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Invasion biology and its discontents.

Human supremacy, language, and animal treatment

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1. **Introduction**
2. **Classification of invasive alien species**
3. **Emerging ethical critiques of invasion biology**
4. **Initial objections from invasion biology**
5. **The assumption of human supremacy**
6. **Language, classification, and treatment**
7. **Differential treatment: Animals in agriculture and humans**
8. **Stock and performative treatment of “invasives”**
9. **Conclusion: Looking forward**

Keywords: alien species, conservation, demonization, ecology, ethics, human supremacy, invasion biology.

Abstract. *Invasion biology is increasingly facing criticism, including for its moral attitudes towards “invasive alien species.” In this paper, we argue that invasion biology relies upon ethical assumptions of human supremacy that are reflected in and reinforced by language used to categorize introduced animals in morally problematic ways. We discuss how denigratory scientific, official, and widely used terms such as “invasive,” “alien,” “pest,” and “feral” interact with the dubious treatment of animals, and we examine several aspects of how the demonizing meaning of these terms are shaped. The shaping factors we focus on are the differential treatment of “invasives” versus humans and other ecologically damaging animals, namely animals in agriculture, and the stock and performative treatment of animals labelled “invasive aliens.” We propose that such language should be essentially removed from biological and conservation sciences and consigned to history’s dustbin. Indeed, invasion biologists should come together to find a new name for their discipline – or rather, for the discipline “invasion biology” might become when it jettisons its assumptions of human supremacy.*

1. Introduction

Invasion biology has faced criticism and controversy over recent decades (Davis, 2009; Elliott-Graves, 2016; Inglis, 2020; Simberloff, 2012). The controversy manifests in diverse academic and conservation communities and is associated with empirical, conceptual, and ethical disagreements about the nature and practice of that discipline and allied disciplines (Cassini, 2020; Castelló and Santiago-Ávila, 2022; Lidström et al., 2016; Probyn-Rapsey and Lennox, 2022; Ricciardi and Ryan, 2018; Sagoff, 2018, 2020; Valéry et al., 2013). Although invasion biology focuses on achieving scientific understanding of adverse ecological impacts caused by what it classifies as “invasive alien species” (also abbreviated IAS), it is also informed by divergent understandings of what the natural world in the Anthropocene will and should look like. Moreover, invasion biology is increasingly witnessing colliding ethical perspectives concerning nonhuman animal interests, sentience, and treatment (Courchamp et al., 2017; Vucetich and Nelson, 2007). Indeed, there is growing critical attention in conservation and ecological

scholarship to notions of anthropocentrism, human exceptionalism, and human supremacy (Kopnina et al., 2018; Wallach et al., 2018) - notions that point to the relative underestimation, dismissal, and denigration of nonhuman creatures (Midgley, 1998).

Human supremacism refers to the way that humans often regard human life as vastly more morally significant than nonhuman life (Kymlicka, 2018). On this view, humans and their lives are taken to be worthy of strong and extensive protections from harmful and lethal treatment, while nonhuman animals and their lives are not. Increased awareness of this inherited moral view is helping to drive discontent about invasion biology. It is important to note that most invasion biologists would agree that humans are not the only loci of value, since the natural world too has value and is worth protecting. But this element of non-anthropocentrism can and often does co-exist with human supremacism. Human supremacism is arguably evident, for example, in the way that invasion biology divides animals into categories of invasive and alien *versus* native and domestic. Arguably, the designation of some animals as “invasives” or “aliens” not only reflects certain ecological effects and qualities of “non-nativeness” but also embodies attitudes towards those animals’ intrinsic value or moral worth.

In this paper, we argue that the language and categorization of animals as “invasive aliens,” and the associated treatment of those animals, is ethically problematic. In fact, we contend that the very name of the scientific discipline - *invasion biology* - needs rethinking (Inglis, 2020). Similar “official” and authoritative labelling - such as by government agencies and conservation organizations - also needs reexamination, as does the use of such terms in less technical or less official and more ordinary or everyday ways. Despite our criticisms, we acknowledge that “non-native” species are indeed implicated in morally difficult and practically wicked problems that defy straightforward and uncontentious solutions. Nonetheless, we shall argue that the role of language and classification here is not trivial or merely “theoretical,” for it can shape and even distort our thinking about appropriate or necessary practical conservation responses. It is a simple fact that so-called “invasive” animals have often been treated with little or no moral consideration (Lidström et al., 2016), and still are. As we shall argue, terms like “invasive” both express and perpetuate a belief in human supremacism that fails to give animals due moral consideration. Our essay explores how both labelling and treating animals as “invasives” is a consequence of an ethically problematic yet often unquestioned allegiance to human supremacy.

The paper proceeds as follows. Section 2 outlines the official classification of IAS, and Section 3 introduces recent ethical critiques of invasion biology and

traditional conservation. Section 4 canvasses some initial possible objections from invasion biologists to ethical criticisms, while Section 5 reveals the assumption of human supremacism in invasion biology. Section 6 discusses the ethical nature and implications of language and the categorization of animals. Subsequently, the paper examines the mutually reinforcing nature of language and animal treatment in terms of the differential treatment and demonizing labelling of other ecologically damaging animals, especially humans and “livestock” (Section 7), and the stock and performative treatment of animals deemed “invasive aliens” (Section 8). The conclusion briefly looks to how problematic language and assumptions of human supremacism that harm animals and ecosystems might be addressed.

2. Classification of invasive alien species

Invasion Biology is partly defined by facts about “natural”¹ and historical animal migration and anthropogenic introductions of species into new environments (Crees and Turvey, 2015). In Earth’s natural history, members of different species have sometimes moved into new territories beyond their historical ranges (e.g., Johnson et al., 1996). Such movement has been integral to the lives of many animal species and is also a major cause of speciation or the birth of new species (e.g., Teitelbaum and Mueller, 2019). However, invasion biology focuses on so-called “introduced” species - that is, species introduced by *humans* (USDA National Invasive Species Information Center, 2021).

Human-mediated movement of life forms have radically changed the “natural” situation. Before humans, species mobility was more profoundly hampered by natural barriers; some, like oceans, were virtually insurmountable. Natural barriers can promote evolution, and long-term isolation of populations on islands and continents have generated unique endemic species existing nowhere else (Johnson et al., 1996; Teitelbaum and Mueller, 2019). Endemism is among the most significant dimensions of Earth’s biodiversity and is intimately tied to “biodiversity,” or the uniqueness of different places on Earth. By both design and accident, humanity became the most formidable influence on the global distribution of species. Consequently, numerous endemic species have experienced unprecedented risk or been driven to extinction, and the planet has become increasingly bio-homogenous - a situation further exacerbated by planted monocultures grown for human and animal consumption.

¹ We note that “natural” and “nature” are complex terms that are currently subject to scholarly discussion and disagreement (see, e.g., Ducarme and Couvet, 2020).

Even so, not all species introduced intentionally or unintentionally by humans into new environments - so-called “alien species” - wreak ecological havoc. Many perish, while others become assimilated with few ill effects. Some introduced species may have initial negative impacts but eventually become nativized, established, and ecologically integrated. Nonetheless, if emergent conditions facilitate explosive reproduction amongst introduced species sometime after their introduction, these species can become deleterious to other (“native”) species, both plant and animal.

