

ARE KOALAS FUNGIBLE? BIODIVERSITY OFFSETTING AND THE LAW

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Humans are decimating nonhuman species and ecosystems, undercutting our own life support systems. In response, conservationists are crafting new ideas to sustain the biodiversity that sustains us all, and lawyers and policymakers are sculpting those ideas into law.

Laws facilitating “biodiversity offsetting” are now on the books or in process in over 100 jurisdictions. Where biodiversity offsetting is permitted, developers may degrade or destroy biodiversity in one place in exchange for “offsetting” the damage elsewhere.

But is life fungible? What does it signify—for human and nonhuman communities—when laws permit us to destroy koalas with certainty right here and now in exchange for offsetting hypothetical koalas in the future, over yonder?

This Article describes this burgeoning practice of biodiversity offsetting, drawing on fieldwork in the United States, Australia, South Africa, and the United Kingdom. The Article explores the many, vehement objections to the process, and counter with the responses to those objections. It concludes that given the shortcomings of laws that guide traditional conservation efforts, and the specter of increasing human demands on a planet

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threatened by global climate change, offsetting done right can be one tool in a reconfigured approach to preserving nonhuman (and thus human) life on Earth.

But how can offsetting be done “right?” Can it ever be anything other than a sop to developers? This Article develops criteria for what effective biodiversity offsetting would look like, explaining how offsetting can fit into landscape-level planning that serves human and nonhuman needs, and illustrate some examples of “best practice” offsetting from the field.

The Article concludes with observations about what biodiversity offsetting says about conservation in the twenty-first century and what sustainable biodiversity conservation in the twenty-first century requires of biodiversity offsetting as we careen into a future of exploding human needs, chaotic climate change, and a renewed need to acknowledge our oft-overlooked crucial dependence on the natural world that sustains us all.

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INTRODUCTION

Humans are causing a cataclysm of species extinction, with rates of decimation many times the “normal” (i.e. without human interference) level.¹ Today, 41 percent of amphibian species, 24 percent of mammal species, and 13 percent of bird species face extinction threats.² The situation will worsen, as human population is expected to grow from seven to nine billion by 2050 and likely to eleven billion by 2100.³ At the same time, the average person’s buying power and consumption will grow by 150 percent.⁴

As we convert more and more of the planet’s land to human uses, and correspondingly deplete biodiversity, we undercut our own life support systems. If we are to continue to depend on functioning ecosystems,⁵ based in a healthy complement of nonhuman species, we need a new toolkit for conservation informed by a new ethic of stewardship.

“Biodiversity offsetting,” where developers degrade biodiversity in one place in exchange for paying to protect biodiversity elsewhere, is rapidly gaining currency as one tool that

¹ See Gerardo Ceballos et al., *Accelerated Modern Human-Induced Species Losses: Entering the Sixth Mass Extinction*, 1 SCI. ADVANCES 1, 1 (2015); Stephanie Pappas, *Extinction Rates Soar to 1,000 Times Normal (But There’s Hope)*, LIVESCIENCE (May 29, 2014, 2:02 PM), <http://www.livescience.com/45964-extinction-rates-1000-times-normal.html>.

² See *The IUCN List of Threatened Species*, INT’L UNION FOR THE CONSERVATION OF NATURE, <https://www.iucn.org/theme/species/our-work/iucn-red-list-threatened-species> (last visited Nov. 17, 2017).

³ See Damian Carrington, *World Population to Hit 11bn in 2100—With 70% Chance of Continuous Rise*, THE GUARDIAN, (Sept. 18, 2014, 2:00 AM), <https://www.theguardian.com/environment/2014/sep/18/world-population-new-study-11bn-2100>.

⁴ See B. MILLER, M.E. SOULE & J. TERBORGH, ANIMAL CONSERVATION, ‘NEW CONSERVATION’ OR SURRENDER TO DEVELOPMENT? 2 (2014), available at http://www.esf.edu/efb/parry/Invert_Cons_14_Readings/Miller_etal_2014.pdf.

⁵ Costanza et al. estimate the total economic value of ecosystem services to be U.S. \$125–\$145 trillion, and estimate that, between 1997 to 2001, humans lost U.S. \$4.3–\$20.2 trillion per year due to land degradation. Robert Costanza et al., *Changes in the Global Value of Ecosystem Services*, 26 GLOBAL ENVTL. CHANGE 152, 152 (2014).

(potentially) optimizes prudent economic and ecological planning. At least fifty nations are currently implementing biodiversity offsetting or have plans to do so.⁶ The World Bank is requiring biodiversity offsetting for prospective clients in 136 countries,⁷ which “should be designed and implemented to achieve measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity.”⁸

As a result, in the Central Valley of California, with the blessing of the U.S. Fish & Wildlife Service (USFWS), developers pay thousands of dollars to a private company—a land undeveloper—to offset impacts that building their shopping center will incur on the elderberry bush, home to the valley elderberry longhorn beetle, an insect formally listed under the U.S. Endangered Species Act (ESA).⁹ In the United Kingdom, Thameslink buys the rights to lay new railroad tracks by offsetting the ecological damage the expansion causes, using a simple metric that calculates offset requirements by habitat type, quality, and rarity.¹⁰ In South Africa, where hundreds of ecosystem types are imminently imperiled (but meticulously mapped), biodiversity managers hope to use offsetting as part of a “managed drawdown” of ecosystems to maintain each type of system in some minimum

⁶ See *Financial Solutions for Sustainable Development: Biodiversity Offsets*, UNITED NATIONS DEVELOPMENT PROGRAMME, <http://www.undp.org/content/sdfinance/en/home/solutions/biodiversity-offset.html> (last visited Feb. 7, 2018); KERRY TEN KATE & MICHAEL CROWE, INT’L UNION FOR CONSERVATION OF NATURE, BIODIVERSITY OFFSETS: POLICY OPTIONS FOR GOVERNMENTS i (2014). See also ORG. FOR ECON. CO-OPERATION AND DEV., BIODIVERSITY OFFSETS: EFFECTIVE DESIGN AND IMPLEMENTATION 15 (2016).

⁷ See Maron et al., *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 *BIOSCIENCE* 489, 490 (2016).

⁸ INT’L FIN. CORP., PERFORMANCE STANDARD 6: BIODIVERSITY CONSERVATION AND SUSTAINABLE MANAGEMENT OF LIVING NATURAL RESOURCES 10 (Jan. 1, 2012), available at [⁹ See *Valley Elderberry Longhorn Beetle*, U.S. FISH & WILDLIFE SERV.: ENVTL. CONSERVATION ONLINE SYS., <https://ecos.fws.gov/ecp0/profile/species/Profile?spcode=I01L> \(last visited Jan. 3, 2018\).](http://www.ifc.org/wps/wcm/connect/bff0a28049a790d6b835faa8c6a8312a/PS6_English_2012.pdf?MOD=AJPERES;WORLD BANK GRP., BIODIVERSITY OFFSETS: A USER GUIDE 3 (2016).</p></div><div data-bbox=)

¹⁰ See Daniel Kemp, *Thameslink Upgrade Uses Offsetting to Boost Biodiversity*, *Construction News* (Feb. 3 2014), <https://www.constructionnews.co.uk/innovation/sustainability/thameslink-upgrade-uses-offsetting-to-boost-biodiversity/8658417.article#.VCWiMb5YB9k>.

sustainable expanse as the nation develops.¹¹ In the growing Queensland, Australia city of Brisbane, developers have followed a Koala Offset Protocol designed specifically to facilitate rapid urban expansion while sustaining the nation's iconic, cuddly species.¹²

But are koalas fungible? And if so, how do we harness law and biology to offset them? Where development for a growing human population is prescribed, and koalas peaceably munching eucalyptus leaves sit in the way, how does a boomtown accommodate both these needs? In its rationale for implementing offsets, Queensland's law permits offsetting when environmental impacts are "unavoidable": "The reason an impact may be unavoidable would be, for example, if a development, such as a pipeline, must pass through an area that contains State significant biodiversity value because the land in the area is too steep and there is no other suitable route."¹³

This description of "unavoidable" is disingenuous. Pipelines, like all development, are always "avoidable." Laws that permit life to be offset in favor of a pipeline reflect that community's or nation's deepest values, and present an occasion to reexamine what those values are, and should be. Where laws warrant an offset, we make the choice that the values potentially provided by a given development outweigh the values presently provided by the life forms and ecosystem onsite. Nature really may not fungible—but if large chunks of nonhuman nature and functioning ecosystems

¹¹ Several experts I interviewed used the term "managed drawdown." *See e.g.* NICKY JENNER & ZOE BALMFORTH, FAUNA & FLORA INT'L, BIODIVERSITY OFFSETS: LESSONS LEARNT FROM POLICY AND PRACTICE: COUNTRY SUMMARY REPORT: SOUTH AFRICA 13, 18 (2015); Interview with Jeffrey Manuel, Dir. of Biodiversity Info. and Plan., S. African Nat'l Biodiversity Inst. in Cape Town, S. Afr. (Feb. 25, 2015); *See also* JEFFREY MANUEL, BBOP COMMUNITY OF PRACTICE, OVERVIEW OF THE SOUTH AFRICAN FRAMEWORK FOR BIODIVERSITY OFFSETS 3 (2013); JEFFREY MANUEL, DEVELOPMENT AND IMPLEMENTATION OF BIODIVERSITY OFFSETS POLICY IN SOUTH AFRICA: INPUT PREPARED FOR SESSION 5 OF THE CONFERENCE "TO NO NET LOSS AND BEYOND" 5 (2014).

¹² *See generally* DEP'T OF ENV'T & HERITAGE PROT., OFFSETS FOR NET GAIN OF KOALA HABITAT IN SOUTH EAST QUEENSLAND POLICY (2010) (Queensl.) (Austl.); DEP'T OF ENV'T & HERITAGE PROT., STATE GOVERNMENT SUPPORTED INFRASTRUCTURE: KOALA CONSERVATION POLICY (2017) (Queensl.) (Austl.).

¹³ QUEENSLAND DEPT. OF ENV'T AND RES. MGMT., QUEENSLAND BIODIVERSITY OFFSET POLICY: VERSION 1 at 6, 46–48 (2011) (Austl.) (defining "state significant biodiversity values" to include endangered ecosystems, essential habitat, wetlands, watercourses, habitat connectivity, and protected plants and animals).

are to survive, we likely must pretend it is. We must figure out what we want and where we want it, and then do our best to fashion laws that effectuate win-win solutions for healthy human and nonhuman communities.

Now is a crucial time to analyze and improve programs that rearrange the pieces of ecological chessboards for purported global benefits. In this Article, I examine the rationales for and implementation of the emerging law of biodiversity offsetting, whose underlying philosophy requires that we plan for koala, beetle, and South African fynbos ecosystem expansion (or drawdown) in the same way we do for subdivision, shopping mall, and mining expansion. Managers of biodiversity—like stewards of other precious resources—walk a fine line between accommodating economic development and protecting long-term ecological sustainability. Choices they make will determine what forms of life will persist, where, and for how long.

Drawing from fieldwork in the United States, Australia, South Africa, and the United Kingdom, I begin this analysis by elucidating what biodiversity offsets are and how they work. I then describe how the many vehement opponents of offsetting fear—correctly—that offsetting done wrong leads to a lose-lose situation with neither sensible and sustainable human development nor sensible and sustainable biodiversity conservation. Critics suggest that we can have sprawling concrete subdivisions or we can have koalas living halcyon lives in the eucalyptus shade, but we may not be able to have both.

After rehearsing objections to biodiversity offsets, I counter that many diverse supporters are embracing offsetting, and the practice is proceeding ahead at breakneck speed. Offset backers claim we must plan for development that reflects the highest potential of the land and the communities that inhabit that land. They assert that offsets contribute to sustainable coexistence with the natural world, permitting both housing subdivisions and koalas, office parks and valley elderberry longhorn beetles, coal mines and fynbos expanses.

Biodiversity offsetting is, thus, about conscientious choosing of what goes where, and why. I examine how the move to offset reflects and furthers new, controversial modes of conservation. The complexities and vicissitudes of an environment in constant flux have always made static conservation—drawing lines on a map where prized biodiversity should stay, and making laws to

defend those lines—questionable. Our knowledge of species and ecosystems—and how they interact—is always incomplete.¹⁴ Climate change further undermines our abilities to predict how species and ecosystems might adapt to human interference.¹⁵

In a forthcoming work, I examine the nuts and bolts of how laws in various jurisdictions function to make biological entities (koalas, beetles, fynbos) into fungible commodities, in search of best practices. Here, I foreshadow that work by expressing a vision for what would count for laws that make “best” biodiversity conservation, and how “best” offsetting laws could fit into that model. Conservation will have to be dynamic, grounded in a holistic ethic of conservation, based in laws that guide all stakeholders towards results that genuinely lead us to a biodiverse future. I illustrate my discussion from field work examples that impressed me for their commitment to sustainable human and nonhuman communities.

I conclude that we should never waste a good crisis. If we are to survive and thrive in a climate change era—if we want savvy development with species surviving alongside—we will be forced into the pragmatic, landscape-level conservation and development planning we should have been doing all along. We can never return to what once was if what once was is no longer. We can only look forward and manage what we wish to be. If what we wish to be includes some chance for some species to survive, for ecosystems to continue to function, and for evolution to continue to unfurl, then carefully planned offsetting can be one tool in the biodiversity law toolkit.

I. AN INTRODUCTION TO BIODIVERSITY OFFSETTING

The boomtown of Brisbane, Australia is adding between 30 thousand and 140 thousand people to its (current) 2.47 million

¹⁴ The International Union for the Conservation of Nature estimates that only fifteen percent (about 1.9 million) of extant species have been described, and of those, only three percent have been assessed for extinction probability. See INT’L UNION FOR THE CONSERVATION OF NATURE, THE IUCN RED LIST OF THREATENED SPECIES: SPECIES EXTINCTION—THE FACTS 1 (2007).

¹⁵ Below, I elaborate on the threats climate change poses to biodiversity. See generally Jeremy Hance, *Climate Change Impacting ‘Most’ Species on Earth Even Down to Their Genomes*, THE GUARDIAN (Apr. 5, 2017), <https://www.theguardian.com/environment/radical-conservation/2017/apr/05/climate-change-life-wildlife-animals-biodiversity-ecosystems-genetics>.

residents per year.¹⁶ Unfortunately for the creatures who live unsuspectingly in development's path, the area is also prime koala habitat. Koala numbers are dwindling, and they are formally listed as "vulnerable" in both the national Environmental Protection and Biodiversity Conservation Act and under the Queensland state law.¹⁷ Queensland law permits destruction of koala habitat, if the development proponent commits "to establish three new koala habitat trees for every one 'non juvenile' tree removed" in the same local government area, in areas of "high value or medium value suitable for rehabilitation habitat," using endemic tree species.¹⁸ Alternatively, the developer may pay into a government-administered conservation fund, using a very complicated formula that multiplies area to be destroyed with "on-ground costs," multiplied again by a koala special matter multiplier, including additions for "landholder incentive payments" and administrative costs.¹⁹

Deborah Tabart, director of the Australia Koala Foundation, is a staunch opponent of this practice: "From the point of view of a koala, any 'offset' program is ridiculous."²⁰ From the point of view of Alan Key, director of Earthtrade, and Queensland's leading provider of offsets, the practice makes sense as a way to balance ecologically sound conservation and economically necessary development.²¹

But as we demand more resources from the planet, we are destroying the ecological systems that support human life. We ignore the ultimate source of human prosperity at our own peril. According to a recent estimate, ecosystem services provide

¹⁶ See *Brisbane Population 2017*, POPULATION AUSTRALIA, <http://www.population.net.au/brisbane-population/> (last visited Nov. 15, 2017).

¹⁷ See *The Koala: Endangered or Not?*, AUSTRALIAN KOALA FOUNDATION, <https://www.savethekoala.com/about-koalas/koala-endangered-or-not> (last visited Nov. 15, 2017).

¹⁸ BIODIVERSITY INTEGRATION & OFFSETS, DEP'T OF ENV'T & HERITAGE PROT., QUEENSLAND ENVIRONMENTAL OFFSET POLICY: VERSION 1.1 at 11 (2014) (Austl.).

¹⁹ See *id.* at 28–31.

²⁰ Deborah Tabart, *From the Point of View of a Koala, any 'Offset' Program is Ridiculous*, THE GUARDIAN (Apr. 2, 2014), <https://www.theguardian.com/commentisfree/2014/apr/03/from-the-point-of-view-of-a-koala-any-offset-program-is-ridiculous>.

²¹ See also *What are Offsets?*, EARTHTRADE, <http://earthtrade.com.au/offsets> (last visited Dec. 2, 2017).

humans with \$125 trillion to \$145 trillion of “free” services,²² including preventing erosion, increasing rainfall, buffering floods, purifying drinking water, harboring crop pollinators and providing food and building materials crucial for human survival. Humans have converted more than half of the Earth’s ice-free land area to human uses.²³ From 1997 to 2001, humans lost \$4.3 trillion to \$20.2 trillion per year due to land degradation.²⁴ The human population is projected to grow from seven to nine billion by 2050, which means we will likely convert another 200 million to one billion hectares of land to human use.²⁵

Conservation of nonhuman (and human) life on Earth requires new, innovative mechanisms to keep pace with human needs. Laws enabling “biodiversity offsetting,” are rapidly gaining currency—they exist or are being developed in over one hundred countries.²⁶ Supporters promote offsetting as a tool that promotes prudent, intertwined economic and ecological planning. As defined here, a biodiversity offset occurs when law permits a developer to destroy or degrade a particular species or ecosystem type in exchange for preserving or restoring a particular species²⁷ or ecosystem type.²⁸ Developers therefore pay for the biodiversity-

²² See Costanza et al., *supra* note 5, at 152.

²³ See Roger LeB. Hooke et al., *Land Transformation by Humans: A Review*, 22 GSA TODAY 4, 7 (2012); Pete Smith et al., *Global Change Pressures on Soils from Land Use and Management*, 22.3 GLOB. CHANGE BIOLOGY 1008, 1099 (2016).

²⁴ See Costanza et al., *supra* note 5, at 152.

²⁵ See Carrington, *supra* note 3; Marine Maron et al., *Faustian Bargains? Restoration Realities in the Context of Biodiversity Offset Policies* 155 BIOLOGICAL CONSERVATION 141,141 (2012). For a graphic depiction of how these effects are playing out in Africa, see Jeffrey Gettleman, *Loss of Fertile Land Fuels ‘Looming Crisis’ Across Africa*, N.Y. TIMES (July 29, 2017), <https://www.nytimes.com/2017/07/29/world/africa/africa-climate-change-kenya-land-disputes.html>.

²⁶ See THE BIODIVERSITY CONSULTANCY, BRIEFING NOTE: GOVERNMENT POLICIES ON BIODIVERSITY OFFSETS 2–3 (2016); ORG. FOR ECON. CO-OPERATION AND DEV., BIODIVERSITY OFFSETS: EFFECTIVE DESIGN AND IMPLEMENTATION 2 (2016).

²⁷ Usually—but not necessarily always—the same species or ecosystem.

²⁸ For overviews of biodiversity offsetting, see generally INT’L UNION FOR CONSERVATION OF NATURE, BIODIVERSITY OFFSETS TECHNICAL STUDY PAPER (2014) (discussing key elements of biodiversity offsetting and recommending certain approaches to its members); TEN KATE, *supra* note 6 (providing an introduction to biodiversity offsetting, among other measures); ORG. FOR ECON. CO-OPERATION AND DEV., *supra* note 6 (explaining biodiversity offsets generally, comparing offsets with other instruments, and examining programs

degrading externalities of their development. Developers may facilitate the offset themselves, pay an in-lieu fee to a government agency or nonprofit (e.g. a land trust) to mitigate, or purchase an offset from a biobanker who specializes in providing offsets.²⁹

At their best, biodiversity offsets allow a jurisdiction to examine an entire landscape, and design where development ought to occur and where conservation makes the greatest ecological and evolutionary sense. For the regulated entity—the mine operator, the developer, the citizen wishing to build a home, the government bureau—offsets may reduce the time and costs of compliance as well as offer sensible flexibility for how to respond to laws protecting biodiversity.³⁰ For conservationists, offsets can help incentivize conservation on private land and can channel protection efforts to where they will be most beneficial to endangered species and ecosystems.

The Business and Biodiversity Offsets Program (BBOP), an association of corporations, NGOs, government bureaus, and financial institutions,³¹ is the leading advocate for best practices and standards. Its core principles, which have been widely adopted in the field, are: a) the “mitigation hierarchy,” which states that offsetting is a last resort after damage has been minimized and restoration has occurred on site; b) a standard of no net loss (and preferably net gain) for biodiversity; c) a requirement of “like-for-like or better,” i.e. offsets should replace the exact kind of biological entity that is being destroyed, or replace it with an entity that is even more imperiled and thus a higher priority for conservation; and d) “red flags,” or extremely endangered species or ecosystems that should never be degraded (and thus never be

currently in place); WORLD BANK GROUP, BIODIVERSITY OFFSETS: A USER GUIDE (2016) (offering “introductory guidance on whether, when and how to prepare and implement biodiversity offsets”).

