



# PESTS

HOW HUMANS CREATE  
ANIMAL VILLAINS



**BETHANY BROOKSHIRE**



*An Imprint of HarperCollinsPublishers*

PESTS. Copyright © 2022 by Bethany Brookshire. All rights reserved. Printed in Canada. No part of this book may be used or reproduced in any manner whatsoever without written permission except in the case of brief quotations embodied in critical articles and reviews. For information, address HarperCollins Publishers, 195 Broadway, New York, NY 10007.

HarperCollins books may be purchased for educational, business, or sales promotional use. For information, please email the Special Markets Department at [SPsales@harpercollins.com](mailto:SPsales@harpercollins.com).

Ecco® and HarperCollins® are trademarks of HarperCollins Publishers.

Acknowledgment is made to Annual Reviews, Inc., for permission to reproduce the illustration in the introduction.

FIRST EDITION

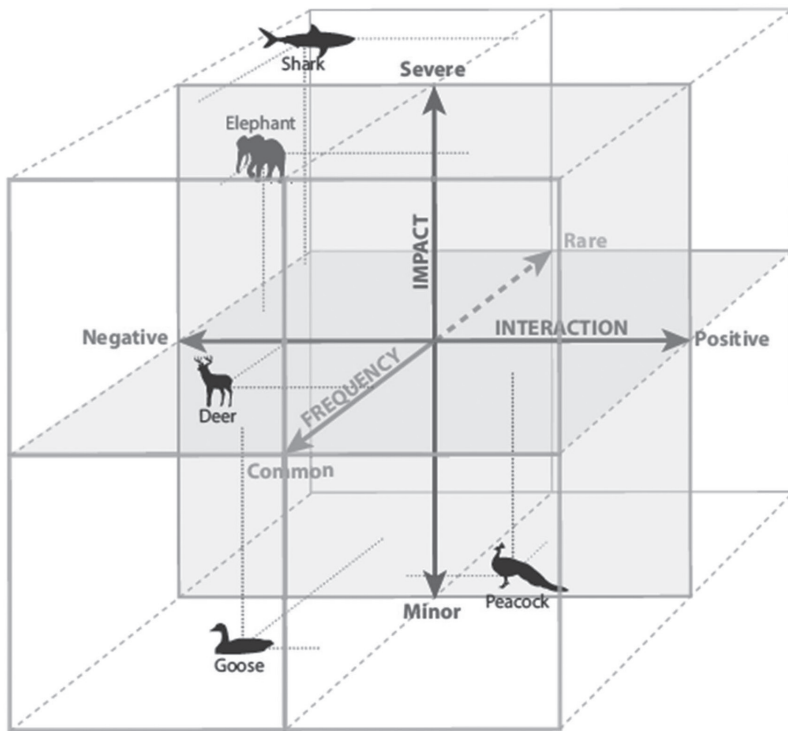
*Designed by Alison Bloomer*

*Images © Shutterstock/Florian Augustin, NataliyaF, Aliaksandr Radzko, SvetSol*

Library of Congress Cataloging-in-Publication Data has been applied for.

ISBN 978-0-06-309725-4

22 23 24 25 26 FR 10 9 8 7 6 5 4 3 2 1



This figure, from Nyhus's 2016 review article "Human-Wildlife Conflict and Coexistence," shows the different ways that people react to the animals around them.

## ACKNOWLEDGMENTS

This book was written in large part on the unceded lands of the Nacotchtank (Anacostan) people, with other chunks written on the unceded lands of the Kalapuya and the Nonotuck. If I've learned anything writing this book, it's how crucial Indigenous knowledge holders everywhere are to changing our interactions with our environments. It is up to non-Indigenous people to listen, learn, and put in the work.

The best part of the book-writing process is the opportunity to indulge in every single impulse of my never-ending curiosity, and I am so grateful for everyone who enables me. First, my agent, Alice Martell, is the best hypewoman a writer could have. My editors, Gabriella Doob, Norma Barksdale, Jane Cavolina, and Denise Oswald, thank you for putting your faith in this project and for saving me from myself. My fact-checker, Kyle Plantz, thank you for your eagle eyes and well-honed skills. Any mistakes remaining are my own fault.

Big projects like this require space, time, and skill. For the space and time, the Knight Science Journalism program at MIT under the direction of Deborah Blum and Ashley Smart was absolutely essential. Not only did it help me take courses to gain expertise and give me the time to write the proposal for this book, it introduced me to the 2019–2020 KSJ Class. Anil Ananthaswamy, John Fauber,

Andrada Fiscutean, Richard Fisher, Tony Leys, Thiago Medaglia, Sonali Prasad, Molly Segal, and Eva Wolfangel are a group like no other, and helped me so much as my ideas came together.

For the skill, I turn to the team at *Science News* and *Science News Explores*. Nancy Shute, Sarah Zielinski, Kate Travis, and the entire team are outstanding colleagues and taught me everything about honesty, integrity, and straight-shooting news (but will never convince me to give up the Oxford comma). Janet Raloff in particular gave me a chance, and has made me the journalist I am today. The lovely podcasting team at Science for the People helped hone my interview skills.

Many wonderful sources and experts took the time to educate me and to share their expertise. Some gave an hour, some let me into their classes, and still others educated me in ways great and small. There are nearly three hundred of them. Many did not end up in the pages of this book, but their ideas all helped to form its words. (Stretches neck, takes deep breath.) In alphabetical order they are: Sunandan Adha, Shelley Alexander, Alexis, Thom Almendinger, Rachel Ankeny, Fabian Aubret, Amy Bachman, Carrie Baker, Liv Baker, Katherine Barnhill-Dilling, Heather Barr, Travis Bartnick, Jon Beckmann, Marc Bekoff, Beth Berkowitz, Carrie Bickwit, Dawn Biehler, Mark Biel, Michael Blum, Ben Bolker, Brad Bolman, Jason Boulanger, Jonathan Boyar, Gustavo Bravo, Mary Brazleton, Stewart Breck, Garrett Broad, Justin Brown, Kristin Brunk, Jeremy Bruskotter, Henry Buller, Kaylee Byers, Karl Campbell, Elizabeth Carlen, Colin Carlson, Carrie, Sarah Carroll, Miguel Chevere, Tom Chiller, Sonja Christensen, Chris Ciuro, Pam Comeleo, Randy Comeleo, Kim Cooper, Jayna Corns, Bobby Corrigan, Michael Cove, Phillip Cox, Sarah Crowley, Thomas Cucci, Joachim Dagg, Peter David, Katharine Dean, Mícheál De Barra, Kristen Denninger Snyder, Chris DePerno, Tristan Donovan, David Drake, Don Driscoll, Alex Dutcher, Bahar Dutt, Scott Edwards, Susan Elias, Emma, Kevin Esvelt, Nick Evans, Fa-Ti Fan, Rowan Flad,

Richard Forman, Jane Foster, Camilla Fox, Jitudan Gadhavi, George Gallagher, Rafael Garcia, Stan Gehrt, Madeleine Geiger, Tom Gilbert, Jacquelyn Gill, David Givens, Andreas Glanznig, Jenny A. Glikman, John Godwin, Eugene Goldfarb, Meredith Gore, Ashley Gramza, Daniel Grear, Miriam Gross, Lori Gruen, Anja Guenther, Anita Guerrini, Fatima Guled, Catherine Hall, Samneiqua Halsey, Rebecca Hardesty, Kristen Hart, Dora Henriksen, Steve Henry, Hal Herzog, Joe Hinnebusch, Hopi Hoekstra, Matthew Holmes, Alice Hovorka, Ardern Hulme-Beaman, Melissa Jenkins, Colin Jerolmack, Heather Johnson, Danson Kaelo, Donna Kalil, Elinor Karlsson, Martin Kavaliers, Roland Kays, Chris Kely, Bruce Kimball, Barbara J. King, Lucy King, Fabienne Krauer, Suresh Kuchipudi, Carl Lackey, Max Lambert, Felix Landry Yuan, Kelly Lane-DeGraaf, Crystal Lantz, Greger Larson, Louis Lefebvre, Sarah Legge, Kirsten Leong, Julie Levy, Matt Liebmann, Anna Lindholm, Wayne Linklater, Lauren Lipsey, Stacy Lischka, Anastasia Livtinsteva, Vanessa LoBue, Mark Long, Kathryn Lord, William Lynn, Christos Lynteris, Suzanne MacDonald, Peter Marra, Lynn Martin, Danielle Martinez, bethany ojalehto mays, Richard Meadow, Raul Medina, Guy Merchant, Alan Mikhail, Anders Møller, Javier Monzon, Lisa Moses, Scott Mullaney, Asia Murphy, Maureen Murray (Boston), Maureen Murray (St. Louis), Melani Nardone, The National Library of Aotearoa/New Zealand, Lisa Naughton-Treves, Victor Ndombi, Nicole Nelson, Chase A. Niesner, Camilla Nord, Phillip Nyhus, Colleen Olfenbuttel, Eileen O'Rourke, David Orton, Kriston Pape, Tom Parr, Michael Parsons, Paul, Jackson Perry, Anna Peterson, Vanessa Petro, Jared Piazza, Anna Pidgeon, Ray Pierotti, James Pokines, Karni Pratap, Kate Pritchett-Corning, Laura Prugh, Emily Puckett, Anne Quain, Niamh Quinn, Maud Quinzin, Karen Rader, Thomas Rawinski, Jennifer Raynor, Paul Rego, Jonathan Richardson, Jeurgen Richt, Harriet Ritvo, Andrew Robichaud, Joshua Rottman, Paul Rozin, James Russell, Allen Rutberg, Royden Saah, Wilson Sairowua, Francisco Santiago-Ávila, Julie Savidge,

Chris Schell, Boris Schmid, Manon Schweinfurth, Esther Serem, James Serpall, Andy Sheppard, Rick Shine, John Shivik, Anne Short Gianotti, Susan Shriner, Shane Siers, Georgiana Silveira, Palatty Sinu, Kristina Slagle, Kirsty Smith, Will Smith, Carly Sponarski, Felicia Staley, Ted Stankowich, Ken Stone, Daniel Storm, Tanja Strive, Jennifer Strules, Jacqueline Sullivan, Mingli Sun, Marliese Talay, Sam Telford, Lydia Tiller, Sarra Tlili, Adrian Treves, Ashley Valm, Mark Vieira, Kathy Vo, Susanne Vogel, Bridgett vonHoldt, Jake Wall, Arian Wallach, Feiran Wang, Derick Wanjala, Jennifer Ward, Georgia Ward-Fear, David Watson, Maggie Watson, Dave Wattles, Matthew Webster, Sam Weiss Evans, Lior Weissbrod, Elic Weitzel, Margaret Wild, Adam Wilkins, Matti Wilks, Fang Xiaoping, Julie Young, Malinda Zeder, Kathy Zeller, and Zhibin Zhang.

I would particularly like to acknowledge the Indigenous peoples across several countries who spoke with me, educated me, or provided resources. I so appreciate the time, patience, and teachings of Nasbah Ben, Karen Bennally, Bradford Haami, Samuel Kala, Martin Maina, Joseph Marshall III, Danica Miller, Douglass Neasloss, Jonah Noosaron, Hori Parata, Neil Patterson, Darren Ranco, Mere Roberts, Eli Suzukovich, Purity Taek, and Harry Walters (who led me to the work of Steve Pavlik).

A researcher is only as good as her translators. Thank you so much to Yenting Chen, Dinah Gardner, Haze Liff, and Simon Mwanza for lending their language skills. Thanks also to my sensitivity readers: Alicia Gangone, Rim Kazhall, Joseph Lee, Simon Mwanza, Sonali Prasad, Giselle Routhier, and Zhutian Yang. And my wonderful expert readers: Rodrigo Pérez Ortega, Jonathan Richardson, Molly Segal, and Susanne Vogel. Your honesty has made both me and the book better.

Colleagues have also helped to soothe my near constant anxiety and encouraged me to embrace the sheer joy of reporting. Maryn McKenna, Christie Aschwanden, Emily Willingham, Shannon

Palus, Amy Maxmen, Adam Rogers, Brendan Maher, Rebecca Boyle, Betsy Mason, Jeffrey Perkel, Tim De Chant, Zach Zorich, Annalee Newitz, David Bamford, and Tina Saey, thank you so much for your support and friendship.

Many scientists and journalists can end up being defined as people by their profession. It is thanks to my wonderful families, by birth and choice, that I am not. To the Capitol Hill Chorale, DC Judo, and the Bruces, thank you for reminding me who I am. Jyoti Daniere keeps me (relatively) sane. Tim Fothergill and K. O. Myers, Sarah Brett England, and Ericka MacLeod gave constant support and kept the alcohol supplies high. Doug McNamara motivated me with coffee and David Steussey with long runs. Every day, Kendra Pierre-Louis, Mika McKinnon, and Kelly Hills have been there, my friends in my pocket and my heart. Riley Black believed in me as a writer before I ever believed in myself. Shannon Griswold, I'd travel with you to the ends of the earth.

My brother, David, keeps my debate skills honed. My mother Cathy's boundless faith keeps me going. My father, Bob, catches my every typo (that one's for you, Dad). My partner, Vince, none of this would be possible without you. I'm the luckiest human on earth, and H. H. Boots, Purrveyor of Dry Goods, and Eliza Schuyler Hamilton are the luckiest cats.

Finally, to F\*\*king Kevin: You inspire me, dude. I was kidding about the mange. I'll leave a tomato out in your honor.



# NOTES

## INTRODUCTION: A PEST IS \_\_\_\_?

- xii lean times in winter: A. Brodin, “The History of Scatter Hoarding Studies,” *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 365 (2010), doi: 10.1098/rstb.2009.0217.
- xii months after hiding them: I. M. V. MacDonald, “Field Experiments on Duration and Precision of Grey and Red Squirrel Spatial Memory,” *Animal Behaviour* 54 (1997), <https://doi.org/10.1006/anbe.1996.0528>.
- xiii disheveled deer parks: M. Holmes, “The Perfect Pest: Natural History and the Red Squirrel in Nineteenth-Century Scotland (William T. Stearn Prize 2014),” *Archives of Natural History* 2, no. 1 (2015), <https://doi.org/10.3366/anh.2015.0284>.
- xiii Victorian egg collector: Holmes, “The Perfect Pest.”
- xiii bird-egg munching villains: Holmes, “The Perfect Pest.”
- xiii and the English: P. Coates, “A Tale of Two Squirrels: A British Case Study of the Sociocultural Dimensions of Debates over Invasive Species,” in *Invasive Species in a Globalized World: Ecological, Social, and Legal Perspectives on Policy*, ed. Reuben P. Keller, Marc W. Cadotte, and Glenn Sandiford, (Chicago: University of Chicago Press, 2014), doi: 10.7208/chicago/9780226166216.001.0001.
- xiv was introduced from the Americas: Coates, “A Tale of Two Squirrels.”
- xiv cause for conservation concern: Holmes, “The Perfect Pest.”
- xv “Human-Wildlife Conflict and Coexistence”: Nyhus, “Human-Wildlife Conflict and Coexistence.”
- xvi Cats kill between: S. Loss, T. Will, and P. Marra, “The Impact of Free-Ranging Domestic Cats on Wildlife of the United States,” *Nature Communications* 4 (2013), <https://doi.org/10.1038/ncomms2380>.
- xvi eight quadrants on a graph: P. J. Nyhus, “Human-Wildlife Conflict and Coexistence,” *Annual Review of Environment and Resources* 41 (2016): 143–71, <https://doi.org/10.1146/annurev-environ-110615-085634>.

