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727 East Dean Keeton St.
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(512) 471-0299 / telj@law.utexas.edu

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Species . . . in Law

By Paul Boudreaux

I. Introduction

What is a *species* of animal? Although some distinctions are easy—the cougar of the American west (*Puma concolor*) is plainly neither a bird nor a fish, for example—other determinations are fraught with difficulties, both biological and legal. Is the *cougar* of west Texas the same species[1] as the *mountain lion* of the Rockies, the *panther* of Florida, or the now-extirpated *catamount* of New England?[2]

Our answers to this and similar questions have profound implications for law and policy. If similar but slightly different groups of animals are "lumped" together as a single species, there will be fewer endangered species because the populations of those species will be larger and thus less likely to be at risk of extinction.[3] But lumping may increase the risk of both extirpation of slightly distinctive groups within the species and of "take" of individual animals, such as by hunting.[4] By contrast, "splitting" similar groups of animals into distinct legal species may trigger legal protections more often because population numbers will be smaller and thereby more at risk.[5] But splitting has problems of its own, such as restraining the introduction of animals from one population to the habitat

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1 The word *species* is both singular and plural. The title of this Article, *Species . . . in Law*, is meant both to clarify that the article addresses the definition of the word *species* and that it focuses on that definition in *law*, not in *science*.

2 *See infra* Parts II & III.B (discussing complications in classifying large American cats).

3 *See infra* Part III.B (discussing the concepts of lumping and splitting).

4 *See, e.g.*, Defs. of Wildlife v. U.S. Dept. of the Interior, 354 F. Supp. 2d 1156, 1171 (D. Or. 2005) (discussing the risks to populations of wolves caused by lumping populations together for conservation purposes).

5 *See* Gary E. Belovsky et al., *Management of Small Populations: Concepts Affecting the Recovery of Endangered Species*, 22 Wildlife Society Bulletin 307, 311 (1994).

of another. When a species' numbers dwindle, lawmakers often face tough choices between taking extraordinary efforts and letting a species dwindle away.[6]

This article explores the complex legal issue of species determination. It is designed for lawyers and policymakers and endeavors to explore the topic in a way that non-scientists (such as the author) might understand. The article proposes that the legal determination of whether similar animals are within the same species should be directed by the *purposes* of the specific legal regime. As such, law's definitions might differ from those proposed by science. For example, if a law has been created primarily to protect species *diversity*, the legal regime should interpret species in a way that maximizes this diversity. Likewise, legal systems that are driven by *animal welfare* or h*uman cultural kindship* should interpret species in ways that maximize the values of these goals, even if this leads to different definitions in different legal regimes.

Part II of this article briefly explores the science of *species* and its evolution from distinctions based purely on description to modern genetic descent analyses. This part demonstrates that *species* is a human, not a natural, construct. Part III analyzes the existing legal frameworks for species determinations, including definitions from the U.S. Endangered Species Act,[7] the European Union,[8] and the International Union for Conservation of Nature.[9] It explores the implications of the various legal definitions, including lumping and splitting, with instructive examples in the lion, orca, and elephant. Part IV presents a new proposal for giving law its own power to create definitions that match the purposes of legal regimes.

II. THE SCIENCE OF *Species* . . . For Lawyers

At the outset, it is essential to highlight the difficulties for lawyers in understanding scientific terminology. Words are the lifeblood of law. Understanding the distinction between terms such as *negligence* and *recklessness*, or *speech* and *conduct*, is critical to a comprehension of law. Scientists are often flummoxed by the fuzziness of legal concepts.[10] For a lawyer delving into science, terminology poses a special difficulty. When biologists discuss species determinations, a grounded understanding of words such as *allo-*

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6 Jeffery P. Cohn, *Saving the California Condor*, 49 BIOSCIENCE 864, 865–66 (1999) (detailing successful but extreme efforts to protect the California condor, including removing hatchlings from their parents and harassing young condors).

7 16 U.S.C. §§ 1531–44 (2012).

8 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, art. 1(g), O.J. (L 206) 1, 6.

9 *IUCN Definitions*, INT'L UNION FOR CONSERVATION OF NATURE, https://www.iucn.org/downloads /en_iucn__glossary_definitions.pdf (last visited Nov. 14, 2019).

10 For instance, the fuzziness in distinguishing between speech and conduct creates elaborate discussions. *See, e.g.*, Aviva O. Wertheimer, *The First Amendment Distinction Between Conduct and Content: A Conceptual Framework for Understanding Fighting Words Jurisprudence*, 63 FORDHAM L. REV. 793 (1994).

patric[11] and *morphology*[12] is essential. As a result, scientists writing about species can quickly move beyond the ken of lawyers. One cannot begin to understand a debate without understanding the words.

As a non-scientist, I have often been stymied by my lack of knowledge. But, as with any study of what is effectively a new language, some simple education as to the meaning of words goes far. Just as a non-lawyer is likely to comprehend easily the distinction between negligence and recklessness after the terms are explained to them, a non-scientist can understand much of the details—or at least, much of the details that a non-scientist needs to know—of the *species* controversy once the non-scientist understands the vocabulary. In this article, I often use words more familiar to lawyers—words such as *animal* and *species*—instead of *organism* and *taxon*, as a scientist would more likely use.

Determining the limits of a *species* is more complex than it might first appear. The topic has bedeviled thinkers and scientists for millennia and is likely to continue to do so in the future. The fundamental reason for the dilemma is that the idea of species delineation is a wholly *human* concept. Nature does not provide animals with a printed universal product code or an identification number. As Charles Darwin wrote more than a century and a half ago, "how entirely vague and arbitrary is the distinction between species and varieties."[13] The distinctions among species, as discussed below, are *fuzzy*, reflecting both how species evolve and are created and how humans interpret these processes.[14]

This fuzziness poses a special dilemma for lawyers. Lawyers are accustomed to dealing with clear distinctions and parameters: "documents must be filed by midnight on September 30th" or "a car may not travel faster than 65 miles per hour." The leading U.S. species protection statute, the Endangered Species Act (ESA), sets forth the term "distinct population segment"[15]—a concept that is not typically used in biology, but which is useful for humans in their efforts to prevent species from disappearing.[16]

But natural phenomena do not always lend themselves to clear-cut distinctions. For example, the seemingly simple question of "How many moons does Saturn have?" is

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11 CHRIS PARK, OXFORD DICTIONARY OF ENV'T & CONSERVATION 18 (1st ed. 2007) (defining *allopatric* as "[s]imilar organisms that could cross breed but don't because of geographical separation").

12 *Id.* at 288 (defining *morphology* as "the study of the structure and form of objects (such as organisms and landforms), without regard to function").

13 CHARLES DARWIN, ON THE ORIGIN OF SPECIES 48 (1859).

14 *See* discussion *infra* Part II.

15 16 U.S.C. § 1532(16) (2012) (defining "species" to include "any subspecies . . . and any distinct population segment").

16 Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4,722, 4,725 (Feb. 7, 1996) ("Three elements are considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act. These are applied similarly for addition to the lists of endangered and threatened wildlife and plants, reclassification, and removal from the lists: 1. Discreteness of the population segment in relation to the remainder of the species to which it belongs; 2. The significance of the population segment to the species to which it belongs; and 3. The population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).").

fuzzy. Years ago the answer was clear: five, including one larger than Earth.[17] But explorations have discovered dozens of much smaller objects revolving around the ringed planet, caught in orbit by Saturn's gravity; indeed, the distinctive rings themselves, although appearing to be solid, are composed of countless small particles.[18] Are these particles satellites or not? Nature does not give us a clear answer; humans must make a distinction for themselves and for their own purposes.

We call the science of organizing things into like groups *taxonomy* (from the Latin root *taxon*, meaning to arrange).[19] Humans categorize organisms into hierarchical groups, the smallest and most numerous of which is *species*.[20]

Humans have interacted with animals (non-human animals, that is) since the dawn of humanity—both as competitors and as predator and prey.[21] For example, it is striking to note that perhaps some of the most compelling artistic images of prehistoric humans—the cave paintings of the Mediterranean region—focus on *animals*, not humans.[22] Indeed, it might be said that our modern technological age has removed us from our traditional connections with our fellow animals more than ever.[23] Although early humans may not have recognized that species evolved, they have for centuries recognized the power to alter species. The most prominent example is *Canis lupus familiaris*, the domesticated dog.[24] Paleohistorians (historians of the distant past) believe that humans domesticated wolves millennia ago and then bred them selectively for traits such as hunting ability and other physical attributes that humans found useful or appealing.[25] Modern dog breeds, from rottweiler to poodle, are the descendants of the wolf.[26] Similarly, farmers bred *aurochs*, or wild ox, for docility and sturdiness, resulting in species such as modern cattle.[27]

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17 NASA, *Pioneer 11 Image of Saturn and its Moon Titan*, FLICKR (Aug. 26, 2019), https://www.flickr.com /photos/nasacommons/9464658509/.

18 Matthew S. Tiscareno et. al, *The Populations of Propellers in Saturn's A Ring*, 135 ASTRON. J. 1083 (2008).

19 PARK, *supra* note 11, at 445 (defining *taxonomy* as "the science of naming and classifying organisms into systematic groups (taxa) based on shared characteristics and natural relationships").

20 *Id.* at 422 (defining *species* as "a population of organisms that reproduce with one another but not with other populations").

21 *See generally* HENRY BESTON, THE OUTERMOST HOUSE 25 (1928) ("[Wild animals] are not brethren, they are not underlings; they are other nations, caught with ourselves in the net of life and time, fellow prisoners of the splendour and travail of the earth.").

22 *See, e.g.*, J. Clottes, *Decorated Cave of Pont d'Arc, known as Grotte Chauvet-Pont d'Arc, Ardèche*, UNESCO WORLD HERITAGE CTR., http://whc.unesco.org/en/documents/129614 (last visited Oct. 11, 2018).

23 *See generally* EDWARD O. WILSON, BIOPHILIA (Harvard Univ. Press 1984) (discussing humans' connections and removal from nature and the animal world).

24 CABI, *Canis lupus familiaris (dogs)*, INVASIVE SPECIES COMPENDIUM, https://www.cabi.org/isc /datasheet/90295 (last updated Sept. 15, 2010).

25 *Id.*

26 *Id.*

27 Anders Gotherstrom et al., *Cattle domestication in the Near East was followed by hybridization with aurochs bulls in Europe*, 272 PROC. ROYAL SOC. B 2349, 2350 (2005), https://royalsocietypublishing .org/doi/full/10.1098/rspb.2005.3243.

Although early humans gave a variety of names to different animals, modern western thought began with Greek thinker Aristotle more than 2,500 years ago.[28] Drawing from observations, Aristotle classified animals first as either carrying blood or bloodless.[29] He then categorized each high classification in lower segments. Within the blooded category, he categorized animals further into birds, mammals, Cetacea (whales, etc.), fish, serpents, reptiles, and legged animals that bear live offspring (what we now call mammals).[30] Although science eventually developed more sophisticated approaches, the Aristotelian method of levels of classifications remains the basis of taxonomy.[31]

Modern nomenclature arose more than two millennia later in the Enlightenment, with the ideas of 18th-century Swedish biologist Carl Linnaeus.[32] Trained as a botanist and physician, Linnaeus approached the topic with a more analytical approach than had Aristotle.[33] Not surprisingly, however, his classifications focused almost entirely on *morphology*, the study of appearances.[34] Famously, Linnaeus developed a system of taxonomic hierarchy that we still use today: organisms are divided into *kingdoms* (originally, either animals or plants) and beneath them *phyla* (within animals, vertebrates or invertebrates); within each phylum, an organism is fitted into a *class*, *order*, *family*, *genus*, and, finally, *species*.[35] Linnaeus' system applied Latin names to these taxonomic classifications.[36]

To simplify the terminology, a unique species typically is referred to using only the genus (capitalized) and species.[37] Thus, the bald eagle of North America is called *Haliaeetus leucocephalus*, even though a complete taxonomy classifies it in the kingdom *Animalia*, phylum *Chordata*, class *Aves*, order *Accipitriformes* and family *Accipitrdae*.[38] Humans are *Homo sapiens* (which means, rather haughtily, "thinking person," with the genus *Homo* being reserved exclusively for humans and our now-extinct recent ancestors).[39] To return to the Introduction's example of the large single-colored cat of the Americas, zoologists now categorize it as single species, *Puma concolor* (puma of one

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28 G.E.R. Lloyd, *The Development of Aristotle's Theory of the Classification of Animals*, 6 PHRONESIS 59 (1961) (discussing Aristotle's *De Partibus Animalium*).

29 Kevin D. Hill, *The Endangered Species Act: What Do We Mean by Species?*, 20 B.C. ENVTL. AFFAIRS L. REV. 239, 247 (1993).

30 ARMAND MARIE LEROI, THE LAGOON: HOW ARISTOTLE INVENTED SCIENCE 211–19 (2014).

31 Hill, *supra* note 29, at 247.

32 ERNST MAYR, SYSTEMATICS AND THE ORIGIN OF SPECIES, FROM THE VIEWPOINT OF A ZOOLOGIST 171 (1942).

33 *Id*.; *see also* CARL LINNAEUS, SYSTEMA NATURAE 1 (1758).

34 *See* MAYR, *supra* note 32, at 171–80.

35 A.J. Cain, *Taxonomy*, ENCYCLOPÆDIA BRITANNICA, https://www.britannica.com/science/taxonomy (last visited Oct. 6, 2019).

36 *Carl Linnaeus*, UC MUSEUM OF PALEONTOLOGY, https://ucmp.berkeley.edu/history/linnaeus.html (last visited Nov. 12, 2019).

37 *Id*.

38 BirdLife Int'l, *Haliaeetus leucocephalus (Bald Eagle)*, IUCN RED LIST OF THREATENED SPECIES, https://www.iucnredlist.org/species/22695144/93492523 (last visited Nov. 14, 2019).

39 Global Mammal Assessment Team, *Homo sapiens (Human)*, IUCN RED LIST OF THREATENED SPECIES, https: //www.iucnredlist.org/species/136584/4313662 (last visited Nov. 14, 2019).

color), even though locally it is referred to as a *mountain lion*, *cougar*, *puma*, *panther*, or *léon americano*.[40] But these classifications are made wholly by humans, with judgments that may be questioned and criticized, leading to revisions. For example, Linnaeus placed the cougar into the *Felis* genus,[41] along with the domesticated cats and other small cats,[42] whereas later taxonomists decided that the much bigger cat deserved a distinct genus with its large, now-distinct ancestors.[43]

To complicate matters further, minor but obvious differences among populations of a single species—often geographically-based—have led taxonomists to create a category called *subspecies*. One approach (there are others) suggests six subspecies for *Puma concolor* based wholly on geography, with *Puma concolor cougar* reserved for the largest North American population.[44] Today, an organization called the International Commission on Zoological Nomenclature attempts to resolve naming disputes, but not the underlying biological debates.[45]

The approach of classifying species solely by morphology (appearance and form) was overturned in the nineteenth century by the discovery that species are related and have evolved from ancestral organisms.[46] The most famous advocate of this understanding was of course Charles Darwin (born the same day in 1809 as Abraham Lincoln[47]), who revolutionized our conception of the natural world. In the early nineteenth century, many still believed in a static universe of species placed on Earth intentionally and permanently by God, as implied by the Christian Bible.[48] However, discoveries of fossils of organisms that no longer lived on Earth but that *resembled* modern species led biologists to conjecture that species *evolved*—changed significantly over time—so much that the descendants had formed a new species.[49] Darwin's grandfather was one of the first advocates of the idea of this change over generations,[50] which Darwin typically referred to as a "mutation."[51] Darwin noticed the phenomenon that species living in distinct geographic or ecological niches—such as islands—tend to resemble, but also vary notice-

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40 C. Nielson et al., *Puma concolor (Puma)*, IUCN RED LIST OF THREATENED SPECIES https://www.iucnredlist.org/species/18868/97216466 (last visited Nov. 14, 2019).

41 *Id.*

42 Mary Jean P. Currier, *Felis Concolor*, 200 MAMMALIAN SPECIES 1, 1–7 (1983).

43 M. Culver et al., *Genomic Ancestry of the American Puma* (Puma Concolor), 91 J. HEREDITY, 186, 186–97 (2000).

44 Nielson et al., *supra* note 40 (noting the genomic ancestry of *Puma concolor*).

45 *See* INT'L COMM'N ON ZOOLOGICAL NOMENCLATURE, http://iczn.org/ (last visited Sept. 17, 2018).

46 *See* Garland E. Allen, *Morphology and Twentieth-Century Biology: A Response*, 14 J. HIST. BIOLOGY 159, 159–60 (1981).

47 Adam Gopnik, *How Lincoln and Darwin Shaped the Modern World*, SMITHSONIAN MAG. (Feb. 2009), https://www.smithsonianmag.com/history/how-lincoln-and-darwin-shaped-the-modern-world-45447280/.

48 *See* Genesis 1:1–25 (English Standard Version) (stating that God created the "heavens and earth" and all living things, including the plants and animals).

49 *How are gene mutations involved in evolution?*, GENETICS HOME REFERENCE, https://ghr.nlm.nih.gov /primer/mutationsanddisorders/evolution (last visited Oct. 5, 2019).

50 *See* DAVID QUAMMEN, THE RELUCTANT MR. DARWIN 27 (2006) (citing Darwin's notebooks).

51 *Id.* at 223–24.

ably,[52] from similar species in nearby niches, such as the distinct finches on the Galapagos Islands off the coast of Ecuador.[53] Darwin surmised that the array of similar species were descended from a common ancestor, thus accounting for their similarity.[54] The process of species branching from a common ancestor is called *speciation*.[55]

Scientists before Darwin developed various ideas of how species transformed. One of the most notable was French biologist Jean-Baptiste Larmarck, who posited that species could mutate by need and effort—for example, a giraffe elongating its neck to reach high leaves by internal effort—and then pass along the acquired trait to offspring, thereby changing the species.[56] But Darwin's close study of varieties in animals led him to reject Lamarck's theory and search for another mechanism by which species mutate.[57] Darwin's tectonic *Origin of Species*, first published in 1859, explained that species evolve through a mechanism called *natural selection*.[58] Stirred by the writings of Thomas Malthus, who noted that humans are likely to suffer because more are born each generation than food and space would allow,[59] Darwin reasoned that individual animals engage in a struggle with their kin. The risks of life act like "a hundred thousand wedges" to "force every kind of adapted structure into the gaps in the economy of nature, or rather forming gaps by thrusting out the weaker ones."[60] In other words, those best *adapted* to survive in their environment prosper and reproduce, passing those adaptive traits to their offspring.[61] Those who fail in the competition die off without reproducing, thus ending these non-adaptive traits.[62] Thus natural selection adapts a species to environmental change.[63] A

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52 *Id.* at 108.

53 *See id.* at 24–25 (discussing finches). For a discussion of how islands shaped Darwin's discoveries, *see id.* at 51–53, 133, 140.

54 *Id.* at 25.

55 PARK, *supra* note 11, at 422 (defining *speciation* as "the process by which new species originate through mutation, natural selection, and evolution, dividing one species into two, which at least in theory are unable to interbreed").

56 RICHARD W. BURCKHARDT, JR., THE SPIRIT OF SYSTEM 169 (1997).

57 QUAMMEN, *supra* note 50, at 66, 70–72.

58 DARWIN, *supra* note 13, at 375–76.

59 *Id.* at 42 (citing THOMAS MALTHUS, ESSAY ON THE PRINCIPLE OF POPULATION (1796)). Later writers, notably Herbert Spencer, applied Malthus's idea to struggle for survival to modern human civilization and justified non-interventionist *laissez-faire* economic policies as matching the "survival of the fittest" in nature. *See generally* HERBERT SPENCER, THE PRINCIPLES OF BIOLOGY, VOL. 1 at 444 (1864). Others called this economic doctrine *Social Darwinism*, although it had little to do with Darwin. *See generally* RICHARD HOFSTADTER, SOCIAL DARWINISM IN AMERICAN THOUGHT (1944).

60 Charles Darwin, Notebook D, at 135e (Sept. 28, 1838), http://darwin-online.org.uk/content/frameset?pageseq=1&itemID=CUL-DAR123.-&viewtype=side. In *The Origin of Species*, Darwin reasoned that the "polity of nature"—in other words, the varieties in the environment and ecology, lead to differently adapted species in different locations. *See* DARWIN, *supra* note 13, at 112.

61 QUAMMEN, *supra* note 50, at 45, 59, 154 (quoting Darwin's letters). The co-discoverer of natural selection, Alfred Russel Wallace, wrote: "The life of wild animals" is a "'struggle for existence" in which "the weakest & lest perfect organized must always succumb." ALFRED RUSSEL WALLACE, ON THE TENDENCY OF VARIETIES TO DEPART INDEFINITELY FROM THE ORIGINAL TYPE (Read Books Ltd. 2016) (1858).

62 QUAMMEN, *supra* note 50, at 45, 59, 154.

squirrel population might find it adaptive to develop large flaps along its arms, creating a new flying squirrel,[64] while a population of salamanders might migrate to a dark cave, thus creating a new species of sightless salamanders.[65]

Darwin's explanation of the means of evolution led to a parallel revolution in the classification of animals. Instead of classifying species based simply on appearance, Darwin wrote that "all true classification is genealogical,"[66] adding that "classification consists in grouping beings according to their actual *relationship*, i.e. consanguinity, or descent from common stocks."[67] Modern taxonomists assign species classifications based on deductions as to how species evolved and what its closest historical kin have been.[68] Accordingly, humans have been placed with other great apes in the family *Hominidae* because of our common ancestors,[69] whereas the plant called Spanish moss is placed in the same family as the pineapple, *Bromeliaceae*, for similar reasons.[70]

If nineteenth century biology was most notable for its new macro-level theory of life, the twentieth century was focused on the micro level. *Genetics* explains how potentially adaptive variations among species occur and how they are passed down to offspring. *Genetics* is the science of heredity.[71] *Genes* are sequences of DNA[72] that determine heritable characteristics.[73] An organism's *genome* is its set of genes.[74] Particular genes within a species may vary; these variants are known as *alleles* and account for some differences in an organism's structure or appearance, such as eye or hair color.[75] *Chromosomes* are the strands of DNA in each cell that carry genetic information.[76] *Genetic drift* occurs when

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63 DARWIN, *supra* note 13, at 375–76.

64 *See* Keith E. Paskins et al., *Take-off and Landing Forces and the Evolution of Controlled Gliding in Northern Flying Squirrels* Glaucomys Sabrinus, 210 J. EXPERIMENTAL BIOLOGY 1413, 1414 (2007).

65 ALDEMARO ROMERO, CAVE BIOLOGY: LIFE IN DARKNESS 8–10 (2009).

66 DARWIN, *supra* note 13, at 420.

67 Letter from Charles Darwin to G. R. Waterhouse (July 26, 1843) (on file with the Cambridge University Library).

68 Alexandra Mushegian, *Biological Classification*, ENCYCLOPÆDIA OF LIFE, https://eol.org/docs/discover /biological-classification (last visited Oct. 3, 2019).

69 *Human*, ENCYCLOPÆDIA OF LIFE, https://eol.org/pages/327955 (last visited Oct. 3, 2019).

70 *Compare Tillandsia usneoides*, FLORA OF NORTH AMERICA, http://www.efloras.org/florataxon.aspx? flora_id=1&taxon_id=222000404 (last visited Nov. 14, 2019) *and Pineapple*, NEWCROP, https://hort.purdue.edu/newcrop/morton/pineapple.html (last visited Nov. 14, 2019).

71 PARK, *supra* note 11, at 188 (defining *genetics* as "[t]he study of genes, inheritance, and variation in organisms.").

72 *Id.* at 125 (defining *DNA* as "[d]eoxyribonucleic acid, the genetic material that is found in all living organisms.").

73 *Id.* at 186 (defining *genes* as "the distinct sequence of DNA that forms part of a chromosome, by which offspring inherit characteristics from a parent.").

74 *Id.* at 188 (defining *genome* as "[a]ll of the genetic information or hereditary material in the chromosomes of a particular organism.").

75 *Id.* at 18 (defining *allele* as "[o]ne of several alternative forms of a gene which occupy the same relative position on paired chromosomes, and which control the inheritance of one characteristic.").

76 *Id.* at 77 (defining *chromosome* as a "package of genes in the nucleus of a cell, composed of DNA and proteins, which contains the genetic information for that cell.").

happenstance or other factors cause one allele to gain prominence in a population.[77] Although humans of centuries ago did not understand genetics, they understood that animals may be cross-bred to achieve certain desirable traits—for example, thick wool for a sheep. Over time, these variations can lead to the evolution of new species. Genetics has transformed the way we think about taxonomy and species distinctions. But genetics does not give us an easy and straightforward answer, in all cases, about how to distinguish different species.

Twentieth century taxonomy was given focus by Ernst Mayr, who was born in Germany in the early years of the century and later moved to the United States.[78] His 1942 work, *Systematics and the Origin of Species, from the Viewpoint of a Zoologist*, applied Darwinian thinking to Linnaean taxonomic study in what became known as the *biological species concept* (BSC).[79] As expressed in a later work, Mayr proposed that species are "groups of actually or potentially interbreeding natural populations which are reproductively isolated from other such groups."[80] The idea is that when groups of one species are isolated, they tend to drift apart genetically from each other. Consider a species of bird groups that fly and then settle on different islands. Because of differing environments, natural selection may push the groups in different morphological and genetic directions. Varying temperatures, different predators, and distinctive food sources may make certain traits more adaptive on each island. For these or other reasons, including genetic drift, one group may become dominated by alleles that are different from those on other islands, leading to long-term genetic differences among the groups to the point that the groups may be considered distinct species. This genetic-based cause of speciation is called *allopatric* (that is, allele-based) speciation.[81] Under this idea, isolated or non-interbreeding groups that may bear a great resemblance to each other—such as North America's whooping crane and sandhill crane—may be considered separate species.[82]

Humans have understood for centuries that some species may sometimes interbreed successfully, creating hybrids. The hybrid of a female horse and male donkey is a *mule*, which is prized for its robustness and surefootedness.[83] But mules themselves are infertile, largely because the horse and donkey parents have provided to the mule a mismatched

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77 *Id.* at 187 (defining *genetic drift* as "[f]luctuations in the frequencies of particular genes within a population over time that are caused by random events rather than by natural selection, and can lead, over successive generations, to a progressive change in the genetic composition of the population.").

78 *Ernst Mayr*, ENCYCLOPÆDIA BRITANNICA, https://www.britannica.com/biography/Ernst-Mayr (last visited Nov. 14, 2019).

79 *See* PARK, *supra* note 11, at 50 (defining the *biological species concept* as "[t]he most commonly used definition of species, as a group of natural populations that interbreed between themselves but not with other such groups.").

80 ERNST MAYR, ANIMALS SPECIES AND EVOLUTION 19 (1963).

81 PARK, *supra* note 11, at 18 (defining *allopatric* as "[s]imilar organisms which could cross breed but don't because of geographical separation.").

82 *See* Ken Ballinger & Jeb Barzen, *Sandhill and Whooping Cranes*, WILDLIFE DAMAGE MGMT. TECH. SERIES (2017), https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1007&context=nwrcwdmts (discussing the distinction between the two groups).

83 Jane Miggett, *The Advantages of a Mule vs. a Horse*, PETS ON MOM.ME, https://animals.mom.me /advantages-mule-vs-horse-6118.html (last visited Aug. 8, 2019).

number of chromosomes.[84] Because of this reproductive "dead end," it appears safe to conclude that horses and donkeys, which are also morphologically different, are separate species.[85] But the possibility of hybrids—and their occasional fertility—makes a clear-cut definition of species somewhat suspect. Nature, it is reiterated, does not care to give us clear delineations among species.

The reliance in Mayr's biological species concept on interbreeding and isolation is appealing because it does not require, in most cases, an analysis of genetic material to distinguish species.[86] A simple study of morphology and behavior can answer many questions of species delineation. Because horses and donkeys typically do not interbreed in nature, they are considered separate species, under the BSC.[87] But the BSC's factors are not always easily resolved. Consider the possibility of similar-looking populations of birds that are geographically isolated—perhaps by a large expanse of water or a mountain range. Because of this isolation, they do not interbreed; but are they capable of doing so? If the answer is "yes," then they might be lumped into the same species, under the factor of "potentially interbreeding." But scientists and lawyers might not know the answer for sure.

Since Mayr, biologists have proposed species tests that are oriented less toward isolation and reproduction in nature and more toward animals' evolutionary history. Animal groups may be assigned to groups through their evolutionary relationship to other animal groups. This approach is called the *phylogenetic species concept* (PSC).[88] The prefix *phylo* derives from the Greek for *kind* or *tribe*.[89] Thus, animal groups that split from their common ancestors in the more distant past are more *phylogenetically* distinct than groups that split more recently. A related term is the *evolutionary species concept*.[90] This approach defines a species as "a lineage of ancestral descent which maintains its identity from other such lineages and which has its own evolutionary tendencies and historical fate."[91] Similar animals that hold similar alleles from the same genetic ancestor thus would be

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84 Monica Rodriguez, *Chimeras, Mosaics, and Other Fun Stuff*, THE TECH MUSEUM OF INNOVATION (June 20, 2007), https://genetics.thetech.org/ask/ask225; *see also* C. J. Davies et al., *Reproduction in Mules: Embryo Transfer Using Sterile Recipients*, 17 EQUINE VETERINARY J. 63–67 (1985).

85 *See* MAYR, *supra* note 80, at 19 (discussing reproductive isolation as an indicator of speciation).

86 *See id.* at 19.

87 *See id.* at 111–12.

88 PARK, *supra* note 11, at 340 (defining the *phylogenetic species concept* as "[t]he idea that a species is the smallest recognizable group of individual organisms within which there is a parental pattern of ancestry and descent.").

89 *Phylo-*, DICTIONARY.COM, https://www.dictionary.com/browse/phylo- (last visited Aug. 8, 2019) (defining the prefix *phylo* as "a combining form meaning 'race,' 'tribe,' 'kind'").

90 *See* Richard Frankham et al., *Implications of Different Species Concepts for Conserving Biodiversity*, 153 BIOLOGICAL CONSERVATION 25, 26–27 (2012).

91 *Id.* at 27.

considered the same species.[92] *Cladistics* categorizes species based on number of shared traits; categorization is most often based on genetic, not morphological, traits.[93]

As a practical matter, making species determinations about obscure animals might be difficult under the *phylogenetic species concept*. Zoologist Kevin de Quieroz has written recently of combining the various approaches to species determinations through a unified species concept that analyzes how far two similar groups have split from each other—either morphologically, genetically, reproductively, or in other ways.[94] The difficulty in making determinations, he wrote, is that different approaches to species determinations will yield different answers as to whether two populations have diverged far enough to be considered two distinct species.[95] In other words, the various criteria are simply *evidence*, instead of definitive indicators, as to whether the groups have become different enough.[96] This exposition might remind a student of law of the familiar answer in law: "It depends."