²⁹ See, e.g., G. DUKE & KERRY TEN KATE, EXPLORING LESSONS LEARNED FROM BIODIVERSITY OFFSETTING MARKETS IN OTHER COUNTRIES THAT COULD INFORM APPRAISAL OF OPTIONS FOR DELIVERING OFFSETS IN ENGLAND 14 (2014); KERRY TEN KATE & MICHAEL CROWE, BIODIVERSITY OFFSETS: POLICY OPTIONS FOR GOVERNMENTS, INPUT PAPER FOR THE IUCN TECHNICAL STUDY GROUP ON BIODIVERSITY OFFSETS 42 (2014); ORG. FOR ECON. CO-OPERATION AND DEV., *supra* note 26, at 5.

³⁰ See Barton H. Thompson, Jr., *Markets for Nature*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 261, 262 (2000).

³¹ See *Business and Biodiversity Offsets Programme*, FOREST TRENDS ASS'N, <http://bbop.forest-trends.org> (last visited Mar. 30, 2018).

offset).³²

The International Finance Corporation, the private sector group of the World Bank, has adopted the mitigation hierarchy for projects it funds, affecting billions of dollars of development projects.³³ It requires that projects “reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats.”³⁴ The Equator Principles, adopted by ninety-one financial institutions in thirty-seven countries to assess and manage social and environmental risk, have embraced BBOP’s offset design principles.³⁵

Biodiversity offsetting is the descendent of market-based mechanisms promoted as a means to compensate for pollution in an economically efficient, politically palatable way.³⁶ In the United States, revisions to the Clean Air Act in 1990 established emissions trading; with strong government oversight and a discrete set of hypothetically fungible pollutants coming from a relatively small number of sources, the program has largely been judged a success.³⁷ To meet Clean Water Act requirements in the United States, those who wished to fill in wetlands have been required to compensate by restoring (or paying others to restore) wetlands elsewhere, sometimes abetting consolidation of larger, more ecologically sustainable areas.³⁸ Businesses providing convenient

³² See BUS. AND BIODIVERSITY OFFSETS PROGRAMME (BBOP), BIODIVERSITY OFFSET DESIGN HANDBOOK: APPENDICES 6, 9, 30 (2009), available at http://www.forest-trends.org/documents/files/doc_3127.pdf; see also *Biodiversity Market: Overview*, ECOSYSTEM MARKETPLACE, <http://www.ecosystemmarketplace.com/marketwatch/biodiversity/> (last visited Mar. 30, 2018).

³³ See INT’L FIN. CORP., PERFORMANCE STANDARD 6: BIODIVERSITY CONSERVATION AND SUSTAINABLE MANAGEMENT OF LIVING NATURAL RESOURCES 2 (2012); see also *Products and Services: Investment*, INT’L FIN. CORP., http://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/solutions/products+and+services/investment-proserv (last visited Feb. 7, 2018).

³⁴ INT’L FIN. CORP., *supra* note 33, at 2.

³⁵ See *About the Equator Principles*, EQUATOR PRINCIPLES, <http://www.equator-principles.com/index.php/about-ep/about-ep> (last visited Nov. 22, 2017).

³⁶ See Thompson, *supra* note 30, at 262.

³⁷ See Clean Air Act of 1970 §§ 401, 402, 42 U.S.C. §§ 7651, 7651(a) (2012); Vivien Foster & Robert H. Hahn, *Designing More Efficient Markets: Lessons From Los Angeles Smog Control*, 38 J. L. & ECON. 19, 20–22 (1995); but see Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles’ Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL’Y F. 231, 235 (1999).

³⁸ See *Mitigation Banking Factsheet*, ENVTL. PROT. AGENCY, <https://www.epa.gov/cwa-404/mitigation-banking-factsheet> (last updated Nov. 16, 2017); See also Thompson, *supra* note 30, at 265.

wetlands “mitigation banking” have sprung up nationally, and officials process 70 thousand to 80 thousand mitigation applications annually, requiring 47 thousand acres of mitigation to compensate for 21 thousand acres of permitted wetlands destruction.³⁹ As of 2010, 950 wetland and stream mitigation banks, covering nearly a million acres, operated across the United States.⁴⁰

Wetlands mitigation assumed that ecosystem function was largely fungible: the ecosystem services provided by Wetland A could be equivalently provided by Wetland B a few miles away.⁴¹ The Clean Air Act treats sulfur oxide emissions in one jurisdiction as the fungible equivalent of emissions elsewhere. Does that mean that life is also fungible? Biodiversity offsetting presumes it to be, and as of 2011, developers have spent \$2.4 billion to \$4 billion globally to offset destruction to biodiversity.⁴²

Specialized conservation banks protect or restore habitat necessary for species that are formally listed as endangered or threatened under the U.S. Endangered Species Act or under parallel laws in other nations or individual states within the United States.⁴³ The U.S. Fish and Wildlife Service (USFWS) awards credits for the protection of species on lands the bank is protecting.⁴⁴

As of the end of 2015, the USFWS had sanctioned 135 conservation banks (nearly four out of five in California⁴⁵)

³⁹ See Rebecca L. Kihlsinger, *Success of Wetlands Mitigation Projects*, 30 NAT'L WETLANDS NEWSL. 14, 14 (2008); Dave Owen, *Little Streams and Legal Transformations*, 2017 UTAH L. REV. 1, 25 (2017); BUS. AND BIODIVERSITY OFFSETS PROGRAMME, BIODIVERSITY OFFSET DESIGN HANDBOOK APPENDICES 12 (2009), available at http://www.forest-trends.org/documents/files/doc_3127.pdf; see generally 33 U.S.C. § 1344; FEDERAL GUIDANCE FOR THE ESTABLISHMENT, USE, AND OPERATION OF MITIGATION BANKS (1995).

⁴⁰ See Jessica Owley, *The Increasing Privatization of Environmental Permitting*, 46 AKRON L. REV. 1091, 1108 (2013).

⁴¹ See J.B. Ruhl, Alan Glen & David Hartman, *A Practical Guide to Habitat Conservation Banking Law and Policy*, 20 NAT. RES. & ENV'T 26 (2005).

⁴² See ORG. FOR ECON. CO-OPERATION & DEV., BIODIVERSITY OFFSETS: EFFECTIVE DESIGN AND IMPLEMENTATION 7 (2016).

⁴³ See *Conservation & Mitigation Banking*, CAL. DEP'T OF FISH & WILDLIFE, <https://www.wildlife.ca.gov/Conservation/Planning/Banking> (last visited Dec. 2, 2017).

⁴⁴ See *id.*

⁴⁵ See *Conservation and Mitigation Banks Established in California by CDFW*, CAL. DEP'T OF FISH & WILDLIFE, <https://www.wildlife.ca.gov/Conservation/Planning/Banking/Approved-Banks> (last visited Dec. 2, 2017).

covering 142 thousand acres.⁴⁶ USFWS may approve a bank once: 1) a third party easement has been established guaranteeing long-term conservation; 2) the banker presents an acceptable long-term management plan; and 3) the banker shows they have sufficient funds to manage the bank over a protracted period of time.⁴⁷ The management plan “should be as specific as possible, but flexible enough to allow changes in management practices in response to monitoring results.”⁴⁸ USFWS emphasizes that each offset decision will be unique and dependent on the species’ needs and the characteristics of the proposed offset site; thus, such offsetting must inevitably be bound to the judgment of the individual regulator.⁴⁹ Prices fetched for offsets at biodiversity banks range between \$2,500 to \$300,000 per acre.⁵⁰

The U.S. Department of Interior is also pursuing biodiversity offsets on a grander scale as it seeks protections and new funding sources for the greater sage grouse⁵¹ and lesser prairie chicken,⁵² whose habitats stand in the way of oil and gas exploration, mineral exploitation, farming, and ranching in the American West, and who live largely in politically conservative-leaning congressional

⁴⁶ See OFF. OF POL’Y ANALYSIS, DEPT. OF INTERIOR, RESULTS FROM A SURVEY OF CONSERVATION BANKING SPONSORS AND MANAGERS 2 (2016).

⁴⁷ See U.S. FISH & WILDLIFE SERV., CONSERVATION BANKING: INCENTIVES FOR STEWARDSHIP 2 (2012).

⁴⁸ *Id.*

⁴⁹ See U.S. FISH & WILDLIFE SERV., GUIDANCE FOR THE ESTABLISHMENT, USE, AND OPERATION OF CONSERVATION BANKS 7 (2003).

⁵⁰ The last comprehensive figures I could find are from 2010. Prices are higher now for some species in some locations, as my interviews revealed. See BECCA MADSEN ET AL., STATE OF BIODIVERSITY MARKETS REPORT: OFFSET AND COMPENSATION PROGRAMS WORLDWIDE 17 (2010).

⁵¹ See U.S. FISH & WILDLIFE SERV., GREATER SAGE-GROUSE RANGE-WIDE MITIGATION FRAMEWORK 20 (2014). See also OLIVIA PEARMAN & RACHEL PLAWECKI, NATURE CONSERVANCY, ASSESSING COMPENSATORY MITIGATION OPTIONS FOR GREATER SAGE-GROUSE CONSERVATION 12 (2015). Listing of the sage grouse as an endangered species is currently warranted, according to USFWS; the agency is attempting to use offsetting as a means to avoid listing and the political headaches and legal battles that such listing will incur. *Id.* §

⁵² See W.E. VAN PELT ET AL. THE LESSER PRAIRIE-CHICKEN RANGE-WIDE CONSERVATION PLAN (2013); Carrie Arnold, *New Schemes Pay You to Save Species—But Will They Work?*, SMITHSONIAN (July 13, 2016), <https://www.smithsonianmag.com/science-nature/new-schemes-aim-pay-save-species-will-they-work-180959759/>; Abhinav Vijay, *Habitat Exchanges and the Problem of Incentivizing Conservation*, ROOSEVELT INST. AT CORNELL UNIV. (Oct. 5, 2015), <https://www.cornellrooseveltinstitute.org/habitat-exchanges-and-the-problem-of-incentivizing-conservation.html>.

districts where opposition to the Endangered Species Act is pronounced.⁵³ As of this writing, the Secretary of the Interior has announced plans to reconsider existing agreements for conservation of the greater sage grouse.⁵⁴ It is unknown what this means for ambitious biodiversity offsetting plans.⁵⁵

In 2015, looking to balance seemingly competing goals, President Obama ordered agencies to adopt a unified set of principles to govern compensatory mitigation, including biodiversity offsetting.⁵⁶ He wrote: “We all have a moral obligation to the next generation to leave America’s natural resources in better condition than when we inherited them. It is this same obligation that contributes to the strength of our economy and quality of life today.”⁵⁷ The presidential memorandum emphasizes the importance of landscape-level planning, adopts the standard mitigation hierarchy, and emphasizes the role that the private sector should play in providing offsets, while maintaining a firm, central government guiding hand in regulating these opportunities.⁵⁸

The current administration has revoked the Obama memorandum as it seeks its own strategies.⁵⁹ Nonetheless, in December 2016, the USFWS finalized its rulemaking for compensatory mitigation under the ESA, which “stresses the need to hold all compensatory mitigation mechanisms to equivalent and effective standards.”⁶⁰ The USFWS defines offsetting as

⁵³ See, e.g., Lisa Friedman, *Interior Department to Overhaul Obama’s Sage Grouse Protection Plans*, N.Y. TIMES (Sept. 28, 2017), <https://www.nytimes.com/2017/09/28/climate/trump-sage-grouse.html>.

⁵⁴ Press Release, Dep’t of the Interior, Secretary of the Interior Ryan Zinke Statement on Sage Grouse Report, (Aug. 7, 2017), available at <https://www.doi.gov/pressreleases/secretary-interior-ryan-zinke-statement-sage-grouse-report>.

⁵⁵ See, e.g., Friedman, *supra* note 53.

⁵⁶ See Memorandum from President Barack Obama on Mitigation Impacts on Natural Resources from Development and Encouraging Related Private Investment (Nov 3, 2015), available at <https://obamawhitehouse.archives.gov/the-press-office/2015/11/03/mitigating-impacts-natural-resources-development-and-encouraging-related>.

⁵⁷ Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment, 80 Fed. Reg. 68,743, 68,743 (Nov. 3, 2015).

⁵⁸ See *id.*

⁵⁹ See Jim Salzman, *The Overlooked Part of Trump’s Executive Order on Climate Change*, LEGAL PLANET (Apr. 6, 2017), <http://legal-planet.org/2017/04/06/the-overlooked-part-of-trumps-executive-order-on-climate-change/>.

⁶⁰ Endangered and Threatened Wildlife and Plants; Endangered Species Act

“compensation for remaining unavoidable impacts after all appropriate and practicable avoidance and minimization measures have been applied, by replacing or providing substitute resources or environments through the restoration, establishment, enhancement, or preservation of resources and their values, services, and functions.”⁶¹ The rulemaking applies to offsets done by the developer, by government agencies, or by third party private biodiversity brokers.⁶² Given the recent change of administration in the United States, it is not clear what the future of this rulemaking will be.

To ascertain how USFWS compensatory mitigation works (and how effective it is), I have visited several biodiversity banks, including Wildlands, Inc.’s “Sacramento River Ranch Farm of the Future,” which provides biodiversity offsets for ESA-listed salmon, Swainson’s hawk, and the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB).⁶³

Banking on a building boom around California’s capital, Wildlands purchased 3,960 acres of derelict farmland in 2003 and now “grows” endangered species alongside more traditional crops like alfalfa, hay, and corn.⁶⁴ Wildlands must show that the habitat is successfully attracting the listed species—an “advanced offset”—before the USFWS will approve the release of credits.⁶⁵ I was impressed at the lushness of the habitat and the knowledge of the enviropreneurs making their livings by offsetting life. I was also impressed at the high prices fetched for quality, privately offered offsets. For example, Wildlands earns 22.4 VELB credits per acre (a credit is five mature elderberry bushes and associated flora), which fetch \$3,000 to \$4,000 per credit (a one-time payment).⁶⁶ For professional biodiversity offsetters in the U.S., raising beetles can be more lucrative than raising corn.⁶⁷

Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,136 (Dec. 27, 2016).

⁶¹ *Id.*

⁶² *See id.*

⁶³ *See* Interview with Steve Morgan, CEO, Sacramento River Ranch, in W. Sacramento, Cal. (Sept. 18, 2014); *see also* *Sacramento River Ranch Mitigation Complex*, WINDLANDS INC., http://www.wildlandsinc.com/case_studies/sacramento-river-ranch-mitigation-complex/ (last visited Dec. 22, 2017).

⁶⁴ *See* Visit to Sacramento River Ranch with Steve Morgan, CEO, in W. Sacramento, Cal. (Sept. 18, 2014).

⁶⁵ *See id.*

⁶⁶ *See id.*

⁶⁷ Speciesbanking.com, maintained by Ecosystem Marketplace, allows

Laws implement biodiversity offsetting beyond the United States. In Australia, six states have established biodiversity offsets programs.⁶⁸ The Environmental Protection and Biodiversity Conservation Act (EPBC) lays out general guidelines for offsetting of “matters of national environmental significance,” i.e. habitats, species, or heritage sites that have formal Commonwealth protection; the states and territories must follow these when designing their own programs,⁶⁹ although local jurisdictions maintain control over local offsets, and coordination among the states and between the states and the Commonwealth is weak.⁷⁰

New South Wales (NSW) law prioritizes “BioBanking,” “encouraging offsets on land that is strategically important for biodiversity in NSW, such as land adjacent to rivers, streams and wetlands and important mapped biodiversity corridors. Establishing offset sites in these areas may generate additional biodiversity credits, which can be sold by landowners.”⁷¹ The BioBanking scheme is founded both on the State’s 1995 Threatened Species Conservation Act and, also a specialized 2008 Threatened Species Conservation (Biodiversity Banking) Regulation.⁷² Studies show that this type of formal coordination facilitates development and associated conservation by speeding up the environmental approval process (for better or worse).⁷³ The program follows the mitigation hierarchy and requires “like-for-

anyone to track offsetting transactions. *See Wildlands Mitigation Bank, ECOSYSTEM MARKETPLACE*, http://us.speciesbanking.com/pages/dynamic/banks.page.php?page_id=7285&eod=1 (last visited Dec. 2, 2017) (listing record for Wildlands, Inc.). For a skeptical view of VELB offsetting, see Marcel Holyoak et al., *The Effectiveness of US Mitigation and Monitoring Practices for the Threatened Valley Elderberry Longhorn Beetle*, 14 J. INSECT CONSERVATION 43 (2010).

⁶⁸ See MADSEN ET AL., *supra* note 50, at 47–56.

⁶⁹ See AUSTL. GOV’T DEP’T OF SUSTAINABILITY, ENV’T, WATER, POPULATION AND CMTYS., ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999: ENVIRONMENTAL OFFSETS POLICY 5 (2011).

⁷⁰ Various interviews emphasized this. *See also* MADSEN ET AL., *supra* note 50, at 48; *Australia’s Scrambled Egg of Government: Who Has the Environmental Power?*, THE CONVERSATION (Dec. 4, 2012), <https://theconversation.com/australias-scrambled-egg-of-government-who-has-the-environmental-power-9582>.

⁷¹ NEW SOUTH WALES GOV’T, NSW BIODIVERSITY OFFSETS POLICY FOR MAJOR PROJECTS 8 (2014).

⁷² See MADSEN ET AL., *supra* note 50, at 51.

⁷³ See TEN KATE, *supra* note 29, at 16.

like” offsets for species or ecosystem types.⁷⁴ NSW also has a Biodiversity Offsets Policy for Major Projects, which employs the mitigation hierarchy and the BioBanking system to standardize requirements for large projects that will damage biodiversity.⁷⁵ It also establishes a “NSW Biodiversity Offsets Fund” to channel offset proceeds towards “strategic purchase” of particularly important land.⁷⁶

The Victoria Native Vegetation Management Program’s “BushBroker” scheme requires offsets for development that will clear native vegetation. Officials endeavor to find landowners who will pledge to preserve their vegetation and, in return, receive credits to sell to developers.⁷⁷ The program uses a much-emulated “habitat hectares” method, where the size, quality, and conservation significance of a parcel to be degraded is calculated; offsets must match or exceed the calculated value, and need not be “like-for-like” habitats as long as regulators calculate a biodiversity gain.⁷⁸ In a comprehensive plan to manage Melbourne’s growth, the government is planning a large Grassland Reserve.⁷⁹ Rather than making developers create hundreds of tiny reserves, Melbourne would use offsetting to create one vast reserve with a viable ecological future.⁸⁰ Government managers often find it easier to manage and monitor single larger reserves, as well.⁸¹

Queensland has endeavored to make koalas a fungible commodity through their Koala Offsets program, which required a net gain of habitat when development contemplated impairing

⁷⁴ See MADSEN ET AL., *supra* note 50, at 51.

⁷⁵ See NEW SOUTH WALES GOV’T, *supra* note 71, at 5, 8.

⁷⁶ See *id.* at 8.

⁷⁷ See MADSEN ET AL., *supra* note 50, at 48; *BushBroker (Victoria)*, SPECIES BANKING, <http://www.speciesbanking.com/program/bushbroker> (last updated Sept. 23, 2010).

⁷⁸ See MADSEN ET AL., *supra* note 50, at 48; BUSINESS AND BIODIVERSITY OFFSETS PROGRAMME (BBOP), BIODIVERSITY OFFSET DESIGN HANDBOOK: APPENDICES 19–20 (2009), http://www.forest-trends.org/documents/files/doc_3127.pdf.

⁷⁹ See G. DUKE & K. TEN KATE, EXPLORING LESSONS LEARNED FROM BIODIVERSITY OFFSETTING MARKETS IN OTHER COUNTRIES THAT COULD INFORM APPRAISAL OF OPTIONS FOR DELIVERING OFFSETS IN ENGLAND 14 (2014).

⁸⁰ Interviews suggest that progress has been slow; see MADSEN, ET AL., *supra* note 50, at 52.

⁸¹ JOSHUA BISHOP, IUCN WORLD CONSERVATION UNION, PRODUCING AND TRADING HABITAT, OR LAND DEVELOPMENT AS A SOURCE OF FUNDING FOR BIODIVERSITY CONSERVATION 2 (2003).

existing koala habitat.⁸² This has been replaced by a more general “Queensland Environmental Offsets Policy”⁸³ buttressed by a “Koala Conservation Policy,” which requires koala offsetting for public sector projects, including “koala spotters” that monitor clearing.⁸⁴ Thus, around the sprawling city of Brisbane and elsewhere in Queensland, koalas become fungible commodities through the requirement that three new koala trees be planted for every mature tree removed on an area of land.⁸⁵ That area is determined by a metric assessing the ecological value of the land to be degraded and ease of administering the offset.⁸⁶ The developer may also pay an in-lieu fee to the government or to a private broker to provide the offset.⁸⁷

I have visited central Queensland with Earthtrade’s⁸⁸ Alan Key. His business offers full service brokerage both to those who would offer offsets and to those entities who need them.⁸⁹ In Queensland, offset sites need not be in the same general vicinity of the area to be degraded; our visit to a prospective offset provided was a ranch ninety kilometers away from the coal mine that would be purchasing the offsets.⁹⁰ Mr. Key was looking for offsets for the EPBC-listed species of the ornamental snake and yakka skink, as well as for the Queensland Environmental Offsets Act-required Brigalow Ecological Community, a particular habitat type dominated by *Acacia* trees with an associated specialized fauna.⁹¹

⁸² See KOALA CONSERVATION UNIT, DEP’T OF ENV’T & HERITAGE PROT., OFFSETS FOR NET GAIN OF KOALA HABITAT IN SOUTH EAST QUEENSLAND POLICY 2 (2010).

