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What Happens When Species Move but Reserves Do Not? Creating Climate Adaptive Solutions to Climate Change

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What Happens When Species Move but Reserves Do Not? Creating Climate Adaptive Solutions to Climate Change

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Most U.S. laws and regulations are not well-suited to respond to the effects of climate change, and the Endangered Species Act—the central federal law meant to protect threatened and endangered species at all costs—is no different. Conservation banking, an Endangered Species Act policy, is a market-based conservation strategy that incentivizes landowners to conserve species on their land. However, fee simple conservation strategies are ill-suited to protecting species on the move due to climate change. This Note first highlights the inadequacies of the current conservation banking system, then suggests how policy makers can transfer the market-based credit system used in conservation banking to a more climate-adaptive system that protects species on the move, which would better meet the goal of the Endangered Species Act to restore populations of listed species. This market-driven climate-adaptive strategy is a more effective means of protecting species that will be moving, while also helping to decrease the traditional conflict between species protection and use of private land.

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Introduction

The bighorn sheep is an icon of the southwestern United States. Adapted to rocky terrain, they have lived in the Sierra Nevada mountains of California for over three hundred thousand years.[1] Bighorn sheep have survived in the Sierra Nevada through at least three ice ages and subsequent periods of warming.[2] Adept at lithely grappling on craggy surfaces, it appears as though all species of bighorn sheep are now facing their largest set of obstacles yet: humans and climate change.[3]

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1. *Overview of Sierra Nevada Bighorn Sheep Research Projects*, Cal. Dep't Fish & Game, http://www.dfg.ca.gov/snbs/ProgramProjects.html (last visited Feb. 2, 2015) (stating that the Sierra Nevada bighorn sheep's history "goes back 300–400 thousand years").

2. *Id.* ("[B]ighorn sheep have persisted in the Sierra Nevada through at least three ice ages.").

3. *See* Christy M. McCain & Sarah R. B. King, *Body Size and Activity Times Mediate Mammalian Responses to Climate Change*, Global Change Biology, Jan. 22, 2014, at 1, 9 ("[L]arge-bodied, obligatory diurnal or nocturnal mammals are rapidly responding to current climate change and many of these responses indicate higher extinction risks. Most of these mammals are the charismatic fauna of North America[, including] bighorn sheep . . . ."); *see also Bighorn Sheep*, U.S. Nat'l Park Serv., http://www.nps.gov/romo/naturescience/bighorn_sheep.htm (last visited Feb. 2, 2015) ("Under the pressures of disease, hunting, and habitat alteration, the bighorn population declined until the middle of this century, when research in the 1950's indicated that about 150 bighorn remained in the area of Rocky Mountain National Park. The surviving bighorn herds were in areas less accessible to

After three hundred thousand years, California bighorn sheep, like their desert and Rocky Mountain relatives, are now facing pressure to move as a result of climate change.[4] Although they can move on almost any hilly surface, these sheep are not adapted to living on land humans have altered for their own uses.[5] Since humans have altered much of the western United States to suit their needs, bighorn sheep forced to move due to climate change pressures will continue to run into modified or destroyed habitat, which acts as a barrier preventing these sheep from finding a suitable habitat further north.[6]

Scientists predict that temperatures in the United States will rise between four and eleven degrees Fahrenheit by 2100.[7] This increase might be too great for many animals to acclimate, and many animals will

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human contact. Their range was limited to the isolated, high country regions . . . . The migrating, low-country herds were gone."); Sarah Jane Keller, *In a New Study, Megafauna More Likely to Feel Climate Impacts than Smaller Species*, HIGH COUNTRY NEWS (Jan. 27, 2014), https://www.hcn.org/blogs/goat/among-north-american-mammals-iconic-ones-are-most-likely-to-feel-impacts-from-climate-change ("[L]arger animals, like moose or desert bighorn sheep have to migrate on a larger scale, and that's often not possible because their habitats are too fragmented. If a herd of desert bighorn sheep tries to escape drought they are probably going to have to have to cross over vast, inhospitable valleys to do it."); *Basic Facts About Bighorn Sheep*, DEFENDERS OF WILDLIFE, http://www.defenders.org/bighorn-sheep/basic-facts (last visited Feb. 2, 2015) ("While livestock is not as much of a threat as in the past, loss of habitat from development is an increasing threat.").

4. *See supra* note 3 and accompanying text.

5. *See Basic Facts About Bighorn Sheep*, *supra* note 3 ("[L]oss of habitat from development is an increasing threat.").

6. *See* Keller, *supra* note 3 (discussing difficulties larger animals, such as bighorn sheep, face while traveling through fragmented habitat); *see also Peninsular Desert Bighorn Sheep Conservation*, CAL. DEP'T FISH & WILDLIFE, https://www.dfg.ca.gov/wildlife/Bighorn/Desert/Peninsular/Conservation.html (last visited Feb. 2, 2015) (attributing bighorn sheep decline to several human activities, including "habitat loss and modification, human disturbance, fragmentation due to roads, rail and tram construction, livestock grazing, disease, poaching, and fire suppression").

7. *Future Climate Change*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/climatechange/science/future.html (last updated Mar. 4, 2014). The projected range depends on which set of predictions scientists use to calculate the temperature rise. Although all future predictions have uncertainty, scientists have reached a general consensus that the global temperature is rising. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS 131 fig.1.4 (2013) (showing potential future rise in global temperature projected to 2035); *Climate Change Is Not Debateable*, CNN PRESS ROOM (Feb. 23, 2014, 2:41 PM), http://cnnpressroom.blogs.cnn.com/2014/02/23/climate-change-is-not-debateable ("[B]etween 95 percent and 97 percent of scientists agree that climate change is happening now, that it's damaging the planet and that it's manmade."). Approximately ninety-seven percent of climate scientists (climatologists) agree that human-caused climate change is occurring. *Consensus: 97 of Climate Scientists Agree*, NASA, http://climate.nasa.gov/scientific-consensus (last visited Feb. 2, 2015) (citing William R. L. Anderegg et al., *Expert Credibility in Climate Change*, 107 PROC. NAT'L ACAD. SCI. 12,107, 12,107 (2010)); Peter T. Doran & Maggie Kendall Zimmerman, *Examining the Scientific Consensus on Climate Change*, 90 EOS 22, 23 (2009); *see also* Naomi Oreskes, *The Scientific Consensus on Climate Change*, 306 SCI. 1686, 1686 (2004)).

be unable to adapt to quickly enough to stay where they are.[8] Like the bighorn, thousands of species are responding to the increase in temperature by moving or changing their species ranges an average of about seventeen kilometers a decade.[9] At this level of movement, most of these species will encounter land that has been repurposed in some way for human use.[10] Those that cannot survive in a human-dominated landscape may hit a wall of human development preventing them from finding suitable habitat elsewhere. These species could be hemmed in by a landscape changing coincident to climate change on one side, and human development on the other. Many species in this situation stand a high chance of going extinct without human intervention to help them survive.

Relatively recently, humans have begun to manage populations of previously ignored species under the auspice of conservation.[11] As humans living in a Western society, we tend to see solutions to other species' problems through at least two lenses: human and cultural.[12] In the case of climate-sensitive species, both lenses produce skewed results. From the human lens, unlike almost every other species on earth, humans have proven resilient in most every ecosystem we have encountered. Other species cannot acclimate to new habitats as well as humans can, and this sensitivity to change normally results in a decrease

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8. "Adaptation" is a term often used interchangeably with "acclimation." However, when biologists refer to adaptation, they are referring to the slow, multigenerational genetic changes that occur to species as the result of evolutionary pressures on a population. Conversely, individuals of a species "acclimate" to their surroundings when, for example, they move from a relatively oxygen-rich lower altitude to an oxygen-poor higher altitude. This acclimation is achieved, for instance, by producing more red blood cells to make it easier for the circulatory systems to carry enough oxygen to body tissues. *See* Ary A. Hoffmann & Carla M. Sgrò, *Climate Change and Evolutionary Adaptation*, 470 NATURE 479, 479 (2011) (discussing species' evolutionary adaptation to climate change); *see also* MERRIAM-WEBSTER'S COLLEGIATE DICTIONARY 8 (11th ed. 2003) (defining acclimation as the "physiological adjustment by an organism to environmental change").

9. *See* I-Ching Chen et al., *Rapid Range Shifts of Species Associated with High Levels of Climate Warming*, 333 SCI. 1024, 1024 (2011) (discussing the results of a meta-analysis of two taxa samples, representing 764 and 1367 species, respectively). In terms of latitude, species are moving at a "rate of 16.9 kilometers per decade." *Id.* Species are also moving up an average of 11 meters in altitude per decade. *Id.*

10. *See* Hillary Mayell, *Human "Footprint" Seen on 83 Percent of Earth's Land*, NAT'L GEOGRAPHIC NEWS (Oct. 25, 2002), http://news.nationalgeographic.com/news/2002/10/1025_021025_HumanFootprint.html ("[Eighty-three] percent of the total land surface and 98 percent of the areas where it is possible to grow the world's three main crops—rice, wheat, and maize—is directly influenced by human activities.").

11. *See generally* Endangered Species Act of 1973, 16 U.S.C. §§ 1531–44 (2014).

12. *See, e.g.*, Maria Kallery & Dimitris Psillos, *Anthropomorphism and Animism in Early Years Science: Why Teachers Use Them, How They Conceptualise Them and What Are Their Views on Their Use*, 34 RES. SCI. EDUC. 291, 291 (2004) (discussing human anthropomorphization of observed animal behaviors). This can be seen when humans attribute human emotions to an animal. However, human perception also affects our attempts to recover species. For example, U.S. wildlife management policies have primarily been couched in our assumption that these animals are beneficial to humans. *See* 16 U.S.C. § 1531 ("[F]ish, wildlife, and plants are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people.").

in species populations—sometimes to the point of extinction.[13] In the human paradigm, one would presume that a rational response to an unsuitable habitat would be to either alter the habitat or move. For humans, a move of ten thousand miles would not necessarily spell death; it would simply require that we practice another viable way of life. Other species do not have this same behavioral plasticity.

