A., Fordham, D., Freeman, T., Hanson-Easey, S., Hawken, S., Helfgott, A., Jones, A., Keenihan, S., . . . Lowe, A. (2026). Evaluative governance for climate action in Australia. *Nature Sustainability*, *9*(7), 944–946. https://doi.org/10.1038/s41893-026-01814-x .

Korsgaard, C. M. (2018). *Fellow Creaturescreatures: Our Obligations obligations to the Other other Animalsanimals*. Oxford University Press.

Lean, C. H. (2020). Why wake the dead? Identity and de-extinction. *Journal of Agricultural and Environmental Ethics, 33*(4), 571–589. https://doi.org/10.1007/s10806-020-09839-8

Ledec, G., & Goodland, R. (1988). *Wildlands: Their protection and management in economic development*. The International Bank for Reconstruction and Development/ The World Bank.

Lee, T. M., Sigouin, A., Pinedo-Vasquez, M. & Nasi, R. (2014). *The harvest of wildlife for bushmeat and traditional medicine in East, South and Southeast Asia: Current knowledge base, challenges, opportunities and areas for future research* (Occasional Paper 115). Center for International Forestry Research. https://www.landscapealliance.org/publications/pdf_files/OccPapers/OP-115.pdf

Legge, M. M., & Robinson, M. (2017). Animals in Indigenous spiritualties: Implications for critical social work. *Journal of Indigenous Social Development*, *6*(1), 1–20. https://journalhosting.ucalgary.ca/index.php/jisd/article/view/58460/43966

Liebman, M. (2005). I fought the law [Review of the book *Terrorists or freedom fighters? Reflections on the liberation of animals*, Edited by S. Best & A. J. Nocella II]. *Journal of Animal Law*, *1*(1), 151–175. https://www.animallaw.info/sites/default/files/jouranimallawvol1_p151.pdf

Lynch, M. J., & Barrett, K. L. (2017). Environmental crime and justice. In R. Holifield, J. Chakraborty, & G. Walker (Eds.), *The Routledge handbook of environmental justice* (pp. 1–12). Routledge.

MacLaurin, J., & Sterelny, K. (2008). *What is biodiversity?* Chicago University Press.

Miller, D. S., Dudzinski, K. M., Anthony, R., Hill, H. M., & Stafford, G. (2024). Zoo and aquarium animal welfare, ethics, and behavior. *Animals*, *14*(11), 1552–1555. https://doi.org/10.3390/ani14111552

Minteer, B. A. (2015). The perils of de-extinction. *Minding Nature, 8*(1), 11–17. https://www.humansandnature.org/filebin/pdf/minding_nature/january_2015/The_Perils_of_De-extinction.pdf

Minteer, B. A., & Collins, J. P. (2013). Ecological ethics in captivity: Balancing values and responsibilities in zoo and aquarium research under rapid global change. *Institute for Laboratory Animal Research Journal*, *54*(1), 41–51. https://doi.org/10.1093/ilar/ilt009

Oksanen, M. (2007). Species extinction and collective responsibility. In I. Kuçuradi, S. Voss, & C. Güzel (Eds.), *Proceedings of the twenty-first World Congress of Philosophy* (Vol. 3, pp. 179–183). Philosophical Society of Turkey. https://doi.org/10.5840/wcp2120073257

Oksanen, M. & Siipi, H. (2014). Introduction: Towards a philosophy of resurrection science. In M. Oksanen & H. Siipi (Eds.), *The ethics of animal re-creation and modification: Reviving, rewilding, restoring* (pp. 1–21). Palgrave Macmillan.

Powell, R. (2011). On the nature of species and the moral significance of their extinction. In T. L. Beauchamp & R. G. Frey (Eds.), *The Oxford handbook of animal ethics*. Oxford University Press.

Preston, C. J. (2018). *The synthetic age: Outdesigning evolution, resurrecting species, and reengineering our world*. MIT Press.

Preston, C. J. (2021). *Extinct and alive: Towards a broader account of loss*. Philosophia.