From the broad approaches of BSC and PSC have arisen several variants. De Quieroz lists two types of biological concepts—one related to isolation and the other related to animals' ability to recognize potential mates—as well as three phylogenetic variants, along with several competing philosophies that complicate these categories.[97] Frankham et al. have suggested that there are 26 different definitions of *species*![98]

At this point, lawyers and policymakers may be tempted to throw up their hands in frustration over biologists' inability to reach a consensus over how to define and differentiate species. Accordingly, this is also a good point at which to turn to law and examine how the law has approached the topic.

III. The Law's Approach to *Species*

The laws concerning *species* appear, not surprisingly, to be premised on the idea that science provides a clear answer for determining the appropriate classification for individual animals. But, as we have seen, biological science is in a state of flux; indeed, modern genetic science has made the issue more, not less, complex than it was in Darwin's day. But law, unlike science, needs to have workable answers to perform its day-to-day conflict resolutions. Accordingly, this Article proposes that law should forge ahead with better definitions of *species*. As explained below, these definitions should be informed by biology; but, ultimately, they should be resolved by the needs of law.

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92 *See* Kevin De Quieroz, *Species Concepts and Species Delimitation*, 56 Systematic Biology, 879, 880-81 (2007).

93 Park, *supra* note 11, at 79 (defining *cladistics* as "a method of classifying organisms into groups (taxa) that is based on order of evolutionary branching rather than on present similarities and differences.").

94 De Quieroz, *supra* note 92, at 882.

95 *Id*. at 882.

96 *Id*.

97 *Id*. at 880. Among the variants is the *ecological species concept*, which focuses on whether the groups occupy the same niches or adaptive zone, and a *genotype cluster species concept*, which focus on genetic similarities. *Id*. at 880.

98 Frankham et al., *supra* note 90, at 26.

A. NOTABLE *Species* Legislation

The modern legal community first turned its attention to the issue of species extinction in 1973. That year, international representatives met in Washington and drafted the Convention on International Trade in Endangered Species of Wild Fauna and Flora, or CITES (pronounced "sigh-teez").[99] Among other things, the treaty was designed to prevent international trade from becoming a significant factor in the extinction of species.[100] But the text of the convention itself did not attempt to delimit species. Rather, it defined *species* to mean, in a circular fashion, "any species, subspecies, or geographically separate population thereof."[101]

This definition is intriguing, however, in that it plainly defines species to mean *more* than species, through its reference to concepts—subspecies and geographically separate populations—that are *not* species. This might ostensibly be viewed as a falsehood: *X* is defined as including both *X* and two categories of *not-X*. A logician might not approve. But such definitions are common in law. This is for good reason: in communicating, humans sometimes use simple terms to connote concepts that vary from definitions found in the dictionary. Over the course of time, when the term is repeated in a closed context, it become a *term of art*, meaning that it holds a special meaning in a particular context.[102] For example, in U.S. constitutional law, the key textual term *interstate commerce*[103] has been defined to include things that are *not* interstate commerce but that merely *affect* interstate commerce.[104] One rationale for this ostensibly illogical reasoning is that allowing Congress to regulate things that merely affect commerce fulfills the *purpose* behind the text of the constitution.[105] Likewise, the U.S. Clean Water Act's reach is predicated on the term *navigable waters*, which the U.S. Congress defined as "waters of the United States, including the territorial seas."[106] The definition makes no reference to navigability. The reasons for this are complex and murky—one reason is that term "navigable waters" was already a familiar one in U.S. water law[107]—and have led to decades

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99 *What is CITES?*, CITES, https://www.cites.org/eng/disc/what.php (last visited Aug. 8, 2019).

100 *Id.*

101 Convention on International Trade in Endangered Species of Wild Fauna and Flora art. 1, ¶ A, Mar. 3, 1973, 27 U.S.T. 1087, TIAS 8249, 993 UNTS 243.

102 JEFFERY LEHMAN & SHIRELLE PHELPS, WEST'S ENCYCLOPÆDIA OF AM. LAW 196 (2d ed. 2005).

103 U.S. CONST. art. 1, § 8, cl. 3 (listing the powers of the U.S. Congress, including the power "to regulate commerce . . . among the several states").

104 *See* Gonzalez v. Raich, 545 U.S. 1 (2005) (Congress holds the power to criminalize manufacture and possession of marijuana); U.S. v. Lopez, 514 U.S. 549 (1995) (Congress does not hold the power to criminalize gun possession).

105 *See, e.g.*, Richard A. Posner, *Positivism Versus Purposivism in First Amendment Analysis*, 54 STAN. L. REV. 737 (2002) (discussing the uses of purposivism in statutory interpretation).

106 33 U.S.C. § 1362(7) (2012).

107 The term "navigable waters" was used in the Rivers and Harbors Act of 1899, which made it unlawful to obstruct navigable waters and gave the federal government the authority to enforce free navigation. 33 U.S.C. § 409 (2012).

of confusion.[108] These examples show that, for a number of reasons, law often defines a key term in a manner that differs from its plain or dictionary meaning.

The international effort of CITES helped to spur the United States' enactment of the Endangered Species Act later in 1973.[109] This famously terse statute states: "'Species' includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature."[110] This definition includes a connection to Mayr's *biological species concept*, in that it refers to the ability to reproduce.[111] But it also mirrors the definition in CITES, in that it covers both subspecies and distinct geographic population of the same species.[112] This can be explained, again, not by science, which seeks to delineate precisely what makes a species unique, but by legal practicalities. The apparent intent of Congress was to create a legal mechanism to decrease the risk of extinction by protecting population segments. Even if it makes for confusing syntax and fuzzy biology, this is a legitimate policy goal of Congress.

Consider, for example, the *Puma concolor*. Although this animal is distributed widely (but not densely)[113] in the Americas from western Canada to Argentina,[114] the species population is decreasing, in part because of the shrinking of its habitat, according to the

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108 The power to regulate dumping into "navigable waters" for the purpose of keeping open the watery paths of navigation undoubtedly touched on interstate commerce. Over the years, the term "navigable waters" came to be connected with a clear congressional power. When the pollution-oriented Clean Water Act was enacted in 1972, congressional drafters chose the familiar term that they assumed would reach evoke congressional powers, even though the term "navigable waters" did not necessarily match the purpose of the new act, which was to limit dumping of liquid and other waste into rivers and seas. *See* Paul Boudreaux, *A New Clean Water Act*, 37 ENVTL. L. REP. 10171 (2007) (discussing the evolution of the term). Since then, the regulatory agencies have struggled to further clarify "navigable waters" and its ill-fitting definition of "waters of the United States." In 2017, the Trump administration revoked the Obama administration's regulatory clarification and replace it with a narrower one. Definition of "Waters of the United States" - Recodification of Preexisting Rules, 82 Fed. Reg. 34,899 (July 27, 2017) (codified at 33 C.F.R. pt. 328); *see generally* Coral Davenport, *E.P.A. Blocks Obama-Era Clean Water Rule*, N.Y. TIMES (Jan. 31, 2018), https://www.nytimes.com/2018/01/31/climate/trump-water-wotus.html (explaining the complicated procedural history).

109 *See* 16 U.S.C. §§ 1533–44 (2012).

110 *Id.* § 1532(16).

111 *See supra* text accompanying notes 79–80 (discussing the "biological species concept").

112 *See* Convention on International Trade in Endangered Species of Wild Fauna and Flora, *supra* note 101. Similarly, Canada's Species at Risk Act—which follows a more traditional, species-centric approach—defines "wildlife species" as "a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus" that is wild and has been present in Canada for at 50 years. Species at Risk Act, S.C. 2002, c 29, art. 2(1) (Can.); *see also* Robin S. Waples et al., *A Tale of Two Acts: Endangered Species Listing Practices in Canada and the United States*, 63 BIOSCIENCE 723 (2013) (comparing the two North American acts).

113 The IUCN cites estimates of the U.S. population at only around 10,000 and the Canadian population at 3,000 to 3,500. Nielson et al., *supra* note 40 (follow "Population" hyperlink).

114 *See id.* (follow "Geographic Range" hyperlink).

IUCN.[115] Using biological assessments of *species*, all of the different groups deserve to be lumped into the same species, *Puma concolor*.[116] But the fragmentation also has led taxonomists to designate between six and thirty-two broad geographic *subspecies* for regions of the Americas (although, for reasons discussed below,[117] the isolated Florida population does not constitute its own subspecies). Why does law make a discreet effort to protect each population segment, considering that all the segments belong to the same biological species? The answer is simple: granting protections to each segment is a practical way to decrease the risk of extinction by devoting focused legal attention to each population group. To give a simple example, consider a species with a seemingly large population. If this species' habitat became fragmented and one of the discrete populations died off, there might be no chance of revival of this population, imposing a long-term setback for the species.[118]

Also notable is that the ESA limits the definition for a "distinct population segment" to "vertebrates"[119]—that is, animals with a backbone (subphylum *Vertebetra*).[120] It may have been necessary for the drafters to include this limitation to ensure political support. Granting more legal protections to vertebrates, which are more *charismatic*[121] to people than are invertebrates—such as mollusks, jellyfish, and worms—makes little biological sense; after all, most animal species are invertebrates.[122] But this kind of political distinction is something that law does all the time; policymakers need not hang their heads in shame for doing so. Law serves different purposes than science.

The International Union for Conservation of Nature (IUCN) is the most prominent international organization for species protection.[123] Because of this, its determinations about species carry great weight. The IUCN's definition of species is:

A group of interbreeding individuals with common characteristics that produce fertile (capable of reproducing) offspring and which are not able to interbreed with other such groups, that is, a population that is reproductively isolated from others; related species are grouped into genera.[124]

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115 *Id.* (follow "Population" hyperlink).

116 *Id.* (follow "Skip to Text summary" hyperlink).

117 *See infra* part III.B.

118 *See* DAVID QUAMMEN, SONG OF THE DODO 457–63 (1996) (discussing the "single large or several small" debate and noting that most ecologists now agree that single large population is better than several small ones).

119 16 U.S.C. § 1532(16) (2012).

120 Malcom T. Jollie, *Vertebrate,* ENCYCLOPÆDIA BRITANNICA, https://www.britannica.com/animal /vertebrate (last updated Apr. 17, 2019). *Vertebetra* is a subphylum within the phylum *Chordata*, which encompasses all animals with a cord, not all of which are considered a backbone. *Id.*

121 *See, e.g.*, Shannon Peterson, *Congress and Charismatic Megafauna: A Legislative History of the Endangered Species Act*, 29 ENVTL. L. 463 (1999) (discussing the effect of "charisma" on animal legislation).

122 Robert M. May, *How Many Species Are There on Earth?*, 241 SCIENCE 1441, 1443 (1988).

123 *About*, INT'L UNION FOR CONSERVATION OF NATURE, https://www.iucn.org/about (last visited Nov. 14, 2019).

124 *IUCN Definitions*, INT'L UNION FOR CONSERVATION OF NATURE, https://www.iucn.org/downloads /en_iucn__glossary_definitions.pdf (last visited Nov. 14, 2019).

Again, this definition appears to follow the biological species concept, in that it relies on the ability to reproduce fertile offspring and reproductive isolation. The reference to "common characteristics," however, could encompass phylogenic-based species concepts.

Interestingly, a more recent animal protection law does *not* attempt to define species. The European Union's Habitats Directive defines "species of [c]ommunity interest" as those that are endangered, vulnerable, rare, or require special protection, but does not define *species* itself.[125] The Directive, adopted in 1992, reflects the more modern focus on protecting wildlife habitat, rather than protecting particular species.[126]

B. Lumping and Splitting

What are legal and the real-world implications of the various approaches to delineating species? What are the benefits and drawbacks of assigning multiple species names to different groups of similar animals, and, by contrast, what are the consequences of combining these groups into a single species? This part explores the legal effects of *splitting* and *lumping*.

Splitting—the practice of assigning multiple species names to similar groups—can create the appearance that one or more of the populations is vulnerable to extinction. Consider the controversial example of the California gnatcatcher (*Polioptila californica*), a small insect-eating bird that lives in California, both north and south of the U.S.-Mexico border.[127] In the 1990s, the U.S. Fish and Wildlife Service studied whether the species should be evaluated as two separate subspecies under the ESA.[128] Because of some morphological differences that appeared near the 30th parallel north in Mexico's Baja California, the agency decided to analyze the conservation status of two separate subspecies.[129] The determination of conservation status depends on factors such as the current population, the predicted population trends, and potential threats to the animal.[130] The range of the northern subspecies—called the coastal California gnatcatcher (*Polioptila californica californica*)—is limited to the crowded and increasingly urbanized areas of southern U.S. California and northern Baja California; in fact, the agency estimated that only one percent of the species were in the northern subspecies and that only about 2,000 breeding pairs existed in the entire U.S. State of California.[131] Because of this precarious situation, the coastal California gnatcatcher was listed under the ESA as *threatened*.[132] In 2016, however, the agency revisited the issue based on a new

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125 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, art. 1(g), O.J. (L 206) 1, 6.

126 *See generally id.*

127 *California Gnatcatcher*, Audubon, https://www.audubon.org/field-guide/bird/california-gnatcatcher (last visited Aug. 8, 2019); Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 Wash. U. L. Q. 1029, 1104 (1997).

128 Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Coastal California Gnatcatcher, 58 Fed. Reg. 16,742 (Mar. 30, 1992) (codified at 50 C.F.R. pt. 17).

129 *Id.*

130 *Id.*

131 *Id.* at 16,749.

132 *Id.* at 16,742.

study of the genome of the gnatcatcher.[133] This was a notable example of a shift from focusing on morphological distinctions to genetic distinctions. But biologists disagreed as to whether the genome differences between the two populations was significant enough to justify continuing the classification of two subspecies.[134] Eventually, the agency decided to stick with the classification of two subspecies and to continue considering the coastal California gnatcatcher as threatened.[135]

The gnatcatcher debate shows the significant effects of lumping on conservation efforts. Had the agency used biological criteria to lump the population into a single, undifferentiated species, the measured population of the gnatcatcher would have been vastly greater and its habitat would have included the less populous desert areas of Baja California Sud. Under such an analysis, it would have been much less likely that the gnatcatcher would have been listed as threatened.[136]

Indeed, environmental advocates sometimes appear to assume that splitting is always better for species conservation.[137] In addition to the quicker triggering of imperiled species protection, splitting minimizes the risk of *outbreeding depression*, which is the phenomenon in which a large population of genetically different individuals creates some offspring that are genetically ill-equipped to survive in the environment.[138] For example, the introduction of Middle Eastern ibex into the population of Alpine ibex (*Capra ibex*) in the mountains of central Europe led to many ibex kids being born during the harsh Alpine winter, resulting in a significant decline in the population.[139]

But *splitting* also causes conservation concerns. Frankham and others have noted that species determinations that are too narrow may sometimes create classifications that, in effect, are too small to be successful.[140] If a group is split into distinct species and avoids any cross-reproduction, a small population might experience *genetic drift* and the possibility of *inbreeding* depression, where interbreeding individuals are too genetically similar, leading to the eventual loss of genetic variety for the group.[141] Frankham and others concluded that "splitting . . . to promote greater conservation of biodiversity can actually

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133 Martha Harbison, *Despite Controversy, the Coastal California Gnatcatcher Will Remain an Endangered Subspecies*, AUBUDON (Sept. 23, 2016), https://www.audubon.org/news/despite-controversy-coastal-california-gnatcatcher-will-remain-endangered.

134 *Id.*

135 Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To Delist the Coastal California Gnatcatcher, 81 Fed. Reg. 59,952 (Aug. 31, 2016) (codified at 50 C.F.R. pt. 15).

136 Doremus, *supra* note 127, at 1104.

137 *Cf.* Daniel J. Rohlf, *There's Something Fishy Going on Here: A Critique of the National Marine Fisheries Service's Definition of Species Under the Endangered Species Act*, 24 ENVTL. L. 617, 667, 670-71 (1994) (criticizing the U.S. agency's tepid use of "evolutionarily significant unit" as a species criterion and suggesting that the U.S. Congress sought to advance "several policy goals . . . in affording [the National Marine Fisheries Service] and [Fish and Wildlife Service] discretion to list groups of organisms below the subspecies level.").

138 *See* Michael Lynch, *The Genetic Interpretation of Inbreeding Depression and Outbreeding Depression*, 45 EVOLUTION 622, 622 (1991).

139 F.J. Turcek, *Effect of Introductions on Two Game Populations in Czechoslovakia*, 15 J. WILDLIFE MGMT. 113, 113–14 (1951).

140 Frankham et al., *supra* note 90, at 26–27.

141 *Id.* at 27.

prevent conservation actions necessary to preserve taxa with a small population size, and thereby result in the loss of existing biodiversity."[142]

Two powerful examples of the potential dangers of splitting have arisen in Florida: one from an obscure species that was lost and another from a charismatic population whose fate remains uncertain. The obscure animal was the dusky seaside sparrow (*Ammodramus maritimus nigrescens*), a darkly colored sparrow that inhabited only the marshes of east central Florida.[143] Exacerbating the loss of habitat caused by wetland draining for agricultural purposes, the U.S. government flooded much of the marshes in the 1960s in an effort to decrease the mosquito population on Merritt Island, the location of the Kennedy Space Center.[144] As the dusky sparrow's population plummeted, some suggested that it be interbred with the related Scott's seaside sparrow; but the government balked at such a drastic "lumping" measure that would have destroyed the dusky bird's distinctiveness.[145] By 1980, the remaining five birds were moved to a nature reserve in central Florida, where efforts to breed them in captivity failed.[146] The last *Ammodramus maritimus nigrescens*, named "Orange Band," died in 1987.[147]

In the same year that the dusky seaside sparrow went extinct, the government decided on a different fate for a bird that is quite different from the obscure sparrow: the charismatic California condor (*Gymnogyps californianus*), the largest land bird of North America, with a typical wingspan of more than nine feet.[148] The dramatic bird once soared over much of the United States west of the Rockies.[149] By 1982, however, only twenty-three condors remained.[150] In 1987, all of them were removed from the wild to begin a captive breeding program.[151] Not everyone agreed with the drastic move; some animal welfare advocates argued it would be better for the remaining individual condors to die in dignity in the wild than to be caged: "better dead than bred."[152] As of 2016, there are more than 400 condors alive—somewhat more in the wild than in captivity.[153] The condor controversy highlighted a potential conflict between *animal welfare*, which focuses on the wellbeing of specific individual animals—even, in this case, to the possible detriment of the long-term survival of the species—and *wildlife conservation*, which focuses on the health of the species as a whole, even to the detriment of specific individuals.

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142 *Id.* at 27.

143 U.S. Fish & Wildlife Serv., *Species Profile for Dusky Seaside Sparrow*, ENVTL. CONSERVATION ONLINE SYS., https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B00R (last visited Nov. 14, 2019).

144 *Id.*

145 JOE ROMAN, LISTED 111 (2011) (discussing the sparrow's extinction).

146 *Id.*

147 U.S. Fish & Wildlife Serv., *supra* note 143.

148 *California Condor Recovery Program*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/cno/es /CalCondor/Condor.cfm (last updated Sept. 30, 2019).

149 *Id.*

150 *Id.*

151 *Id.*

152 *See* Jennis Erin Smith, *Better Bred*, TIMES LIT. SUPP. (Sept. 5, 2015) https://www.the-tls.co.uk/articles/private/better-bred/.

153 *California Condor Population Information*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/cno/es /CalCondor/Condor-population.html (last visited Oct. 8, 2019).

Another mixed success is the story of the so-called Florida "panther." As noted above, this population belongs to the species *Puma concolor*, the vast majority of which live in western North America and South America; the Florida population is extremely isolated.[154] The Fish and Wildlife Service has listed it as a distinct subspecies, *Puma concolor coryi*, in large part because of its geographic isolation, despite considerable evidence that in terms of its genome it should be classified identically with the mountain lions and cougars of the American West.[155] Indeed, the IUCN classifies the Florida population as part of the large, northern American subspecies of *Puma concolor cougar*.[156] The Florida population has long been precariously low—reaching as low as fifty by 1990,[157] when many panthers showed signs of inbreeding such as kinked tails or cowlicked back hair.[158] The subspecies has been listed as endangered.[159] Because of the risk of inbreeding depression and other factors,[160] authorities decided in the 1990s to introduce "cougars" from Texas—*Puma concolor stanleyana*—that are genetically similar to the Florida "panther."[161] The move was controversial, as some argued that this would dilute the distinctiveness of the Florida animal.[162] Advocates of the introduction pointed out, however, that the Florida and Texas cats were both part of a larger southern U.S. interbreeding population until modern times.[163] A follow-up study by a group of prominent biologists in 2010 concluded that the introduction was largely a success: "panther numbers increased threefold, genetic heterozygosity doubled, survival and fitness measures improved, and inbreeding correlates declined significantly."[164] The Fish and Wildlife Service called the introduction a success, as it created "beneficial impacts of genetic restoration on the genetic health of the population as well as the coinciding increase in panther abundance."[165]

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154 *See* Culver et al., *supra* note 43, at 186.

155 *See id*. at 197.

156 Nielson et al., *supra* note 40.

157 *Florida panther population estimate updated*, U.S. FISH & WILDLIFE SERV. (Feb. 22, 2017), https:/ /www.fws.gov/southeast/news/2017/02/florida-panther-population-estimate-updated/; Catherine Skipp, *Cougars Enlisted in Effort to Save the Florida Panther*, N.Y. TIMES, May 11, 1993.

158 U.S. Fish & Wildlife Serv., *Florida Panther*, *in* 4 MULTI-SPECIES RECOVERY PLAN FOR SOUTH FLORIDA 117, 118 (1999), https://www.fws.gov/verobeach/MSRPPDFs/Florida Panther.pdf.

159 *Florida Panther*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/refuge/florida_panther/wah/panther.html (last visited Aug. 8, 2019).

160 S. L. Pimm et al., *The Genetic Rescue of the Florida Panther*, 9 ANIMAL CONSERVATION 115, 116 (2006).

161 Warren E. Johnson et al., *Genetic Restoration of the Florida Panther*, 329 SCIENCE 1641, 1641–42 (2010).

162 Liza Gross, *Why Not the Best? How Science Failed the Florida Panther*, 3 PLOS BIOLOGY 1525, 1529 (2015) (discussing the risk of "genetic introgression").

163 *Id*. (noting that the Texas and Florida cats were once part of a single larger population).

164 Johnson et al., *supra* note 161, at 1641.

165 *Florida Panther*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/refuge/florida_panther/wah /panther.html (last visited Aug. 8, 2019).

C. Some Current Global "Species" Controversies

This section highlights a handful of recent controversies and changes in the taxonomy for significant animals. One reason for including this section is to give the reader a sense of the types of current controversies; the other reason is to show that scientific conclusions have often been inconsistent. This section highlights three charismatic species: the lion, the killer whale (orca), and the elephant. Although ecologists do not like to give undue attention to popular species, the legal community often does because public opinion drives legal policy.[166]

1. Lions

The great cats are a notable example of changes in species determinations. In 2017, an IUCN study group proposed a wide-ranging reclassification, concluding that "using more advanced morphological, biogeographical and, foremost, molecular techniques have provided new insights into cat phylogeny and variation, suggesting several important changes with regard to species and subspecies."[167]

The lion (*Panthera leo*) is famous in the western world as a symbol of power and strength, appearing in cultural symbols ranging from the Neolithic cave paintings of Chauvet, France,[168] to representations of a deity in ancient Egypt,[169] to sculptures in the center of the Muslim Nasrid Alhambra palace,[170] to the British royal coat of arms,[171] to the nickname of an American football team in Detroit, Michigan.[172] Although the current species once ranged across nearly all of Africa and the southwest quadrant of Asia,[173] its habitat is now limited to pockets in sub-Saharan Africa and a tiny population in and around the Gir National Forest of the state of Gujarat, India.[174] Although biologists agree that all the populations belong to a single species under biological analysis, beyond this there is great disagreement. As recently as 2005, a noted biologist argued for eleven subspecies,[175] even though the IUCN for many years preferred the simplicity of

166 *See, e.g.*, Elizabeth Bennett, *Another Inconvenient Truth: The Failure of Enforcement Systems to Save Charismatic Species*, 45 Oryx 476 (2011) (exemplifying how charismatic species can get more attention or legal protection).

167 *A Revised Taxonomy of the Felidae*, CATnews Special Issue 11 (Cat Specialist Group, Species Survival Commission of the International Union for Conservation of Nature, Bern, Switzerland), Apr. 2017, at 1, 3, https://repository.si.edu/bitstream/handle/10088/32616/A_revised_Felidae_Taxonomy_CatNews.pdf?sequence=1&isAllowed=Y.

168 *See* Jean-Marie Chauvet et al., Dawn of Art: The Chauvet Cave (1996).

169 *See* Jana Garai, The Book of Symbols (1973).

170 *See* M. Isabel Sarro et al., *Biodeterioration of the Lions Fountain at the Alhambra Palace, Granada (Spain)*, 41 Building & Env't 1811, 1812 (2006).

171 *See* Jordan Cavell, *The Royal Coat of Arms Explained*, Royal Central (May 15, 2017), http:/ /royalcentral.co.uk/blogs/history/the-royal-coat-of-arms-explained-82173.

172 *See* Detroit Lions, https://www.detroitlions.com/ (last visited Nov. 14, 2019).

173 H. Bauer et al., *Panthera leo (Lion)*, IUCN Red List of Threatened Species, https://www.iucnredlist.org /species/15951/115130419 (last visited Nov. 14, 2019).

174 *See* David Quammen, Monster of God: The Man-Eating Predator in the Jungles of History and the Mind 49 (2003).

175 W.C. Wozencraft, *Order Carnivora*, *in* 1 Mammal Species of the World 532 (3d ed. 2005).

only two subspecies: the African lion (*Panthera leo leo*) and Asian lion (*Panthera leo perscia*).[176]

According to most recent studies, however, the simple continental division makes little sense; both morphological and genetic studies show that the Asian population is a fairly recent (within the past 20,000 years) introduction from Africa.[177] Accordingly, the IUCN Cat Specialist Group has recognized (albeit with a note of uncertainty about future evidence) two subspecies: *Panthera leo leo*, including lions now living in west Africa and India (the type most familiar to Europeans from its former range in north Africa, even though those population numbers are very low), and the slightly different (genetically) and more numerous *Panthera leo melanochaita* of the plains of east Africa.[178]

The new classification poses some intriguing questions for conservation. The *Panthera leo leo* population is very low: an estimated 400 inhabit West Africa (the IUCN lists this population as *critically endangered*, the most dire category)[179] and at most 600 or so inhabit the sole Asian enclave in India.[180] What if wildlife managers decided that the risk of inbreeding or other threats justified introductions between populations? Would the subspecies classification make it reasonable to ship Indian lions to west Africa, or vice versa? Would potential objections of the local people make this problematic? Moreover, it is not hard to imagine that in the future both the West African and Asian populations of *Panthera leo leo* could fall to critically low levels. Would introduction of the genes of *Panthera leo melantohonica* be appropriate? The answer to this question might well depend on the goal of the human mangers of wildlife. If the desire above all else is to preserve all types of genetic diversity, then it might be best to avoid interbreeding the two subspecies, with the risk that one might go extinct. Similarly, if we wish to preserve the local identities of the populations—such as the often-lighter manes of the Indian lions—we might refrain from introductions. However, if our chief goal is to avoid the risk of extinction in the wild of the sole species of lion (*Panthera leo,* with a total population below 40,000, which is less than the human population of Cheyenne, Wyoming[181]) in a world of an expanding human population and shrinking wild habitat, it may be wise to encourage interbreeding of all subspecies. Science cannot determine which goal is best; human judgment must ultimately make this choice.[182]

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176 Bauer et al., *supra* note 173.

177 *A Revised Taxonomy of the Felidae*, *supra* note 167, at 72.

178 *Id.* at 73. Although the IUCN warns that population counts are difficult, the IUCN estimates that between 20,000 and 40,000 lions live in Africa, with the number falling. Bauer et al., *supra* note 173. As a whole, the species is categorized as *vulnerable*, but not *endangered*. *A Revised Taxonomy of the Felidae*, *supra* note 167, at 73.

179 Bauer et al., *supra* note 173.

180 Himanshu Kaushik, *Lion Population Roars to 650 in Gujarat Forests*, TIMES OF INDIA, Aug. 4, 2017.

181 Bauer et al., *supra* note 173; *QuickFacts: Cheyenne city, Wyoming*, U.S. CENSUS BUREAU, https://www.census.gov/quickfacts/cheyennecitywyoming (last visited Nov. 14, 2019).

182 A remarkably similar debate has surrounded the tiger (*Panthera tigris*), the largest of all cats. *A Revised Taxonomy of the Felidae*, *supra* note 167. The tiger is legendary throughout Asia for its ferocity, including occasional taste for human flesh. *See* QUAMMEN, *supra* note 174, at 386. In part because the tiger's habitat has been near the densest human populations in the world—south and east Asia—its fate is more dire than that of the lion; there are only about 3000 wild tigers, and their population is falling. J. Goodrich et al., *Panthera tigris (Tiger)*,

2. Killer Whales (Orcas)

The predatory marine mammal called the *killer whale* or *orca* (*Orcina orca)* inhabits nearly all the salt water seas of the world.[183] The IUCN suggests that this cetacean (a family that includes whales and dolphins[184]) "may be the second-most widely ranging mammal species on the planet, after humans," although it is more commonly found in cool waters and in sheltered bays and seas.[185] As a result, it does not qualify for any vulnerable status for the IUCN, even though the worldwide population might be as low as only 50,000.[186]

Biologists consider all orcas to be within the same species, even though, according to the IUCN, "there is extensive and growing evidence that it is in fact a complex of multiple forms with morphological, genetic, ecological, and behavioral differences that merit subspecies if not also species designations."[187] One categorization of orcas divides the animals into *resident* (typically staying close to shores), *transient* (more mobile) and *offshore* (traveling further from the coasts), with some notable differences in appearance among the three *ecotypes*.[188] Despite their geographic overlap, the three ecotypes typically do not interact or interbreed.[189] Moreover, some localized populations are decreasing in number. In the United States, one of the most famous groups is the *southern resident group* that spends much of its time in the Puget Sound of Washington state, although individuals sometimes stray as far south as California and as far north as Alaska.[190] This group numbers less than 1,000 orcas, a total that is down from earlier estimates. Threats include boat traffic, pollution, and a decrease in the number of salmon, which are the orcas' favorite food.[191]

IUCN Red List of Threatened Species, https://www.iucnredlist.org/species/15955/50659951 (last visited Nov. 14, 2019). The IUCN classifies the tiger as *endangered*. *Id.* A recent IUCN report decided in favor of two subspecies: one for continental Asia and one for the much smaller population on the island of Sumatra in Indonesia. *A Revised Taxonomy of the Felidae*, *supra* note 167, at 67. The recognition of these two subspecies might open up a wider range of conservation options. Andreas Wilting et al., *Planning Tiger Recovery: Understanding Intraspecific Variation for Effective Conservation*, 1 Science Advances (June 26, 2015).