- xvi cubes of human judgment: Nyhus, “Human-Wildlife Conflict and Coexistence.”
- xx like tiny mailboxes: E. Cortesi, et al., “Cultural Relationships Beyond the Iranian Plateau: the Helmand Civilization, Baluchistan and the Indus Valley in the 3rd Millennium BCE,” *Paléorient* 34 (2008), doi: 10.2307/41496521.
- xxi “images of your tumors”: 1 Samuel 6:5.
- xxi deserved the same fate: “The Farmer and the Stork,” *Aesop Fables*.
- xxii fear and loathing: No matter where they are found, gray wolves the world over are *Canis lupus*, and can and do interbreed with domestic dogs. Nature isn’t far away after all.
- xxiii run out of wolves: J. Strutt, *The Sports and Pastimes of the People of England from the Earliest Period, Including the Rural and Domestic Recreations, May Games, Mummeries, Pageants, Processions and Pompous Spectacles* (London: Methuen, 1903).
- xxiii another two centuries: Strutt, *The Sports and Pastimes of the People of England*.
- xxiii with a stick in 1621: J. T. Coleman, *Vicious: Wolves and Men in America* (New Haven, CT: Yale University Press, 2006).
- xxiii for their own meals: “Wolf Wars: America’s Campaign to Eradicate the Wolf,” *The Wolf That Changed America*, season 24, episode 4, PBS, September 14, 2008.
- xxiv named the world: “Ma’iingan (The Wolf) Our Brother,” White Earth Land Recovery Project, <https://www.welrp.org/about-welrp/maiiingan-the-wolf-our-brother/>.
- xxiv “join them on earth”: “Ma’iingan (The Wolf) Our Brother.”
- xxiv the lower forty-eight states: “Wolf Wars.”
- xxv wolves, grizzly bears: J. A. Estes, et al., “Trophic Downgrading of Planet Earth,” *Science* 333 (2011), doi: 10.1126/science.1205106.
- xxv Colorado, Idaho, and Montana: S. Brasch, “It’s Official: Colorado Has Its First Wild Wolf Pups Since the 1940s,” CPR News, June 9, 2021.
- xxvi Biehler is the author of: D. Biehler, *Pests in the City: Flies, Bedbugs, Cockroaches, and Rats* (Seattle: University of Washington Press, 2013).
- xxvii lack of opportunity, or simple poverty: Biehler, *Pests in the City*.

## CHAPTER 1: A PLAGUE OF RATS

- 4 known as a sage: “About Karni Mata,” Karni Mata Temple, <http://matakarnitemple.com/karni-mata/>, accessed May 17, 2022.
- 7 Romans left Britain: K. Rielly, “The Black Rat,” in *Extinctions and Invasions: A Social History of British Fauna*, ed. T. O’Connor and N. Sykes (Oxford, UK: Oxbow Books, 2010), 134–45.

- 8 new ideas about those rats: Jonathan Burt, *Rat* (London: Reaktion Books, 2005).
- 8 sewers began to proliferate: Burt, *Rat*.
- 8 recognized across cultures: P. Ekman and W. V. Friesen, "Constants Across Cultures in the Face and Emotion," *Journal of Personality and Social Psychology* 17 (February 1971), <http://doi.org/10.1037/h0030377>.
- 10 drug called domperidone: C. L. Nord, et al., "A Causal Role for Gastric Rhythm in Human Disgust Avoidance," *Current Biology* 31 (February 2021), <https://doi.org/10.1016/j.cub.2020.10.087>.
- 12 SGARs for rodent control: California State Assembly Bill No. 1788, Pesticides: Use of Second Generation Anticoagulant Rodenticides, September 30, 2020, [https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=201920200AB1788](https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB1788).
- 13 and 13 deaths: "Leptospirosis in Dogs in Los Angeles County in 2021," County of Los Angeles Public Health, Veterinary Health, updated March 11, 2022, <http://www.publichealth.lacounty.gov/vet/Leptospirosis2021.htm>.
- 13 third plague pandemic: J. Frith, "The History of Plague—Part 1: The Three Great Pandemics," *Journal of Military and Veterans' Health* 20 (April 2012).
- 14 skeleton from Latvia: J. Susat, "A 5,000-Year-Old Hunter-Gatherer Already Plagued by *Yersinia pestis*," *Cell Reports* 35 (June 29, 2021), <https://doi.org/10.1016/j.celrep.2021.109278>.
- 14 skeleton from Russia: M. A. Spyrou, et al., "Analysis of 3800-year-old *Yersinia pestis* Genomes Suggests Bronze Age Origin for Bubonic Plague," *Nature Communications* 9 (June 2018), <https://doi.org/10.1038/s41467-018-04550-9>.
- 15 the main drivers: K. R. Dean, et al., "Human Ectoparasites and the Spread of Plague in Europe during the Second Pandemic," *Proceedings of the National Academy of Sciences* 116 (January 2018), <https://doi.org/10.1073/pnas.1715640115>.
- 16 Some are pneumonic: D. J. D., Eam, et al., "Acceleration of Plague Outbreaks in the Second Pandemic," *Proceedings of the National Academy of Sciences* 117 (October 2020), <https://doi.org/10.1073/pnas.2004904117>.
- 16 for rat tails: Michael Vann and Liz Clarke, *The Great Hanoi Rat Hunt: Empire, Disease, and Modernity in French Colonial Vietnam* (New York: Oxford University Press, 2019).
- 17 had the villages destroyed: Maurits Bastiaan Meerwijk, "Bamboo Dwellers: Plague, Photography, and the House in Colonial Java," in *Plague Image and Imagination from Medieval to Modern Times, Medicine and Biomedical Sciences in Modern History*, ed. C. Lynteris (Palgrave Macmillan, Cham), [https://doi.org/10.1007/978-3-030-72304-0\\_8](https://doi.org/10.1007/978-3-030-72304-0_8).

- 19 Predator Free 2050 strategy: “Predator Free 2050,” Department of Conservation, Te Papa Atawhai, Government of New Zealand, <https://www.doc.govt.nz/nature/pests-and-threats/predator-free-2050/>.
- 19 Māori to trap them again: P. M. Wehi, et al., “Managing for Cultural Harvest of a Valued Introduced Species, the Pacific Rat (*Rattus exulans*) in Aotearoa New Zealand,” *Pacific Conservation Biology* 27 (August 2021), <https://doi.org/10.1071/PC20094>.
- 20 Robert Sullivan’s book: Robert Sullivan, *Rats: Observations on the History & Habit of the City’s Most Unwanted Inhabitants* (New York: Bloomsbury, 2004).
- 22 a single bin cost: “A Look at UM’s New \$4,500 Trash Cans,” *Daily Mississippian*, January 16, 2019, <https://thedmonline.com/a-look-at-ums-new-4500-trash-cans/>.
- 25 interviewed twenty people: K. A. Byers, et al., “‘They’re Always There’: Resident Experiences of Living with Rats in a Disadvantaged Urban Neighbourhood,” *BMC Public Health* 19 (July 2019), <https://doi.org/10.1186/s12889-019-7202-6>.
- 27 did just fine: Michael H. Parsons, et al., “Rats and the COVID-19 Pandemic: Considering the Influence of Social Distancing on a Global Commensal Pest,” *Journal of Urban Ecology* 7, no. 1 (September 2021), <https://doi.org/10.1093/jue/juab027>.
- 28 like Times Square: “NYC Trash Bin Pilot Program Aims to Curb Large Garbage Piles on City Streets,” Eyewitness News, ABC, April 20, 2022, <https://abc7ny.com/eric-adams-new-york-city-boroughs-waste-bins/11773111/>.

## CHAPTER 2: A SLITHER OF SNAKES

- 30 slithering through South Florida: “Burmese Python,” Everglades National Park, National Park Service, updated August 12, 2021, <https://www.nps.gov/ever/learn/nature/burmese-python.htm>.
- 30 absence of rabbits: M. E. Dorcas, et al., “Severe Mammal Declines Coincide with Proliferation of Invasive Burmese Pythons in Everglades National Park,” *Proceedings of the National Academy of Sciences* 109 (January 2012), <https://doi.org/10.1073/pnas.1115226109>.
- 33 participating in the Florida Python Challenge: “Florida Python Challenge 2022,” <https://flpythonchallenge.org/>, accessed May 17, 2022.
- 33 removed 223 snakes: “223 Pythons Removed during 2021 Florida Python Challenge,” Spectrum News, Bay News 9, August 4, 2021, <https://www.baynews9.com/fl/tampa/news/2021/08/04/223-pythons-removed-during-2021-florida-python-challenge>.

- 34 have a healthy concern: G. C. Davey, "Self-Reported Fears to Common Indigenous Animals in an Adult Uk Population: The Role of Disgust Sensitivity," *British Journal of Psychology* 85 (November 1994), <http://www.doi.org/10.1111/j.2044-8295.1994.tb02540.x>.
- 35 babies will focus intently: V. LoBue and K. E. Adolph, "Fear in Infancy: Lessons from Snakes, Spiders, Heights, and Strangers," *Developmental Psychology* 55 (September 2019), <http://doi.org/10.1037/dev0000675>.
- 35 born to fear snakes: V. LoBue, et al., "Young Children's Interest in Live Animals," *British Journal of Developmental Psychology* 31 (March 2013), <https://doi.org/10.1111/j.2044-835X.2012.02078.x>.
- 35 some side-eye: Susan Mineka, et al., "Fear of Snakes in Wild- and Laboratory-Reared Rhesus Monkeys (*Macaca mulatta*)," *Animal Learning & Behavior* 8, no. 4 (1980): 653–63, <https://doi.org/10.3758/BF03197783>.
- 35 not at all: J. Joslin, H. Fletcher and J. Emlen, "A Comparison of the Responses to Snakes of Lab- and Wild-Reared Rhesus Monkeys," *Animal Behaviour* 12, nos. 2–3 (April–July 1964): 348–52, [https://doi.org/10.1016/0003-3472\(64\)90023-5](https://doi.org/10.1016/0003-3472(64)90023-5).
- 35 pick up on their nerves: S. Mineka, et al., "Observational Conditioning of Snake Fear in Rhesus Monkeys," *Journal of Abnormal Psychology* 93, no. 4 (1984): 355–72, <https://doi.org/10.1037/0021-843X.93.4.355>.
- 36 pointier snake as mean: J. Souchet and F. Aubret, "Revisiting the Fear of Snakes in Children: The Role of Aposematic Signalling," *Scientific Reports* 6, November 2016, <https://doi.org/10.1038/srep37619>.
- 37 a fearful voice: LoBue and Adolph, "Fear in Infancy."
- 37 might kiss them: M. Conrad, L. B. Reider, and V. LoBue, "Exploring Parent–Child Conversations about Live Snakes and Spiders: Implications for the Development of Animal Fears," *Visitor Studies* 24 (February 2021), doi: 10.1080/10645578.2020.1865089.
- 37 provide negative information: Conrad, Reider, and LoBue, "Exploring Parent–Child Conversations."
- 38 god of the underworld in Europe: Emma Marris, *Wild Souls: Freedom and Flourishing in the Non-Human World* (New York: Bloomsbury, 2021).
- 38 snakes in northern Europe: H. J. R. Lenders and I. A. W. Janssen, "The Grass Snake and the Basilisk: From Pre-Christian Protective House God to the Antichrist," *Environment and History* 30 (August 2014), <http://doi.org/10.3197/096734014X14031694156367>.
- 39 sixty of those: C. Arnold, "Snakebite Steals Millions of Years of Quality Life in India," *Nature News*, December 4, 2020, <https://www.nature.com/articles/d41586-020-03327-9>.
- 39 averaged 58,000 deaths: Z. E. Selvanayagam, et al., "ELISA for the Detection of Venoms from Four Medically Important Snakes of India," *Toxicon* 37 (May 1999), [https://doi.org/10.1016/S0041-0101\(98\)00215-3](https://doi.org/10.1016/S0041-0101(98)00215-3).

- 40 101 snakebite deaths: S. C. Greene, et al., "Epidemiology of Fatal Snakebites in the United States 1989–2018," *American Journal of Emergency Medicine* 45 (July 2021), <https://doi.org/10.1016/j.ajem.2020.08.083>.
- 40 neglected tropical disease: "Snakebite Envenoming," World Health Organization, May 17, 2021, <https://www.who.int/news-room/fact-sheets/detail/snakebite-envenoming>.
- 41 real, live ones: F. L. Yuan, et al., "Sacred Groves and Serpent-Gods Moderate Human-Snake Relations," *People and Nature* 2 (March 2020), <https://doi.org/10.1002/pan3.10059>.
- 41 about 16 percent: Yuan, et al., "Sacred Groves and Serpent-Gods."
- 42 portions of the island: T. H. Fritts, et al., "Symptoms and Circumstances Associated with Bites by the Brown Tree Snake (Colubridae: *Boiga irregularis*) on Guam," *Journal of Herpetology* 28 (March 1994), <https://doi.org/10.2307/1564676>.
- 43 taking up oxygen: L. Clark, C. Clark, and S. Siers, "Brown Tree Snakes: Methods and Approaches for Control," in *Ecology and Management of Terrestrial Vertebrate Invasive Species in the United States*, ed. W. C. Pitt, J. C. Beasley, and G. W. Witmer (Boca Raton, FL: CRC Press, 2017), 415.
- 43 four days after deployment: R. A. Garcia, et al., "Adaptation of an Artificial Bait to an Automated Aerial Delivery System for Landscape-Scale Brown Treesnake Suppression," *Biological Invasions* 23 (May 2021), <https://doi.org/10.1007/s10530-021-02567-8>.
- 44 indistinguishable from Spam: Mary Roach, *Fuzz: When Nature Breaks the Law* (New York: W. W. Norton & Company, 2021).
- 44 6 percent of the bait: S. R. Siers, et al., "In Situ Evaluation of an Automated Aerial Bait Delivery System for Landscape-Scale Control of Invasive Brown Treesnakes on Guam," in *Island Invasives: Scaling Up to Meet the Challenge*, ed. C. R. Veitch, et al. (Gland, Switzerland: IUCN, 2019), 348–55.
- 45 four grams of acetaminophen: S. R. Siers, et al., "Evaluating Lethal Toxicant Doses for the Largest Individuals of an Invasive Vertebrate Predator with Indeterminate Growth," *Management of Biological Invasions* 12, no. 2 (June 2021), <https://doi.org/10.3391/mbi.2021.12.2.17>.
- 48 month in salt water: K. M. Hart, P. J. Schofield, and D. R. Gregoire, "Experimentally Derived Salinity Tolerance of Hatchling Burmese Pythons (*Python molurus bivittatus*) from the Everglades, Florida (USA)," *Journal of Experimental Marine Biology and Ecology* 413 (February 2012), <https://doi.org/10.1016/j.jembe.2011.11.021>.
- 49 Indian pythons: M. E. Hunter, et al., "Cytonuclear Discordance in the Florida Everglades Invasive Burmese Python (*Python bivittatus*) Population Reveals Possible Hybridization with the Indian Python (*P. molurus*)," *Ecology and Evolution* 8 (September 2018), <https://doi.org/10.1002/ece3.4423>.