From the cultural lens, Western principles have affected the way we conserve species in the United States. One of our largest attempts to protect species has been to create wildlife refuges—land meant to be protected in perpetuity.[14] Fee simple conservation in a climate-changing world may make sense within the human land use context.[15] However, in the non-human setting, when a lack of necessary resources renders a species' land unusable, some individuals of a species on that land may die, and others may move to survive.[16] Especially considering the effect of climate change on many species' ranges and some species' connections to certain scarce resources,[17] fee simple ownership would seem like a ridiculous system for many species. If, for example, a squirrel is intimately tied to a species of acorn tree for food and shelter, any land that does not have these trees would be worthless to that squirrel. If the tree range moves, so must the squirrel. Likewise, if the species of acorn tree is dependent on a certain temperature and precipitation range, these trees cannot survive when viable conditions are not present.

The use of a fee simple paradigm to conserve non-human species is theoretically possible with active human involvement. Unlike most species, humans have the capacity to mold a plot of land to meet a wide variety of needs. On a small scale, we create artificial habitats with exotic pets in aquariums. Humans have also altered land for other species' use

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13. *See infra* Part II.A (discussing human-caused species declines primarily as the result of habitat modification).

14. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-07-1092, U.S. FISH AND WILDLIFE SERVICE: ADDITIONAL FLEXIBILITY NEEDED TO DEAL WITH FARMLANDS RECEIVED FROM THE DEPARTMENT OF AGRICULTURE 6 (2007), *available at* http://www.gao.gov/assets/270/266901.pdf ("[T]he [Fish and Wildlife] Service . . . has received at least 1,400 easement and fee-simple farmlands from the Farm Service Agency since 1986 . . . . scattered across 38 states . . . ."); *id.* at 1 ("Congress consolidated many of these lands into the National Wildlife Refuge System . . . .").

15. "Fee simple" is "[a]n interest in land that, being the broadest property interest allowed by law, endures until the current holder dies without heirs." BLACK'S LAW DICTIONARY 733 (10th ed. 2014). Fee simple ownership is also referred to as ownership in perpetuity. Implicit in the concept of fee simple ownership is the idea that the boundaries of the property interest do not migrate; they are fixed.

16. For example, see *infra* Part II.A for a discussion of human-caused species declines due to reduced resource availability.

17. *See* Chen et al., *supra* note 9, at 1024 (stating that species are moving at a "rate of 16.9 kilometers per decade"); *see also* Camille Parmesan, *Ecological and Evolutionary Responses to Recent Climate Change*, 37 ANN. REV. ECOLOGY, EVOLUTION, & SYSTEMATICS 637, 637 (2006) (finding that "[p]redator-prey and plant-insect interactions have been disrupted when interacting species have responded differently to warming" and that "resource use and dispersal have evolved rapidly at expanding range margins").

on a much larger scale and with much larger species populations. For example, humans introduced European grasses to the United States across millions of acres so that European cattle could graze in larger numbers.[18]

U.S. regulators and conservationists have looked for fee simple solutions to species declines, including the conservation of both federally[19] and privately[20] owned lands. One such conservation strategy is conservation banking, which allows the "taking," or the harming or killing of individuals of an endangered or threatened species, on one plot of to-be-developed land on the condition that the permittee compensate for this loss by buying habitat in a "bank" of land managed to preserve the target species "in perpetuity."[21] But what happens when the species moves?

This Note argues that a fee simple reserve system is not the best conservation strategy for species that are sensitive to, and likely to migrate due to, climate change pressures. Approval of this conservation method should rest upon a scientific assessment of the likelihood that a given species will move as a result of climate change. For those species that are likely to move large distances as early as the next fifty to 100 years, every fee simple acre devoted to conservation that the species can no longer use represents conservation value lost. In these instances, regulators should instead adopt a conservation strategy that moves with the species. To further this policy, this Note suggests that the Fish and Wildlife Service ("FWS") adopt a "climate banking" system—a market-based conservation scheme designed to fund monitoring and conservation efforts that follow species that are moving. For climate-sensitive species, this solution provides a more suitable private-land conservation strategy than the current conservation banking system.

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18. Joseph M. DiTomaso, *Invasive Weeds in Rangelands: Species, Impacts, and Management*, 48 WEED SCI. 255, 255–57, 259 (2000) (naming several grasses that were introduced from Europe because American grasses did not grow quickly enough to meet grazing quotas). This is not to say humans have been entirely successful or deliberate in their introduction of species. But this example does display one large-scale example of humans changing millions of acres of habitat to manage a species at otherwise unsustainable levels.

19. *See* Federal Land Policy and Management Act, 43 U.S.C. § 1701(a)(8) (2014) ("[T]he public lands [will] be managed in a manner that will protect the quality of . . . ecological, environmental, air and atmospheric, [and] water resource[s], and . . . will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife . . . ."); *see also* Endangered Species Act of 1973, 16 U.S.C. § 1534(a) (2014) (requiring the Secretaries of the Interior and Agriculture to "establish and implement a program to conserve [endangered and threatened] fish, wildlife, and plants"). This law applies both to public and private land.

20. *See* 16 U.S.C. § 1538(a)(1)(B) (prohibiting the "tak[ing] of *any* [endangered or threatened] species within the United States [or its territorial seas]" (emphasis added)). This prohibition against taking does not distinguish between public or private land.

21. Guidance for the Establishment, Use, and Operation of Conservation Banks, 68 Fed. Reg. 24,753, 24,753 (May 8, 2003) ("A conservation bank is a parcel of land containing natural resource values that are conserved and managed in perpetuity for listed species and used to offset impacts to the comparable resource values on non-bank lands occurring elsewhere.").

Part I of this Note gives an overview of some of the present and future dangers species face and then shifts to a general discussion of the primary U.S. law designed to protect threatened and endangered species: the Endangered Species Act. Part II discusses conservation banking and proposed best practices, leading to an overall assessment of the effectiveness of conservation banking as a conservation strategy. Part III provides a study of the San Joaquin kit fox, an example of a climate-sensitive species that is currently the target of several conservation banks. Part IV analyzes the adequacy of the responses by other scholars on the topic of climate change and conservation banking. In Part V, this Note discusses "climate banking," a new conservation strategy that includes adaptive responses to climate change in the core of its conservation model. Finally, this Note discusses and refutes some potential drawbacks to this new strategy.

I. An Overview of the Human-Caused Threats to Vulnerable Species

A. Negative Human Effects on Global Species Populations

The world has entered what two authors have called "the Anthropocene" epoch, an age in history where human activities have "major and still growing [planetary] impacts."[22] Historically, human effects on species have been enormous, and they continue to grow as our seven-billion-strong population continues to increase at more than twice the rate of human deaths.[23] Humans, just one species out of millions on Earth, use up to half of the terrestrial surface and over half of the global surface water.[24] Today, humans are a major—likely the largest—cause of species extinctions.[25] Scientists count habitat loss as one of "[t]he main causes of species extinction,"[26] and humans are the largest source of

22. Paul J. Crutzen & Eugene F. Stoermer, *The "Anthropocene,"* Global Change Newsl., May 2000, at 17, 17; *see also* Rodolfo Dirzo et al., *Defaunation in the Anthropocene*, 345 Sci. 401, 401 (2014) (referring to the recent wave of species loss as "Anthropocene defaunation").

23. *Current World Population*, Worldometers, http://www.worldometers.info/world-population (last visited Feb. 2, 2015) (dynamic clock showing the human population as over 7,287,385,650, with 360,000 births per day and 148,600 deaths per day as of this printing).

24. Peter M. Vitousek et al., *Human Domination of Earth's Ecosystems*, 277 Sci. 494, 494 (1997) (concluding that "[b]etween one-third and one-half of [Earth's] surface has been transformed by human action," as well as "more than half of all accessible surface fresh water").

25. Georgina Mace et al., *Biodiversity*, *in* 1 Ecosystems and Human Well-Being: Current State and Trends 77, 79 (Rashid Hassan et al. eds., 2005) ("Over the past few hundred years humans may have increased the species extinction rate by as much as three orders of magnitude."); *see also* Shahid Naeem et al., *Preserving Nature*, *in* 2 The Endangered Species Act at Thirty: Conserving Biodiversity in Human-Dominated Landscapes 70, 71 (J. Michael Scott et al. eds., 2006).

26. Mace et al., *supra* note 25, at 79; *see also* Naeem et al., *supra* note 25, at 72. Other human-related impacts on species include, inter alia, the introduction of invasive species, hunting, pollution, and climate change. *See* Mace et al., *supra* note 25, at 79; Naeem et al., *supra* note 25, at 71.

habitat loss.[27] Human-caused climate change also affects species viability through a combination of habitat loss and ecosystem changes that are occurring due to local changes in precipitation and temperatures.[28]

Species extinction is occurring at a rate of as much as 1000 times the rate species were going extinct before humans began to hunt and farm.[29] This amounts to a loss of 150 to 200 species each day.[30] This extinction rate may eventually lead to the loss of as much as fifty-eight percent of all species worldwide.[31]

There are currently more than 20,000 threatened species worldwide,[32] including 1517 populations listed as being in danger of extinction in the United States alone.[33] Left unchecked, it is clear that humans will continue habits that lead to species extinctions. Markets have traditionally ignored species loss as an externality to productive economic activities, such as farming or foresting.[34] It is often even worse when species are valued in markets—with notable examples of unsustainable exploitation in rhinoceroses, gorillas, and elephants,[35] to name a few.

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27. *See* Naeem et al., *supra* note 25, at 72 (listing human-caused "habitat modification" as one of the main—likely *the* main—source of habitat decline).

28. *Id.*; *see* Mace et al., *supra* note 25, at 79.

29. Stuart L. Pimm et al., *The Future of Biodiversity*, 269 SCI. 347, 347 (1995) (measuring a range of an increase of species extinction rates "100 to 1000 times their pre-human levels").

30. *The State of the Planet's Biodiversity: Key Findings from the Millennium Ecosystem Assessment*, U.N. ENV'T PROGRAM, http://www.unep.org/wed/2010/english/biodiversity.asp (last visited Feb. 2, 2015).

31. Chris D. Thomas et al., *Extinction Risk from Climate Change* 427 NATURE 145, 146 (2004). This number varies greatly. In his analysis, Thomas estimates the total number of extinctions to range from as few as eleven percent of all species to as many as fifty-eight percent. *See id.* at 146, tbl.1; *see also* Mace et al., *supra* note 25, at 79 (estimating that "[b]etween 12 and 52 of species . . . are threatened with extinction").

