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ITERATIONS

HISTORICAL FUTURES

EXTINCTION AND THE END OF FUTURES*

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ABSTRACT

Extinction, in biological terms, is the end of an evolutionary line, a potential future cutoff. It involves a transition between the historical past in which a species was biologically alive and a future in which it isn't, a transition from extant to extinct. In this contribution to the "Historical Futures" series, I examine two aspects of extinction histories: transition and anticipation. First, I argue that scholars need to understand extinction as a process with a prolonged and even possibly reversible transition between extant and extinct rather than a definitive end point. Second, I analyze conservation as a practice of anticipatory extinction that tries to create futures for extant species. Extinction, as a nonlinear process, demands that we consider the coterminous past, present, and future. The end of futures for a species requires rethinking how we conceptualize historical (future) endings under times of rapid environmental change.

Keywords: environmental history, conservation, extinction, transitions, anticipation, Anthropocene

Scientific consensus is that we are living through a mass planetary extinction event with over one million plant and animal species currently threatened with extinction. In the Anthropocene, human-induced environmental change is the cause of nearly all modern extinctions.[2] Extinction, in biological terms, is the end of an evolutionary line, a potential future cutoff. Extinction histories are necessarily, then, histories of the end of the future.

Environmental humanities scholars, particularly ones coming from environmental philosophy, have contemplated the entanglement of time and generations through extinction processes. In their book, which launched the subfield of

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1. The author is funded by the Research Council of Norway for the project "Beyond Dodos and Dinosaurs: Displaying Extinction and Recovery in Museums" (project 283523).

2. For a summary of the major drivers of contemporary extinction, see Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, 2019, https://ipbes.net/global-assessment.

"extinction studies," Deborah Bird Rose, Thom van Dooren, and Matthew Chrulew argued that the generative capacity of the species is ended through extinction.[3] With extinction, the possibilities for future biological generation are denied and this disrupts relations. Extinction, as a process, includes simultaneously deep-time elements and rapid change. Long evolutionary pasts suddenly and seemingly meet an end.

Extinction, as a process and as an idea, is historically situated and time-bound. Western scientific understandings of extinction as a biological phenomenon arose at a specific moment under the context of European colonialism. From findings of mastodon bones debated by Thomas Jefferson and Georges Cuvier to the rapid disappearance of Stellar sea cows in the northern Pacific, extinction was made visible to Europeans in the New World.[4] The extinction of animals, from the loss of the passenger pigeon and the attempted extermination of the American bison in North America to the intentional eradication of the thylacine of Australia, spread with the expanding white settlement of the nineteenth century.[5] Extinctions are historical phenomena involving physical change and cultural recognition of that change. Extinction sits at the intersection of cultural history and natural history.

On one level, extinction histories are easy—they are declensionist narratives in the extreme. The decline of the species is complete, so the ending would seem to write itself. Yet I believe that extinction challenges our conventional historical approach. Timelines get messy with extinction. How can extinction, which is based on the absence of a thing everywhere at this moment, be known with certainty based on past data? Does extinction happen when the last individual dies or when there is no chance of a future? Historians know that our narratives are always time-dependent—where we start and end our story matters to its reading—so how does the technological potential to recreate species in the future affect our interpretation of histories?

All of these questions expose extinction as a future-oriented historical phenomenon. In their introduction to the "Historical Futures" series, Zoltán Boldizsár Simon and Marek Tamm suggested that there are three modalities for exploring historical futures: transitions, anticipatory practices, and registers.[6] In this

3. Deborah Bird Rose, Thom van Dooren, and Matthew Chrulew, "Telling Extinction Stories," in *Extinction Studies: Stories of Time, Death, and Generations*, ed. Deborah Bird Rose, Thom van Dooren, and Matthew Chrulew (New York: Columbia University Press, 2017), 1-17

4. Mark V. Barrow Jr., *Nature's Ghosts: Confronting Extinction from the Age of Jefferson to the Age of Ecology* (Chicago: University of Chicago Press, 2009); Ryan Tucker Jones, *Empire of Extinction: Russians and the North Pacific's Strange Beasts of the Sea, 1741–1867* (Oxford: Oxford University Press, 2014).