- 49 the “Judas” technique: B. J. Smith, et al., “Betrayal: Radio-Tagged Burmese Pythons Reveal Locations of Conspecifics in Everglades National Park,” *Biological Invasions* 18 (July 2016), <https://doi.org/10.1007/s10530-016-1211-5>.
- 51 the Cobra Effect: J. Maheshwari, “Cobra Effect: The Law of Unintended Consequences (Part 1),” Medium, February 13, 2019, <https://medium.com/@jayna.1989/cobra-effect-the-law-of-unintended-consequences-part-1-d3e674f68400>.

### CHAPTER 3: A NEST OF MICE

- 60 full of gazelles: T. Dayan and D. Simberloff, “Natufian Gazelles: Proto-Domestication Reconsidered,” *Journal of Archaeological Science* 22 (September 1995), [https://doi.org/10.1016/S0305-4403\(95\)80152-9](https://doi.org/10.1016/S0305-4403(95)80152-9).
- 62 house mouse was born: B. Brookshire, “How the House Mouse Tamed Itself,” *Science News*, April 19, 2017, <https://www.sciencenews.org/blog/scicurious/how-house-mouse-tamed-itself>.
- 63 Delicious: Gilbert Smith, et al., “Human Follicular Mites: Ectoparasites Becoming Symbionts,” *Molecular Biology and Evolution* 39, no. 6 (June 2022), <https://doi.org/10.1093/molbev/msac125>.
- 64 new, scary environments: J. A. Bravo, et al., “Ingestion of *Lactobacillus* Strain Regulates Emotional Behavior and Central Gaba Receptor Expression in a Mouse via the Vagus Nerve,” *Proceedings of the National Academy of Sciences* 108 (August 2011), <https://doi.org/10.1073/pnas.1102999108>.
- 64 produce the same effect: J. R. Kelly, et al., “Lost in Translation? The Potential Psychobiotic *Lactobacillus Rhamnosus* (Jb-1) Fails to Modulate Stress or Cognitive Performance in Healthy Male Subjects,” *Brain, Behavior, and Immunity* 61 (March 2017): 50–59, <https://doi.org/10.1016/j.bbi.2016.11.018>.
- 64 pharmacy in your gut: A. Alberdi, et al., “Do Vertebrate Gut Metagenomes Confer Rapid Ecological Adaptation?,” *Trends in Ecology & Evolution* 31, no. 9 (September 2016): 689–99, <https://doi.org/10.1016/j.tree.2016.06.008>.
- 65 that likes darkness: K. M. Neufeld, et al., “Reduced Anxiety-like Behavior and Central Neurochemical Change in Germ-Free Mice,” *Neurogastroenterology & Motility* 23, no. 3 (March 2011): 255–64, <https://doi.org/10.1111/j.1365-2982.2010.01620.x>.
- 65 no response at all: K-A. M. Neufeld, et al., “Mouse Strain Affects Behavioral and Neuroendocrine Stress Responses Following Administration of Probiotic *Lactobacillus rhamnosus* JB-1 or Traditional Antidepressant Fluoxetine,” *Frontiers in Neuroscience* 12 (May 2018): 294, <https://doi.org/10.3389/fnins.2018.00294>.

- 67 solving the tasks: L. Vrbanc, et al., “Enhanced Problem-Solving Ability as an Adaptation to Urban Environments in House Mice,” *Proceedings of the Royal Society of Sciences—Biological Sciences* 288, no. 1945, February 2021, <http://doi.org/10.1098/rspb.2020.2504>.
- 67 poor country mice: V. Mazza and A. Guenther, “City Mice and Country Mice: Innovative Problem Solving in Rural and Urban Noncommensal Rodents,” *Animal Behaviour* 172 (February 2021): 197–210, <https://doi.org/10.1016/j.anbehav.2020.12.007>.
- 67 In urban environments: Pizza Ka Yee Chow, Nicola S. Clayton, and Michael A. Steele, “Cognitive Performance of Wild Eastern Gray Squirrels (*Sciurus carolinensis*) in Rural and Urban, Native, and Non-native Environments,” *Frontiers in Ecology and Evolution* 9 (February 2021), <https://doi.org/10.3389/fevo.2021.615899>.
- 68 the behavior spread: L. Lefebvre, “The Opening of Milk Bottles by Birds: Evidence for Accelerating Learning Rates, but Against the Wave-of-Advance Model of Cultural Transmission,” *Behavioural Processes* 34, no. 1 (May 1995): 43–53, [https://doi.org/10.1016/0376-6357\(94\)00051-H](https://doi.org/10.1016/0376-6357(94)00051-H).
- 68 raccoon-proof bins: L. Cecco, “Raccoons v Toronto: How ‘Trash Pandas’ Conquered the City,” *Guardian*, October 5, 2018, <https://www.theguardian.com/world/2018/oct/05/canada-toronto-raccoons>.
- 72 forty-five hundred years ago: E. Cortesi, et al., “Cultural Relationships Beyond the Iranian Plateau: The Helmand Civilization, Baluchistan and the Indus Valley in the 3rd Millennium BCE,” *Paléorient* 34, no. 2 (January 2008): 5–35, <http://doi.org/10.2307/41496521>.
- 73 invention of William Hooker: W. C. Hooker, “Animal Trap,” Patent No. 528,671, November 6, 1894.
- 73 the author of books: D. Drummond, *Nineteenth Century Mouse Traps Patented in the U.S.A.: An Illustrated Guide* (Galloway, OH: North American Trap Collectors Association, Inc., 2004).
- 74 *Queanbeyan Age* in 1871: S. M. Herald, “A Mouse Plague,” *Queanbeyan Age*, June 15, 1871.
- 75 thirty-two million mice: “Mice Plague in Australia,” *Nature* 129, no. 755 (May 1932), <https://doi.org/10.1038/129755b0>.
- 75 their hospital beds: N. Zhou, “Three Hospital Patients Bitten as Mouse Plague Sweeps Western NSW,” *Guardian*, March 18, 2021, <https://www.theguardian.com/australia-news/2021/mar/18/three-hospital-patients-bitten-by-mice-as-absolute-plague-sweeps-western-nsw>.
- 75 with zinc phosphide: “‘Follow the Instructions,’ Customers Warned after Several Hospitalized by Rodent Bait,” *Mudgee Guardian* (February 9, 2021), <https://www.mudgeeguardian.com.au/story/7118595/residents-urged-to-be-cautious-with-mouse-bait-misuse-resulting-in-poisoning/>.



- 75 as well as it does rats: V. Olmos and C. Magdalena López, “Brodifacoum Poisoning with Toxicokinetic Data,” *Clinical Toxicology* 45, no. 5 (October 2008): 487–89, doi: 10.1080/15563650701354093.
- 76 as one unit: Reka K. Kelemen, Marwan Elkrewi, Anna K. Lindholm, and Beatriz Vicoso, “Novel Patterns of Expression and Recruitment of New Genes on the T-Haplotype, a Mouse Selfish Chromosome,” *Proceedings of the Royal Society B* 289, no. 1968 (February, 2022): 20211985, <https://doi.org/10.1098/rspb.2021.1985>.
- 77 95 percent of the time: A. Manser, B. König, and A. K. Lindholm, “Polyandry Blocks Gene Drive in a Wild House Mouse Population,” *Nature Communications* 11, no. 5590 (November 2020), <https://doi.org/10.1038/s41467-020-18967-8>.
- 78 problem is over: J. Godwin, et al., “Rodent Gene Drives for Conservation: Opportunities and Data Needs,” *Proceedings of the Royal Society—Biological Sciences* 286 (November 2019), <http://doi.org/10.1098/rspb.2019.1606>.
- 79 mice in a natural environment: J. N. Runge, “Selfish Migrants: How a Meiotic Driver Is Selected to Increase Dispersal,” *Journal of Evolutionary Biology* 35, no 4 (April 2022): 621–32, <https://doi.org/10.1111/jeb.13989>.
- 80 won't even mate: A. Manser, et al., “Female House Mice Avoid Fertilization by T Haplotype Incompatible Males in a Mate Choice Experiment,” *Journal of Evolutionary Biology* 28, no. 3 (January 2015): 54–64, <https://doi.org/10.1111/jeb.12525>.
- 81 it wasn't that simple: A. Manser, et al., “Controlling Invasive Rodents via Synthetic Gene Drive and the Role of Polyandry,” *Proceedings of the Royal Society—Biological Sciences* 286 (August 2019), <https://doi.org/10.1098/rspb.2019.0852>.
- 82 50 percent to 72 percent: H. A. Grunwald, et al., “Super-Mendelian Inheritance Mediated by CRISPR–Cas9 in the Female Mouse Germline,” *Nature* 566 (January 2019): 105–9, <https://doi.org/10.1038/s41586-019-0875-2/>.
- 83 dogs and sheep: “History of Blood Transfusion,” American Red Cross, <https://www.redcrossblood.org/donate-blood/blood-donation-process/what-happens-to-donated-blood/blood-transfusions/history-blood-transfusion.html>, accessed May 18, 2022.
- 84 “Do you like mice?”: C. C. Little, “A New Deal for Mice,” *Scientific American*, January 1, 1935.
- 85 to form the Jackson Laboratory: Leila McNeill, “The History of Breeding Mice for Science Begins with a Woman in a Barn,” *Smithsonian Magazine*, March 20, 2018.
- 86 “nature and cure of cancer”: Little, “A New Deal for Mice.”
- 87 says Karen Rader: K. Rader, *Making Mice: Standardizing Animals for American Biomedical Research, 1900–1955* (Princeton, NJ: Princeton University Press, 2004).

- 85 twelve thousand strains of mice: “Fast Facts,” Jackson Laboratory, <https://www.jax.org/about-us/fast-facts>, accessed May 18, 2022.
- 85 three million mice: “The World’s Favourite Lab Animal Has Been Found Wanting, but There Are New Twists in the Mouse’s Tale,” *The Economist*, December 24, 2016, <https://www.economist.com/christmas-specials/2016/12/24/the-worlds-favourite-lab-animal-has-been-found-wanting-but-there-are-new-twists-in-the-mouses-tale>.

## CHAPTER 4: A DROPPING OF PIGEONS

- 89 found modern journalism: “The Long History of Speed at Reuters,” Reuters, October 21, 2020, <https://www.reuters.com/article/rpb-historyofspeed-idUSKBN2761XC>.
- 89 and South Asia: Michael D. Shapiro and Eric T. Domyan, “Domestic Pigeons,” *Current Biology* 23, no. 8 (April 2013): PR302-R303, <https://doi.org/10.1016/j.cub.2013.01.063>.
- 90 earliest domesticated birds: D. S. Farner, et al., ed., *Avian Biology VI* (New York: Academic Press, 1982).
- 90 five thousand years ago: C. A. Driscoll, et al., “From Wild Animals to Domestic Pets, an Evolutionary View of Domestication,” *Proceedings of the National Academy of Sciences*, 106 (June 2009): 9971–78, <https://doi.org/10.1073/pnas.0901586106>.
- 90 is the messenger: Andrew D. Blechman, *Pigeons: The Fascinating Saga of the World’s Most Revered and Reviled Bird* (New York: Grove Press, 2006), 13.
- 90 the pigeon fancy: C. Darwin, *On the Origin of Species: A Facsimilie of the First Edition* (Cambridge: Harvard University Press, 1964).
- 91 feral pigeon populations do: J. Jokimäki and J. Suhonen, “Distribution and Habitat Selection of Wintering Birds in Urban Environments,” *Landscape and Urban Planning* 39, no. 4 (January 1998): 253–63, [https://doi.org/10.1016/S0169-2046\(97\)00089-3](https://doi.org/10.1016/S0169-2046(97)00089-3).
- 91 June 22, 1966: “Hoving Calls a Meeting to Plan for Restoration of Bryant Park; Cleanup Is Urged for Bryant Park,” *New York Times*, June 22, 1966, <https://www.nytimes.com/1966/06/22/archives/hoving-calls-a-meeting-to-plan-for-restoration-of-bryant-park.html>.
- 91 1851 to 2006: C. Jerolmack, “How Pigeons Became Rats: The Cultural-Spatial Logic of Problem Animals,” *Social Problems* 55, no. 1 (February 2008): 72–94, <https://doi.org/10.1525/sp.2008.55.1.72>.
- 91 birds of spreading disease: Jerolmack, “How Pigeons Became Rats.”
- 91 dovescotes of the rich: C. Humphries, *Superdove: How the Pigeon Took Manhattan . . . and the World* (Washington, DC: Smithsonian, 2008).

- 92 in ancient Persia: Humphries, *Superdove*.
- 92 two whole hours: “Reuters: A Brief History,” *Guardian*, May 4, 2007, <https://www.theguardian.com/media/2007/may/04/reuters.pressandpublishing>.
- 93 an urban environment: D. Ducatez, et al., “Ecological Generalism and Behavioural Innovation in Birds: Technical Intelligence or the Simple Incorporation of New Foods?,” *Journal of Animal Ecology* 84 (June 2014): 79–89, <https://doi.org/10.1111/1365-2656.12255>.
- 94 urban birds are better: J. Audet, “The Town Bird and the Country Bird: Problem Solving and Immunocompetence Vary with Urbanization,” *Behavioral Ecology* 27, no. 2 (March–April 2016): 637–44, <https://doi.org/10.1093/behecol/arv201>.
- 95 it was thirteen rabbits: “How European Rabbits Took Over Australia,” *National Geographic*, <https://www.nationalgeographic.org/article/how-european-rabbits-took-over-australia/>, accessed May 18, 2022.
- 95 rabbit-proof fences: “State Barrier Fence Overview,” Department of Primary Industries and Regional Development, Government of Western Australia, updated May 4, 2022, <https://www.agric.wa.gov.au/invasive-species/state-barrier-fence-overview>.
- 98 infected with “ornithosis”: Jerolmack, “How Pigeons Became Rats.”
- 98 also called psittacosis: Jerolmack, “How Pigeons Became Rats.”
- 98 a health menace: Jerolmack, “How Pigeons Became Rats.”
- 98 DO NOT FEED PIGEONS: “Health Board Bids City Abolish Pigeon-Feeding Areas in Parks,” *New York Times*, October 23, 1963, <https://www.nytimes.com/1963/10/23/archives/health-board-bids-city-abolish-pigeonfeeding-areas-in-parks.html>.
- 99 around the globe: A. P. Litvintseva, et al., “Evidence That the Human Pathogenic Fungus *Cryptococcus Neoformans* Var. *Grubii* May Have Evolved in Africa,” *PLOS ONE* 11, no. 6 (May 2011), doi: 10.1371/journal.pone.0019688.
- 100 70 percent of Australia: T. Strive and T. E. Cox, “Lethal Biological Control of Rabbits—The Most Powerful Tools for Landscape-Scale Mitigation of Rabbit Impacts in Australia,” *Australian Zoologist* 40, no. 1 (2019): 118–29, <https://doi.org/10.7882/AZ.2019.016>.
- 100 into the bush in the late 1880s: D. Peacock and I. Abbott, “The Mongoose in Australia: Failed Introduction of a Biological Control Agent,” *Australian Journal of Zoology* 58, no. 4 (November 2010): 205–27, <http://doi.org/10.1071/ZO10043>.
- 101 method to kill bunnies: “Extermination of Rabbits,” *Sydney Morning Herald*, September 7, 1867, <https://trove.nla.gov.au/newspaper/article/13649462>.