The term “invasive alien species” (IAS) is a technical or official term in invasion biology. The designation applies to species beyond the perimeter of certain human uses that are judged to have deleterious current or future consequences for biodiversity in wild environments and/or for humans (e.g., human health and economic activity). This subset of introduced species may kill, outcompete, infect, or displace “native” species and contribute to extinctions and global loss of endemism and biodiversity. For example, the similarity of fish species in US freshwater systems has increased dramatically because of the introduction of game fish across the North American continent (Rahel, 2007). Globally, many of the most ecologically damaging species - including highly adaptable animals like rats, cats, feral dogs, pigs, and goats - contribute to epoch Homogenocene, as our biogeological time has been christened (Mann, 2011).

Some animals arguably occupy a grey zone between fully native, introduced, and “invasive.” Consider the dingo. Brought by humans to Australia several millennia ago, dingoes may have played a role in the mainland extinction of the Tasmanian tiger (Balme et al., 2018) (though this is debated). In any case, this relatively recent arrival has become nativized and established. Indeed, conservation biologists sometimes applaud the dingo’s present ecological role as an apex predator, since dingoes help control invasive meso-predators like foxes and feral cats (Johnson and VanDerWal, 2009). However, some agriculturalists persecute dingoes as pests and enemies of livestock to protect their livelihoods and economic interests, sometimes killing dingoes and hanging their corpses from trees and fences on display.

The dingo illustrates the definitional quandary of how long a species needs to be present in a new area and what level of integration it needs to have for it to earn the title “native.” Nonetheless, there are many species that are much easier to classify; indeed, invasion biologists have had little difficulty in calling many animals invasive aliens and advocating for their removal, often by harmful and lethal means. However, both the biological classification and the treatment of animals

as invasive aliens has begun to be questioned, including from the perspective of ethics.

3. Emerging ethical critiques of invasion biology

Strong ethical concerns about individual animals have often been lacking in more mainstream conservation circles and certainly in much actual conservation practice (Wallach et al., 2018). Historically, values and goals related to the integrity of ecosystems and viability of native (and especially endemic) species tended to trump concerns about the well-being and lives of individuals that are labelled invasive or pests. The tide has begun, albeit slowly, to change. There is now greater interest in animal welfare in conservation (Beausoleil, 2020; Hampton et al., 2019) and in the welfare effects of poisons, snares, and guns. Moreover, concern for animals can go beyond a basic interest in animal welfare and the avoidance of suffering. For example, some critics note that we often fail to give serious moral regard for animals and their desire to continue living, their inherent or intrinsic value, and their fair and just treatment (Lynn et al., 2019; Santiago-Ávila and Lynn, 2020).

Critics also contend that maligning and disparaging invasive species make them appear dispensable and can even constitute an intrinsic injustice. Philosophers C.E. Abbate and Bob Fischer recently argued that when conservationists and influential conservation bodies designate some but not other animal species as invasive and worthy of extermination, they *demean* the animals so labelled and treated (Abbate and Fischer, 2019). These authors argue that wrongful discrimination occurs when conservation treats different sentient nonhuman animal species that have the same moral worth as if they had radically different moral worth. Holding, say, that wild-living cats - but not bilbies - are simply “not worthy of existence” (Abbate and Fischer, 2019, p. 8) in Australia constitutes wrongful discrimination, insofar as cats and bilbies have equal moral worth and are both worthy of existence. Abbate and Fischer contend that this form of differential attitude and treatment is itself a demeaning or degrading wrong to those targeted animals, *independently* of any associated harm done to them (such as suffering) and any other infringements of their rights.

A significant ethical development within conservation biology occurred recently with the emergence of compassionate conservation (Ben-Ami, 2017; Bobier and Allen, 2021; Coghlan and Cardilini, 2021). This philosophy and movement is currently mounting a sustained critique of ethical values traditionally assumed in conservation and invasion biology (Ramp and Bekoff, 2015; Wallach et al., 2018)

and has generated some opposition (Callen et al., 2020; Driscoll and Watson, 2019). Its practitioners claim that we should not lose sight of individual animals and their wellbeing when we address ecological problems. On the contrary, they argue, we should place certain ethical principles that value and protect individuals front and center, or alongside rather than subordinate to principles that value and protect collectives such as species. According to this approach, principles such as “Individuals matter”, “First do no harm,” and “Peaceful co-existence” should replace the moral anthropocentrism that underlies and shapes much conventional conservation practice (Wallach et al., 2020).

While compassionate conservationists do not deny that introduced species can sometimes be a real ecological threat, they do argue that conservation policy should respect individual animals and their self-determined relational lives, modes of social organization, and interests in living as the kind of individuals and communities they are. Arian Wallach and colleagues write that as “people who care about wildlife and nature, the conservation community should ask itself not only what kind of nature (ecology) it aims to preserve but also what kind of nature (character) it aspires to manifest. That conservationists have normalized the perpetuation of substantial, intentional, and unnecessary harm against wildlife individuals is a tragic failure to exercise compassion” (Wallach et al., 2018, p. 1263).

We shall argue that one fundamental way to treat animals justly and compassionately is to stop categorizing certain creatures as *alien invaders* (and similar) and to cease treating them in a spirit that reflects an underlying assumption of human supremacy. This change entails altering the language with which we scientifically and otherwise officially classify animals, and also unofficially describe them. It further entails altering the treatment that characteristically accompanies such categorization and description. As we shall argue, the language and the types of classification of certain animals on the one hand, and their wrongful treatment on the other, are interwoven.

4. Initial objections from invasion biology

Our claim is that the scientific or official designation and the casual labelling of animals as “invasive,” “aliens,” “pests,” and the like - plus a great deal of the treatment that accompanies that language - is ethically problematic. In response to this claim, invasion biologists could advance at least two initial objections. Some invasion biologists may first remind us that non-native, introduced animals often have profoundly damaging effects on native species and ecosystems. Indeed, there no shortage of examples of such ecological damage. Invasion

biologists may further claim that efforts to eradicate those damaging species can sometimes benefit native species and should at least be tried, given the great environmental harms that may otherwise ensue. Such action, it may be said, is ethical even though it is harmful to animals and even though the ecological benefits of harmful action are often not certain (and may be far from certain).

Second, invasion biologists might argue that categories and descriptions like “invasive” and “alien” accurately reflect the ecological realities. They may acknowledge that animals are due moral consideration for their welfare, but that these values and duties are typically outweighed by duties to conserve threatened native species and ecosystems. Nonetheless, they may stress that minimization of animal harm and suffering within such activities should occur where possible. All this, invasion biologists may conclude, is consistent with continuing to officially designate and to unofficially describe many introduced animals as invasive aliens and pests.

In our view, these objections from invasion biology are problematic. Specifically, they tend to be grounded in an ethically dubious assumption of human supremacy and they relatedly underplay the ethical import of labelling and classifying animals in the ways that they do. We will argue that case in a moment. But before that, we want to again stress that introduced species can indeed create difficult practical and ethical problems. This point is sometimes resisted. For example, some critics of invasion biology point out that if certain introduced species tend to cause damage, they do so not single-handedly but in conjunction with other key causes, often anthropogenic drivers such as fossil fuel burning, deforestation, land agriculture, pollution, and overfishing.² Critics of invasion biology may also note that eradication of introduced species can be an empirically contested measure: eradication programs sometimes work but often they do not. In the last two to three decades, for example, introduced rats have been eradicated from about a thousand small islands (the most recent case is South Georgia Island near Antarctica, the biggest island thus far of rodent removal success after a decade-long campaign (Martin and Richardson, 2019)). By contrast, operations on continents to eradicate the Nutria (a large rodent originating from South America) from the Chesapeake Bay region (US), Burmese pythons (native to Southeast Asia) from the Everglades (US), or cats and rabbits in Australia have been largely unsuccessful (Kearney et al., 2018).