Reyes, J. W. (2007). Environmental policy as social policy? The impact of childhood lead exposure on crime. *NBER Working Paper Series,* 13097. https://doi.org/10.3386/w13097

Ripple, W. J., Wolf, C., Newsome, T. M., Galetti, M., Alamgir, M., Crist, E., . . . & 15,364 Scientist Signatories from 184 Countries. (2017). World scientists' warning to humanity: A second notice. *BioScience*, *67*(12), 1026–1028. https://doi.org/10.1093/biosci/bix125

Rohwer, Y., & Marris, E. (2018). An analysis of potential ethical justifications for mammoth de-extinction and a call for empirical research. *Ethics, Policy & Environment, 21*(1), 127–142. https://doi.org/10.1080/21550085.2018.1448043

Ross, D. (2019). Consciousness, language, and the possibility of non-human personhood: Reflections on elephants. *Journal of Consciousness Studies*, *26*(3–4), 227–251.

Safari, N., & Bouzari, S. (2020). Comparative study of legal aspects of cryonics in Iran and US law. *Medical Law Journal*, *13*(51), 155–176.

Sandler, R. L. (2017). De-extinction: Costs, benefits and ethics. *Nature Ecology & Evolution*, *1*(4), Article 0105. https://doi.org/10.1038/s41559-017-0105

Sandler, R. L. (2019). Should we engineer species in order to save them? *Environmental Ethics, 41*(3), 221–236. https://doi.org/10.5840/enviroethics201941323

Sandler, R. L. (2021). Species conservation, biotechnology, and intergenerational ethics. In S. M. Gardiner (Ed.), *The Oxford handbook of intergenerational ethics* (pp. 809–823). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190881931.013.52

Sandler R, Stabell, E. D., Baylon, R., Lundgren, C., Weisbeek, P., Yelle, B., & Zaba, M. (2022). Eric Katz on "de-extinction": Ontology, value and normativity. *Ethics, Policy & Environment, 25*(2), 104–108. https://doi.org/10.1080/21550085.2022.2071554

Schneider, J. L. (2012). *Sold into extinction: The global trade in endangered species*. Praeger.

Seto, K. C., Guneralp, B., & Hutyra, L. R. (2012). Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. *Proceedings of the National Academy of Sciences, 109*(40), 16083–16088.

Shepherd, C. R., Connelly, E., Hywood, L., & Cassey, P. (2017). Taking a stand against illegal wildlife trade: The Zimbabwean approach to pangolin conservation. *Oryx, 51*(2), 280–285. https://doi.org/10.1017/S0030605316000119

Siipi, H., & Finkelman, L. (2017). The extinction and de-extinction of species. *Philosophy and Technology, 30*, 427–441. https://doi.org/10.1007/s13347-016-0244-0

Smith, I. A. (2016). *The intrinsic value of endangered species*. Routledge.

Sodhi, N. S., Brook, B. W., & Bradshaw, C. J. A. (2009). Causes and consequences of species extinctions. In S. A. Levin (Ed.), *The Princeton guide to ecology* (pp. 514–520). Princeton University Press.

Staker, A. (2017). Should chimpanzees have standing? The case for pursuing legal personhood for non-human animals. *Transnational Environmental Law*, *6*(3), 485–507. https://doi.org/10.1017/S204710251700019X

The Stanford Environmental Law Society. (2001). *The endangered species act*. Stanford University Press.

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., & Ludwig, C. (2015). The trajectory of the Anthropocene: The great acceleration. *The Anthropocene Review, 2*(1), 81–98. https://doi.org/10.1177/2053019614564785

Swedlow, M. R. (2015). The woolly-mammoth in the room: The patentability of animals brought back from extinction through cloning and genetic engineering. *Washington Journal of Law, Technology & Arts*, *11*, 183–196. https://digitalcommons.law.uw.edu/wjlta/vol11/iss3/3

Tanswell, F. S. (2024). The concept of extinction: Epistemology, responsibility, and precaution. *Ethics, Policy & Environment*, *27*(2), 205–226. https://doi.org/10.1080/21550085.2022.2133937

Thresher, A. C. (2022). When extinction is warranted: Invasive species, suppression-drives and the worst-case scenario. *Ethics, Policy & Environment, 25*(2), 132–152. https://doi.org/10.1080/21550085.2020.1848197

Turner, D. D. (2014). The restoration argument for extinction reversal. In M. Oksanen & H. Siipi (Eds.), *The ethics of animal re-creation and modification: Reviving, rewilding, restoring* (pp. 40–59). Palgrave Macmillan.