- 101 with chicken cholera: J. F. Prescott, review of *Pasteur's Gambit: Louis Pasteur, the Australasian Rabbit Plague and a Ten Million Dollar Prize*, *Veterinary Microbiology* 149 (May 2011): 3N4, <http://doi.org/10.1016/j.vetmic.2010.12.019>.
- 101 Myxoma took off: T. Strive, "Lethal Biological Control of Rabbits," *Australian Zoologist* 40, no. 1 (2019): 118–28.
- 101 PR and humane disaster: P. J. Kerr, R. N. Hall, and T. Strive, "Viruses for Landscape-Scale Therapy: Biological Control of Rabbits in Australia," in *Viruses as Therapeutics: Methods and Protocols*, ed. A. R. Lucas (New York, Humana Press, 2021).
- 101 imported from Germany: Kerr, Hall, and Strive, "Viruses for Landscape-Scale Therapy."
- 102 months after death: Kerr, Hall, and Strive, "Viruses for Landscape-Scale Therapy."
- 102 around the outbreak: Kerr, Hall, and Strive, "Viruses for Landscape-Scale Therapy."
- 102 pest control in 1996: Kerr, Hall, and Strive, "Viruses for Landscape-Scale Therapy."
- 102 another, deadlier strain: D. S. L. Ramsey, et al., "Emerging RHDV2 Suppresses the Impact of Endemic and Novel Strains of RHDV on Wild Rabbit Populations," *Journal of Applied Ecology* 57, no. 3 (March 2020): 630–41, <https://doi.org/10.1111/1365-2664.13548>.
- 103 pounds of waste per year: D. H. R. Spennemann and M. J. Watson, "Experimental Studies on the Impact of Bird Excreta on Architectural Metals," *APT Bulletin: Journal of Preservation Technology* 49, no. 1 (2018): 19–28, <https://www.jstor.org/stable/26452201>.
- 103 "aesthetically displeasing": D. H. R. Spennemann, M. Pike, and M. J. Watson, "Effects of Acid Pigeon Excreta on Building Conservation," *International Journal of Building Pathology* 35, no. 1 (April 2017), <https://doi.org/10.1108/IJBPA-09-2016-0023>.
- 104 Sacré-Coeur and Trafalgar Square: "How Does Acid Precipitation Affect Marble and Limestone Buildings?," United States Geological Survey, [https://www.usgs.gov/faqs/how-does-acid-precipitation-affect-marble-and-limestone-buildings?qt-news\\_science\\_products=0#](https://www.usgs.gov/faqs/how-does-acid-precipitation-affect-marble-and-limestone-buildings?qt-news_science_products=0#), accessed May 18, 2022.
- 104 pH of 7.4: Spennemann, Pike, and Watson, "Effects of Acid Pigeon Excreta."
- 104 copper or bronze: E. Bernardi, et al., "The Effect of Uric Acid on Outdoor Copper and Bronze," *Science of the Total Environment* 407, no. 7 (March 2009): 2383–89, <https://doi.org/10.1016/j.scitotenv.2008.12.014>.
- 104 care much about pigeons: D. H. R. Spennemann, M. Pike, and M. J. Watson, "Bird Impacts on Heritage Buildings: Australian Practitioners' Perspectives and Experiences," *Journal of Cultural Heritage Management and Sustainable Development* 8, no. 1 (January 2018): 62–75, <https://doi.org/10.1016/j.jchm.2017.12.001>.

org/10.1108/JCHMSD  
-07-2016-0042.

- 105 can land anyway: M. Conover, *Resolving Human-Wildlife Conflicts: The Science of Wildlife Damage Management* (Boca Raton, FL: CRC Press, 2001).
- 105 pigeon to land: Conover, *Resolving Human-Wildlife Conflicts*.
- 105 pack of fifteen: "Optical Bird Gel Repellant," BirdBusters, <https://www.birdbusters.com/shop/Optical-Bird-Gel-Repellent.html>, accessed May 18, 2022.
- 106 Mikhail tracked down: A. Mikhail, *The Animal in Ottoman Egypt* (Oxford: Oxford University Press, 2016).
- 107 dog's saliva is impure: "Fatwa No: 335128: Impurity of Dogs—Command to Kill Black Dogs," Fatwa, October 22, 2016, <https://www.islamweb.net/en/fatwa/335128/impurity-of-dogs-command-to-kill-black-dogs>.
- 107 at their ease: "Fatwa No: 335128."
- 107 done to a person: S. A. Rahman, "Religion and Animal Welfare—An Islamic Perspective," *Animals (Basel)* 7, no. 2 (February 2017), <http://doi.org/10.3390/ani7020011>.
- 107 they ate garbage: Mikhail, *The Animal in Ottoman Egypt*.
- 108 littered the streets: Mikhail, *The Animal in Ottoman Egypt*.
- 110 scare the pigeons away: L. Hornack, "London's Pigeon Problem Has a Simple Solution: A Hawk," *The World*, March 15, 2017, <https://theworld.org/stories/2017-03-15/londons-pigeon-problem-has-simple-solution-hawk>.
- 110 birdseed to tourists: C. Jerolmack, *The Global Pigeon* (Chicago: University of Chicago Press, 2013).
- 111 writes in his book: Jerolmack, *The Global Pigeon*.
- 111 "put in a home": Jerolmack, *The Global Pigeon*.

## CHAPTER 5: A MEMORY OF ELEPHANTS

- 118 adoption fee: "Adopt an Orphan," Sheldrick Wildlife Trust, <https://www.sheldrickwildlifetrust.org/orphans>, accessed May 19, 2022.
- 119 terrifying game animals: Stephanie Hanes, *White Man's Game: Saving Animals, Rebuilding Eden, and Other Myths of Conservation in Africa* (New York: Metropolitan Books, 2017), 101.
- 119 by the millions: J. R. Poulsen, , C. Rosin, A. Meier, E. Mills, C. L. Nuñez, S. E. Koerner, E. Blanchard, J. Callejas, S. Moore, and M. Sowers, "Ecological Consequences of Forest Elephant Declines for Afrotropical Forests," *Conservation Biology* 32, no. 3 (June 2018): 559–67, <https://doi.org/10.1111/cobi.13035>.
- 121 2,398 people died in India: PTI, "Elephants Killed over 2,300 People in Last Five Years: Elephant Ministry," *The Hindu*, June 28, 2019, <https://www.thehindu.com/sci-tech/energy-and-environment/elephants-killed-over-2300-people-in-last-five-years-environment-ministry/article28208456.ece>.
- 121 450 elephants died, too: PTI, "Elephants Killed over 2,300 People."

- 121 in the United States, it's news: Normvance, "Bear Put Down after Trapping Family in Home for 45 Minutes," *Pagosa Springs Journal*, September 16, 2021, <https://pagosasprings.com/bear-put-down-after-trapping-family-in-home-for-45-minutes/>.
- 121 In a 2021 map: E. Di Minin, et al., "A Pan-African Spatial Assessment of Human Conflicts with Lions and Elephants," *Nature Communications* 12, no. 2978 (May 2021), <https://doi.org/10.1038/s41467-021-23283-w>.
- 122 parks and reserves in East Africa: Di Minin, et al., "A Pan-African Spatial Assessment."
- 122 and employs about one million people: Reuters Staff, "COVID Slashes Kenyan Tourism Revenues by \$1 Billion," Reuters, December 2, 2020, <https://www.reuters.com/article/health-coronavirus-kenya-tourism-idUSL8N2II4DE>.
- 123 at least a generation: Jon T. Coleman, *Vicious: Wolves and Men in America* (New Haven: Yale University Press, Lamar Series in Western History, 2006).
- 123 horrible, hairy criminals: Coleman, *Vicious: Wolves and Men in America*.
- 123 the wolfish sinner: Coleman, *Vicious: Wolves and Men in America*.
- 123 "punished for living": Coleman, *Vicious: Wolves and Men in America*.
- 124 "an entire species": Coleman, *Vicious: Wolves and Men in America*.
- 124 lives per year: G. Bombieri, J. Naves, V. Penteriani, et al. "Brown Bear Attacks on Humans: a Worldwide Perspective," *Scientific Reports* 9, no. 8573 (June 2019), <https://doi.org/10.1038/s41598-019-44341-w>.
- 124 Chignik in Alaska: S. Woodham, "Wolf May Have Killed Teacher Near Chignik Lake," *Anchorage Daily News*, March 20, 2010, <https://www.adn.com/alaska-beat/article/wolf-may-have-killed-teacher-near-chignik-lake/2010/03/10/>.
- 124 2,040 cattle: USDA, "Cattle and Calves Death Loss in the United States Due to Predator and Nonpredator Causes, 2015," APHIS, VS, NAHMS, December 20, 2017.
- 124 mostly to disease: USDA, "Cattle and Calves."
- 125 *The Predator Paradox*: J. Shivik, *The Predator Paradox: Ending the War with Wolves, Bears, Cougars, and Coyotes* (Boston: Beacon Press, 2014).
- 126 notes in his book: Joseph Marshall III, *On Behalf of the Wolf and the First Peoples* (Santa Fe: Museum of New Mexico Press, 1995).
- 127 When a male elephant: Anthony J. Hall-Martin and L. A. van der Walt, "Plasma Testosterone Levels in Relation to Musth in the Male African Elephant," *Koedoe* 27 (December 1984): 147–49, <https://doi.org/10.4102/koedoe.v27i1.561>.
- 129 function of the ecosystem: Michiel P. Veldhuis, Mark E. Ritchie, Joseph O. Ogutu, et al., "Cross-Boundary Human Impacts Compromise the Serengeti-Mara Ecosystem," *Science* 363, no. 64636 (March 2019): 1424–28, <https://doi.org/10.1126/science.aav0564>.

- 129 leave the elephants in crisis: Connor J. Cavanagh, Teklehaymanot Welde-michel, and Tor A. Benjaminsen, "Gentrifying the African Landscape: The Performance and Powers of for-Profit Conservation on Southern Kenya's Conservancy Frontier," *Annals of the American Association of Geographers* 110, no. 5 (March 2020): 1594–612, <https://doi.org/10.1080/24694452.2020.1723398>.
- 130 Electric fences are going up: J. Shaffer, "Human-Elephant Conflict: A Review of Current Management Strategies and Future Directions," *Frontiers in Ecology and Evolution* 6 (January 2019), <https://doi.org/10.3389/fevo.2018.00235>.
- 130 short-circuit the wires: Shaffer, "Human-Elephant Conflict."
- 130 fences to kill: T. Kalam, et al., "Lethal Fence Electrocution: A Major Threat to Asian Elephants in Assam, India," *Tropical Conservation Science* 11 (December 2018), <https://doi.org/10.1177/1940082918817283>.
- 130 Pliny the Elder: E. J. Christie, "The Idea of an Elephant: Ælfric of Eynsham, Epistemology, and the Absent Animals of Anglo-Saxon England," *Neophilologus* 98 (October 2013): 465–79, <https://doi.org/10.1007/s11061-013-9374-0>.
- 130 had bees in them: L. E. King, "African Elephants Run from the Sound of Disturbed Bees," *Current Biology* 17, no. 19 (2007): R832–33, <https://doi.org/10.1016/j.cub.2007.07.038>.
- 130 they ran: King, "African Elephants Run."
- 131 86 percent: L. E. King, et al., "Beehive Fence Deters Crop-Raiding Elephants," *African Journal of Ecology* 47, no. 2 (June 2009): 131–37, <https://doi.org/10.1111/j.1365-2028.2009.01114.x>.
- 131 twenty countries and counting: "Our Beehive Fence Design," Elephants and Bees Project, Save the Elephants, <https://elephantsandbees.com/beehive-fence/>, accessed May 18, 2022.
- 131 full of bees: King, et al., "Beehive Fence Deters Crop-Raiding Elephants."
- 131 \$2,500 per year: G. Rapsomanikis, "The Economic Lives of Smallholder Farmers," Food and Agriculture Organization of the United Nations, 2015.
- 132 an elephant repellant: T. Chapman, "Brewing Smelly Elephant Repellant," Elephants and Bees Project, Save the Elephants, December 17, 2019, <https://elephantsandbees.com/brewing-smelly-elephant-repellent/>.
- 134 often afraid of bees: Renaud Hecklé, Pete Smith, Jennie I. Macdiarmid, Ewan Campbell, Pamela Abbott, "Beekeeping Adoption: a Case Study of Three Smallholder Farming Communities in Baringo County, Kenya," *Journal of Agriculture and Rural Development in the Tropics and Subtropics* 119, no. 1 (2018).
- 135 a geo-fence: J. Wall, et al., "Novel Opportunities for Wildlife Conservation and Research with Real-Time Monitoring," *Ecological Applications* 24, no. 4 (June 2014): 593–601, <http://doi.org/10.1890/13-1971.1>.
- 135 fifty "flagship" elephants: "Monitor," Mara Elephant Project, <https://maraelephantproject.org/our-approach/monitor/>, accessed May 18, 2022.