² Critics can of course recognize exceptions in which an introduced species has almost single-handedly caused extinctions. An example could be the adverse effects of the brown tree snake which was accidentally brought to Guam (Wiles et al., 2003).

Some critics of invasion biology also claim that introduced species can increase biodiversity locally even as they reduce Earth's biodiversity overall. Introduced species that flourish in new environments may be regarded as especially ecologically valuable when those species are threatened in their original ranges. It is also possible to argue that species movement is a natural phenomenon and that humans are "natural" too; thus, human artifacts such as parking lots and monoculture plantations are in a sense a part of nature. And because it is ultimately *nature* that is driving biological invasions, resulting ecosystems abounding with introduced species are simply "novel ecosystems" or "the new wild" (Pearce, 2016).

Some of these criticisms contain insights. For example, it is true that there are other important drivers of ecological damage that need to be addressed more seriously (we return to this point in the conclusion). It is also very important to appreciate, partly for moral reasons, that eradication programs can often fail, especially in the long term. Furthermore, the idea that we may challenge "nativism" and re-imagine the ecological role of non-native species is important and worth debating further (Peretti, 1998).

Nonetheless, we might question the unequivocal naturalization of human impacts on nature and the acceptance of homogenization in Earth's biota. While the human-induced movement of animal species may sometimes entail a "resetting" of evolutionary history under which biodiversity eventually recovers, "eventually" here may mean thousands or millions of years. And although humans are indeed part of the natural world, they also possess a profound ability to wreck it. Finally, while we agree with some critics of invasion biology that it is important to recognize the limitations of effective control of unwanted species, that fact alone does not demonstrate that it is ethically problematic to label those animals as "invasives" and to seek their eventual eradication for ecological reasons, even if doing so involves causing great suffering and mass death and even if the success of the programs is uncertain. Such criticisms of invasion biology must be buttressed by further arguments about the classification and treatment of animals as "invasive aliens". We shall now make one such argument.

5. The assumption of human supremacy

Attempts to justify the classification and treatment of "invasive alien species" relies on an assumption of human supremacy. This claim needs some explanation. Human supremacism is the moral view that humans have the right to dominate and routinely harm and kill nonhuman animals - but not other humans - for the sake of human interests, including economic interests. A human

supremacist implicitly or explicitly holds that the moral difference between humans and nonhuman animals is so large that we may regard animals as essentially our tools to use. This position is consistent with a belief in an ethical obligation to minimize suffering and other welfare harms in the pursuit of ecological or human interests. But for a human supremacist, such constraints are relatively weak and would never be applied to humans in that form, since humans are owed much greater consideration. For example, poisoning or shooting animals but never humans to protect collectives may be routinely seen as justified and “necessary”.

Human supremacism, then, severely downgrades the vital interests of nonhuman animals relative to humans and grants them far weaker protections. Human supremacism can also contain other elements. For instance, some human supremacists believe, as Eileen Crist puts it, that the “Earth belongs to humanity [and] that the planet consists in resources for the betterment of people” (Crist, 2017, p. 62). Political theorist Dinesh Wadiwel suggests that human supremacism can accompany a sense of entitlement concerning the domination and management of nature (Wadiwel 2015).

In fact, the assumption of human supremacy came under attack several decades ago just as the field of invasion biology was beginning (Adams and Gruen, 2014; Gruen, 2011; Regan, 2004; Singer, 1995). This critique, from disciplines as diverse as philosophy, political theory, and certain sciences, claims that human supremacy is a moral prejudice that lacks substantial ethical and scientific foundations. Given that many animals are sentient creatures with a range of emotional, social, and cognitive abilities, and given that a number of these psychological properties are similar to those found in human beings (even if they are not identical), many contemporary moral thinkers believe that the total or relative ethical dismissal of animal interests is a human prejudice (Korsgaard, 2004; Rachels, 1990). At the least, there seems to be an onus on those who place little weight on animal interests to show how that stance is not a mere prejudice that we have inherited.

Yet virtually no one in the fields of invasion biology or conservation more generally has attempted to provide solid foundations for the human supremacism that underlies their position. On the contrary, some conservationists (Callen et al., 2020; Driscoll and Watson, 2019; Oommen et al., 2019) have tended to respond to ethical criticisms of the treatment of introduced animals by simply ignoring or avoiding the challenge or by begging the question about the correctness of human supremacy and its implications for animals (Coghlan and Cardilini, 2020). The relative lack of reasoned argument is a key reason why it is often

reasonable to refer to the *assumption* of (rather than just the belief in) human supremacy in the context of invasion biology.

The assumption of human supremacy explains why many invasion biologists, conservationists, and others are inclined to call for eradication programs so readily, including when the evidence that those programs will have the desired and sustained effects are uncertain or relatively weak. Because human supremacism sets the ethical bar for harming animals that much lower, nonhumans are often effectively treated as morally disposable even when harming them is regretted (though human supremacism can tend to displace moral regret as well (Batavia et al., 2020)). Furthermore, an attitude of human supremacy helps explain why some people think it acceptable to officially (and colloquially) label some animals as “invasive aliens”.³

Such language can be regarded as itself an *expression* of supremacist prejudice against animals. Furthermore, those means of classification also help to *perpetuate* that prejudice. In other words, human supremacism and the language of classification are interconnected and mutually reinforcing phenomena. Because some will resist these claims, we shall now examine the language of invasion and its connection to the supremacist treatment of animals in some detail.

6. Language, classification, and treatment

In this and the following sections, we attempt to shed more light on the problematic meaning and implications of language in invasion biology. We aim to show that in parts of conservation, certain words, classifications, and treatment, which bear the imprint of an undefended faith in human supremacism, can shape and feed into one another.

Some of the language used to describe non-native species is part and parcel of a major ethical problem in invasion biology (Larson, 2005). Terms like invader, invasion biology, invasive species, and aliens are not “neutral” descriptions of facts but rather controversial and meaning-rich metaphors. Metaphors are ubiquitous in language, including in science, and are no doubt fundamental to thought (Lakoff and Johnson, 2008). In fact, language has its own life and can morph in ways beyond individual usage and denotation. Metaphors often suggest themselves in response to phenomena and can make those phenomena more lucidly

³ We would also suggest that unquestioned or undefended attitudes of human supremacy sometimes also drive a reluctance to consider critically questioning nativism or being open to imagining new kinds of ecosystems that involve introduced species.

intelligible; equally, metaphors can imbue phenomena with an ambience that has unintended or problematic implications. For example, metaphors of *war*, such as the war on drugs or poverty, can be problematic in various social contexts (Flusberg et al., 2018).⁴

Dictionaries define “invasion” along the following lines: “an instance of invading a country or a region with an armed force; an incursion by many people or things into a place or sphere of activity; or an unwelcome intrusion into another’s domain” (Lexico.com, 2021). Some of those who show discontent with invasion biology have explored possible extended aspects or meanings of such language. For example, Brendon Larson argues that narratives of invasive animals interact with sociocultural phenomena and that the tag of invasive alien species is associated with politically charged ideas of militarism, nativity, and nationalism (Larson, 2005).

Some critics argue that talk of invasive alien species can insidiously invoke xenophobia and racism because of that language’s genealogy or broader history. “Invasive” connotes “threat” and the occupation of a territory by someone or some group that does not belong. Political scientist Claire Jean Kim argues that the category of “alien,” like that of “race, lumps and splits” (Kim, 2015, p. 24); it tends to construct a logic of exclusion in which those who are not like us, and those who do not belong, are located outside the political community and moral circle (see also Wadiwel and Taylor, 2016). Such exclusionary language has, controversially, been applied to refugees, asylum seekers, and displaced peoples (Elder, 2003).