⁸³ See BIODIVERSITY INTEGRATION & OFFSETS, DEP’T OF ENV’T & HERITAGE PROT., QUEENSLAND ENVIRONMENTAL OFFSET POLICY VERSION 1.1 at 11 (2014).

⁸⁴ See generally CONSERVATION & BIODIVERSITY POL’Y UNIT, DEP’T OF ENV’T & HERITAGE PROT., STATE GOVERNMENT SUPPORTED COMMUNITY INFRASTRUCTURE KOALA CONSERVATION POLICY (2017).

⁸⁵ See BIODIVERSITY INTEGRATION & OFFSETS, DEP’T OF ENV’T & HERITAGE PROT., QUEENSLAND ENVIRONMENTAL OFFSET POLICY VERSION 1.1 at 11, 26, 31.

⁸⁶ See *id.*; Interview with Alan Key, CEO, Earthtrade, in Rockhampton, Queensl., Austl. (Feb. 23–24, 2017).

⁸⁷ See *id.*

⁸⁸ See generally EARTHTRADE, <http://earthtrade.com.au> (last visited Dec. 3, 2017).

⁸⁹ EARTHTRADE, EARTHTRADE’S PROCESS TO SECURE BIODIVERSITY OFFSETS, 2 (2014). All documents on file with author.

⁹⁰ See Interview with Alan Key, *supra* note 86.

⁹¹ See *Species Profile and Threats Database: Brigalow*, AUSTL. GOV’T DEP’T OF ENV’T AND ENERGY, <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=28> (last visited Nov. 23, 2017).

The ranchers wanted to maintain or restore part of their land, and offsets would be a financial means for them to do so instead of using these lots for grazing.⁹² Queensland, as in elsewhere in Australia, does not share the United States policy that “advanced offsets” be established, i.e. the restoration need not be completed before the initial destruction is allowed.⁹³ But the offset would require a comprehensive management plan and a guarantee to not be cleared for the duration of the destruction at the mining site.⁹⁴

South Africa is a leading practitioner of biodiversity offsetting in Africa.⁹⁵ The 1998 National Environmental Management Act (NEMA) requires developers to avoid or “remedy” environmental impacts, with biodiversity offsets suggested as a conservation option.⁹⁶ While the National Biodiversity Act of 2004 provides for listing of endangered and threatened species, it does not require mitigation.⁹⁷ Furthermore, biodiversity managers stressed to me that any kind of required development mitigation is still at the discretion of government officials.⁹⁸

The nation is proposing a better coordinated offsetting system, moving away from the largely ministerial, ad hoc decisions under NEMA.⁹⁹ That policy’s specific contours and implementation are particularly crucial for South Africa, which draws substantial revenue from wildlife tourism, and whose rural communities often depend on biological resources for their livelihoods. In KwaZulu-

⁹² See Interview with Alan Key, *supra* note 86.

⁹³ See *id.*; Interview with Alan Key, CEO, Earthtrade, in Rockhampton, in Brisbane, Queensl., Austl. (Jan. 9, 2015).

⁹⁴ See interview with Alan Key, *supra* note 86; interview with Alan Key, *supra* note 93.

⁹⁵ See BECCA MADSEN, NATHANIEL CARROLL & KELLY MOORE BRANDS, ECOSYSTEM MARKETPLACE, STATE OF BIODIVERSITY MARKETS REPORT: OFFSET AND COMPENSATION PROGRAMS WORLDWIDE 33 (2010); Susan Brownlie et al., *Biodiversity Offsets in South Africa: Challenges and Potential Solutions*, 35 IMPACT ASSESSMENT AND PROJECT APPRAISAL (2017).

⁹⁶ See National Environmental Management Act of 1998 § 23(2)(b) (S. Afr.). This has been interpreted by biodiversity managers to include biodiversity offsetting as a mitigation tool. Interview with Jeffrey Manuel, *supra* note 11.

⁹⁷ See National Environmental Management: Biodiversity Act of 2004 §§ 56, 57, 88 (S. Afr.).

⁹⁸ Several government biodiversity managers I interviewed in South Africa emphasized this. See National Environmental Management: Biodiversity Act of 2004 §§ 56, 57, 88 (S. Afr.).

⁹⁹ See REPUBLIC OF S. AFR. DEPT. OF ENVT. AFFAIRS, DRAFT DISCUSSION DOCUMENT ON ENVIRONMENTAL OFFSETS (2015); JENNER & BALMFORTH, *supra* note 12, at 4.

Natal and the Western Cape provinces, for example, officials are attempting to use scientific data to calculate what “ratios” of species individuals or habitat area to protect in exchange for permitting development to destroy individuals and their habitat elsewhere.¹⁰⁰ Instead of “like-for-like,” both provincial offset guidelines allow “trading up,” i.e., allowing an offset to preserve habitats that face graver threats than the one being destroyed.¹⁰¹ Private citizens and mining, hydropower, and logging businesses have also developed their own voluntary biodiversity offset demonstration projects.¹⁰² Furthermore, biodiversity advocates have suggested prioritizing offsets in the 8 percent of landscape that provides the headwaters for 50 percent of the nation’s scarce water resources, thus focusing conservation efforts where they can protect and produce more clean water downstream.¹⁰³

Evolving South African policy differs from policy in the United States and Australia, where “no net loss” or “net gain” of biodiversity is usually required.¹⁰⁴ In South Africa, biodiversity managers recognize that sometimes biodiversity will lose ground as the nation is in the throes of post-apartheid era development necessary to meet the needs of a burgeoning, largely poor population.¹⁰⁵ Biodiversity managers there point to the nation’s excellent mapping data for over four hundred kinds of ecosystems that could use developer fees to fund a “managed drawdown” of each so that some ecologically sustainable representative sample could endure, with the emphasis on “managed,” i.e., planned and not capricious.¹⁰⁶

¹⁰⁰ See MADSEN ET AL., *supra* note 50, at 34; PROVINCIAL GOV’T OF THE WESTERN CAPE: DEPT. OF ENVTL. AFF. & DEV. PLAN., PROVINCIAL GUIDELINE ON BIODIVERSITY OFFSETS: REVISED DRAFT iv (March 2007).

¹⁰¹ See *id.*

¹⁰² See JENNER & BALMFORTH, *supra* note 11, at 23–25; MADSEN ET AL., *supra* note 50, at 34.

¹⁰³ Interview with John Dini, Dir. of Ecological Infrastructure, S. African Nat’l Biodiversity Inst., in Stellenbosch, S. Afr. (Mar. 12, 2015); Interview with Jeffrey Manuel, *supra* note 11; For a comprehensive look at water as ecological infrastructure, with biodiversity co-benefits, see David Takacs, *South Africa and the Human Right to Water: Equity, Ecology, and the Public Trust Doctrine*, 34 BERKELEY J. INT’L L. 55, 97–106 (2016).

¹⁰⁴ See BUSINESS AND BIODIVERSITY OFFSETS PROGRAMME (BBOP), BIODIVERSITY OFFSET DESIGN HANDBOOK: APPENDICES 9, 22, 25, 41 (2009).

¹⁰⁵ See Interview with Jeffrey Manuel, *supra* note 11; Interview with John Dini, *supra* note 103; see also Takacs, *supra* note 103, at 97–106.

¹⁰⁶ See JENNER & BALMFORTH, *supra* note 11, at 15; JEFFREY MANUEL,

In the United Kingdom, decisions about offsetting are presently left to the several hundred local planning authorities, approximately 42 percent of which have employed offsetting.¹⁰⁷ Offsets are largely small scale, local projects.¹⁰⁸ The nation has floated an overarching plan for offsets, but that plan has stalled, with the UK Department for Environment, Food and Rural Affairs (DEFRA) continuing to work for “how best to compensate for biodiversity loss when it cannot first be avoided or mitigated.”¹⁰⁹ The Environment Bank, a private biodiversity offset broker, employs simple “metrics”—recommended by DEFRA—to calculate offsets needed.¹¹⁰ The metric combines three criteria: ecological distinctiveness, habitat condition, and area to be degraded to calculate the number of “units” that must be offset.¹¹¹ So, for example, to serve as a pilot project and assuage criticisms of its project, Thameslink voluntarily offset its railroad expansion between London and Brighton by following the mitigation hierarchy and employing this metric for “unavoidable” losses to derive a “net gain” of biodiversity.¹¹² A loss of “42 biodiversity units” was offset by tree planting nearby—to mitigate greater than 42 units—conducted by the London Wildlife Trust.¹¹³

The programs I reviewed share a commonality: biodiversity offsetting presumes quantification of biodiversity as a tradeable commodity. This raises the question: can and should biodiversity

DEVELOPMENT AND IMPLEMENTATION OF BIODIVERSITY OFFSETS POLICY IN SOUTH AFRICA: INPUT PREPARED FOR SESSION 5 OF THE CONFERENCE “TO NO NET LOSS AND BEYOND” (2014); Interview with Jeffrey Manuel, *supra* note 11; Interview with John Dini, *supra* note 103.

¹⁰⁷ See DEP’T FOR ENV’T FOOD & RURAL AFF., CONSULTATION ON BIODIVERSITY OFFSETTING IN ENGLAND: SUMMARY OF RESPONSES 13 (2016) (Eng.).

¹⁰⁸ See Interviews with David Hill, Chairman, & Cara Marshall, Assoc., The Env’t Bank, in Ripon, N. Yorkshire, U.K. (Nov. 27, 2014).

¹⁰⁹ Ben Connor, *Biodiversity Offsetting in the UK: Cast into the Wilderness?*, ECOSYSTEM MARKETPLACE (Mar. 18, 2016), <http://www.ecosystemmarketplace.com/articles/biodiversity-offsetting-in-the-uk-cast-into-the-wilderness/> (internal quotation omitted).

¹¹⁰ See THE ENVIRONMENT BANK, BIODIVERSITY ACCOUNTING: AN INTRODUCTION 3–4.

¹¹¹ See THE ENVIRONMENT BANK, BIODIVERSITY OFFSETTING: A GENERAL GUIDE 6–7 (2013).

¹¹² See Kemp, *supra* note 11. See also Interview with Julia Baker, Biodiversity Technical Specialist, Parsons Brinckerhoff, in Canterbury, U.K. (Nov. 24, 2014).

¹¹³ See *id.*

be reduced to a simple metric? Critics—and they are numerous—say “no.”

II. CONTROVERSY SURROUNDING BIODIVERSITY OFFSETTING

To me it is akin to some guy going into that art gallery and pointing at the Mona Lisa on the wall and saying sorry mate we need that bitso the Mona Lisa has to go. But we will paint you another one.

—Ecology Professor Richard Hobbs, University of Western Australia.¹¹⁴

The practice of biodiversity offsetting faces serious opposition from a coterie of critics, including a coalition of over one hundred organizations who have formally called for ending the practice.¹¹⁵ In this Part, I present the most common and strongest arguments against biodiversity offsetting. Critics allege that commodifying biodiversity removes effective ethical strictures to destroying life, puts economic value on what should be considered priceless, circumvents effective existing species protection laws, and is impracticable to implement in law effectively, if we could even agree on what “effectively” means.

The primary arguments against biodiversity offsetting take the following forms.

A. *Endangered Species Laws Exist for a Reason, Work Well, and Where They Do Not, Should Simply Be Implemented and Enforced More Rigorously*

Decades-old laws exist in the United States and elsewhere to protect endangered species and threatened ecosystems. Why allow workarounds that undercut the reason an environmental statute exists in the first place? For example, while the ESA forbids any

¹¹⁴ SENATE ENV'T & COMM. REFERENCES COMMITTEE, PARLIAMENT OF AUSTL., ENVIRONMENTAL OFFSETS 22 (2014) (internal quotation omitted).

¹¹⁵ See *No to Biodiversity Offsetting!*, WORLD RAINFOREST MOVEMENT (Nov. 21, 2013), <http://wrm.org.uy/meetings-and-events/over-100-organisations-call-for-an-end-to-biodiversity-offsetting-plans/>; Chris Lang, *No to Biodiversity Offsetting*, REDD-MONITOR (Nov. 22, 2013), <http://www.redd-monitor.org/2013/11/22/no-to-biodiversity-offsetting/>. For a summary of objections, see also TEN KATE, *supra* note 29, at 12.

person to “take” any endangered species,”¹¹⁶ the Department of Interior has since found various ways to circumvent the absolute prohibition. By allowing “flexibility mechanisms,” including offsets, administrators of the ESA face criticism for blunting the potential force of the Act by, for example, “convert[ing] an act of specific stages and clear commands into an act of discretion.”¹¹⁷ Commentators James Salzman and JB Ruhl say it makes no sense that the “basis for trading environmental commodities is a regulatory proscription of behavior followed by regulatory permission of the behavior under controlled conditions.”¹¹⁸ These workarounds may, in fact, facilitate destruction “because of the ease of purchasing mitigation bank credits without needing to think critically about an individual project or ecosystem.”¹¹⁹

Other critics suggest that it is inappropriate to put what should be government functions—setting standards and implementing and enforcing the law—into the hands of private actors who may not have the public’s best interests in mind.¹²⁰ It is arguably more difficult and expensive for governments to purchase land or enforce environmental regulations than to permit a market (often unregulated or under-regulated) for offsets. And the prospect of getting paid to take care of one’s land may provide a perverse incentive away from voluntary, responsible stewardship of private property.¹²¹

¹¹⁶ See 16 U.S.C. § 1538(a)(1)(B) (2012).

¹¹⁷ Oliver A. Houck, *The Endangered Species Act and Its Implementation by the Departments of Interior and Commerce*, 64 U. COLO. L. REV. 277, 279 (1993); see also Dave Owen, *Critical Habitat and the Challenge of Regulating Small Harms*, 64 FLA. L. REV. 141, 185–86. (2012).

¹¹⁸ James Salzman & JB Ruhl, *Currencies and the Commodification of Environmental Law*, 53 STAN. L. REV. 607, 616 (2000); Martine Maron et al., *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 BIOSCIENCE 489, 491 (2016). See also Jessica Owley, *The Increasing Privatization of Environmental Permitting*, 46 AKRON L. REV. 1091, 1092 (2013) (“Many environmental laws appear to prohibit environmental degradation outright, but then contain provisions allowing for environmentally destructive activities after obtaining appropriate permits.”).

¹¹⁹ Jessica Owley, *The Increasing Privatization of Environmental Permitting*, 46 AKRON L. REV. 1091, 1110 (2013). See also Brendan Sydes, “Net Gain” and Offsets in Victoria: Implementation of Native Vegetation Policy Under the Planning and Environment Act 1987 at 37 (2007) (Master’s thesis, University of Melbourne) (on file with author).

¹²⁰ See Owley, *supra* note 119, at 1127.

¹²¹ This is the central thesis of Ascelin Gordon, Joseph W. Bull, Chris Wilcox, & Martin Maron. See Ascelin Gordon et al., *Perverse Incentives Risk*

B. *Biodiversity Offsetting is Just a License to Trash Nature*

As I will discuss below, biodiversity offsetting is modeled on more established forms of pollution trading. Many scholars have documented the flaws and foibles of carbon trading, which allows continued greenhouse gas pollution due to (sometimes) fictitious trades.¹²² If we can't design effective trading schemes for fungible pollutants, how can we design such schemes for complex systems of diverse life forms?¹²³ Critics allege that biodiversity offsetting will inevitably allow dubious projects to proceed for solely political and economic reasons, and not because the proposed projects and offsets are what is best for biodiversity.¹²⁴

With biodiversity offsets, we trade certain loss for very uncertain gain.¹²⁵ For opponents, trading certain destruction for uncertain (or extensively time delayed) restoration is a bad deal.¹²⁶ According to critics, biodiversity offsetting provides a "license to

Undermining Biodiversity Offset Policies, 52 J. APPLIED ECOLOGY 532, 533–34 (2015); Marine Maron et al., *Faustian Bargains? Restoration Realities in the Context of Biodiversity Offset Policies*, 155 BIOLOGY CONSERVATION 141, 146 (2012); See TEN KATE, *supra* note 29, at 12. For an overview of environmental laws leading to perverse incentives that undermine conservation, see David Takacs, *Protecting Your Environment, Exacerbating Injustice: Avoiding "Mandate Havens,"* 24 DUKE ENVTL. L. & POL'Y F. 315 (2015).

¹²² See generally DAVID TAKACS, *FOREST CARBON: LAW AND PROPERTY RIGHTS* (2009).

¹²³ Even the Pope has doubts. See Pope Francis, *Laudato Si'*, Encyclical Letter of the Holy Father Francis on Care for Our Common Home ¶167 (2015). See also David Takacs, *Forest Carbon (REDD+), Repairing International Trust, and Reciprocal Contractual Sovereignty*, 37 VT. L. REV. 653, 661 (2013); LARRY LOHMANN, *CARBON TRADING: A CRITICAL CONVERSATION ON CLIMATE CHANGE, PRIVATISATION, AND POWER* 230 (2006); Camila Moreno et al., *Beyond Paris: Avoiding the Trap of Carbon Metrics*, OPENDEMOCRACY (Feb. 8, 2016), <https://www.opendemocracy.net/transformation/camila-moreno-lili-fuhr-daniel-speich-chass/beyond-paris-avoiding-trap-of-carbon-metr>.

¹²⁴ See Christopher D. Ives & Sarah A. Bekessy, *The Ethics of Offsetting Nature*, 13 FRONTIERS IN ECOLOGY & THE ENV'T 568, 568 (2015).

¹²⁵ See Katharine N. Suding, *Toward an Era of Restoration in Ecology: Successes, Failures, and Opportunities Ahead*, 42 ANN. REV. ECOLOGY, EVOLUTION & SYSTEMATICS 465, 470 (2011). See also Marine Maron et al., *supra* note 25, at 143, 145.

¹²⁶ See FERN, *CRITICAL REVIEW OF BIODIVERSITY OFFSET TRACK RECORD 1* (providing a bibliography on failed restoration); Maron et al., *supra* note 25, at 144–45; Suding, *supra* note 125, at 470–71. Cf. Marine Maron et al., *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 BIOSCIENCE 489 (2016) (critiquing biodiversity offsetting, but recognizing its importance in policymaking).

trash” or “license to kill” nature that we should not be granting.¹²⁷ In Victoria, Australia, where formal offsetting has been in place as long as anywhere else, critics contend that offsets have been a sop to developers, allowing clearing where laws would otherwise circumscribe such behavior, with poor metrics, monitoring, and enforcement.¹²⁸ In official testimony in Australia, offsets have been called the “saviour for inappropriate development”¹²⁹ that contain “loopholes big enough to drive the biggest mining dump truck through,”¹³⁰ and that do not work in practice. For example, parking lots are misclassified as areas of “high conservation significance,” while known endangered species areas are subject to a lower conservation significance status.¹³¹

A recent evaluation of eight early biodiversity offsetting schemes in New South Wales resulted in rankings of one “disastrous” outcome, five “poor” outcomes, two “adequate” outcomes, and no “good” outcomes.¹³² Similarly, in Western Australia, fewer than 40 percent of 208 offsets studied were judged as “effective” (where the offset produced desired results and long-

¹²⁷ Bruce A. McKenney & Joseph M. Kiesecker, *Policy Development for Biodiversity Offsets: A Review of Offset Frameworks*, 45 ENVTL. MGMT. 165, 173 (2010); James Kanter, *Companies with Poor Track Records on Environmental Damage Try for Change*, N.Y. TIMES (Oct. 13, 2008), <https://www.nytimes.com/2008/10/13/business/worldbusiness/13iht-rbogbio.4.16.908253.html>; for characterization of Habitat Conservation Plans as “licenses to kill”, see J. B. Ruhl, *How to Kill Endangered Species, Legally: The Nuts and Bolts of Endangered Species Act ‘HCP’ Permits for Real Estate Development*, 5 ENVTL. L. 345 (1999).

¹²⁸ ENVTL. DEFENDERS OFF., REFORMING NATIVE VEGETATION OFFSET RULES IN VICTORIA 4 (2013); Interview with Brendan Sydes, CEO, Env’tl. Just. Austl., in Melbourne, Vict., Austl. (Jan. 28, 2015).