- 136 three quadcopter drones: N. Hahn, et al., “Unmanned Aerial Vehicles Mitigate Human–Elephant Conflict on the Borders of Tanzanian Parks: A Case Study,” *Oryx* 51, no. 3 (November 2016): 513–16, doi: 10.1017/S0030605316000946.
- 136 the propeller blades: “Protect,” Mara Elephant Project, <https://maraelephantproject.org/our-approach/protect/>, accessed May 18, 2022.
- 137 and life in prison: E. Atienza, “Fact Check: Did Kenya Introduce the Death Penalty for Wildlife Poachers?,” *Checkyourfact.com*, December 25, 2019, <https://checkyourfact.com/2019/12/25/fact-check-kenya-introduce-death-penalty-law-poachers-elephants-rhinos/>.
- 140 exceptionally good luck: “The Elephant’s Placenta and the Lucky Brothers,” *Lion Guardians*, June 9, 2017, <http://lionguardians.org/the-elephants-placenta-and-the-lucky-brothers/>.
- 140 to receive blessings: J. Kioke, et al., “Maasai People and Elephants: Values and Perceptions,” *Indian Journal of Traditional Knowledge* 14, no. 1 (January 2015): 13–19.

## CHAPTER 6: A NUISANCE OF CATS

- 145 one of her sisters: B. Brookshire, “I Spent 5 Months Trying to Coax a Cat from My Ceiling,” *Atlantic*, August 19, 2021, <https://www.theatlantic.com/science/archive/2021/08/ceiling-cat-meme-came-live-my-house/619832/>.
- 146 one to four billion birds and six to twenty-two billion mammals: Loss, Will, and Marra, “The Impact of Free-Ranging Domestic Cats.”
- 146 At least 63 species: F. Medina, et al., “A Global Review of the Impacts of Invasive Cats on Island Endangered Vertebrates,” *Global Change Biology* 17 (November 2011), <https://doi.org/10.1111/j.1365-2486.2011.02464.x>.
- 146 threaten 430 more: T. S. Doherty, et al., “Invasive Predators and Global Biodiversity Loss,” *Proceedings of the National Academy of Sciences* 40 (October 2015), <https://doi.org/10.1073/pnas.1602480113>.
- 146 86 percent of the species extinctions: D. R. Spatz, et al., “Globally Threatened Vertebrates on Islands with Invasive Species,” *Science Advances* 3 (October 2017), doi:10.1126/sciadv.1603080.
- 147 around ten thousand years ago: C. A. Driscoll, et al., “The Near Eastern Origin of Cat Domestication,” *Science* 317 (July 2007), <https://doi.org/10.1126/science.1139518>.
- 147 basically called cats “meow”: J. Bradshaw, *Cat Sense: How the New Feline Science Can Make You a Better Friend to Your Pet* (New York: Basic Books, 2013).



- 147 they were being depicted: J. A. Serpall, "Domestication and History of the Cat," in *The Domestic Cat: The Biology of its Behaviour* (Cambridge: Cambridge University Press, 2013), 89.
- 147 were caring for kitty injuries: A. Haruda, et al., "The Earliest Domestic Cat on the Silk Road," *Scientific Reports* 10 (2020), <https://doi.org/10.1038/s41598-020-67798-6>.
- 148 in 1998, their traps came up empty: E. Vázquez-Domínguez, G. Ceballos, and J. Cruzado, "Extirpation of an Insular Subspecies by a Single Introduced Cat: The Case of the Endemic Deer Mouse *Peromyscus guardia* on Estanque Island, Mexico," *Oryx* 38 (August 2004), doi: 10.1017/S0030605304000602.
- 148 a cat, and one hundred of her bowel movements: E. Mellink, G. Ceballos, and J. Luévano, "Population Demise and Extinction Threat of the Angel De La Guarda Deer Mouse (*Peromyscus Guardia*)," *Biological Conservation* 108 (November 2002), [https://doi.org/10.1016/S0006-3207\(02\)00095-2](https://doi.org/10.1016/S0006-3207(02)00095-2).
- 148 93 percent of the scats: Vázquez-Domínguez, Ceballos, and Cruzado, "Extirpation of an Insular Subspecies."
- 148 The last known example died: Vázquez-Domínguez, Ceballos, and Cruzado, "Extirpation of an Insular Subspecies."
- 149 In just a year, the bird was gone: R. Galbreath and D. Brown, "The Tale of the Lighthouse-Keeper's Cat: Discovery and Extinction of the Stephens Island Wren (*Traversia lyalli*)," *Notornis* 51 (2004).
- 149 cats disappeared from the island: Galbreath and Brown, "The Tale of the Lighthouse-Keeper's Cat."
- 150 The analog towers: "Hawaii TV Stations to Go Digital One Month before National DTVTransition," *Hawaii News Now*, October 15, 2008.
- 151 In a survey conducted: A. F. Raine, et al., "Managing the Effects of Introduced Predators on Hawaiian Endangered Seabirds," *Journal of Wildlife Management* 84 (April 2020), <https://doi.org/10.1002/jwmg.21824>.
- 151 Half of those were due to rats: Raine, "Managing the Effects of Introduced Predators."
- 151 headed for extinction within: Raine, "Managing the Effects of Introduced Predators."
- 153 2.8 million feral cats: House of Representatives Standing Committee on the Environment and Energy, "Tackling the Feral Cat Pandemic: A Plan to Save Australian Wildlife: Report of the Inquiry into the Problem of Feral and Domestic Cats in Australia," Commonwealth of Australia, 2020, [https://www.aph.gov.au/Parliamentary\\_Business/Committees/House/Environment\\_and\\_Energy/Feralanddomesticcats/Report](https://www.aph.gov.au/Parliamentary_Business/Committees/House/Environment_and_Energy/Feralanddomesticcats/Report).
- 153 30 million homeless felines: A. N. Rowan, T. Kartal, and J. Hadidian, "Cat Demographics & Impact on Wildlife in the USA, the UK, Australia and New

- Zealand: Facts and Values,” *Journal of Applied Animal Ethics Research* 2 (2019), <https://doi.org/10.1163/25889567-12340013>.
- 153 extinction of twenty-five Australian mammal species: House of Representatives Standing Committee on the Environment and Energy, “Tackling the Feral Cat Pandemic.”
  - 153 prevented the extinction of thirteen mammal taxa: S. Legge, et al., “Australia Must Control Its Killer Cat Problem. A Major New Report Explains How, but Doesn’t Go Far Enough,” *The Conversation*, February 9, 2021.
  - 155 2005 paper looking at TNR programs: P. Foley, et al., “Analysis of the Impact of Trap-Neuter-Return Programs on Populations of Feral Cats,” *Journal of the American Veterinary Medical Association* 227 (December 2005), <https://doi.org/10.2460/javma.2005.227.1775>.
  - 155 if you could TNR: Foley, et al., “Analysis of the Impact of Trap-Neuter-Return Programs.”
  - 155 bred even more: Idit Gunther, et al., “Reduction of Free-Roaming Cat Population Requires High-Intensity Neutering in Spatial Contiguity to Mitigate Compensatory Effects,” *Proceedings of the National Academy of Sciences* 119, no. 15 (April 2022): e2119000119, <https://doi.org/10.1073/pnas.2119000119>.
  - 156 by Daniel Spehar and Peter Wolf: D. D. Spehar and P. J. Wolf, “Back to School: An Updated Evaluation of the Effectiveness of a Long-Term Trap-Neuter-Return Program on a University’s Free-Roaming Cat Population,” *Animals* 9 (2019), <https://doi.org/10.3390/ani9100768>.
  - 156 there were only ten cats left: Spehar and Wolf, “Back to School.”
  - 156 In most successful studies: K. Tan, J. Rand, and J. Morton, “Trap-Neuter-Return Activities in Urban Stray Cat Colonies in Australia,” *Animals* 7 (2017), <https://doi.org/10.3390/ani7060046>. See also: Spehar and Wolf, “Back to School.”
  - 158 “climate refugees”: M. C. Urban, “Climate-Tracking Species Are Not Invasive,” *Nature Climate Change* 10 (May 2020): 382–84, <https://doi.org/10.1038/s41558-020-0770-8>.
  - 158 “Instead of a paradigm”: Marris, *Wild Souls*, 173.
  - 159 estimated in 2013 that cats kill: Loss, Will, and Marra, “The Impact of Free-Ranging Domestic Cats”; S. Loss, T. Will, and P. Marra, “Correction: Corrigendum: The Impact of Free-Ranging Domestic Cats on Wildlife of the United States,” *Nature Communications* 4 (2013), <https://doi.org/10.1038/ncomms3961>.
  - 159 925 GPS collars: R. Kays, et al., “The Small Home Ranges and Large Local Ecological Impacts of Pet Cats,” *Animal Conservation* 23 (October 2020), <https://doi.org/10.1111/acv.12563>.
  - 160 They’re about forty-one calories each: F. B. Golley, “Energy Dynamics of a Food Chain of an Old-Field Community,” *Ecological Monographs* 30 (April 1960), <https://doi.org/10.2307/1948551>.

- 160 delicious, delicious meat: Martina Cecchetti, et al., “Drivers and  
Facilitators of Hunting Behaviour in Domestic Cats and Options for  
Management,” *Mammal Review* 51, no. 3 (July 2021): 307–22, <https://doi.org/10.1111/mam.12230>.
- 160 Fancy Feast throughout history: Cecchetti et al., “Drivers and Facilitators  
of Hunting Behaviour.”
- 160 keep the hunting hustle going: Cecchetti et al., “Drivers and Facilitators of  
Hunting Behaviour.”
- 161 rats and cats just avoided each other: M. H. Parsons, et al., “Temporal and  
Space-Use Changes by Rats in Response to Predation by Feral Cats in an Urban  
Ecosystem,” *Frontiers in Ecology and Evolution* (September 2018), <https://doi.org/10.3389/fevo.2018.00146>.
- 161 surveyed 219 feline households: S. L. Crowley, M. Cecchetti, and R.  
A. McDonald, “Diverse Perspectives of Cat Owners Indicate Barriers to  
and Opportunities for Managing Cat Predation of Wildlife,” *Frontiers in  
Ecology and the Environment* 18 (December 2020), <https://doi.org/10.1002/fee.2254>.
- 162 41 percent of the population: W. L. Linklater, et al., “Prioritizing  
Cat-Owner Behaviors for a Campaign to Reduce Wildlife Depredation,”  
*Conservation Science and Practice* 5 (May 2019), <https://doi.org/10.1111/csp2.29>.
- 163 apparently without any hint of irony: G. Williams, “Caught Cats Put to  
Good Use Catching Rabbits in Queenstown,” *Otago Daily Times*, July 18,  
2021.
- 163 study that Linklater and his colleagues: Linklater, et al., “Prioritizing Cat-  
Owner Behaviors.”
- 165 cat-owning beliefs into five groups: Crowley, Cecchetti, and McDonald,  
“Diverse Perspectives of Cat Owners.”
- 166 what they might be willing to do: W. L. Linklater, et al., “Prioritizing Cat-  
Owner Behaviors.”
- 167 decreased the prey brought home: M. Cecchetti, et al., “Provision of High  
Meat Content Food and Object Play Reduce Predation of Wild Animals by  
Domestic Cats *Felis catus*,” *Current Biology* 31 (2021), <https://doi.org/10.1016/j.cub.2020.12.044>.
- 167 cultural models that different groups use: K. M. Leong, A. R. Gramza, and  
C. A. Lepczyk, “Understanding Conflicting Cultural Models of Outdoor Cats to  
Overcome Conservation Impasse,” *Conservation Biology* 34 (October 2020),  
<https://doi.org/10.1111/cobi.13530>.

## CHAPTER 7: A BAND OF COYOTES

- 177 attack our kids: Jesse O'Neill, "Coyote Attacks Toddler on California Beach," *New York Post*, April 30, 2022, <https://nypost.com/2022/04/30/huntington-beach-coyote-attack-injures-toddler-in-california/>.
- 177 Manhattan's Central Park: J. Salo, "Coyote Spotted in Central Park," *New York Post*, February 8, 2021, <https://nypost.com/2021/02/08/coyote-spotted-in-central-park/>.
- 178 Rancho La Brea in Los Angeles: "Mammal Collections," La Brea Tar Pits & Museum, <https://tarpits.org/research-collections/tar-pits-collections/mammal-collections>, accessed May 28, 2022.
- 178 *Coyote America*: Dan Flores, *Coyote America: A Natural and Supernatural History* (New York: Basic Books, 2016).
- 178 Steve Pavlik: Steve Pavlik, *Navajo and the Animal People: Native American Traditional Ecological Knowledge and Ethnozoology* (Golden, CO: Fulcrum Publishing, 2014).
- 178 First Man and First Woman: Pavlik, *Navajo and the Animal People*.
- 178 across the sky: Pavlik, *Navajo and the Animal People*.
- 178 death as well as birth: Pavlik, *Navajo and the Animal People*.
- 179 burned-up wood for his trouble: Pavlik, *Navajo and the Animal People*.
- 179 without much trouble: K. M. Berger, et al., "Indirect Effects and Traditional Trophic Cascades: A Test Involving Wolves, Coyotes and Pronghorn," *Ecology* 89, no. 3 (March 2008): 818–28, <https://doi.org/10.1890/07-0193.1>.
- 180 pack for protection: Berger, et al., "Indirect Effects and Traditional Trophic Cascades."
- 180 They're bigger: J. G. Way, "A Comparison of Body Mass of *Canis latrans* (Coyotes) between Eastern and Western North America," *Northeastern Naturalist* 14, no. 1 (March 2007): 111–24, [https://doi.org/10.1656/1092-6194\(2007\)14\[111:ACOBMO\]2.0.CO;2](https://doi.org/10.1656/1092-6194(2007)14[111:ACOBMO]2.0.CO;2).
- 181 it's hard to know: Flores, *Coyote America*.
- 181 start breeding slightly earlier: J. C. Kligo, et al., "Reproductive Characteristics of a Coyote Population Before and During Exploitation," *Journal of Wildlife Management* 81, no. 6 (November 2017): 1386–93, <https://doi.org/10.1002/jwmg.21329>.
- 181 for the rest: Kligo, et al., "Reproductive Characteristics of a Coyote Population."
- 181 were moving in: Kligo, et al., "Reproductive Characteristics of a Coyote Population."