Dinesh Wadiwel gives a related explication of the meaning of some biological language that describes displaced animals. He argues that humans typically assume a position of epistemic, legal, and political dominion over nonhumans that entails a brute right to arbitrarily decide how we label them, which of them is worthy of moral considerability, and who will be killed (Wadiwel, 2015, pp. 9, 22). Thus, connotations of arbitrary power and implications of “might is right” could conceivably affect the meaning of invasion language. It might also be argued that once the metaphor of biological invasion enters the public domain, it can lead to additional demonizing tropes. Consider phrases like “the cancer of invasion” and promises such as “government gets tough with invasive aliens.” For some scholars, the framework of biological invasion tends to create binaries

⁴ In contrast to these uses, the “war against animals” is arguably a more illuminating use of the term, especially for those who oppose human supremacism (Wadiwel, 2015).

of “good” versus “bad” species while bringing into subliminal play polarizations between “nationals” and “foreigners” and the “other” (Lidström et al., 2016).

We believe that exploration of the above possible meanings and connotations is important. However, our contribution to the elucidation of problematic meanings of classifications and labels in invasion biology focuses more directly on two other important features: (1) the differential treatment of “invasive” animals versus humans and other animals, especially animals in agriculture; and (2) the stock and performative treatment of “invasive” nonhumans. This discussion will also serve to illustrate how demonizing language and classification can be informed by the human supremacist treatment of animals; and conversely, how the human supremacist treatment of animals can be promoted by demonizing language and labelling of a scientific or other official kind (e.g., by scholars and by conservation and invasive species organizations) as well as by a more colloquial kind of talk in the general population.

7. Differential treatment: Animals in agriculture and humans

The first feature we will discuss which shapes the meaning of the language of invasion concerns the differential classification and treatment of various sentient beings. In particular, invasion biology embodies very different attitudes and treatment directed toward introduced animals as compared to: (a) other non-endemic animals, especially animals in agriculture; and (b) human groups. This separation or division occurs in cases in which (a) and (b) are (like the targeted introduced species) similarly causing ecological damage. Let us consider these two comparatively protected groups in turn.

Take non-endemic animals in agriculture first (Gurevitch and Padilla, 2004). Earlier we encountered Abbate and Fischer’s identification of ethical problems associated with the differential treatment of “invasive” species and native species (Abbate and Fischer, 2019). Our point here focuses on differential labelling and treatment of “invasive” animals and animals in agriculture. Invasion biology and its language is clearly molded by human interests that go beyond the ecological. This is shown in the fact that domestic species amply qualify for the label “invasive,” but, despite being called “invasive” when they go “feral,” are not deemed “invasive” when they are kept as legal human property.⁵ In this way, certain non-endemic species are regarded as not worthy of existence or as apt for special

⁵ We do not mean to imply that animals in agriculture are treated justly; but that is a separate question.

singling out, but this is not the case when they are of economic value to humans. What appear to be irregularities from an ecological perspective about which species are labelled invasive and which are exempted can be accompanied by calls for practical action: invasion biology sometimes supports killing introduced animals for economic interests. In New Zealand, for example, eradicating introduced possums and stoats is regularly backed by the allegation that these species carry bovine TB and threaten farm animal losses and associated economic interests. Similarly, in the United States, the US Wildlife Services has killed hundreds of thousands of starlings (among innumerable other animals) in just a few decades in the service of agricultural interests (Paini et al., 2016).

The fact that many introduced animals are marked as “invasive” and are branded as removable - while the spread of agricultural animals is generally not so criticized and is often implicitly or explicitly taken as a reason for killing “invasives”, including in ways that would not generally be tolerated even for farmed animals - is ecologically curious. The massive biological “invasion” of animal and crop agriculture (what Alfred Crosby famously called “ecological imperialism”) is often invisible as a bona fide and orchestrated biological-invasion event. As such, it tends to be treated as impervious to the framing of “invasive alien species.” By far the greatest threat to biodiversity are processes such as climate change and deforestation, of which animal agriculture is a large part. Climate change may be the final blow to Earth’s biodiversity, barring unprecedented, concerted social changes to reverse the ever-worsening forecasts. The number of anthropogenic climate-related natural disasters per year has doubled over the last 20 years, and, according to the World Wildlife Fund, there was a decline of 58% in the number of reptiles, birds, mammals, and fish between 1970 and 2012 (McRae et al., 2016, p. 19).

Today, “livestock” and humans comprise 96 percent of the aggregate weight of land mammals on the planet (Bar-On et al., 2018). Agriculture is a salient and sometimes leading cause of many major problems: global warming; species extinctions; killing of big herbivores and carnivores; massive insect species and population declines; devastation of freshwater species; nitrogen, pesticide, and greenhouse pollution; homogenization of domestic plants and animals; and emergence of devastating zoonotic and other infectious diseases (Coghlan et al., 2021; Hayek et al., 2021). We tend to think of “habitat destruction” and “invasive species” as distinct and equal contributors to biodiversity collapse. Yet such thinking tends to be molded by the fact that we call some lifeforms “invasive” but not others. The latter include domestic species like cattle, sheep, goats, chickens, and pigs. Huge portions of cropland are dedicated to feedstock for confined

farm animals. If we imaginatively loosen the mental grip of the idea that “habitat destruction” and “invasive species” are balkanized categories of impact, we can appreciate that the human-mediated biological “invasion”⁶ of farmed animals is behind much of the habitat loss, wildlife killing and death, pollution, and climate change that are most responsible for biodiversity collapse.

That habitat destruction for agriculture (as well as for other reasons), combined with the mass killing of wild animals and climate change, have been or will be the primary drivers of biodiversity loss does not mean that “invasive” species are not also drivers (Kearney et al., 2018). Of course, the degree of contribution of different factors that are ecologically damaging can vary by ecoregion or time, and in the case of past extinctions, causation is sometimes unknowable. Furthermore, most threatened species face more than one threat. Life is afflicted by adverse synergies which decrease the odds of survival (biologists call this predicament the “one-two-three punch”) But our point is that certain animals that are sometimes equally or more ecologically damaging than “invasive” species are excluded from that designation because they are regarded as beneficial to human beings. Farmed animals are not classified in the way that “alien invaders” are even when there is no major difference in their ecological impact. While the reasons for this make sense from an economic vantage point, the difference in labelling nonetheless helps color the meaning of “invasive” and associated biological language and classification.

Let us now consider a relevant aspect of the differential treatment of humans as compared to non-endemic nonhumans. Human beings generally, as well as certain groups of humans driving specific ecosystem traumas, also amply qualify in ecological terms for the designation “invasive.” Yet it goes without saying that we would find it wrong to officially label certain groups of humans, such as some farmers or timber workers, as “pests”, “invasives” or “aliens” within the biological or ecological sciences, in conservation organizations, and so forth. Were such a definition to be made seriously and without irony in a biological textbook, for instance, it would be swiftly and rightly condemned as both obscene and dangerous, regardless of any degree of ecological merit it might possess. Clearly, we readily recognize that such scientific or technical labelling and classification of humans or groups of humans (except when it is not meant quite seriously, has an ironic twist, etc.) is morally repugnant. In contrast, the completely serious and

⁶ As we will soon stress, it is ethically problematic to call *any* sentient nonhuman animal “invasive”. A key part of the present point is the failure to fully register the primary causes of biodiversity loss and ecological destruction and how this is related to the demonizing labelling and the denigration of certain “invading” animals.

unequivocal biological labelling of animals as “invasive pests” is often simply taken for granted.