5. For some of these histories, see Jennifer Price, *Flight Maps: Adventures with Nature in Modern America* (New York: Basic Books, 1999); Andrew C. Isenberg, *The Destruction of the Bison: An Environmental History, 1750–1920* (Cambridge: Cambridge University Press, 2000); Robert Paddle, *The Last Tasmanian Tiger: The History and Extinction of the Thylacine* (Cambridge: Cambridge University Press, 2000); Miles A. Powell, *Vanishing America: Species Extinction, Racial Peril, and the Origins of Conservation* (Cambridge, MA: Harvard University Press, 2016); and Dolly Jørgensen, *Recovering Lost Species in the Modern Age: Histories of Longing and Belonging* (Cambridge, MA: MIT Press, 2019).

6. Zoltán Boldizsár Simon and Marek Tamm, "Historical Futures," *History and Theory* 60, no. 1 (2021), 3-22.

contribution to the series, I take up Simon and Tamm's call and examine the practices of transition and anticipation in extinction histories. I argue that the end of futures for a species requires rethinking how we conceptualize historical (future) endings under times of rapid environmental change.

TRANSITIONING TO/FROM EXTINCTION

Extinction involves a transition between the historical past in which a species was biologically alive and a future in which it isn't, a transition from extant to extinct. Even in Indigenous cosmologies that frame extinction as a species retreating from its current relations rather than ending its existence, there is still a transition to a state of the species not being physically present.[7] To label something as extinction is to acknowledge an end. The question is whether it ends with a whimper or with a bang.

Extinction is basically defined as there being an absence of a thing—that it no longer exists. But how do we determine that something is not there? Historical writing generally starts from the premise that evidence is needed to make a claim. Writing from absence is problematic because the lack of something in the record may not mean that it was not there but rather that we don't have access to it. When writing the history of extinction, the problem of absence rears its head. Absence from all places will mean that the species is extinct, but presence in only one place means that it is not. Transitioning from not finding something in a place (the presence of absence) to claiming that something is not anywhere (the absence of presence) is difficult.[8] Just one confirmed sighting from one place at one moment in time affirms that a species is extant rather than extinct. Since gathering such evidence is as impractical as creating Lewis Carroll's map of the world at a one-to-one scale, extinction is typically contested.

The thylacine, also known as the Tasmanian tiger, is the most well-known contested extinction.[9] The thylacine, the largest marsupial carnivore in modern Australasia, had been systematically hunted by white colonial settlers on the island of Tasmania from the early 1800s because it was thought to predate on settler livestock. Immediately after the last captive thylacine died in 1936, a search party from the Tasmanian Animals and Birds Protection Board went into the mountainous region of the island to locate other individuals. Although no thylacines were spotted, other evidence of their presence, such as casts of footprints, was collected. The assumption was that, while people had not directly seen a thylacine, they were still there, hidden from view. Expeditions to find thylacines went out over the ensuing decades and reports of thylacine sightings regularly graced the

7. For extinction as the breaking of relations in Indigenous thought, see Audra Mitchell, "Revitalizing Laws, (Re)Making Treaties, Dismantling Violence: Indigenous Resurgence against 'the Sixth Mass Extinction,'" *Social & Cultural Geography* 21, no. 7 (2020), 909-24.

8. Dolly Jørgensen, "Presence of Absence, Absence of Presence, and Extinction Narratives," in *Nature, Temporality and Environmental Management: Scandinavian and Australian Perspectives on Peoples and Landscapes*, ed. Lesley Head, Katarina Saltzman, Gunhild Setten, and Marie Stenseke (London: Routledge, 2016), 45-58.