32. *Table 1: Numbers of Threatened Species by Major Groups of Organisms (1996–2013)*, IUCN REDLIST, http://www.iucnredlist.org/documents/summarystatistics/2013_1_RL_Stats_Table1.pdf (last updated July 8, 2013). This number should be much higher. Of the over 70,000 species it has evaluated, the IUCN found 28.5 to be threatened. The total number of described species, however, is over 1.7 million, and the total number of species may be over 8 million. If nearly thirty percent of the 8 million total species are threatened, then the total number of endangered species may amount to 2.28 million. *See id.*

33. *Summary of Listed Species Listed Populations and Recovery Plans*, U.S. FISH & WILDLIFE SERV., ENVTL. CONSERVATION ONLINE SYS., http://ecos.fws.gov/tess_public/pub/Boxscore.do (last visited Feb. 2, 2015). Fish and Wildlife Service ("FWS") counts thirteen species twice due to distinct geographical ranges. *Id.*

34. *See, e.g.*, J.N. Pretty et al., *An Assessment of the Total External Costs of UK Agriculture*, 65 AGRIC. SYS. 113, 125 (2000) (discussing the externalization of biodiversity loss from farming in the United Kingdom).

35. Edie Freedman, *Tracking the Black Market in Endangered Species*, O'REILLY (Mar. 6, 2013), http://animals.oreilly.com/tracking-the-black-market-in-endangered-species (listing, inter alia, the price for gorillas at $40,000, elephants at $28,200, and one kilogram of Rhino horn at $97,000). The reasons for black market prices are complex and dependent on the region. For the purposes of this discussion, it is only necessary to note how valuable these species can be to some buyers.

B. The Endangered Species Act as a Response to Species Declines

The Endangered Species Act ("ESA") was created as a response to the massive loss of species habitat and population numbers in the United States from the start of Western colonization to 1973, when the ESA was enacted.[36] Congress explicitly addressed this concern, noting that "various species . . . have been rendered extinct as a consequence of economic growth and development untempered by adequate concern and conservation."[37]

A species becomes "listed" under the ESA, meaning that it qualifies for protection, when the Secretary of the Interior finds that a species faces a danger of,[38] or will likely face a danger of,[39] becoming extinct either globally or locally. This protection applies to species on both public[40] and private lands.[41] Consistent with current scientific findings listing habitat loss as a key risk to species,[42] a central mechanism of species conservation is habitat protection. Because of this, FWS prohibits certain types of habitat modification on private land if this modification would directly harm a listed species.[43]

II. Species Conservation on Private Land

This Part first discusses the perverse incentive the ESA brought to bear on listed species present on private land, and then provides both the purpose and structure of conservation banking as a solution to this problem.

A. The Perverse Incentives of the ESA

It is difficult to imagine how species conservation could be successful without cooperation from private landowners. Private landowners own nearly seventy percent of the land in the United States.[44] This percentage of privately owned land rises to as much as

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36. J. Michael Scott et al., *Introduction*, *in* 1 The Endangered Species Act at Thirty: Renewing the Conservation Promise 3, 3–4 (Dale D. Goble et al. eds., 2006) ("[M]ore than five hundred species formerly found in the United States are presumed to be extinct . . . .").

37. Endangered Species Act of 1976, 16 U.S.C. § 1531(a)(1) (2014).

38. *See id.* § 1532(6) (defining "endangered species").

39. *See id.* § 1532(20) (defining "threatened species").

40. *Id.* § 1534(a).

41. *Id.* § 1538(1)(a)–(g) (listing the different types of prohibited acts which apply on both private and public land).

42. *See* Naeem et al., *supra* note 25, at 72–73.

43. *See* Babbitt v. Sweet Home Chapter of Cmtys. for a Great Or., 515 U.S. 687, 708 (1995) (holding that the definition of harm "include[s] 'significant habitat modification or degradation that actually kills or injures wildlife'" (quoting Endangered and Threatened Wildlife and Plans Rule, 50 C.F.R. § 17.3 (1995))). Under this definition of harm (one type of taking), private landowners can be liable under the ESA for using their land in a way that is unsuitable for species conservation.

44. Barton H. Thompson, Jr., *Managing the Working Landscape*, *in* 1 The Endangered Species Act at Thirty: Renewing the Conservation Promise, *supra* note 36, at 101, 101.

ninety percent in some states.[45] The remaining thirty percent of land in the United States is mostly underproductive land.[46] As much as eighty percent of listed species use private land to some extent.[47] To rest a conservation strategy solely on thirty percent of the least productive lands in the nation would likely fail.

Since the ESA prohibits the "taking" of listed species, no matter where they are found,[48] the Act places concrete restrictions on private land use when a listed species is present on private land.[49] Although the ESA is meant to protect species from harm, the restriction on private land use where a listed species is found often provided a perverse incentive for private landowners to harm the very species Congress intended the ESA to protect.[50]

Often, landowners purchase land for a specific economic purpose that could harm members of a listed species. The discovery of an endangered species on this land could lead to use restrictions that would prevent landowners from maximizing the expected economic gain from their land. If, for instance, a logger accidentally cuts down a tree that is home to endangered owlets and FWS finds that all the landowner's trees are suitable endangered owl territory, the logger may be enjoined from cutting any of the remaining trees on her land. The discovery of a listed species could turn a profitable plot of land into a financially toxic one, especially if the landowner purchased this land with the intent of regularly harvesting lumber.

This threat of substantial financial loss creates an incentive for the landowner to hide the existence of a listed species on her land from the federal government and others.[51] The ESA comes into force against

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45. *Id.*

46. *Id.*

47. *Id.*

48. "Take" is defined in the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect." Endangered Species Act of 1973, 16 U.S.C. § 1532(19) (2014).

49. *See* Endangered and Threatened Wildlife and Plants Rule, 50 C.F.R. § 17.3 (2014) (stating the definition of harm "include[s] significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering").

50. *See generally* Daowei Zhang, *Endangered Species and Timber Harvesting: The Case of Red-Cockaded Woodpeckers*, 42 ECON. INQUIRY 150 (2004) (discussing preemptive habitat destruction to prevent use by endangered species); Amara Brook et al., *Landowners' Responses to an Endangered Species Act Listing and Implications for Encouraging Conservation*, 17 CONSERVATION BIOLOGY 1638 (2003) (discussing landowners' negative responses to the potential listing of a mouse species, noting that many landowners sought to harm the species on their land and would not allow for information gathering on their land). After the Supreme Court decision in *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, there is no doubt that at least some modifications of private land that "actually harm" a listed species are forbidden under the ESA. 515 U.S. 687, 702–03 (1995) (rejecting private landowners' argument that the ESA places no extra burden on private landowners because if the Secretary of the Interior wanted to, she could simply acquire owners' land for public use under eminent domain).

51. Of course, there is also a financial incentive to rob a bank. The ESA is designed to criminally penalize anyone who takes a species. However, the bank analogy does not fully capture the "take"

private landowners if they actually harm a species, or if harm would result from a landowner's proposed land use. Conversely, the landowner will only be liable if and when: (1) a federal agent or concerned citizen learns about the existence of the listed species on the owner's land, and (2) there is admissible evidence of a taking. The low likelihood of reprisal and the frequently high stakes that are involved can create a strong economic motivation to kill, hide, or remove a listed species or its habitat from the land before the existence of the species becomes known to others. This creates what one author has labeled a "perverse incentive[] . . . to 'shoot, shovel, and shut up.'"[52] Or, to put a spin on the popular idiom "what you do not know cannot hurt you," the landowner may conclude that "what the enforcer does not know cannot be harm."

B. Conservation Incentives and Incidental Take Permits

Aldo Leopold once observed, "conservation will ultimately boil down to rewarding the private landowner who conserves the public interest."[53] Congress first authorized the use of conservation incentives by amending section 10 of the ESA in 1982.[54] The goals of these policies are both to remove some of the negative incentives the harsh language of the ESA creates, as well as to add positive inducements for private landowners to willingly enlist the use of their private property into the conservation of federally listed species.[55] All of the incentives that section 10 provide must flow through the incidental take permitting process.[56] Incidental take permits ("ITPs") allow the "taking [of listed species] otherwise prohibited by [the ESA] if such taking is incidental to . . . the carrying out of an otherwise lawful activity."[57] For example, if a housing developer wishes to cut down trees that are part of endangered marbled murrelet nesting sites, she must request an ITP from FWS claiming she is carrying out some otherwise lawful activity. This is in

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dynamic. In the example of endangered species habitat on private land, there are no security alarms or CCTV cameras watching a person's every move. A landowner who takes a species or destroys habitat often leaves little trace of either. The criminal deterrence aspect of the ESA is probably mildly effective. Nevertheless, the minimal threat of reprisal and the potentially large economic impacts both indicate that criminal deterrence alone will not likely save species. The threat of the stick does not refute the existence of the carrot.

52. Albert C. Lin, *Participants' Experiences with Habitat Conservation Plans and Suggestions for Streamlining the Process*, 23 Ecology L.Q. 369, 382 (1996).

53. Aldo Leopold, The River of the Mother of God and Other Essays 202 (Susan L. Flader & J. Baird Callicott eds., 1991).

54. Sarah Matsumoto et al., Citizens' Guide to the Endangered Species Act 35 (2003).

55. *See id.* at 47 (discussing a 1997 congressional bill intended to enhance existing "incentives for private landowners to protect species and their habitat").

56. *See* Endangered Species Act of 1973, 16 U.S.C. § 1539(a) (2014) (discussing incidental take permitting requirements).

57. *Id.* § 1539(a)(1)(B).

contrast to the harshness of the pre-section 10 ESA that would give FWS no choice but to deny any land use that harmed listed species habitat.

There are limitations on FWS's discretion to allow the incidental taking of listed species. The permitting agent is only allowed to approve incidental takes if the permittee (the land developer), "to the maximum extent practicable, minimize[s] and mitigate[s] the impacts of such taking," and "the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild."[58] An approved ITP will enumerate conditions the developer must fulfill to ensure that she mitigates development impacts and does not further threaten the survival of the species.[59] The prescribed conditions can either be performed on the landowner's land[60] or off-site in a compensatory mitigation scheme such as conservation banking.[61] Of course, the incentive for these programs is the promise that FWS will leave the developer alone so long as she satisfies the conditions in her ITP. In the case of conservation banking, both the developer and the banker may receive an economic benefit from the conservation in the form of a development permit or funding to conserve land.[62]

Section 10 truly began to take hold in the 1990s, amid a conservative swing in Congress.[63] Then-Secretary of the Interior, Bruce Babbitt, endeavored to make the ESA more politically palatable to congressional conservatives by promoting compromises to reduce perceived conflicts between development and species conservation.[64] These incentives have taken various forms, including safe harbor agreements,[65] candidate conservation agreements,[66] and habitat conservation plans,[67] a subset of which are conservation banks.[68]

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58. *Id.* § 1539(a)(2)(B)(ii), (iv).

