

## *Living On Earth*, Online Notes

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### Chapter 8. Wild Nature

222 *The point made by Pollock and Krasner*: This is from the transcript of “Oral History Interview with Lee Krasner, 1964 Nov. 2–1968 Apr. 11,” at the Archives of American Art, Smithsonian Institution. The italics on “*am*” do not appear in the transcript, but the emphasis is clear if you listen to the recording.

224 *That story can make the whole sequence seem “natural”*: James Lovelock, in *A Rough Ride to the Future* (2014), sometimes seems to be heading toward saying something like this, but I don’t think he does.

225 *Martha Nussbaum has argued that wild nature no longer exists*: See her *Justice for Animals: Our Collective Responsibility* (2023), and especially “A Peopled Wilderness,” *The New York Review of Books*, December 8, 2022.

226 *a new geological epoch, the “Anthropocene”*: The term’s introduction is usually credited to Paul Crutzen and Eugene Stoermer, “The ‘Anthropocene,’” *Global Change Newsletter*, 2000, though there were some earlier uses, often with slightly different meanings.

226 *I quite like James Lovelock’s way*: This is also in *A Rough Ride to the Future*.

227 *The Cretaceous, the time of the formation of chapter 3’s forests*: See Jessica Tierney et al., “Past Climates Inform Our Future,” *Science*, 2020.

228 *This is a problem for many shell-building invertebrates*: I said earlier that the slow, “geological” carbon cycle works in part through sea creatures locking carbon away in their shells, which eventually become limestone. If the ocean becomes so acidic that many of these organisms can’t function, then the laying down of carbon in limestone may slow. It won’t stop, apparently; see James Kasting, “The Goldilocks Planet? How Silicate Weathering Maintains Earth ‘Just Right,’” *Elements*, 2019.

228 *In the case of birds, a recent report:* See Kenneth Rosenberg et al., “Decline of the North American Avifauna,” *Science*, 2019.

228 *In the case of the cheetahs of chapter 6, only about 7,000 remain:* The cheetah number is from the IUCN Red List of Threatened Species, 2021. The Gouldian Finch number is from the World Wildlife Fund.

For the finches, see also <https://www.calacademy.org/explore-science/gouldian-finch>: "There are fewer than 3,000 finches remaining in the wild, which puts them on the world’s growing list of endangered species.... In addition, thousands of wild Gouldian finches were captured during the early 20<sup>th</sup> century and sold to aviculture enthusiasts worldwide. The birds are still widely traded in that community, but captive populations now differ from the wild ones, having been bred for several non-natural color mutations." Another relevant paper: "Causes of the decline of the Gouldian Finch *Erythrura gouldiae*," by Sonia Tidemann, *Bird Conservation International*, 2010.

Also according to the World Wildlife Fund, a little over 1,000 mountain gorillas survive: [https://wwf.panda.org/discover/knowledge\\_hub/endangered\\_species/great\\_apes/gorillas/mountain\\_gorilla/](https://wwf.panda.org/discover/knowledge_hub/endangered_species/great_apes/gorillas/mountain_gorilla/)

228 *That is an exaggeration; the mass extinctions of the past:* Peter Brannen, “Earth Is Not in the Midst of a Sixth Mass Extinction,” *The Atlantic*, June 13, 2017.

228 *The Earth, surprisingly, is a now a bit greener:* See Abby Tabor, “Human Activity in China and India Dominates the Greening of Earth, NASA Study Shows,” *NASA*, Feb 11, 2019.

229 *A “CO<sub>2</sub> fertilization effect”:* See Zaichun Zhu et al., “Greening of the Earth and Its Drivers,” *Nature Climate Change*, 2016.

233 *I understand the alarm that many feel about climate change:* When I talk about mobility as part of a solution, I do not intend to minimize the stresses and costs of moving. A sense of place, of home, is a central source of purpose and well-being in the lives of many people. Losses of community patterns, of ways of living in a physical environment, are real and significant.

234 *The Clean Water Act (as it is commonly known) became law in 1972:* John Waldman, “Once an Open Sewer, New York Harbor Now Teems with Life. Thank the Clean Water Act,” *The New York Times*, December 30, 2022.

234 *The reef was saved by a small but energetic conservation movement:* See Ann Jones and Gregg Borschmann, “Harold Holt, the Poet and ‘the Bastard from Bingil Bay’: How Reef Conservation Began,” *ABC Science*, August 11, 2018.

235 *Insects also seem much more likely to have experiences of this kind:* If a form of subjective experience exists in some kind of animal, it should generally have some *point*. It should be part of what helps those animals steer their way through the world. If there was a species in which pain had no useful role at all—if it could never guide an animal toward something better for it—then we might expect this kind of experience to fade as evolution went on. That fact probably does constrain the extent of negative experience in the natural world. But not much; even if pain does have to be selective in order to be useful, it could be extremely common in animal life.