This practice is problematic. For instance, when we turn a species into a “pest” or “feral” or “invasive,” the first casualty can be humane and just treatment. Indeed, the alliance between label and mistreatment describes the status quo: worldwide, millions of animals branded as pests or invasives are killed as a matter of course and with little moral acknowledgement (van Eeden et al., 2020). Imaginatively turning this troubling language for once upon ourselves - e.g., entertaining the (objectionable) idea of humans being seriously described in textbooks or official documents as “invasive pests” - has at least some merit: it may prompt reflection about historical, current, and future human responsibility. “Invasion” can also highlight the fact that humans are sometimes morally responsible for the harm they do to other species, including when that harm stems from human supremacism, indifference, and a sense that it is permissible or proper to subjugate other sensitive creatures.

We should note that an imaginative notion of all humans-as-invasive species ignores the fact that different peoples have had very divergent impacts. It has been argued that the global North or West, have developed material and ideological cultures based on conquest, takeover, killing, and enslaving. It is true that wealthier nations have caused much of the damage. Thus, “invasion” in a political sense of subjugation of nonhuman and human realms, has been a regrettable hallmark of European civilization and the developed world’s mode of operation. At the same time, it is also true that humans, across the globe, and by virtue of being large, intelligent omnivores on top of the food chain, are the most destructive animal species in earth’s history (Harari, 2014). Thus, both humans and “livestock” are in an intelligible ecological sense often just as “invasive” as so-called “invasive animal species.” Yet only the latter are scientifically and officially branded as such—and this conveys and reinforces the thought that such animals are especially odious and worthy of eradication, typically with relatively little ethical consideration or moral regret.

However, having made this point we now want to emphatically claim that *no being of significant moral worth* deserves to be in those ways demonized and put at routine risk of brutal and uncompassionate treatment. Biologically, officially, or authoritatively categorizing any morally significant group—be they humans, “livestock,” or “non-endemic alien” species— as “invasive” or as “alien pests” is an ethically dubious act that normalizes unjust treatment. Indeed, when humans categorize, describe, and treat sentient animals in those ways, they express an underlying allegiance to human supremacism.

While we may wish to reduce over time the numbers of certain animals (including future humans) that can cause ecological damage, we should not do so by unjust and cruel means or with contemptuous or dismissive attitudes. Our argument here is simply that the selective application of terms like “invasive” to certain groups but not to other often equally or even more ecologically disruptive ones (principally human beings and the domestic animals they create and use for their own benefit), expresses and shapes human supremacy in relation to the animals that invasion biology calls “invasive aliens”. Animals like foxes, dogs, possums, rabbits, cats, and many more species frequently bear the brunt of this denigration and the suffering and violence that attends it, including the infliction of harm and death in the pursuit of worthy conservation goals.

8. Stock and performative treatment of “invasives”

In addition to the semantic effects of such differential treatment, various other ways that so-called “invasive” and “pest” animals have historically been and continue to be treated also contributes to the meanings of invasion biology language. A prime shaper of meaning is the widespread belief (which may take the form of a virtually reflex reaction) that introduced species have no place in their non-natural environments and ought to be eradicated by virtually any means necessary. This includes practical means that are violent, inflict great suffering and mass death, and sometimes have a performative element. In this section, we discuss, first, the stock and historically typical responses to “invasive” animals and, second, animal treatment that has performative dimensions. Both features contribute to the meaning of the language of invasion.

“Stock” calls are calls for the elimination and harming of animals that are routine, unexceptional, normalized, and sometimes automatic or relatively unreflective. Stock responses can be made even when it is far from certain that the action will result in successful and sustained removal of the animals concerned. Indeed, invasion biology often supports continuous harmful micromanagement actions like the indefinite or perennial killing of animals to protect parts of the environment. While humans are often implicated in precipitating the ecological risks, it is the animals that often pay a painful or a fatal price. Consider, for example, the recently instituted policy by the US Fish and Wildlife Service in which barred owls - who have been moving into the territory of endangered spotted owls possibly due to anthropogenic degradation of habitat - are shot to save spotted owls (Lynn, 2018; Wiens et al., 2020). Should this policy be deemed “effective,” it may result in an indefinite killing of barred owls with far from any guarantee of long-

term success. Such responses, which have been commonplace in conservation, carry and reveal the imprint of human supremacism. The unargued assumption behind those actions is often that it is perfectly legitimate and unproblematic to intentionally deprive unwanted yet sensitive animals of their lives on a large and perhaps indefinite scale.

The example of New Zealand provides a case study of treatment of unwanted animals that has human supremacist overtones. Like Australia, New Zealand is a hotspot of species introductions that threaten endemic species, such as the flightless kakapo and kiwi birds. The country recently announced its “Apollo program” to become predator-free by 2050 (and remove all predators from nature reserves by 2025) (Greshko, 2016). The program’s focus is on exterminating eight introduced species: four species of rodents, three species of mustelids (commonly known as weasels), and the common possum. The announced program has been high-profile and was praised by conservationist Sir David Attenborough, who stated that “the knees of rats shake when New Zealand is near” (NZ Herald, 2019). The ecological concerns themselves are all too real. The country’s conservation minister observed that “New Zealand’s unique native creatures and plants...evolved for millions of years in a world without mammals and as a result are extremely vulnerable to introduced predators which kill around 25 million native birds every year” (Barry, 2016).

One criticism of the New Zealand program is that it is quite uncertain whether it will succeed. Permanent removal of “invasive species” is challenging enough on smaller islands,⁷ let alone the large islands of New Zealand. Critics who focus on such intractability urge that seeking alternative solutions to killing might be preferable to a perpetual treadmill of eradication. Another criticism is the readiness to use methods which cause great suffering. A variety of eradication methods are used in New Zealand, including fences and traps, and more methods are under consideration including species-specific poisons (and also genetic techniques (like CRISPR-Cas9) to produce sterility) (Predator Free NZ Trust, 2019). No method, however, is more controversial than the use of 1080, which has been deployed in New Zealand since the 1950s.

1080 is an indiscriminate poison that can kill non-target animals like dogs and horses (and sometimes even endangered animals themselves) and that, moreover, causes an agonizing death. The Society for the Prevention of Cruelty to Animals recently criticized the New Zealand government for using 1080, stating that the

⁷ In one of the Pitcairn Islands of the South Pacific, for example, the rat population was reduced to 80 individuals but rebounded to 10,000 individuals in a few years.

poison causes “intense and prolonged suffering” and should be banned and replaced with more humane methods (SPCA New Zealand, 2022). However, New Zealand’s Environmental Protection Authority defends the use of 1080 for environmental and agricultural purposes (Environmental Protection Authority NZ, 2022). The use of killing methods that cause enormous suffering for target animals have, of course, been stock and normalized responses in conservation.