9. For a more detailed discussion of the thylacine's contested extinction, see Jørgensen, "Presence of Absence."

pages of the local newspaper. Park rangers carried a "thylacine response kit" that contained equipment to allow any traces of thylacines to be scientifically collected for verification.[10] No thylacine remains were ever confirmed. The thylacine was eventually declared extinct by the International Union for Conservation of Nature in 1982 and by the Tasmanian government in 1986, fifty years after the last known individual died.

This kind of time lag in declaring extinction is typical. For example, the Caribbean monk seal was last seen in the 1950s, but it took until 2008 for the US Fish and Wildlife Service to classify it as extinct. That conclusion was made only after decades of extensive aerial surveys, interviews with local inhabitants, and investigation of all reported sightings.[11] The ivory-billed woodpecker is another example of a prolonged extinction transition. The last universally accepted sighting of the bird was in 1944, but sighting reports trickled in over the next decades. In 2005, a group of scientists led by John Fitzpatrick of the Cornell Laboratory of Ornithology claimed to have proof of ivory-billed woodpeckers still living in Arkansas.[12] The announcement caused a media frenzy, but the visual evidence was quickly refuted by other experts.[13] Numerous extensive searches were made to look for more evidence, but nothing incontrovertible was found. In 2021, the US Fish and Wildlife Service proposed removing the ivory-billed woodpecker from the endangered species list because it should be classified as extinct. The official transition from existence to extinction is long because of the difficulty of turning the absence of presence into the presence of absence.

The transition between extant and extinct has sometimes been written as the history of an individual, the endling. The term "endling," which is defined as the last individual of a species, has been growing in usage since it was first put in a 2001 Australian National Museum exhibition about the thylacine's extinction.[14] For the thylacine, the endling is taken to be the last captive individual who died in 1936 in a zoo in Hobart. Endlings are ultimate tragedy stories because, with the death of the individual, their species' future is ended.

Martha, the last captive passenger pigeon, typifies the use of the endling's death as a stand-in for extinction. When Martha died in the Cincinnati Zoo in 1914, passenger pigeons were no more. So, it seemed natural that, for the centenary anniversary of the extinction in 2014, Martha would serve as stand-in for all passenger pigeons. This is apparent in texts ranging from Mark Avery's popular history book *A Message from Martha* (2014) to the large-scale mural *Martha, the Last Passenger Pigeon* by artist John A. Ruthven in Cincinnati, Ohio (2013). Martha herself (in taxidermied form) was the main attraction of the Smithsonian Libraries' *Once There Were Billions: Vanished Birds of North America* (2014–2016) temporary

10. One of these kits is in the thylacine display room of the Tasmania Museum and Art Gallery.

11. Dolly Jørgensen, "Erasing the Extinct: The Hunt for Caribbean Monk Seals and Museum Collection Practices," *História, Ciências, Saúde – Manguinhos* 28, suppl. 1 (2021), 161-83.

12. John W. Fitzpatrick et al., "Ivory-Billed Woodpecker (*Campephilus principalis*) Persists in Continental North America," *Science* 308 (June 2005), 1460-62.

13. See Ursula K. Heise, "Lost Dogs, Last Birds, and Listed Species: Cultures of Extinction," *Configurations* 18, no. 1–2 (2010), 49-72

14. Dolly Jørgensen, "Endling, the Power of the Last in an Extinction-Prone World," *Environmental Philosophy* 14, no. 1 (2017), 119-38.

exhibition, which was created in honor of the centenary of her death. The death of the last individual serves as the transition from extant to extinct.