59. *Id.* § 1539(a)(2)(A)(ii), (iv).

60. *See* Endangered and Threatened Wildlife and Plants Rule, 50 C.F.R. § 17.3 (2014) (defining a habitat conservation plan as a plan "required by section 10(a)(2)(A) of the ESA that an applicant must submit when applying for an incidental take permit").

61. *See* Memorandum from Dir. of U.S. Dep't of the Interior on Guidance for the Establishment, Use, and Operation of Conservation Banks to the Reg'l Dirs. of Regions 1–7 & Manager of Cal. Nev. Operations 4 (May 2, 2003), *available at* https://www.fws.gov/endangered/esa-library/pdf/Conservation_Banking_Guidance.pdf [hereinafter Banking Guidance] (explaining that the legal basis for conservation banking is grounded in section 10).

62. *See id.* at 1 (discussing the benefits of conservation banking for developers and bankers). For a discussion on conservation banking, see *infra* Part II.C.

63. *See* Dale D. Goble, *Evolution of At-Risk Species Protection*, *in* 2 THE ENDANGERED SPECIES ACT AT THIRTY: CONSERVING BIODIVERSITY IN HUMAN-DOMINATED LANDSCAPES, *supra* note 25, at 6, 21 (explaining that Republican victories in 1994 led to increased debate regarding the ESA).

64. *See id.* at 21–22.

65. Thompson, *supra* note 44, at 119.

66. *Id.* at 122.

67. *Id.* at 106.

68. Jessica Fox et al., *Conservation Banking*, *in* 2 THE ENDANGERED SPECIES ACT AT THIRTY: CONSERVING BIODIVERSITY IN HUMAN-DOMINATED LANDSCAPES *supra* note 25, at 228, 228.

C. Conservation Banking

Conservation banking curiously started in 1995 with a bad bank loan.[69] Before 1995, ITPs were issued but there was no guarantee that FWS would approve these proposed conservation plans, which created high transaction costs.[70] Bank of America obtained Carlsbad Highlands, a proposed housing development, through the foreclosure of a 6.8 million dollar loan.[71] This land was valued far below the value of the loan as a result of a late-1980s California housing bust.[72] This property was, and still is, the site of the habitat of the coastal California gnatcatcher, an endangered bird.[73] Listed as threatened under the ESA, the presence of the coastal California gnatcatcher further decreased the value of the land.[74] After Bank of America considered its options, it decided to push for the creation of a "banking" system.[75] Under this new banking system, conservation bank owners were contractually bound to conserve species and their habitat in "conservation bank" land preapproved by FWS for ITP mitigation purposes. Because the bank land is preapproved for mitigation, FWS assured developers that buying banking credits would allow the agency to quickly approve the developers' mitigation proposals, reducing time, cost, and uncertainty.[76] The Carlsbad Highlands conservation bank is still operational today, its credits fully sold.[77]

In 2003, nearly eight years after California established its first conservation bank, FWS officially approved of the practice and wrote guidelines to implement conservation banking nationwide.[78] According to FWS guidelines, conservation banking is beneficial from at least four

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69. Anne T. Lawrence, *The Emergence of Conservation Banking in Southern California*, *in* Ahead of the Curve: Cases of Innovation in Environmental Management 93, 93 (Ken Green et al. eds., 2001).

70. *See id.* at 100. James Jackson, Vice President of Bank of America's Costa Mesa office, explained "how screwed up the [federal ITP] system was . . . [developers would] go out and find some property for mitigation, take it to the feds, and the government would [refuse to approve it]." *Id.*

71. *Id.*

72. *Id.* at 95–96.

73. *Carlsbad Highlands Conservation Bank*, Species Banking, http://us.speciesbanking.com/pages/dynamic/banks.page.php?page_id=7191 (last visited Feb. 2, 2015).

74. *Id.* Traditionally, endangered species on private land inhibited a variety of potential land uses. Even in the case of incidental take permitting, land use is restricted and landowner duties to protect the listed species increase. This places a cloud on the title, decreasing the value of the land. *See* Ike C. Sugg, *Caught in the Act: Evaluating the Endangered Species Act, Its Effects on Man and Prospects for Reform*, 24 Cumb. L. Rev. 1, 67 (1993) (citing *National Environmental Forum Survey*, Times-Mirror Mags., June 1992, at 23) (discussing land devaluation arising from ESA species protection on private land).

75. *See* Lawrence, *supra* note 69, at 100–01 (summarizing Bank of America's efforts in creating the conservation banking system).

76. *Id.* at 100 (stating that a "preapproved bank . . . would take the guessing out of [mitigation proposals]," and that preapproved banks would create a "superior product [that would get] preferential treatment in the [mitigation] marketplace").

77. *Carlsbad Highlands Conservation Bank*, *supra* note 73.

78. *See generally* Banking Guidance, *supra* note 61.

perspectives: FWS's, the developer's,[79] the owner of the conservation bank's ("banker"),[80] and the species'.[81] First, banking is attractive to FWS because it encourages participation in federal conservation efforts by private landowners.[82] Banks can be large enough to mitigate dozens of projects, and tend to be better managed than other mitigation strategies.[83] Second, the developer benefits because banking "saves time and money by identifying pre-approved conservation areas [and] sellers [and by] simplifying the regulatory compliance process and associated paperwork."[84] Third, from the banker's perspective, banking can turn the financial liability of having listed species on her land into a long-term income-generating activity.[85] Finally, banking is beneficial to species because a species ostensibly has a professionally restored and managed habitat available for eternity, through efforts such as revegetation and stream improvement.

The conservation banking system is arguably more protective of species than many other of today's private land use conservation strategies. As its name suggests, conservation banking requires the landowner to conserve the species. In the context of the ESA, a mandate to "conserve" is stronger than the typical section 10 mandate to "mitigate" adverse impacts as a result of the incidental take.[86] Mitigation is, for the most part, a negative duty, as it requires that a landowner do nothing directly to harm a species and to limit the incidental harm her actions cause to the species.[87] Conversely, the ESA defines conservation

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79. It is possible that ITPs may be granted for purposes other than what is traditionally referred to as "development." The label "developer" is used in this Note as a label to help differentiate between the buyer of credits (developer) and the seller of credits (banker).

80. The literature does not refer to the group of landowners that own conservation banks as bankers, but the name seems appropriate. The landowner-banker conducts a transaction that deposits the value of the developer's investment in a bank. Of course, this comparison is not directly parallel. Nevertheless, the label is suitable, and it serves the purpose of distinguishing between the parties involved in banking transactions.

81. Banking Guidance, *supra* note 61, at 1.

82. *See id.* at 2 ("Conservation banking reduces the piecemeal approach to conservation efforts that can result from individual projects by establishing larger reserves and enhancing habitat connectivity.").

83. *Id.* (explaining that conservation banks can be "large enough to accommodate the mitigation of multiple projects"). For a list of comments discussing the failure of other types of mitigation tools, see Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,594, 19,595 (Apr. 10, 2008) (to be codified at 40 C.F.R. pt. 230) ("[T]here is greater risk and uncertainty associated with in-lieu fee programs regarding the implementation of the compensatory mitigation project and its adequacy to compensate for lost functions and services."); see also *id.* at 19,619 ("[O]n-site avoidance often result[s] in small areas for compensatory mitigation projects, which are unlikely to function properly.").

84. Banking Guidance, *supra* note 61, at 1.

85. *Id.*

86. *See* Endangered Species Act of 1973, 16 U.S.C. § 1539(a)(2)(A)(ii) (2014) (provision requiring incidental take permittees to "minimize and mitigate" adverse impacts to listed species that will result from their proposed land use).

87. Mitigation, 40 C.F.R. § 1508.20 (2014) Mitigation includes:

> (a) Avoiding the impact altogether by not taking a certain action or parts of an action.

as the use of all methods necessary to recover listed species.[88] Although "conservation" in the context of the ESA is a term of art that does not necessarily require conservation bank owners to fulfill the statutory conservation mandate of the ESA, conservation banking does typically impose more land use restrictions and other affirmative duties on the bank owner. Bankers are typically required to:

- enter into a Conservation Banking Agreement with the Service;
- grant a conservation easement to an eligible third party, precluding future development of the property and restricting certain land uses;
- develop a long-term management plan for the conservation bank; and
- provide funding for monitoring and long-term management of the conservation bank.[89]

These assurances are typically more elaborate than the conditions of other ITPs.[90] For instance, most other permits will not typically require a conservation easement on the land set aside for mitigation purposes, but this is commonplace in the context of conservation banking.

The process of establishing a bank and receiving an ITP is relatively straightforward. Banking is market driven, so it should only exist where there is a demand for development on land inhabited or used by listed species.[91] When the developer decides to develop land that contains a listed species or its habitat, she may apply for an ITP that would allow her to "take" a small number of the listed species so long as the taking is

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(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

Id. I refer to this as a negative duty because, unlike a conservation mandate that would require a landowner to take active steps to improve a species' habitat, mitigation only requires the landowner to take steps to ensure the species is no worse off than it was before the landowner's activities.

88. 16 U.S.C. § 1532(3).

89. *For Landowners—Conservation Banking: Frequently Asked Questions*, U.S. FISH & WILDLIFE SERV., http://www.fws.gov/endangered/landowners/conservation-banking-faq.html (last updated July 15, 2013).

90. Habitat conservation plans ("HCPs") require the permittee to fulfill mitigation conditions in the ITP. However, HCPs do not require the permittee to place a conservation easement on her land, restricting many land uses for the foreseeable future. *See, e.g.*, Endangered and Threatened Wildlife and Plants Rule, 50 C.F.R. § 17.22(b)(3) (2014) (not listing a conservation easement as a mandatory term in a habitat conservation plan).