Our next point relates to the idea that “invasive” animals are also sometimes treated in *performative* ways (Desmond, 2016). The performative element can both reflect and contribute to the meaning of demonizing classifications and categorizations. Once again, the New Zealand case is illustrative, this time for the performative treatment of some animals deemed “invaders” in that country, such as Australian brush-tailed possums. The NZ public, including schoolchildren, were urged to join in the killing of targeted animals. Individuals and the general population were exposed to the spectacle of the killing of animals performed with an element of relish or fun. As one conservation scientist put it, “we’re in a relatively unique position in New Zealand, where people are really, really willing to kill for conservation. It’s a kind of national pastime” (quoted in Owens, 2017). In rural schools, possum hunts and killing competitions are held and killed possums have been entered in best-dressed possum competitions. People may even be encouraged to swerve and run over possums on the roads (McCrow-Young et al., 2015). Such performative displays are depicted as harmless fun and humorous, but they clearly condone cruelty and teach children and adults to have no or minimal moral regard for some sentient beings

There is, in fact, a broader supremacist practice of displaying slain animals as spectacles —whether in the context of trophy hunting, bounty killings, killing contests of despised or feared animals, pest exterminations, or culling “invasive” animals. Such displays take the form of hangings, lining up corpses, exhibiting the yawning mouths large carnivores, and “decorative” mountings of animal corpses or heads (Desmond, 2016). As mentioned earlier, dingoes, or dingoes taken to be wild dogs (Probyn-Rapsey, 2015), are strung from trees by some Australian farmers (ABC NW Qld reporters, 2021). Although one can sympathize with, say, farmers and the domestic animals that are preyed upon, such normalized “grotesqueries” nonetheless exhibit and reinforce the supremacist moral exclusion of nonhuman animals. In addition to being ethically dubious, such performative actions also help to condition the contemporary meaning of terms like “invasive pests” and thereby to promote future wrongful attitudes and action.

As Eileen Crist has observed, the rhetorical force of some performative spectacles is to reaffirm what has been called (by John Rodman) the Differential

Imperative: the urge to reiterate the immeasurable distance between human and animal (Crist, 2017, p. 62). One way to illustrate this idea is by a simple thought experiment: it is morally unimaginable that a human body, even the body of an outcast or enemy, would be displayed as we display killed animal “pests.” When such a performance does occur, perpetrated say by modern terrorist groups, it is rightly condemned as barbaric. Fictional representations, such as in the popular series *Game of Thrones*, make ample use of this general kind of performative treatment of human beings to reveal graphically that the purpose of exhibiting a slain corpse is to debase and demean the “alien” and the “other.” The fact that a slain animal can still, relatively unproblematically, be made into a spectacle that elevates its killer and denigrates the victim discloses another side of the supremacist attitude towards animals.

The performative treatment of animals, then, is another example of how human supremacism is reflected in the language and treatment of “invasive” animals and of how that language and treatment in turn reinforces the relative dismissal and denigration of animals. The language of invasion absorbs such connotations. This is the case even when individual scientists and others who deploy the language disavow such performative spectacles and other kinds of treatment. Thus, the conditioning of language in invasion biology partly occurs outside of that discipline as well as within it. But the fact that it partly occurs outside of that discipline does not imply that science’s embrace of those terms is ethically neutral. On the contrary, such language is, as we have sought in this paper to demonstrate, decidedly problematic.

9. Conclusion: Looking forward

In this paper, we argued that invasion biology has relied upon assumptions of human supremacy that lead not only to dismissal of conservation and ecological values - a consequence that invasion biology would lament - but also to wrongful yet common attitudes towards and treatment of so-called “invasive alien species.” Such assumptions are now facing growing reassessment and criticism: invasion biology increasingly has its critics and discontents. We also demonstrated how the language and official or scientific classification of introduced and non-endemic animals is intertwined with their ethically problematic, human supremacist treatment. Our focus was on several factors that help to shape the meaning of terms such as “invasive,” “alien,” “pest” and “feral.” The factors we examined were the differential treatment of “invasives” versus humans and other ecologically damaging animals, namely animals in agriculture; and the stock and

performative treatment of animals scientifically and officially categorized as invasive aliens. Such factors are interwoven with language and classification in a reciprocal relationship that tends to promote and reinforce a lack of serious moral consideration of these animals and to sustain morally prejudiced attitudes against them.

Despite the history of ecological destruction and of animal abuse and injustice facilitated by human supremacy, there are things we can now do. For instance, we should put much more emphasis on seeking alternative and just and compassionate ways to address the real ecological threats caused by various animal species (Ramp and Bekoff, 2015; Wallach et al., 2018). A part of this shift could involve agitating to greatly reduce the number of farmed animals on the planet that are also often wrongfully exploited under human supremacist assumptions (Coghlan et al., 2021). We should seek to contract the range of grazing and growing feedstock, freeing habitat for wild creatures. Mass reversion of habitat back to wild places would facilitate a sounder ecological negotiation between native and introduced species and assist in mitigating climate change (Searchinger et al., 2018). Problems, losses, and dilemmas would not thereby disappear; but they would become less acute and pressing in a more spacious world - hopefully a world in which wild inhabitants can more often work out their relations for themselves without widespread human coercion and violence.

Humanity's great task, one might say, is to stop destroying the natural environment, withdraw our occupancy from a substantial part of it (Kopnina, 2016), and dismantle the legacy of human supremacy associated with wrongful treatment of the nonhuman world. As we have argued, one vital part of changing our relations to that nonhuman world involves reassessing demonizing and denigratory language that supports human supremacy and propels the associated unethical treatment of animals. Terms like "alien," "invasive," and "pest" should, we suggest, be removed from biological and conservation sciences and consigned to history's dustbin. Children and university students should be educated about the value of the nonhuman world without encountering denigratory labelling of animals as "invasive aliens" and "pests" in textbooks and scholarly articles and without being taught by authoritative teachers and scientists that such language is unproblematic. Finally, invasion biologists might come together to find a new name for their discipline - or more accurately and hopefully, for the discipline "invasion biology" might become after it jettisons its human supremacist assumptions.

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References

- Abbate, C. E., and Fischer, B. (2019). Don't Demean "Invasives": Conservation and Wrongful Species Discrimination. *Animals*, 9(11), 1–14. <https://doi.org/10.3390/ani9110871>
- ABC NW Qld reporters. (2021, June 19). Dead wild dogs are strung from trees—Some say it's outdated, others say it serves a purpose. *ABC News*. <https://www.abc.net.au/news/2021-06-20/dead-dingos-wild-dogs-in-trees-queensland/100219086>
- Adams, C. J., and Gruen, L. (2014). *Ecofeminism: Feminist intersections with other animals and the earth*. Bloomsbury Publishing USA.
- Balme, J., O'Connor, S., and Fallon, S. (2018). New dates on dingo bones from Madura Cave provide oldest firm evidence for arrival of the species in Australia. *Scientific Reports*, 8(1), 9933. <https://doi.org/10.1038/s41598-018-28324-x>
- Bar-On, Y. M., Phillips, R., and Milo, R. (2018). The biomass distribution on Earth. *Proceedings of the National Academy of Sciences*, 115(25), 6506–6511.
- Barry, M. (2016). *Predator Free New Zealand 2050 to be a massive team effort*. Department of Conservation. <https://www.doc.govt.nz/news/media-releases/2016/predator-free-nz-2050-to-be-a-massive-team-effort/>
- Batavia, C., Nelson, M. P., and Wallach, A. D. (2020). The moral residue of conservation. *Conservation Biology*, 34(5), 1114–1121. <https://doi.org/10.1111/cobi.13463>
- Beausoleil, N. J. (2020). I Am a Compassionate Conservation Welfare Scientist: Considering the Theoretical and Practical Differences Between Compassionate Conservation and Conservation Welfare. *Animals*, 10(2), 257. <https://doi.org/10.3390/ani10020257>
- Ben-Ami, D. (2017). Compassionate conservation, where to from here? *Israel Journal of Ecology and Evolution*, 63(3–4), 1–4. <https://doi.org/10.1163/22244662-06303401>
- Bobier, C., and Allen, B. (2021). The virtue of compassion in compassionate conservation. *Conservation Biology*. <https://doi.org/10.1111/cobi.13776>
- Callen, A., Hayward, M. W., Klop-Toker, K., Allen, B. L., Ballard, G., Beranek, C. T., Broekhuis, F., Bugir, C. K., Clarke, R. H., Clulow, J., Clulow, S., Daltry, J. C., Davies-Mostert, H. T., Di Blanco, Y. E., Dixon, V., Fleming, P. J. S., Howell, L. G., Kerley, G. I. H., Legge, S. M., ... Wüster, W. (2020). Envisioning the future with 'compassionate conservation': An ominous projection for native wildlife and