183 R. Reeves et al., *Orcinus orca (Killer Whale)*, IUCN Red List of Threatened Species, https:/ /www.iucnredlist.org/species/15421/50368125 (last visited Nov. 14, 2019).

184 *Cetaceans*, Marine Mammal Ctr., http://www.marinemammalcenter.org/education/marine-mammal-information/cetaceans/ (last visited Nov. 14, 2019).

185 Reeves et al., *supra* note 183.

186 *Id*.

187 *Id*.

188 *Killer Whale Populations and Social Structure*, Nat'l Oceanic & Atmospheric Admin. Fisheries, https://www.fisheries.noaa.gov /national/endangered-species-conservation/killer-whale-populations-and-social-structure (last updated Nov. 17, 2017).

189 *Killer Whale (Northeast Pacific Southern Resident Population)*, Fisheries & Oceans Can., http:/ /www.dfo-mpo.gc.ca/species-especes/profiles-profils/killerWhalesouth-PAC-NE-epaulardsud-eng.html (last updated Dec. 6, 2018).

190 *Id*.

191 *Killer Whale*, Nat'l Oceanic & Atmospheric Admin. Fisheries, https://www.fisheries.noaa.gov/species/killer-whale#spotlight (last visited Nov. 14, 2019); *see also*

As the result of litigation, the U.S. National Oceanic and Atmospheric Administration (NOAA) has listed the southern resident group as an endangered *distinct population segment* (DPS) under the ESA.[192] This gives this group all the benefits of imperiled species law: a prohibition against "take," with limited exceptions,[193] a requirement that the U.S. government consult with expert agencies to ensure that its actions do not "jeopardize" the DPS,[194] and other protections. But this is all because of a classification—the distinct population segment—that has little basis in biology. Why does U.S. law define *species* to include a DPS? It is because of a legal conservation conclusion that loss of a distinct population group might portend danger for the species as a whole, as well as the fact that, for these orcas, this population segment is especially prominent in the human mind because of their location. These are good reasons for protections, even though they are based on legal and policy considerations instead of biology.

3. *Elephants*

One final species for study is perhaps the most notable in the conservation world: the elephant. The largest land animal (large males can stand over four meters high and up to seven tons),[195] the elephant appeals to humans because of its size, intelligence, and apparent displays of empathy.[196] Killed for its milky-white, large tusks (which are simply large teeth), elephant populations fell dramatically in the twentieth century and recovery has been hampered by the animal's slow gestation and reproductive rates.[197]

The CITES Secretariat uses the elephant's form and tusk in its logo.[198] Despite banning international trade of ivory in 1989, CITES permitted two highly controversial "one-off" sales, which were justified as a way of meeting demand and raising money by selling off already-harvested tusks but were also sharply condemned as creating uncertainty in the market.[199] In 2017, China, once the world's largest market for ivory products (where its role roughly matched that of diamonds in the West) banned the sale of

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Linda V. Mapes & Hal Bernton, *Feds Could Restrict Pacific Ocean Fishing over Endangered Orcas, NOAA Letter Says*, SEATTLE TIMES, Mar. 7, 2019.

192 *Listing of Southern Resident Killer Whale Under the ESA,* NAT'L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, https://www.fisheries. noaa.gov/action/listing-southern-resident-killer-whale-under-esa (last updated May 29, 2019).

193 16 U.S.C. § 1538(a) (2012).

194 *Id.* § 1536(a)(2).

195 *African Elephant Facts*, ELEPHANTS FOR AFRICA, https://www.elephantsforafrica.org/elephant-facts/ (last visited Nov. 14, 2019).

196 *See generally* JEFFREY MOUSSAIEFF MASSON & SUSAN MCCARTHY, WHEN ELEPHANTS WEEP: THE EMOTIONAL LIVES OF ANIMALS (1996) (discussing the emotions and empathy of elephants).

197 Rachel Nuwer, *More Bad News for Africa's Elephants: A Super-Slow Reproduction Rate*, N.Y. TIMES, Sept. 2, 2016.

198 *See CITES Logo*, CITES, https://cites.org/eng/gallery/species/cites_logo.html (last visited Nov. 14, 2019).

199 Erwin H. Bulte et al., *The Effects of One-Off Ivory Sales on Elephant Mortality*, 71 J. WILDLIFE MGMT. 613, 618 (Dec. 13, 2010).

ivory, to the joy of elephant conservationists.[200] Whether this step will significantly dampen the horrific business of poaching elephants for their tusks remains to be seen.

There is broad consensus that there are at least two distinct species: the Asian elephant (*Elephas maximus)* and the African elephant *(Loxodonta africana)*.[201] The Asian species differs by its typically smaller size (adult males weigh only up to 4000 kg), smoother skin, and smaller ears (which are triangular, like the shape of India).[202] It suffers from living in one of the most densely populated regions in the world, with a rough estimated total population of only 50,000 elephants, and perhaps considerably fewer.[203] Because of its deceasing numbers, the Asian elephant is classified by the IUCN as *endangered*.[204]

By contrast, the African elephant occupies a wider range of locations, albeit highly fragmented across sub-Saharan Africa, in numbers that may exceed 400,000.[205] Despite poaching, the total population is slowly increasing, according to the World Wildlife Federation.[206] The growing population led IUCN to classify the African species in 2004 as merely *vulnerable* (changed from *endangered* in 1996).[207] But its conservation status is not the same across the continent. The IUCN has divided the population into four regions, giving an *endangered* status to the central African population but classifying the southern population as a species of *only least concern*.[208] In southern Africa, "which now harbors the largest known populations on the continent, elephant numbers are believed to have been at their lowest around the turn of the twentieth century, and to have been increasing steadily ever since."[209] The relatively optimistic assessment of the elephant's future in the south—in the nations of Namibia, Zimbabwe, and South Africa—poses some intriguing questions about the elephant's conservation future and how to best define it as a species.

Some biologists argue in favor of dividing the African elephant into two new species: the savanna or bush elephant (*L. africana)* mostly in the south, and the far less numerous

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200 *China's Ban on Ivory Trade Comes into Force*, BBC NEWS (Jan. 1, 2018), https://www.bbc.com /news/world-asia-china-42532017.

201 A. Choudhury et al., *Elephas maximus (Asian Elephant)*, IUCN RED LIST OF THREATENED SPECIES, https://www.iucnredlist.org/species/7140/12828813 (last visited Nov. 14, 2019); *African Elephant*, WORLD WILDLIFE FOUND., https://www.worldwildlife.org/species/african-elephant (last visited Nov. 14, 2019).

202 A. Choudhury et al., *Elephas maximus (Asian Elephant)*, IUCN RED LIST OF THREATENED SPECIES, https://www.iucnredlist.org/species/7140/12828813 (last visited Nov. 14, 2019).

203 *Id*.

204 *Id*.

205 *African Elephant*, WORLD WILDLIFE FOUND., https://www.worldwildlife.org/species/african-elephant (last visited Nov. 14, 2019).

206 J. Blanc, *Loxodonta africana (African Elephant)*, IUCN RED LIST OF THREATENED SPECIES, https://www.iucnredlist.org/species/12392/3339343 (last visited Aug. 8, 2019).

207 *Id*.

208 *Id*.; *Africa's Giraffe*, GIRAFFE CONSERVATION FOUND., https://giraffeconservation.org/wp-content/uploads/2016/09/Conservation-Status-Distribution-poster-2016-LR-c-GCF.pdf (last visited Nov. 14, 2019).

209 Blanc, *supra* note 206 (follow "Skip to Text summary" hyperlink).

forest elephant (*L. cyclotis*).[210] Limited to the Congolian rainforests, especially in Gabon, the forest elephant shows both genetic and morphological differences from elephants in the rest of the continent.[211] Among these distinctions is a slower growth rate.[212] This population roughly matches the central African region classified as endangered by the IUCN.[213] But the IUCN does not recognize two different African species, stating that "more extensive research is required to support the proposed re-classification [as] premature allocation into more than one species may leave hybrids in an uncertain conservation status."[214]

If a consensus is reached that the African elephant should be divided into two species, this would raise intriguing conservation opportunities for the southern African population. Shorn of the most imperiled population (the central group, now classified as a separate species),[215] the savanna elephant might face a relatively successful future, despite the well-publicized problem of poaching for ivory. The southern African elephant might not be classified as imperiled under any standard, either by the IUCN or under any of the CITES appendices.[216] With an optimistic classification, the southern African elephant might be legally eligible for take—hunting and capture—and for international trade. Animal rights advocates would no doubt vigorously oppose such a change for the iconic species. But if a southern species were removed from endangered lists, it would also open the possibility of expanding the idea of *community-based wildlife management*. This concept involves granting a significant amount of discretion in handling wildlife to local communities, instead of national or international authorities.[217] Some advocates have argued that local support for protection of certain species would improve if the community were given more input—and indeed, even the power to override—many of the constraints of traditional, centralized legal conservation. Stefan Carpenter has argued, for example, that the local concerns of poor farmers and ranchers in Namibia had been overlooked by high-level conservation decisionmakers before implementation of community-based management.[218] These people hold serious concerns about elephants trampling their crops and even endangering their families.[219] But many residents, at the same time, acknowledge or even cherish the existence of elephants in their region, as well as recognize the economic value of ecotourism. If communities were given greater

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210 Tara Connor, *Loxodonta cyclotis*, ANIMAL DIVERSITY WEB, http://animaldiversity.org/accounts /Loxodonta_cyclotis/ (last visited Nov. 14, 2019).

211 *Id.*

212 *Id.*

213 Blanc, *supra* note 206.

214 *Id.*

215 Connor, *supra* note 210.

216 *See The CITES Appendices*, CITES, https://www.cites.org/eng/app/index.php (last visited Nov. 14, 2019).

217 *See, e.g.*, Clark C. Gibson & Stuart A. Marks, *Transforming Rural Hunters into Conservationists: An Assessment of Community-Based Wildlife Management Programs in Africa*, 23 WORLD DEV. 941, 941 (1995); Johan T. Du Toit, *Wildlife Harvesting Guidelines for Community-Based Wildlife Management: A Southern African Perspective*, 11 BIODIVERSITY & CONSERVATION 1403, 1403–04 (2002).

218 Stefan Carpenter, *The Devolution of Conservation: Why CITES Must Embrace Community-Based Resource Management*, 2 ARIZ. J. ENVTL. L. & POL'Y 1, 9–16 (2011).

219 *Id.* at 22–24, 28.

power to make conservation decisions, the argument goes, they could take steps to protect their local elephants from indiscriminate harm, but could also permit the occasional killing of elephants that habitually trample crops. And communities could set up small ranches on which elephants' tusks would be sustainably harvested for ivory. Even if such a future seems shocking, this could be the result of simple changes in the species determinations for the elephant.

IV. A Proposal for Law's Domain for *Species*

This Article has endeavored to show that law cannot rely solely on science for a delineation of the term *species*. Because the concept is a human one, not a biological or natural one, scientists are unlikely to agree as to whether the BSC, the PSC, or another potential test is the "correct" one. All definitions have their benefits and drawbacks, but none can be relied on to lump or split populations of animals with confidence in all instances. For the foreseeable future, there are bound to be competing and inconsistent scientific definitions. Because of this scientific uncertainty, I propose, as an alternative, that law make its *own* definitions of species, designed to meet legal and policy goals rather than match scientific findings.

Science and law do not follow identical aims. For biologists, the question of *species* determination might depend on physiology, genetic characteristics, or evolutionary history. But such criteria might not match the reasons that humans have decided to regulate conduct related to animal species.[220] Laws concerning various species might be spurred by a variety of aims, such as: a practical desire to conserve a species for future human use in medicine or agriculture; to protect important cogs in the mechanisms of natural ecosystems; to provide people with recreational opportunities or aesthetic enjoyment; or cultural, religious, or spiritual imperatives.

Accordingly, the legal community should not be shy in crafting definitions of species to meet these human interests, even if they might not match perfectly—or even conflict—with current scientific thinking. Science might help inform law, but it need not control it. For example, law might conclude that distinct population segments of orcas should be considered a distinct species, in a legal regime, because of a practical desire to minimize the risk of future extinction by incremental loss of various population segments over time. This is a sensible approach, even if the distinct population segment idea does not match the biological approach to species delineation.

Beyond simply protecting a species from extinction, the legal community may have several distinct goals to consider when defining a species for lawmaking purposes. First, a law might be intended to conserve animals for their potential *usefulness* in medicine, agriculture, and other practical sciences.[221] A notable example is the cancer-fighting

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220 *See, e.g.*, *Why Save Endangered Species?*, U.S. Fish & Wildlife Serv. (July 2005), https://www.fws.gov /nativeamerican/pdf/why-save-endangered-species.pdf (listing practical uses, ecosystem benefits, and other intangible factors for saving species).

221 *See, e.g.*, Food & Agric. Org. of the U.N., The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture 65-79 (2015), http://www.fao.org/3/a-i4787e.pdf.

properties of unique enzymes found in Madagascar's rosy periwinkle.[222] To preserve biological material for use by humans in future generations, lawmakers might use science to determine which populations or animals are likely to be the most useful. Biologists might well respond that the answer is to protect a wide range of *genetic diversity*. Accordingly, a legal goal might be to protect groups of animals—we might call them "species"—using a definition that is different from any biological definition. Consider the potential example of distinct groups of similar animals that hold slight but noticeable variations in their genetic makeup (different alleles, for example). Biologists might conclude that the groups' genetics, physiology and evolutionary history point toward lumping them together as a single species. By contrast, however, lawmakers might well conclude that it is wisest to split these animals into separate legally defined species to conserve the greatest variety of potential valuable genetic diversity.

To give an example of how this legal approach might work, consider the U.S. ESA,[223] which is often the subject of proposed amendments.[224] For the purpose of preserving genetic diversity, the Act's definition of species might be amended to include "populations with distinctive genetic characteristics that may reasonably be expected to offer potential usefulness in medicine or technology."

Next, humans might desire to preserve animals based on geographic locations. A goal might be to retain certain animals in specific locations because of their value in maintaining an *ecosystem* (the interaction of different parts of nature, including animals, plants, and non-living components).[225] For example, the wolf's removal from Yellowstone National Park in the twentieth century led to a boom in the population of elk (formerly the chief prey of the wolf), which in turn led to elk eating too many tree saplings, resulting in erosion of vegetation-denuded slopes along the park's streams and rivers.[226] A government might conclude that a discrete population of animals is important for maintaining or improving an important ecosystem and that a decline in this population fragment might be irreversible.[227] This concern might compel the government to choose a legal species definition that expands the ESA's distinct population segment idea.[228] The IUCN, for example, might extend its practical references to "species" to include "discrete populations that are essential to the viability of an ecosystem of flora and fauna."

Another culture might not worry about possible extinction, ecosystem decline, or fragmentation; rather, this culture might be more concerned about *human-animal conflicts*

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222 JOHN INNES CTR., *Madagascar Periwinkle Research Uncovers Pathway to Cancer-Fighting Drugs*, SCIENCEDAILY, May 3, 2018.

223 16 U.S.C. §§ 1531–44 (2012).

224 *See, e.g.*, Timothy Cama, *Western Lawmakers Introduce Bills to Amend Endangered Species Act*, THE HILL, July 12, 2018.

225 *Ecosystem*, ENCYCLOPÆDIA BRITANNICA, https://www.britannica.com/science/ecosystem (last visited Nov. 14, 2019).

226 David Frey, *Study shows Yellowstone wolves' impact on streams*, WILDLIFE SOC'Y (Nov. 30, 2018), https://wildlife.org/study-shows-yellowstone-wolves-impact-on-streams.

227 *See* QUAMMEN, *supra* note 118, at 457–63 (concerning the "single large or several small debate").

228 The U.S. Endangered Species Act includes a "distinct population segment" as part of its definition of "species." 16 U.S.C. § 1532(16) (2012).

(i.e., between farmers and animal predators). These conflicts could be ameliorated by concentrating animal groups into a handful of large preserves.[229] This culture's law might prefer a definition of species that lumps together groups of animals that are somewhat genetically different to allow population concentration, as long as it does not generate problems of outbreeding depression. The law might take precautions and allow lumping only when the classification "provides for the long-term sustainability of the species, decreases harms caused by the species to local communities, and improves human cultural attitudes toward the animal population."

Finally, a civilization might cherish specific animal groups because of their *cultural or historic significance*. An example would be the Gir lions of Africa—the only Asian remnant of the *Panthera leo*.[230] The small sub-population of the species has been suffering from disease and there is a debate in India over whether to relocate some of the lions to protect them from an epidemic.[231] A national or regional definition of *species* could be created to include this historically significant group. Similarly, the European Union's Habitats Directive already includes a category called "species of [c]ommunity interest."[232] Such a definition could be clarified to encompass "population groups that are of special cultural or historical interest," even if they do not meet any biological definition of a distinct species.

A homespun U.S. example of cultural significance might include the "Chincoteague ponies" (in fact, simply small horses) of coastal Virginia and Maryland.[233] Made famous by Marguerite Henry's children's novel *Misty of Chincoteague*, a tale of the horses' arrival after a wreck of a Spanish galleon, the wild "ponies" are a famous part of coastal lore.[234] Each year, tourists watch as they are herded at low tide from their usual home on isolated Assateague Island to nearby Chincoteague, where they are paraded and foals are sold to the public.[235] The wild horses have been suffering from a fungus-like infection that has killed many in recent years.[236] A U.S. state conservation law could include within its definition of *species* any population group considered "culturally distinctive and significant" and provide legal measures to protect this group from extirpation. Such a definition would not match any biological test, but it would be justified by wholly human interests.

If carried out, the proposal for legally specific definitions might result in a panoply of different interpretations of a single term—*species*—across a range of different laws. Moreover, the legal definitions might conflict with those used by biologists. But a lack of

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229 *See* Carpenter, *supra* note 218, at 1–50 (discussing human-animal conflicts); QUAMMEN, *supra* note 118, at 463–67 (concluding that a "single large" habitat is often better than "several small" habitats).

230 *See, e.g.*, G Seetharaman, *What's Stopping the Asiatic lions of Gir from Getting a New Home?*, ECON. TIMES, Oct. 20, 2018 (discussing the cultural importance of the Gir lions and the government's opposition to any relocation).

231 *Id.*

232 EU Council Directive 92/43/EEC, *supra* note 125.

233 *Assateague's Wild Horses*, NAT'L PARK SERV., https://www.nps.gov/asis/learn/nature/horses.htm (last updated Mar. 14, 2017).

234 *See* MARGUERITE HENRY, MISTY OF CHINCOTEAGUE (1947).

235 *Assateague's Wild Horses*, *supra* note 233.

236 Steve Hendrix, *On an Island Famous for Wild Ponies, a Dangerous Infection is Killing Horses*, WASH. POST, Dec. 31, 2018.

uniformity should not trouble us. One of the points that distinguishes law from science is that science is descriptive, whereas law is *pragmatic*. Science seeks to explain the rules of the universe, which are, well, universal.[237] Law has less lofty aims; it seeks to resolve discrete disputes that arise day-to-day in civilization. An attribute of law is that it is flexible enough to cabin definitions of terms into discrete realms of problem-solving, without worrying much about other applications. Because of their limited and practical goals, specific laws may do non-universal things, i.e., defining environmental terms such as "water"[238] or "solid"[239] in ways that may seem incorrect to a scientist. Law seeks to solve problems and its problem-solving need not match how other disciplines characterize the world.

Humans use the word *species* to refer to groups of individual living things that hold similar characteristics.[240] No other word (at least in English) holds a similar meaning. We used the word before modern Linnaean classification, before Darwin's theory of natural selection, and before the science of genetics, and we are likely to use it far into the future.[241] There is no practical reason why we cannot define the word in different circumstances with distinct meanings.

Human and animal characterizations may run both ways. Commenting on the relationship between humans and animals, American naturalist Henry Beston wrote in the 1920s:

> [The] animal shall not be measured by man. In a world older and more complete than ours, they move finished and complete, gifted with the extension of the senses we have lost or never attained, living by voices we shall never hear. They are not brethren, they are not underlings: they are other nations, caught with ourselves in the net of life and time, fellow prisoners of the splendour and travail of the earth.[242]

When assessing what we call *Homo sapiens*, many non-human animals might reasonably conclude that our group is different from other animals. Clever animals might even distinguish that the creatures who wear orange vests in November (that is, human hunters) should be feared more than similar-appearing creatures in other garb at other times of the year. Likewise, some birds can distinguish the faces of humans with whom

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237 *Science*, MERRIAM-WEBSTER.COM, https://www.merriam-webster.com/dictionary/science (last visited Nov. 14, 2019).

238 *See, e.g.*, Brad Plumer & Umair Irfan, *Why Trump wants to repeal an Obama-era clean water rule*, VOX (Dec. 11, 2018), https://www.vox.com/energy-and-environment/2017/2/28/14761236/wotus-waters-united-states-rule-trump (discussing the tortured history of the term "waters of the United States").

239 *See* Solid Waste Disposal Act, 42 U.S.C. § 6903(27) (2012) (defining "solid" to include a liquid and a contained gas).

240 Indeed, the word derives from the Latin root *specere*, meaning to "see," "look," or "appear." *Species*, MERRIAM-WEBSTER.COM, https://www.merriam-webster.com/dictionary/species (last visited Nov. 14, 2019).

241 Eugene McCarthy, *On the Origins of the Word Species*, MACROEVOLUTION.NET, http://www.macroevolution.net/species.html (last visited Oct. 18, 2019).

242 BESTON, *supra* note 21.

they have had troubling interactions from those who have been friendlier to them.[243] If these animals' minds classify different groups of humans as different categories of animals, they do so for very practical and worthy reasons.

Law could, and should, do something similar. In differing circumstances and in different locations, law might use its elasticity to give different meanings to the same key term. Law need not be bound by the strictures of science in applications that call for greater flexibility and creativity. When humans desire to protect species for their genetic diversity, these goals should govern; when humans wish to shelter species for their cultural value, this ideal should control. By rendering to law its *own* domain in matching definitions to purposes, we might better effectuate a society's goals in delineating *species*.

Paul Boudreaux is a professor of law at Stetson University College of Law, Gulfport, Florida, USA. *This article was supported by a generous grant from Stetson Law. The author thanks student research assistants Lydia Greiner (Stetson Law '16) and Tom Hall (Stetson Law '20) for their research. The author also thanks Professor Sarah Schindler and Professor Shelly Saxer for their valuable comments on a draft of this article.*

243 Crows, for one, can distinguish humans by aspects their appearance, including the faces of those that they dislike because of earlier threats. Michelle Nijuis, *Friend or Foe? Crows Never Forget a Face, It Seems*, N.Y. TIMES, Aug. 25, 2008, https://www.nytimes.com/2008/08/26/science/26crow .html; Donna J. Cross, John M. Marzluff, Satoshi Minoshim & Robert Miyaoka, *Brain imaging reveals neuronal circuitry underlying the crow's perception of human faces*, 109 (39) PNAS 15912 (2012), https://doi.org/10.1073 /pfnas.1206109109.

Fossil Fortunes: Regulating Commercial Paleontology & Incentivizing Fossil Discovery

By Ashlee A. Paxton-Turner

I. Introduction

Imagine the earth millions of years ago, long before any human walked its surface. Maybe a *Triceratops* is off in the distance eating shrubs or hiding from the infamous *Tyrannosaurus rex*.[1] Or a *Tarbosaurus bataar* is roaming what is now the Gobi Desert in

1 Joseph Castro, *Triceratops: Facts About the Three-Horned Dinosaur*, Live Science (Mar. 18, 2016), http://www.livescience.com/24011-triceratops-facts.html.

search of its dinner.[2] Fast forward several millennia. A man named Eric Prokopi roams the Gobi Desert. He finds and tries to sell the remains of a *Tarbosaurus bataar*,[3] his discovery—and attempted sale—leaves journalists, lawyers, judges, and academics struggling to understand the illegal dinosaur fossil market.

So, what is it about dinosaurs? What would make the sale of a bunch of bones garner so much attention? Perhaps *Jurassic Park* and its popularity can help explain the fascination with these creatures that no human or human ancestor has ever encountered. In 1993, *Jurassic Park* hit the silver screen, bringing Michael Crichton's world to life and starting a long-standing movie franchise that continues to captivate the imagination of millions around the world.[4] That might be part of the answer, but even before 1993, many people were in awe of these creatures that lived long before any human.[5] Eric Prokopi, a commercial paleontologist, was no different.[6] Prokopi first caught the thrill of hunting for fossils as a young boy searching for shark teeth in Central Florida.[7] As an adult, he became interested in "prehistoric animal treasure."[8] This interest carried Prokopi all the way to an auction house with a *Tarbosaurus bataar* specimen, a close relative of the *Tyrannosaurus rex*, from the Gobi Desert.[9] At auction, Prokopi's *Tarbosaurus bataar* sold for just over $1 million.[10]

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2 Wynne Parry, Tarbosaurus *vs*. Tyrannosaurus*: What's the Difference?*, LIVE SCIENCE (May 23, 2012), http://www.livescience.com/20540-tarbosaurus-tyrannosaurus-difference.html.

3 Paige Williams, *The Black Market for Dinosaurs*, THE NEW YORKER (June 7, 2014), http://www.newyorker.com/tech/elements/the-black-market-for-dinosaurs. *See generally* PAIGE WILLIAMS, THE DINOSAUR ARTIST: OBSESSION, BETRAYAL, AND THE QUEST FOR EARTH'S ULTIMATE TROPHY (2018).

4 *See* Michael Cieply, *'Jurassic World' Tromps All Over Box Office Competition*, N.Y. TIMES, (June 14, 2015), https://www.nytimes.com/2015/06/15/movies/jurassic-world-tromps-all-over-the-box-office-competition.html (discussing the "near-record $204.6 million in estimated weekend sales at the domestic box office, and about $512 million worldwide").

5 *See* Brian Switek, *Why do we love dinosaurs so much?*, THE GUARDIAN (Sept. 5, 2014), https://www.theguardian.com/commentisfree/2014/sep/05/dinosaurs-discovery-new-dinosaur-dreadnoughtus-schrani ("Dinosaurs can be Hollywood monsters, objects of scientific fascination and everything in between, but at the root of it, our fascination with them stems from wanting to know more about the prehistory we share. The dinosaur story is part of our own.").

6 This Article defines "commercial paleontologist" as someone who is not an amateur and who does not participate in excavations on behalf of a museum or university or another research-based institute. Instead, a commercial paleontologist participates in excavations for the primary purpose of making money.

7 Paige Williams, *The Black Market for Dinosaurs*, THE NEW YORKER (June 7, 2014), http://www.newyorker.com/tech/elements/the-black-market-for-dinosaurs.

8 *Id*.

9 Brian Switek, *The Million-Dollar Dinosaur Scandal: Meet the crooks, smugglers, and counterfeiters who run the most brazen fossil scams*, SLATE (Jan. 9, 2013), http://www.slate.com/articles/health_ and_science/science/2013/01/tarbosaurus_bataar_smuggling_case_dinosaur_fossil_dealers_steal_bones_from.html.

10 *Id*.

Nevertheless, the story does not end at the auction house. Instead, Prokopi's dinosaur landed him in federal court facing several counts of felonious smuggling[11] after the Mongolian government, through a Houston attorney, sued to recover the *T. bataar* specimen.[12] Just as many people have become fascinated with dinosaurs, Prokopi was not the first commercial paleontologist to smuggle dinosaur bones and other fossils.[13] It is no secret that the black market for dinosaur bones and other fossils has been an ongoing problem for decades.[14] Traditionally, this problem has been addressed through civil and criminal sanctions, and many cases usually end in plea bargains.[15] Yet, despite these sanctions, the fossil trade continues, and many fossils are left in the hands of private collectors rather than museums and universities where the public can marvel at part of its global natural heritage.[16]

Different countries have different regimes for regulating fossils. In the United States, a relatively new piece of federal legislation, the Paleontological Resource Preservation Act (PRPA), unifies the previously disparate pieces of federal legislation to create a unified scheme for dealing with fossils on federal lands.[17] Under the PRPA, paleontologists must obtain a permit to dig and excavate on federal lands.[18] Although casual diggers do not need a permit, the PRPA does not allow commercial paleontologists to obtain permits.[19] For some, denying permits to commercial paleontologists may seem like a step in the right direction to encourage digging for fossils for scientific research and public appreciation. However, eliminating these commercial paleontologists may instead only further the black market trade in fossils.[20] More problematically, cutting out commercial paleontologists may even leave some fossils undiscovered,[21] which raises the question of

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11 Paige Williams, *The Black Market for Dinosaurs*, THE NEW YORKER (June 7, 2014), http://www.newyorker .com/tech/elements/the-black-market-for-dinosaurs.

12 *Id.*

13 *Id.* ("Fossil poaching is neither new nor especially rare, and mostly happens in fossil-rich countries such as China, Argentina, and the United States.").

14 *See id.*

15 *Id.*

16 *Id.*

17 Paleontological Resources Preservation Act, 16 U.S.C. § 470aaa-1 (2009).

18 *Id.* at § 470aaa-3.

19 *Id. See* 16 U.S.C. § 470aaa-5 (2009) ("A person may not sell or purchase or offer to sell or purchase any paleontological resource if the person knew or should have known such resource to have been excavated, removed, sold, purchased, exchanged, transported, or received from Federal land.").

20 *See* Maggie Koerth-Baker, *Who Owns The Dinosaurs? It All Depends On Where You Find Them*, FIVE THIRTY EIGHT (Apr. 23, 2019), https://fivethirtyeight.com/features/who-owns-the-dinosaurs-it-all-depends-on-where-you-find-them/ ("Under the law, most fossil digging on federal lands requires a permit, those permits can only be obtained by qualified scientists, and any specimens that are found belong to the public . . . But none of that applies on private land . . . There, both access to the land and ownership of the fossils usually go to whoever is willing to pay landowners the most.").

21 *See* Keith Cronin, Note, *A Bone to Pick: The Paleontological Resources Preservation Act and Its Effect on Commercial Paleontology*, 7 ALB. GOV'T L. REV. 267, 287 (2014) ("While zealously protecting against the misappropriation of fossils, Congress is inadvertently decreasing the number of fossils discovered on federal land.").

how to cut down on dinosaur bone (and other fossil) smuggling without completely destroying the incentives for people to go out and discover these bones and fossils. One thing is clear, though: simply disallowing permits to commercial paleontologists is not the solution.[22]

Other natural resource management schemes may provide useful insights, particularly those regimes that recognize the commercial and economic uses for the resource. An ideal scheme would include additional incentives to encourage commercial paleontologists to keep digging, but then to share their finds with museums and universities rather than sell them at auction. Such incentives could include compensation and legal entry into the marketplace with fossils from federal lands. When the costs incurred by a commercial paleontologist for illegal fossils are high,[23] legal entry could be a significant incentive in its own right. This Article considers three possible regimes that would incorporate legal entry into the federal fossil trade in the United States and a modest beginning for legal entry into the Mongolian and Chinese fossil trade. One possibility would be a tradeable quota regime,[24] under which commercial paleontologists would be able to acquire additional tradeable shares in exchange for donating a certain percentage of their finds to museums or universities. Alternatively, commercial paleontologists could be included in the PRPA's existing permitting scheme by requiring that they structure their sales to buyers on the condition that the buyers agree to share the fossil for a specified time with a museum or university. A third possible regime would require commercial paleontologists to provide a right of first refusal of any finds to a museum or university at a discounted price.