¹²⁹ SENATE ENV’T & COMM. REFERENCES COMMITTEE, PARLIAMENT OF AUSTL., ENVIRONMENTAL OFFSETS § 3.4 (2014) (Austl.).

¹³⁰ *Id.* at § 3.31; see also SENATE ENV’T & COMM. REFERENCES COMMITTEE, PARLIAMENT OF AUSTL., ENVIRONMENTAL OFFSETS: AUSTRALIAN GREENS MINORITY REPORT § 1.2 (2014) (Austl.) (“[T]he Australian Greens oppose the very notion of offsetting nature. The principle is nonsensical and its implementation has shown itself to be a fig leaf for continued approvals of projects with unacceptable impacts: the evidence shows that offsets do not and cannot achieve their objectives.”)

¹³¹ See Young En Chee, *Hidden Flaws in Victoria’s New Native Vegetation Clearing Rules*, THE CONVERSATION (Oct. 3, 2013, 1:36 AM), <https://theconversation.com/hidden-flaws-in-victorias-new-native-vegetation-clearing-rules-18516>.

¹³² See NATURE CONSERVATION COUNCIL, PARADISE LOST: THE WEAKENING AND WIDENING OF NSW BIODIVERSITY OFFSETTING SCHEMES, 2015–2016 at 5 (2016).

term benefits and the benefits of the offset outweighed the original destruction) in meeting their stated goals.¹³³

C. *Individual Forms of Life Are Not Fungible, and Ecosystems Cannot and Should Not Be Replaced*

Allowing life to be offset assumes that individual creatures are cogs in an ecological or evolutionary wheel: if what we care about is perpetuating a species or an ecosystem, then individuals conserved or created (who otherwise would not be) over yonder might be preferable to those we destroy over here. But that is likely not the way the individual koala or valley elderberry longhorn beetle would see it if they could express an opinion. Seeing individual beings as mere fungible cogs violates a biocentrist view of the world, where each being has moral worth.¹³⁴ The logic of environmental markets *may* pertain well when applied to air pollutant (including greenhouse gas) trading, because certain pollutants are hypothetically fungible from the point of view of those affected by them.¹³⁵ Koalas, on the other hand, are not fungible, at least from the sentient viewpoint of the koala to be expunged and offset.¹³⁶

In a seminal article on environmental markets, Salzman and Ruhl note the problems of space, time, and type when making the law of fungible ecological commodity trading.¹³⁷ I will return to this below; here I note critics contend that life is not a fungible commodity across the categories of space, time, and type. “Space”

¹³³ See Jelena May, Richard J. Hobbs & Leonie E. Valentine, *Are Offsets Effective? An Evaluation of Recent Environmental Offsets in Western Australia*, 206 BIOLOGICAL CONSERVATION 249, 249 (2017).

¹³⁴ For a fuller exploration of the ethical bases (or lack thereof) for biodiversity offsetting, see Christopher D. Ives & Sarah A. Bekessy, *The Ethics of Offsetting Nature*, 13 FRONTIERS IN ECOLOGY & THE ENV'T 568 (2015); Martine Maron et al., *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 BIOSCIENCE 489, 491 (2016).

¹³⁵ See BRENDAN SYDES, “NET GAIN” AND OFFSETS IN VICTORIA—IMPLEMENTATION OF NATIVE VEGETATION POLICY UNDER THE PLANNING AND ENVIRONMENT ACT 1987 at 14 (2007); James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 STAN. L. REV. 607, 648–49 (2000); Christopher D. Ives & Sarah A. Bekessy, *The Ethics of Offsetting Nature*, 13 FRONTIERS IN ECOLOGY & THE ENV'T 568, 571 (2015); Tabart, *supra* note 20.

¹³⁶ See Martine Maron et al., *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 BIOSCIENCE 489, 491 (2016).

¹³⁷ See Salzman & Ruhl, *supra* note 135.

is problematic because any distance in which an offset occurs will not have precisely the same ecological characteristics as the place that has been destroyed, and whatever benefits biodiversity was providing in its original location will be lost. “Time” is also problematic: while destruction may happen in a few hours, restoration may take decades or centuries—if ever—to be effective.¹³⁸ Critics particularly object when destruction is allowed to occur before suitable offset sites have been restored, or even chosen.¹³⁹ We can predict with certainty what destruction will look like, but cannot precisely describe the “counterfactual scenario” that an offset will provide.¹⁴⁰

As for “type,” if all life forms and ecosystems are unique to time and place, reducing biodiversity to a simple numerical formula and trading “like-for-like” are nonsensical notions.¹⁴¹ What is it we are trying to conserve? A particular life? If so, biodiversity offsetting is useless unless we transport the actual organism (which seldom happens and when it does happen, may not succeed).¹⁴² An “equivalent” breeding pair? How would we know what would have happened to the original pair, or what will happen to the hypothetical new pair? Simplified metrics that enable offsetting can never account for the genetic uniqueness of biodiversity in any location or the inability to predict what would have happened at the original site if undisturbed or what will

¹³⁸ See TEN KATE, *supra* note 29, at 11.

¹³⁹ This is the case in both Australia and South Africa, where “advanced offsets” are not required to be completed before the destruction is permitted.

¹⁴⁰ See Katharine N. Suding, *Toward an Era of Restoration in Ecology: Successes, Failures, and Opportunities Ahead* 42 ANN. REV. ECOLOGY, EVOLUTION & SYSTEMATICS 465, 467 (2011); TEN KATE, *supra* note 29, at 11.

¹⁴¹ See J.W. Bull, M.J. Hardy, A. Moilanen, A. Gordon, *Categories of Flexibility in Biodiversity Offsetting, and Their Implications for Conservation*, 192 BIOLOGICAL CONSERVATION 522 (2015); Christopher D. Ives & Sarah A. Bekessy, *The Ethics of Offsetting Nature*, 13 FRONT. ECOL. ENVIRON. 568, 570 (2015).

¹⁴² See Interviews with Deborah Tabart, CEO, Australian Koala Found., in Brisbane, Austl. (Jan. 4, 2015) and site visits with Doug Kerlin, Chief Ecologist, Australian Koala Found., in Southeast Queensl., Austl. (Jan. 7, 2017). In various visits to offset sites with Mr. Kerlin, it was clear that the habitats restored or preserved for koala offsets were not thriving or were too small or disconnected from other habitats to succeed to sustain a population of koalas. Other site visits, for example, with Paul Dettmann, Cassinia Env'tl., in Victoria, Austl. (Jan. 26, 2015) and Alan Key, *supra* note 86, revealed more robust, ecologically healthy offsets.

happen at an offset site.¹⁴³ For those who see each individual life as morally relevant and who would suggest that “[n]ature is not tradeable because it is unique,”¹⁴⁴ destroying existing life for an uncertain gain over yonder is morally repugnant and ecologically problematic.

Even if we do not give moral worth to each being, according to ecologist Hugh Possingham, “it is not possible to trade it from one place to another and hope to retain its value; biodiversity is dependent on where it is in the landscape (place) and when it is (time).”¹⁴⁵ This worldview animates the lead quote from this section from Professor Hobbs: “To me it is akin to some guy going into that art gallery and pointing at the Mona Lisa on the wall and saying sorry mate we need that bitso the Mona Lisa has to go. But we will paint you another one.”¹⁴⁶ For those sharing this mindset, no amount of metrics machinations will justify an offset: life forms are distinctive to their time and place, and it is nonsensical to trade them.¹⁴⁷ In Australian Senate testimony, Stephen Talbott said:

Everything in that forest has a purpose to us as Aboriginal people. The animals, the trees, they all have cultural meaning to us. When they turn around and look at these offset areas or try to rejuvenate areas, they only plant the trees, but they do not do the grasses, they do not do the bush tucker; they do not take our elders out to do that. For a lot of these areas that they have the biodiversity offsets for, they have not even captured the cultural values.¹⁴⁸

If we focus less on species or individuals and more on habitat, ecosystem function and services, and potential for evolution to continue with maximum genetic variability, then ecocentrists who value functioning ecosystems overshadow other criticisms.

¹⁴³ For difficulties in using different metrics, see J.W. Bull et al., *Comparing Biodiversity Offset Calculation Methods With a Case Study in Uzbekistan*, 178 *BIOLOGICAL CONSERVATION* 2 (2014). For a more general critique, see Martine Maron et al. *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 *BIOSCIENCE* 489, 492–93 (2016).

¹⁴⁴ SENATE ENV'T & COMM. REFERENCES COMMITTEE, PARLIAMENT OF AUSTL., ENVIRONMENTAL OFFSETS 113 (2014) (Austl.).

¹⁴⁵ *Id.* at 22 (internal quotation omitted).

¹⁴⁶ *Id.*

¹⁴⁷ Hildebrand et al. describe this as “the myth of the carbon copy.” Robert H. Hildebrand et al., *The Myths of Restoration Ecology*, 10 *ECOLOGY & SOC'Y* 19 (2005).

¹⁴⁸ SENATE ENV'T & COMM. REFERENCES COMMITTEE, PARLIAMENT OF AUSTL., ENVIRONMENTAL OFFSETS 23 (2014) (quoting Stephen Talbott).

Ecosystems are place-specific and dynamic: each is unique and irreplaceable.¹⁴⁹ To cite the British Green Party, “[t]he concept of biodiversity offsetting betrays a failure to understand the complexity of nature and the inter-related nature of different ecological elements. It suggests that animals, plants and microbes are simply like Lego blocks, to be moved around at will, when in fact they exist in complex inter-relationships of which we frequently have only the dimmest understanding or none at all.”¹⁵⁰ To put it more bluntly, as does a discussant in a *Guardian* forum: “Accept the principle of biodiversity offsetting and you accept the idea that place means nothing. That nowhere is to be valued in its own right any more, that everything is exchangeable for everything else, and nothing can be allowed to stand in the way of the graders and degraders.”¹⁵¹

Local people—whether they live in traditional Aboriginal communities or wealthy suburban hideaways—depend upon local biodiversity for ecosystem services, as well as cultural, aesthetic, and recreational amenities.¹⁵² A study of Florida wetlands

¹⁴⁹ See Karl Mathiesen, *Is Biodiversity Offsetting a ‘License to Trash Nature’?* THE GUARDIAN (May 22, 2014), <http://www.theguardian.com/environment/2013/nov/12/biodiversity-offsetting-license-trash-nature> (quoting U.K. Wildlife Trusts).

¹⁵⁰ *Id.* (quoting the British Green Party). See also in the same article a remark by Friends of the Earth: “Nature is too complex to simply be moved at the whim of a developer. Ancient habitats are impossible to recreate and many others difficult to restore or recreate. Nature’s intrinsic value cannot be accurately measured by a metric and access to the natural world is valued by local communities—both values are lost if nature is treated as a chess piece to be shifted around the country.” *Id.* See also Christopher D. Ives & Sarah A. Bekessy, *The Ethics of Offsetting Nature*, 13 FRONTIERS IN ECOLOGY & THE ENV’T 568, 571 (2015).

¹⁵¹ Karl Mathiesen, *Is Biodiversity Offsetting a ‘License to Trash Nature’?*, THE GUARDIAN (May 22, 2014), <http://www.theguardian.com/environment/2013/nov/12/biodiversity-offsetting-license-trash-nature>.

¹⁵² See, e.g., BUSINESS AND BIODIVERSITY OFFSETS PROGRAM (BBOP). BIODIVERSITY OFFSET COST-BENEFIT HANDBOOK. 35 (and throughout) (2009). See also Chris Lang, *No to Biodiversity Offsetting*, REDD-MONITOR (Nov. 22, 2013), <http://www.redd-monitor.org/2013/11/22/no-to-biodiversity-offsetting/> (quoting FERN); J.W. Bull et al., *Categories of Flexibility in Biodiversity Offsetting, and Their Implications for Conservation*, 192 BIOLOGICAL CONSERVATION 522, 530 (2015); WORLD BANK GROUP, BIODIVERSITY OFFSETS: A USER GUIDE 4 (2016); J.B. Ruhl & Jim Salzman, *The Effect of Wetland Mitigation Banking on People*, 28 NAT’L WETLANDS NEWSL. 1, 8 (2006). For a holistic explanation and defense of ecosystem services, see J.B. Ruhl, *In Defense of Ecosystem Services*, 32 PACE ENVTL. L. REV. 306 (2015); Martine Maron et al. *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 BIOSCIENCE 489, 493

compensatory mitigation shows that offsets go where land is cheapest (not surprising as this is an explicit goal of supporters who say markets should decide what goes where), sometimes in distant places from the original destruction, thus removing necessary ecosystem services, “which will do nothing to aid local drinking water supply, filtration, or flooding.”¹⁵³ Just as pollution trading creates “hot spots”—sacrifice zones where pollution may remain or intensify (often in communities of color) in exchange for reduced pollution elsewhere—so offsetting may create biodiversity hot spots or poverty zones—places where the amenities biodiversity brings are gone.¹⁵⁴ Some communities not only lose the ecosystem service for which biodiversity is a surrogate,¹⁵⁵ but also lose the aesthetic, recreational, and biophilic fulfillment the natural world provides. A development enabled by offsets loses the biodiversity that would make that development sustainable, and the neighborhood pleasant. Furthermore, the citizens who rely on local biodiversity are often excluded from the decision-making process.¹⁵⁶

Critics further allege it is costly and difficult, if not impossible, to *restore* species composition and ecological function.¹⁵⁷ We lack good data on whether, when, and how restoration is actually successful.¹⁵⁸ Where data do exist, many

(2016).

¹⁵³ Bonnie Malloy, *Symbolic Gestures or Our Saving Grace: The Relevance of Compensatory Mitigation for Florida’s Wetlands in the Climate Change Era*, 27 J. LAND USE & ENVTL. L. 103, 137 (2011). See also J.B. Ruhl & James Salzman, *The Effect of Wetland Mitigation Banking on People*, 28 NAT’L WETLANDS NEWSL. 1, 8–9 (2006) (explaining that mitigation banking is meant to allow developers to establish banks in cheaper regions, thus mitigation banks are typically located in rural areas rather than the urban areas where banking is located).

¹⁵⁴ See Ruhl, *supra* note 41, at 32 ; Salzman & Ruhl, *supra* note 135, at 628–29, 666, 674.

¹⁵⁵ See Salzman & Ruhl, *supra* note 135, at 612.

¹⁵⁶ See *id.* at 684.

¹⁵⁷ See, e.g., Suding, *supra* note 125, at 470; TEN KATE, *supra* note 29, at 11; Patrick ten Brink et al., *Chapter 1: The Global Biodiversity Crisis and Related Policy Challenge*, in THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY: TEEB FOR NATIONAL AND INTERNATIONAL POLICY MAKERS 28 (Patrick ten Brink ed., 2009); Hildebrand, *supra* note 147; Maron, *supra* note 121, at 143.

¹⁵⁸ See Carsten Neßhöver et al., *Chapter 9: Investing in ecological infrastructure*, in THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY: TEEB FOR NATIONAL AND INTERNATIONAL POLICY MAKERS 8, 11 (Patrick ten Brink ed., 2009); Maron et al., *supra* note 25, at 144–45; Suding, *supra* note 125, at 465, 467.

restoration attempts fail, and most only partially succeed.¹⁵⁹ For example, the track record for wetlands restoration under section 404 of the Clean Water Act is spotty due to unfocused goals, inadequate monitoring, reporting, and enforcement, lack of guarantees that the wetlands will remain protected in perpetuity,¹⁶⁰ and the difficulty of predicting how nature will respond to human manipulation.¹⁶¹ Offset protocols often assume that if one restores appropriate flora, the desired fauna will follow. However, a major study on rehabilitation of mining sites in Australia found that this “is not always a robust assumption”—i.e. it is not necessarily true.¹⁶² It is particularly difficult to create new habitat that achieves desired goals, and even with focused monitoring, observers can only track a limited subset of a complex ecosystem.¹⁶³ Even if koalas are potentially fungible, it would take a lot more research and careful monitoring and expense to make them so.¹⁶⁴

¹⁵⁹ See Suding, *supra* note 125, at 469; Maron et al., *supra* note 25, at 144 (concluding that success rates vary dramatically based on type of restoration, type of ecology, and the disturbance the system is exposed to); Holly P. Jones & Oswald J. Schmitz, *Rapid Recovery of Damaged Ecosystems*, 4 PLOS ONE 1, 1 (2009) (finding that due to the magnitude of human exploitation of ecosystems, they will likely take centuries to recover, if they recover at all); Royal C. Gardner, *Money for Nothing? The Rise of Wetland Fee Mitigation*, 19 VA. ENVTL. L. J. 1, 2 (2000) (explaining that many traditional wetland mitigation efforts have failed); James Murphy et al., *New Mitigation Rule Promises More of the Same: Why the New Corps and EPA Mitigation Rule Will Fail to Protect Our Aquatic Resources Adequately*, 38 STETSON L. REV. 311, 316 (2009) (citing mitigation failures associated with the Clean Water Act’s Section 404 permitting process).

¹⁶⁰ See generally R. Kyle Alagood, *The Mythology of Mitigation Banking*, 46 ENVTL. L. REP. 10200 (2016).

¹⁶¹ See Salzman & Ruhl, *supra* note 135 at 648; Marine Maron et al., *Faustian Bargains? Restoration Realities in the Context of Biodiversity Offset Policies*, 155 BIOLOGICAL CONSERVATION 141, 143 (2012); Jessica Owley, *The Increasing Privatization of Environmental Permitting*, 46 AKRON L. REV. 1091, 1095–96 (2013); Rebecca L. Kihslinger, *Success of Wetlands Mitigation*, 30 NAT’L WETLANDS NEWSL. 14 (2008).

¹⁶² Romaine H. Cristescu et al., *Is Restoring Flora the Same as Restoring Fauna? Lessons Learned from Koalas and Mining Rehabilitation*, 50 J. APPLIED ECOLOGY 423, 430 (2013).

¹⁶³ See Maron et al., *supra* note 126, at 144–45. See also Maron et al., *supra* note 25, at 145 (discussing how, with “more sophisticated” goals, measuring success and making sure all criteria of the lost habitat are met becomes less likely).

¹⁶⁴ See Romaine H. Cristescu et al., *Is Restoring Flora the Same as Restoring Fauna? Lessons Learned from Koalas and Mining Rehabilitation*, 50 J. APPLIED ECOLOGY 423, 430 (2013). They conclude: “If the lack of congruence between flora and fauna [i.e. koala presence] success that we found in this study is

D. *Laws Permitting Biodiversity Offsetting Fetishize Metrics*

To justify biodiversity offsetting, lawmakers and advocates turn to science—often baroquely quantified—to legitimize the practice of offsetting and the specific choices made under the practice’s aegis. When calculating the value of “natural capital” that puts a price on biodiversity, George Monbiot writes, “[t]hese figures, ladies and gentlemen, are marmalade. They are finely shredded, boiled to a pulp, heavily sweetened and still indigestible. In other words, they are total gibberish.”¹⁶⁵

In my book, *The Idea of Biodiversity*, I examine what “biodiversity” means to the conservation biologists who invented the term and advocated on its behalf, all the while providing meaningful data on its diminution. What happens when biologists, who draw their expertise and authority from objectivity, become advocates? Science carries the imprimatur of objectivity,¹⁶⁶ and when we throw numbers and formulas into the mix, we further provide a patina of legitimacy to biodiversity offsetting.

Critics suggest we can only fetishize metrics so far: abstruse formulas to calculate offsetting parameters seem to fetishize rigor for what are essentially values-based decisions.¹⁶⁷ Kerry ten Kate acknowledges the difficulty of measuring biodiversity compared to measuring greenhouse gas emissions, stating that she has “carbon envy.”¹⁶⁸ Professor Holly Doremus notes that, because scientific data always underdetermines natural resource policy decisions, the imprimatur of objectivity given by science can be used by anyone, including opponents of conservation, “[w]hen scientific data are limited and legislative value judgments have been made only at the broadest level, political choices necessarily, and legitimately, factor into natural resource decisions. The core of the problem is not the involvement of politics but its concealment behind a cloak

common in restoration, developing cost effective, relevant, and feasible fauna criteria is crucial. This may well be the next challenge in achieving true ecosystem restoration.”

¹⁶⁵ *The Pricing of Everything*, GEORGE MONBIOT (Jul. 24, 2014), <http://www.monbiot.com/2014/07/24/the-pricing-of-everything/>.

¹⁶⁶ See generally DAVID TAKACS, *THE IDEA OF BIODIVERSITY* (1996).

¹⁶⁷ For example, for simulation models of flexibility in biodiversity offsetting, see J. W. Bull et al., *Categories of Flexibility in Biodiversity Offsetting, and Their Implications for Conservation*, 192 *BIOLOGICAL CONSERVATION* 522, 524 (2015).