But is this actually when extinction occurs? If a thylacine, or even a small group of thylacines, were located, it would not mean that the animal has escaped extinction. When populations of a species are very small, they may be "functionally extinct," which is the term used when the population cannot recover. The northern white rhinoceros, which is technically a subspecies of white rhino living in Central and Eastern Africa, has only two surviving individuals, both of whom are female.[15] This means that, while northern white rhinos still exist, the species is functionally extinct because it can no longer reproduce. The same could be said of Lonesome George, the last Pinta Island tortoise, who died in 2012.[16] He spent forty years in captivity as the only known individual of his kind, making it impossible to reproduce Pinta Island tortoise offspring. In these cases, the end of the future for the species was coming regardless of a few live individuals.

When a species is considered extinct, the possibilities for writing its history and future are limited—the extinction serves as an end to the species' life story. An extinction changes the way we read and interpret older histories of the species, turning a story of possible outcomes into a story of an inevitable ending. For example, the famous naturalist Aldo Leopold reflected on this relationship between the extinction of the passenger pigeon and the history of capitalism: "We are told by economic moralists that to mourn the pigeon is mere nostalgia; that if the pigeoners had not done away with him, the farmers would ultimately have been obliged, in self-defense, to do so."[17] There was an inevitability to the passenger pigeon's extinction that could only be seen in hindsight, even if Leopold wished that other futures would have been possible.

Yet even once a species is officially declared extinct by governmental bodies, the transition to extinction may not be complete. The Tasmanian Department of Primary Industries, Parks, Water and Environment regularly investigates thylacine sighting reports.[18] In 2021, there was a spat of media coverage of a supposed thylacine sighting with evidence. News articles proclaimed that a thylacine had been filmed, but scientists who viewed the footage quickly dismissed it as a Tasmanian pademelon.[19] Although this latest sighting was not determined to be a

15. Oliver A. Ryder et al., "Exploring the Limits of Saving a Subspecies: The Ethics and Social Dynamics of Restoring Northern White Rhinos (*Ceratotherium simum cottoni*)," *Conservation Science and Practice* 2, no. 8 (2020).

16. Sarah Bezan, "The Endling Taxidermy of Lonesome George: Iconographies of Extinction at the End of the Line," *Configurations* 27, no. 2 (2019), 211-38, and Gitte Westergaard and Dolly Jørgensen, "Making Specimens Sacred: Putting the Bodies of Solitario Jorge and Cụ Rùa on Display," in *Animal Remains*, ed. Sarah Bezan and Robert McKay (London: Routledge, 2021), 68-86.

17. Aldo Leopold, "On a Monument to the Pigeon," in *Silent Wings: A Memorial to the Passenger Pigeon* (Madison: Wisconsin Society for Ornithology, 1947), 4.

18. According to the records of the Tasmanian Department of Primary Industries, Parks, Water and Environment, there were eight investigated reports between 1 September 2016 and 19 September 2019. See their "Thylacine Sightings Reports," https://dpipwe.tas.gov.au/Documents/RTI%20025%20-%202019-20.pdf.

19. Naaman Zhou, "Wildlife expert pours cold water on claims Tasmanian tiger family spotted," *The Guardian*, 23 February 2021, https://www.theguardian.com/australia-news/2021/feb/23/wildlife-expert-pours-cold-water-on-claims-tasmanian-tiger-family-spotted.

thylacine, the possibility that one is found cannot be completely dismissed. After all, the Australian night parrot (*Pezoporus occidentalis*) had no confirmed sightings between 1912 and 1979, but since 2016, several live night parrots have been filmed, and the Lord Howe Island stick insect (*Dryococelus australis*), which was believed to have been extinct since 1930, was rediscovered in 2001. The lingering uncertainty of extinction means that, at any time in the future, the history of the thylacine's past might need to be rewritten because it turns out to be extant.