- 182 it was the yard: S. M. Alexander and D. L. Draper, "The Rules We Make That Coyotes Break," *Contemporary Social Science* 16, no. 1 (May 2019): 127–39, <http://doi.org/10.1080/21582041.2019.1616108>.
- 182 always be trespassing: Alexander and Draper, "The Rules We Make That Coyotes Break."
- 183 more natural landscape: S. M. Alexander and D. L. Draper, "Worldviews and Coexistence with Coyotes," in *Human Wildlife Interactions: Turning Conflict into Coexistence*, ed. Beatrice Frank, Jenny A. Glikman, and Silvio Marchini (Cambridge: Cambridge University Press, 2019).
- 184 compared to the outskirts: M. Fidino, et al., "Landscape-Scale Differences among Cities Alter Common Species' Responses to Urbanization," *Ecological Applications* 31, no. 2 (March 2021): e02253, <https://doi.org/10.1002/eap.2253>.
- 185 don't want to: E. H. Ellington and S. D. Gehrt, "Behavioral Responses by an Apex Predator to Urbanization," *Behavioral Ecology* 30, no. 3 (May/June 2019): 821–29, <https://doi.org/10.1093/beheco/arz019>.
- 185 middle of downtown: Ellington and Gehrt, "Behavioral Responses by an Apex Predator."
- 185 posts and any comment threads: S. Altrudi and C. Kelty, "Animals, Angelenos and the Arbitrary: Analyzing Human-Wildlife Entanglement in Los Angeles," personal communication, 2021.
- 185 "keep your pets inside!": Altrudi and Kelty, "Animals, Angelenos and the Arbitrary."
- 185 make people afraid: Altrudi and Kelty, "Animals, Angelenos and the Arbitrary."
- 186 make the news: B. Erickson, "Lake Highlands Residents, Authorities Tell Different Stories About Coyote That Attacked Toddler," *Dallas* magazine, May 4, 2022, <https://www.dmagazine.com/frontburner/2022/05/coyote-attack-dallas-lake-highlands/>.
- 187 can startle them: N. J. Lance, et al., "Biological, Technical, and Social Aspects of Applying Electrified Fladry for Livestock Protection from Wolves (*Canis lupus*)," *Wildlife Research* 37, no. 8 (January 2011), <http://doi.org/10.1071/WR10022>.
- 187 Starting in 2000, scientists: M. Musiani, et al., "Wolf Depredation Trends and the Use of Fladry Barriers to Protect Livestock in Western North America," *Conservation Biology* 17, no. 6 (December 2003): 1538–47, <https://doi.org/10.1111/j.1523-1739.2003.00063.x>.
- 188 it looked too small: J. Young, et al., "Mind the Gap: Experimental Tests to Improve Efficacy of Fladry for Nonlethal Management of Coyotes," *Wildlife Society Bulletin* 43, no. 9 (June 2019), <http://doi.org/10.1002/wsb.970>.

- 188 experimented with turbo-fladry: Lance, et al., “Biological, Technical, and  
Social Aspects of Applying Electrified Fladry.”
- 190 grant applications in 2017: “Agriculture & Wildlife Protection Program,”  
Benton County, OR., <https://bentonawpp.wordpress.com/home/>, accessed May  
19, 2022.
- 191 little penguins of Middle Island: E. Nobel, “Maremma Sheepdog and  
Little Penguin Protector Retires after Nine Years on Middle Island,” ABC News,  
October 16, 2019, [https://www.abc.net.au/news/2019-10-17/middle-island  
-penguin-protector-oddball-maremma-retires/11607662](https://www.abc.net.au/news/2019-10-17/middle-island-penguin-protector-oddball-maremma-retires/11607662).
- 194 as seen on *Shark Tank*!: CoyoteVest, [https://www.coyotevest.com/products  
/coyotevest](https://www.coyotevest.com/products/coyotevest), accessed May 19, 2022.
- 195 black-and-white prey did: Caitlin Fay, “Aposematic Variation and the  
Evolution of Warning Coloration in Mammals” (master’s thesis, California  
State University, Long Beach, 2016).
- 195 a warning signal: Fay, “Aposematic Variation,” 27.
- 196 outdoors every day: Kathy Vo, speech at the Society of Integrative and  
Comparative Biology, 2021.
- 196 run-ins with coyotes: Vo, speech at the Society of Integrative and  
Comparative Biology.
- 196 encounter a coyote: “Take Action: Coexisting with Coyotes,” Santa  
Monica Mountains National Recreation Area, National Park Service, [https://  
www.nps  
.gov/samo/learn/management/support-coyotes.htm](https://www.nps.gov/samo/learn/management/support-coyotes.htm), accessed May 19, 2022.
- 196 In a small study: J. K. Young, E. Hammill, and S. W. Breck, “Interactions  
with Humans Shape Coyote Responses to Hazing,” *Scientific Reports* 9  
(December 2019), <https://doi.org/10.1038/s41598-019-56524-6>.
- 196 more hazing effort: Young, Hammill, and Breck, “Interactions with  
Humans.”
- 197 while she was on tour: “Coyotes Kill Toronto Singer in Cape Breton,”  
CBC News, October 28, 2009, [https://www.cbc.ca/news/canada/nova-scotia/  
coyotes  
-kill-toronto-singer-in-cape-breton-1.779304](https://www.cbc.ca/news/canada/nova-scotia/coyotes-kill-toronto-singer-in-cape-breton-1.779304).
- 197 killed by coyotes: Carly C. Sponarski, et al., “Attitudinal Differences  
Among Residents, Park Staff, and Visitors Toward Coyotes in Cape Breton  
Highlands National Park of Canada,” *Society & Natural Resources* 28, no. 7  
(May 2015): 720–32, <https://doi.org/10.1080/08941920.2015.1014595>.
- 197 staff or tourists were: Sponarski, et al., “Attitudinal Differences Among  
Residents.”
- 198 real risk of those things: Sponarski, et al., “Attitudinal Differences Among  
Residents.”
- 198 haunted the residents: Sponarski, et al., “Attitudinal Differences Among  
Residents.”

## CHAPTER 8: A FLUTTER OF SPARROWS

- 202 “were extremely poor”: Weimin Xiong, “The 1950s Eliminate Sparrows Campaign.”
- 202 “most easily be implemented”: Xiong, “The 1950s Eliminate Sparrows Campaign.”
- 202 a youth movement: Xiong, “The 1950s Eliminate Sparrows Campaign.”
- 203 On a spring morning in 1958: Sha Yexin, “The Chinese Sparrows of 1958,” EastWestSouthNorth, August 31, 1997, [https://web.archive.org/web/20120808000323/http://www.zonaeuropa.com/20061130\\_1.htm](https://web.archive.org/web/20120808000323/http://www.zonaeuropa.com/20061130_1.htm).
- 203 between 310,000 and 800,000 sparrows killed: Yexin, “The Chinese Sparrows of 1958.”
- 203 “that threatened them”: Mikhail Klochko, *Soviet Scientist in Red China* (New York: F. Praeger, 1964).
- 203 “a woman’s bloodcurdling screams”: Klochko, *Soviet Scientist in Red China*.
- 204 from resting anywhere: “Great Leap,” *People’s Century*, PBS, Wednesday, June 16, 1999, <https://www.pbs.org/wgbh/peoplescentury/episodes/greatleap/description.html>.
- 204 “drop from exhaustion”: Klochko, *Soviet Scientist in Red China*.
- 204 extinct in China: Michael McCarthy, “The Sparrow That Survived Mao’s Purge,” *Independent*, September 3, 2010, [https://web.archive.org/web/20120723011028/http://www.independent.co.uk/environment/nature/nature\\_studies/nature-studies-by-michael-mccarthy-the-sparrow-that-survived-maos-purge-2068993.html](https://web.archive.org/web/20120723011028/http://www.independent.co.uk/environment/nature/nature_studies/nature-studies-by-michael-mccarthy-the-sparrow-that-survived-maos-purge-2068993.html).
- 204 and 1,367,440 sparrows: Frank Dikötter, *Mao’s Great Famine: The History of China’s Most Devastating Catastrophe, 1958–1962* (New York: Bloomsbury, 2010), 192.
- 204 In Judith Shapiro’s: Judith Shapiro, *Mao’s War Against Nature: Politics and the Environment in Revolutionary China* (Cambridge: Cambridge University Press, 2001), 87.
- 204 “infestations in the grain”: Shapiro, *Mao’s War Against Nature*, 87.
- 205 were already hungry: Dikötter, *Mao’s Great Famine*.
- 205 twenty-eight million people: Hanyi Chen, et al., “Sparrow Slaughter and Grain Yield Reduction during the Great Famine of China,” posted to SSRN April 23, 2021, <http://dx.doi.org/10.2139/ssrn.3832057>.
- 205 fifteen and forty-five million people: Vaclav Smil, “China’s Great Famine: 40 Years Later,” *British Medical Journal* 318, no. 7225 (December 1999): 1619–21, <http://doi.org/10.1136/bmj.319.7225.1619>. See also Chen, “Sparrow Slaughter and Grain Yield Reduction,” and Xin Meng, et al., “The Institutional Causes of China’s Great Famine, 1959–1961,” *Review of Economic Studies* 82 (April 2015): 1568–611, <http://doi.org/10.1093/restud/rdv016>.
- 205 ate the living: Dikötter, *Mao’s Great Famine*, 321, 322.

- 206 roots of the cane: “Canegrubs,” Sugar Research Australia, <https://sugarresearch.com.au/pest/canegrubs/>, accessed May 19, 2022.
- 206 plantations in Puerto Rico: Rick Shine, *Cane Toad Wars* (Oakland: University of California Press, 2018).
- 207 cane toad trap: Richard Shine, et al., “A Famous Failure: Why Were Cane Toads an Ineffective Biocontrol in Australia?,” *Conservation Science and Practice* 2, no. 12 (December 2020): e296, <https://doi.org/10.1111/csp2.296>.
- 208 Sydney and Canberra: Richard Shine, “The Ecological, Evolutionary, and Social Impact of Invasive Cane Toads in Australia,” in *Invasive Species in a Globalized World*, ed. Keller, Cadotte, and Sandiford.
- 208 the 1988 documentary: *Cane Toads: An Unnatural History*, documentary, 1988, <https://www.youtube.com/watch?v=6SBLfltsow>, accessed May 19, 2022.
- 209 without getting poisoned: Christa Beckmann and Richard Shine, “Toad’s Tongue for Breakfast: Exploitation of a Novel Prey Type, the Invasive Cane Toad, by Scavenging Raptors in Tropical Australia,” *Biological Invasions* 13 (2011): 1447–55, <https://doi.org/10.1007/s10530-010-9903-8>.
- 209 skin and poisonous shoulders: Marissa Parrott, et al., “Eat Your Heart Out: Choice and Handling of Novel Toxic Prey by Predatory Water Rats,” *Australian Mammalogy* 42, no 2 (September 2019): 235–39, <http://doi.org/10.1071/AM19016>.
- 209 other poisonous species: Parrott, et al., “Eat Your Heart Out.”
- 209 resistance to their poison: Ben Phillips and Richard Shine, “An Invasive Species Induces Rapid Adaptive Change in a Native Predator: Cane Toads and Black Snakes in Australia,” *Proceedings of the Royal Society—Biological Sciences* 273 (March 2006): 1545–50, <http://doi.org/10.1098/rspb.2006.3479>.
- 209 dry Australian heat: Georgia Kosmala, et al., “Skin Resistance to Water Gain and Loss Has Changed in Cane Toads (*Rhinella Marina*) during Their Australian Invasion,” *Ecology and Evolution* 10, no 23 (December 2020): 13071–79, <https://doi.org/10.1002/ece3.6895>.
- 209 toads left behind: Shine, “The Ecological, Evolutionary, and Social Impact of Invasive Cane Toads.”
- 210 show more cannibalism: Jayna DeVore, et al., “The Evolution of Targeted Cannibalism and Cannibal-Induced Defenses in Invasive Populations of Cane Toads,” *Proceedings of the National Academy of Sciences* 118, no. 35 (August 2021): e2100765118, <https://doi.org/10.1073/pnas.2100765118>.
- 211 living-but-less-deadly toads: Reid Tingley, et al., “New Weapons in the Toad Toolkit: A Review of Methods to Control and Mitigate the Biodiversity Impacts of Invasive Cane Toads (*Rhinella Marina*),” *Quarterly Review of Biology* 92, no. 2 (June 2017): 129–49, <http://doi.org/10.1086/692167>.
- 212 thirty-one released lizards made it: G. Ward-Fear, J. Thomas, J. K. Webb, D. J. Pearson, and R.Shine, “Eliciting Conditioned Taste Aversion in Lizards: Live Toxic Prey Are More Effective Than Scent and Taste Cues



Alone,” *Integrative Zoology* 12, no. 2 (March 2017): 112–20, <https://doi.org/10.1111/1749-4877.12226>.

- 213 biocontrol for the prickly pear: “The Prickly Pear Story,” Queensland Government, Department of Agriculture and Fisheries, 2020, [https://www.daf.qld.gov.au/\\_\\_data/assets/pdf\\_file/0014/55301/prickly-pear-story.pdf](https://www.daf.qld.gov.au/__data/assets/pdf_file/0014/55301/prickly-pear-story.pdf).
- 213 devour those cacti: “The Prickly Pear Story.”
- 213 combat grass carp: “Carp Herpes Virus First Step in Native Fish Recovery Says Alliance,” Invasive Species Council, April 6, 2016, <https://invasives.org.au/media-releases/carp-herpes-virus-first-step-native-fish-recovery-says-alliance/>.
- 214 “leave not a particle”: Jackson Perry, “‘Conquered by the Sparrows’: Avian Invasions in French North Africa, circa 1871–1920,” *Environmental History* 25, no. 2 (April 2020).
- 215 284,000 sparrow nests: Perry, “‘Conquered by the Sparrows.’”
- 216 “by the sparrows”: Perry, “‘Conquered by the Sparrows.’”
- 216 “horrendous sort of cruelty”: Perry, “‘Conquered by the Sparrows.’”
- 216 organize antisparrow campaigns: Perry, “‘Conquered by the Sparrows.’”
- 217 sense of home: Matthew Holmes, “The Sparrow Question: Social and Scientific Accord in Britain, 1850–1900,” *Journal of the History of Biology* 50 (August 2017): 645–71, <https://doi.org/10.1007/s10739-016-9455-6>.
- 217 waged war in newspapers: Holmes, “The Sparrow Question.”
- 217 friend or foe: Michael Brodhead, “Elliott Coues and the Sparrow War,” *New England Quarterly* 44, no. 3 (September 1971): 420–32.
- 217 United States denied it: Pierre Juin, “Clark Denounces Germ War Charges; Accuses Chinese Communists of Fabricating Statements Attributed to Captives,” *New York Times*, February 24, 1953.
- 217 international investigation: “Report of the International Scientific Commission for the Investigation of the Facts Concerning Bacterial Warfare in Korea and China,” International Scientific Commission, 1952.
- 217 were made up: Milton Leitenberg, “China’s False Allegations of the Use of Biological Weapons by the United States during the Korean War,” *Cold War International History Project*, Working Paper 78, March 2016.
- 217 there is still controversy: Diarmuid Jeffreys, “Dirty Little Secrets,” *Al Jazeera*, March 17, 2010.
- 218 “an excellent option”: Xiong, “The 1950s Eliminate Sparrows Campaign.”
- 219 overinflated their numbers: Dikötter, *Mao’s Great Famine*.
- 220 would not be punished: Dikötter, *Mao’s Great Famine*, 309, 317.
- 220 huge floods to others: Shapiro, *Mao’s War Against Nature*.
- 221 eat their fruit trees bare: Holmes, “The Sparrow Question.”
- 221 poison, guns, and cats: Holmes, “The Sparrow Question.”