¹⁶⁸ See Bonnie Tsui, *A Better Kind of Offset*, *THE DAILY GOOD* (July 14, 2009), <https://www.good.is/articles/a-better-kind-of-offset> (quoting ten Kate).

of science.”¹⁶⁹ Science is a tool, not a cudgel. Writing about environmental scientists, Doremus notes that the “semblance of scientific objectivity helps them avoid uncomfortable and difficult debates over underlying values. Without the cover of science, they might face the difficult prospect of defending public implementation of what appears to be nothing more than their (perhaps quirky) taste for environmentalism.”¹⁷⁰ The same can be said of business advocates of biodiversity offsetting: without the cover of the façade of numbers and formulas, it would be more difficult to defend what could be nothing more than a taste for profiteering at the expense of nature. Critics allege that when we fetishize our metrics, and pretend that the numbers have all the answers and we should just follow the numbers, we misuse science to make the non-fungible fungible.

E. *Biodiversity Should Not Become a Commodity*

Finally, various observers fundamentally object to, in the words of George Monbiot, “the same process of commodification that has blighted everything else the corporate economy touches.”¹⁷¹ As Monbiot summarizes it, with biodiversity offsetting, “you are effectively pushing the natural world even further into the system that is eating it alive. All the things which have been so damaging to the living planet are now being sold to us as its salvation; commodification, economic growth, financialisation, abstraction.”¹⁷²

Ideas themselves become ecological actors; even the idea of “biodiversity” was consciously constructed as a bundle of ideas meant to change how we view, and thus treat, the natural world.¹⁷³

¹⁶⁹ Holly Doremus, *Science Plays Defense: Natural Resource Management in the Bush Administration*, 32 *ECOLOGY L. Q.* 249, 253 (2005).

¹⁷⁰ *Id.* at 254.

¹⁷¹ George Monbiot, *Biodiversity Offsetting Will Unleash a New Spirit of Destruction on the Land*, *THE GUARDIAN* (Dec. 7, 2012), <https://www.theguardian.com/environment/georgemonbiot/2012/dec/07/biodiversity-offsetting-unleash-wildlife-destruction>. For organized NGO opposition along these lines, see George Monbiot, *The Unsung World*, *GEORGE MONBIOT* (Dec. 8, 2012), <http://www.monbiot.com/2012/12/08/the-unsung-world/> and *No to Biodiversity Offsetting!*, *WORLD RAINFOREST MOVEMENT* (Nov. 21, 2013), <http://wrm.org.uy/meetings-and-events/over-100-organisations-call-for-an-end-to-biodiversity-offsetting-plans/>.

¹⁷² Monbiot, *supra* note 165.

¹⁷³ This is one of the main theses of my book *THE IDEA OF BIODIVERSITY*. See generally TAKACS, *THE IDEA OF BIODIVERSITY*, *supra* note 167.

For critics, life itself should not be fed into the maw of the neoliberal paradigm sweeping the globe, i.e. forms and processes of government “that aim to replicate capitalist market dynamics across the social and political landscape.”¹⁷⁴ Biodiversity offsetting promotes an ideology linking boardrooms to “pristine” nature through a lens that commodifies ecological features previously thought to be “priceless.” Species and ecosystems are now “natural capital” to be bought, sold, and competitive with other forms of capital.¹⁷⁵ Once biodiversity becomes just another fungible commodity, it will lose ground when it fails to hold its short-term value against other commodities. For critics of offsetting, the ecological contradictions of capitalism—that it affirmatively depends on depleting nature—cannot be resolved by resorting to more capitalism.¹⁷⁶

Even the Convention of Biological Diversity undermines itself by commodifying nature in two of its three framing goals:

The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.¹⁷⁷

Thus, the foremost international gloss of the exigencies of biodiversity conservation emphasizes using components and sharing those benefits—nature is not nature, it is “genetic resources” atomized for profit, to be secured with the North–South transfer of funds. Nature is a source of monetary wealth for development. Rather than a roadmap for preservation of the natural world, it is a call for more equitable sharing of commodified

¹⁷⁴ ROBERT FLETCHER, WOLFRAM DRESSLER, & BRAM BÜSCHER, *NATURE™ INC.: ENVIRONMENTAL CONSERVATION IN THE NEOLIBERAL AGE* 4 (2014) (citing Robert Fletcher, *Neoliberal Environmentalism: Towards a Poststructuralist Political Ecology of the Conservation Debate*, 8 CONSERVATION & SOC’Y 171 (2010)).

¹⁷⁵ For a review of the literature criticizing nature commodified thusly, see FLETCHER ET AL., *supra* note 174.

¹⁷⁶ See, e.g., Murat Arsel & Bram Büscher, *Nature™ Inc: Changes and Continuities in Neoliberal Conservation and Market-Based Environmental Policy*, 43 DEV. & CHANGE 53, 60 (2012).

¹⁷⁷ Convention on Biological Diversity art. 1, Jun. 5, 1992, 1760 U.N.T.S. 79.

nature, and it is precisely that hegemonic philosophy of capitalism that biodiversity preservation law should avoid, not promote through market mechanisms such as offsetting.

III. THE CASE FOR BIODIVERSITY OFFSETTING

Governing a transition toward an effective climate response and [sustainable development] pathway is a challenge involving rethinking our relation to nature, accounting for multiple generations and interests (including those based on endowments in natural resources), overlapping environmental issues, among actors with widely unequal capacities, resources, and political power, and divergent conceptions of justice.

—Intergovernmental Panel on Climate Change.¹⁷⁸

Despite the diverse criticisms offered above, offsetting *may* comprise a part of a necessary revolution in managing and balancing human and nonhuman needs to sustain multiple, integrated communities. Some of the criticisms above cannot be addressed: for example, if one believes that each individual life is sacred, or if ecosystems can never be replicated, then any arguments for offsetting are non-starters. Some arguments we can merely mitigate as best as possible. But sometimes, offsetting may be a better result for nonhuman and associated human communities. With biodiversity offsets, we pretend that life is fungible because it is both economically convenient to do so, and because the fiction may make it more likely that forms of life actually survive and thrive.

Human needs are inflicting catastrophic effects on nonhuman species. We are in the midst of an extinction crisis, with some experts declaring this the “Anthropocene” era, as humans dominate and degrade the planet’s life cycles and processes.¹⁷⁹

¹⁷⁸ Marc Fleurbaey et al., Working Group III to the Fifth Assessment Rep. of the Intergovernmental Panel on Climate Change, *Sustainable Development and Equity*, in CLIMATE CHANGE 2014: MITIGATION OF CLIMATE CHANGE 283, 287 (O Edenhofer et al. eds, 2014).

¹⁷⁹ See Paul Crutzen & Eugene F. Stoermer, *The “Anthropocene,”* 41 GLOBAL CHANGE NEWSL. 17, 17 (2000). For a review on our domination, see Tim Caro et al., *Conservation in the Anthropocene*, 26 CONSERVATION. BIOLOGY 185, 185 (2011). In 2016, the International Commission on Stratigraphy’s Subcommission on Quaternary Stratigraphy may decide to designate a new geologic era bearing the name “Anthropocene.” See Working Group on the Anthropocene, *What is the ‘Anthropocene’?—Current Definition and Status*,

More than one-third of terrestrial ecosystems have been converted to human use, and another third have been seriously degraded (although other estimates range between fifteen and sixty-five percent).¹⁸⁰ Between 500 million and 2.5 billion extra acres will be needed to accommodate the growing human population,¹⁸¹ which is predicted to grow from seven to nine billion by 2050, and likely to eleven billion by 2100.¹⁸²

Meanwhile, species are disappearing, and with them, full functioning of the ecosystems that they inhabit. It is fiendishly difficult to know how many species are going, or have gone, or will go extinct, given that we do not know how many species currently exist.¹⁸³ We cannot count them as disappearing before we know them. Conservation biologists estimate that species are disappearing at 100 to 1,000 times the background rate (i.e. the

SUBCOMMISSION ON QUATERNARY STRATIGRAPHY, <http://quaternary.stratigraphy.org/workinggroups/anthropocene/> (last visited Dec. 2, 2017).

¹⁸⁰ See Pete Smith et al., *Global Change Pressures on Soils from Land Use and Management*, 22 GLOBAL CHANGE BIOLOGY 1008, 1009 (2016); Suding, *supra* note 125, at 466; Shelley Welton et al., *Legal & Scientific Integrity in Advancing a “Land Degradation Neutral World”*, 40 COLUM. J. ENVTL. L. 39, 49 (2015).

¹⁸¹ See Maron, *supra* note 25. Some optimists believe that these numbers are unduly pessimistic, as rapidly developing technology, especially in agriculture, is “liberating the environment,” and allowing us to feed many more people on less acreage using less energy. See, e.g., Jesse H. Ausubel, *The Return of Nature: How Technology Liberates the Environment*, THE BREAKTHROUGH INST. (2015), <https://thebreakthrough.org/index.php/journal/past-issues/issue-5/the-return-of-nature>. I do not share his optimism.

¹⁸² See Carrington, *supra* note 3. Not everyone is so pessimistic. The Breakthrough Institute posits an ecomodernist philosophy, including hopeful predictions that we will continue to exploit less of the planet’s resources as human needs grow. See Ted Nordhaus et al., *Ecomodernism and the Anthropocene: Humanity as a Force for Good*, THE BREAKTHROUGH INST. (Summer 2015), <https://thebreakthrough.org/index.php/journal/past-issues/issue-5/ecomodernism-and-the-anthropocene>, and Ausubel, *supra* note 181. Most authors—myself included—are not as sanguine. Even if we are getting more efficient (which often takes large amounts of petrofertilizers and other corporate controlled inputs), I seriously doubt agriculture can keep pace with growing human needs, particularly in the developing world. Witness the growing land invasions in developing nations for food and biofuel to support growing demands for food and biofuel from the US, EU, India, China and others. See Takacs, *supra* note 121.

¹⁸³ Just under 2 million species have been described; estimates range from 5 to 11 million species or more that actually exist. Stephanie Pappas, *Extinction Rates Soar to 1,000 Times Normal (But There’s Hope)*, LIVESCIENCE (May 29, 2014, 2:02 PM), <http://www.livescience.com/45964-extinction-rates-1000-times-normal.html>.

rate absent humans).¹⁸⁴ In New South Wales alone, which has lost nearly half its bushland through development, 59 percent of all mammals, 34 percent of amphibians, and 30 percent of birds are threatened with extinction.¹⁸⁵

The U.S. Endangered Species Act lists over 2,000 species threatened or endangered with extinction, about 1,500 of which are domestic.¹⁸⁶ The IUCN, which keeps a “red list” of threatened species, lists 24,431 species as Critically Endangered, Endangered, or Vulnerable; they stress they have only assessed five percent of all described species.¹⁸⁷ Clearly our current approaches to biodiversity conservation are not keeping pace with the level of decimation. Furthermore, as Jeffrey Sayer says, “[w]e must accept that a world of 9 billion middle class people is unlikely to be able to afford even the 12 percent of land allocated to protected areas that IUCN claims we have today.”¹⁸⁸

Yet, as Aldo Leopold famously put it: “If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.”¹⁸⁹ For the modern era, it will get increasingly difficult to keep every cog and wheel in the machine of biodiversity. This does not mean we should abandon our current biodiversity conservation approaches, but they do need help if we are to sustain the biodiversity that sustains us. Nor does it mean we give up and let it all go: we must try to keep every cog we can so the wheel of evolution continues to unfurl.

Nonhuman species and ecosystems will need secure (but dynamic) refugia from the impacts of human need and a shifting climate.¹⁹⁰ In the Anthropocene era, we have no choice but to

¹⁸⁴ See Pappas, *supra* note 1; Ceballos, *supra* note 1, at 1.

¹⁸⁵ NATURE CONSERVATION COUNCIL, *supra* note 132, at 5.

¹⁸⁶ U.S. FISH & WILDLIFE SERV., ENVIRONMENTAL ONLINE CONSERVATION SYSTEM, <https://ecos.fws.gov> (last visited Jan. 12, 2018).

¹⁸⁷ INT’L UNION FOR CONSERVATION OF NATURE, RED LIST TABLE 1: NUMBERS OF THREATENED SPECIES BY MAJOR GROUPS OF ORGANISMS (1996–2017) (updated May, 4, 2017).

¹⁸⁸ Jeffrey Sayer, *Reconciling Conservation and Development: Are Landscapes the Answer?*, 41 *BIOTROPICA* 649, 650–51 (2009).

¹⁸⁹ Aldo Leopold, *Conservation*, in *ROUND RIVER* 146–47 (Luna B. Leopold ed., Oxford Univ. Press 1993).

¹⁹⁰ For a review of “flexible” conservation methods, see J. Owley & D. Takacs, *Flexible Land Conservation in Uncertain Times*, in *CONTEMPORARY*

manage the planet: nonhuman species do and will exist where we choose to allow them to exist, and where we abet their survival. The choices are *how* do we manage the planet, with what value priorities, and using what wisdom.

Rather than sink into a mire of despair, advocates see biodiversity offsetting as one element of hopeful, sound, savvy planning to carry humans and the nonhumans with which we share the planet into the Anthropocene.¹⁹¹ What if the effort to preserve species and ecosystems were economically incentivized—including allowing some to “farm” biodiversity as a crop and thus add to the conservation estate? What if the symbiosis between the human and the nonhuman world were carefully and intelligently managed to ensure the sustainability of both worlds?

Increasingly, conservation experts are calling for a new set of tools grounded in a new ethic of conservation if we are to prevent and reverse current trends of degradation. The existing tools are not sufficient, and never have been. Managers of Earth’s imperiled biodiversity, backed by conservation biologists and defended by environmental lawyers, must not only guard biodiversity’s established redoubts, but must find new ways to expand those refugia, and to integrate conservation in places and in ways it has not traditionally been practiced. For example, a call for greater attention to restoration states: “Conservation has traditionally been a rearguard measure to prevent further degradation rather than a means for increasing resources or natural capital. As such, simple maintenance as opposed to enhancement of ecosystems may often leave ecosystems and species vulnerable.”¹⁹² Biodiversity offsetting *could* help us both maintain and enhance species populations and ecosystem functionality going forward.

A. *Biodiversity Offsetting Could Fit in Comprehensive Landscape-Level Planning for Development and Conservation*

Biodiversity advocates call for comprehensive conservation planning in the context of comprehensive development planning. Biodiversity conservation must go hand in hand with meeting the

ISSUES IN CLIMATE CHANGE LAW AND POLICY: ESSAYS INSPIRED BY THE IPCC (Robin Kunedis Craig & Stephen R. Miller eds., 2016).

¹⁹¹ See Sayer, *supra* note 188, at 651.

¹⁹² Hildebrand, *supra* note 147, at 1.

needs of a growing population,¹⁹³ as resilient ecological communities support resilient human communities.¹⁹⁴ The UK government's Green Paper on biodiversity offsetting recognizes that "[d]evelopment provides the homes and infrastructure needed to create wealth. Nature underpins our economy: the soil needed to grow food, the water that sustains life, the insects which pollinate crops and wild plants, the woods, forests and wild places that provide space for exercise and enjoyment."¹⁹⁵

I am in no way claiming or advocating that biodiversity offsetting is *the* answer to our conundrum of how to balance conservation with economic development. But smart offsets can be one tool in comprehensive landscape-level planning, part of the compromise that would situate sound development planning within sound biodiversity management, and vice versa.

Rather than atomized species-by-species or project-by-project conservation, such comprehensive plans could be developed through a public process including government officials, environmental advocates, business interests, biologists, and representatives of the public. Plans would seek to identify and account for "the full range of biological features, how they are currently distributed, and what minimum viability needs each biological target require to persist in the long term."¹⁹⁶

The problem is not that conservation progresses project-by-project or species-by-species *per se*; rather, many of those biodiversity conservation interventions are implemented ad hoc rather than planned holistically, or are rearguard emergency room interventions rather than proactive prophylaxis. It is not that ecological science or conservation biology are perfect predictors of what a particular species or ecosystem needs (especially with the incipient unpredictability of climate change), but they can give us some idea of what types of interventions might be successful in sustaining a species' evolutionary potential or keeping an

¹⁹³ See Michael Shellenberger & Ted Nordhaus, *On Pragmatic Conservation*, THE BREAKTHROUGH (Jun. 3, 2015), <http://thebreakthrough.org/index.php/voices/michael-shellenberger-and-ted-nordhaus/on-pragmatic-conservation>.

¹⁹⁴ See TEN KATE, *supra* note 29, at 10; Joseph M. Kiesecker et al., *Development by Design: Blending Landscape-Level Planning with the Mitigation Hierarchy*, 8 FRONTIER ECOLOGY ENV'T 261, 262 (2009).

¹⁹⁵ DEPT. FOR ENV'T & RURAL AFF., BIODIVERSITY OFFSETTING IN ENGLAND GREEN PAPER 2 (2013).

¹⁹⁶ Kiesecker, *supra* note 194, at 262.

ecosystem viable.

Biodiversity conservation advocates often criticize the ESA and similar species-by-species protection laws. They find these laws insufficiently myopic, expensive to implement, failing to protect landscape or ecosystems or watersheds, leading to fragmented conservation efforts and landscapes, politically unpalatable, and implemented when it is too late to save the species.¹⁹⁷ On the other hand, species-focused conservation does have its advantages: species are (usually) easy to identify with precision (at least more so than the bounds of an “ecosystem” or “watershed”), often mediagenic, and thus able to arouse enthusiasm for conservation.¹⁹⁸

The USFWS itself acknowledges the impracticality of protecting the more than 1,500 formally listed domestic species under the ESA. The projected increase in human population growth and consequent increasing demand on our natural resources, accelerated climate change, continued introductions of invasive species, and other stressors are putting even more species at risk and compromising the essential functions of ecosystems necessary to improve the status and recover these species. “We cannot expect to change the status trajectories of these species without a commitment to responsible and implementable standards for accomplishing effective, sustainable compensatory mitigation that fully offsets the adverse impacts of actions to species and other resources of concern.”¹⁹⁹ Using a landscape approach—focusing on sustaining natural ecosystems that sustain human communities—would help ensure that compensatory mitigation measures will meaningfully offset adverse effects to a species or a habitat in a way that is ecologically sustainable over the long term.

¹⁹⁷ See Jacqueline Lesley Brown, *Preserving Species: The Endangered Species Act Versus Ecosystem Management Regime, Ecological and Political Considerations, and Recommendations for Reform*, 12 J. ENVTL. L. & LITIG. 151, 178 (1997); Curtis Filaroski, *Single-Minded Determination: The Problems with the Endangered Species Act and the Consensus on Fixing Species Conservation Law Through a Focus on Ecosystems and Biodiversity*, 30 J. ENVTL L. & LITIG. 57, 68 (2015); Erica Goode, *A Shifting Approach to Saving Endangered Species*, N.Y. Times (Oct. 5, 2015), <https://www.nytimes.com/2015/10/06/science/a-shifting-approach-to-saving-endangered-species.html>.

¹⁹⁸ See chapter 3 of DAVID TAKACS, *THE IDEA OF BIODIVERSITY* (1996) for an extensive discussion on why biodiversity conservation has traditionally focused on “species.”

¹⁹⁹ Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95316, 95,318 (Dec. 27, 2016).

This also sustains functioning ecosystems upon which endangered species depend.²⁰⁰

Even with a species-by-species approach, biodiversity offsetting can concentrate protection where it is most needed, for example in adding land to existing protected reserves or in strategic migration corridors.²⁰¹ Biodiversity offsetting can help fulfill the aims of the ESA and similar laws, while softening their cudgel: the Act itself is endangered as it is seen in some quarters as too unyielding and restrictive.²⁰² As a part of political accommodation, the United States has experimented with proactive conservation tools²⁰³ that avoid confrontation and create a pressure valve for the ESA's survival. If done well, these accommodations, including enabling biodiversity offsetting, respect the spirit (if not always the letter) of the ESA and incentivize conservation in a sensible, planned way.

Biologist Martin Nie notes that in the United States, current public-private checkerboards for conservation are “crazy quilts” that make no ecological sense: “Grizzlies—like fire, weeds, water, wildlife, and most conservation issues—require a boundary-spanning planning approach.”²⁰⁴ Offsetting as part of landscape-

²⁰⁰ See *id.* at 95,326; Rudolf S. De Groot et al., *Benefits of Investing in Ecosystem Restoration*, 27 CONSERVATION BIOLOGY 1286, 1292 (2013).

²⁰¹ See REBECCA KORMOS ET AL., BIODIVERSITY OFFSETTING IN THE UNITED STATES: LESSONS LEARNED ON MAXIMIZING THEIR ECOLOGICAL CONTRIBUTION 7 (2015).

²⁰² See J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 62 (2008); J.B. Ruhl, *Biodiversity Conservation and the Ever-Expanding Web of Federal Laws Regulating Nonfederal Lands: Time for Something Completely Different?*, 66 U. COLO. L. REV. 555, 560 (1995); Mark Miller, *High Court Agrees to Hear Landmark Endangered Species Act Case*, PACIFIC LEGAL FOUND. (Jan. 24, 2018), <https://pacificlegal.org/high-court-agrees-to-hear-landmark-endangered-species-act-case/>.