236 *Might experience in some animals not have this other, positive side?:* Heather Browning and Walter Veit have written several articles on this topic; see especially “Positive Wild Animal Welfare,” *Biology and Philosophy*, 2023.

236 *The next step seems to be to think about an overall accounting:* On this topic, see the Browning and Veit article cited in the preceding note.

237 *Whether a human life is a good one depends on more:* On this topic, see also J. David Velleman, “Well-Being and Time,” *Pacific Philosophical Quarterly*, 1991.

240 *They prepared a nest in a tree hollow:* These two (probably—the identification is not certain) also engaged in physical battles with other birds while establishing the nest. I described these episodes on my *MetaZoon* blog ([metazoan.net](http://metazoan.net)). You can work backwards from this post, which has links: <https://metazoan.net/107-cockatoo-news-2/>

240 *a number of nonhuman animals have recently been shown:* See Alex Schnell et al., “Cuttlefish Exert Self-Control in a Delay of Gratification Task,” *Proceedings of the Royal*

*Society B*, 2021, both for a very interesting case and for a quick survey of what has been shown in this area.

244 *The philosopher Jeff McMahan has argued:* See “The Moral Problem of Predation,” in *Philosophy Comes to Dinner* (edited by Andrew Chignell et al., 2015).

244 *Lori Gruen has emphasized this problem, in response:* This is in her *Ethics and Animals*, and McMahan responds in the paper cited in the preceding note.

244 *Nussbaum’s view of how animals should be treated:* See her *Justice for Animals*. Here is a point of agreement with Nussbaum. In these recent writings, she is very critical of “safari” tourist experiences that feature the observation of animals being killed by predators. She finds this indicative of something wrong in many human attitudes to wild nature. I think that if one encounters a situation of this kind in an eco-tourism context, it is good to look away.

249 *McMahan draws on a view offered by the philosopher Thomas Nagel:* McMahan quotes these passages from Nagel and Regan. See Thomas Nagel, *The View from Nowhere* (1986), and Tom Regan, *The Case for Animal Rights* (1983, updated edition 2004). McMahan compares the two editions of Regan.

252 *The total number of poultry, pigs, and cattle:* Here I draw on the dissertation work of Rachael Banks (“Experimental and Theoretical Studies of Non-Equilibrium Systems: Motor-Microtubule Assemblies and the Human-Earth System,” Caltech, 2023) and other sources (including <https://ourworldindata.org>).

252 *The majority of these animals probably live within:* The 74 percent figure is from the Sentience Institute, <https://www.sentienceinstitute.org/global-animal-farming-estimates>. Their estimate is based in part on the numbers of animals within farming operations of various sizes. As they note, animals can be confined in cruel ways within facilities that do not meet a “CAFO” criterion. In the main text, I emphasize modern chicken and pig farming as the paradigm cases of “factory farming.” See the online notes (soon) for more detail.

I don't discuss fish farming and other forms of aquaculture much here. For some figures and arguments (the numbers are huge), see Becca Franks, Christopher Ewell, and Jennifer Jacquet, "Animal Welfare Risks of Global Aquaculture," *Science Advances*, 2021. From 2018: "The farmed aquatic animal tonnage represents 250 to 408 billion individuals, of which 59 to 129 billion are vertebrates (e.g., carps, salmonids)."

252 *Wild mammals, mostly very small, outnumber livestock by something like eighteen to one:* See Lior Greenspoon et al., "The Global Biomass of Wild Mammals," *PNAS*, 2023. The situation with birds is similar, but not quite as extreme in how the relationships change. Most wild birds are smaller than farmed birds, but the difference is not as big as with mammals. Two recent estimates of the wild bird population are 50 billion (Corey Callaghan, Shinichi Nakagawa, and William Cornwell, "Global Abundance Estimates for 9,700 Bird Species," *PNAS*, 2021) and 100 billion (the 2018 biomass distribution paper). Farmed birds are 25 billion or so. I don't discuss marine mammals here, but their biomass is large. See "The Global Biomass of Wild Mammals."

253 *If we just think about mammals with bodies larger than one kilogram:* See "The Global Biomass of Wild Mammals."

255 *With these questions on the table, this is also the right point:* My third friend was fairly close to the second, but also said that humans have had a natural span that is coming to an end, a fact that is reflected in our present destructiveness.

255 *As we peer forward from our current vantage point:* See Jack O'Malley-James et al., "Swansong Biospheres: Refuges for Life and Novel Microbial Biospheres on Terrestrial Planets Near the End of Their Habitable Lifetimes," *International Journal of Astrobiology*, 2013. To add insult to injury, we'll apparently lose our oxygen as well. See Kazumi Ozaki and Christopher Reinhard, "The Future Lifespan of Earth's Oxygenated Atmosphere," *Nature Geoscience*, 2021.