This Article sketches the three possible regimes that would control the smuggling and commercialization of dinosaur bones and other fossils, encourage public accessibility to these fossils, and encourage the discovery of fossils. Part II briefly discusses the value of dinosaur bones and fossils as part of a global natural heritage. Part III then discusses a few of the ways the United States has previously managed fossils, some proposed legislation leading up to the Paleontological Resource Preservation Act (PRPA), and the PRPA itself. This Part also includes a brief discussion of the regimes in China and Mongolia, where dinosaur bones are commonly found. Additionally, Part III explains

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22 *See id.*; *see also* Alanna Mitchell, *Plundering Science, Bone by Bone*, N.Y. TIMES, Oct. 22, 2013, at D6 ("[S]ome scientists hoped that [Prokopi's] case . . . would curb the illegal digging, [but] that does not appear to have happened."); *see also* Erik Ortiz, *Fossil Theft Raises Concerns About Bustling Black Market*, NBC NEWS (Feb. 21, 2014), http://www.nbcnews.com/news/crime-courts/fossil-theft-raises-concerns-about-bustling-black-market-n35846 (discussing how, at least according to Prokopi, "trying to stifle the black market would make matters worse.").

23 *See* Paige Williams, *Bones of Contention*, THE NEW YORKER (Jan. 28, 2013), http://www.newyorker.com/magazine/2013/01/28/bones-of-contention-2 (describing just some of the costs Prokopi incurred due to the government's prosecution of him and Eric Prokopi effectively incurred financial ruin as a result of the government's prosecution of him).

24 This regime would be like the existing tradable quota regime used for other natural resources like the red snapper in the Gulf of Mexico. *See* 50 C.F.R. § 622.21 (2019) ("This section establishes an [individual fishing quota (IFQ)] program for the commercial red snapper component of the Gulf reef fish fishery. Shares determine the amount of Gulf red snapper IFQ allocation, in pounds gutted weight, a shareholder is initially authorized to possess, land, or sell in a given calendar year.").

several problems with these regimes. Part IV discusses the goals of an ideal regime that includes commercial paleontologists and then proposes three regimes that would accomplish those goals. All three possible regimes would include additional incentives for commercial paleontologists to share their finds with the public rather than always rushing to the auction house or the black market.

II. The Value of Dinosaur Bones & Fossils & Who's Digging for Them

Dinosaur bones and other fossils have much to offer individuals and their communities. Specifically, this Part discusses two primary values: (1) access to our global natural heritage, and (2) expanding our collective knowledge. Any fossil management plan should try to account for these values. As such, this Part lays the groundwork for the values for which all three possible regimes discussed in Part IV should try to account. This Part also provides a brief overview of the different paleontologists—both commercial and academic—amateurs who spend time digging for fossils, and the fossils market.

A. A Global Natural Heritage

Dinosaurs continue to captivate the public imagination, and their bones are no different.[25] Discoveries of dinosaur bones often find their way to major news media outlets and excite the public.[26] But dinosaur bones are more than just a cornerstone of public imagination that some people find in museums and certain private collectors enjoy from the comfort of their living rooms.[27] Dinosaur bones and other fossils capture part of a global natural heritage that situates individuals and their communities in a history that stretches back well beyond the settlers at Jamestown in 1607 or the Ming Dynasty.[28] Dinosaur bones are reminders of what was on the earth long before any human roamed its lands.

Early conservation efforts to preserve wilderness in the United States provide a helpful analogy for understanding the value of preserving and discovering a shared natural heritage. For example, part of the Wilderness Society's platform was to preserve the wilderness so that future generations would be able to appreciate it.[29] Part of that appreciation must take the form of recognizing that "in maintaining . . . access to wildness we

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25 *See, e.g.*, Tom Holland, *Dinomania: the story of our obsession with dinosaurs*, The Guardian (June 5, 2015), https://www.theguardian.com/books/2015/jun/05/dinomania-dinosaur-obsession-science.

26 *See* Colleen Shalby, *43 dinosaur eggs discovered at construction site in China*, PBS (Apr. 22, 2015), www.pbs.org/newshour/rundown/43-dinosaur-eggs-discovered-construction-site-china (reporting on the excitement surrounding discovery of dinosaur eggs in China in 2015).

27 *See* Olivia Lang, *Room in your lounge for a dinosaur skeleton?*, BBC News (Oct. 5, 2010), http:/ /www.bbc.com/news/world-europe-11430159.

28 *See When did dinosaurs live?* Natural History Museum, http://www.nhm.ac.uk/discover/dino-directory/about-dinosaurs/when-did-dinosaurs-live.html (last updated June 5, 2018) ("Dinosaurs lived between 245 million and 66 million years ago.").

29 Robert Yard, *A Summons to Save the Wilderness*, 1 The Living Wilderness 2 (1935).

are not . . . escaping from life but rather keeping in touch with our true reality . . . ."[30] What did that look like then in the context of promoting wilderness preservation? Howard Zahniser writes that this appreciation is related to a "realiz[ation] that we ourselves are creatures of the wild."[31] The story of the wilderness is part of the story of the United States and its people. Similarly, the story of the dinosaurs and other prehistoric species is the story of the earth and its people. Fossils tell that story of prehistoric natural heritage just as the wilderness tells its own story of natural heritage. Moreover, in one report, the Department of the Interior recognized "fossils are part of America's heritage,"[32] even listing it as the first principle for congressional consideration.[33] Although fossils are neither as culturally tied to American heritage as its wilderness or as culturally significant in America as they are in other nations, the seeds are there for recognizing fossils as part of a collective natural heritage within the United States and globally.

Although some countries consider fossils, alongside other antiquities, as part of their "national patrimony,"[34] that view does not preclude a global patrimony. For example, when discoveries are made of hominids, they may be found in countries around the globe, but their discoveries are included in a global story of human ancestry.[35] Indeed, when Eugene Dubois unearthed Java Man in Indonesia in the 1890s,[36] the discovery was not just part of Indonesia's story, but also part of the world's story of human origins.[37] Dubois's discovery was explained as "an event of the first importance to the scientific world"[38] not just to Indonesia or even to Holland, which was Dubois's native country.[39] Dinosaur bones and other fossils can be treated in much the same way.

B. THE MORE YOU KNOW: COLLECTIVE KNOWLEDGE

This global natural heritage is not all that dinosaur bones have to offer. They also offer important scientific information that adds to the general collective knowledge of the earth's history, which is vital for new discoveries and new research. For example, fossils can shed light on the story of climate change and what the world should expect in

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30 Howard Zahniser, *Our World and Its Wilderness*, 40 THE AMES FORESTER 21 (1953).

31 *Id.*

32 SEC'Y OF THE INTERIOR, FOSSILS ON FEDERAL & INDIAN LANDS, at 8 (2000); *see also* Cronin, *supra* note 21, at 280.

33 SEC'Y OF THE INTERIOR, FOSSILS ON FEDERAL & INDIAN LANDS, at 7 (2000).

34 JOSEPH L. SAX, PLAYING DARTS WITH A REMBRANDT: PUBLIC AND PRIVATE RIGHTS IN CULTURAL TREASURES 184 (1999).

35 *See, e.g.*, Ann Gibbons, *The Human Family's Earliest Ancestors*, SMITHSONIAN MAGAZINE (Mar. 2010), http://www.smithsonianmag.com/science-nature/the-human-familys-earliest-ancestors-7372974/ (discussing the discovery of Ardi, *Ardipithecus ramidus*, in Ethiopia). Ardi is "by far the most complete of the early hominids; most of her skull and teeth as well as extremely rare bones of her pelvis, hands, arms, legs and feet have so far been found." *Id.* Her discovery tells the global story of humanity, not just Ethiopia's story. The same could be said for dinosaur bones.

36 *See generally* O.C. Marsh, *The Ape-Man from the Tertiary of Java*, 3 SCIENCE 789 (1896).

37 RICHARD A. FORTEY, FOSSILS: THE HISTORY OF LIFE 196 (1982) ("It soon became clear that early human history embraced a large part of the world . . . .").

38 Marsh, *supra* note 36, at 793.

39 *Id.* at 790.

the decades and generations to come.[40] After all, fossils are basically a record of everything that has happened throughout the planet's history, and that information could be invaluable.[41] Typically, historical records are treated with respect and are valued for the information they provide. Fossils are similarly valuable.

This knowledge is also valuable for its own sake. Fostering intellectual interest can serve as its own justification for preserving remnants of the earth's past.[42] For example, a meteorite that crashed in Australia decades ago is still being studied, but not for its "practical value."[43] Instead, people keep studying it because of its "diverse organic compounds—compounds that must have rained down on the early earth and may have given rise to the earliest life."[44] People care about this meteorite because "[m]eteorites are deeply interesting . . . in themselves."[45] That is reason enough to preserve it.[46]

An analogy to the treatment of endangered species is helpful for understanding the value of the knowledge that comes from the discovery and preservation of dinosaur bones. Just like the meteorite, some endangered species are not studied for their "practical value."[47] According to some scholars, "[b]iological diversity has been deemed the 'living library' of the life sciences."[48] When a species becomes extinct, "we lose from this living library a life form that is separated from its nearest kin by thousands to millions of years."[49] It is certainly true that some species can help us cure diseases, but it is equally important to remember that "every form of life represents the working of ages of the earth's career that have come and gone."[50] Fossils provide us with similar information. Just like living things, fossils can also "reflect a vast story about events in our planet's ancient history . . . ."[51] This knowledge is independently valuable and reason enough to find and preserve remains of the earth's past.

One final counterpoint is worth mentioning. A careful reader might wonder if there is any reason to keep these fossils in the ground. Would it really be ideal if all dinosaur bones were unearthed? The commercial paleontologists (and maybe even the academics) might be out of a job, and the amateurs may find it harder to connect with science and their planet's past. But are there other benefits to keeping these fossils in the ground? Would total extraction disrupt the layers of sediment that make up the planet? Would unearthing all the planet's fossils reveal too much? Are some stories better left untold? Answering these questions in detail is beyond the scope of this Article, but this Article

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40 *See, e.g.*, Eric Hand, *Fossil leaves suggest global warming will be harder fight than scientists thought*, SCIENCE (Jan. 4, 2017, 9:00 AM), http://www.sciencemag.org/news/2017/01/fossil-leaves-suggest-global-warming-will-be-harder-fight-scientists-thought.

41 *What can we tell from the fossil record?*, AM. GEOSCIENCES INST., https://www. americangeosciences.org/education/k5geosource/content/fossils/what-can-we-tell-from-the-fossil-record (last visited Nov. 4, 2019).

42 EDWARD L. MCCORD, THE VALUE OF SPECIES 9 (2012).

43 *Id.*

44 *Id.*

45 *Id.*

46 *Id.*

47 *Id.*

48 *Id.* at 20.

49 *Id.*

50 *Id.*

51 *Id.*

takes the approach that more knowledge is always better when it comes to the planet's history.

The earth has been around much longer than any scientist, or any human for that matter. When there is so much left unknown and unaccounted for, it does not seem advantageous to turn away from potential sources of knowledge. There is a new urgency for this knowledge, too, with the realization of climate change and large segments of the population refusing to acknowledge climate change.[52] The need to understand the planet's history has never been more pressing.

C. MEET THE DIGGERS

The allure of fossils is undeniable, and the magnetism of maybe finding the next great dinosaur skeleton is even more tempting. Ever since 1824, when William Buckland discovered the first dinosaur fossil,[53] the bones of a *Megalosaurus*,[54] many people have gone out searching for these specimens of the earth's past.[55] But who are they? Some are academics with years of training and education devoted to unearthing these fossils to tell the planet's story and move science forward.[56] Others are amateurs—regular people, part-time hobbyists, and dinosaur enthusiasts who enjoy connecting with their planet on

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52 *See, e.g.*, Clare Foran, *Donald Trump and the Triumph of Climate-Change Denial*, THE ATLANTIC (Dec. 25, 2016), https://www.theatlantic.com/politics/archive/2016/12/donald-trump-climate-change-skeptic-denial/510359/.

53 Brian Switek, *A Brief History of Hidden Dinosaurs*, SMITHSONIAN MAGAZINE (July 30, 2012), http://www.smithsonianmag.com/science-nature/a-brief-history-of-hidden-dinosaurs-9663115/.

54 *Id.*

55 *See, e.g.*, Larry Bleiberg, *10 best places to discover dinosaurs and fossils*, USA TODAY (June 24, 2016, 8:05 AM), https://www.usatoday.com/story/travel/destinations/10greatplaces/2016/06/24 /dinosaur-fossil-sites/86286054/ ("Fossil sites and displays continue to attract adults and kids fascinated by the flesh-eating monsters that once ruled the planet."); *see also* David Mark Simpson, *Please Pass the Pickax*, N.Y. TIMES, Jan. 5, 2016, at D1 (discussing scientist, Dr. Bruce Schumacher, and his team of volunteers who uncover dinosaur bones from Picketwire Canyon in Colorado). But being an amateur or a volunteer does not mean a lack of training. *Id.* In fact, although "[m]ost of the volunteers are amateurs interested in paleontology, like a retired meat cutter, a retired secretary of an oil and gas company and a retired aerospace engineer" and "many [are] in their 70s and 80s, . . . Dr. Schumacher has been training [them] for the last 15 years." *Id.* These volunteers have "become a highly skilled team." *Id. See also* Brian Switek, *Want to go hunting for dinosaur bones? Here's what to expect*, WASH. POST (July 15, 2016), https://www.washingtonpost .com/news/speaking-of-science/wp/2016/07/15/want-to-go-hunting-for-dinosaur-bones-heres-what-to-expect/?utm_term=.cbca051f3fc4 ("Who doesn't want to find a dinosaur?").

56 *See, e.g.*, Stephen Brusatte, *Working with dinosaurs: the secret life of a paleontologist*, THE GUARDIAN, https://www.theguardian.com/careers/dream-job-working-dinosaurs-paleontologist. Of course, even academics treat their work differently. In fact, Michael Crichton drew this exact point in *Jurassic Park* with fictional University of Denver paleontologist, Alan Grant, who "saw himself as an outdoor man" and "had little patience for the academics, for the museum curators, for what he called Teacup Dinosaur Hunters." MICHAEL CRICHTON, JURASSIC PARK 27 (1991).

a new level.[57] Finally, some are commercial paleontologists, who make their living selling their discoveries.[58] But, even among the commercial paleontologists, the motives are mixed. Some are fossil-enthusiasts just like the academics and amateurs.[59] Others might be just as happy to sell antique furniture as they would dinosaur bones, if the price were right. Indeed, some "are disreputable and brutish, ripping bones from national parks and other protected lands and selling them for a quick buck."[60] Somewhat surprisingly, others, "in developing countries such as China and Morocco, are peasants striving to ease their painful lives with whatever they can claw, quite literally, from the earth around them."[61]

The methods of excavation are just as varied as the diggers' backgrounds.[62] Although "academic paleontologists . . . [have] tended to tar all dealers with the same brush—as greedy yahoos and enemies of science, [this] charge [might be] undeserved."[63] Although some diggers might be "pick-swinging farmers hack[ing] rock slabs containing the remains of ancient birds and fish with little more concern than they g[i]ve to plowing their fields,"[64] others are exceptionally careful and keep detailed records.[65] The diggers—even those within a specific grouping like commercial paleontologists—come from all backgrounds with any number of motivations, interests, and types of expertise. As such, trying to build a fossil management plan that focuses on the digger's identity is likely to come up short and leave out valuable manpower.

D. Welcome to the Market

Finally, what does the market for these fossils look like? Large skeletons have become extremely lucrative in famous auction houses.[66] Smaller skeletons and fossils have

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57 *See* Riley Black, *Commercial Collectors and the Plight of Paleontology*, Smithsonian Magazine (Mar. 24, 2009), http://www.smithsonianmag.com/science-nature/commercial-collectors-and-the-plight-of-paleontology-41226166/ ("From the very beginning, amateurs have been essential to the development of paleontology.").

58 *See id.* (discussing commercial collectors' "concern[s] with how much money a specimen can make").

59 See Lewis M. Simons, *Fossil Wars*, Nat'l Geographic, http://science.nationalgeographic.com/science /prehistoric-world/fossil-wars/ ("[S]ome dealers are careful collectors and honest businessmen . . . .").

60 *See id.*

61 *Id.*

62 *Id.*

63 *Id.*

64 *Id.*

65 *Id.*

66 *See, e.g.*, *id.* (discussing dinosaur bones and other fossils as "potentially lucrative commodities"); *see also* Jonathon Keats, *Fossil Hunting*, Forbes (May 4, 2011, 6:00 PM), https://www.forbes.com/forbes-life-magazine/2011/0509/at-auction-collecting-edward-cope-othniel-marsh-fossil-hunting.html; Brook Mason, *Should you buy a dinosaur?*, BBC (Nov. 3, 2014), http://www.bbc.com/capital/story/20140509-the-mastodon-in-the-living-room ("[A] complete *Tyrannosaurus rex* skeleton can command seven figures . . . .").

found a market where regular people can trade fossils.[67] Even smaller fossils have found a market at prices that any number of people could afford. For example, eBay sells fossils.[68] But commercial paleontologists know that there is a lucrative market for significant finds with a *T. rex* usually selling in the millions of dollars and a mammoth usually selling for $250,000 or more.[69] Many of the sales, however, are illegal, so it is hard to know exactly how much money is involved in the fossil trade, though "educated guesses from dealers and scientists suggest that it runs into the tens of millions of dollars each year."[70]

To be fair, the market was not always this robust. Some commentators have pointed to a "boom[ ] in the late 1980s, when dealers from Japan, flying high on an economic bubble, started buying up some of the biggest and best U.S. fossils and installing them in new museums back home."[71] But the media frenzy over the litigation and sale of *Sue*, a *T. rex*, in the 1990s may be equally responsible for bringing fossils to light as "potentially lucrative commodities"[72] and not just "scientific curiosities."[73]

But who exactly are the buyers? Sometimes, parents looking for a creative Christmas or birthday gift for their children seek out fossils. Sometimes the buyers are affluent.[74] In other instances, the buyers are corporations, who might simply be spending money to help a museum purchase a unique specimen.[75] A *T. rex* might run in the millions of dollars, but for that curious elementary school student, parents can pick up shark teeth for around $5.[76] Diggers come from different backgrounds and hold different motivations; similarly buyers have different backgrounds and motivations as well. The common theme, however, is the overall fascination with our planet's past—whether that fascination is for economic, scientific, philosophical, or individual reasons.

III. FOSSIL LAW: EXISTING FOSSIL MANAGEMENT REGIMES

Recognizing the value of the discovery and preservation of dinosaur bones is not enough to explain the benefits of a regime that involves commercial paleontologists. It is also necessary to discuss the old regime in the United States and its current form to understand the shortcomings of existing regimes. This Part also briefly mentions some

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67 Brook Mason, *Should you buy a dinosaur?*, BBC (Nov. 3, 2014), http://www.bbc.com/capital/story /20140509-the-mastodon-in-the-living-room ("[A]n authentic fossil shark tooth can be had for only about $5.").

68 *See id.*

69 *See* Lewis M. Simons, *Fossil Wars*, NAT'L GEOGRAPHIC, http://science.nationalgeographic.com/science /prehistoric-world/fossil-wars/ ("[S]ome dealers are careful collectors and honest businessmen.").

70 *Id.*

71 *Id.*

72 *Id.*

73 *Id.*

74 *See id.* ("[W]ealthy fossil fanciers such as Bill Gates, Nicholas Cage, and Charlie Sheen, to name a few, compete in New York and California auction houses for the most eye-popping specimens.").

75 For example, McDonald's and Disney helped Chicago's Field Museum purchase Sue, a *T. rex*, for $8.36 million. *Id.*

76 Mason, *supra* note 67.

unique aspects of the regimes in countries like China and Mongolia, where dinosaur bones are also often found.

A. United States

This Section first describes the earlier regime before the passage of the Paleontological Resource Preservation Act (PRPA). Next, this Section discusses the PRPA itself. It is worth noting that this discussion is focused on fossils found on federal lands. On private property, commercial paleontologists can work out contracts with the owners,[77] but it just so happens that federal lands have a lot of fossils.[78]

1. The Law Before the PRPA

Myriad statutes and regulations addressed fossils and who could collect them before the passage of the PRPA.[79] Effectively, a patchwork of law regulated fossils, including the Antiquities Act, the Archaeological Resources Protection Act of 1979, regulations from the National Park Service (NPS), and criminal law.[80] The NPS was supposed to deal with fossils and paleontological resources in conservation and management plans.[81] Criminal law could be invoked whenever there was an "unauthorized conversion of anything of value belonging to the United States."[82] There were, however, other notable defects and limitations. For example, the Archaeological Resources Protection Act of 1979 specifically excludes fossils, unless found in an archaeological context.[83] The absence of a uniform regime made enforcement particularly difficult.[84]

In response to the failure of this patchwork of laws, namely the failure of the Antiquities Act in the *Black Hills* litigation,[85] another wave of academic criticism and political lobbying for a more comprehensive and uniform regime emerged.[86] Two proposed bills from the 1990s, the Vertebrate Paleontological Resources Preservation Act (VPRPA)

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77 Sax, *supra* note 34, at 180.

78 Bryce Koester, *Protecting Our Paleontological Heritage on U.S. Federal Lands*, Paleontological Soc'y (Feb. 12, 2019), https://www.paleosoc.org/protecting-our-paleontological-heritage-on-u-s-federal-lands/.

79 Alexa Z. Chew, Note, *Nothing Besides Remains: Preserving the Scientific and Cultural Value of Paleontological Resources in the United States*, 54 Duke L. J. 1031, 1036 (2005).

80 *Id.*

81 *Id.* at 1037; *see also* Organic Act of 1916, 64 Cong. Ch. 408, 39 Stat. 535, § 3 (repealed 2014) ("[N]o natural curiosities, wonders, or objects of interest shall be leased, rented, or granted to anyone on such terms as to interfere with free access to them by the public.").

82 Chew, *supra* note 79, at 1037.

83 *Id.*; *see also* 16 U.S.C. § 470bb (2009) ("Nonfossilized and fossilized paleontological specimens, or any portion or piece thereof, shall not be considered archaeological resources, under the regulations under this paragraph, unless found in an archaeological context.").

84 *See* Cronin, *supra* note 21, at 276 ("[T]he Antiquities Act['s . . .] vague terms, restrictive legislative history, and weak punishments . . . discouraged enforcement.").

85 The *Black Hills* litigation concerned the discovery and sale of *Sue*, a *T. rex* found on Indian land. Sax, *supra* note 34, at 180–82 (providing a quick summary of the events leading up to the litigation and subsequent auction). *See generally* Patrick K. Duffy & Lois A. Lofgren, *Jurassic Farce: A Critical Analysis of the Government's Seizure of "Sue," A Sixty-Five-Million-Year-Old Tyrannosaurus Rex Fossil*, 39 S.D. L. Rev. 478 (1994).

86 *See* Cronin, *supra* note 21, at 280–81.

and the Fossil Preservation Act (FPA), approached fossil management in different ways. The VPRPA would have cut out all commercial collecting,[87] but the FPA, interestingly, provided some space for the practice.[88] The FPA proposed a permitting scheme that prohibited commercial permits for scientifically unique discoveries as determined by a Council.[89] The FPA also required commercial collectors to deposit paleontological records and data with the U.S. Geological Survey.[90] Finally, commercial collectors would have to pay fees for the permits and "a royalty on the fair market value of each fossil removed under the permit."[91]

The inclusion of commercial paleontologists in the FPA was met was sharp criticism,[92] so any attempt to include commercial paleontologists moving forward must account for this criticism. Scientists, museum directors, and academics considered such inclusion as an attempt to put our national heritage "up for sale."[93] The criticism also focused on the lack of criminal penalties and the ways in which a commercial collector could circumvent the FPA's requirement of turning over certain discoveries to the U.S.[94] Specifically, the FPA only required permits for excavations on sites greater than two meters, and several paleontologists and organizations claimed important finds often are discovered in an area of less than two meters.[95] Consequently, commercial paleontologists could do preliminary research to keep their sites below the maximum land area and avoid permitting altogether.[96] As such, to pass muster with the scientific and academic community, a new fossil management plan would likely have to maintain criminal penalties, prioritize non-commercial collecting, and incentivize public access to commercial discoveries if commercial paleontologists were to be included. Three possible fossil management plans that include commercial paleontologists and address these concerns are discussed in Part IV.

2. BASICS OF THE PRPA REGIME

Under PRPA,[97] the Secretary of the Interior has to "manage and protect paleontological resources on Federal land using scientific principles and expertise."[98] A permitting scheme for paleontologists specifically excludes commercial paleontologists,[99] but

87 *Id.* at 280.
88 *Id.* at 281.
89 Fossil Preservation Act of 1996, H.R. 2943, 104th Cong. § 5(a)(2) ("Commercial permits may not be issued under this section for the quarrying or removal of a scientifically unique find.").
90 *Id.* § 5(d)(1)(C).
91 *Id.* § 6(b).
92 Gretchen Lundgren, *Protecting Federal Fossils from Extinction*, 26 B.C. ENVTL. AFF. L. REV. 225, 251 (1998).
93 Robert Davis, *Experts Fear Fossil Free-For-All; Bill Would Ease Access to Site*, CHI. SUN-TIMES, July 21, 1996, at 40 (quoting David Krause).
94 Lundgren, *supra* note 92, at 251–52.
95 *Id.* at 252; *see* Fossil Preservation Act § 4(a)(1)(A)(I)–(V).
96 Lundgren, *supra* note 92, at 252.
97 *See generally* Cronin, *supra* note 21 (outlining the regulation authority granted to the Department of the Interior in the discovery and management of paleontological resources).
98 Paleontological Resource Preservation Act, 16 U.S.C. § 470aaa-1(a) (2009).
99 *Id.* § 470aaa-3.

PRPA includes an exception for "hobbyists" or "amateur collectors".[100] There is a benefit in getting everyday people excited about finding pieces of this shared global natural heritage, so this type of exception for hobbyists is likely important. Additionally, amateurs have often been extremely valuable in uncovering important finds.[101] The next aspect of the PRPA is that fossils have to be "deposited in an approved repository."[102] Finally, PRPA maintains civil and criminal penalties for violations of the Act, including imprisonment for up to five years.[103]

3. The Problem with Excluding Commercial Paleontologists

Although PRPA remedied several problems of the old regime by creating a single, uniform regime, excluding commercial paleontologists remains problematic. First, "[f]ossils must first be found if they are to be preserved."[104] At its core, it is a question of manpower. Without commercial paleontologists involved legally, the black-market trade in dinosaur bones and fossils would only increase and some fossils would inevitably be left undiscovered.[105] When fossils remain on the black market, fewer individuals and communities get to see and learn from the fossils. Likewise, when fossils remain in the ground, no one gets to see or learn from them.

Some may argue that it is better to leave commercial players out because monitoring costs of inclusion would be too high and would therefore not be worth striking a bargain with these commercial players. After all, if their inclusion could be effectively monitored, then improved enforcement under the current scheme to minimize illegal trade would also be possible. But minimizing the illegal trade does not pull any more fossils out of the ground. Manpower is still lost, and that manpower is needed to find fossils in the first place, if they are ever going to be preserved. Otherwise, the fossils might just be lost to erosion.[106]

In addition to manpower, commercial paleontologists have historically found some of the most important and unique fossils.[107] For example, commercial paleontologists discovered "some of the most complete skeletons of *Tyannosaurus rex*, *Edmontosaurus*, *Triceratops*, a new Ceratopsian and a brand new oviraptorosaurian theropod."[108] Com-

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100 *Id.*

101 *See* Simpson, *supra* note 56; *see also* Switek, *supra* note 54.

102 16 U.S.C. § 470aaa-4 (2009).

103 *Id.* § 470aaa-5(c).

104 Cronin, *supra* note 21, at 289.

105 Ortiz, *supra* note 22.

106 *See* Brian Switek, *The Million-Dollar Dinosaur Scandal*, Slate (Jan. 9, 2013), http://www.slate.com/articles/health_and_science/science/2013/01/tarbosaurus_bataar_smuggling_case_dinosaur_fossil_dealers_steal_bones_from.html (indicating that because "there are not enough paleontologists to excavate every dinosaur," some fossils might be lost to erosion).

107 *See* Peter L. Larson & Donna Russell, *The benefits of commercial fossil sales to 21st century paleontology*, 17 Palaeontologia Electronica 2E, 4 (2014) (noting that commercial paleontologists have discovered commercial paleontologists discovered "some of the most complete skeletons of *Tyrannosaurus rex*, *Edmontosaurus*, *Triceratops*, a new Ceratopsian and a brand new oviraptorosaurian theropod").

108 *Id.*

mercial discoveries also found their way to museums for the public and academic paleontologists to appreciate and study.[109]

On the other hand, critics claim that the commercial paleontologists "are actually damaging to science."[110] As an example, many critics point to Prokopi's *Tarbosaurus* found in Mongolia.[111] What the critics fail to realize, though, is that many commercial paleontologists and other commercial collectors also disfavor illegal discoveries because these illegal discoveries "unfairly compete with legal fossils."[112] Many commercial collectors disapprove of "the destruction of sites or the theft and damage of specimens by those who work outside the law."[113] In fact, even Prokopi has spoken out against the destruction of paleontological sites.[114] Additionally, when the Montana House of Representatives passed a bill in 2013 that would have allowed the sale of fossils from one of its state parks, the Senate did not approve the bill, and "there [was] simply no evidence that the bill was the brainchild of commercial fossil collectors."[115] When academic paleontologists halted the sale of "well-known and often duplicated" fossils by the San Diego Museum of Natural History,[116] their success was bittersweet: by halting the sale, the Museum was unable to raise funds to purchase another "important local fossil collection."[117]

When 66% of Americans think that the earth is less than 10,000 years old, fossils can play a huge role in helping people learn about the earth's history.[118] For that to happen, fossils must be found. Commercial paleontologists can help make that happen sooner rather than later.