- biodiversity. *Biological Conservation*, 241, 108365. <https://doi.org/10.1016/j.biocon.2019.108365>
- Cassini, M. H. (2020). A review of the critics of invasion biology. *Biological Reviews*, 95(5), 1467–1478. <https://doi.org/10.1111/brv.12624>
- Castelló, P. P., and Santiago-Ávila, F. J. (2022). Conservation after Sovereignty: Deconstructing Australian Policies against Horses with a Plea and Proposal. *Hypatia*, 37(1), 136–163. <https://doi.org/10.1017/hyp.2021.72>
- Coghlan, S., and Cardilini, A. P. A. (2020). Compassionate conservation deserves a morally serious rather than dismissive response—Reply to Callen et al. 2020. *Biological Conservation*, 242, 2. <https://doi.org/10.1016/j.biocon.2020.108434>
- Coghlan, S., and Cardilini, A. P. A. (2021). A critical review of the compassionate conservation debate. *Conservation Biology*. <https://doi.org/10.1111/cobi.13760>
- Coghlan, S., Coghlan, B. J., Capon, A., and Singer, P. (2021). A bolder One Health: Expanding the moral circle to optimize health for all. *One Health Outlook*, 3(1), 21. <https://doi.org/10.1186/s42522-021-00053-8>
- Courchamp, F., Fournier, A., Bellard, C., Bertelsmeier, C., Bonnaud, E., Jeschke, J. M., and Russell, J. C. (2017). Invasion biology: Specific problems and possible solutions. *Trends in Ecology and Evolution*, 32(1), 13–22.
- Crist, E. (2017). The affliction of human supremacy. *The Ecological Citizen*, 1(1), 61–64.
- Davis, M. A. (2009). *Invasion biology*. Oxford University Press on Demand.
- Desmond, J. C. (2016). Displaying death and animating Life. In *Displaying Death and Animating Life*. University of Chicago Press.
- Driscoll, D. A., and Watson, M. J. (2019). Science denialism and compassionate conservation: Response to Wallach et al. 2018. *Conservation Biology*, 33(4), 777–780. <https://doi.org/10.1111/cobi.13273>
- Ducarme, F., and Couvet, D. (2020). What does ‘nature’ mean? *Palgrave Communications*, 6(1), 1–8. <https://doi.org/10.1057/s41599-020-0390-y>
- Elder, C. (2003). Invaders, illegals and aliens: Imagining exclusion in a White Australia. *Law Text Culture*, 7, 221.
- Elliott-Graves, A. (2016). The problem of prediction in invasion biology. *Biology and Philosophy*, 31(3), 373–393.
- Environmental Protection Authority NZ. (2022). 1080. <https://www.epa.govt.nz/everyday-environment/animals-and-insects/1080/>
- Flusberg, S. J., Matlock, T., and Thibodeau, P. H. (2018). War metaphors in public discourse. *Metaphor and Symbol*, 33(1), 1–18. <https://doi.org/10.1080/10926488.2018.1407992>
- Greshko, M. (2016, July 25). *In World First, Country to Wipe Out Invasive Predators*. National Geographic. <https://www.nationalgeographic.com/science/article/new-zealand-invasives-islands-rats-kiwis-conservation>

- Gruen, L. (2011). *Ethics and animals: An introduction*. Cambridge University Press.
- Gurevitch, J., and Padilla, D. K. (2004). Are invasive species a major cause of extinctions? *Trends in Ecology and Evolution*, *19*(9), 470–474. <https://doi.org/10.1016/j.tree.2004.07.005>
- Hampton, J. O., Warburton, B., and Sandøe, P. (2019). Compassionate versus consequentialist conservation. *Conservation Biology*, *33*(4), 751–759.
- Harari, Y. N. (2014). *Sapiens: A Brief History of Humankind*. Random House.
- Hayek, M. N., Harwatt, H., Ripple, W. J., and Mueller, N. D. (2021). The carbon opportunity cost of animal-sourced food production on land. *Nature Sustainability*, *4*(1), 21–24. <https://doi.org/10.1038/s41893-020-00603-4>
- Inglis, M. I. (2020). Wildlife Ethics and Practice: Why We Need to Change the Way We Talk About ‘Invasive Species.’ *Journal of Agricultural and Environmental Ethics*, *33*(2), 299–313.
- Johnson, C. N., and VanDerWal, J. (2009). Evidence that dingoes limit abundance of a mesopredator in eastern Australian forests. *Journal of Applied Ecology*, *46*(3), 641–646. <https://doi.org/10.1111/j.1365-2664.2009.01650.x>
- Kearney, S. G., Carwardine, J., Reside, A. E., Fisher, D. O., Maron, M., Doherty, T. S., Legge, S., Silcock, J., Woinarski, J. C. Z., Garnett, S. T., Wintle, B. A., Watson, J. E. M., Kearney, S. G., Carwardine, J., Reside, A. E., Fisher, D. O., Maron, M., Doherty, T. S., Legge, S., ... Watson, J. E. M. (2018). The threats to Australia’s imperilled species and implications for a national conservation response. *Pacific Conservation Biology*, *25*(3), 231–244. <https://doi.org/10.1071/PC18024>
- Kim, C. J. (2015). *Dangerous Crossings*. Cambridge University Press.
- Kopnina, H. (2016). Half the earth for people (or more)? Addressing ethical questions in conservation. *Biological Conservation*, *203*, 176–185.
- Kopnina, H., Washington, H., Taylor, B., and Piccolo, J. J. (2018). Anthropocentrism: More than just a misunderstood problem. *Journal of Agricultural and Environmental Ethics*, *31*(1), 109–127.
- Korsgaard, C. (2004). Fellow creatures: Kantian ethics and our duties to animals. *The Tanner Lectures on Human Values*, *24*, 77–110.
- Kymlicka, W. (2018). Human rights without human supremacism. *Canadian Journal of Philosophy*, *48*(6), 763–792. <https://doi.org/10.1080/00455091.2017.1386481>
- Lakoff, G., and Johnson, M. (2008). *Metaphors We Live By*. University of Chicago Press.
- Larson, B. M. (2005). The war of the roses: Demilitarizing invasion biology. *Frontiers in Ecology and the Environment*, *3*(9), 495–500. [https://doi.org/10.1890/1540-9295\(2005\)003\[0495:TWOITRD\]2.0.CO;2](https://doi.org/10.1890/1540-9295(2005)003[0495:TWOITRD]2.0.CO;2)
- Lexico.com. (2021). *Invasion: Meaning and Definition for UK English*. Lexico Dictionaries. <https://www.lexico.com/definition/invasion>