91. *See* John Merrifield, *A Market Approach to Conserving Biodiversity*, 16 ECOLOGICAL ECON. 217, 221 (1996) (describing the effect of market forces on market-driven environmental trading systems, such as conservation banks).

incidental to the purpose of the permit.[92] Since the proposed development will take a listed species, FWS will place conditions on the approval of the ITP that provides for the minimization and mitigation of adverse effects of the developer's proposed land use.[93] If there is a conservation bank in the area,[94] FWS or the developer can request that the developer's mitigation occur through the purchase of bank "credits."[95]

D. Credit Concerns

A banking credit is "a unit of measure representing the quantification of species or habitat conservation values within a conservation bank."[96] FWS explains this more fully in its guidelines:

> The values of the natural resources are translated into quantified "credits." Typically, the credit price will include funding for the long-term natural resource management and protection of those values. Project proponents are, therefore, able to complete their conservation needs through a one time purchase of credits from the conservation bank. This allows "one-stop-shopping" for the project proponent, providing conservation and management for listed species in one simplified transaction.[97]

Despite its relatively innocuous definition, the concept of "quantifying" nature has been hotly debated.[98] Scholars have noted that assigning a value to listed species habitat runs a high risk of miscalculation.[99] Just like any other market that trades in dissimilar items, for conservation banking to exist there must be fungibility, or the ability to find a common trading denominator.[100] This fungibility is

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92. *See* Endangered Species Act of 1973, 16 U.S.C. § 1539 (2014) (providing for approval of ITPs for the incidental take of listed species).

93. *See* 50 C.F.R. § 17.3 (2014) (mandating conditions that minimize and mitigate harm to listed species in a habitat conservation plan).

94. The service area is typically "located within areas designated in recovery plans" of listed species. Banking Guidance, *supra* note 61, at 8. Developers wishing to develop within a given species' protected range will normally be able to compensate for the use of this land by purchasing credits in a bank that is the species habitat range near the development site. *See id.* at 8–9.

95. *Id.* at 4.

96. *Id.* at 17.

97. *Id.* at 2.

98. *See* James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 Stan. L. Rev. 607, 607 (2000) (stating that environmental trading markets often trade in "nonfungibilities" of "type, time, and space").

99. *See generally id.* (discussing the complications with the commodification of natural resources).

100. The easiest example of this is the use of currency. In many early markets, people traded one good for another—such as a pair of shoes for two shirts. Because most items are of unequal value in the market, they are said to lack fungibility. Conversely, currency creates a common denominator for consumers to exchange. Additionally, the dollar is fungible—each U.S. dollar is of identical value to the market. Benjamin Geva, *From Commodity to Currency in Ancient History-on Commerce, Tyranny, and the Modern Law of Money*, 25 Osgoode Hall L.J. 115, 118 n.16 (1987). In the conservation banking market, "credits" serve a similar function as the U.S. dollar. Developers who

largely a false construct, as many of the items being traded will not be equivalent.[101] Nonetheless, environmental market participants must equate the value between one lost acre of to-be-developed land that is currently home to the coastal California gnatcatcher on Blackacre to the value of the to-be-conserved gnatcatcher habitat on Greenacre. To do so requires some method of valuation based on our understanding of each land value as it relates to the species. For instance, if gnatcatchers require scrub oak for nesting and only prey on a certain type of coastal insect, the credit may be valued based on the availability of each habitat feature in Blackacre and Greenacre, respectively. If Greenacre is rich in prime habitat relative to Blackacre, then Greenacre's habitat will be valued more highly per acre than Blackacre's.

As FWS conservation banking guidelines suggest, the valuation system is mostly static. There is only one transaction between the developer and banker and only one set value for Greenacre's credits.[102] Once both are valued, these values practically never change. FWS contends that it can change the value of bank credits, but it is highly constrained from doing so for two notable reasons. First, once a transaction is complete, it cannot be undone.[103] The permittee will not be required to purchase more credits if the banker's land becomes less valuable. FWS is allowed to penalize bankers, but doing so may force the banker to devote banking funds to litigation that could better be spent maintaining and restoring habitat. Second, even if FWS could change the value or suspend the sale of the remaining credits in a bank, this threat is moot in cases where a banker has completely sold all of the bank's credits.[104] This rigidity prevents any meaningful change once a bank is established. Even if the needs of the species change or new conservation

must mitigate the destruction of ten acres of an endangered species' habitat can accomplish this mitigation through the purchase of credits on the banking market. At least in the eyes of the banking market, this makes the destroyed and banking habitats fungible.

101. *See* Salzman & Ruhl, *supra* note 98, at 662–64 (discussing the nonfungibilities of type, space, and time).

102. *SEE* Banking Guidance, *supra* note 61, at 9 (stating that, for a certain type of conservation bank, "credits should be based on the biological values of the bank at the time the bank agreement is established").

103. FWS conservation bank guidelines do not explicitly state that credits cannot be recalled, but it is nonetheless unlikely that they can be. For example, in the section of the guidelines labelled "Remedial Actions," FWS does not state that credit recall is an acceptable remedy for bankers who do not adequately perform their conservation duties. *See id.* at 14. The most drastic measure envisioned by the guidelines is to force the absent banker to sell her land to a responsible third party who will continue to conserve it. *See id.*

104. Once a credit is sold, its value is fixed. Changing the value of sold credits would only add instability to the market. Thus, if a bank's credits have all been sold, FWS no longer considers altering the value of the credits as a penalty. Although FWS has not indicated that it would consider penalizing negligent bankers by forcing them to buy credits in other banks to compensate for the low quality of their own bank, this could be a possible remedy. *See* Banking Guidance, *supra* note 61, at 14 (discussing remedial action in the form of suspending pre-sale credits but not listing a credit-reevaluation remedy for banks that have sold all their credits).

strategies become available, the conditions in the banking agreement may prove resistant to the addition of new strategies. In light of something as dynamic and challenging as climate change, this resistance to change may not adequately conserve climate-sensitive species.

This rigidity in credit values is deliberate. Without predictable credit prices, both bankers and permittees may find the investment to be too risky.[105] Conservation banking markets need fungibility to function, so FWS pushes habitat features into artificial boxes of similar habitat features.[106] As the founder of the banking system recognized, "a preapproved bank . . . would take the guessing out of [the incidental take permitting process]."[107] A lack of market clarity could very easily push many, if not most, market participants away from buying and selling credits.

A fee simple, single-transaction market system may provide market stability, but it also creates the risk of more externalities or permanent losses for which the bank does not account.[108] The largest potential externality of a one-off investment in species habitat is that it cannot account for that land's future value to the target species or any other species. In the realm of climate change, habitat could be irreversibly modified in the next fifty to one hundred years, let alone in the duration imagined by the artificial concept of ownership in perpetuity. Rising sea levels could swallow coastal habitat; drought could dry and then burn forest habitat. In short, the banking system externalizes the reality that many species can or must move from their current habitats in the coming decades. In this future scenario, conservation banks would externalize all conservation costs that must occur outside of the bank's boundaries when banking species move off the banking habitat. Every acre of banking land originally intended for perpetual conservation that can no longer be used by the species is bank value lost. Every new acre enlisted outside of the bank that must add protective measures for listed species due to species movement is a cost for which the conservation banking system does not account.

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105. Silvia Wissel & Frank Wätzold, *A Conceptual Analysis of the Application of Tradable Permits to Biodiversity Conservation*, 24 CONSERVATION BIOLOGY 404, 407 (2010) ("High transaction costs may reduce market activity and may arise as a result of complicated and time-consuming administrative procedures.").

106. *See* Salzman & Ruhl, *supra* note 98, at 662–64. For example, the cost of establishing a bank may be prohibitive without some initial up-front investment. It follows that there may be a lag between when the listed species habitat is destroyed on the developed land and when the bank is able to compensate for that loss. When a species lives without suitable habitat comparable to the habitat it lost, this time is permanently lost; it can never be recompensated.

107. Lawrence, *supra* note 69, at 100 (discussing the historically ambiguous ITP approval policy of FWS).

108. *See* Salzman & Ruhl, *supra* note 98, at 624–25, 662–64.

III. Case Study: The San Joaquin Kit Fox

The San Joaquin kit fox illustrates why banking may not be well-suited for some species. The kit fox is a native California species historically found throughout California's San Joaquin Valley.[109] Adapted to desert and grassland habitat,[110] its numbers began to decline dramatically due to increased human presence and land development.[111] Now, the kit fox lives on the small fragments of undeveloped land that can still support it—mostly on the Valley's outskirts.[112]

A study by M. Rebecca Shaw and others modeled the effect that climate change would have on the remaining populations of the San Joaquin kit fox.[113] Shaw projected the kit foxes' likely climate change-related movement from today to 2100.[114] The Shaw study concluded that within fifty to one hundred years, little to no suitable habitat would remain throughout the entire area currently home to the kit fox.[115] The Shaw study found that "[e]stablishing a static network of connected reserves through acquisition or set-asides may not be effective in the future given ecological, economic, and social responses to climate change are likely to be nonlinear and multidirectional."[116]

The high likelihood that the kit fox will move away from most or all of the lands it is currently inhabiting makes it a difficult species to manage within a fee simple paradigm, and conservation banking will likely not be an adequate conservation solution. Nonetheless, the kit fox is a current target species in at least five conservation banks.[117] In the Palo Prieto Conservation Bank, it is the only species targeted for protection, and in the Haera Wildlife Conservation Bank, it is one of

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109. Endangered Species Prot. Program, U.S. Envtl. Prot. Agency, Endangered Species Facts: San Joaquin Kit Fox 1 (2010), *available at* http://www.epa.gov/espp/factsheets/san-joaquin-kitfox.pdf [hereinafter Kit Fox Facts].

110. *Id.* (describing kit fox habitat as "largely annual grassland"); *see also* Theresa Nogeire et al., Presentation on Impacts of Habitat Loss, Climate Change and Pesticide Exposure on Kit Fox Populations at the Ecological Society of America (Aug. 5–10, 2012) (stating that kit foxes are "desert-adapted").

111. *See* Kit Fox Facts, *supra* note 109, at 1.

112. *Id.*

113. *See* M. Rebecca Shaw et al., *Economic Costs of Achieving Current Conservation Goals in the Future as Climate Changes*, 26 Conservation Biology 385, 389 tbl.1 (2012) (identifying the kit fox as having a narrow climatic range, a long dispersal distance, and requiring at least 215,501 hectares of land to survive as a species).

114. *Id.* at 387.

115. *Id.* at 391 fig.2 (graph showing the ratio of undeveloped "area with suitable climate . . . to the baseline conservation goal under climate change").

116. *Id.* at 394.