Welchman, J. (2017). 'How much is that mammoth in the window'? *Ethics, Policy & Environment, 20*(1), 41–43. https://doi.org/10.1080/21550085.2017.1299674

Welchman J (2021) Does justice require De-extinction of the heath hen? In B. Bovenkerk & J. Keulartz (Eds.), *Animals in our midst: The challenges of co-existing with animals in the Anthropocene* (pp. 513–532). Springer International Publishing.

White, R. (2018). Ecocentrism and criminal justice. *Theoretical Criminology, 22*(3), 342–362. https://doi.org/10.1177/1362480618787178

White, R. (2013). *Environmental harm: An eco-justice perspective*. Policy Press.

Wienhues, A., Baard, P., Donoso, A., & Oksanen, M. (2023). The ethics of species extinctions. *Cambridge Prisms: Extinction, 1*, Article e23. https://doi.org/10.1017/ext.2023.21

World Wildlife Fund. (2022). *10 of the world's most endangered animals*. https://www.wwf.org.uk/learn/wildlife/endangered-animals.

Wyatt, T., & Brisman, A. (2017). The role of denial in the 'theft of nature': A comparison of biopiracy and climate change. *Critical Criminology, 25*(3), 325–341. https://doi.org/10.1007/s10612-016-9344-5

Zimmer, C. (2013). Back to life. *National Geographic, 223*(4), 28–43. https://carlzimmer.com/bringing-them-back-to-life-239/

About the Authors

James Gacek is an Associate Professor and Head of the Department of Criminology at the University of Regina. He continues to extensively publish in reviews, journals and international fora, particularly in areas of (1) corrections and community justice; (2) green criminology; and (3) the broader socio-politics of judicial reasoning. Current research explores the complex needs of older individuals in custody and upon release, including but not limited to challenges with aging, palliative care, medical assistance in death, and natural death.

Jared R. Dmello is a Senior Lecturer in the School of Society and Culture at Adelaide University and a non-residential Research Associate at the Center on Public Security at Rutgers University. He is also on the Executive Committee of the Addressing Violent Extremism and Responses to Terrorism (AVERT) Network. Dr. Dmello's work primarily focuses on interdisciplinary approaches to investigating illicit networks, including terrorism, gangs, and trafficking activities.

Amin Asfari is an Associate Professor in the Department of Criminology at the University of Regina, where he is also the Founding Director of the Criminal Justice Centre for Advocacy, Research, and Education (CJCARE). His research examines Islamophobia, policing, criminal justice, public policy, and the experiences of Muslim communities in North America. His interdisciplinary work draws on criminology, public policy, and sociolegal studies to examine institutional responses to racialization, surveillance, and discrimination/hate crime.

Endnotes

[i] Literature differs on whether to use terms like 'resurrection' versus 'de-extinction.' Rather than engage in a discussion of semantics, we respectively recognize how some literature may interchange terms, while others have distinctive reasons to use one term over others. Our use of terms will vary by context.

[ii] One may consider extinctions of all species to be morally problematic (or 'bad,' in simple terms). Yet, by considering such extinctions as 'bad' or 'wrong,' we could inevitably downplay if not decrease anthropogenic causation's moral relevance (see Powell, 2011). For discussions of extinction aligning with discussions of moral responsibility, see Oksanen (2007).

[iii] Yet, and much to the chagrin of the authors, resurrecting dinosaurs is (still) presently out of reach (Delord, 2014). As Zimmer (2013) explains, "in reality the only species we can hope to revive now are those that died within the past few tens of thousands of years and left behind remains that harbor intact cells or, at the very least, enough ancient DNA to reconstruct the creature's genome" (p. 33). Moreover, as Delord (2014) indicates, "even if all sorts of *Jurassic Park* fantasies, such as re-creating extinct dinosaurs, have been completely dismissed by scientific studies on the rate of DNA destruction, more realistic projects of fossil DNA sequencing are commonly conducted today" (p. 22). Nevertheless, resurrecting the species of those that vanished during (and/or because of) humanity's ascension to world domination is increasingly becoming a scientific possibility.

[iv] We recognize these benefits may exist independently of any perceived or actual economic payoff.