## CHAPTER 9: A HERD OF DEER

- 228 can leap eight feet: Leonard Perry, "Effective Deer Fences," Green Mountain Gardener, University of Vermont Department of Plant and Soil Science, <https://pss.uvm.edu/ppp/articles/deerfences.html>, accessed May 21, 2022.
- 228 crashing into a deer: "How Likely Are You to Have an Animal Collision," SimpleInsights, StateFarm, <https://www.statefarm.com/simple-insights/auto-and-vehicles/how-likely-are-you-to-have-an-animal-collision>, accessed May 21, 2022.
- 228 a white-tailed deer: Sophie Gilbert, et al., "Socioeconomic Benefits of Large Carnivore Recolonization Through Reduced Wildlife-Vehicle Collisions," *Conservation Letters* 10, no. 4 (July/August 2017): 431–39, <https://doi.org/10.1111/conl.12280>.
- 228 440 people die: Derrell Lyles, Department of Transportation, personal communication.
- 228 stomachs of wild animals: Michael Mengak and Mark Crosby, "Farmers' Perceptions of White-Tailed Deer Damage to Row Crops in 20 Georgia Counties During 2016," University of Georgia Warnell School of Forestry and Natural Resources, August 2017.
- 229 the nineteenth century: Jim Sterba, *Nature Wars: The Incredible Story of How Wildlife Comebacks Turned Backyards into Battlegrounds* (New York: Crown Publishers, 2013), 87.
- 229 roamed North America: Kurt VerCauteren, "The Deer Boom: Discussions on Population Growth and Range Expansion of the White-Tailed Deer," in *Bowhunting Records of North American Whitetail Deer*, 2nd ed., ed. Glenn Hisey and Kevin Hisey (Chatfield, MN: Pope and Young Club, 2003).
- 230 common food staples: Albert Gonzalez, "Seminole Food: Patterns of Indigenous Foodways in South Florida, 1855 to 1917," *New Florida Journal of Anthropology* 2, no. 2 (February 2021), <https://doi.org/10.32473/nfja.v1i2.123723>.
- 230 deer hair: Sterba, *Nature Wars*, 151.
- 230 the hunting season: J. W. Grandy, E. Stallman, and D. Macdonald, "The Science and Sociology of Hunting: Shifting Practices and Perceptions in the United States and Great Britain," in *The State of the Animals II*, ed. D. J. Salem and A. N. Rowan (Washington, DC: Humane Society Press, 2003), 107–30).
- 230 below fifteen million: VerCauteren, "The Deer Boom."
- 230 in the United States: VerCauteren, "The Deer Boom."
- 230 to become "wild": Sterba, *Nature Wars*, 87
- 230 in the Adirondacks: Sterba, *Nature Wars*, 98.
- 231 functionally illegal: Sterba, *Nature Wars*, 95.
- 231 The state agencies do: Sterba, *Nature Wars*, 103.

- live in the woods already: Sterba, *Nature Wars*.
- “two thirds of the U.S. population”: Sterba, *Nature Wars*, 2.
- habitat Americans made: VerCauteren, “The Deer Boom.”
- forty-five deer: Quality Deer Management Association, QDMA Whitetail Report, Bogart, GA, 2009.
- from the ground up: Keith Geluso, Carter G. Kruse, and Mary J. Harner, “Wetland Edge Trampled by American Bison (*Bos Bison*) Used as Basking Site for Painted Turtles (*Chrysemys picta*),” *Transactions of the Nebraska Academy of Sciences and Affiliated Societies* (2020), <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1543&context=tnas>.
- with large grazers: Geluso, Kruse, and Harner, “Wetland Edge Trampled by American Bison.”
- to sun on lakeshores: Geluso, Kruse, and Harner, “Wetland Edge Trampled by American Bison.”
- colonists in 1788: “Australian Brumby Horse,” Breeds of Livestock, Department of Animal Sciences, Oklahoma State University, <http://afs.okstate.edu/breeds/horses/australianbrumby>, accessed May 21, 2022.
- feral by 1804: “Feral Horse (*Equus caballus*) and Feral Donkey (*Equus asinus*),” Fact Sheet, Australian Government, Department of Agriculture, Water, and the Environment, 2011.
- feral horses roam Australia: “Feral Horses,” Invasive Species Council, <https://invasives.org.au/our-work/feral-animals/feral-horses/>, accessed May 21, 2022.
- at their heels: Banjo Paterson, “The Man from Snowy River.”
- with gunshot wounds: Bianca Nogrady, “In Australia’s Snowy Mountains, a Battle Over Brumbies,” Undark, July 25, 2018, <https://undark.org/2018/07/25/battle-over-brumbies/>.
- has banned the practice: Nogrady, “In Australia’s Snowy Mountains, a Battle Over Brumbies.”
- lizards, and freshwater crayfish: Rosie King, “Kosciuszko National Park Brumbies Causing ‘Abhorrent’ Damage, Says Indigenous River Guide,” ABC News (Australia), July 6, 2020, <https://www.abc.net.au/news/2020-07-07/kosciuszko-feral-horses-controversy/12405310>.
- continued to increase: Don Driscoll, et al., “Feral Horses Will Rule One Third of the Fragile Kosciuszko National Park under a Proposed NSW Government Plan,” The Conversation, October 7, 2021, <https://theconversation.com/feral-horses-will-rule-one-third-of-the-fragile-kosciuszko-national-park-under-a-proposed-nsw-government-plan-169248>.
- horses and frogs alike: Don A. Driscoll and Maggie J. Watson, “Science Denialism and Compassionate Conservation: Response to Wallach et al. 2018,”

- Conservation Biology* 33, no. 4 (August 2019): 777–80, <https://doi.org/10.1111/cobi.13273>.
- 239 the vibrant hue: Margaret Davis, “Australia Culling 10,000 Feral Horses to Control Their Rapidly Growing Population Threatening Endangered Species, Habitats,” *Science Times*, November 1, 2021, <https://www.sciencetimes.com/articles/34272/20211101/australia-culling-10-000-feral-horses-control-rapidly-growing-population.htm>.
- 239 They can even see orange: Kurt VerCauteren and Michael Pipas, “A Review of Color Vision in White-Tailed Deer,” *Wildlife Society Bulletin* 31, no. 3 (Autumn 2006): 684–91.
- 242 lower deer densities: Donald Waller and Nicholas Reo, “First Stewards: Ecological Outcomes of Forest and Wildlife Stewardship by Indigenous Peoples of Wisconsin, USA,” *Ecology and Society* 23, no. 1 (2018): 45, <https://doi.org/10.5751/ES-09865-230145>.
- 242 deer are native: Sterba, *Nature Wars*.
- 243 epizootic hemorrhagic disease: Sonja A. Christensen, et al., “Spatial Variation of White-Tailed Deer (*Odocoileus Virginianus*) Population Impacts and Recovery from Epizootic Hemorrhagic Disease,” *Journal of Wildlife Diseases* 57, no. 1 (January 2021): 82–93, <https://doi.org/10.7589/JWD-D-20-00030>.
- 243 chronic wasting disease: Michael Samuel and Daniel Storm, “Chronic Wasting Disease in White-Tailed Deer: Infection, Mortality, and Implications for Heterogeneous Transmission,” *Ecology* 97, no. 11 (November 2016): 3195–205, <https://doi.org/10.1002/ecy.1538>.
- 243 even COVID-19: Mitchell Palmer, et al., “Susceptibility of White-Tailed Deer (*Odocoileus virginianus*) to SARS-CoV-2,” *Journal of Virology* 95, no. 11 (2021), <https://doi.org/10.1128/JVI.00083-21>.
- 243 sharpshooters in 2004: Thomas Almendinger, et al., “Restoring Forests in Central New Jersey Through Effective Deer Management,” *Ecological Restoration* 38, no. 4 (December 2020): 246–56, <http://doi.org/10.3368/er.38.4.246>.
- 243 more abundant outside: Almendinger, “Restoring Forests in Central New Jersey.”
- 244 in the United States alone: “Lyme Disease: Data and Surveillance,” Centers for Disease Control and Prevention, [https://www.cdc.gov/lyme/datasurveillance/index.html?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Flyme%2Fstats%2Findex.html](https://www.cdc.gov/lyme/datasurveillance/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Flyme%2Fstats%2Findex.html), accessed May 21, 2022.
- 244 Lyme, Connecticut: “A Brief History of Lyme Disease in Connecticut” Connecticut State Department of Health, updated July 1, 2019. <https://portal.ct.gov/DPH/Epidemiology-and-Emerging-Infections/A-Brief-History-of-Lyme-Disease-in-Connecticut>.
- 245 “Lyme arthritis”: “A Brief History of Lyme Disease in Connecticut.”

- 245 deer—were limited: A. M. Kilpatrick, et al., “Lyme Disease Ecology in  
a Changing World: Consensus, Uncertainty and Critical Gaps for Improving  
Control,” *Philosophical Transactions of the Royal Society B* 372, no. 1722 (April  
2017), <http://dx.doi.org/10.1098/rstb.2016.0117>.
- 245 3.6 per doe: Uriel Kitron, et al., “Spatial Analysis of the Distribution  
of *Ixodes dammini* (Acari: Ixodidae) on White-Tailed Deer in Ogle County,  
Illinois,” *Journal of Medical Entomology* 29, no. 2 (March 1992): 259–66,  
[https://doi  
.org/10.1093/jmedent/29.2.259](https://doi.org/10.1093/jmedent/29.2.259).
- 245 12.7 ticks per deer: M. L. Baer-Lehman, et al., “Evidence for Competition  
between *Ixodes scapularis* and *Dermacentor albipictus* Feeding Concurrently on  
White-Tailed Deer,” *Experimental and Applied Acarology* 58 (May 2012): 301–  
14, <https://doi.org/10.1007/s10493-012-9574-5>.
- 245 555 larval ticks per deer: Ching-I Huang, et al., “High Burdens of *Ixodes  
scapularis* Larval Ticks on White-Tailed Deer May Limit Lyme Disease Risk in  
a Low Biodiversity Setting,” *Ticks and Tick-borne Diseases* 10, no. 2 (February  
2019): 258–68, <https://doi.org/10.1016/j.ttbdis.2018.10.013>.
- 245 doing controlled burns: Kilpatrick, et al., “Lyme Disease Ecology in a  
Changing World.”
- 245 fears of side effects and low demand: L. E. Nigrovic and K. M.  
Thompson, “The Lyme Vaccine: A Cautionary Tale,” *Epidemiology &  
Infection* 135, no. 1 (January 2007): 1–8, [http://doi.org/ 10.1017  
/S0950268806007096](http://doi.org/10.1017/S0950268806007096).
- 245 hope for another: Cassandra Willyard, “Lyme Vaccines Show New  
Promise, and Face Old Challenges,” Undark, October 2, 2019, [https://undark  
.org/2019/10/02/new-landscape-lyme-vaccines/](https://undark.org/2019/10/02/new-landscape-lyme-vaccines/).
- 246 in the Reservation: John Patrick Connors and Anne Short Gianotti,  
“Becoming Killable: White-Tailed Deer Management and the Production of  
Overabundance in the Blue Hills,” *Urban Geography* (May 2021), [https://doi  
.org/10.1080/02723638.2021.1902685](https://doi.org/10.1080/02723638.2021.1902685).
- 246 a controlled hunt: Connors and Gianotti, “Becoming Killable.”
- 247 some several times: Connors and Gianotti, “Becoming Killable.”
- 247 Friends of the Blue Hills: Connors and Gianotti, “Becoming Killable.”
- 248 on Staten Island: Brooke Jarvis, “Deer Wars and Death Threats,” *New  
Yorker*, November 8, 2021, [https://www.newyorker.com/magazine/2021/11/15/  
deer  
-wars-and-death-threats](https://www.newyorker.com/magazine/2021/11/15/deer-wars-and-death-threats).
- 248 National Institutes of Health: “Fertility Control,” White Buffalo, Inc.,  
<https://www.whitebuffaloinc.org/fertility-control>, accessed May 21, 2022.
- 248 twenty-three deer: Blue Hills State Reservation, White-Tailed Deer  
Management Program, 2021 Deer Management Plan, October 8, 2021.
- 249 deer became killable: Connors and Gianotti, “Becoming Killable.”

## CHAPTER 10: A SLOTH OF BEARS

- 256 and Kentucky: Sean M. Murphy, et al., “Early Genetic Outcomes of American Black Bear Reintroductions in the Central Appalachians, USA,” *Ursus* 29, no. 2 (May 2019): 119–33, <https://doi.org/10.2192/URSU-D-18-00011.1>.
- 258 got a bear visit: Stewart W. Breck, Nathan Lance, and Victoria Seher, “Selective Foraging for Anthropogenic Resources by Black Bears: Minivans in Yosemite National Park,” *Journal of Mammalogy* 90, no. 5 (October 2009): 1041–44, <https://doi.org/10.1644/08-MAMM-A-056.1>.
- 258 forty years of yearling bears: Nicholas P. Gould, et al., “Growth and Reproduction by Young Urban and Rural Black Bears,” *Journal of Mammalogy* 102, no. 4 (August 2021): 1165–73, <https://doi.org/10.1093/jmammal/gyab066>.
- 259 bred at that age: Gould, et al., “Growth and Reproduction.”
- 259 new set of skills: B. Brookshire, “Changing People’s Behavior Can Make Bear Life Better,” *Science News for Students*, April 8, 2021, <https://www.sciencenewsforstudents.org/article/changing-people-behavior-can-make-bear-life-better>.
- 259 “landscape of fear”: Kathy Zeller, et al., “Black Bears Alter Movements in Response to Anthropogenic Features with Time of Day and Season,” *Movement Ecology* 7, no. 19 (July 2019), <https://doi.org/10.1186/s40462-019-0166-4>.
- 259 11:00 p.m. to 3:00 a.m.: Lee Anne Ayers, et al., “Black Bear Activity Patterns and Human Induced Modifications in Sequoia National Park,” *Bears: Their Biology and Management* 6 (1986): 151–54, <https://doi.org/10.2307/3872819>.
- 259 spring and fall: Zeller, “Black Bears Alter Movements.”
- 260 heart rates increased: Mark A. Ditmer, et al., “American Black Bears Perceive the Risks of Crossing Roads,” *Behavioral Ecology* 29, no. 3 (May/June 2018): 667–75, <https://doi.org/10.1093/beheco/ary020>.
- 260 Tahoe, and Durango: H. E. Johnson, et al., “Shifting Perceptions of Risk and Reward: Dynamic Selection for Human Development by Black Bears in the Western United States,” *Biological Conservation* 187 (July 2015): 164–72, <https://doi.org/10.1016/j.biocon.2015.04.014>.
- 261 2.3 days shorter: Heather Johnson, et al., “Human Development and Climate Affect Hibernation in a Large Carnivore with Implications for Human–Carnivore Conflicts,” *Journal of Applied Ecology* 55, no. 2 (2017): 663–72, <https://doi.org/10.1111/1365-2664.13021>.
- 261 human and natural food: Johnson, et al., “Human Development and Climate Affect Hibernation.”
- 261 by 60 percent: Rebecca Kirby, et al., “The Diet of Black Bears Tracks the Human Footprint across a Rapidly Developing Landscape,” *Biological Conservation* 200 (August 2016): 51–59, <https://doi.org/10.1016/j.biocon.2016.05.012>.