117. *Conservation and Mitigation Banks in California Approved by CDFW*, Cal. Dep't of Fish & Wildlife, https://www.wildlife.ca.gov/Conservation/Planning/Banking/Approved-Banks (last visited Feb. 2, 2015) [hereinafter *Approved California Banks*] (listing currently approved conservation banks in California, including those for the San Joaquin kit fox).

only two protected species.[118] If Shaw's models are correct, then by as early as 2050, neither the banks nor their surrounding lands will provide suitable habitat for the kit fox due to likely changes in vegetation and water availability, which could eliminate suitable resources for the fox and its prey.[119]

Banking may be a good short-term solution for the kit fox. It provides the fox with suitable, maintained habitat mostly free of pesticides and land uses that are incompatible with the fox's needs.[120] However, conservation banking will likely not provide a long-term solution in light of the kit fox's predicted response to climate change. Bankers who attempt to dutifully maintain kit fox habitat may nonetheless find that kit foxes, their habitat, or their food sources have moved. Alternatively, if the conservation bank habitat remains suitable as land outside of the bank becomes unsuitable, the banking system may create an ecological "island" population of kit foxes.[121] This "island" population may then be unable to rejoin or move with larger populations of the fox that could potentially move great distances due to climate change.

IV. Potential Solutions to Species Movement Due to Climate Change Within the Conservation Bank Paradigm

Relatively few authors have addressed the issue of climate adaptation as it relates to conservation banking. One set of authors suggests maintaining the current banking system, but handling climate-change issues on a case-by-case basis due to "the difficulty in predicting the magnitude and impact of climate changes in specific regions."[122] However, these authors do not suggest how this case-by-case analysis

118. *Id.*

119. Nogeire et al., *supra* note 110; *see Basic Facts About San Joaquin Kit Foxes*, Defenders of Wildlife, http://www.defenders.org/san-joaquin-kit-fox/basic-facts (last visited Feb. 2, 2015) (discussing threats to the kit fox, including drought, climate change, and habitat modification, which make it difficult for kit foxes to find food).

120. Nogeire et al., *supra* note 110 (summary of the effects of climate change and pesticides on kit fox populations); *see also* Paul Schaefer, *Kit Fox Gets Some Protection in California*, Envtl. News Network (Sept. 27, 2007, 7:41 PM), http://www.enn.com/wildlife/article/23452 (listing some conservation measures undertaken at a kit fox conservation bank intended to "maintain or enhance the health and ecology of the natural habitat").

121. A habitat "island" could be any species habitat that is separated from other suitable habitat on all sides by unsuitable habitat. *See* Angela D. Yu & Simon A. Lei, *Equilibrium Theory of Island Biogeography: A Review*, *in* Shrubland Ecosystem Genetics and Biodiversity: Proceedings 163 (2001), *available at* http://www.fs.fed.us/rm/pubs/rmrs_p021.pdf (commenting on "the theoretical similarities between [ocean] islands and fragmented mainland landscapes").

122. Robert Bonnie & David S. Wilcove, *Ecological Considerations*, *in* Conservation & Biodiversity Banking: A Guide to Setting Up and Running Biodiversity Credit Trading Systems 59 (Nathaniel Carroll et al. eds., 2008).

might be conducted; their only advice is to stay away from species' upper and lower habitat ranges.[123]

At least one author has analyzed this problem in depth. In his Note, Tristan Kimbrell found that conservation banking, as it currently exists, may be insufficient to protect listed species.[124] Kimbrell analyzed three alternative strategies for confronting the issue of conservation bank species moving: (1) maintaining the current banking system as-is, (2) proactively purchasing banking land where species will likely move, and (3) forcing current bankers to either purchase other banks' credits or buy more banking land when species have moved off their lands.[125]

Kimbrell rejects leaving the banking system "as-is"[126] for reasons already addressed in this Note.[127] Namely, the species may move, leaving the banker with the compulsory yet depressing task of maintaining a habitat for a species that is no longer present. Kimbrell also eliminates the second solution of proactively creating banks in potential future species locations.[128] Kimbrell concludes that this solution will likely fail because, even with our best modeling of future species movements, models will likely "not be able to accurately predict where a listed species will occur in the future," and such a modeling system would be costly.[129] This banking policy would also be unable to predict future land use changes that may decrease the quality or the effectiveness of a future bank.[130]

Kimbrell finally settles on a "stepping-stone approach," where the "conservation bank owner must buy land where the species currently exists and must either create a conservation easement for those new lands, or buy credits for that species in another conservation bank where the species currently exists."[131] Kimbrell suggests that current bankers would be able and willing to afford this because bank owners can terminate the conservation easement on their land then sell it, or they could alternatively use the money earned from the original bank purchase to purchase a conservation easement or bank credits on new land.[132] Under Kimbrell's proposal, conservation bank land must be

123. *See id.* (suggesting a case-by-case approach for siting conservation banks and advising bankers to use caution when siting near the southern or northern limits of species ranges, but offering no further advice).

124. *See* Tristan Kimbrell, Note, *Moving Species and Non-Moving Reserves: Conservation Banking and the Impact of Global Climate Change*, 22 FORDHAM ENVTL. L. REV. 119, 120 (2010) (explaining that when "species migrate[] away from the conservation bank land due to climate change or some other ecological interaction, . . . developers are developing land but the species is not being protected in the long-term").

125. *Id.* at 139.

126. *Id.* at 119, 141–43 (noting that "[m]oving species present a problem for non-moving preserves because the species meant to be protected may migrate out of the fixed preserve").

127. *See supra* Part III.

128. Kimbrell, *supra* note 124, at 145.

129. *Id.*

130. *Id.*

131. *Id.* at 146.

132. *Id.*

easily interchangeable with new, equally valued land where the species currently exists. One acre in the banker's old bank would simply be replaced by one new acre where the species has moved. The conservation easement that the banker has placed on the banking land could essentially be removed from the old banking land and transplanted to the new land. The cost to improve the new plot of land must also be accounted for in the initial credit purchase in the old bank.

Kimbrell's approach will likely fail for several reasons. First, Kimbrell does not account for the dynamics of multispecies or multipurpose banks. For instance, the majority of conservation banks in California are set up for multiple species, or for both species and wetlands mitigation.[133] Since conservation banking and wetlands mitigation—a market-based conservation system for wetlands—flow through different statutes and require separate credit sales and permitting processes, it would not likely be as simple as a banker pulling up tent poles and relocating with the species.[134] In addition, species will move off the banker's property in any direction that contains suitable habitat.[135] This problem may be compounded in the case of a multispecies bank, since different species tend to respond to climate change and habitat modifications differently.[136] With these factors in mind, a land sale and relocation mandate for bankers could range from being financially stringent to impossible.

Kimbrell's preferred solution also ignores the subjective attachment that landowners have with their land.[137] If the banking contract practically requires landowners to be disgorged from their lands to afford

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133. *See Approved California Banks*, *supra* note 117.

134. The Army Corps of Engineers and Environmental Protection Agency have the authority to permit wetland dredging and filling through section 404 of the Clean Water Act. Clean Water Act § 404, 33 U.S.C. § 1344(a) (2014). These agencies have interpreted this authority to allow for mitigation banking, a market-based credit system akin to conservation banking. *See Mitigation Banking Factsheet*, U.S. ENVTL. PROT. AGENCY, http://water.epa.gov/lawsregs/guidance/wetlands/mitbanking.cfm (last updated Mar. 20, 2014) (defining mitigation banks, and stating that "[t]he value of a bank is defined in 'compensatory mitigation credits'"). The section 404 permitting authority is independent of the authority to approve ITPs for listed species through section 10 of the ESA. Even if it would make sense for an endangered species to be protected on another site, a banker who has sold both species and wetlands credits would not be able to abdicate her duties under the Clean Water Act. The banker would still be required to maintain the wetlands located within the original bank for mitigation banking purposes.

135. *See* Shaw et al., *supra* note 113, at 394 (describing species dispersal in response to climate change as "nonlinear and multidirectional").

136. *Id.* at 389 tbl.1 (showing conservation goals, ranging from narrow climatic range and short dispersal distance to wide climatic range and long dispersal distance).

137. *See* Po-Hsin Lai & Urs P. Kreuter, *Examining the Direct and Indirect Effects of Environmental Change and Place Attachment on Land Management Decisions in the Hill Country of Texas, USA*, 104 LANDSCAPE & URB. PLAN. 320, 321 (noting that people often form "emotional ties [with their land] that provide an anchor for individuals to cultivate a sense of self, self-esteem, and belonging").

credits in other banks when a target species moves, this could act as a disincentive for would-be bank owners who would like to keep their land whether they retain the profit from a conservation bank or not. Landowners in this category may refuse to enter into new conservation banking contracts, even in the unlikely event that these new contracts proved more lucrative. This would further weaken an already thin banking market, which would make it more difficult for bankers to fulfill Kimbrell's suggested requirement of purchasing new credits or easements when species move.

In addition, conservation easements are likely more difficult to remove than Kimbrell suggests. An easement is a property right in perpetuity.[138] Contrary to Kimbrell's suggestion, conservation easements are incredibly difficult to extinguish or modify, even with the police power of eminent domain.[139] Thus, a conservation banker who would prefer to sell her old banking land may very well end up stuck with both a financially unattractive piece of property containing a conservation easement and a duty to purchase more credits with money she may not have. With regard to species that will likely disperse widely over the coming years, bankers would be left with the duty to purchase many more acres of conservation easements, leaving a trail of ecologically beneficial but financially toxic land in the banker's wake. If the initial complication of multispecies banks is not enough to prevent would-be bankers from entering into the market, the "continual purchase" provision would act as a glaring "DO NOT ENTER" sign to future bankers.

Finally, Kimbrell's solution could create costly litigation in an industry that is already cash strapped and sparsely litigated.[140] For example, under Kimbrell's proposal, bankers might need to sue to: (1) terminate conservation easements on their old conservation banks; (2) challenge an FWS decision that the conservation bank's target species are moving off of the banking land; or (3) challenge contract terms requiring bankers to purchase credits in other banks or divest in their

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138. Derrick P. Fellows, Note, Kelo, *Conservation Easements, and Forever: Why Eminent Domain Is Not a Sufficient Check on Conservation Easements' Perpetual Duration*, 35 WM. & MARY ENVTL. L. & POL'Y REV. 625, 630 (2011) (stating that even eminent domain is an "inadequate remedy to counteract the otherwise perpetual nature of many conservation easements").

139. *See generally id.* (discussing the complex legal issues involved in exercising eminent domain against conservation easements); *see also* Dana Joel Gattuso, *Conservation Easements: The Good, the Bad, and the Ugly*, NAT'L CTR. FOR PUB. POL'Y RES. (May 2008), http://www.nationalcenter.org/NPA569.html ("Outcomes [from attempts to terminate conservation easements] could differ depending on the specific language of the easement, state law, and interpretations of the residing courts. Laws generally favor honoring perpetuity, primarily because grantors receive federal tax benefits for donating or selling conservation easements only if they are perpetual.").