²⁰³ For more on Habitat Conservation Plans, Candidate Conservation Agreements with Assurances, and Safe Harbor Agreements, see *Habitat Conservation Plans Overview*, U.S. FISH & WILDLIFE SERV., <https://www.fws.gov/endangered/what-we-do/hcp-overview.html> (last updated Dec. 13, 2017); *For Landowners: Safe Harbor Agreements*, U.S. FISH & WILDLIFE SERV., <https://www.fws.gov/endangered/landowners/safe-harbor-agreements.html> (last updated Feb. 22, 2018); *Candidate Conservation: Candidate Conservation Agreements*, U.S. FISH & WILDLIFE SERV., <https://www.fws.gov/endangered/what-we-do/cca.html> (last updated Nov. 21, 2017).

²⁰⁴ Martin Nie, *Whatever Happened to Ecosystem Management and Federal Land Planning?*, in THE LAWS OF NATURE: REFLECTIONS ON THE EVOLUTION OF ECOSYSTEM MANAGEMENT LAW AND POLICY 69–70 (Kalyani Robbins ed.,

level planning can span these boundaries and bridge the gap between disconnected public and private conservation and development efforts.

As part of regulatory flexibility under the ESA, USFWS will allow the “take” of a species in exchange for developing and implementing a habitat conservation plan (HCP) that “provide[s] for partnerships with non-Federal parties to conserve the ecosystems upon which listed species depend, ultimately contributing to their recovery.”²⁰⁵ But as implemented, HCPs, and other species and habitat conserving laws elsewhere, may fracture conservation efforts into small, isolated islands that result in ecological dead ends for the species and ecosystems of interest.²⁰⁶ As atomized efforts, they force property owners who are not experts in conservation to do expensive make-work that may provide little help to the imperiled species.²⁰⁷

Ideally, conservation banks consolidate small, fragmented species conservation projects into large contiguous preserves with higher habitat values.²⁰⁸ Concentrating biodiversity protection in large areas can lessen fragmentation where scraps of isolated habitat fail to provide area to support minimum viable population sizes or corridors to connect isolated populations.²⁰⁹ Conservation

2013).

²⁰⁵ *Habitat Conservation Plans: Overview*, U.S. FISH & WILDLIFE SERV., <https://www.fws.gov/endangered/what-we-do/hcp-overview.html> (last updated Dec. 13, 2017); Endangered Species Act of 1973 § 10(a)(1)(B), 16 U.S.C. § 1539(a)(1)(B).

²⁰⁶ See Jessica Fox & Anamaria Nino-Murcia, *Status of Species Conservation Banking in the United States*, 19 CONSERVATION BIOLOGY 997 (2005).

²⁰⁷ See Jacqueline Lesley Brown, *Preserving Species: The Endangered Species Act Versus Ecosystem Management Regime, Ecological and Political Considerations, and Recommendations for Reform*, 12 J. ENVTL. L. & LITIG. 151, 200 (1997). For some reviews of the history and ups and downs of HCPs, see Barton H. Thompson, Jr., *The Endangered Species Act: A Case Study in Takings & Incentives*, 49 STAN. L. REV. 305 (1997); Eric Fisher, *Habitat Conservation Planning Under the Endangered Species Act: No Surprises & the Quest for Certainty*, 67 U. COLO. L. REV. 371 (1996); Shi-Ling Hsu, *The Potential and the Pitfalls of Habitat Conservation Planning Under the Endangered Species Act*, 29 ENVTL. L. REP. 10,592 (1999); Ruhl, *supra* note 127.

²⁰⁸ See *Conservation and Mitigation Banking*, CAL. DEP’T OF FISH & WILDLIFE, <http://www.dfg.ca.gov/habcon/conplan/mitbank/> (last visited Dec. 2, 2017); U.S. FISH & WILDLIFE SERV., GUIDANCE FOR THE ESTABLISHMENT, USE, AND OPERATION OF CONSERVATION BANKS 6 (2003).

²⁰⁹ See, e.g., U.S. FISH & WILDLIFE SERV., GUIDANCE FOR THE ESTABLISHMENT, USE, AND OPERATION OF CONSERVATION BANKS 4 (2003); *Conservation and Mitigation Banking*, CAL. DEP’T OF FISH & WILDLIFE,

biologists usually, but do not always, aver that single large reserves are more ecologically sustainable than several smaller reserves of the same surface area, due to the ability of larger populations to survive disturbances, and “edge effects” from surrounding habitats whose biota may invade and conquer the desired rare species.²¹⁰ The USFWS suggests that “larger reserves are more likely to ensure ecosystem functions, foster biodiversity, and provide opportunities for linking existing habitat.”²¹¹ The World Bank suggests “aggregated biodiversity offsets” that both minimize costs and optimize conservation outcomes.²¹²

As a result, advocates of offsetting suggest that the money and effort invested in scattered, ecologically imprudent HCPs and similar individualized projects elsewhere could instead go to well-planned offsets in well-managed public or private reserves that allow for greater size for more viable populations, and can help prioritize connectivity between sites.²¹³ The California Department of Fish and Wildlife “has found that the establishment and use of conservation and mitigation banks may result in added ecological benefits and reduced administrative costs over the more traditional forms of smaller, single-purpose mitigation projects.”²¹⁴ Those added benefits include “conservation of important habitat and habitat linkages.”²¹⁵ In the United States, regional HCPs and Natural Community Conservation Plans (NCCPs) could abet or incorporate biodiversity offsetting, where developers pay “in lieu” fees to the government to offset the damage in a planned, landscape-level arrangement. They would still need to balance landscape planning with the needs of individual species, which is a difficult balancing act: offsets could play a targeted role here.²¹⁶

In the United States, HCPs began with the Department of

<https://www.wildlife.ca.gov/Conservation/Planning/Banking> (last visited Mar. 31, 2018)); Aaron Cotter, *Building a Bank Takes More than Just Snakes* (May 19, 2011), http://www.fws.gov/sacramento/Outreach/Featured-Stories/BuildingBanksSnakes/outreach_featured-stories_BuildingBanksSnakes.htm.

²¹⁰ For a good court explanation, see *Sierra Club v. Marita*, 46 F.3d 606, 618 (7th Cir. 1995).

²¹¹ U.S. FISH & WILDLIFE SERV., *supra* note 47, at 2.

²¹² See WORLD BANK, BIODIVERSITY OFFSETS: A USER GUIDE 35–36 (2016).

²¹³ See Jessica Fox & Anamaria Nino-Murci, *Status of Species Conservation Banking in the United States*, 19(4) CONS. BIO. 997 (2005).

²¹⁴ CAL. FISH & GAME CODE § 1797(g) (2012).

²¹⁵ *Id.*

²¹⁶ See Kormos, *supra* note 201, at 9.

Interior's blessing in the early 1980s, and expanded widely in the 1990s,²¹⁷ and were billed as a tool to provide flexibility in interpreting the ESA. According to Dave Owen, "[n]o one could credibly dispute that the political pressures against species protection are persistent and intense."²¹⁸ Salzman and Ruhl note "[t]his combination of public attack and political threat has led to real, pounding pressure on the agencies. To a great extent, then, habitat [environmental trading markets] serve as political steam valves, dissipating public attacks and blunting pointed legislation and litigation."²¹⁹ These pressures have only grown, as conservative opposition to all forms of regulation has intensified.²²⁰

Advocates suggest that offsetting can similarly take political pressure off conservation laws by putting market incentives on species conservation.²²¹ The USFWS is now encouraging streamlined, formalized biodiversity offsetting for programmatic HCPs, as "[m]arket-based mitigation programs improve regulatory predictability, provide efficiencies of scale, and incentivize private investment in species conservation."²²² The USFWS hopes to avoid "a piecemeal approach that often results in small, non-sustainable parcels of habitat scattered throughout the landscape" and will preferentially approve "compensatory mitigation projects sited within the boundaries of priority conservation areas identified

²¹⁷ See Salzman & Ruhl, *supra* note 135, at 648 n.102.

²¹⁸ Dave Owen, *Critical Habitat and the Challenge of Regulating Small Harms*, 64 FLA. L. REV. 141, 187 (2012); see also Matthew Daly, *GOP Targets Endangered Species Act as Protections Lifted*, U.S. NEWS (July 19, 2017), <https://www.usnews.com/news/politics/articles/2017-07-19/gop-targets-endangered-species-act-as-protections-lifted>; Corbin Hiar, *Battle Over Landmark Law Already Raging Out of Public Eye*, GREENWIRE (Apr. 17, 2017), <https://www.eenews.net/stories/1060053165>.

²¹⁹ Salzman & Ruhl, *supra* note 135, at 678.

²²⁰ See *Section 2: Views of Government Regulation*, PEW RES. CTR. (Feb. 23, 2012), <http://www.people-press.org/2012/02/23/section-2-views-of-government-regulation/>; Peter M. Shane, *The Quiet GOP Campaign Against Government Regulation*, THE ATLANTIC (Jan. 26, 2017), <https://www.theatlantic.com/politics/archive/2017/01/gop-complicates-regulation/514436/>.

²²¹ See David Bunn, Mark Lubell & Christine K. Johnson, *Reforms Could Boost Conservation Banking by Landowners*, 67 CAL. AGRIC. 86, 94 (2013).

²²² Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,317 (Dec. 27, 2016) (citing Jessica Fox & Anamaria Nino-Murcia, *Status of Species Conservation Banking in the United States*, 19 CONSERVATION BIOLOGY 996–1007 (2005)).

in existing landscape-scale conservation plans.”²²³ However, like similar plans in Queensland (where in-lieu fees for offsetting are collected, but not rapidly deployed), Melbourne (where the vast grasslands reserve funded by offsets is still in the planning stages), and South Africa (where the meticulously mapped ecosystems and planned comprehensive offsetting await the political will to link offsets to conservation), these landscape-level plans have not yet been implemented and thus remain largely aspirational.²²⁴

We do find an excellent example in California, which has pioneered Natural Community Conservation Plans (NCCPs), fourteen plans now covering seven million acres.²²⁵ In California, regulators have also approved over three dozen private conservation banks, ranging from eight acres to six thousand acres, and averaging about six hundred acres each.²²⁶ While surveys also suggest that some banks are approved without regard to broader landscape-level conservation goals,²²⁷ many are part of a regional HCP or NCCP; eight of ten South Coast banks are within a NCCP.²²⁸

Regulators implementing national and state endangered species laws “[review] the landscape area by area and species by species, yielding a list of types of terrain that might be purchased for mitigation, such as creekside corridors, alkali wetlands and meadows, and serpentine rock types home to rare and specially adapted species. The effect is less a clear map and more a bridal registry: a list to be consulted at need, from which future developers can pick and choose.”²²⁹ In most NCCPs, developers pay the government fees that the government invests in

²²³ *Id.* at 95340.

²²⁴ Email from Peter Lukey, Chief Pol’y Advisor, Strategic Env’tl. Intelligence, Dept. of Env’tl. Aff., S. Afr., to author (June 13, 2017) (on file with author).

²²⁵ *Natural Conservation Planning (NCCP)*, CAL. DEPT. OF FISH & WILDLIFE, <https://www.wildlife.ca.gov/Conservation/Planning/NCCP> (last visited Dec. 22, 2017).

²²⁶ See Bunn, *supra* note 221, at 88; see also *Conservation and Mitigation Banks Established in California by CDFW*, CAL. DEPT. OF FISH & WILDLIFE, <https://www.wildlife.ca.gov/conservation/planning/banking/approved-banks> (last visited Mar. 31, 2018).

²²⁷ See Bunn, *supra* note 221, at 86.

²²⁸ See *id.* at 92.

²²⁹ John Hart, *Planned Wilderness: A Big Deal for Bay Area Open Space*, BAY NATURE (Oct. 6, 2011), <https://baynature.org/articles/planned-wilderness/>.

biodiversity targets;²³⁰ these could just as easily be invested in privately run biodiversity banks. Supporters of offsetting point to the sound conservation planning and public buy-in for this kind of landscape-level planning, providing money for conservation that is less acrimonious and more likely to accommodate human and nonhuman needs.

The Department of Interior supports streamlined approval for renewable energy projects in California's deserts, and thus "[m]itigation is being baked into an integrated, landscape-level management and planning exercise."²³¹ This gives greater certainty to permit applicants (who are providing low-GHG emitting energy) and the public, and promotes "meaningful, landscape-level environmental needs—rather than small-bore and/or ad hoc mitigation efforts."²³² Incorporating biodiversity offsetting at an early stage means that parties can plan ahead so that both agencies and developers know what they have to do, and environmental advocates and conservation biologists can advise on where large new sources of cash can do the most good for biodiversity. According to the Bureau of Land Management's guidance, "a landscape-scale approach paired with the mitigation hierarchy process allows for the identification of the most appropriate combination of mitigation measures across all relevant scales to provide the maximum benefit to the impacted resources."²³³

The Department of Interior is also pursuing this philosophy on a grander scale as it seeks protections and new funding sources for the sage grouse²³⁴ and lesser prairie-chicken, whose habitats stand in the way of oil and gas development in the American west. "Habitat credit exchanges," a cutting edge form of offsets, have

²³⁰ See DANIEL POLLAK, NATURAL COMMUNITY CONSERVATION PLANNING (NCCP) 21, 34, 41 (2001).

²³¹ David J. Hayes, *Addressing the Environmental Impacts of Large Infrastructure Projects: Making 'Mitigation' Matter*, 44 ENVTL. L. REP. 10016, 10017 (2014).

²³² *Id.* at 10019.

²³³ U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MGMT., HANDBOOK H-1794-1, MITIGATION 1-4 (2016).

²³⁴ See U.S. FISH & WILDLIFE SERV., GREATER SAGE GROUSE RANGE WIDE MITIGATION FRAMEWORK, 1 (2014). Listing of the sage grouse as an endangered species is currently warranted, according to USFWS; the agency is attempting to use offsetting as a means to avoid listing and the political headaches and legal battles such listing will incur.

also been approved to assist the imperiled lesser prairie-chicken where private “programmatically conservation banks” will differ from a traditional biodiversity bank in that a “Master Bank Sponsor” will “review applications for completeness, maintain bank parcel ledgers, and oversee that implementation and compliance of the programmatically conservation bank agreement is being met by the Bank Sponsor.”²³⁵ Thus, some broker—preferably a government agency—coordinates offsets between those who need and those who provide, preferentially channeling offsets from where need is greatest to where conservation priorities are most urgent or ecologically adaptive.²³⁶ Such exchanges have been proposed for the ecologically precarious Central Valley of California, where between half a million and a million acres of compensation are needed for various NCCPs, new ambitious water infrastructure, and high-speed rail development.²³⁷ In the plans, “farmers will be paid to ‘grow’ habitat such as flooded fields for salmon and migratory birds, riparian forest for Swainson’s hawks and wetlands for giant garter snakes.”²³⁸ “The result will be a new funding stream that will enable landowners to earn revenue by implementing innovative strategies to restore functional

²³⁵ *Frequently Asked Questions: Lesser Prairie-Chicken Programmatic Conservation Bank Agreement*, U.S. FISH & WILDLIFE SERV. (Mar. 24, 2015), https://www.fws.gov/southwest/es/documents/R2ES/LPC_PCBA_FAQs_final.pdf. The Environmental Defense Fund NGO has been a particular backer of these exchanges. Letter from David Festa, Vice President, West Coast & Land, Water & Wildlife, to Benjamin Tuggle, Regional Director, U.S. Fish & Wildlife Serv. (Nov. 5, 2015).

²³⁶ See Kormos, *supra* note 201, at 8; Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,344 (Dec. 27, 2016).

²³⁷ See Matt Weiser, *Farmers and Environmentalists: Old Enemies Conserving Water Together*, WATER DEEPLY (Mar. 17, 2017), <https://www.newsdeeply.com/water/community/2017/03/17/farmers-and-environmentalists-old-enemies-conserving-water-together>; *Central Valley Habitat Exchange*, ENVTL. DEF. FUND, <https://www.edf.org/ecosystems/central-valley-habitat-exchange> (last visited Mar. 31, 2018); *FAQ: Central Valley Habitat Exchange*, ENVIRO EXCHANGE, <https://www.enviroaccounting.com/cvhe/Program/Display/FAQ> (last visited Mar. 31, 2018); Interview with Steve Morgan & Carl Wilcox, Cal. Dept. of Fish and Wildlife, in Yountville, Cal. (Aug. 1, 2014); Interview with Wayne White, President of Nat’l Mitigation Banking Ass’n and Dir. Of Bus. Dev. of Wildlands, Inc., in Sacramento, Cal. (Oct. 14, 2014).

²³⁸ *About Central Valley Habitat Exchange: A Market-based Approach to Integrate Agriculture and Habitat*, ENVIRO ACCOUNTING, <https://www.enviroaccounting.com/cvhe/Program/Display/About> (last visited Dec. 15, 2017).

habitat.”²³⁹ These are envisioned as short-term contracts that afford a kind of oxymoronic dynamic permanence, i.e. they can be changed as the needs of species and their regulators change.

It is not just the United States where compensatory mitigation based upon landscape-level planning is encouraged. For example, in a comprehensive plan to manage Melbourne, Australia’s growth corridor, the government is trying to create a vast grassland reserve. Rather than making developers create hundreds of tiny reserves, Melbourne would create one vast reserve with a viable ecological future.²⁴⁰ Government managers often find it easier to manage and monitor single larger reserves as well.²⁴¹

Cassinia Environmental, a Victoria-based environmental services business, “has a very long term vision of reconnecting all of Australia’s National Parks through a network of private land managed for conservation. We call this vision Biolinking Australia—and it’s a goal we share with many other conservation organizations. Facilitating the movement and migration of native species, our 10 year goal is to link the Grampians National Park with the Gunbower National Park on the Murray River.”²⁴² Sites I visited were in robust ecological condition, and in a profile, Paul Dettmann, founder of Cassinia, calls himself “a ‘quilt maker.’²⁴³ I’m always looking for the bits and pieces that can be sewn together to better support the landscape.”²⁴⁴ Sites that he is

²³⁹ *Central Valley Habitat Exchange*, ENVTL. DEF. FUND, http://www.edf.org/sites/default/files/CentralValley_HabEx_factsheet_05.pdf. (last visited Apr. 9, 2018).

²⁴⁰ See, e.g., DUKE, *supra* note 79, at 14; MADSEN ET AL., *supra* note 50, at 52; Melbourne Strategic Assessment, *Grassland Reserves*, <https://www.msa.vic.gov.au/conservation-actions/western-grassland-reserve> (last visited Dec. 2, 2017). Interviews in Melbourne suggest that progress has been slow. Interview with Brendan Sydes, *supra* note 128; Interview with Paul Dettmann, Founder & Dir., Cassinia Env’tl., in Vict., Austl. (Jan. 26, 2015 & June 30, 2017).

²⁴¹ See JOSHUA BISHOP, IUCN WORLD CONSERVATION UNION, PRODUCING AND TRADING HABITAT, OR LAND DEVELOPMENT AS A SOURCE OF FUNDING FOR BIODIVERSITY CONSERVATION (2003) .

²⁴² *Our Work*, CASSINIA ENVTL., <https://www.cassinia.com/our-work> (last visited Mar. 31, 2018).

²⁴³ Interview with Paul Dettmann, *supra* note 240; *Piecing Together the Patchwork of Biodiversity*, GREENFLEET BLOG FEED, <http://www.greenfleet.com.au/Blog/ArtMID/3250/ArticleID/56/Piecing-together-the-patchwork-of-biodiverse-forests> (last visited Mar. 31, 2018).

²⁴⁴ *Piecing Together the Patchwork of Biodiversity*, GREENFLEET BLOG FEED, <http://www.greenfleet.com.au/Blog/ArtMID/3250/ArticleID/56/Piecing-together-the-patchwork-of-biodiverse-forests> (last visited Mar. 31, 2018).

working on, and which I have visited, seemed in robust ecological condition, but are threatened with development.²⁴⁵ His projects fulfill the goals of his company, i.e. using offsets to link together strategic corridors for biodiversity.²⁴⁶

In South Africa, biodiversity managers have suggested prioritizing offsets in the 8 percent of the landscape that provides the headwaters for 50 percent of the nation's scarce water resources.²⁴⁷ Managers also discussed that while biodiversity offsets are suggested as a conservation option, any kind of required development mitigation is at the discretion of government officials: offsets are a way to get mitigation where otherwise none would be required.²⁴⁸ In a similar vein, a United States study of San Joaquin kit foxes and Florida panthers suggests that these ESA-listed species are better off today because habitat-destroying projects are being approved rapidly, and biodiversity offsetting adds mitigation where none would otherwise occur.²⁴⁹

B. *Climate Change Adds to the Urgency for New Tools*

Biodiversity offsets can help us balance development and conservation even in “normal” times. But, as we learn more and more about the terrifying ways climate change is shaping and degrading nonhuman life on Earth, we understand we are living in far from normal times.²⁵⁰ The Intergovernmental Panel on Climate Change (IPCC) warns that “[e]xtinction risk is increased with both magnitude and rate of climate change. Many species will be unable to track suitable climates under mid- and high-range rates of climate change during the 21st century.”²⁵¹ With “high

²⁴⁵ See Interviews and site visits with Paul Dettmann, *supra* note 240.