B. POINTS OF COMPARISON WITH CHINA AND MONGOLIA

One way that other countries' legal regimes differ from the regime in the United States is that fossils are treated as part of the national heritage.[119] This values-based approach in the regulatory regimes in China and Mongolia might be worth folding into the PRPA to emphasize the value of dinosaur bones as fossils as they are discovered. Just recently, dinosaur eggs and fossils were returned to Mongolia for display in its dinosaur museum.[120] One way Mongolia is addressing the international black market is by open-

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109 *Id.*
110 *Id.*
111 Switek, *supra* note 53.
112 Larson & Russell, *supra* note 107, at 4.
113 *Id.*
114 Williams, *supra* note 3 (In court, Prokopi made the following statement: "I have never and will never condone destruction of specimens merely for profit.").
115 Larson & Russell, *supra* note 107.
116 *Id.*
117 *Id.*
118 *Id.* ("A recent Gallup poll . . . revealed that 66% of Americans believe that the Earth is less than 10,000 years old.").
119 Dorna Sachiko Sakurai, *Animal. Mineral, or Cultural Antiquity?: The Management and Protection of Paleontological Resources*, 17 LOY. L.A. INT'L & COMP. L.J. 197, 199 (1994).
120 Mirren Gidda, *U.S. Returns Stolen Dinosaur Eggs and Fossils to Mongolia*, NEWSWEEK (Apr. 6, 2016), http://www.newsweek.com/dinosaur-eggs-fossils-smuggling-mongolia-444427.

ing a museum to display recovered fossils.[121] This regime explicitly emphasizes the public value in these resources. These countries' regimes are not without their own pitfalls, including vague language and exceptionally harsh punishments.[122]

Although fossils are part of our global heritage, countries like Mongolia and China consider fossils to be part of their national heritage. Balancing these alternative views of fossils is crucial when it comes to enforcement and feasibility of any of the schemes discussed in Part IV if they are to apply beyond the United States. For China, "[f]ossils of paleo vertebrates and paleo anthropoids of scientific value shall be protected by the state in the same way as cultural relics."[123] The general rule is that fossils cannot be exported from China, but despite this rule, a significant illegal trade in Chinese fossils exists.[124] The Chinese protection, like the regime in the United States, includes criminal sanctions.[125] But unlike in the United States, *all* fossils in China are under the purview of the Chinese government.[126] Additionally, Chinese criminal sanctions are much harsher than U.S. criminal sanctions.[127] In fact, Chinese penalties can even include the death penalty if the illegal excavation is serious enough.[128]

Aside from a much harsher criminal penalty, what are the other drawbacks? Protecting fossils of "scientific value" as "cultural relics" is vague, and these harsh penalties have not curbed the illegal trade in fossils in China.[129] And the imposition of the harshest penalty is also predicated on vague language.[130] After all, what really constitutes "serious" when deciding how to punish someone who illegally started digging and carrying off his discoveries?[131] Indeed, at least one scholar has argued that by protecting fossils based on the values associated with them rather than taking "a more object focused approach" is simply not as successful in actually protecting fossils and curbing their black market sale.[132] Like China, Mongolia effectively prohibits the export of any fossils.[133] Addition-

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121 Ben Dooley, *Mongolia seeks to crush fossil black market*, PHYS.ORG (Jan. 10, 2017), https://phys.org /news/2017-01-mongolia-fossil-black.html.

122 *See* Anne Carlisle Schmidt, *The Confuciusornis Sanctus: An Examination of Chinese Cultural Property Law and Policy in Action*, 23 B.C. INT'L & COMP. L. REV. 185, 198 (2000).

123 Law of the People's Republic of China on the Protection of Cultural Relics (promulgated by the Standing Comm. Nat'l People's Cong., Nov. 19,1982, rev'd June 29,1991, rev'd Oct. 28, 2002), art. 2 (China)).

124 Schmidt, *supra* note 121, at 201.

125 *Id.* at 199.

126 *Id.* at 202.

127 *Id.* at 209.

128 *Id.*

129 *Id.* at 215.

130 *See id.* at 209.

131 *Id.* ("Article 328 [of the People's Republic of China Criminal Law] is the only article that specifies what kinds of situations are serious . . . [and] includes illegally digging ancient remains tombs protected by the state, being the ringleader of an organization that engages in illegal digging, engaging in repeated illegal digging and robbing, or illegally digging and robbing precious relics and causing serious damage to relics.") (quoting Criminal Law of the People's Republic of China (promulgated by the Standing Comm. Nat'l People's Cong., Jul. 1, 1979, rev'd Mar 14,1997, effective Mar. 14, 1997), art. 328 (China)).

132 *Id.* at 221–22.

ally, the United States simply does not always recognize these other countries' bans.[134] As such, when it comes to developing a regime to suppress the illegal fossils trading and ensure that the fossils are protected and accessible to the public, a modest beginning likely would have to include recognizing the cultural significance other countries place on fossils. It would also probably be beneficial to work collaboratively with organizations like the Society of Vertebrae Paleontology to enforce a regime that reaches some type of compromise.[135] Some possibilities of such a compromise are discussed in Part IV. These possibilities could gradually be introduced to create an international scheme, or the United States could also serve as a testing ground for any of them.

IV. PICKING UP WHERE PRPA LEAVES OFF & SOME WAYS OF INCLUDING COMMERCIAL PALEONTOLOGISTS

PRPA is an important step in the right direction to regulate fossils, but more can be done so that more fossils are discovered and thus protected. Including commercial paleontologists can provide additional manpower that ensures even more fossils are discovered, thereby widening the collective knowledge and furthering our sense of place within this global natural heritage. This Part first discusses some of the goals of including commercial paleontologists before turning to three possible ways to include them. This Part does not argue for any one of the three possible forms of inclusion over the others. Instead, this Part sketches different ways to achieve the goals of such inclusion and some of the potential enforcement and feasibility issues common to all three. Scholars, practitioners, politicians, and paleontologists can take up the debate on which form of inclusion would be the most practical.

A. GOALS OF INCLUSION OF COMMERCIAL PALEONTOLOGISTS

There are two primary goals of including commercial paleontologists in the search for fossils on federal lands: (1) discourage the black-market trade in fossils, and (2) encourage fossil discovery so that the general fund of knowledge expands, and the public has access to pieces of their shared global natural heritage—the story of their planet before it became theirs.

1. DISCOURAGING THE BLACK MARKET IN FOSSILS

The first step is to bring the trade in dinosaur bones and other fossils out of the shadows. Although this trade is an international trade, it is possible for the United States to lead the way by imagining a legal way into the discovery and trade of these bones. Similarly, if the excavation and trade in the United States is at least out of the shadows, then maybe this will incentivize some commercial paleontologists to stick with excavations in the United States rather than risk getting tangled in international criminal law. Such a result would have the added benefit of reducing the illegal international trade.

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133 Brian Handwerk, *Dinosaur Auction Assailed for Offering 'Illegal' Fossils*, NAT'L GEOGRAPHIC, June 2004.

134 *Id.*

135 *See generally* SOC'Y OF VERTEBRATE PALEONTOLOGY, http://vertpaleo.org/.

Moreover, the black market trade in fossils is much different than something like the black market ivory trade where legal entry into the market would still leave a major problem: killing elephants faster than they can reproduce.[136] With fossils, the concern is not about protecting a species' ability to survive, but rather about ensuring scientific and public access to what these specimens can teach us. But the ivory ban itself does teach a powerful lesson: an outright ban will not stop the black-market trade.[137] That must be true of fossils too. After all, commercial paleontologists are banned from the permitting scheme on federal lands.[138] But has that stopped their trade? The short answer is no.[139] What this means is that the current regime that cuts out commercial players has not stopped the black-market trade, and the fear of legal entry that exists with other currently illegal trades like the ivory trade is not as pressing.

2. The Best Case: Incentivizing Fossil Discovery & Expanding Collective Knowledge

This second goal is likely the more important and practical of the two goals. It is no secret that commercial paleontologists have been the ones to discover some of the most unique finds.[140] In fact, as it so happens, "[v]ery few . . . *Tyrannosaurus* specimens were discovered by academic paleontologists."[141] Of course, the argument goes that involving commercial paleontologists may not only lead to more discoveries, but also more dinosaur bones in private collectors' living rooms.[142] Accordingly, any benefit from the discovery is lost to everyone but the commercial paleontologist who cashes in at the auction house and the private collector who gets to enjoy a piece of his planet's past while he reads the newspaper. But this view might be much too cynical. After all, with

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136 *See* Virginia Morell, *Legalizing ivory trade won't save elephants, study concludes*, Science (Sept. 15, 2016, 12:00 PM), http://www.sciencemag.org/news/2016/09/legalizing-ivory-trade-wont-save-elephants-study-concludes.

137 *Id.*

138 Paleontological Resource Preservation Act, 16 U.S.C. §§ 470aaa-3–470aaa-5 (2009).

139 *See* Donovan Webster, *The Dinosaur Fossil Wars*, Smithsonian Magazine (Apr. 2009), http://www.smithsonianmag.com/science-nature/the-dinosaur-fossil-wars-116496039/ ("Nobody knows how much fossil material is being taken off public lands and smuggled out") (quoting James Clark).

140 Larson & Russell, *supra* note 107, at 4.

141 Neal L. Larson et al., *What commercial fossil dealers contribute to the science of paleontology*, The Journal of Paleontological Sci. (2017), http://www.aaps-journal.org/Fossil-Dealer-Contributions.html. The Journal of Paleontological Sciences also provides a breakdown of specific donations. *Fossil Specimens Placed in Museums and Universities by Commercial Paleontology*, The Journal of Paleontological Sci., http://aaps-journal.org/Commercial-Contributions-to-Paleontology.html (last updated Nov. 3, 2019).

142 *See* Joe Hagan, *Nathan Myhrvold: How a Geek Grills a Burger*, Men's Journal, http://www.mensjournal.com/features/nathan-myhrvold-how-a-geek-grills-a-burger-20121119 (discussing a private collector who has discovered twelve tyrannosaurus rex skeletons, "the most T. rexes found by a single team in the past 100 years[,]" and donated some of his finds to museums). Myhrvold has donated some of his finds to museums, including a *T. rex* found in Montana. *Id.*; *see also* Ashlea Ebeling, *Dig It*, Forbes, (June 12, 2000), https://www.forbes.com/forbes/2000/0612/6514418a.html.

more people eligible for permits, it is more likely more fossils will be found, and that is an important starting point.

Of course, finding the dinosaur bones and other fossils is just part of the story. To expand the collective knowledge and opportunities for the public to connect with this shared global natural heritage and to help dispel common misperceptions about the age of the earth,[143] the fossils must be shared once they are discovered. As such, any form of inclusion of commercial paleontologists would try to promote public access to the fossils. This goal can be accomplished in several ways, such as prioritizing non-commercial paleontologists by giving them a larger share of the permits or incentivizing commercial paleontologists not to rush to the auction house first. For example, in one regime, commercial paleontologists might be able to increase their share by donating certain discoveries to universities and museums. In another, certain costs might be set out to allow going to the auction house in certain instances instead of others. The next section takes up three possible regimes.

B. THREE WAYS FOR COMMERCIAL PALEONTOLOGISTS TO START DIGGING (LEGALLY!)

1. *TRADEABLE QUOTA PERMITS*

This first possible regime starts with the premise that fossils are a unique type of finite natural resource that are especially hard to observe. After all, how can anyone know for sure how many total fossils exist in the world? The existing tradeable quota regime for the red snapper in the Gulf of Mexico is a helpful analogy. There, fishermen have a total allowable catch (TAC).[144] The quotas are transferable[145] and are developed as a "percentage of the red snapper commercial quota."[146]

Of course, the analogy is the not perfect. To start, the difficulty in observing fossils is different than it is for the red snapper.[147] With the red snapper, the difficulty in observation is due both to their opacity and mobility.[148] Although the fossils are immobile, determining just how many bones are buried beneath the earth is much harder than estimating how many red snapper are in the Gulf of Mexico. Penetrating the Gulf is necessarily easier than penetrating the earth. Additionally, fossils are a finite resource. But this distinguishing feature from the red snapper alone should not pose an insurmountable obstacle. Unlike other non-renewable resources where future values could fluctuate significantly,[149] making tradeable permits a less desirable regime,[150] dealers and

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143 Larson & Russell, *supra* note 107, at 4.

144 Suzi Kerr, Richard G. Newell & James N. Sanchirico, *Fishing Quota Markets*, RES. FOR THE FUTURE 2 (2002), http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-Event-fishing-quota.pdf.

145 *Id*. *See also* GULF OF MEXICO FISHERY MGMT. COUNCIL, RED SNAPPER INDIVIDUAL FISHING QUOTA PROGRAM 5-YEAR REVIEW 10 (2013), http://archive.gulfcouncil.org/docs/amendments/Red%20Snapper%205year%20Review%20FINAL.pdf.

146 *Id*. at 10.

147 *See* Lecture by Prof. Jedediah Purdy, Duke University School of Law Natural Resources Seminar (Feb. 28, 2017) (notes on file with author).

148 *Id*.

149 TONY CLAYTON & NICHOLAS RADCLIFFE, SUSTAINABILITY: A SYSTEMS APPROACH 120 (1996).

scientists are already able to estimate the value of certain types of fossils with more consistency. Finally, although fossils are treated as a commodity, they are not subject to commodities futures in the same way that a non-renewable resource like oil is.

In addition to the similarities between fossils and the red snapper, namely the difficulty in observing and knowing just how many exist, the two resources share similar political characteristics. Just like red snapper is subject to competing uses—economic gain and community and cultural values, to name two[151]—fossils are also subject to competing uses. Fossils may not be part of the local culture in the way fisheries often are, but fossils are subject to the same tension between economic and cultural values. Specifically, fossils are subject to the pressures of large-scale economic gain and a shared interest in preserving and learning from our global natural heritage.[152]

So, how exactly would a tradeable permit system work for fossils? Under this regime, commercial paleontologists would effectively get bonus points for donating a find to a museum or university. Basically, this regime would increase a commercial paleontologist's shares per donation.

Tradeable permits would leave in place civil and criminal penalties and require permitting for excavation on any site, regardless of its size, to address the criticisms that evolved around site size under the proposed FPA, discussed earlier.[153] Rather than create a system where our natural heritage, vested in fossils beneath our feet, would become a commodity for sale,[154] this system would, first and foremost, incentivize donation to museums and universities because those donations would increase a commercial collector's share of permits and allow her to collect more fossils. To make this incentive more powerful, there could also be a provision that a lack of donations, depending on how many discoveries the commercial collector found, could result in a decreased TAC. Finally, this regime would still prioritize non-commercial collectors by letting them start out with a greater TAC.

2. Sell & Share

Under a sell-and-share regime, commercial paleontologists could sell finds to private buyers with restrictions on sharing with the public. For example, the private buyer would have to agree to share the dinosaur with a museum or university for a set amount of time before private ownership began. Alternatively, there could be a time-share scheme in which the buyer lends the dinosaur to a museum or university or somehow displays the dinosaur for the public to view or for scientists to study on a regular, recurring basis, such as every tenth year.

Just like the tradeable shares approach, a sell-and-share regime would also maintain civil and criminal penalties and require permitting for sites of all sizes. Requiring some public and scientific access prioritizes accessibility and collective knowledge, which were the two largest concerns critics of the FPA pointed to as evidence the FPA did not prioritize non-commercial collectors.[155]

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150 *See id.*

151 Purdy, *supra* note 147.

152 The litigation surrounding Prokopi is just one example. *See* Williams, *supra* note 3.

153 Lundgren, *supra* note 92, at 252.

154 *Id.* at 251 (quoting David Krause).

155 *Id.* at 251–53.

An additional problem with this regime that may emerge is in getting buyers to sign onto these terms of sale. To that end, such a regime might have the unintended (but ultimately beneficial) result of encouraging commercial paleontologists to make casts of their most unique finds and then sell or donate the actual finds at reduced prices to museums. If such a result came to fruition, scientists and the public would get the benefit of fossils, the commercial paleontologist would still make some money from both the sale of the specimen and a sale of the cast,[156] and the private buyer would still have a unique piece in his living room.

Finally, monitoring and enforcing the terms of sale could prove difficult. It is reasonable, however, to imagine a museum asking a court to enforce the terms of the contract should the buyer later fail to comply with the terms. Monitoring the terms of the front-end would be the more difficult aspect. Who would scrutinize what the dealer and buyer agreed upon in the contract? In other words, unlike other types of agreements, such as a securities offering, for instance, these contracts would not be readily susceptible to such independent and regulatory oversight. One solution would be to require the designation of the museum or university that would share the specimen with the private buyer upfront in the contract and to require the auction house or a review board to approve the terms of the contract before finalizing the buyer's bid. It would require collaboration with museums, universities, and auction houses that could be expensive initially, but could become a rather efficient and mechanical process with time. For example, auction houses could develop pre-approved museums and universities with which buyers could agree to share the specimen and simply work approval of the terms of the contract into the bidding process.

3. *Right of First Refusal to Museums & Universities*

Under this regime, commercial paleontologists would be required to offer a find to a museum or university at discounted price before extending an offer to a potential private buyer. This would essentially act as a cost of inclusion in the PRPA's permitting scheme. This regime would also provide a way to test the value of a particular discovery because, if there were no museum or university interest, then perhaps less would be lost if the discovery made its way to a private collection. Similar to the other two proposed plans, this regime would keep the civil and criminal penalties and require permitting regardless of the size of the excavation site. In response to the critics of the FPA,[157] this form of inclusion of commercial collectors prioritizes non-commercial interests by offering any finds at a discounted price to those entities that will be able to conduct research on the specimen and best share the discovery with the public.

One problem with this regime is that it might be the least attractive option to commercial paleontologists. After all, many significant discoveries that could yield the highest prices would likely be purchased at the discounted price by a museum or university. Commercial collectors' financial incentive to do the digging in the first place may be

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156 *See* Williams, *supra* note 23 (describing that Prokopi hoped the cast of the *T. bataar* would sell "for at least thirty thousand dollars").

157 Lundgren, *supra* note 92, at 252 (indicating that critics of the FPA believed that "resources from public lands should be protected from private sale or trade, and should find proper disposition in a public museum or institution where they can be properly cared for and studied.").

reduced—at least as to digging to discover what they think will be significant finds. Significant finds, then, might stay in the ground. It is possible that the creation of an oversight council like the one proposed in the FPA[158] could be somewhat responsive to this problem. For example, the council could decide if a discovery was significant and thus required to be offered first to museums and universities. Presumably, this council would at least keep the commercial collector from having to offer everything at a discounted price to a museum or university first. On the other hand, this problem may not be as insurmountable as it first appears. Not all commercial paleontologists are just out to make a quick buck.[159] Some commercial paleontologists go into this line of work out of a love of the hunt, the history, and the fossils themselves.[160] Prokopi was no different. He, too, is an avid fossil enthusiast—getting to dig and collect fossils for a living was part of a childhood passion.[161] As such, the right of first refusal would simply be the cost of doing business. With high costs of litigation, legal entry might be enough of an incentive.[162]

C. Enforcement & Feasibility Concerns Applicable to All Three Possible Regimes

Considering these schemes, the question of how feasible it would be for them to exist outside of the United States naturally arises. How could they be enforced, if at all? To start, any regime would have to account for other countries' emphasis on fossils' national significance. This hurdle is not insurmountable. For countries like Mongolia that have created museums for recovered fossils,[163] sell-and-share and right-of-first-refusal schemes might be particularly viable options. Namely, Mongolia would get to display fossils it considers part of its national heritage and maybe even have greater access to these fossils. The museum would then have more displays, which is a plus for Mongolia—attracting tourists and enhancing national pride.

The way in which ancient cultural property is handled in different countries provides useful insights into enforcement and feasibility. Particularly, if any of these regimes are to serve as a modest beginning for an international regime. First, any of the possibilities discussed earlier would have to balance the ownership-focused approach in the United States with the values-focused approach of countries like China and Mongolia. After all, "[u]nder American law, a dinosaur on private land is just another object, like coal or a cow."[164] But even on federal land, a dinosaur is still an object that may or may not have scientific or intellectual value. The United States views dinosaur bones and

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158 Fossil Preservation Act of 1996, H.R. 2943, 104th Cong. §§ 9(a)–(c) ("The Director of the United States Geological Survey shall establish a council to be known as the 'National Fossil Council' . . . [that] . . . shall develop procedures for identifying specimens as scientifically unique, including procedures for cases in which the determination is made during the collection process or after the removal of the specimen from Federal lands.").

159 *See, e.g.*, Simons, *supra* note 59.

160 *See id.*

161 *See* Williams, *supra* note 3 ("Prokopi grew up hunting shark teeth and other fossils on the shores and in the rivers of central Florida.").

162 *See* Williams, *supra* note 23 (discussing how the litigation over the *T. bataar* effectively landed Prokopi in financial ruin).

163 *See* Williams, *supra* note 3 (discussing how the *T. bataar* ended up in Mongolia's dinosaur museum).

164 Sax, *supra* note 34, at 180.

other fossils as objects to be found without always considering the value that these fossils have beyond value to those who own the land in which fossils are buried.[165] Other countries consider paleontological resources to be "elements of the national patrimony."[166] Whether fossils should be properly classified as objects of national heritage rather than global heritage is beyond the scope of this Article, but the different cultural approaches to the treatment of these specimens in other parts of the world is a necessary starting point if one of the above-mentioned regimes is to have international influence.

As Joseph Sax explains, it may be a practical necessity to compensate the finders of important artifacts to ensure public access.[167] This Article argues that these potential finders should include commercial paleontologists, and if they are included and sufficiently compensated, then it is more likely that the fossils will be "direct[ed] . . . into official or scholarly channels . . . ."[168] Other countries already account for these incentives and balance them with regulations that are "designed to prevent destructive excavations, interference with scientific study, or denial of access by the public."[169] As such, all of the previously mentioned regimes could incentivize directing fossil discoveries to research or public access. Additionally, the regimes could easily include regulations on tools of excavation to avoid damaging sites. In fact, if commercial paleontologists are brought out of the shadows, they may feel less rushed during excavations because the fear of "being caught" is removed and may be able to be more careful and avoid accidental damages from rushed excavations.

V. CONCLUSION

There is just something about dinosaur bones. They connect us to a world we can never know. In fact, unlike archaeological discoveries, fossils can take us back even further in time. Indeed, "[t]o hold in one's hands the remnant of such a spectacular creature that roamed the earth millions of years ago is an extraordinary experience."[170] It may be hard to fathom everything that came before us and understand our planet's history, but fossils help bridge that gap. After all, "more wondrous [than holding or viewing the fossils] . . . is to realize that we too are forms of life that evolved on the same planet as that dinosaur, and that we are standing in this moment of time and perceiving with a special intelligence the dinosaur's fossil remnant."[171] But to bridge the gap between the earth's past and the present day, the fossils first have to be found. With careful planning,

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165 Maggie Koerth-Baker, *Who Owns The Dinosaurs? It All Depends On Where You Find Them*, FIVETHIRTYEIGHT (Apr. 23, 2019), https://fivethirtyeight.com/features/who-owns-the-dinosaurs-it-all-depends-on-where-you-find-them/ ("[M]ost fossil digging on federal lands requires a permit, those permits can only be obtained by qualified scientists, and any specimens that are found belong to the public . . . [however,] access to [private] land and ownership of the fossils usually go to whoever is willing to pay landowners the most.").

166 SAX, *supra* note 34, at 184.

167 *Id.* at 185.

168 *Id.*

169 *Id.*

170 MCCORD, *supra* note 42, at xii.

171 *Id.*

commercial paleontologists can do just that; they can help discover the fossils that tell the story of the earth's past.

Eric Prokopi's work as a commercial paleontologist, who was involved in some of the planet's most fruitful digs, helped tell that story.[172] Although the sale of his *Tarbosaurus* sent him to the federal courthouse, Prokopi's actions uncovered a significant specimen that might have otherwise gone undiscovered. In fact, that dinosaur is now on display in Mongolia's dinosaur museum for all to study and appreciate.[173] A regime that included commercial paleontologists like Prokopi might discourage the illegal trade and ensure that more fossils are brought to the surface. If the fossils remain in the ground, though, the story goes untold, and a valuable piece of history remains forever buried.

Ashlee A. Paxton-Turner J.D., Duke University School of Law; B.A. University of Pennsylvania. *Many thanks to Professor Jedediah Purdy for his encouragement of this project and helpful insights along the way. Thanks also to the editors of the Texas Environmental Law Journal for their hard work on this Article.*

172 Regardless of the opinions of Prokopi's supporters or critics, due to his efforts, numerous specimens from dig sites around the world have been unearthed. *See* Williams, *supra* note 3.

173 Williams, *supra* note 23.

Individual Preferences in Policy Analysis: A Normative Framework

By Gabriel A. Weil

I. Executive Summary

Measures of individual preferences are a key input in cost-benefit analysis. However, behavioral science has raised questions about the rationality of these preferences. The *Nudge* thesis relies on that scientific research to prescribe interventions to influence individual choices. However, the more modest step of limiting reliance on these preferences in evaluating non-paternalistic government policies has not been taken up. We lack a consistent theory of when public policy should defer to these preferences, with legal and policy advocates adopting ad hoc result-oriented approaches. I argue that policymakers should be prepared to override individual preferences in cases where their only plausible rational justification(s) sever their connection to social welfare, undermining their normative motivation. For time discounting, this means eliminating the pure time preference component of the discount rate for most purposes. For valuing mortality risks, it implies shifting from the value of a statistical life method to a modified value of a statistical life-year method.

II. INTRODUCTION

Measures of individual preferences are a key input for cost-benefit analysis (CBA), the dominant mode of formal policy analysis in the United States.[1] However, behavioral science is increasingly demonstrating that individual preferences are often inconsistent, unstable, subject to systematic biases and framing effects, difficult to determine, and arguably irrational. For instance, willingness to pay (WTP) and willingness to accept for a lottery are weakly correlated at best,[2] an individual's preference between two options can flip based on whether they are evaluated separately or together,[3] and people report higher WTP for a given public good when they are told it is more costly to provide.[4] This research inspired Cass Sunstein and Richard Thaler's *Nudge* thesis—also known as libertarian paternalism—that prescribes crafting choice architecture to influence individual choices in normatively appealing directions consistent with enlightened preferences.[5] It has not, however, significantly altered the reliance of regulatory bodies on measures of individual preferences in conducting CBA and setting policy.[6]

This article will argue that policymakers should not defer to individual preferences in cases where the only plausible rational justification(s) for them lack normative motivation, regardless of the merits of nudges. In particular, the component of the discount rate attributable to pure time preference should be eliminated because the only plausible rationale for pure time preference—Parfitian ideas about attenuated connectedness to one's future self—severs the connection with social welfare that justifies CBA. Likewise, policymakers should shift from the value of a statistical life (VSL) method to a modified value of a statistical life-year (VSLY) method. Arguments for retaining the VSL based on preferences fail. To the extent the claimed pattern of preferences holds, it still cannot be defended in normative terms.

The remainder of this article proceeds as follows. Part II articulates the tension in both pro- and anti-regulatory advocates' positions on discount rates and valuing life, elucidating how they embody inconsistent positions regarding deference to individual preferences. Part III examines the role of pure time preference in discounting, concluding that it is not a proper component of the discount rate, for most purposes. In doing so, it considers three defenses of pure time preference: (a) Parfitian ideas about attenuated connectedness with future selves, (b) opportunity cost, and (c) policy regime coherence.

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1 MATTHEW ADLER & ERIC POSNER, NEW FOUNDATION OF COST BENEFIT ANALYSIS (2006).

2 Colin Camerer, Jonathan Chapman, Mark Dean, Pietro Ortoleva, & Erik Snowberg, *Willingness to Pay and Willingness to Accept are Probably Less Correlated Than You Think* (Nat'l Bureau of Econ. Res., Working Paper No. 23954, 2017).

3 Cass R. Sunstein, *On Preferring A to B, While Also Preferring B to A*, 30(3) RATIONALITY AND SOC'Y 305 (2018).

4 J. Baron & N.P. Maxwell, *Cost of Public Goods Affects Willingness to Pay for Them*, 9 J. BEHAV. DECISION MAKING 173 (1994).

5 CASS R. SUNSTEIN & RICHARD H. THALER, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS (2008).

6 Sunstein acknowledges the possibility that behavioral market failures justify adjustments to WTP and corresponding VSL estimate, writing that "further conceptual and empirical work needs to be done on these issues." CASS R. SUNSTEIN, THE COST-BENEFIT REVOLUTION 55 (2018).

Extracting the component of market rates of return that reflects pure time preference results in a lower discount rate, meaning the future is valued more highly.

Part IV discusses mortality risk, applying similar reasoning as in Part III to conclude that a modified VSLY approach should replace the VSL method. Part V considers well-being analysis (WBA) as an alternative to CBA, concluding that it confronts difficulties in its treatment of discounting and mortality risk that are comparable to those facing CBA. Part VI evaluates whether social welfare is best conceived of in terms of preference satisfaction or subjective well-being. Part VII discusses Matthew Adler and Eric Posner's concept of laundered preferences and how their framework could accommodate the account of preferences articulated in the foregoing parts.[7] Part VIII analyzes some key objections to the *Nudge* thesis, arguing that even if these objections hold, they do not justify deference to the relevant preferences when evaluating non-paternalistic regulations. Part IX considers feasibility standards, safety maximization standards, cost-effectiveness analysis, and other alternatives to CBA, arguing that they generally lack normative motivation and that CBA is preferable for most major rules. Part X concludes.

III. Two CBA Controversies Connected by Time Preference

Consider two related controversies in CBA: the value of a life and the social discount rate. The choice between the VSL method and the VSLY method is important for several environmental, health, and safety regulations. Defenders of retaining the VSL method point out that direct revealed and stated preferences studies of older people do not reveal a substantially lower WTP to avoid near-term mortality risks, so discounting the value of their lives with VSLY measures would violate their preferences.[8] They would prefer to treat accidental death at age sixty as equivalently bad as death by the same mode at age thirty, even though the thirty-year-old can expect to live about twenty-six more years than the sixty-year-old.[9] Doing so implicitly embraces a high value for the rate of pure time preference, a component of the discount rate that reflects the lower value people place on an otherwise identical (including in probability) cost or benefit that is delayed in time.

When it comes to the social discount rate, the alignment of interests flips such that anti-regulatory advocates and scholars tend to support use of a high social discount rate, consistent with the high rate of pure time preference most people exhibit in their market behavior.[10] A high social discount rate downplays the importance of problems like climate change, for which the most significant costs will not arise for decades. Economists Nicholas Stern's and William Nordhaus's widely divergent estimates of the projected costs of climate change are driven by their choices of discount rates.[11] Under Stern's

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7 Adler & Posner, *supra* note 1, at 36–38.