140. Currently, conservation banks are hardly ever the subject of litigation. This could change, however, if landowners were contractually obligated to either sell land that they did not wish to sell or buy new land they are unable to afford. These added duties could easily compel bankers to litigate against FWS to challenge the terms of their banking agreements.

own banks. This sort of legal conflict would use resources better spent on species conservation, on both the federal and private sides.

V. Climate Banking

A. Climate Banking as a Viable Alternative to Conservation Banking

As species move in response to climate change, the static assumptions on which a reserve-based system, such as conservation banking, rests will likely fail to adequately conserve species.[141] Current models of species movement implicate a more dynamic approach to species conservation that assumes species movement in response to the multifarious pressures of climate change and habitat modification. Therefore, any new conservation policy that FWS promotes should be more climate-adaptive. These new climate-adaptive strategies should not simply seek to conserve species where they currently are; instead, these new strategies should proactively seek to conserve species as they move.

As FWS indicates in its conservation banking guidelines, it views market-based conservation incentives as a viable incentive to promote conservation on private land.[142] If FWS chooses to continue to use a market-based system to conserve listed species, it should do so under a more climate-adaptive framework. I refer to this new system as "climate banking."

Unlike the purely fee simple conservation banking system, climate banking aims to incorporate species movement into its conservation strategy. Under a climate-banking system, FWS can continue to use its current conservation banking credit system to acquire the financial means to conserve species on private land.[143] On the land to be

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141. Thompson, *supra* note 44, at 103 ("To the degree that the habitat of a species is evolving, a pure reserve strategy also may not be ecologically sustainable in the long run.").

142. Banking Guidance, *supra* note 61, at 1 ("Conservation banking is attractive to landowners and land managers because it allows conservation to be implemented within a market framework, where habitat for listed species is treated as a benefit rather than a liability.").

143. Although there is no unanimous support of the commodification of species habitat, FWS has signaled that it plans to continue to endorse market-based conservation incentives on private land, such as conservation banking. Commodification will consistently fail to capture the true value of species habitat as it is available today and in the future, and this value will be consistently in flux both in the short and long term. At the very least, a market-based credit system can provide more conservation resources for moving species than other schemes currently available. Although it is a less than ideal solution, I propose climate banking under these practical and political constraints. *See* Wissel & Wätzold, *supra* note 105, at 404 ("[T]he application of tradable permits to biodiversity conservation is a complex issue because destroyed and restored habitats are likely to differ. There may be various trade-offs between the ecological requirements that destroyed and restored habitats be as similar as possible, and the need for a certain level of market activity to have a functioning trading system."); *but cf.* Banking Guidance, *supra* note 61, at i (asserting that conservation banking promotes

developed, climate credits can be calculated as they were before, with a monetary conservation value attached to them. The developer can purchase these credits on an open market within the service area of the bank, as is the current practice.

The main difference between conservation banking and climate banking is that these credits will not be sold exclusively to fee simple banks. Instead of promoting the conservation of a purely fee simple conservation system, "climate credits" will be sold to a "climate banker"—a private conservation organization that enters into an agreement with both the developer and FWS to follow the climate bank's target species as it moves. Under a climate-banking agreement, the climate banker's duty of following the target species will be two-fold: to monitor species movement and to implement conservation measures where the target species are found.

The monitoring component of climate banking would serve the important function of tracking species. This sort of tracking is of paramount importance since one of the largest "unknowns" of how species will respond to climate change is where species will move.[144] This sort of species tracking could be undertaken either intrusively, through the insertion of subdural GPS devices into certain individuals of the banking species, or unobtrusively, by periodically searching for signs of species on land, such as the presence of fox dens.[145] As the climate banker monitors and tracks the species, it would have an affirmative duty to report this information to FWS and to publicize this information, either through the maintenance of its own website or through FWS's maintenance of a nationwide information clearinghouse.[146] As the

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the purpose of the ESA because it "provides a collaborative incentive-based approach to endangered species conservation, which . . . can aid in the recovery of the species").

144. *See* Kimbrell, *supra* note 124, at 145 (arguing that a "weakness of [the purchasing future habitat] approach is that ecological models may not be able to accurately predict where a listed species will occur in the future to make this approach feasible").

145. Biologists use both methods to monitor and track study species. So long as the climate banking company works with the approval of FWS, any "taking" under the ESA should be approved, and, therefore, incidental to the climate banker's goal of species conservation. *See* Robert R. Ream et al., *Population Dynamics and Home Range Changes in a Colonizing Wolf Population*, *in* THE GREATER YELLOWSTONE ECOSYSTEM: REDEFINING AMERICA'S WILDERNESS HERITAGE 349, 352–54 (Robert B. Keiter & Mark S. Boyce eds., 1994) (radio-collar tracking of species movements); Khristen Foss, *OR-7 (The Lone Wolf) Continues to Travel*, ROCKY MOUNTAIN TRACKING (Dec. 6, 2011) (GPS tracking); James Hadler et al., *West Nile Virus Surveillance in Connecticut in 2000: An Intense Epizootic Without High Risk for Severe Human Disease*, 7 EMERGING INFECTIOUS DISEASES 636, 636 (2001) (visual tracking). This sort of tracking could easily fall under the ESA section 10 take exception, allowing "any act . . . for scientific purposes or to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations." Endangered Species Act of 1973, 16 U.S.C. § 1539(a)(1)(A) (2014).

146. The information-gathering step is crucial, and it is also often very cost intensive. Conservation efforts can only actively protect those individuals of a species that can be located. *See* David T. Barnett et al., *The Art and Science of Weed Mapping*, 132 ENVTL. MONITORING & ASSESSMENT 235, 236

climate banker collects this information, it can also report any unauthorized takings of listed species, which could improve the enforcement function of the ESA.[147]

Although information gathering is an important step in conserving species as they move, climate bankers would need to use the majority of the resources they receive from climate credits to actively conserve the species where it is found on private land. Habitat restoration and maintenance activities should focus on holistically accommodating the target species' resource needs on private land. Also, climate bankers could be encouraged to aggressively adopt new proven conservation strategies as they are developed.[148]

As listed species move, they will enter different privately held land. Once a climate bank's target species moves, the climate banker would then need to obtain permission to conduct its conservation activities on those private lands. Climate bankers can obtain this permission through the ITP process. For example, if a landowner wishes to use portions of her land already in use by a listed species, she would likely need to obtain an ITP, which would contain conditions meant to protect the listed species. One such ITP condition would be to allow the climate banking company access to relevant portions of the landowner's land to conduct its conservation activities. Since the climate banking company already has an approved conservation strategy, climate banking could then be used to streamline the incidental take permitting process on private land. In this scenario, the private landowner may be responsible for mitigating the adverse effects of her incidental take, but the climate

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(2007) ("Mapping[, a form of information gathering,] records what, how much, and where . . . species exist on a landscape, and, when implemented over time and space . . . helps predict the spread of species, facilitates the exchange of data between agencies, and increases public and political awareness."); *see also You Can Be a Scientist, Too!*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/climatestudents/
scientists/citizen-science.html (last visited Feb. 2, 2015) (listing various organizations and projects that request volunteers to help gather information "by observing the world around [them] and reporting what [they] find").

147. This suggestion is tenuous. FWS walks a thin line between promoting conservation and creating enmity towards it. Deputizing climate bankers as FWS reporters could create deep distrust between landowners and climate bankers, which could limit climate bankers' access to target species and foster general distrust for their work. However, having bankers constantly survey private land for signs of listed species could also help FWS fulfill its mandate to protect listed species. Although admirable, I would advise against making climate bankers play an enforcement role, at least until they have become better established in the field.

148. Other conservation methods have proven to be inflexible and may disincentivize adoption of new conservation strategies. *See Lawsuit Challenges Plan to Log 150,000 Acres in Northern California,* CENTER FOR BIOLOGICAL DIVERSITY (Aug. 12, 2013), http://www.biologicaldiversity.org/news/press_releases/
2013/fruit-growers-supply-08-12-2013.html (discussing a habitat conservation plan containing a fifty-year contract term where the landowner would only be required to meet mitigation measures agreed upon at the signing of the document).

banker would be responsible for using the assets it has acquired from credits sold to it to take on the more costly task of conserving the species on private land.[149]

At the same time that climate banking companies are conserving and monitoring species where they are found, climate bankers could proactively encourage target species to use ecosystem corridors predetermined to be ecologically suitable paths to larger public lands.[150] To achieve this, climate bankers could establish and sell credits to proactively restore and maintain habitat in these "least-cost" corridors, with the understanding that there is a high likelihood that target species will prefer to use, and will tend to fare better, on these paths.[151]

Currently, conservation banking is primarily conducted by for-profit organizations that specialize in conservation banking.[152] The new climate banking system could be conducted by these same for-profit organizations, with a similar or greater degree of auditing and reporting than these organizations are subject to under the current system.[153] Because these organizations specialize in habitat management, FWS generally considers their work to be of an acceptable quality.[154] However, environmentally focused nonprofit organizations and local agencies would also be able to perform these same duties, possibly with less doubt that these organizations are "act[ing] in the public interest."[155] Currently, all three types of bankers are encouraged to manage banks and sell credits. Unless one type of organization (public, private, or nonprofit) proves to be more effective or trustworthy at managing

149. *See* Banking Guidance, *supra* note 61, at 2 (discussing the difference between mitigation and conservation).

150. *See* KRISTEEN PENROD ET AL., S. COAST WILDLANDS PROJECT, SOUTH COAST MISSING LINKAGES PROJECT: A LINKAGE DESIGN FOR THE TEHACHAPI CONNECTION 9 (2003) (discussing a study mapping a set of least-cost corridors for several listed species, defined as "the zone in which [all modeled species] would encounter the least energy expenditure," which would increase species' chances of survival).

151. *See id.* at 8.

152. *See Wildlands: The Leader in Mitigation Banking*, WILDLANDS, http://www.wildlandsinc.com/about/company-overview (last visited Feb. 2, 2015); *see also Approved California Banks*, *supra* note 117 (listing all the banking sites in California, categorized by ownership type).

153. *See* Banking Guidance, *supra* note 61, at 13, 16–17 (listing reporting and monitoring requirements required to be placed in the banking agreement). In particular, climate banking could profit from more explicit and increased auditing requirements. Increased FWS auditing would be advised especially when climate banking is first introduced to ensure this conservation strategy proves beneficial to the managed species and to iron out any wrinkles.