The future and history of a species might also have to be rewritten because of the technologies of de-extinction. With new genetic techniques of cloning and splicing, DNA is being touted as a route to transition back from extinct to extant. While this may sound like science fiction fantasy, an individual clone of the Pyrenean ibex (also called the Spanish bucardo) was born in 2003, three years after the last animal had died. Although the baby bucardo died almost immediately after birth, processes of species resurrection or de-extinction are unsettling the temporalities of extinction.[20] Ongoing projects to de-extinct species like the thylacine and the passenger pigeon disrupt a one-way historical narrative of existence to extinction because they posit that extinction can be undone.[21] Adam Searle has argued that de-extinction engages with "liminal materiality between living and dead": it uses genetic material that, while not living itself, can constitute living matter, making DNA "the salvaged ghosts of extinction's lost pasts, the synthesized ghosts of extinction's lost futures."[22] According to some, extinction might not be an ended future after all.

Rather than thinking of extinction as a fixed state that commences at a particular moment in historical time, historians need to understand extinction as an elongated nonlinear transition between extant and extinct. Extinction can be contested; extinction status can flip back and forth if a species is rediscovered or recreated. Although extinction nominally is the end of the line for a species, there is the ever-present potential for the future end to be undone. Extinct species sit in a transitional liminal space—mostly dead, but potentially alive.

20. Adam Searle, "Spectral Ecologies: De/extinction in the Pyrenees," *Transactions of the Institute of British Geographers* 47, no. 1 (2022), 167-83.

21. Stephanie S. Turner, "Open-Ended Stories: Extinction Narratives in Genome Time," *Literature and Medicine* 26, no. 1 (2007), 55-82; Jørgensen, *Recovering Lost Species in the Modern Age*. There is much debate about de-extinction and whether or not recreating extinct species actually makes the species not extinct. Often, aesthetics—that is, an animal looking like an extinct ancestor—drives de-extinction efforts of species; see, for example, Clemens Driessen and Jamie Lorimer, "Back Breeding the Aurochs: The Heck Brothers, National Socialism, and Imagined Geographies for Non-Human Lebensraum," in *Hitler's Geographies: The Spatialities of the Third Reich*, ed. Paolo Giaccaria and Claudio Minca (Chicago: University of Chicago Press, 2016), 138-58, and Sandra Swart, "Zombie Zoology: History and Reanimating Extinct Animals," in *The Historical Animal*, ed. Susan Nance (Syracuse, NY: Syracuse University Press, 2015), 54-72. But visual representation is highly problematic; see Rosie Ibbotson, "De-Extinction and Representation: Perspectives from Art History, Museology, and the Anthropocene," *International Review of Environmental History* 3, no. 1 (2017), 21-42.

22. Adam Searle, "Anabiosis and the Liminal Geographies of De/extinction," *Environmental Humanities* 12, no. 1 (2020), 324, 325.

ANTICIPATING EXTINCTION

Michael Soulé famously defined the field of conservation biology as "a crisis discipline" in his groundbreaking 1985 article, "What Is Conservation Biology?"[23] He argued that the field had to operate in crisis mode because rapid and irreversible environmental problems like logging, habitat fragmentation, poaching, and invasive species demanded immediate action. As Soulé laid out the foundational positions of conservation biology, he argued that biodiversity, ecological complexity, and evolution are good and that "the untimely extinction of populations and species is bad."[24] He advocated judging the actions of conservation biologists by these normative postulates as they took up the call to "modify significantly the *rate* at which biotic diversity is destroyed."[25] In this argument, Soulé was participating in the discursive creation of the "biodiversity crisis" that grew to dominate environmental thinking from the 1980s.[26]

Soulé's crisis is an extinction crisis. We can read Soulé's vision of species conservation practices as anticipatory extinction practices. In other words, Soulé set up conservation biology as a direct response to the impending threat of extinction, which would do damage to existing biological communities, functions, and species that he took as baseline goods. Conservation as action is motivated by extinction as the alternative.