8 Michael Livermore & Richard Revesz, Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment and Our Health 77 (2008).

9 Soc. Sec. Admin., Actuarial Life Table, https://www.ssa.gov/oact/STATS/table4c6.html (last visited June 23, 2018).

10 Livermore & Revesz, *supra* note 8.

11 William D. Nordhaus, *A Review of the "Stern Review on the Economics of Climate Change"*, 45 J. Econ. Literature 686, 689-90 (2007); Cass R. Sunstein & David Weisbach, *Climate*

preferred discount rate of 1.4% per year, the present value of one dollar of damages in one hundred years is twenty-five cents—more than fifty times the present value under Nordhaus's preferred discount rate of 5.5%.[12]

Pro-regulatory advocates like Richard Revesz and Michael Livermore argue that the intergenerational context is "fundamentally different from the context of individual discounting" and an "unavoidably moral decision that should be governed by notions of fairness and equal consideration of all people."[13] They support this position, in part, by arguing that the rationale for discounting based on the anticipated greater wealth of future generations is undermined by the negative consequences of climate change projected to be suffered most acutely by individuals in poor, developing countries—like Bangladesh, which has a per capita gross national product (GNP) less than one ninetieth of U.S. GNP and is unlikely to exceed current U.S. income levels within a century.[14] However, because individuals tend to value the welfare of foreigners and abstract future generations less than their own future welfare, this rationale for embracing a low discount rate still requires overriding individual preferences.[15] It is natural for legal and policy advocates to rely on preference-based rationales that support their favored policies and to find reasons why measures of individual preferences should not dictate policy when it would support outcomes they disfavor. Nonetheless, it is worth acknowledging the link between these disputes and how the logic of both the pro- and anti- regulatory positions on valuing life are difficult to reconcile with their positions on time discounting.

Recognizing this tension leaves one with four options. First, one could recommit to a thoroughgoing effort to maximize an aggregation of individual preferences, as inferred by the fallible available tools. This is what Matthew Adler and Eric Posner call "textbook CBA."[16] Second, one could continue to rely on individual preference-based justifications for policy choices when congenial to one's prior commitments, while explaining away deviations on an ad hoc basis. This is what advocates and scholars pushing both pro- and anti-regulatory agendas tend to do. Third, one could point to the heuristics and biases literature as a justification for eschewing reliance on individual preferences entirely. This approach includes number of alternatives to CBA, including technology-based and other feasibility standards, safety maximization standards, and intuitive balancing all avoid reliance on individual preferences.[17] A special case of this option that retains both a con-

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Change and Discounting the Future: A Guide for the Perplexed, 27 YALE L. & POL'Y REV. 433, 433-34 (2009).

12 Mark Harrison, *Valuing the Future: The Social Discount Rate in Cost-Benefit Analysis* 7 (Gov't Productivity Comm'n, Visiting Research Paper 2010).

13 LIVERMORE & REVESZ, *supra* note 8, at 111.

14 *Id.* at 111–12.

15 In fact, it is standard practice outside the domain of climate change for CBA not even to consider the non-domestic costs and benefits of regulation. U.S. OFFICE OF MGMT. & BUDGET, Circular A-4 15 (2003).

16 ADLER & POSNER, *supra* note 1, at 62–63, 187. Adler and Posner also characterize this approach as the "sum-of-CVs test" where CVs refers to contingent valuations, the subjective utility associated with a possible future state of the world.

17 Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553 (2002); ADLER & POSNER, *supra* note 1, at 73–81.

nection to individual subjectivity and the goal of maximizing (a conception of) social welfare is WBA, which relies on present subjective well-being evaluations instead of forward-looking preferences.[18] Finally, one could develop a principled and consistent approach to policy evaluation that neither ignores nor completely defers to measures of individual preferences.

The remainder of this article articulates and defends a vision of the latter option while remaining open to version of WBA. Regulators should not rely on measures of individual preferences in cases when there is no rational basis for that preference that is also normatively viable. I will argue that the only rational basis for pure time preference, Parfitian ideas about personal identity and connectedness over time, severs the connection with social welfare. Since maximizing social welfare is the normative basis for CBA, policymakers should not incorporate preference patterns like pure time preference that do not actually track social welfare.[19] While a broader range of rationales are offered for older people exhibiting similar WTP to avoid near-term mortality risk as younger people, I will argue that this case similarly offers no rationally plausible basis that maintains the link with social welfare. I will also defend CBA against a range of other approaches that eschew reliance on individual preferences and other quantitative proxies for social welfare entirely.

IV. Discounting the Future

Discount rates applied to future regulatory costs and benefits should be lowered to eliminate, or at least substantially curtail, the component attributable to pure time preference. Time preference is the degree to which people care less about benefits or costs further in the future.[20] Since this preference often partially reflects both the uncertainty associated with future costs and benefits and anticipated decreases in the utility of future consumption, the pure rate of time preference can be defined as the degree to which people care less about a fixed (in probability-adjusted terms) amount of utility in the future relative to current utility.[21]

The general concept of time preference includes two uncontroversial components.[22] First, any delayed gratification risks an intervening event that prevents the reward from being reaped. In the individual case, the risk of premature death offers rational support to a perfectly selfish agent to adjust the value of saving for retirement downward in propor-

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18 John Bronsteen, Christopher Buccafusco, & Jonathan S. Masur, *Well-Being Analysis vs. Cost-Benefit Analysis*, 62 Duke L. J. 1603 (2013).

19 *See* Adler & Posner, *supra* note 1, at 25.

20 Shane Frederick, George Loewenstein, & Ted O'Donoghue, *Time Discounting and Time Preference: A Critical Review*, 40 J. of Econ. Literature 351, 352 (2002).

21 *Id.*

22 *But see* Tyler Cowen & Derek Parfit, *Against the Social Discount Rate, in* Justice between Age Groups and Generations 144 (James S. Fishkin & Peter Laslett, eds., 1992) (arguing that uncertainty about the future and the declining marginal utility of income should be treated directly, rather than through the social discount rate).

tion to the risk.[23] In the social case, the risk of an asteroid collision causing human extinction reduces the expected benefit of climate change mitigation. Second, the delayed benefit may confer less utility later than now. Inflation will likely make a given dollar value worth less in the future. Even inflation- adjusted dollars may yield less utility if you expect yourself or your society to be richer in the future, due to the declining marginal utility of wealth and income.[24]

Finally, the capacity of an individual or a society to enjoy a benefit may diminish for reasons unrelated to inflation or economic growth. This is easier to see in an individual case, where a less luxurious vacation taken while one still has the vigor of youth may generate more enjoyment than a more luxurious, but also more sedentary, vacation thirty years later. Accounting for these factors—risk, inflation, and declining marginal utility—is objectively justified.[25] The expectation that a specific non-monetary benefit will be less enjoyable in the future is subjective, but seems plausible in some cases. Stripping these components away yields the pure rate of time preference, the rate at which future utility is discounted for no other reason than that it is in the future.[26]

In the following sections, I consider three arguments about the role of pure time preference in discounting. Section A addresses Derek Parfit's ideas about personal identity and connectedness, which offer a plausible rational justification for pure time preference on the individual level. However, like Parfit, I conclude that this justification is normatively unsustainable on the social level.[27] Section B considers opportunity cost as a justification for including pure time preference in the social discount rate and concludes that this rationale only applies to investment-displacing costs. It argues that the Office of Management and Budget's current guidance on discounting cannot be justified even for investment-displacing costs. Section C addresses the argument that pure time preference should be included in the discount rate to maintain coherence with the overall policy regime regarding future orientation. It concludes that this consideration can justify partial incorporation of pure time preference into discount rates applied to consumption-displacing costs.

A. A Parfitian Defense

On the individual level, a plausible rationale for pure time preference is that the future person named Gabriel Weil, whose body shares physical continuity with mine and who remembers making (many of) my current choices, is not really or fully me in the

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23 Although individual discounting due to risk of non-realization of delayed benefits is uncontroversial and rational, it is not clear that it should be included in the discount rate. If someone saves for retirement, but then dies of a heart attack at age 50, those savings are not lost to society. So, there is a divergence between the individually rational optimal savings rate and corresponding discount rate, and the socially optimal discount rate. Calculations of the costs and benefits of rules also generally account for the expected number of people who will be affected by them, thereby incorporating individual mortality risks. Thus, retaining this component of the discount rate risks double- counting. An analogous concern is discussed in greater detail in Part IV on valuing mortality risks.

24 R. Layard, G. Mayraz, & S. Nickell, *The Marginal Utility of Income*, 92 J. PUB. ECON. 1846 (2008).

25 Frederick, Loewenstein, & O'Donoghue, *supra* note 20.

26 *Id.*

27 DEREK PARFIT, REASONS AND PERSONS 170 (1984).

relevant sense. In this view, saving for retirement or forgoing unhealthy foods is more like idiosyncratic generosity toward a specific future person than it is like ordinary self-regarding behavior.[28] Parfit wrote, "My concern for my future may correspond to the degree of connectedness between me now and myself in the future . . . since connectedness is nearly always weaker over long periods, I can rationally care less about my further future."[29] Because the vast majority of people discount the welfare of others at least somewhat relative to their own welfare, pure time preference would be a logical extension of that inclination. To the extent that the beneficiary of my financial savings and diet is a different person from my present self, pure time preference is no more open to rational criticism than moderate selfishness. My future "self" may "regret" that my choices favor my current welfare over his, but this would not be so different from a beggar who regrets the insufficient generosity of wealthy people who pass him on the street. While total unselfishness is considered morally praiseworthy, few people would condemn moderate selfishness as irrational. In fact, a common argument against utilitarianism is that it is too demanding in its impartiality, imposing moral duties that individuals cannot be reasonably expected to fulfill.[30]

The connectedness rationale is not mere philosophical speculation. Studies show that the degree of subjective connectedness with one's future self-influences savings behavior.

> Specifically, when the future self shares similarities with the present self, when it is viewed in vivid and realistic terms, and when it is seen in a positive light, people are more willing to make choices today that may benefit them at some point in the years to come.[31]

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28 *Id.*

29 *Id.* at 313. Parfit distinguishes discounting based on connectedness from traditional time-based economic discounting, indicating that his analysis supports the former. He even suggests that discounting would be insignificant in over brief time periods, since people are very closely connected to the yesterday and tomorrow versions of their selves, in contrast to selves separated by forty years. This would be inconsistent with empirically observed discount rates, where are often hyperbolic, showing higher time discount rates in the short term than for more distant delays. However, my intuition is that connectedness aligns well with observed time preference. My self, at this moment, is as connected to me as possible, whereas there is some drop off for my self tomorrow, in part because sleep has severed the continuity of consciousness at least once. By contrast, one can hardly notice a drop off in connectedness when comparing one's connection to one's self forty years in the future compared to forty years and one day in the future. Both may feel quite alien, but the latter's marginal decrease in expected connectedness seems tiny, if even noticeable.

30 *See* Brian McElwee, *Demandingness Objections in Ethics*, 67 PHIL. Q. 84 (2017).

31 Hal E. Hershfield, *Future self-continuity: how conceptions of the future self transform intertemporal choice*, 1235 ANN. N.Y. ACAD. SCI 30 (2011). *See also* Jeremy N. Bailenson, Laura L. Carstensen, Jesse Fox, Daniel G. Goldstein, Hal E. Hershfield, William F. Sharpe, & Leo Yeykelis, *Increasing Saving Behavior Through Age-Progressed Renderings of the Future Self*, 48 J. MARK. RES. S23 (2011); Brittany M. Christian et al., *Saving for Your Future Self: The Role of Imaginary Experiences*, 16 SELF & IDEN. 384 (2017).

There is also evidence that people exhibit reduced time preference when make savings decisions for others, rather than themselves.[32] This makes sense if pure time preference is driven by attenuated feelings of connectedness with one's future selves.

However, the rationale for individual pure time preference cannot justify relatively high social discount rates. Even if we assume that personal identity in the relevant sense is not stable over time and moderate selfishness is rationally justifiable, this offers no basis for law and public policy to favor the interests of present or near-future person-moments over further future person-moments. Just as we generally expect law and public policy to be impartial when adjudicating the interests of presently existing people, the default presumption should be that law and public policy are neutral with regard to conflicts of interest between present and future versions of Gabriel Weil that will likely exist over the coming decades. Whether or not such neutrality entails paternalistic interventions with respect to "self"-regarding choices on behalf of our future "selves," it certainly seems to imply that public policy should not take present people's valuation of the future at face value for the purpose of evaluating non-paternalistic regulatory interventions. Moreover, there is evidence that individuals exhibit lower discount rates when making decisions on behalf of others.[33] This suggests that people would not want their rate of pure time preference as applied to personal utility to be applied to public policy choices that will affect the welfare of many people. It is also consistent with the interpretation that self-regarding time preference is due, at least in part, to attenuated connectedness with one's future self over time. Thus, the only plausible rational justification for pure time preference severs its connection with social welfare. Since CBA's normative justification is enabling maximization of social welfare,[34] preference patterns that fail to track social welfare should be disregarded by policymakers. Likewise, if the Parfitian account of pure time preference fails, this preference pattern is simply irrational and not fit to serve as the basis for public policy.[35] This analysis suggests that the component of the discount rate attributable to pure time preference should be subtracted out, increasing the orientation of regulatory policy on the future.

B. Opportunity Cost

What about opportunity cost and market rates of return? OMB Circular A-4, which provides guidelines for CBA, offers three rationales for discounting:

> (a) Resources that are invested will normally earn a positive return, so current consumption is more expensive than future consumption, since you are giving up that expected return on investment when you consume today.
>
> (b) Postponed benefits also have a cost because people generally prefer present to future consumption. They are said to have positive time preference.

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32 Jeremy Shapiro, *Discounting for You, Me and We: Time Preference in Groups and Pairs* (2010), ECON. DEP'T, MASS. INST. OF TECH., http://economics.mit.edu/files/6059 (last visited July 20, 2018).

33 *Id.*

34 ADLER & POSNER, *supra* note 1.

35 *See* Shane Frederick, Discounting, *Time Preference, and Identity* (1999) (Ph.D. thesis, Dept. Soc. & Decision Sci., Carnegie Mellon U.).

> (c) Also, if consumption continues to increase over time, as it has for most of U.S. history, an increment of consumption will be less valuable in the future than it would be today, because the principle of diminishing marginal utility implies that as total consumption increases, the value of a marginal unit of consumption tends to decline.
>
> There is wide agreement with point (a). Capital investment is productive, but that point is not sufficient by itself to explain positive interest rates and observed saving behavior. To understand these phenomena, points (b) and (c) are also necessary. *If people are really indifferent between consumption now and later, then they should be willing to forgo current consumption in order to consume an equal or slightly greater amount in the future*. That would cause saving rates and investment to rise until interest rates were driven to zero and capital was no longer productive. As long as we observe positive interest rates and saving rates below 100 percent, people must be placing a higher value on current consumption than on future consumption.[36]

Rationale (c) is discussed above as the declining marginal utility of consumption and should be uncontroversial so long as per capita income can be expected to continue growing. It is worth noting that rising incomes may also be expected to lead people to increase their monetized values of non-market goods like clean air.[37] Rationale (b) certainly includes pure time preference, but *may* also incorporate future benefit realization risk and the potential diminution of capacity to enjoy specific benefits discussed above. If the risk of individual non-realization of deferred benefits is a significant component of individual time preference, this may lead to double counting since CBA directly accounts for uncertainties in the magnitude of costs and benefits, including the number of people who will enjoy the benefits. Existential risks that would prevent anyone from experiencing delayed costs or benefits may be best accounted for in the discount rate if realized. In any case, the Circular's language makes clear that rationale (a) is not an independent basis for discounting. Instead, positive risk-adjusted market rates of return are taken as evidence for rationales (b) and (c). If pure time preference is not a proper component of the social discount rate, then by Circular A-4's own reasoning, pure time preference should be subtracted out of any market measure used to determine the discount rate.

But if resources invested at the market rate of return could produce greater benefits in the future, is that not the best outcome under the prevailing constraints? If public policy cannot change individual time-welfare tradeoff decisions to eliminate pure time preference—at least without pervasive and heavy-handed intervention or state control throughout the economy—then shouldn't government only make investments that have higher expected returns than private investments? Perhaps, but not all the costs of regulation come out of investment. Some costs displace present consumption.[38] Rejecting the validity of pure time preference would seem to imply different treatment of these costs. Arguably, current practice already makes such a distinction:

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36 U.S. Office of Mgmt. & Budget, *supra* note 15, at 32 (emphasis added).

37 Nemat Shafik, *Economic Development and Environmental Quality: An Econometric Analysis*, 46 Oxford Econ. Papers 757 (1994).

38 U.S. Office of Mgmt. & Budget, *supra* note 15, at 32.

> As a default position, OMB Circular A-94 states that a real discount rate of 7 percent should be used as a base-case for regulatory analysis. The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy. It is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. *It approximates the opportunity cost of capital, and it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector. . . .*
>
> The effects of regulation do not always fall exclusively or primarily on the allocation of capital. *When regulation primarily and directly affects private consumption (e.g., through higher consumer prices for goods and services), a lower discount rate is appropriate.* The alternative most often used is sometimes called the "social rate of time preference." This simply means the rate at which "society" discounts future consumption flows to their present value. If we *take the rate that the average saver uses to discount future consumption as our measure of the social rate of time preference,* then the real rate of return on long-term government debt may provide a fair approximation. Over the last thirty years, this rate has averaged around 3 percent in real terms on a pre-tax basis. For example, the yield on 10-year Treasury notes has averaged 8.1 percent since 1973 while the average annual rate of change in the CPI over this period has been 5.0 percent, implying a real 10-year rate of 3.1 percent.[39]

While OMB Circulars A-4 and A-94 endorse applying different discount rates to consumption and investment, they appear to do so for the wrong reason. Circular A-4 explicitly claims to "take the rate that the average saver uses to discount future consumption as our measure of the social rate of time preference."[40] This implies taking observed rates of time preference, based on rationales (b) and (c), including the pure time preference component, at face value as a measure of social time preference.[41] As discussed above, this cannot be justified.

The use of returns on government debt as a proxy for average saver time preference is also unclear, since few savers invest exclusively or even primarily in government debt.[42] Moreover, most of the federal public debt is held by foreign countries and institutional investors, rather than domestic private savers.[43]

Perhaps OMB Circular A-4's approach can be rehabilitated by thinking of interest rates on federal debt in terms of the government's cost of capital rather than as a reflection of individual time preference.[44] In this view, government should undertake regulatory interventions and make other investments (e.g., infrastructure) when the expected social returns are greater than the borrowing costs, so long as the up-front costs come out of consumption rather than higher-yield investments. This does not seem to go far enough, for two reasons. First, the government's borrowing costs are influenced by pure

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39 *Id.* at 33 (emphasis added).

40 *Id.*

41 *Supra* text accompanying note 36.

42 Kimberly Amadeo, *Who Owns the U.S. National Debt?*, THE BALANCE, https://www.thebalance.com/who-owns-the-u-s-national-debt-3306124 (last updated Oct. 28, 2019).

43 *Id.*

44 *See* U.S. OFFICE OF MGMT. & BUDGET, *supra* note 15, at 33.

time preference, suggesting they offer an overestimate of the true social discount rate. Second, buyers of government debt have the alternatives of both present consumption and riskier investments like real estate, equity markets, corporate debt, and municipal debt.[45]

This suggests that marginal investors are indifferent between the low-risk, low-return value proposition of government debt and higher-risk, higher-return market alternatives. Perhaps society at large has reason to be more risk tolerant than the investment community, but these reasons likely stop short of complete risk neutrality. The same declining marginal utility of income logic that supports discounting also supports a social preference for insuring against downside tail risk.[46] This suggests that even to the extent that the costs of a regulatory intervention or government investment come out of private investment, 7% likely represents too high an estimate of the appropriate discount rate.

C. Policy Regime Coherence

A related issue is that many government policies not subjected to CBA influence the savings rate. These include tax-exempt or deferred savings programs like IRAs and 401(k)s, corporate profits taxes, inheritance taxes, investment and R&D tax credits, capital gains and dividends taxes, Social Security, Medicare, the mortgage interest deduction, property taxes, non-taxation of the imputed rental value of land, federal budget deficits, and infrastructure investments.[47] Some of these programs, like IRAs and 401(k)s, are designed to encourage savings.[48] Others, like federal budget deficits, capital gains taxes, Medicare, and pay-as-you-go Social Security retirement benefits, have the effect of reducing public and/or private savings.[49] What would constitute a neutral policy with regard to savings rates is not free from controversy. Many economists argue that taxing any investment returns biases people toward present consumption.[50] In this view,

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45 *Basic Types of Investments – Financial Instruments You Should Know*, Money Instructor (Oct. 11, 2019), http://content.moneyinstructor.com/775/financial-instruments-know.html.

46 Martin L. Weitzman, *Fat Tails and the Social Cost of Carbon*, 104(5) Am. Econ. Rev. 544 (2014).

47 Paul A. David & John L. Scadding, *Private Savings: Ultrarationality, Aggregation, and 'Denison's Law'*, 82 J. Pol. Econ. 225 (1974); Chris Carroll & Lawrence H. Summers, *Why Have Private Saving Rates in the United States and Canada Diverged?* (Nat'l Bureau of Econ. Res., Working Paper No. 2319, 1987); Martin Feldstein, *The Effect of Social Security on Private Savings: The Time Series Evidence* (Nat'l Bureau of Econ. Res., Working Paper No. 314, 1979).

48 Karen Dynan, *Proposal 6: Better Ways to Promote Saving through the Tax System*, *in* 2–3 The Hamilton Project: 15 Ways to Rethink the Federal Budget (Brookings Inst., 2013), https://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/THP_15WaysFedBudget_Prop6.pdf.

49 Laurence J. Kotlikoff, *Health Expenditures and Precautionary Savings* (Nat'l Bureau of Econ. Res., Working Paper No. 2008, 1986); Martin S. Feldstein, *Social Security and Private Savings: International Evidence in an Extended Life-Cycle Model* in Martin S. Feldstein M.S. & Robert P. Inman, The Econ. of Pub. Services (Robert P. Inman & Martin S. Feldstein eds., 1997).

50 Vernon L. Smith, *Tax Depreciation Policy and Investment Theory*, 4(1) Int'l Econ. Rev. 80 (1962); Stephen R. Bond, Michael P. Devereux, & Malcolm J. Gammie, *Tax Reform to Promote Investment*, 12(2) Oxford R. of Econ. Pol'y 109 (1996).

IRAs and 401(k)s represent a step toward savings neutrality, rather than affirmative government support for higher savings rates.[51] If overall government policy does not promote higher savings rates and counteract pure time preference, it may be argued that failing to apply market indicators to cost-benefit discounting is incoherent. Likewise, if the overall policy regime does promote savings, this would be reflected in the rates of return used to set discount rates, so no further adjustment would be needed.

A similar issue arises regarding the distribution of costs and benefits across the population. Advocates of replacing CBA with WBA, like John Bronsteen, Christopher Buccafusco, and Jonathan S. Masur, argue that wealth effects distort the WTP measures used in CBA:

> It has long been understood that the value an individual places on a risk or a benefit will necessarily be affected by that individual's wealth. A millionaire might think nothing of paying $10,000 to breathe slightly cleaner air, but someone who must support a family on $25,000 per year will be much more hesitant to make the same trade-off. Similarly, wealthy people rarely take high-risk jobs because the wage premium is worth less to them and is insufficient to compensate them for the risk. The reason is not that the benefit or risk involved is greater for the wealthier person (though there may be slight differences). Rather, wealth effects are driven by the fact that the money is worth less to the wealthy person. Because cost-benefit analysis involves translating harms and benefits into dollars, these "wealth effects" will affect cost-benefit calculations.
>
> Wealth effects play a large and undeniable role in wage-premium studies, yet CBA cannot fully account for these effects. The fact that rich and poor people (who presumably care equally, or at least comparably, about staying alive) would be willing to pay vastly different amounts to avoid a 1-in-10,000 risk of death illustrates the inadequacy of this metric for valuing lives. WBA circumvents these issues entirely by valuing lives based on individuals' own assessments of their well-being.[52]

Some ambiguity lies in the claim that rich people and poor people care equally about staying alive. We can grant that this is true in an absolute sense[53] while recognizing that if it were possible to transfer the societal resources that would be spent on a stronger rule to the affected population as cash, their WTP, as mediated by wealth effects, is highly relevant. A lot depends on whether you take the sum of societal resources redirected from rich people to poor people as fixed. Advocates for WBA acknowledge this issue, but maintain that agencies should aim to maximize well-being within the scope of their authority:

> Any time a government agency must decide between two projects—or two locations for the same project—one of which will affect wealthy people and the

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51 *See, e.g.*, Kevin A. Hassett & R. Glenn Hubbard, *Tax Policy and Business Investment*, *in* HANDBOOK OF PUB. ECON. (Alan J. Auerbach & Martin Feldstein eds., 2002).

52 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1652.

53 As Cass Sunstein points out, even this claim is more questionable in considering "Easy Cases" where the population benefitting from reduced mortality risks from a proposed regulation would also be responsible for paying its cost, as in most regulations of product safety. Sunstein, *supra* note 3, at 40, 61.

> other of which will affect poor people, it risks being led astray by wealth effects if it looks at the actual populations of people who will be affected. It may be led to believe that the "wealthy" project will have a greater effect on welfare than the "poor" project, simply because of the impact of wealth on willingness to pay. When the agency cannot tax and transfer—and nearly all agencies lack that authority—*it will err and select the wrong project. WBA, on the other hand, would not be confused by wealth effects.*
>
> WBA does not require that costs and benefits be translated into dollars, and so the wealth of the affected population cannot confound the analysis. . . .
>
> Economists generally believe that it is more efficient to allocate resources via taxes and transfers than through regulations and new policy proposals. Accordingly, agencies should concentrate on maximizing aggregate wealth and consumption, and welfare and distributional concerns should be left to the tax system. If agencies were to switch to a welfarist decision procedure such as WBA, they would be measuring the wrong quantity.[54]

The authors go on to reject the economists' critique of WBA, pointing to a number of methodological issues with CBA, which are discussed in Part V.[55] However, they do not truly grapple with the issue of how an agency should behave when it lacks the tools to achieve the globally optimal outcome.[56]

Three approaches to this issue seem plausible. Approach 1: Agency analysis accepts the rest of government policy as fixed and optimizes its targeted metric (subjective well-being, net benefits, etc.). Approach 2: Agency adopts the policy it believes would be appropriate as part of an optimal overall policy regime. Approach 3: Agency views the level of redistribution and/or future orientation of policy as a matter for democratic deliberation and matches its weighting of these concerns to be in conformity with the overall status quo policy regime, including taxes and transfers. We can treat these three approaches as ideal types, recognizing that the best approach may be a weighted average of two or three.

The first two approaches play out somewhat differently as applied to wealth effects and discounting. For wealth effects, Approach 1 might mean adopting a regulatory posture that weighs the interests of low-income people more heavily than existing tax and transfer policy, meaning a Pareto improvement might be possible by reducing the stringency of a regulation that primarily benefits poor people and compensating them with cash that they value more than the forgone regulatory benefits. Under Approach 2, by contrast, an agency might conclude that most redistribution should be done through taxes and transfers and mostly take WTP measures at face value. There would be some scope for adjustment for wealth effects under this approach. After all, if low-income people had higher after-tax-and-transfer income, they would likely value health and

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54 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1654 (emphasis added).

55 *Id.* at 1654–55.

56 They also fail to raise the related concern that projects that concentrate their net benefits on poor neighborhoods may induce changes in property values that price poor people out of those neighborhoods. In principle, however, these effects could be incorporated into either WBA or a form of CBA that incorporates distributional weights. ADLER & POSNER, *supra* note 1, at 143–44.

safety more in monetary terms. It is also dubious that the optimal policy regime would conduct 100% of its redistribution of benefits through taxes and transfers rather than regulatory policy. Nonetheless, these adjustments would likely stop far short of the full cancellation of wealth effects advocated for under WBA.

For discounting, the differences between Approach 1 and Approach 2 would be less sharp. Under Approach 1, regulators would distinguish regulatory costs that come out of present consumption from those that come out of investment, using the status quo cost of capital for investment-displacing costs and a normative, pure time preference-free, discount rate for consumption-displacing costs. Under Approach 2, agency behavior would depend on a judgment regarding the merits of nudges and more coercive forms of paternalism. If the ideal policy regime would include robust employment of nudges (and more coercive interventions when necessary), agencies could simply discount using the market equilibrium cost of capital that they calculate would prevail if people did not exhibit pure time preference, treating present consumption and investment equally. However, if the ideal policy regime includes some special deference to individual autonomy, as maintained by *Nudge* critics, then differential treatment of displaced savings and investment would likely persist as well.[57]

Approach 3 would apply similarly to both cases. With respect to redistribution, there is a tradeoff on some margins between promoting equality and maximizing efficiency.[58] The prevailing tax and transfer regime and a range of other policy choices reflects a social choice regarding how to balance these competing objectives. This picture is complicated somewhat by the existence of policies that both increase inequality and reduce growth.[59] Nonetheless, agencies could adopt a weighting of monetized benefits that seeks to align with the implicit democratic choice balancing these competing goals. Similarly, a range of government policies related to public and private savings and investment is reflecting an implicit discount rate. Agencies could simply adopt a discount rate consistent with this overall policy regime and apply it to costs that displace both consumption and investment. Alternatively, if public and private savings and investment are treated sufficiently differently in the broad sweep of public policy, an agency might also infer at least so commitment to the principle of noninterference with private autonomy appealed to by *Nudge* critics.[60] This might justify continuing to apply a lower discount rate to consumption-displacing costs than to investment-displacing costs, even under an approach that uncritically embraces the prevailing level of future orientation embedded in the policy regime.

How should agencies decide which of these approaches to adopt? First, the viability of Approach 3 is necessarily limited by any specific guidance offered in the statute the agency is administering. Any obligation to act in conformity with democratic choices inferred from a policy regime would be trumped by domain-specific statutory provisions.

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57 David F. Bradford, *Constraints on Government Investment Opportunities and the Choice of Discount Rate*, 65 AMER. ECON. REV. 887 (1975).

58 Edgar K. Browning & William R. Johnson, *The Trade-Off Between Equality and Efficiency*, 92(2) J. POL. ECON. 175, 199 (1984).

59 *See generally* BRINK LINDSEY & STEVEN M. TELES, THE CAPTURED ECONOMY: HOW THE POWERFUL ENRICH THEMSELVES, SLOW DOWN GROWTH, AND INCREASE INEQUALITY (2017).

60 Aneil Kovvali, *Who Are You Calling Irrational?*, 110 NW. U. L. REV. 707, 712 (2016).

Nothing in the Constitution requires the Congress to be consistent in its value judgments, and the vagaries of legislative sausage-making routinely reflect temporary and issue-specific coalitions rather than an ideologically coherent program. However, regulatory statutes are typically silent on the issues of discounting and the balance between efficiency and equality.[61] Given the typically general language of regulatory statutes and the Supreme Court's doctrine of *Chevron* deference, agencies have wide discretion in implementing CBA.[62] It is also unclear that the plethora of economic policies that do address questions of future orientation and of balancing efficiency and equality reflect genuine democratic deliberation over these issues.[63] However, an agency may risk political backlash if it pursues an agenda for redistribution of benefits or future orientation that goes beyond what the public is prepared to support. Agencies would be wise to give some weight to the implicit balance of efficiency and equality as well as present and future welfare struck in the legislative process, even if the Congress has not expressed a clear or consistent will on the matter.