²⁴⁶ See *Biolinking Australia*, CASSINIA ENVIRONMENTAL, <https://www.cassinia.com/biolinking-vision> (last visited Mar. 31, 2018).

²⁴⁷ See Interview with Jeffrey Manuel, *supra* note 11; Interview with John Dini, *supra* note 103. For a comprehensive look at water as ecological infrastructure, with biodiversity co-benefits, see Takacs, *supra* note 103, at 97–106.

²⁴⁸ See *id.*

²⁴⁹ See Kormos, *supra* note 201, at 5.

²⁵⁰ See, e.g., Hance, *supra* note 15; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY (2014); Bellard, C. et al., *Impacts of Climate Change in the Future of Biodiversity*, 15 *ECOLOGY LETTERS* 365 (2012).

²⁵¹ Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, *Summary for Policymakers*, in CLIMATE CHANGE 2014: IMPACTS, ADAPTION, AND VULNERABILITY 1, 15 (C.B. Field et al. eds., 2014).

confidence,” the IPCC adds that species will go extinct:

[Species] that cannot adapt sufficiently fast will decrease in abundance or go extinct in part or all of their ranges. Management actions, such as maintenance of genetic diversity, assisted species migration and dispersal, manipulation of disturbance regimes and reduction of other stressors, can reduce, but not eliminate, risks of impacts to terrestrial and freshwater ecosystems due to climate change, as well as increase the inherent capacity of ecosystems and their species to adapt to a changing climate.²⁵²

Climate change is shifting species’ genetic makeup, but often not quickly enough to adapt to rapid warming and chaotic seasonal changes. In a 2016 study, 47 percent of 976 species showed local extinctions related to climate change, with effects particularly marked in animals, and in flora and fauna in tropical locales or freshwater habitats.²⁵³ These effects are evident despite the relatively modest current impacts of extant climate change compared to more dramatic impacts to come.²⁵⁴ Climate change is changing the physical nature of the habitat, altering the resulting ranges of species, and changing the timing of when food sources appear or mating occurs.²⁵⁵ To quote an article in *Science*: “Most ecological processes now show responses to anthropogenic climate change.”²⁵⁶ Some places—for example Australia, the biodiversity offsetting pioneer—will be harder hit than others.²⁵⁷ The fabric of entire ecosystems is fraying,²⁵⁸ leading biologists to fret about widespread ecological collapse.

²⁵² *Id.*

²⁵³ See John J. Wiens, *Climate-Related Local Extinctions are Already Widespread Among Plant and Animal Species*, 14 PLOS BIOLOGY 1, 1 (2016); see generally Michela Pacifi et al., *Species Traits Influenced Their Response to Recent Climate Change*, 7 NATURE CLIMATE CHANGE 205 (2017).

²⁵⁴ See *id.*

²⁵⁵ See Jessica Wentz, *Planning for the Effects of Climate Change on Natural Resources*, 47 ENVTL. L. REP. NEWS & ANALYSIS 10220 (2017) (providing an overview of how different U.S. land management agencies must and should be planning for climate change impacts).

²⁵⁶ Brett R. Scheffers et al., *The Broad Footprint of Climate Change from Genes to Biomes to People*, 354 SCI. 719, 720 (2016).

²⁵⁷ See Oliver Milman, *Climate Change Will Hit Australia Harder Than Rest of World, Study Shows*, THE GUARDIAN (Jan. 26, 2015), <https://www.theguardian.com/environment/2015/jan/26/climate-change-will-hit-australia-harder-than-rest-of-world-study-shows>.

²⁵⁸ For a comprehensive review on how climate change is changing biological systems, see Scheffers, *supra* note 256, at 719.

Climate change's impacts are inherently chaotic and thus unpredictable: the only thing we can count on is change. This is the "no-analog" future for which our existing understanding of biodiversity's needs will prove inadequate to the task of preserving biodiversity going forward.²⁵⁹ The climate change-addled Anthropocene will demand creative thinking and new mechanisms for adding to the conservation estate if humans are to survive and thrive by sharing the world with some complement of diverse species and functional ecosystems. Climate change just exacerbates the chaos of how species and their ecosystems interact: even in "controlled" conditions we cannot precisely name what species need, or how they will evolve and respond to environmental stimuli or disruption. Humans long ago began meddling with ecosystems, introducing (accidentally or not) species where they had never belonged. There is no pre-human state we can name that we should be trying to preserve, or restore: we can only look forward to the future and hope that, with human assistance, some degree of ecosystem function based upon some robust number of species will survive alongside us into the uncertain chaotic future.²⁶⁰

If we are to help species cope with climate change, we will need to be nimble, adaptive, aggressive, creative, and courageous. We will need to take chances, and biodiversity offsetting is one chance worth taking, but one we must take with extreme caution. Savvy offsetting can be channeled towards *resilience*, i.e. helping species and ecosystems respond to future ecological shocks climate change will exact.²⁶¹ Climate change threatens all our current reserve-based biodiversity conservation efforts.²⁶² Places

²⁵⁹ See Ruhl, *supra* note 202, at 21–23.

²⁶⁰ For a lovely evocation of this view, see Joseph Mascaro, *Earth Makers: The Ancient Practice of Ecosystem Creation*, THE BREAKTHROUGH INST. (2015), <https://thebreakthrough.org/index.php/journal/past-issues/issue-5/earth-makers>. For the dilemma of what to restore an ecosystem to, see an example from Botswana's Chobe National Park, where current attempts to restore an elephant-damaged ecosystem would require continuous replication of previous capricious disturbances, see J.T. du Toit, *Considerations of Scale in Biodiversity Conservation*, 13 ANIMAL CONS. 228, 232–33 (2010).

²⁶¹ See DAVID DODMAN, THE WORLD WATCH INST., STATE OF THE WORLD 2009: INTO A WARMING WORLD 168 (2009); Mascaro, *supra* note 260.

²⁶² See Camille Parmesan, *Biotic Response: Range and Abundance Changes*, in CLIMATE CHANGE AND BIODIVERSITY 41, 45 (Thomas E. Lovejoy & Lee Hannah eds., 2005); Miguel B. Araújo et al., *Would Climate Change Drive Species Out of Reserves? An Assessment of Existing Reserve-Selection Methods*,

we have set aside and protected for biodiversity conservation may no longer serve their original purpose towards protecting particular species or ecosystem types. Species will need migration corridors, places where development does not prevent species from gradually shifting their ranges as their ecosystems evolve.²⁶³ This may include “assisted migration,” where managers translocate biodiversity to more apt locales,²⁶⁴ and some of those locales may be offsets developed because of their new conservation significance.

Thus, current methods of static conservation—drawing a line on a map, putting a fence around a piece of property and defending it—may be even less effective as climate change forces changes in species and their habitat. The land we preserve today on behalf of conservation may not be the land imperiled species need tomorrow; nature will have better ideas than we do on where it belongs as the environment shifts.²⁶⁵ Even though some species may be able to adapt to a changing climate,²⁶⁶ there must be geographical and management flexibility to ensure many other species persist.

Offsetting can be part of an adaptive management paradigm

10 GLOBAL CHANGE BIOLOGY 1618, 1623 (2004). *See generally* Justin Gillis, *Spared Winter Freeze, Florida’s Mangroves are Marching North*, N.Y. TIMES (Dec. 30, 2013), <https://www.nytimes.com/2013/12/31/science/without-winter-freezes-mangroves-are-marching-north-scientists-say.html?pagewanted=all>.

²⁶³ *See* Malloy, *supra* note 153, at 138. *See also* REBECCA KORMOS ET AL., BIODIVERSITY OFFSETTING IN THE UNITED STATES: LESSONS LEARNED ON MAXIMIZING THEIR ECOLOGICAL CONTRIBUTION 9 (2015) (arguing that developers must take into account individual species’ needs when investing, which frequently requires investing in more than one site).

²⁶⁴ *See* David Appel, *Can “Assisted Migration” Save Species from Global Warming?*, SCIENTIFIC AMERICAN (Mar. 1, 2009), <https://www.scientificamerican.com/article/assited-migration-global-warming/#>.

²⁶⁵ *See* Michael J. Bean & Lynn E. Dwyer, *Mitigation Banking as an Endangered Species Conservation Tool*, 30 ENVTL. L. REP. 10537, 10550 (1999); Jeremy Hance, *Climate Change Impacting ‘Most’ Species on Earth, Even Down to Their Genomes*, THE GUARDIAN (Apr. 5, 2017), <https://www.theguardian.com/environment/radical-conservation/2017/apr/05/climate-change-life-wildlife-animals-biodiversity-ecosystems-genetics>; *see generally* Eric Biber, *Which Science? Whose Science? How Scientific Disciplines Can Shape Environmental Law*, 79 U. CHI. L. REV. 471 (2012); Sindya N. Bhanoo, *Habitat Loss Speeds up a Kestrel’s Life*, N.Y. TIMES (Feb. 24, 2014), <https://www.nytimes.com/2014/02/25/science/habitat-loss-speeds-up-a-kestrels-life.html>.

²⁶⁶ *See* Sindya N. Bhanoo, *Habitat Loss Speeds Up a Kestrel’s Life*, N.Y. TIMES (Feb. 24, 2015), <https://www.nytimes.com/2014/02/25/science/habitat-loss-speeds-up-a-kestrels-life.html>.

for managing biodiversity in a climate change future, i.e. regularly evaluating whether the conservation outcomes we seek are occurring, and shifting management accordingly.²⁶⁷ Where climate change forces species to shift habitat directions, we will have to shift management directions accordingly; a pool of temporary or permanent financially incentivized offset areas can be a tool for managers to help biodiversity adapt to climate change.

Biodiversity offsetting, done right, could be part of a deliberate, planned system of ecological design in a postmodern, apocalyptic age of the Anthropocene. Below, and in a forthcoming paper, I will discuss more on how to employ biodiversity offsetting the “right” way; but postmodern ecological design has to be rooted in the science of ecology: nature operates by its laws, not ours. We must adapt our laws to nature’s laws, or we are merely rearranging koalas on the deck of the Titanic.

Even the finest fixed-location biodiversity offsetting banks may be just as useless over the long term as public lands set aside as fixed reserves. One author advocates a series of “stepping stone” reserves, where owners and managers must invest in another reserve if the species they were meant to manage goes extinct on their property²⁶⁸—a kind of offsetting the offsets, perhaps ad infinitum.²⁶⁹ Rather than setting static boundaries for species and ecosystem preservation, government managers will need to be flexible on where habitat conservation goes as ecosystems change unpredictably; private investors may be more nimble in purchasing and restoring lands, migrating business opportunities that track the migrating needs of species pursuing changing ecological resources.²⁷⁰

In changing ecological conditions, particularly in the face of climate change, managers may require that offset providers pursue dynamic, adaptive management to generate credits where a parcel of land might otherwise have been conserved, but may not represent suitable habitat in the future without such

²⁶⁷ See J. B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 50 (2008); also see Wentz, *supra* note 255.

²⁶⁸ See Tristan Kimbrell, *Moving Species and Non-Moving Reserves: Conservation Banking and the Impact of Global Climate Change*, 22 FORDHAM ENV. L. REV. 119, 120 (2010).

²⁶⁹ See *id.* at 148.

²⁷⁰ For a study of this in action in Florida wetlands, see Malloy, *supra* note 153.

management.²⁷¹ Those arguing for leaving species where and how they currently exist overlook that some currently occupied habitats may degrade and become uninhabitable in the long run, and even our imperfect attempts at managing offset habitats may be better for the target biodiversity element than leaving currently occupied habitats alone.²⁷² The idea behind habitat conservation exchanges, or temporary conservation easements—short term contracts that can require particular management actions but not lock in those actions if species needs change—may be a particularly apt offset tool as species' needs evolve.

C. *Debates about Biodiversity Conservation, a Struggle for the Soul of the Conservation Movement, and Helping to Bridge the Difference*

Professor Jed Purdy describes law as “the tendon that connects imagination and materiality when it comes to landscapes. The way we live is a kind of collective landscape architecture.”²⁷³ Law increasingly translates our values onto the landscape; how and why we care about biodiversity gets written into law, which then is transcribed onto the landscape. We can use law to fashion a world of symbiosis between human and nonhuman communities, by managing the nonhuman world that is neither pristine wilderness nor manicured garden. Laws promoting and enabling offsetting recognize this and help develop an Anthropocene ethos: human and nonhuman communities will exist where we deign them to exist. Smart offsetting helps us allocate space on the planet wisely, recognizing that only by enhancing the nonhuman will the human flourish.

In a high profile, controversial article,²⁷⁴ biologist Peter

²⁷¹ See Bean, *supra* note 265, at 10547.

²⁷² See *id.* at 10550.

²⁷³ Ross Andersen, *Nature Has Lost Its Meaning*, THE ATLANTIC (Nov. 30, 2015), <https://www.theatlantic.com/science/archive/2015/11/nature-has-lost-its-meaning/417918/>.

²⁷⁴ See, e.g., Ross Anderson, *Nature Has Lost its Meaning*, THE ATLANTIC (Nov. 30, 2015), <https://www.theatlantic.com/science/archive/2015/11/nature-has-lost-its-meaning/417918/>; Erica Goode, *A Shifting Approach to Saving Endangered Species*, N.Y. TIMES (Oct. 5, 2015), <https://www.nytimes.com/2015/10/06/science/a-shifting-approach-to-saving-endangered-species.html>; D. T. Max, *Green is Good: The Nature Conservancy Wants to Persuade Big Business to Save the Environment*, THE NEW YORKER (May 12, 2014), <http://www.newyorker.com/magazine/2014/05/12/green-is-good>; Andrew C. Revkin, *Critic of Conservation Efforts Gets Critiqued*, N.Y. TIMES (Apr. 10,

Kareiva and co-authors assert (correctly) that “conservation is losing the war to protect nature despite winning one of its hardest fought battles—the fight to create parks, game preserves, and wilderness areas.”²⁷⁵ For the 87 percent of the planet without such protection, “[c]onservationists will have to jettison their idealized notions of nature, parks, and wilderness—ideas that have never been supported by good conservation science—and forge a more optimistic, human-friendly vision.”²⁷⁶ The authors assert that because people have interfered with the ecological balance in every corner of the planet, securing pristine parks or wilderness is futile and counterproductive.²⁷⁷ In the name of conservation, governments create paper parks that are poorly protected havens for biodiversity, arrogate land from indigenous groups who are the rightful owners, and “have grossly overstated the fragility of nature,” while, according to the authors, “nature is so resilient that it can recover rapidly from even the most powerful human disturbances” such as the Chernobyl nuclear disaster.²⁷⁸

Kareiva et al. advocate that we pursue “development by design, done with the importance of nature to thriving economies foremost in mind. Instead of pursuing the protection of biodiversity for biodiversity’s sake, a new conservation should seek to enhance those natural systems that benefit the widest number of people, especially the poor.”²⁷⁹ In sum, “[n]ature could be a garden—not a carefully manicured and rigid one, but a tangle of species and wildness amidst lands used for food production, mineral extraction, and urban life.”²⁸⁰ Furthermore, “a conservation that is only about fences, limits, and far away places only a few can actually experience is a losing proposition. Protecting nature that is dynamic and resilient, that is in our midst

2012), https://dotearth.blogs.nytimes.com/2012/04/10/peter-kareiva-critic-of-environmentalism-gets-critiqued/?_r=0; Andrew C. Revkin, *Peter Kareiva, an Inconvenient Environmentalist*, N.Y. TIMES (Apr. 3, 2012), <https://dotearth.blogs.nytimes.com/2012/04/03/peter-kareiva-an-inconvenient-environmentalist/>.

²⁷⁵ Peter Kareiva, Michelle Marvier & Robert Lalasz, *Conservation in the Anthropocene: Beyond Solitude and Fragility*, THE BREAKTHROUGH INST. (2012), <https://thebreakthrough.org/index.php/journal/past-issues/issue-2/conservation-in-the-anthropocene/>.

²⁷⁶ *Id.*

²⁷⁷ *See id.*

²⁷⁸ *Id.*

²⁷⁹ *Id.*

²⁸⁰ *Id.*

rather than far away, and that sustains human communities—these are the ways forward now.”²⁸¹

In opposition, conservation biologists like Miller et al. argue that the preferred “center of traditional conservation is the preservation of biodiversity for ecosystem function and evolutionary potential.”²⁸² They believe that protected areas, particularly large parcels with connectivity to similar areas, should remain the paramount goal for biodiversity conservation.²⁸³ They argue that focusing on nature for humans’ sake is not only arrogant, but leads to inevitable environmental destruction when no obvious economic value for nature exists.²⁸⁴ And they believe that we “tinker” and destroy at our own peril.²⁸⁵ As Michael Soulé, one of the founders of conservation biology, expressed it, Kareiva and allies’ “resilience argument is so misleading that it boggles the mind.”²⁸⁶ And a major study finds that biodiversity is threatened not only when protected areas are degraded, but when areas around them are as well.²⁸⁷ In other words, nature is not as resilient as Kareiva et al. believe.

Law professor Pat Parenteau describes these debates as “a struggle for the soul of the conservation movement.”²⁸⁸ The struggle is counterproductive. The threats are so dire that those who care about the synergistic health of human and nonhuman communities should be exploring their disagreements, but should ultimately be working together. Protecting protected parks and wilderness comprises a small—but vital—part of overall conservation efforts.²⁸⁹ Elucidating ways for protected areas to

²⁸¹ *Id.*

²⁸² *Id.*

²⁸³ See B. Miller et al., ‘*New Conservation*’ or *Surrender to Development?*, 17 ANIMAL CONSERVATION 509, 512 (2014).

²⁸⁴ See *id.*; see also Reed Noss et al., *Humanity’s Domination of Nature is Part of the Problem: A Response to Kareiva and Marvier*, 64 BIOSCIENCE 241, 242 (2013).

²⁸⁵ See Miller, *supra* note 283, at 511.

²⁸⁶ Quoted in D. T. Max, *Green is Good: The Nature Conservancy Wants to Persuade Big Business to Save the Environment*, THE NEW YORKER, (May 12, 2014) <http://www.newyorker.com/magazine/2014/05/12/green-is-good>.

²⁸⁷ See William F. Laurence et al., *Averting Biodiversity Collapse in Tropical Forest Protected Areas*, 489 NATURE 289, 290 (2012).

²⁸⁸ Quoted in Erica Goode, *A Shifting Approach to Saving Endangered Species*, N.Y. TIMES (Oct. 5, 2015), <https://www.nytimes.com/2015/10/06/science/a-shifting-approach-to-saving-endangered-species.html>.

²⁸⁹ See Kieran Suckling, *Conservation for the Real World*, THE

serve human needs is similarly urgent.

As the director of the Center for Biological Diversity puts it when describing Kareiva et al.'s ideas, "having created an ideal thesis of conservation devoid of human impacts and interests, they are catapulted to the equally ideal antithesis of a world with only human impacts and interests. The real world of synthesis escapes them." I certainly agree with the thesis that protected parks alone are insufficient and will have to be buttressed with artificial manipulations of the "natural" world—for both nonhuman communities and the human communities that rely upon them. But I agree with Kareiva et al.'s critics: we should defend those places that are current redoubts of biodiversity and continue to aggressively guard what few "wild" places still exist.

Biodiversity offsetting is one addition to our conservation toolkit that splits the difference between seeing biodiversity solely as an instrument for humans and putting a fence around biodiversity to keep humans out. If done wisely, biodiversity offsetting may contribute to all these goals, eliding the difference between nature as sacred and nature as profane. Legal frameworks for biodiversity offsetting can support "development by design."²⁹⁰ We have no choice but to manage the planet intensively in the Anthropocene, which means careful planning for the needs of interrelated human and nonhuman communities. Even with an anthropocentric view, we recognize that the greatest good for the greatest number of humans means investing in ecosystems that function well with a maximum of species diversity. Such utilitarian ethics extend to thinking about the greatest good for the greatest number and diversity of nonhuman species. Offsetting provides new rationales and dedicated funding mechanisms to achieve this goal, to augment protected land, and to encourage actors to restore and steward biodiversity.

In biodiversity offsetting, some restoration sites I have visited create artificial, highly managed assemblages, but ones that are organic to the place and, when designed and stewarded well, enhance a species' or ecosystem's chances of survival. We are not choosing between civilization or wild places: we are enhancing or (paradoxically) creating the latter as the only way of providing for

BREAKTHROUGH INST. (Apr. 2012), <https://thebreakthrough.org/journal/debates/conservation-in-the-anthropocene-a-breakthrough-debate/conservation-for-the-real-world>.

²⁹⁰ See Kareiva, *supra* note 275.

the former's survival and health.