154. I found little discussion about the benefits of one organization over another in the conservation banking context. However, the longer-established and similar mitigation banking programs have discussed the advantages of each type of bank owner. *See*, e.g., Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,594, 19,606 (Apr. 10, 2008) (to be codified at 40 C.F.R. pt. 230). In another market-based banking context, that privately owned banks "have certain advantages. They have a strong financial incentive to provide effective, timely mitigation that may be lacking for noncommercial entities." *Id.*

155. *Id.*

climate banks over time, all three should be encouraged to participate in this new market.[156] Since commercial entities are the main participants in the current banking market, it would seem natural that they would also be the vanguard of any new banking system.

The inception of a new climate banking incentive system does not entirely obviate the need for conservation banks or other reserves. Even if climate banks become the main focus of the market-based private conservation movement, conservation banks could be used as stints in the "artery" corridors keeping these least-cost corridors open. Since these corridors will likely be valuable highways for the movement of multiple species in the future, conservation banks could be funded and maintained as a conservation easement in perpetuity. The owners of these strategically placed conservation banks would be required to assist the conservation mandate of the climate banker for the duration that the target species remain on the conservation banker's land. However, in the climate-change scenario, the overall goal of the conservation bank would be to make movement to listed species' ultimate habitat possible.

As with conservation banking, climate bankers will have to have some incentive structure to encourage good work. In the current conservation banking system, private bankers are, at a minimum, financially motivated to effectively manage their land. They are also contractually bound to regularly fulfill certain minimum duties, and they risk losing the ability to sell credits and to manage their banking land if they fail to meet these requirements.[157] FWS may also require the banker to post a "bond equal to the present value of the management costs . . . to ensure performance."[158] FWS should continue to use all of these tactics to ensure private banker performance. For nonprofit and government actors, the incentive will not only be fear of breach of contract and other remedial action, but also that that these organizations are inherently motivated to "act in the public interest."[159] Additionally, all three types of organizations would suffer reputational losses if they fail to satisfactorily meet their climate banking obligations. A loss in reputation may lead to organizational difficulty in fundraising, selling credits, or getting new bank lands approved for sale.

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156. Currently, there is insufficient information to determine whether there should be a preference for public, private, or nonprofit management of these banks. Unless and until there is a consensus favoring or disfavoring one organizational type of banker, I propose to allow all three players to continue to participate in this new market.

157. *See* Banking Guidance, *supra* note 61, at 14 (discussing remedial actions in the event the bank owners fail to meet their obligations).

158. *Id.*

159. *See* Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,594, 19,606 (Apr. 10, 2008) (to be codified at 40 C.F.R. pt. 230).

B. Potential Problems with the Climate Banking System

Although climate banking has clear conservation advantages with regard to managing populations of moving species, the mobility of this new program may also cause some noteworthy drawbacks. First, despite the incentives climate banking may offer to landowners, there may still be resistance to letting strangers onto landowners' lands for trust and privacy reasons. For instance, a landowner may be concerned that the climate banker may report observed malfeasance to FWS, such as destroyed habitat or injury to protected species, which may cause FWS to initiate an enforcement action against the landowner. Additionally, landowners may simply feel uncomfortable with having guests on their land whom they would not have otherwise invited. If several landowners in a key corridor refuse access, this refusal could stymie the work of the climate banker and weaken efforts to conserve the listed target species.

As to landowners' concerns about being reported for ESA violations, FWS already attempts to ease landowner fears through selective enforcement of the ESA and the addition of "no surprises" clauses in their ITPs.[160] With "no surprises" clauses and the broader ITP structure, FWS guarantees landowners will not be penalized for an incidental take of species or unforeseen habitat destruction on their land.[161] With regard to landowners' other privacy concerns, ITP conditions normally require the landowner to permit FWS access to their land for auditing and inspection purposes.[162] Presented with a choice to allow a climate banker or a government official onto their land, landowners may prefer to provide land access to the climate banker. Finally, any trust issues and privacy concerns will likely diminish as climate bankers become an established presence and landowners begin to form relationships with these organizations.

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160. *See* Endangered and Threatened Wildlife and Plants Rule, 50 C.F.R. § 17.32(b)(2)(A)–(F) (2014) (guaranteeing that FWS will not hold landowners liable for incidental takings of listed species so long as permittees meet permit conditions for species listed in their ITPs); *see also* Spirit of the Sage Council v. Norton, 294 F. Supp. 2d 67, 79 (D.D.C. 2003) (FWS asserting that the no surprises rule is simply a codification of their preexisting authority to selectively enforce the ESA).

161. U.S. Fish & Wildlife Serv., Habitat Conservation Plans: Section 10 of the Endangered Species Act 1 (2005), *available at* http://www.fws.gov/endangered/esa-library/pdf/HCP_Incidental_Take.pdf. FWS only guarantees protection from enforcement in response to *unintentional* harm. Nothing in any future regulatory scheme will likely reward landowners who intentionally harm a listed species. Therefore, any guarantee the "no surprises" policy and ITPs provide to landowners will likely be limited to unintentional harm only. Landowners who intentionally harm species may still expose themselves to being reported to FWS by climate bankers.

162. U.S. Dep't of the Interior, Fish & Wildlife Serv. et al., Habitat Conservation Planning and Incidental Take Permit Processing Handbook app. 4 at 5 (1996), *available at* http://www.fws.gov/endangered/esa-library/pdf/Hcpapp4.pdf (permit template listing as one of FWS's responsibilities as "monitor[ing] the implementation [of the Permit] including each of the terms of [the Implementing] Agreement . . . in order to ensure compliance with the Permit").

FWS also has the option to employ more forceful methods to ensure landowner cooperation. Most importantly, landowners who wish to continue to use land that is a listed species' habitat need to have a valid ITP in order to do so. FWS could grant permits only on the condition that if a species is the target of a climate bank, the climate banker will be allowed to conduct its conservation activities on relevant portions of the landowner's land. Since climate banking may reduce the total cost of the landowner's ITP performance, it is reasonable to imagine that many landowners would welcome the addition of this term. If FWS chooses to allow some landowners to exclude climate bankers from their lands, FWS could either require the recalcitrant landowner to purchase extra climate bank credits to offset their incidental take, or FWS could transfer the extra cost of conservation that would have been covered by the climate banker onto the private landowner in the form of stricter on-site ITP conditions. In situations where landowners take on the climate banker's conservation duties, climate bankers may still play an important advisory role by instructing the landowner on how to effectively perform her new duties.

Second, following species that are dispersing in several directions may become very costly for climate bankers, or some habitat modifications may be relatively expensive to undertake. Since climate banking would be a voluntary market, the risk of costs outrunning profits would likely be the main reason climate bankers would not enter into this market.

There are several ways in which climate bankers could mitigate these costs. First, FWS could limit climate bankers' duties until their bank has a certain minimum amount of credits purchased. For instance, climate bankers may only be initially required to maintain a limited portion of the target species' service area at first, which would then grow as the banker's bank becomes better established. If populations of a species start to split into distinct segments, a climate banker who does not have the resources to conserve all populations could also apply to FWS to only conserve certain populations. Next, if the climate banker reports to FWS that a target species is expensive to conserve, FWS could internalize this cost by raising the cost of climate credits to developers. Alternatively, FWS could provide funding to climate bankers to control excessive costs.

Despite these potentially unforeseeable costs, climate banking may prove to be a more cost-effective solution than conservation banking. Unlike conservation banking, climate banking would not require bankers to conserve land in fee simple. Thus, although climate bankers may need to be more mobile than conservation bankers, climate bankers would feasibly be able to function at a fraction of the cost of conservation

banking.[163] As with conservation banking, climate bankers must pay to improve and maintain climate banking land. Because climate bankers may continually move with the species, the cost of habitat improvement and maintenance would potentially be greater than that of the conservation bankers, who would likely be required to improve their banking land less often. This increased cost should be offset by the climate bankers' avoidance of land purchase and annual land taxes. Additionally, climate bankers may be able to substantially reduce the cost of land improvement by proactively improving least-cost corridors for use by multiple climate banking species.[164]

CONCLUSION

The best scientific information we have indicates humans are the major cause of global climate change. Humans are responsible for a greatly magnified rate of species extinction. Many believe that conserving species is simply the right thing to do. However, even the less environmentally motivated members of our species can recognize the immense economic and informational benefit other nonhuman species have. Each lost species signals the permanent loss of millennia of information and future value. In the end, each lost species is a lost opportunity.

Although some species, such as humans and cockroaches, are better equipped to acclimate to a variety of ecosystems, a vast majority of species are not so lucky. To these species, a changing climate means changed habitat. When crucial features of species habitat move, change, or disappear, most species are strained to react. Without active human efforts, thousands to millions of species may go extinct.

Conservation banking has been heralded as one of the most positive environmental compromises to come out of the ESA. With policies such as this, landowners may no longer view endangered and threatened species on their land as an obstruction to financial gain. Banking shows how conservation can be both financially and ecologically beneficial.

However, the theory behind conservation banking fails to account for species movement. Conservation banks, like the wildlife reserve

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163. Conservation banking combines the costs of fee simple ownership and species conservation in perpetuity. Of the two up-front costs, the fee simple ownership would normally be the more expensive by several orders. However, the continuing cost of conservation in perpetuity, by its very nature, would eventually outstrip the cost of the fee simple purchase of even very expensive land. Since climate banking potentially envisions protecting species over much broader and more dynamic ranges and may incur extra costs in the form of habitat restoration as species move, I would suggest that FWS employ some of the cost-reducing mechanisms I discuss in this Part. That is, if conservation costs expand beyond revenue brought in through the sale of climate credits.

164. *See* PENROD ET AL., *supra* note 150, at 8 (discussing the benefits of maintaining "least-cost" corridors—corridors of improved habitat that species could use to migrate in response to climate change).

system, may have been seen as an ideal system to protect species in an earlier era. However, this system fundamentally fails to account for one of the most dynamic forces in human history: climate change. Conservation banks cannot be the full solution to species protection.

In the future, conservation policies must focus on protecting species where they are, not just where policymakers would like them to be. In order for future conservation policies to be effective, policymakers must build climate-adaptive measures into current laws and regulations. If we are to use a market-based approach that takes climate change into account, this system will have to be an adaptive one. Climate banking has the ability to better conserve listed species as they move, and it would do so without substantially disrupting the current market system that FWS promotes through its conservation banking policy. It is through the promotion of policies such as climate banking that FWS will be better able to conserve listed species on the move as a result of climate change.

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