Seeking coherence with the overall existing policy regime may be considered a valuable end, independent of concerns about democratic legitimacy. With regard to wealth effects, Approach 3 might be the only way for an agency, given the limited scope of its powers, to avoid contributing to a Pareto inefficient outcome.[64] This would occur if some population would value a cash transfer more than a regulatory benefit, and the taxes required to fund that transfer are less costly to the taxed parties that the regulation would be. If the agency ignores coherence considerations and proceeds with regulation, the overall outcome would be Pareto inferior to one in which the regulation is repealed and replaced with a tax and transfer adjustment. However, the tax and transfer scheme and other, less transparent, forms of redistribution are sufficiently complex and incoherent that Pareto improvements are likely to be (at least theoretically) possible even if agencies prioritize this sort of policy regime coherence over other considerations.[65]

It is also not clear that when looking at two alternatives that are Pareto non-comparable (e.g., regulate or not), the theoretical existence of a Pareto improvement to one of those options is relevant.[66] These considerations apply with greater force to the discounting domain where it is not well established that paternalistic interventions to promote future orientation are preferable to adjustments of non-paternalistic regulation toward greater temporal neutrality. Thus, while policy coherence may be a legitimate

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61 *See* Cass R. Sunstein, *Interpreting Statutes in the Regulatory State*, 103 HARV. L. REV. 405, 446 (1989).

62 *See* Chevron U.S.A., Inc. v. Nat. Res. Def. Council, Inc., 467 U. S. 837 (1984).

63 *See* William N. Eskridge, Jr., *Politics without Romance: Implications of Public Choice Theory for Statutory Interpretation*, 74 VIRG. L. REV. 275, 276–77 (1988).

64 A Pareto inefficient outcome is one for which it is possible to make at least one person better off without making anyone worse off (a Pareto improvement). HAL R. VARIAN, INTERMEDIATE MICROECONOMICS: A MODERN APPROACH 15 (8th ed. 2010).

65 Deborah L. Paul, *The Sources of Tax Complexity: How Much Simplicity Can Fundamental Tax Reform Achieve*, 76 N.C. L. REV. 151, 167–68 (1997).

66 Pareto non-comparability means that moving from one alternative to the other makes at least one person better off and at least once person worse off. David W. Pearce, THE DICTIONARY OF MODERN ECON., 331 (2d. ed. 1983).

objective to which some weight should be given, both in its own terms and on democratic legitimacy grounds, we can reject a pure implementation of Approach 3.

As indicated above, the choice between the Approach 1 and Approach 2 is much more significant for wealth effects than for discounting. Neither Approach 1 nor Approach 2 would apply the pure time preference component of discounting to consumption-displacing costs. The major difference is regarding the treatment of investment-displacing costs and only arises if you accept the legitimacy of some amount of paternalism regarding savings rates and other choices involving time tradeoffs. Having rejected pure implementation of Approach 3, we can therefore conclude that the existence of sub-optimally utilized policy levers affecting savings rates cannot justify full inclusion of pure time preference in discount rates for consumption-displacing costs. Pure time preference may only be included in the discount rate for consumption-displacing costs to the extent that we give some weight to Approach 3 and conclude that the overall existing policy regime favors present consumption over future benefits to a degree that is consistent with affirming pure time preference.

V. VALUING LIFE

Let us now return to the question of how to value mortality risks. The currently dominant practice in the United States is population-average VSL, which places a fixed value on a statistical life regardless of age or health status.[67] The VSLY approach would instead value mortality risks based on an estimate of how many life-years would be lost from the expected deaths, weighing preventing the death of a young and healthy person as a greater benefit than preventing the death of an older or sicker person.[68] Population-average VSL also differs from textbook VSL, which allows for valuations that are heterogeneous by income, age, and other attributes.[69] It is worth quoting Revesz and Livermore's defense of population-average VSL and critique of the VSLY alternative at some length.

> The life-years method does not flow from either sound economic theory or good facts. *The approach is fundamentally inconsistent with the important tenet of economic theory in which value is determined by the willingness to pay*. Under that tenet, the economic value of mortality risk reductions should be determined by how much an individual would voluntarily exchange for the reduction. It would only be economically defensible to decrease the value assigned to mortality risk reduction to account for age if one's willingness to pay decreases as one ages.
>
> But the life-years method ignores willingness to pay as a proxy for value, and instead assumes a downward linear relationship between a person's age and the value of that person's life. *This assumption is inconsistent with the standard economic observation that individuals generally assign greater value to goods that are more limited*

67 Cass R. Sunstein, *Lives, Life-Years, and Willingness to Pay*, 104 COLUM. L. REV. 205, 205–206 (2004). Different agencies do use different values for statistical lives, but for each agency the VSL method uses a fixed value regardless of age.

68 LIVERMORE & REVESZ, *supra* note 8.

69 ADLER & POSNER, *supra* note 1.

> *in supply*. The technique uses a constant per life-year value, so that all life years are valued equally no matter when they occur during the life cycle.
>
> As people age, they can anticipate fewer future life years. Because of this scarcity, we might expect that they value their future life years more highly than younger people would. *By assuming that no difference exists between the values a 40-year-old and a 70-year-old would attribute to an additional year of life, the life-years method overlooks the effect of scarcity on valuation*. By ignoring the effect of scarcity and focusing regulatory efforts on reducing risk for young and healthy people, the life-years method delivers regulatory benefit to those who value it least. This approach takes the standard economic logic of "willingness to pay" and stands it on its head. Generally, the most efficient system is the one that moves resources to the people that value them most. The life-years method accomplishes exactly the opposite. Moreover, across a certain age range of their lives, *as people grow older, they have more income and wealth. It is well established that the willingness to pay to avoid risk is highly correlated with income. The greater affluence of middle-aged individuals (at least preretirement) thus suggests an increase in willingness to pay*, contrary to the prediction of the life-years method.
>
> Various models—all ignored by life-years advocates—seek to determine how the value of risk reduction might change with age. *Some models predict that as the probability of death increases, so does the willingness to pay to avoid risk, because people cannot take money to their graves*. In other models, increases in background risk, which occur as people age, decrease the willingness to pay for a specific risk. Other models are simply ambiguous. It is possible that none of these models captures the whole story. What is important, however, is that no plausible economic model offers even lukewarm support for the diminishing linear relationship between life expectancy and willingness to pay that undergirds the life-years method. The life-years method, then, is entirely without theoretical justification.[70]

Let us assume, for the sake of argument, that WTP to avoid near-term mortality risks is constant throughout the life cycle. That is, a thirty-year-old American woman with a remaining life expectancy of fifty-two years exhibits no greater WTP to avoid a near-term mortality risk than a sixty-three-year-old woman with a remaining life expectancy of twenty-two years.[71] Under this assumption, population-average VSL converges with textbook VSL, at least with regard to age. This is the most favorable assumption we can make for population-average VSL method—that individual preferences offer no basis for deviating from a constant VSL over the life cycle. If the case for the VSL method falls short under this assumption, we can safely reject it.

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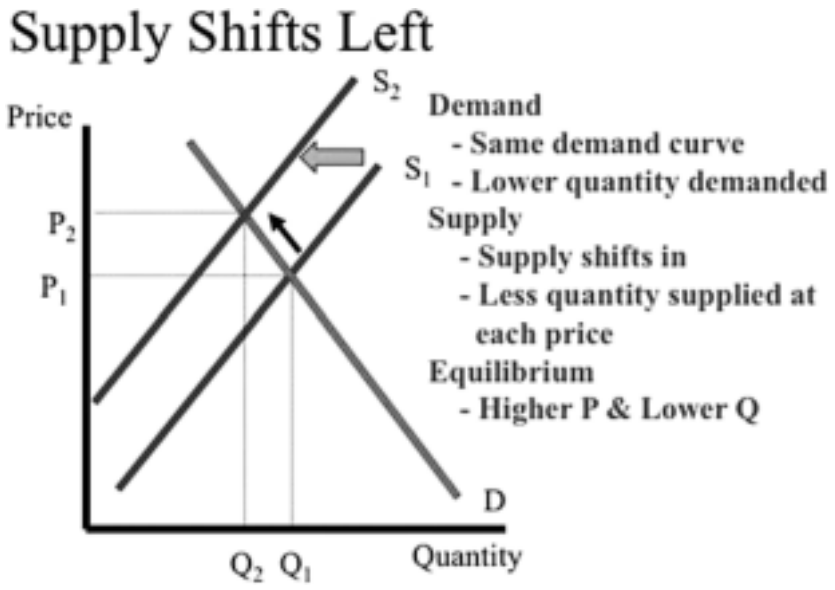
70 LIVERMORE & REVESZ, *supra* note 8, at 80–81 (emphasis added).

71 SOC. SEC. ADMIN., *supra* note 9.



Revesz and Livermore offer two principal reasons why roughly constant WTP to avoid mortality risk across the life cycle might be plausible: scarcity and wealth effects. Regarding scarcity, they claim that "individuals generally assign greater value to goods that are more limited in supply."[72] This claim is somewhat misleading. In orthodox economic theory, the shape of the demand curve is independent of supply.[73]

What is true is that a leftward shift in the supply curve will tend to raise both the price and the marginal value of a unit of a good, even as the total[74] quantity demanded falls.[75] This is a consequence of the tendency of demand curves to slope downward—for consumers to buy less of a good as the price rises.[76] This, in turn, is a function of diminishing marginal utility.[77] A tenth apple is worth less to a hungry person than the first, so she will only buy ten if the price is sufficiently low. If she is hungry, however, her willingness to pay for the first apple may be quite high. In this sense, the first apple can be said to be more valuable to her than the tenth. If apples become scarcer, the price will rise and she will buy fewer, but the marginal value of the last apple she buys will be greater than when apples are plentiful. If this translates at all to the context of life-years, it suggests that the marginal value of a life-year *decreases* over the life cycle. That, at least, is what the concept of diminishing marginal utility would imply. It is true, however, that not all demand curves slope down monotonically.[78] In this context, there may

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72 LIVERMORE & REVESZ, *supra* note 8, at 80.

73 N. GREGORY MANKIW, PRINCIPLES OF ECONOMICS 82 (2009).

74 BRIGHAM YOUNG UNIV.-IDAHO, *ECON 150 Economic Principles and Problems – Micro: Section 01: Supply and Demand*, https://courses.byui.edu/econ_150/econ_150_old_site/lesson_03.htm (last visited Aug. 12, 2018).

75 *Id.*

76 *Id.*

77 George J. Stigler, *The Adoption of the Marginal Utility Theory*, 4 HIST. OF POL. ECON. 571, 579 (1972).

78 *See, e.g.*, Harvey Leibenstein, *Bandwagon, Snob, and Veblen Effects in the Theory of Consumers' Demand*, 64(2) Q. J. OF ECON. 183 (1950).

be reasons to think that the first year of life is not the most valuable. Indeed, charity evaluator GiveWell weighs lost life-years against factors like level of cognitive function at the age of death.[79] Nonetheless, the true claim that scarce goods tend to be more valuable to those who consume them simply does not support the conclusion that years that fall later in the life cycle are more valuable than earlier years.

With regard to wealth effects, note that Revesz and Livermore are essentially claiming that policymakers should value benefits to (pre-retirement) older people more highly precisely because older people have more income and wealth.[80] This is in tension with their argument, discussed in Part II, that we should not apply standard economic discounting to climate change because many of those most affected by its impacts will be poor Bangladeshis. I sincerely doubt that Revezs and Livermore would favor broad application of the idea that regulatory efforts should be focused on reducing risk for wealthy and high-income people, but this is precisely what their reasoning implies.[81] Moreover, even if CBA should value the lives of wealthier people more because of their higher WTP, then it would be better to do so directly rather than using age as a proxy for wealth and income, as Revezs and Livermore's rationale for retaining population-average VSL implies.[82] Using a fixed VSL not only imperfectly tracks actual wealth and income levels, but also entangles wealth effects with irrational or normatively unsustainable drivers of WTP like pure time preference.

Revezs and Livermore's argument that older people's WTP are driven up by the fact that they "cannot take money to their graves," should be particularly unpersuasive to regulators.[83] To the extent this is the correct explanation for older people's increasing WTP per life-year, what is changing is not the value of life-years as people age; it is the value of money. Money may not have much value to a person who is about to die, but the money (and real resources) invested in lowering mortality risk will necessarily be diverted from the living population. Individuals may not be able to take money to the grave with them, but that does not mean that money and the real resources it commands lose their social value when the person dies. Thus, to the extent that older people's WTP to avoid mortality risks is driven up by this phenomenon, the link between their preferences and social welfare is broken. As with pure time preference, this break negates the normative value of the preference pattern and renders it irrelevant to policymakers

Let us consider the issue from a moral perspective.[84] From an outside perspective, the death of a thirty-year-old woman who would have lived another fifty-two years seems to be worse than the death of a sixty-three-year old woman who otherwise would have lived another twenty-two years.[85] There is room for reasonable disagreement with regard to

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79 Robert Wiblin, *Finding the Best Charity Requires Estimating the Unknowable*, 80,000 HOURS (July 16, 2018), https://80000hours.org/podcast/episodes/james-snowden-givewell-research/.

80 LIVERMORE & REVESZ, *supra* note 8.

81 Cass Sunstein points out that the case for valuing mortality risks for wealthier and higher-income populations more highly is strongest in the "Easy Cases" when the beneficiaries of a proposed regulation would also be responsible for paying its costs. *See* Sunstein, *supra* note 3, at 40, 61.

82 LIVERMORE & REVESZ, *supra* note 8, at 81.

83 *Id.*

84 *Id.* at 110–11.

85 For further discussion on this point, *see* Sunstein, *supra* note 67, at 214–16.

whether the average value of a life-year in one's thirties, forties, and fifties is higher or lower than in one's sixties, seventies, and eighties. As one ages and loses the vigor and health of youth, she is compensated with wisdom, financial security, and grandchildren.[86]

A full appraisal might consider average happiness and life satisfaction over the life-cycle, as well as the contributions individuals make to society. Studies have generally shown a U-shaped happiness curve, with people reporting high life satisfaction in early adulthood that gradually declines before recovering as they enter retirement.[87] However, recent work has called into question whether this result is an artifact of individuals' reporting functions.[88] A reasonable case can be made that earlier or later life-years are marginally more valuable. What cannot be credibly argued is that the three years between ages eighty-two and eighty-five that a sixty-three-year-old woman would lose to premature death are approximately equivalent in value to the thirty-three years between ages thirty and sixty-three that a thirty-year-old-woman would lose. (They both would lose the nineteen years between ages sixty-three and eighty-two, in expectation).[89] However, this is precisely the view one must adopt in order to conclude that the age of the potential beneficiary of mortality risk reduction is irrelevant, as the VSL method does.

Revezs and Livermore fail to mention another potential explanation for older people valuing near-term mortality risk reduction at similar levels to younger people: time preference. In particular, the Parfitian idea that pure time preference is rationally justified by decreasing levels of connectedness with successive future selves seems highly relevant.[90] In this view, when younger people consider near-term mortality risks, they are giving little weight to potential lost life-years decades in the future, when the person who would or would not exist is not fully "them." As with other manifestations of Parfitian pure time preference, the rational defensibility of this behavior does not imply that policymakers should uncritically accept this revealed preference as the basis for non-paternalistic regulation.[91] As argued above, public policy should be neutral between the

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86 *See generally* ATUL GUWANDE, BEING MORTAL: ILLNESS, MEDICINE AND WHAT MATTERS IN THE END (2014).

87 Timothy N. Bond & Kevin Lang, *The Sad Truth About Happiness Scales: Empirical Results* (Nat'l Bureau of Econ. Res., Working Paper No. 24853, 2018).

88 *Id.* at 19–20.

89 Technically, life expectancy tables compress a wide distribution into an average. Someone who is currently thirty years old is no more likely to die at eighty-two than someone who is currently sixty-three. The reason she has a lower expected death age is that she might die before age sixty-three. This does mean she is somewhat less likely than a sixty-three-year-old to experience the life-years between eighty-two and eighty-five, but much less than a naive interpretation of life expectancy tables would imply. However, this consideration only amplifies the absurdity of treating the sixty-three-year-old's remaining twenty-two expected life-years as equally valuable to the thirty-year-old's fifty-two expected remaining life-years, since the overlap in life stage of the lost life-years is even greater than the nineteen years that the naive calculation suggests.

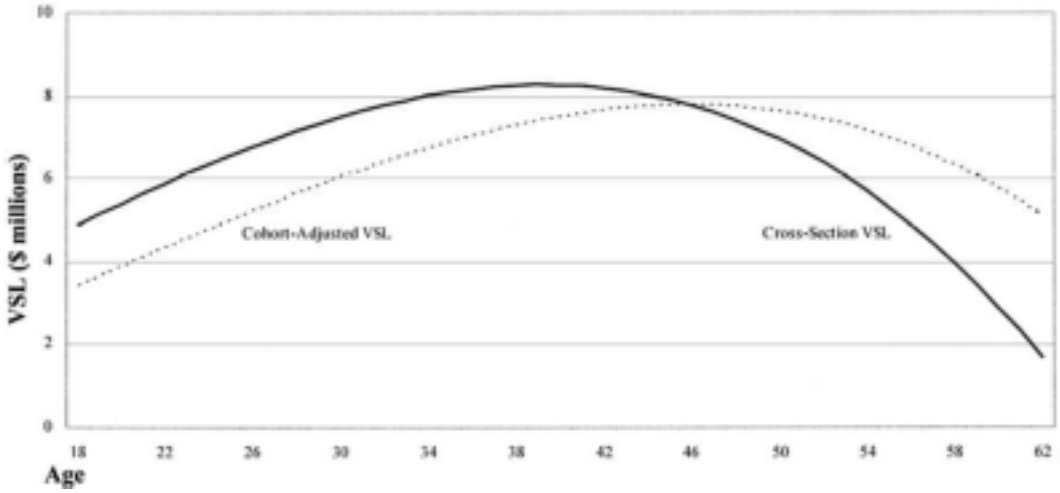
90 PARFIT, *supra* note 27.

91 Non-paternalistic regulation refers to any regulation designed primarily to regulate other-regarding activities like pollution or product safety, as opposed to self-regarding activities like diet, exercise, and retirement savings. Most major rules subject to CBA are non-paternalistic in this sense.

interests of present and future iterations of a citizen, just as it should be between different contemporary citizens. Thus, as with pure time preference, no rationale for the pattern of individual preferences that might support the population average VSL approach is rationally plausible while also maintaining the connection to social welfare that normatively justifies deference to individual preferences.

Joseph Aldy's and W. Kip Viscusi's analysis of Bureau of Labor Statistics Census of Fatal Occupational Injuries data yield an inverted U-shaped pattern for VSL over the lifecycle.[92]

FIGURE 1—COHORT-ADJUSTED AND CROSS-SECTION VALUE OF STATISTICAL LIFE, 1993–2000



Viscusi notes that annual earning and consumption patterns "exhibit a trajectory that that mimics the overall shape of the VSL-age relationship."[93] He then claims that "This similarity is not a statistical quirk, as there is a theoretical linkage of one's valuation of safety to income and consumption levels."[94] Viscusi stipulates that, in an idealized economic model where people where endowed with their lifetime wealth at birth, VSL would steadily decline with age, corresponding to a roughly fixed VSLY.[95] Given imperfect credit and insurance markets, however, individuals' financial resources change significantly over their lifecycle.[96] Given this empirical relationship, Viscusi rejects proposals to scale back valuations of mortality risk based on the remaining life expectancy at risk, because "such quantity adjustments are not based on how people's willingness to pay for the risk reduction varies across these policies."[97]

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92 Joseph E. Aldy & W. Kip Viscusi, *Adjusting the Value of a Statistical Life for Age and Cohort Effects*, 90(3) REV. ECON. & STAT. 573 (2008).

93 W. KIP VISCUSI, PRICING LIVES: GUIDEPOSTS FOR A SAFER SOCIETY 99–100 (2018).

94 *Id.*

95 *Id.* at 97–98.

96 *Id.*

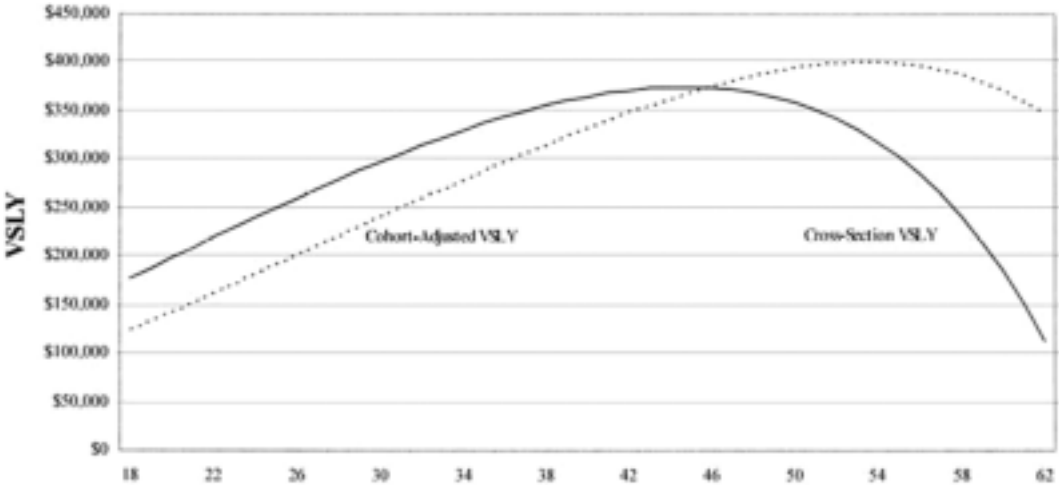
97 *Id.* at 104.

In addressing the relative fairness of population average VSL and VSLY, Viscusi considers an extreme case comparing a thirty-year-old with a remaining life expectancy of forty-nine years to an elderly person with advanced emphysema and a life expectancy of one year.[98] He concedes that using a population average VSL for valuing risks to both of their lives is inequitable in ignoring the extra forty-eight years of life expectancy at risk for the thirty-year-old.[99] However, he claims that the VSLY approach "also creates a bias by steadily reducing the total benefit attached to the remaining years of life as a person ages."[100] It is not clear why this represents a bias. All people will die at some point and lose their remaining life expectancy. All public policy can ever do is influence the likelihood that they will die at any time. Viscusi compares both the population average VSL and VSLY unfavorably to textbook VSL, but holds that "pinpoint matching of the person's valuation of the risk reduction to particular policies is generally not possible."[101] He concludes population average VSL is efficient and equitable for policies with broad impact and that VSLY should be reserved for "special instances in which the policy delivers only a minor effect on life expectancy" and thus "utilization of the VSLY approach retains a linkage to private valuations of risk."[102]

Viscusi's approach is based on the fundamental premise that willingness to pay is the ultimate arbiter of value. It is indeed rational for willingness to pay for a good to rise with wealth and income, as the marginal value of a dollar falls. Given political or economic (including negative incentive effects) constraints on redistribution, there may be a case for adjusting the value of mortality risks for wealth and income. If "safety" were the *same good* across the lifecycle, it would make sense to defer to individual preferences about it that track willingness to pay for other consumption items. However, reductions in mortality risk buy a person fewer expected life-years as they get older. To the extent that individual willingness to pay purely tracks wealth and income across the lifecycle, it ignores the quantity of life lost, suggesting a myopic focus on the near future. Thus, while it may make sense to adjust VSLY for wealth and income, the variation in available financial resources over the lifecycle is not a good reason to ignore the diminishing quantity of left at risk as a person ages. This point is underscored by Aldy and Viscusi's method of extracting VSLY estimates across the lifecycle, shown in figure 2 below.[103]

98 *Id.*
99 *Id.*
100 *Id.* at 108.
101 *Id.*
102 *Id.* at 109.
103 Aldy & Viscusi, *supra* note 92, at 579.

FIGURE 2—VALUE OF A STATISTICAL LIFE-YEAR BASED ON COHORT-ADJUSTED AND CROSS-SECTION VALUE OF STATISTICAL LIFE, 1993–2000



Aldy and Viscusi apply a 3% discount to the remaining expected life years to back out an estimate of VSLY by age from VSL figures.[104] Recall that life expectancy already incorporates other mortality risks that might detract from the value of reducing any specific risk, so the risk that one might not realize the full benefit of later saved life-years cannot justify applying this discount rate.

The expectation that society will be wealthier in the future cuts both ways in this context, since wealthier future people can be expected to value their lives more than present people by Viscusi's own reasoning. Indeed, Viscusi implicitly acknowledges as much in his discussion of discounting future mortality risks, where he suggests applying a 3% discount rate, but offsetting it with a 2% annual increase in VSL, for a net discount factor of 1%.[105] If anything, the case for discounting is stronger in the case of future mortality (as opposed to later life-years lost due to current mortality risks), because benefit realization risk may not be separately accounted for in that case. Applying a 3% discount rate to statistical life-years thus leans very heavily on pure time preference, which lacks a normatively compelling rationale. If the safety the variation in VSL over the lifecycle were driven entirely by wealth and income effects, as Viscusi suggests, a 3% discount rate would not be needed to produce an age-VSLY curve that roughly track to willingness to pay for other goods.[106]

Life valuation does raise an additional complication. Traditional advocates of the VSLY method favor taking the VSL calculated using a population of average age forty and dividing that figure by the life expectancy of a forty-year-old to derive the value of a life-year.[107] If the forty-year-olds take insufficient account of the value of life-years that successive versions of their selves will experience in the coming decade, this method will

104 *Id.* at 579–80.
105 VISCUSI, *supra* note 93, at 128–29.
106 *Id.*
107 LIVERMORE & REVESZ, *supra* note 8, at 77.

underestimate the value of a life-year. In this sense, Viscusi, Revesz, and Livermore are correct that existing VSLY methods are naïve and inadequate. On the other hand, older people focused on the idea that they "cannot take money to their graves" may overestimate the value of a life-year, at least in monetized terms. A rigorous application of the VSLY approach to valuing risk reduction will require further methodological refinement to identify an appropriate life-year value. These methodological challenges, however, do not justify continued application of the population average VSL method, which relies on preferences that, if rationally justifiable at all, are not normatively valid inputs for CBA. The upshot of shifting from the population-average VSL method to a modified VSLY approach would be to weigh the deaths of middle-age and younger people more heavily and the deaths of older people less heavily in evaluating proposed regulations.

VI. WELL-BEING ANALYSIS

Perhaps the issues raised about relying on individual preferences in policy analysis justify a sharper break with the current practice of CBA. One alternative is WBA, which seeks to maximize individual self-reported life satisfaction, measured in well-being units (WBUs), instead of the satisfaction of preferences in monetized units as CBA does.[108] The case for making this switch hinges on whether how well a person's is life is going is best judged by how often they get what they want or how happy they are. I address this debate in Part VI. But first, Part V argues that although WBA advocates like Bronsteen, Buccafusco, and Masur offer a trenchant critique of CBA, they rightly acknowledge that WBA is not intended to solve every problem. Of interest here, difficult decisions will still have to be made about valuing life and time discounting, thorny issues that will need to be addressed whether or not the switch is made from CBA to WBA.

A. MORTALITY RISK IN WBA

Advocates of WBA point out several sources of error associated with the revealed preference studies frequently relied upon in CBA. This critique is at its strongest in discussing informational and computational problems. Bronsteen, Buccafusco, and Masur note that wage premium studies assume, without adequate justification, that workers are well informed about the risks of various occupations, are able to assimilate low mortality risks (e.g., 1 in 10,000) so as to affect job choice and wage bargaining, and act on information about mortality.[109] They also argue that a 1-in-10,000 mortality risk may be "too fine-grained for regression analysis to detect" in the context of a choice between jobs that vary on a number of dimensions other than wages and safety.[110] Given these challenges, they argue that it should not come as a surprise that wage premium studies have produced VSL estimates ranging from $100,000 to $76,000,0000.[111] W. Kip Viscusi points out that observed variation in VSL plausibly tracks genuine differences between populations and contexts, rather than measurement issues.[112] For instance, VSL esti-

108 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1618.
109 *Id.*
110 *Id.* at 1648.
111 *Id.* at 1650.
112 VISCUSI, *supra* note 93, at 104.

mates under $1 million come from studies of very high risk occupations with annual fatality rates of 1/1000.[113] It stands to reason that people with comparatively low valuations of mortality risks will self-select into these jobs.[114] The authors discuss wealth effects and affective forecasting errors, which cast doubt on the normative value of preferences based on expectation of the impact of outcomes on later well-being.[115] These are indeed serious methodological challenges for CBA, and Bronsteen, Buccafusco, and Masur claim that WBA "sidesteps nearly all of these problems."[116]

WBA advocates also argue that traditional CBA is wrong to treat all deaths as equally bad, at least in welfarist terms. Accordingly, they agree that the VSLY method is an improvement over the VSL approach.[117] They correctly point out that both approaches ignore the quality of the life-years saved.[118] The quality-adjusted life-years (QALY) approach seeks to address this shortfall, but WBA proponents argue that the methods used to elicit QALY values overstate the negative utility associated with many negative health states, among other issues.[119] In particular, they suggest that time tradeoff and standard gamble studies using healthy people will tend to underweight lost life-years compared with years of impaired health.[120] However, WBA also faces significant challenges with the relative weighting of mortality and other risks. Consider Bronsteen, Buccafusco, and Masur's application of WBA:

> b. Cancer Cases Avoided. The EPA provided a range of estimates for the number of cases of cancer that will be avoided under each regulatory option. In the interest of simplicity, we base our calculations on the median number. There are limited available data on the welfare loss that an individual experiences when she is sick with cancer, but one study calculated the welfare loss from "stomach/liver/kidneys or digestive problems," which we believe is the closest analog. *That welfare loss is 0.238 WBUs per year while the person is sick.* We assume that the typical individual who dies from cancer caused by dioxin and furan effluents is sick with cancer for two years and then dies thirty years before she normally would. This is obviously a rough assumption, but it is no rougher than the EPA's assumption that all lives are equivalently valuable and have a median value of $5.75 million. The average American has a life satisfaction of *7.4* (again, on a scale of 0.0 to 10.0). *When an individual dies, she loses all of the welfare that she might otherwise have experienced throughout the remaining years of her life.* Thus, we calculate the welfare benefit from avoiding one fatal case of cancer by the following equation:
>
> (2) Welfare benefit from avoided fatal cancer = 2 x (0.238 WBUs) + 30 x (7.4 WBUs) = 222.48 WBUs.[121]

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113 *Id.*
114 *Id.* at 8.
115 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1618.
116 *Id.* at 1650–51.
117 BRONSTEEN, BUCCAFUSCO, & MASUR, HAPPINESS & THE LAW 85 (2015) [hereinafter HAPPINESS & THE LAW].
118 *Id.*
119 *Id.* at 86–87.
120 *Id.* at 87.
121 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1641 (emphasis added).

Whatever methodological and conceptual flaws CBA and QALYs may be said to suffer from, this application of WBA cannot be considered an improvement. In this example, the authors treat not being alive as equivalent to being alive with a life satisfaction of 0.0, the lower bound of the scale used.[122] That equates not being alive to the worst imaginable torture.[123] None of us know for sure what happens when we die, but it is reasonable to assume that death represents the end of subjective experience. That is, it is like nothing to be dead, much like it is like nothing to not have been born. It is a neutral experience (or non-experience, if you prefer). Most people's lives may be better than neutral,[124] but it is an enormous leap to conclude that *an*y time spent alive is necessarily above the neutral point.