Environmental humanities scholars have tended to anticipate extinction as well, fusing possible future extinctions and contemporary conservation. Ursula Heise's influential *Imagining Extinction* carries the subtitle "The Cultural Meanings of Endangered Species," thereby framing conservation as averted future extinction.[27] Most of the chapters in the book *Extinction Studies* are likewise about endangered species that are still around rather than species that are globally extinct.[28] Titles such as Juno Salazar Parreñas's *Decolonizing Extinction: The Work of Care in Orangutan Rehabilitation* and Deborah Bird Rose's *Wild Dog Dreaming: Love and Extinction* assume that their still-extant animal subjects will become extinct if current practices continue.[29] These works reveal a propensity toward extinction anxiety, a fear of potential ended futures.[30]

23. Michael E. Soulé, "What Is Conservation Biology?" *BioScience* 35, no. 11 (1985), 727-34.

24. Ibid., 730.

25. Ibid., 733.

26. See David Sepkoski, *Catastrophic Thinking: Extinction and the Value of Diversity from Darwin to the Anthropocene* (Chicago: University of Chicago Press, 2020), chapter 6.

27. Ursula K. Heise, *Imagining Extinction: The Cultural Meanings of Endangered Species* (Chicago: University of Chicago Press, 2016).

28. Only James Hatley's chapter on the Honshu wolf of Japan centers a certain extinction. See James Hatley, "Walking with Ōkami, the Large-Mouthed Pure God," in Rose, van Dooren, and Chrulew, *Extinction Studies*, 19-46.

29. Juno Salazar Parreñas, *Decolonizing Extinction: The Work of Care in Orangutan Rehabilitation* (Durham: Duke University Press, 2018) and Deborah Bird Rose, *Wild Dog Dreaming: Love and Extinction* (Charlottesville: University of Virginia Press, 2011).

30. On ecological anxiety, see Paul Robbins and Sarah A. Moore, "Ecological Anxiety Disorder: Diagnosing the Politics of the Anthropocene," *Cultural Geographies* 20, no. 1 (2013), 3-19, and Susan Clayton, Christie Manning, Kirra Krygsman, and Meighen Speiser, *Mental Health and Our Changing Climate: Impacts, Implications, and Guidance* (Washington, DC: American Psychological Association and ecoAmerica, 2017).

Environmental historians have demonstrated that extinction—or, even more often, the imminent threat of extinction—has motivated conservation efforts. Conservation is a measure that attempts to extend temporally into the future something that has existed in the past and still exists in the present. Unlike in the case of de-extinction, in which a species has existed in the past and does not exist in the present yet will be remade for future existence, conservation attempts to maintain the presence of a species indefinitely. For example, Ryan Tucker Jones has shown how the nineteenth-century Pacific conservation attempts of the Russian-American Company were developed in response to the complete extinction of the Stellar sea cow and localized population decreases of fur seals and sea otters.[31] In the late nineteenth and twentieth centuries, conservationists confronted projected extinctions through nature protection measures, from private bison conservation to international frameworks like the US-Canadian Migratory Bird Treaty and the International Union for Conservation of Nature and Natural Resources (IUCN).[32] Focusing on future extinctions, rather than on already completed ones, opens up possibilities for action to maintain a species' timeline. As Elizabeth Hennessy has argued in the case of Galapagos tortoises, the shift from reporting extinction losses to sounding the "alarm about the tortoises' pending extinction" by identifying at-risk populations "created a space for thinking differently about saving tortoises."[33]

Narrating histories of conservation thus means narrating histories of imagined future extinctions. In historical narrative practice, the end of species in the past becomes bound to future (possible) endings. *Extinction Voices*, a natural history display intervention at the Bristol Museum and Art Gallery in 2019, demonstrates how this can function in practice. The natural history section curator Isla Gladstone felt the need to respond to a report issued by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which concluded that one million species face extinction if the global status quo remains unchanged.[34] Instead of making a separate exhibition about extinction, Gladstone created an intervention in the existing displays: she added labels to the existing specimens documenting their IUCN status if they are extinct, endangered, threatened, or vulnerable and covered the specimens with black semitransparent fabric.[35] The intent was to force visitors to imagine a world in which those animals were extinct. The natural history museum, which typically displays artifacts of the past and present, was repurposed to curate the future.[36] In the Anthropocene,

31. Jones, *Empire of Extinction*.

32. Barrow, *Nature's Ghosts*.

33. Elizabeth Hennessy, *On the Backs of Tortoises: Darwin, the Galápagos, and the Fate of an Evolutionary Eden* (New Haven: Yale University Press, 2019), 71.