- 262 slows that trimming: Rebecca Kirby, et al., “The Cascading Effects of Human Food on Hibernation and Cellular Aging in Free-Ranging Black Bears,” *Scientific Reports* 9, no. 2197 (February 2019), <https://doi.org/10.1038/s41598-019-38937-5>.
- 262 aging more rapidly: Kirby, et al., “The Cascading Effects of Human Food.”
- 262 human-caused death: Jared S. Laufenberg, et al., “Compounding Effects of Human Development and a Natural Food Shortage on a Black Bear Population along a Human Development-Wildland Interface,” *Biological Conservation* 224 (August 2018): 188–98, <https://doi.org/10.1016/j.biocon.2018.05.004>.
- 263 for bear roadkills: Sharon Baruch-Mordo, et al., “Spatiotemporal Distribution of Black Bear–Human Conflicts in Colorado, USA,” *Journal of Wildlife Management* 72, no. 8 (November 2008): 1853–62, <https://doi.org/10.2193/2007-442>.
- 263 bear-resistant trash cans: Heather Johnson, et al., “Assessing Ecological and Social Outcomes of a Bear-Proofing Experiment,” *Journal of Wildlife Management* 82, no. 6 (August 2018): 1102–14, <https://doi.org/10.1002/jwmg.21472>.
- 264 half actually did: Stacy A. Lischka, et al., “A Conceptual Model for the Integration of Social and Ecological Information to Understand Human–Wildlife Interactions,” *Biological Conservation* 225 (September 2018): 80–87, <https://doi.org/10.1016/j.biocon.2018.06.020>.
- 265 used them correctly: Stacy A. Lischka, et al., “Psychological Drivers of Risk-Reducing Behaviors to Limit Human–Wildlife Conflict,” *Conservation Biology* 34, no. 6 (December 2020): 1383–92, <https://doi.org/10.1111/cobi.13626>.
- 265 39 percent more: Johnson, et al., “Assessing Ecological and Social Outcomes.”
- 268 too close to people: Alyze Kotyk, “Humans’ Behaviour May Change if They Realized How Many Black Bears Are Killed Every Year in B.C.: Advocate,” CTV News, Vancouver, Canada, January 20, 2022, <https://bc.ctvnews.ca/humans-behaviour-may-change-if-they-realized-how-many-black-bears-are-killed-every-year-in-b-c-advocate-1.5747815>.
- 268 Virginia City in Montana: Michael Cast, “Virginia City: The Model Bear-Smart Community,” *Missoulian*, January 9, 2022, [https://missoulian.com/news/local/virginia-city-the-model-bear-smart-community/article\\_06cd732b-7dfe-55db-bf77-419f0fbaf711.html](https://missoulian.com/news/local/virginia-city-the-model-bear-smart-community/article_06cd732b-7dfe-55db-bf77-419f0fbaf711.html).
- 269 damaging their property: Stacy A. Lischka, et al., “Understanding and Managing Human Tolerance for a Large Carnivore in a Residential System,” *Biological Conservation* 238 (October 2019), doi: 10.1016/j.biocon.2019.07.034.

## CHAPTER 11: A PEST BY ANY OTHER NAME

- 274 “pest control operator” in 1936: Sullivan, *Rats*.

- 275 “matter out of place”: Mary Douglas, *Purity and Danger: An Analysis of  
Concept of Pollution and Taboo* (New York: Routledge & Kegan Paul, 1966).
- 276 Genesis 1:28: Richard Wright, “Responsibility for the Ecological Crisis,”  
*BioScience* 20, no. 15 (August 1970): 851–53, <https://doi.org/10.2307/1295493>.
- 276 upon the earth: Genesis 1:28, <https://www.kingjamesbibleonline.org/Genesis-1-28/>.
- 278 “mutuality of life”: Marshall, *On Behalf of the Wolf and the First Peoples*.
- 279 “key to survival”: Marshall, *On Behalf of the Wolf and the First Peoples*, 8.
- 280 “we do the same”: Sullivan, *Rats*, 2.
- 287 responded with panic: B. Brookshire, “As Wild Turkeys Grow in Number, so  
Do Risky Encounters with Humans,” *Washington Post*, April 22, 2022, [https://  
www.washingtonpost.com/health/2022/04/22/wild-turkey-anacostia-attacks/](https://www.washingtonpost.com/health/2022/04/22/wild-turkey-anacostia-attacks/).
- 287 as early as 300 BCE: Erin Kennedy Thornton, et al., “Earliest Mexican Turkeys  
(*Meleagris gallopavo*) in the Maya Region: Implications for Pre-Hispanic  
Animal Trade and the Timing of Turkey Domestication,” *PLOS ONE* 7, no. 8  
(August 2012): e42630, <https://doi.org/10.1371/journal.pone.0042630>.
- 287 the Civil War: Sterba, *Nature Wars*, 151.
- 288 flocks in the United States took off: Sterba, *Nature Wars*, 151.
- 288 four million birds: James E. Miller, et al., “Turkey Damage Survey: A Wildlife  
Success Story Becoming Another Wildlife Damage Problem,” *Wildlife Damage  
Management Conference Proceedings*, October 2000.
- 288 ruined by scratching turkey claws: James E. Miller, “Wild Turkeys,” Wildlife  
Damage Management Technical Series, USDA, APHIS, WS, January 2018.
- 288 cannot, in fact, solve everything: Joshua Bote, “Destructive Turkeys Are  
Creating a Nightmare at Bay Area NASA Lab,” SFGate, February 8, 2022,  
[https://www.sfgate.com/bayarea/article/Turkeys-create-nightmare-NASA-Ames-  
lab-16841998.php](https://www.sfgate.com/bayarea/article/Turkeys-create-nightmare-NASA-Ames-lab-16841998.php).



## FURTHER READING

This is not a full bibliography of everything I've ever read (trust me, no one wants that). Most specific citations that are important I've left to the endnotes. Instead, this is a list of books, articles, and more that helped to form my thinking about *Pests*, and that will give you more amazing information about the animals that love to live with us.

### HUMAN-WILDLIFE INTERACTIONS

- Barilla, James. *My Backyard Jungle: The Adventures of an Urban Wildlife Lover Who Turned His Yard into Habitat and Learned to Live with It*. New Haven: Yale University Press, 2013.
- Biehler, Dawn. *Pests in the City: Flies, Bedbugs, Cockroaches & Rats*. Seattle: University of Washington Press, 2013.
- Dikötter, Frank. *Mao's Great Famine: The History of China's Most Devastating Catastrophe, 1958–1962*. New York: Bloomsbury, 2010.
- Donovan, Tristan. *Feral Cities: Adventures with Animals in the Urban Jungle*. Chicago: Chicago Review Press, 2015.
- Hanes, Stephanie. *White Man's Game: Saving Animals, Rebuilding Eden, and Other Myths of Conservation in Africa*. New York: Metropolitan Books, 2017.
- Herzog, Hal. *Some We Love, Some We Hate, Some We Eat: Why It's So Hard to Think Straight About Animals*. New York: HarperCollins, 2010.
- Johnson, Nathanael. *Unseen City: The Majesty of Pigeons, the Discreet Charm of Snails & Other Wonders of the Urban Wilderness*. New York: Rodale Wellness, 2016.
- Kimmerer, Robin Wall. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants*. Minneapolis, MN: Milkweed Editions, 2013.
- King, Barbara J. *Animals' Best Friends: Putting Compassion to Work for Animals in Captivity and in the Wild*. Chicago: Chicago University Press, 2021.
- Marris, Emma. *Rambunctious Garden: Saving Nature in a Post-Wild World*. New York: Bloomsbury, 2011.

- . *Wild Souls: Freedom and Flourishing in the Non-Human World*. New York: Bloomsbury, 2021.
- Marshall, Joseph, III. *On Behalf of the Wolf and the First Peoples*. Santa Fe: Museum of New Mexico Press, 1995.
- Pavlik, Steve. *Navajo and the Animal People: Native American Traditional Ecological Knowledge and Ethnozoology*. Golden, CO: Fulcrum Publishing, 2014.
- Roach, Mary. *Fuzz: When Nature Breaks the Law*. New York: W. W. Norton & Company, 2021.
- Shapiro, Judith. *Mao's War Against Nature: Politics and the Environment in Revolutionary China*. Cambridge: Cambridge University Press, 2001.
- Shivik, John A. *The Predator Paradox: Ending the War with Wolves, Bears, Cougars, and Coyotes*. Boston: Beacon Press, 2014.
- Sterba, Jim. *Nature Wars: The Incredible Story of How Wildlife Comebacks Turned Backyards into Battlegrounds*. New York: Crown, 2013.

## **SPECIES-SPECIFIC BOOKS AND ARTICLES**

- Blechman, Andrew D. *Pigeons: The Fascinating Saga of the World's Most Revered and Reviled Bird*. New York: Grove Press, 2006.
- Bradshaw, John. *Cat Sense: How the New Feline Science Can Make You a Better Friend to Your Pet*. New York: Basic Books, 2013.
- Brookshire, Bethany. "As Wild Turkeys Grow in Number, So Do Risky Encounters with Humans." *Washington Post*, April 22, 2022. <https://www.washingtonpost.com/health/2022/04/22/wild-turkey-anacostia-attacks/>.
- . "Changing People's Behavior Can Make Bear Life Better." *Science News for Students*, April 8, 2021. <https://www.sciencenewsforstudents.org/article/changing-people-behavior-can-make-bear-life-better>.
- . "How the House Mouse Tamed Itself." *Science News*, April 19, 2017. <https://www.sciencenews.org/blog/scicurious/how-house-mouse-tamed-itself>.
- Burt, Jonathan. *Rat*. London: Reaktion Books, 2005.
- "Cane Toads: An Unnatural History." YouTube. Posted May 11, 2015. <https://youtu.be/6SBLf1tsoaw>.
- Cecco, Leyland. "Raccoons v Toronto: How 'Trash Pandas' Conquered the City." *Guardian*, October 5, 2018. <https://www.theguardian.com/world/2018/oct/05/canada-toronto-raccoons>.
- Coleman, Jon T. *Vicious: Wolves and Men in America*. New Haven, CT: Yale University Press, 2004.
- Flores, Dan. *Coyote America: A Natural and Supernatural History*. New York: Basic Books, 2016.
- Hongoltz-Hetling, Matthew. *A Libertarian Walks into a Bear: The Utopian Plot to Liberate an American Town (And Some Bears)*. New York: PublicAffairs, 2020.
- Humphries, Courtney. *Superdove: How the Pigeon Took Manhattan . . . and the World*. New York: HarperCollins, 2008.

- Jarvis, Brooke. "Deer Wars and Death Threats." *New Yorker*, November 8, 2021.  
<https://www.newyorker.com/magazine/2021/11/15/deer-wars-and-death-threats>.
- Jerolmack, Colin. *The Global Pigeon*. Chicago: University of Chicago Press, 2013.
- Justice, Daniel Heath. *Raccoon*. London: Reaktion Books, 2021.
- Marra, Peter P., and Chris Santella. *Cat Wars: The Devastating Consequences of a Cuddly Killer*. Princeton, NJ: Princeton University Press, 2016.
- National Geographic Society. "How European Rabbits Took Over Australia."  
 National Geographic.org. Posted on January 27, 2020. <https://www.nationalgeographic.org/article/how-european-rabbits-took-over-australia/>.
- Nogrady, Bianca. "In Australia's Snowy Mountains, a Battle over Brumbies." *Undark*, July 25, 2018. <https://undark.org/2018/07/25/battle-over-brumbies/>.
- Shine, Rick. *Cane Toad Wars*. Oakland: University of California Press, 2018.
- Stolzenburg, William. *Rat Island: Predators in Paradise and the World's Greatest Wildlife Rescue*. New York: Bloomsbury, 2011.
- Sullivan, Robert. *Rats: Observations on the History & Habitat of the City's Most Unwanted Inhabitants*. New York: Bloomsbury, 2004.
- Vann, Michael, and Liz Clarke. *The Great Hanoi Rat Hunt: Empire, Disease, and Modernity in French Colonial Vietnam*. New York: Oxford University Press, 2019.

## **HUMAN-WILDLIFE INTERACTIONS: SCIENTIFIC ARTICLES AND BOOKS**

- Douglas, Mary. *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*. New York: Routledge & Kegan Paul, 1966.
- Frank, Beatrice, Jenny A. Glikman, and Silvio Marchini, eds. *Human Wildlife Interactions: Turning Conflict into Coexistence*. Cambridge: Cambridge University Press, 2019.
- Mikhail, Alan. *The Animal in Ottoman Egypt*. Oxford: Oxford University Press, 2014.
- Nyhus, Phillip J. "Human-Wildlife Conflict and Coexistence." *Annual Review of Environment and Resources* 41 (2016): 143–71. <https://doi.org/10.1146/annurev-environ-110615-085634>.
- Ritvo, Harriet. *The Animal Estate: The English and Other Creatures in the Victorian Age*. Cambridge, MA: Harvard University Press, 1987.
- Stone, Ken. *Reading the Hebrew Bible with Animal Studies*. Stanford, CA: Stanford University Press, 2018.

## **SPECIES-SPECIFIC SCIENTIFIC ARTICLES AND BOOKS**

- Haami, Bradford. *Cultural Knowledge and Traditions Relating to the Kiore Rat in Aotearoa. Part 1: A Maori Perspective*. Science and Mathematics Education Papers. Hamilton, NZ: University of Waikato, 1993.

- Holmes, Matthew. "The Perfect Pest: Natural History and the Red Squirrel in Nineteenth-Century Scotland." *Archives of Natural History* 2, no. 1 (2015): 113–25. <https://doi.org/10.3366/anh.2015.0284>.
- LoBue, Vanessa, and Karen E. Adolph. "Fear in Infancy: Lessons from Snakes, Spiders, Heights, and Strangers." *Developmental Psychology* 55, no. 9 (2019): 1889–907. <https://doi.org/10.1037/dev0000675>.
- Nelson, Nicole C. *Model Behavior: Animal Experiments, Complexity, and the Genetics of Psychiatric Disorders*. Chicago: University of Chicago Press, 2018.
- Rader, Karen. *Making Mice: Standardizing Animals for American Biomedical Research, 1900–1955*. Princeton, NJ: Princeton University Press, 2004.
- Roberts, Mere. *Scientific Knowledge and Cultural Traditions. Part 2: A Pakeha View of the Kioro Rat in New Zealand*. Science and Mathematics Education Papers. Hamilton, NZ: University of Waikato, 1993.
- Serpall, James A. "Domestication and History of the Cat." In *The Domestic Cat: The Biology of its Behaviour*, edited by Dennis C. Turner and Patrick Bateson, 83–100. Cambridge: Cambridge University Press, 2013.