- Lidström, S., West, S., Katzschner, T., Pérez-Ramos, M. I., and Twidle, H. (2016). Invasive narratives and the inverse of slow violence: Alien species in science and society. *Environmental Humanities*, 7(1), 1–40.
- Lynn, W. S. (2018). Bringing ethics to wild lives: Shaping public policy for barred and northern spotted owls. *Society and Animals*, 26(2), 217–238.
- Lynn, W. S., Santiago-Ávila, F., Lindenmayer, J., Hadidian, J., Wallach, A., and King, B. J. (2019). A moral panic over cats. *Conservation Biology*, 33(4), 769–776. <https://doi.org/10.1111/cobi.13346>
- Mann, C. (2011). The Dawn of the Homogenocene. *Orion Magazine*. <https://orionmagazine.org/article/the-dawn-of-the-homogenocene/>
- Martin, A. R., and Richardson, M. G. (2019). Rodent eradication scaled up: Clearing rats and mice from South Georgia. *Oryx*, 53(1), 27–35. <https://doi.org/10.1017/S003060531700028X>
- McCrow-Young, A., Linné, T., and Potts, A. K. (2015). Framing Possums: War, sport and patriotism in depictions of brushtail possums in New Zealand print media. *Animal Studies Journal*, 4(2), 29–54.
- McRae, L., Freeman, R., and Marconi, V. (2016). *Living Planet Report 2016: Risk and Resilience in a New Era* (pp. 1–145). <http://www.deslibris.ca/ID/10066038>
- Midgley, M. (1998). *Animals and why they matter*. University of Georgia Press.
- NZ Herald. (2019). *Rats shake in fear when NZ is near—Sir David Attenborough*. Politics. <https://www.nzherald.co.nz/nz/rats-shake-in-fear-when-nz-is-near-sir-david-attenborough/EW4JMTU6WIS7ITKLNKTJXSUP64/>
- Oommen, M. A., Cooney, R., Ramesh, M., Archer, M., Brockington, D., Buscher, B., Fletcher, R., Natusch, D. J. D., Vanak, A. T., Webb, G., and Shanker, K. (2019). The fatal flaws of compassionate conservation. *Conservation Biology*, 33(4), 784–787. <https://doi.org/10.1111/cobi.13329>
- Owens, B. (2017). Behind New Zealand’s wild plan to purge all pests. *Nature*, 541(7636), 148–150. <https://doi.org/10.1038/541148a>
- Paini, D. R., Sheppard, A. W., Cook, D. C., De Barro, P. J., Worner, S. P., and Thomas, M. B. (2016). Global threat to agriculture from invasive species. *Proceedings of the National Academy of Sciences*, 113(27), 7575–7579. <https://doi.org/10.1073/pnas.1602205113>
- Pearce, F. (2016). *The new wild: Why invasive species will be nature’s salvation*. Beacon press.
- Peretti, J. H. (1998). Nativism and Nature: Rethinking Biological Invasion. *Environmental Values*, 7(2), 183–192.
- Predator Free NZ Trust. (2019, September 4). *Gene editing for pest control*. Predator Free NZ. <https://predatorfree.nz/research/gene-editing-pest-control/>
- Probyn-Rapsey, F. (2015). Dingoes and dog-whistling: A cultural politics of race and species in Australia. *Animal Studies Journal*, 4(2), 55–77.

- Probyn-Rapsey, F., and Lennox, R. (2022). Feral violence: The Pelorus experiment. *Environment and Planning E: Nature and Space*, 5(1), 362–380. <https://doi.org/10.1177/2514848620976959>
- Rachels, J. (1990). *Created from animals: The moral implications of Darwinism*. Oxford University Press.
- Ramp, D., and Bekoff, M. (2015). Compassion as a practical and evolved ethic for conservation. *BioScience*, 65(3), 323–327.
- Regan, T. (2004). *The case for animal rights*. University of California Press.
- Ricciardi, A., and Ryan, R. (2018). The exponential growth of invasive species denialism. *Biological Invasions*, 20(3), 549–553.
- Sagoff, M. (2018). What is invasion biology. *Ecological Economics*, 154(C), 22–30.
- Sagoff, M. (2020). Fact and value in invasion biology. *Conservation Biology*, 34(3), 581–588.
- Santiago-Ávila, F. J., and Lynn, W. S. (2020). Bridging compassion and justice in conservation ethics. *Biological Conservation*, 248, 108648. <https://doi.org/10.1016/j.biocon.2020.108648>
- Searchinger, T. D., Wirseniens, S., Beringer, T., and Dumas, P. (2018). Assessing the efficiency of changes in land use for mitigating climate change. *Nature*, 564(7735), 249–253. <https://doi.org/10.1038/s41586-018-0757-z>
- Simberloff, D. (2012). Nature, natives, nativism, and management: Worldviews underlying controversies in invasion biology. *Environmental Ethics*, 34(1), 5–25.
- Singer, P. (1995). *Animal liberation*. Random House.
- SPCA New Zealand. (2022). 1080—*What is it, and what can be done about it?* <https://www.spcanewzealand.org/news-and-events/news-article/1080-what-is-it-and-what-can-be-done-about-it>
- USDA National Invasive Species Information Center. (2021). *About invasive species*. Executive Order 13112 - 1. Definitions. <https://www.invasivespeciesinfo.gov/executive-order-13112-section-1-definitions>
- Valéry, L., Fritz, H., and Lefeuvre, J.-C. (2013). Another call for the end of invasion biology. *Oikos*, 122(8), 1143–1146.
- van Eeden, L. M., Newsome, T. M., Crowther, M. S., Dickman, C. R., and Bruskotter, J. (2020). Diverse public perceptions of species' status and management align with conflicting conservation frameworks. *Biological Conservation*, 242, 1–6. <https://doi.org/10.1016/j.biocon.2020.108416>
- Vucetich, J. A., and Nelson, M. P. (2007). What are 60 warblers worth? Killing in the name of conservation. *Oikos*, 116(8), 1267–1278.
- Wadiwel, D. (2015). *The war against animals*. Brill.

- Wadiwel, D., and Taylor, C. (2016). A Conversation on the Feral. *Feral Feminisms*, 6, 82–94.
- Wallach, A. D., Batavia, C., Bekoff, M., Alexander, S., Baker, L., Ben-Ami, D., Boronyak, L., Cardilin, A. P. A., Carmel, Y., Celermajer, D., Coghlan, S., Dahdal, Y., Gomez, J. J., Kaplan, G., Keynan, O., Khalilieh, A., Kopnina, H., Lynn, W. S., Narayanan, Y., ... Ramp, D. (2020). Recognizing animal personhood in compassionate conservation. *Conservation Biology*, 34(5), 1097–1106. <https://doi.org/10.1111/cobi.13494>
- Wallach, A. D., Bekoff, M., Batavia, C., Nelson, M. P., and Ramp, D. (2018). Summoning compassion to address the challenges of conservation. *Conservation Biology*, 32(6), 1255–1265.
- Wiens, J. D., Dugger, K. M., Lesmeister, D. B., Dilione, K. E., and Simon, D. C. (2020). *Effects of barred owl (Strix varia) removal on population demography of northern spotted owls (Strix occidentalis caurina) in Washington and Oregon—2019 annual report* (No. 2020–1089; p. 19). US Geological Survey. <https://doi.org/10.3133/ofr20201089>
- Wiles, G. J., Bart, J., Beck JR., R. E., and Aguon, C. F. (2003). Impacts of the Brown Tree Snake: Patterns of Decline and Species Persistence in Guam's Avifauna. *Conservation Biology*, 17(5), 1350–1360. <https://doi.org/10.1046/j.1523-1739.2003.01526.x>

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