34. IPBES, *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*.

35. Dolly Jørgensen and Isla Gladstone, "The Passenger Pigeon's Past on Display for the Future," *Environmental History* 27, no. 2 (2022).

36. For a call for museums to respond to contemporary environmental change, see *Curating the Future: Museums, Communities and Climate Change*, ed. Jennifer Newell, Libby Robin, and Kirsten Wehner (New York: Routledge, 2016).

museums are called upon to anticipate extinction futures rather than to just document extinction pasts.

Biodiversity conservation anticipates possible or probable futures. While some conservation practices, particularly ecological restoration, have been criticized for focusing too much on the past for conservation aims,[37] the future orientation of conservation as anticipating extinction also deserves consideration. The ever-present extinction threat means that histories of conservation should, in fact, be written as histories of futures.

EXTINCTION AS FUTURE ENDINGS OR BEGINNINGS

Extinction is not just in the past; it is very much in the present. That present then affects visions of what the future holds. A world of extinction is not a world without the species that have died; rather, it is a world in which those species change form. Humans, as kin of those nonhumans, continue to be in relations with them regardless of their extinction status.[38] Those relations have historicity and temporality bridging the extant and extinct.

Extinct things do not just disappear. Audra Mitchell has argued that extinction proliferates a species rather than reducing it.[39] Extinct species are "absent subjects" linked to humans through narrative and everyday discourse. Dinosaurs inhabit children's books. The dodo waddles into places ranging from *Alice in Wonderland* to the museum. The thylacine peeks out at passersby from vehicle registration plates on Tasmania. "Dead as a dodo" does not mean dead and forgotten; it means living and present even in (or perhaps because of) extinction.

Thinking about extinction and extinct things can help us unpack how history unfolds under rapidly changing environmental conditions. Philosopher Michelle Bastian has argued that we need to rethink how we tell time in the Anthropocene, turning away from linear atomic clocks and toward other ways of coordinating our actions to the world.[40] She used the example of threatened leatherback turtles, which are having to adjust rapidly to warming temperatures while at the same time having long lives and long evolutionary histories. Thinking of turtles as devices that "enable us to reliably notice change and so perceive time as passing," Bastian has argued for multispecies entanglement with time.[41] In this vein, realigning our sense of time with extinct species offers an opportunity to consider the coterminous past, present, and future.

Extinction is not a linear phenomenon. It bends and folds back upon itself. The transition between extant and extinct is prolonged and may oscillate back

37. Jan E. Dizard, "Uneasy Relationships Between Ecology, History, and Restoration," in *Restoration and History: The Search for a Usable Environmental Past*, ed. Marcus Hall (New York: Routledge, 2010), 154-63.

38. Mitchell, "Revitalizing Laws"; Donna J. Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press, 2016).

39. Audra Mitchell, "Beyond Biodiversity and Species: Problematizing Extinction," *Theory, Culture & Society* 33, no. 5 (2016), 23-42.

40. Michelle Bastian, "Fatally Confused: Telling the Time in the Midst of Ecological Crises," *Environmental Philosophy* 9, no.1 (2012), 23-48.

41. Ibid., 27.

and forth over time. Anticipated future ends motivate conservation in the here and now. These characteristics require rethinking how scholars might conceptualize historical future endings in the Anthropocene. Ends are not ends. Extinction might be the beginning of an end, or the end of a beginning.

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