D. *Biodiversity Offsetting as a Tool to Restore and Rewild*

Offsetting based in ecologically savvy, strategically situated offsetting may benefit biodiversity. While the critics cited above express concerns about the past and future of restoration, others say that the billions of dollars spent on global restoration of biodiversity can, do, and must succeed.²⁹¹ A meta-analysis of over two hundred restoration projects recognized that it is difficult to capture the diverse benefits and services provided by ecosystems, and chose a conservative “worst case scenario” discount rate to assess benefits; the authors found restoration often yields benefits that outweigh costs.²⁹² In a different review of 240 studies of ecosystem restoration, Jones and Schmitz found eighty-three studies showing full recovery (in quicker times than had been predicted), ninety partial recovery, and only sixty-seven showing no recovery.²⁹³ One may view their glass as half full or empty, but the “message of [their] paper is that recovery is possible and can be rapid for many ecosystems, giving much hope for humankind to transition to sustainable management of global ecosystems.”²⁹⁴ If you see the glass as half full, biodiversity offsetting can provide one funding source for large-scale, strategic restoration.

We find an aggressive form of restoration in the “rewilding”²⁹⁵ movement, i.e. “deep restoration based on the reintroduction of relatively complete faunal assemblages”²⁹⁶ that “offers us a chance to replace our silent spring with a raucous summer.”²⁹⁷ In “rewilding,” officials may allow formerly

²⁹¹ See Marianne Kettunen et al., *Chapter 8: Recognising the Value of Protected Areas*, in *THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY: TEEB FOR NATIONAL AND INTERNATIONAL POLICY MAKERS* 28 (Patrick ten Brink ed., 2009).

²⁹² See Rudolf S. De Groot et al., *Benefits of Investing in Ecosystem Restoration*, 27 *CONSERVATION BIOLOGY* 1286, 1291 (2013).

²⁹³ See Jones, *supra* note 159, at 3.

²⁹⁴ *Id.* at 6.

²⁹⁵ See, e.g., *What is Rewilding Europe and What are We up to?*, *REWILDING EUROPE*, <https://www.rewildingeurope.com/about/> (last visited Dec. 22, 2017).

²⁹⁶ Martin Lewis, *Rewilding Pragmatism*, *THE BREAKTHROUGH INST.* (2015), <https://thebreakthrough.org/index.php/journal/past-issues/issue-5/rewilding-pragmatism>.

²⁹⁷ George Monbiot, *A Manifesto or Rewilding the World*, *GEORGE MONBIOT* (May 27, 2013), <http://www.monbiot.com/2013/05/27/a-manifesto-for-rewilding-the-world/>.

extirpated species (e.g. wolves in Wyoming or, remarkably, the Netherlands²⁹⁸) to return. Or, more aggressively, citizen-advocates or government officials may reintroduce²⁹⁹ species (often predators) from where they had once been, but now are absent (e.g. bears in the French and Spanish Pyrenees or grizzlies in the western United States).³⁰⁰

In their explication of “rewilding,” Soulé and Noss describe rewilding as “[r]epairing all past insults” committed by humans against functioning ecosystems, emphasizing “restoration and protection of big wilderness and wide-ranging, large animals—particularly carnivores” so that these ecosystems become self-sustaining.³⁰¹ Large carnivores are keystone species essential to the health of the ecosystems in which they belong.³⁰² Reintroducing them is a keystone technique in rewilding, as

²⁹⁸ See Richard Conniff, *Pastoral Icon or Woolly Menace?* N.Y. TIMES (Jan. 24, 2014), <https://www.nytimes.com/2014/01/26/opinion/sunday/pastoral-icon-or-woolly-menace.html>; Edward A. Fitzgerald, *Wolf Delisting: Old Wine in New Bottles*, 44 ENVTL. L. REPORTER 10413, 10414 (2014).

²⁹⁹ Or introduce a species for the first time in places it has not been found historically.

³⁰⁰ See, e.g., Charles J. Wilson, *What Future for Bears in Western Europe?* 35 ECOS (2014); Steve Cracknell, *Brown Bear Arrives in Catalan Pyrenees Rewilding Project*, LA SENDA PIERAICA (June 7, 2016), <http://www.lasenda.net/brown-bear-arrives-in-catalan-pyrenees-rewilding-project/#more-326>; This is sometimes done under the guise of the ESA’s support for “experimental populations,” which have their own special rules designed, in part, to ward against public opposition, including killing those animals that have been reintroduced. See, e.g., 16 U.S.C. § 1539(j) (2012); H.R. REP. NO. 97-567, at 2834 (1982); John Soltes, *North Carolina Wants Feds to End Red Wolf Rewilding Program*, EARTH ISLAND JOURNAL (Feb. 24, 2015), http://www.earthisland.org/journal/index.php/elist/eListRead/north_carolina_wants_feds_to_end_red_wolf_rewilding_program/. Non-predators also succumb to unhappy local residents in rewilding programs. See, e.g., Sam Jones, *Bison Found Poisoned and Decapitated on Spanish Reserve*, THE GUARDIAN (Sept. 20, 2016), <https://www.theguardian.com/environment/2016/sep/20/european-bison-herd-poisoned-decapitated-spanish-reserve>; Whitney Stohr, *Trophic Cascades and Private Property: The Challenges of a Regulatory Balancing Act and Lessons the UK Can Learn from the Reintroduction of the American Gray Wolf*, 2 U. BALT. J. LAND & DEV. 15 (2012). For a review of attempts to “delist” wolf species in the United States, see Edward A. Fitzgerald, *Wolf Delisting: Old Wine in New Bottles*, 44 ENVTL. L. REP. 10413 (2014).

³⁰¹ Michael Soulé & Redd Noss, *Rewilding and Biodiversity*, WILD EARTH 1, 2, 6, 7 (1998).

³⁰² See *id.* at 6. See also DAVE FOREMAN, *Chapter 8: Rewilding North America*, in *REWILDING NORTH AMERICA: A VISION FOR CONSERVATION IN THE 21ST CENTURY* 128 (2004) (explaining the role that top-trophic level carnivores play in sustaining ecosystem function and species diversity).

predators “are often instrumental in maintaining the integrity of ecosystems. In turn, the predators require extensive space and connectivity” between habitats.³⁰³

Here, too, offsetting could play a role by providing a funding mechanism for restoring or procuring land to fulfill such ambitious plans. This might necessitate an “unlike-for-unlike” or “trading up” form of offsetting, because, almost by definition, the existing nearby fauna no longer looks like what ecologists would wish to restore. Given the future, unpredictable vicissitudes of climate change, offsetting could allow managers and all citizens to decide with what kinds of ecological companions we wish to share our communities.

E. *Commodification May Be Unavoidable or Even Desirable*

For critics cited earlier in this Article, biodiversity is unique, priceless, defined by its geophysical location, and cannot be replaced or traded. For those that share this worldview, biodiversity offsetting will always be a non-starter.

Biodiversity offsetting symbolizes and advances a middle way between anthropocentrism, biocentrism, and ecocentrism; no matter why we prize biodiversity, well planned offsets can enhance the object of our moral allegiance. Offsetting exists between “new pragmatism” (biodiversity should exist solely for human use) and “traditional” (biodiversity for biodiversity’s sake, put a fence around it and defend it) conservationists. We may believe biodiversity is sacred and priceless,³⁰⁴ but, at least in the present, for most of us, that is not the way most of the world works. Supporters of offsetting believe that until we put an economic value on what has hitherto been unvalued or undervalued, biodiversity will continue to be disregarded as an unaccounted-for externality, a casualty of unfettered development. If done well, offsetting settles between caving to capitalism and using capitalism to put a value on what has previously been valueless.

In a classic article, economist Allen V. Kneese described how failing to account for externalities of our development leads to a market failure that creates environmental problems: “For example, an emission of smoke may cause damage to those impacted greater

³⁰³ FOREMAN, *supra* note 302.

³⁰⁴ Admittedly, that is how I view the world. *See also* G.A. Res. 37/7, World Charter for Nature (Oct. 28, 1982).

than what it would cost to curb the discharge. But since no market exists in which they can effectively express their willingness to change money for smoke reduction, their willingness to pay is not taken into account in the emitter's decision."³⁰⁵ Thus, we need to visualize development in an appropriately broad "problem shed," taking into account *all* of the benefits and costs flowing from the development. When we do so, we would account for, and assign a price to, all environmental externalities, including biodiversity diminution.³⁰⁶

Supporters stress that biodiversity offsetting puts a price on what had been previously priceless, making biodiversity destruction an untallied externality of development, leading us to squander this valuable resource.³⁰⁷ Biodiversity offsetting represents one way we can expand the problem shed, and put a price on the value of nonhuman life, thus balancing the books when nonhuman life is being destroyed due to human development.³⁰⁸

As J.B. Ruhl puts it, "money talks, plain and simple by putting raw economic values and other contributions to human well-being in play on behalf of conservation, it goes far to change the negotiation dynamics and final terms in the never-ending struggle between conservation and development. That may sound crass, and it rankles many who place primacy on environmental conservation, but it is what it is."³⁰⁹ Offsetting will pour billions of dollars into biodiversity conservation.³¹⁰

Nearly three quarters of the land in the continental United States is privately owned; half of all endangered and threatened species have 80 percent or more of their necessary habitat on private land.³¹¹ Once a price is put on biodiversity, private landowners have a heightened economic incentive to manage their

³⁰⁵ Allen V. Kneese, *The 'Problem Shed' As a Unit for Environmental Control*, 16 ARCHIVES ENVTL. HEALTH 124, 125 (1968).

³⁰⁶ *See id.* at 124.

³⁰⁷ *See, e.g.*, UNITED NATIONS ENVIRONMENT PROGRAM, TOWARDS A GREEN ECONOMY. PATHWAYS TO SUSTAINABLE DEVELOPMENT AND POVERTY ERADICATION 5–6 (2011).

³⁰⁸ *See* TEN KATE, *supra* note 29, at 12.

³⁰⁹ J.B. Ruhl, *In Defense of Ecosystem Services*, 32 PACE ENVTL. L. REV. 306, 311 (2015).

³¹⁰ *See* Kiesecker, *supra* note 194, at 265.

³¹¹ *See* MICHAEL BEAN ET AL., THE PRIVATE LANDS OPPORTUNITY: THE CASE FOR CONSERVATION INCENTIVES 2 (2003).

land for conservation.³¹² Endangered species become assets for a property owner to steward, not a liability to dread or even destroy surreptitiously.³¹³ The U.S. Department of the Interior's program to mitigate greater sage grouse diminution (and avoid formal listing under the ESA) seeks explicitly to make sage grouse assets, not liabilities, to property owners who conserve them.³¹⁴ Offsetting creates an expanded class of "enviropreneurs,"³¹⁵ who can participate in free market solutions to environmental conservation.

Under this view, the ESA and similar laws are not being undercut, but, instead, are acting as their framers intended, forging new ways to force development that balances economy and ecology in prudent ways. For the UK's leading biodiversity offset private company, offsetting "is not a license to trash, it is the complete opposite. When you put a value on biodiversity, you are putting a financial incentive for developers not to trash it."³¹⁶ Offsetting in the developing world could be used as a way for poor communities to benefit from stewarding biodiversity; this is often a justification for REDD+ (Reducing Emissions from Deforestation and Forest Degradation) offsets, as well.³¹⁷

Biodiversity offsetting can provide money in the form of

³¹² See Jessica Fox & Anamaria Nino-Murcia, *Status of Species Conservation Banking in the United States*, 19 CONSERVATION BIOLOGY 996 (2005). The government of New South Wales, for example, cites this as a major impetus for a move to private biobanking. See NSW GOVERNMENT, NSW BIODIVERSITY OFFSETS POLICY FOR MAJOR PROJECTS 8 (2017). The Australian Senate notes that biodiversity offsetting payments could also provide funds to help Aboriginal peoples manage communally owned land. See SENATE ENV'T & COMM. REFERENCES COMMITTEE, PARLIAMENT OF AUSTL., ENVIRONMENTAL OFFSETS 24 (2014) (Austl.); see also Jacqueline Lesley Brown, *Preserving Species: The Endangered Species Act Versus Ecosystem Management Regime, Ecological and Political Considerations, and Recommendations for Reform*, 12 J. ENVTL. L. & LITIG. 151, 244-46 (1997).

³¹³ See generally Bunn, *supra* note 221.

³¹⁴ See U.S. FISH & WILDLIFE SERVICE, *supra* note 47, at 4.

³¹⁵ See *What's an Enviropreneur?*, PERC (Dec. 1, 2017), <http://perc.org/programs/perc-enviropreneurs/enviropreneur-institute>.

³¹⁶ Tom Tew, CEO of the Environment Bank, quoted in Damian Carrington, *Biodiversity Offsetting Proposals 'a License to Trash Nature'*, THE GUARDIAN (Sep. 13, 2010), <http://www.theguardian.com/environment/2013/nov/12/biodiversity-offsetting-license-trash-nature>. When I interviewed David Hill, Chairman of The Environment Bank at the company's headquarters, they expressed this view as well. See Interview with David Hill, *supra* note 108.

³¹⁷ See Kormos, *supra* note 201, at 16. For comprehensive reviews of REDD+, see generally Takacs, *supra* note 122.

payments to help cash-strapped governments do what they might otherwise not be able to afford to do.³¹⁸ This certainly seemed like an impetus behind South Africa's offsetting plans.³¹⁹ A review of the potential of biodiversity offsetting in New South Wales notes that the government only supplies enough funds to manage 19 percent of species that are threatened.³²⁰ And Kiesecker et al. note that a single oil and gas field pumped \$24.5 million into a biodiversity mitigation fund in Wyoming, compared to \$4 million otherwise available for wildlife conservation.³²¹

Private managers (i.e. those who offer offsets for a business) may or may not be more nimble than government agencies in responding to climate change and other unanticipated ecological events, and may or may not be able to plan at an ecosystem level, rather at the caprice of random property-by-property development proposals.³²² But developers who try to create and implement their own offset projects are operating well outside their expertise.³²³ It may be prudent to encourage these new forms of business whose incentive is in healing the planet and who have the ecological expertise to do so adeptly.³²⁴ Private biodiversity bankers in the United States, United Kingdom, and Australia repeatedly told me that this is their business and livelihood, and they work to stay on good terms with (sometimes skeptical) government agencies who must approve their offset plans.³²⁵ That is to say, private bankers are subject to the law, they know its details, and are under great business pressure to demonstrate successful compliance. In certain

³¹⁸ For an example from Brazil, see Juan David Quintero & Aradhna Mathur, *Biodiversity Offsets and Infrastructure*, 25 CONSERVATION BIOLOGY 1121, 1122–23 (2011); JOSHUA BISHOP, IUCN WORLD CONSERVATION UNION, PRODUCING AND TRADING HABITAT, OR LAND DEVELOPMENT AS A SOURCE OF FUNDING FOR BIODIVERSITY CONSERVATION (2003).

³¹⁹ See Interview with Jeffrey Manuel, *supra* note 11; Interview with John Dini, *supra* note 103.

³²⁰ See NEIL BYRON ET AL., A REVIEW OF BIODIVERSITY LEGISLATION IN NSW 60 (2014).

³²¹ See Kiesecker, *supra* note 194, at 265.

³²² See Kai N. Lee, *Appraising Adaptive Management*, 3 CONSERVATION ECOLOGY (1999).

³²³ For example, in New South Wales formal law, “biobanking will also help to promote a move away from proponents buying land themselves for offsets, which is not their core business.” NEW SOUTH WALES GOVERNMENT, *supra* note 71, at 7.

³²⁴ See TEN KATE, *supra* note 29, at 10.

³²⁵ See Interview with Wayne White, *supra* note 237; Interviews with Paul Dettmann, *supra* note 240; Interview with Alan Key, *supra* note 86.

regions of California, developers have a choice to go with the one-stop shopping, preapproved Department of Fish and Wildlife banks, or to find their own.³²⁶ Their own can be cheaper (as developers can do their own negotiations or buy their own properties), but the Department-approved banks have readymade templates, and once the banks have undergone a rigorous approval process, offer nearly certain preapproval to the developer looking to fulfil the legal requirement as painlessly as possible.³²⁷ If a developer uses a bank, it pays more, but gets streamlined certainty.³²⁸

Some biodiversity banks I visited in central California and in Victoria and Queensland, Australia seemed like prime habitat in ecologically prudent locations that otherwise would have been destroyed, while others restored previously degraded land that now hosted endangered species where otherwise such conservation would not have existed. Biodiversity brokers with whom I have spent time in California, Australia, and the UK see themselves as models of corporate social responsibility, where their profits are tied to the public's interest in a sustainable environment; this was supported by the ecologically vibrant sites I viewed when we toured their properties.³²⁹ Thus, biodiversity may benefit greatly from offsetting done in private, professional hands, if done right. At the same time, we expect government entities to persist over the long term: will the same be true of private reserve managers tasked with shepherding biodiversity into eternity? For those who have fundamental objections to private investors profiting from biodiversity, there is no reason government entities themselves, or land trusts, or other NGOs, could not be the bankers or the brokers.

³²⁶ See Interview with Carl Wilcox, Cal. Dept. of Fish and Wildlife, in Yountville, Cal. (Aug. 1, 2014); Interview with Steve Morgan, *supra* note 63.

³²⁷ See Interviews with Paul Dettmann, *supra* note 240; Interview with Alan Key, *supra* note 86; Interview with Steve Morgan, *supra* note 63; Interviews with David Hill, *supra* note 108; Interview with Greg Sutter, President, Ecological Servs., in Cosumnes Floodplain Restoration Bank, Sacramento Cty., Cal. (Aug. 1, 2014).

³²⁸ See Interview with Carl Wilcox, Cal. Dept. of Fish and Wildlife in Yountville, Cal. (Aug. 1, 2014); Interview with Steve Morgan, *supra* note 63; Interview with Greg Sutter, Gen. Manager & Vice President, Westervelt Ecological Serv. and Cosumnes Floodplain Mitigation Banking Galt, Cal. (Sept. 11, 2014); Interview with Wayne White, *supra* note 237.

³²⁹ See Interviews with Paul Dettmann, *supra* note 240; Interview with Alan Key, *supra* note 86; Interview with Steve Morgan, *supra* note 63; Interviews with David Hill, *supra* note 108; Interview with Greg Sutter, *supra* note 327.

Indeed, a site I visited with the director of an Australian land trust—prime koala habitat, adjacent to an existing protected area, with funds obtained through selling credits to be used for other conservation projects—seemed a boon for the affected biodiversity.³³⁰

Offsetting done well will not be cheap, quick, or easy.³³¹ But by putting an economic value on nature and charging developers who destroy it—while anathema to purists—may, if done well, benefit biodiversity and the humans who depend upon it in the long term.

CONCLUSION

This Article has introduced biodiversity offsetting, laid out objections to the practice, and discussed ways and reasons that biodiversity offsetting could, and perhaps, should be part of our conservation practice in the Anthropocene era.

But my optimism is tentative and bounded: biodiversity offsetting is no panacea. In a forthcoming article, I will describe the legal conditions (rooted in existing best practices) that should apply if we are to make koalas (and valley elderberry longhorn beetles, and brigalow, and fynbos) tradeable commodities. To make koalas fungible, the law (and those implementing it) will have to pay attention to the variables of timing (e.g. when the offset needs to be in place and for how long), space (e.g. how far from the original destruction the offset must be), and type (e.g. what, exactly, is being traded for what). Laws must be clear on who has what responsibilities to ensure that the offsets succeed in perpetuity, with chaotic ecological contingencies (e.g. fires, climate change, species who do not do what we think they are going to do) factored in. The problem of environmental democracy³³²—who has a say in when and where offsets occur—will need to be addressed, and may prove unsolvable when offsets permit the loss of citizens' cherished natural surroundings. I will examine how and when the mitigation hierarchy (avoid and

³³⁰ See Interview with Alan Key, *supra* note 86.

³³¹ In papers I have written on REDD+, I make the point that to do REDD+ “right” might price the program out of existence. See David Takacs, *Environmental Democracy and Forest Carbon (REDD+)*, 44 ENVTL. L. 71, 113 (2014); Takacs, *supra* note 123.

³³² For a comprehensive discussion of environmental democracy promise and pitfalls in REDD+, see generally *id.*

minimize destruction before offsets are chosen) should work, the problematic nature of using complicated metrics to ensure “no net loss,” and the central role that ecological uncertainty will always play in trading certain destruction for unpredictable gains.

We are entering into uncharted territory as expanding human populations with exploding needs and desires will increasingly depend upon biodiversity. All the while biodiversity—depleted by human need and buffeted by climate change—will be increasingly unable to meet those needs.

But we should never waste a good crisis. We must constantly remind ourselves that humans are a part of, and not apart from, nature. We must figure out where and how we want to share the planet symbiotically with nonhuman nature upon which we depend. Biodiversity, and the humans who depend upon it, will require new, creative, diverse legal mechanisms to sustain it; and whether we like it or not, that is likely to include biodiversity offsetting. Ultimately, any given biodiversity offset will be preferable if it contributes to a world of “deep equity”—if it synergistically improves the health and potential of individual humans, human communities, and nonhuman communities.³³³ It will be up to environmental laws and lawyers to ensure this.

³³³ See David Takacs, *Forest Carbon Projects and International Law: A Deep Equity Legal Analysis*, 22 GEO. INT’L ENVTL. L. REV. 521 (2010).