To be fair, Bronsteen, Buccafusco, and Masur do envision WBA using a negative ten to ten scale with zero as the neutral point.[125] Accordingly, treating years not spent alive as worse than any possible living years is not inherent in WBA. They use a zero to ten

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122 One potential concern about this mode of analysis is its implications for the welfare impact of population growth. A straightforward application of the conception of WBA presented here would imply that adding a new member to the population is to be favored up until the point that his existence reduces the well-being of others by more than his total expected well-being. This reasoning, of course, leads to Parfit's repugnant conclusion, which holds that no matter how large a population of ecstatic people you have, there will always be a much larger population of people whose lives are just barely worth living that should be preferred because it has greater aggregate welfare. PARFIT, *supra* note 27, at 381–90. There are three potential responses to this. The simplest is to embrace the repugnant conclusion, arguing that our intuitive aversion to it reflects scale insensitivity. Second, one could argue that WBA only applies to presently existing people. This seems arbitrary, however, since WBA would judge any future state by the well-being of then-existing people, regardless of whether they existed at the time at which any prospective analysis was done. Finally, WBA advocates could argue that the same conundrum applies to CBA. This may be correct. However, CBA seems to be on somewhat stronger ground in claiming that not-presently-existing people cannot be said to have preferences. Therefore, new births would only affect CBA to the extent that existing people have preferences about them. However, CBA does purport to be able to analyze the costs and benefits of policies whose primary effects are for future generations, which suggests it is using the preferences of current people as proxies for the welfare of future people. CBA defenders could still claim that these preference proxies do not include the desire to be born, since this is not a preference that anyone can have. In any case, the repugnant conclusion is a long-standing and vexing puzzle in population ethics, and it may be unreasonable to expect WBA to solve it. This footnote simply serves to flag the issue for future discussion.

123 Bronsteen and Masur both dispute this characterization, saying that they explicitly point out that WBA should be conducted using a negative ten to ten scale with a zero-neutral point. They say it is unfair to judge the merits of WBA based on this first example, which must rely upon imperfect existing data, particularly when comparing it to current CBA practice, which is the product of decades of refinement. Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1633; E-mail correspondence with John Bronsteen, Jonathan S. Masur, and Gabriel Weil, Fellow, Univ. of Cal. Irvine School of Law, Ctr. for Land, Env't, and Nat. Res. (Aug. 14, 2018) (on file with author).

124 *But see* DAVID BENATAR, BETTER NEVER TO HAVE BEEN: THE HARM OF COMING INTO EXISTENCE (2008).

125 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1618.

scale in the sample analysis because most existing data was collected using that scale.[126] In that case, zero is not an appropriate neutral point. We do not know for sure what point subjects assume corresponds to neutrality on a zero to ten scale, but zero is not a plausible assumption. Their analysis also implies that a year of not being alive is more than thirty-one times worse than a year of being sick with cancer, meaning that a person would be better off living with cancer for thirty-two years before finally succumbing than she would be living thirty-one healthy years and then dying quickly and painlessly. This seems implausible.

Faced with this challenge, WBA advocates emphasize that they are not seeking to maximize preference fulfillment, as CBA does, but to maximize well-being. People may predict that they will lose a great deal of welfare when suffering from cancer, but studies of people suffering from similar symptoms do not always bear this out.[127] People underestimate their capacity to adapt to new conditions and thus might overestimate the welfare loss from non-fatal cancer.[128] However, even if we grant that the goal of public policy should be to maximize happiness rather than preference fulfillment, there is reason to doubt that self-reports of life satisfaction, particularly for cancer patients, are reflective of their actual welfare. They may be affected by social desirability bias and/or try to look brave and convince themselves and their loved ones that things are not so bad.[129] People may also have systematically different reporting functions.[130] In particular, what is interpreted as hedonic adaptation may instead be an adaptation of individual utility scales such that the threshold for reporting the highest levels of life satisfaction is lowered.[131] Unlike the random variations in reporting functions that Bronsteen, Buccafusco, and Masur argue will tend to wash out in large populations averages,[132] this sort of systematic shift in response to health or wealth/income shocks would present more significant methodological hurdles for WBA.[133] This may be just as significant a source of error as the affective forecasting errors that WBA advocates point to for wage-premium studies. As Bronsteen, Buccafusco, and Masur rightly point out, however, these limitations must

126 *Id*. Bronsteen, Buccafusco, and Masur's argument that it is not fair to judge the potential of WBA based on a sample analysis conducted with flawed data is also in some tension with their claim that "[t]here is already a treasure- trove of longitudinal data on life satisfaction that has been collected over the decades in the United States, Great Britain, and Germany." HAPPINESS & THE LAW, *supra* note 117, at 51.

127 Shane Frederick & George Loewenstein, *Hedonic Adaptation*, WELL-BEING: FOUNDATIONS OF HEDONIC PSYCHOLOGY 302–29 (1999).

128 *Id*.

129 *See* Robert J. Fisher & James E. Katz, *Social Desirability Bias and the Validity of Self-Reported Values*, 17 PSYCH. & MARKETING 105, 116 (2000). Social desirability bias refers to the tendency of survey respondents to answer questions in a manner that will be viewed favorably by others. It poses a serious problem with conducting research using self-reports.

130 Bond & Lang, *supra* note 87, at 43–46.

131 *Id*. at 45–46.

132 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1626–27.

133 Bond & Lang, *supra* note 87, at 43–46; Richard E. Lucas, *Adaptation and the Set-Point Model of Subjective Well-Being Does Happiness Change After Major Life Events?*, 16 CURRENT DIRECTIONS IN PSYCH. SCI. 75 (2007).

be assessed in comparison to those of CBA.[134] Resolving this methodological debate is beyond the scope of this article.

WBA advocates might also accept some my other criticisms of this specific implementation of WBA and try to adjust the method accordingly. For instance, they might accept the need for some tweaks to their method for assessing the well-being loss from cancer, but maintain that this information is much more reliable than assessments based on people's predictions of how bad cancer will be, as inferred from studies of wage differentials confounded by a multitude of uncontrolled variables. Indeed, Bronsteen has privately expressed openness to tweaks along these lines, while maintaining that self-reported life satisfaction is a better proxy for welfare than WTP.[135] As for the utility loss from death, Bronsteen, Buccafusco, and Masur do recognize the need to conduct new studies with a negative to positive range where zero is explicitly identified as representing an equal balance between positive and negative experience, equivalent to not being alive.[136]

It is likely that a workable form of WBA could be devised along these lines. It may even be an improvement over CBA. It is not plausible, however, to claim that WBA neatly sidesteps the methodological issues associated with mortality risk in CBA. Perhaps the most significant obstacle facing WBA is that it is not possible to ask non-living people how happy they are. This is especially important because prolonging life dominates non-fatal health problems, monetary costs, and other considerations under the vision of WBA presented by Bronsteen, Buccafusco, and Masur. Getting this feature wrong could easily wipe out any advantages associated with other aspects of WBA. To weigh the benefit of prolonging life against other policy goals, a methodology must compare the value of being alive to being dead; but an experiential measure like WBA makes that impossible because no one can report on the experience of death. Even using a negative ten to ten scale with death as the zero point, there would still be no way to know how death compares to life in terms of experiential reporting—that is, in terms of the method of valuation that WBA uses. Is death half-way between the worst experience and the best one? How could one possibly know, or even guess, given WBA's methodology? One option would be to instruct participants in happiness studies to treat the zero rating as equivalent to not being alive. Of course, this would require participants to *imagine* what it is like not to be alive and expose the method to the same concerns about affecting forecasting errors that WBA advocates raise about CBA.

Bronsteen acknowledges that the impossibility of eliciting the life satisfaction of non- living people presents a challenge for WBA, but does not think it offers a reason to prefer any other methodology.[137] On my reading, this is dependent on his claim that "alternatives like CBA do such a bad job of measuring welfare by *any* plausible yardstick of what welfare is."[138] If CBA could overcome the methodological challenges associated with measuring individual preferences about mortality risk *and* those preferences are a

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134 HAPPINESS & THE LAW, *supra* note 117, at 92.

135 E-mail correspondence with John Bronsteen and Gabriel Weil, Fellow, Univ. of Cal. Irvine School of Law, Ctr. for Land, Env't, and Nat. Res. (Aug. 14, 2018) (on file with author).

136 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1618.

137 E-mail correspondence with John Bronsteen and Gabriel Weil, Fellow, Univ. of Cal. Irvine School of Law, Ctr. for Land, Env't, and Nat. Res. (Aug. 14, 2018) (on file with author).

138 *Id.*

plausible proxy for welfare, then CBA would have a stronger claim to measuring a quantity of relevance to valuing life. Perhaps CBA falls sufficiently short on one or both of those criteria to outweigh this limitation of WBA. Nonetheless, WBA's commitment to present subjective experience evaluation as the best proxy for welfare does render the impossibility of collecting these data for the single most important effect of regulation (especially in WBA's own weighting) a particularly pressing challenge for WBA.[139] Bronsteen agrees that more work is needed in this area and suggests this challenge may be addressed within WBA by looking at the happiness ratings reported by people when they are numb as a proxy for not being alive.[140] He also suggests the WBA might borrow some preference-based methods from CBA, saying:

> [A]lthough the best way (for reasons we provide at length) to gauge the welfare-value of an experience is to record people's in-the-moment self-reports of that experience, that's not the *only* way. Unlike CBA or any other methodology, WBA uses the best way for everything that it can, and for something like death where that best way is impossible, it uses second-best alternatives. . .. WBA faces this problem with assessing the effect of death on well-being, but other methodologies face this problem with assessing the effect of *everything* on well-being.[141]

This approach would expose WBA to the same criticisms Bronsteen, Buccafusco, and Masur level at CBA in the context of valuing mortality risks. It would also revive the debate over competing VSL, VSLY, and QALY methods. Combining preference-based measures with subjective well-being measures would also introduce of additional complexity into WBA. Nonetheless, these costs may be worth paying if WBA proponents are correct that self- reports of experience are the best way to measure welfare.

B. Time Discounting in WBA

Regarding time discounting, advocates of WBA claim that since WBA is not based on monetary values, "time value of money" rationales involving interest rates and inflation do not apply to WBA.[142]

> Unlike money, well-being is time invariant. Five WBUs in 2021 are worth just as much in welfare terms as 5 WBUs in 2011. Indeed, the entire reason that the value of money varies over time is that the amount of well-being it can be used to purchase varies over time. Thus, there is no need to discount in order to accommodate the time-value of well-being. Many of the difficulties with discounting that force EPA to report results at two different discount rates, and the interagency climate change working group to do so at three different rates, are simply irrelevant to WBA.[143]

In Bronsteen, Buccafusco, and Masur's account, the importance of discounting in CBA is driven primarily using dollars as the unit of account. In this view, accounting for the

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139 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1683.

140 E-mail correspondence with John Bronsteen and Gabriel Weil, Fellow, Univ. of Cal. Irvine School of Law, Ctr. for Land, Env't, and Nat. Res. (Aug. 14, 2018) (on file with author).

141 *Id.*

142 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1686.

143 *Id.*

costs and benefits of regulation in terms of WBUs allows policy analysts to mostly avoid the discounting puzzle. I disagree.

To the extent that the compliance costs of regulation displace investment, that will tend to decrease the well-being of the would-be beneficiaries of those investments. Even if one is convinced that increases in wealth as such have minimal effects on well-being, some of that displaced investment is likely to be in technologies that would have extended lives, to which WBA would give great weight. In principle, WBA could try to directly track what the marginal funds would be invested in and trace their impact on future well-being. Analogous direct accounting for displaced investments could be done in CBA, which is precisely what Cowen and Parfit advocate in their case for a zero social discount rate.[144] In practice, however, it is much simpler to calculate the economic returns on investment as a proxy for well-being and then translate those returns into WBA.

All the issues discussed above regarding potential differential treatment of investment- displacing vs. consumption-displacing costs would thus apply to WBA. As discussed above regarding wealth effects, the thorny issue of how to address coherence with government policy not subject to WBA would also remain. Embracing WBA might entail a more paternalistic approach that would imply government policy should promote higher savings rates, but agencies applying WBA will still lack the policy tools to implement that vision.[145] Likewise, exogenous existential risks like asteroid impacts that would wipe out all deferred benefits (whether accounted for in dollars or WBUs) are another driver of discount rates that WBA must account for. Working with a non-monetized measure of value might avoid the need to address adjustments associated with inflation and the declining marginal utility of wealth and income, but even these are likely to creep back when considering investment returns. In any case, discount rates are typically applied to real dollars, with inflation accounted for separately.[146] Thus, WBA cannot avoid most of the messy issues associated with selecting a discount rate, and switching back and forth between dollars and WBUs as the unit of account may introduce some additional complexity.

Bronsteen, Buccafusco, and Masur acknowledge that WBA may have to entertain the possibility of discounting based on individuals' "pure time preferences for immediate gratification over later benefits" and other vaguely specified rationales.[147] As explained

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144 *See* Cowen & Parfit, *supra* note 22.

145 The paternalism claim is not meant as a criticism of WBA. As my analysis of pure time preference suggests, it is plausible that public policy should indeed be more paternalistic in terms of promoting higher savings rates. It is worth noting, however, that if Bronsteen, Buccafusco, and Masur are correct that marginal increases in life expectancy are much more valuable than increases in non-health-related consumption, this suggests a much more comprehensive suite of paternalistic interventions may be warranted. As with future-orientation, one might conclude nudges or more coercive interventions are inappropriate even if individual choices are not entitled to deference in evaluating non-paternalistic regulations.

146 John Whitehead, *Discount Rates for Benefit-Cost Analysis*, CROMULENT ECON. BLOG (August 10, 2005), https://www.envecon.net/2005/08/discount_rates_.html#targetText=Most%20discount%20rates%20used%20for,are%20virtually%20default%20risk%20free.&targetText=Assuming%20expected%20inflation%20is%20equal,%2Dfree%20interest%20is%201.74%25.

147 Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1688.

in OMB Circular A-4, however, the time value of money rationale for discounting overlaps with other plausible rationales, rather than providing independent justification.[148] Part of the explanation for the fact that one dollar a year from now is worth less than a dollar today is indeed the empirical reality of time preference, including its uncontroversial components like future benefit realization risk and the residual pure time preference. It would be an odd result to retain the least defensible component of the discount rate while setting aside less controversial components associated with returns on investments and deferred benefit realization risk.

None of this means that WBA is inherently incompatible with a rigorous and normatively justified approach to discounting. However, it does suggest that WBA must grapple with many of the same questions about the future orientation of public policy that CBA must and possibly some new questions that are unique to WBA. While it may be true that the value of WBUs is time-invariant, this conclusion does not resolve most of the important questions about discounting, including those addressed in earlier parts of this article.[149] It also suggests, as Bronsteen, Buccafusco, and Masur implicitly concede, that more work will be needed before WBA is ready for implementation.[150]

Nonetheless, if WBA advocates are correct in arguing that subjective well-being is a better proxy for welfare than preference fulfillment, it is worth refining the methodology and considering its use in policy evaluation.[151] It is relevant in this context that a lot of the supposed methodological advantages of WBA relative to CBA, particularly sidestepping affective forecasting errors, come from evaluating CBA by the standard of subjec-

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148 U.S. Office of Mgmt. & Budget, *supra* note 15, at 32.

149 Bronsteen, Buccafusco, and Masur acknowledge that a role for pure time preference may be retained in WBA. Bronsteen, Buccafusco, & Masur, *supra* note 18, at 1688. Likewise, if future people are expected to have higher well-being (not just wealth), perhaps diminishing marginal returns apply to the non-monetary inputs to well-being. Egalitarian considerations might also favor marginal increments of WBUs for relatively unhappy currently living people over the same increase in WBUs for happier future people. Also, the claim should at least be clarified to refer to certain WBUs. Any realization risk for future WBUs would justify weighting them less heavily than more certain near-term WBUs, whether this risk is accounted for directly or through some sort of discount factor.

150 *Id*. at 1633. This point was also suggested in e-mail correspondence with John Bronsteen. E-mail correspondence with John Bronsteen and Gabriel Weil, Fellow, Univ. of Cal. Irvine School of Law, Ctr. for Land, Env't, and Nat. Res. (Aug. 14, 2018) (on file with author).

151 WBA also differs from traditional CBA in its method of aggregation of individual welfare to social assessment. WBA combines a utilitarian social welfare function method of aggregation with a happiness-based conception of well-being. CBA's method of aggregation, using dollars as the common unit, could also be applied to a happiness-based conception of well-being. *See* Matthew D. Adler, *Happiness Surveys and Public Policy: What's the Use?*, 62 Duke L. J. 1509 (2013). Conversely, a utilitarian or prioritarian social welfare function method of aggregation could be applied to a preference-based conception of well-being. Matthew D. Adler, *A Better Calculus for Regulators: From Cost-Benefit Analysis to the Social Welfare Function* 17 (Duke Law School Public Law & Legal Theory Series, Working Paper No. 2017-19, 2017) [hereinafter *A Better Calculus*]. While Adler makes a compelling case that a utilitarian social welfare function would be an improvement over CBA as a method of aggregation, that issue is beyond the scope of this article. For present purposes, the relevance of WBA is as a potential alternative approach to the issues raised above regarding using measures of individual preferences in policy analysis.

tive well-being maximization. It should not be surprising if a policy analysis tool explicitly designed around self- reports of well-being does better by that standard than one designed around preference fulfillment. What people want is not always what is most conducive to their overall life satisfaction.[152] In this respect, WBA is a more paternalistic method than CBA, which generally takes people's preferences at face value.[153]

Lisa Robinson's analysis of WBA applies the opposite frame as Bronsteen, Buccafusco, and Masur's:

> WBA does not tell us how individuals prefer to allocate resources. Whereas statistical analysis can be used to estimate the relationship between measures of subjective well-being and income, *such analysis does not indicate whether the affected individuals would willingly exchange income for that level of well-being*. Nor does WBA ask individuals how they would prefer to allocate money across different goods and services, including nonmarket outcomes such as improved health. Rather, *it assumes that individuals would prefer to see resources allocated so as to achieve a higher level of subjective wellbeing, however defined*. Thus, if used as a decision criterion, WBA is more paternalistic: the analyst decides that money should be allocated so as to maximize well- being, even if those affected would prefer to allocate resources differently.[154]

Characterizing WBA as if people *prefer* a resource allocation that maximizes well-being applies the standard embodied in CBA to WBA. Each approach requires strong methodological assumptions in order to function as a good approximation of the other. This is true even though both ultimately seek to measure and maximize a conception of social welfare – to make people better off. Applying the standard associated with one's favored approach and then characterizing the alternative method as facing greater methodological challenges in meeting it unnecessarily confuses this issue. Both WBA and CBA face significant methodological challenges, even in terms of the conception of welfare that each is crafted to maximize (preference fulfillment or subjective well-being, within legislative and moral side constraints). When the other method's standard is applied, the methodological and conceptual challenges multiply.

Bronsteen, Buccafusco, and Masur offer compelling arguments for conceiving of social welfare in terms of happiness rather that preference satisfaction or an objective list of goods. The next part of this article considers those arguments alongside Matthew Adler and Eric Posner's restricted preferences account.

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152 Daniel J. Benjamin et al., *Beyond Happiness and Satisfaction: Toward Well-Being Indices Based on Stated Preference*, 104(9) AM. ECON. REV. 2698 (2014).

153 Again, this is not necessarily a criticism of WBA. Complete deference to individual preferences is not normatively justified, as earlier parts of this article argue. The question is how much normative value preferences should have—if any—over and above their ability to predict subjective well-being.

154 Lisa A. Robinson, *Cost-Benefit Analysis and Well-Being Analysis?*, 62 DUKE L. J. 1717, 1731 (2013) (emphasis added).

VII. Happiness vs. Preference Satisfaction

Adler and Posner offer a book-length defense of CBA.[155] Part of this defense is their contention that maximizing fulfillment of individual preferences, subject to certain conditions, is what it means to maximize welfare.[156] They in turn endorse weak welfarism, under which maximizing social welfare is one of multiple objectives that have moral relevance.[157] Bronsteen, Buccafusco, and Masur similarly allow that non-welfarist considerations like moral rights and fairness may have value independent of their contribution to aggregate welfare.[158] In justifying their approach, Adler and Posner consider two alternative conceptions of welfare: mental-state accounts and objective-good accounts.[159] They claim to demonstrate these views are both inferior to fulfillment of laundered preferences.[160] Consider their analysis of mental-state accounts:

> Freud, wracked by pain at the end of his life, refused painkillers because they would have impeded his thinking. He preferred the more painful mental state (thinking clearly but suffering great pain) to the more pleasant mental state (thinking fuzzily but suffering no pain) and, intuitively, was better off with the more painful mental state.
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> [M]ental state accounts generally, remain vulnerable to a powerful objection. All such accounts insist that welfare is solely a function of our mental states. If *P*'s mental states are identical in O_1 and O_2, then, regardless of the other ways in which the two outcomes might differ, P's welfare must be the same in both states. This is implausible. Imagine that P wants to be reputed to be a great scholar, and has been systematically tricked by his colleagues into thinking that he has that reputation; in fact, they are unimpressed by his scholarship and belittle it behind his back. O_1 is the actual outcome, namely, one in which P incorrectly believes he has a good scholarly reputation; O_2 is a counterfactual outcome, in which P believes he has a good scholarly reputation and really does (his colleagues admire his work). Then P's mental states are identical in O_1 and O_2, but, intuitively, O_2 is better for P's welfare than O_1. No mental-state account can validate this kind of intuition.[161]

One question we can ask about this is how well the mental-state account maps onto WBA. In Freud's case, the matter would turn on whether Freud's subjective reports of life satisfaction in the two cases tracked his preference to forgo pain killers.[162] If not, WBA would favor ignoring Freud's preference unless doing so violated rights or similar possible side-constraints prohibiting direct autonomy violations. In the case of a scholar

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155 Adler & Posner, *supra* note 1. Adler has since disavowed CBA as a method of aggregating individual welfare, but remains committed to a preference-based conception of welfare. *A Better Calculus*, *supra* note 151.

156 *A Better Calculus*, *supra* note 151, at 36.

157 *Id.* at 54.

158 Happiness & the Law, *supra* note 117, at 162–63.

159 Adler & Posner, *supra* note 1.

160 *Id.*

161 Adler & Posner, *supra* note 1, at 30.

162 Happiness & the Law, *supra* note 117, at 179–80.

with a potentially false impression of having a great reputation, it seems clear that WBA will be indifferent to the reality of the scholar's reputation, so long as he was unable to detect his colleagues' trickery. Indeed, this case is like the deceived spouse case examined by Bronsteen, Buccafusco, and Masur:

> Jack is very happy in his marriage to Jill, and fully believes she is faithful to him. In one possible state of affairs, she is cheating on Jack without his knowledge. We are asked to suppose that these two states of affairs are identical but for the cheating, as far as Jack's experience of life is concerned. To wit: Jill treats Jack *identically* whether she is cheating on Jack or not; Jack never learns that Jill is cheating on him; and Jack's experience of life is never affected by the cheating in any way.[163]

Bronsteen, Buccafusco, and Masur go on to consider variations on this hypothetical where Jill's cheating takes place on a business trip to Nepal, closely before or after Jack's death. These variations tend to pump one's intuition closer to the view that happiness, in the sense of positive mental states, offers a complete account of welfare. Bronsteen, Buccafusco, and Masur then offer the following analysis:

> We think that people's intuitions about the original example may be driven by their failure to honor the example's rules. This would make sense because it is almost impossible to believe that Jill would treat Jack *identically* is she were cheating and if she were faithful. When we try to imagine those two states in the original example, we picture Jill very differently in each of them. In the state where she is faithful, we picture her loving Jack and having no interest in cheating on him. This picture seems like a recipe for a solid, lasting marriage and for great happiness along the way. But when we picture the unfaithful state, we struggle to imagine Jill acting *exactly* the same way toward Jack. How could she possibly do that unless she were some sort of sociopath, or a pathological liar, or at a minimum a cold and unfeeling person? We think that for most people, their feelings would show through in one way or another. Either they would feel guilty and let it show, or their cheating would be motivated by dissatisfaction that would show, or there would be some other manifestation of their cheating. If Jill really showed nothing, then it means that Jack is married to someone who seems a lot different from our picture of Jill in the faithful state, and that affects out intuitions about how much happiness Jack is getting out of the marriage (notwithstanding the stipulation to the contrary).[164]

I suspect that WBA proponents are correct that most people's intuitions are driven by smuggled-in happiness-affecting differences that violate the stipulation of the hypothetical. However, imagine we strip down the differences in the original hypothetical, stipulating that in both cases Jill truly does love Jack, but does not believe that either marital infidelity or deception are immoral (perhaps because she accepts a subjective well-being account of welfare). If she encounters an opportunity to cheat that is attractive, convenient, and low risk, she will take it. The only difference between the case in which she cheats and the case in which she doesn't cheat is whether such an opportunity

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163 *Id.* at 167.

164 *Id.* at 168–69.

arises. In this hypothetical, it really does seem plausible that Jack's happiness could be entirely unaffected by this difference, even if their marriage lasts for decades after the cheating occurs. I confess that I lack strong intuitions about whether Jack would be made worse off by such cheating. However, I do think that enough people do have a strong intuition that *objective reality* matters to welfare, over and above its impact on subjective experience, that this stripped-down hypothetical still presents something of anomaly for the mental state account of welfare.

This *objective reality* intuition is also pumped by Robert Nozick's famous experience machine hypothetical, which Bronsteen, Buccafusco, and Masur also address.[165] Indeed, they argue that in the most important cases, the experience machine essentially reduces to the deceived spouse case.[166] I concur, with the proviso that the experience machine offers the prospect of *perfect* deception, which really could have no impact on happiness, much like my stripped-down version of the deceived spouse hypothetical. In both cases, the residual difference between happiness-equivalent cases relates to the consistency of objective reality with subjective experience.

Another example might be a physicist, say Isaac Newton, whose theories of physics seemed completely accurate during his lifetime, but were later found to be flawed. One could reasonably ask whether he would have been better off had his theories been correct. We can suppose he had a preference to discover true theories of physics, not merely true-seeming approximations. A mental state account of happiness would hold that Newton would have been no better off had his theories been true, so long as this had no observable consequences communicated to him during his lifetime. Perhaps this is correct, but the possibility that objective reality is relevant to welfare, over and above subjective experience, cannot be easily dismissed.

WBA advocates also argue that, even if the hedonic theory leads to a counterintuitive result in the experience machine case, this would not be sufficient to refute an account that covers countless other cases better than any other theory.[167] This argument was more compelling back in the 1970s when Nozick thought up the experience machine hypothetical. Today, the looming prospects of engrossing virtual reality worlds and direct brain stimulation have the potential to create positive subjective mental experiences largely untethered from objective physical reality.[168] As public policy confronts these technologies, it will be important to have an account of welfare that handles deviations between subjective experience and objective reality in a satisfactory way.[169] Perhaps that will mean overriding the intuitions and corresponding preferences of those who believe that positive mental experiences are less valuable when disconnected from true beliefs about external reality. Perhaps not. In any case, it will be increasingly diffi-

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165 ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA 42–45 (1974). The experience machine would stimulate an individual's brain to provide what pleasurable experience he desires. While plugged into the machine, people would be unable to distinguish their experience from a similar one in the outside world.

166 HAPPINESS & THE LAW, *supra* note 117, at 168–69.

167 *Id.* at 175.

168 *See* Yew–Kwang Ng, *Towards Welfare Biology: Evolutionary Economics of Animal Consciousness and Suffering*, 10 BIOL. & PHIL. 255, 258 (1995).

169 HAPPINESS & THE LAW, *supra* note 117, at 175.

cult to set aside such concerns as irrelevant and implausible science-fiction hypotheticals.[170]

Now consider one final example that Bronsteen, Buccafusco, and Masur address as raising potential objections to their hedonic theory of welfare:

> In one state, Jane lives in poverty in a society that discriminates against her based on her sex. But she has adapted to the poverty and discrimination and feels quite happy despite it. In the other state, Jane lives a life of comfort, activity, and commitment to justice, all in a society that gives her full political and social rights and nourishes her capabilities. But she feels no happier throughout her life than if she had lived in poverty in oppression.[171]

Bronsteen, Buccafusco, and Masur again argue, correctly in my view, that "the example gains all its intuitive traction from telling people to disregard something that they cannot in fact disregard."[172] While it may be true that we cannot disregard our assumption that someone who is free and rich and able-bodied is happier than someone who is oppressed, poor, or disabled, this is precisely what WBA asks us to do when people report the same life satisfaction levels. Indeed, Bronsteen, Buccafusco, and Masur cite WBA's superior accounting for hedonic adaptation as a positive virtue relative to CBA. Thus, while they are right that this example does not falsify the hedonic theory of well-being, it does underscore the methodological challenges facing WBA. WBA advocates may respond that CBA must confront adaptive preferences, just as WBA must confront hedonic adaptation. However, at least Adler and Posner, as discussed below, recognize that adaptive preferences do not correspond to welfare and advocate excluding them from CBA (while recognizing this may be infeasible in practice).[173] Thus, while adaptation poses a challenge for preference and mental state accounts of welfare, it is worth noting that Bronsteen, Buccafusco, and Masur's formulation of WBA is based on the view that all reported adaptation correspond to happiness and thus welfare. This affords greater relevance to common intuitions that some people are worse off than others who report the same subjective life satisfaction ratings.

There is at least one potential objection to their hedonic theory of welfare that Bronsteen, Buccafusco, and Masur do not fully address: the intrapersonal and intertemporal aggregation problems.[174] Bronsteen, Bussafusco, and Masur's account of WBA holds that every moment of experience and every increment of life satisfaction should be weighted equally. It also, as discussed above, holds that extending one's life further in time is equivalent to packing the net positive utility experienced in the extra years into a shorter life.[175] However, their defense of a hedonic account of welfare never actually argues for these propositions. This is despite Bronsteen, Buccafusco, and Masur's statement that a theory of well-being must answer questions like, "[i]s Sam better off if he

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170 *Id.*
171 *Id.* at 170.
172 *Id.* at 171.
173 ADLER & POSNER, *supra* note 1, at 128–29.
174 HAPPINESS & THE LAW, *supra* note 117, at 158–60. Bronsteen, Buccafusco, and Masur do address a special case of intrapersonal aggregation in their discussion of the well-being of a marathon runner.
175 *Id.* at 166–67.

extends his life an extra year by making healthy choices that sacrifice some of his enjoyment of life?"[176] This is indeed an important question, but asking living people about their life satisfaction cannot alone answer it. Living people do, however, have preferences about the tradeoffs between extending their lives and increasing the average utility of the time they are alive. Thus, a preference-based account of welfare offers a subjective anchor for valuing life extension that is unavailable to mental state accounts.

A related question relates to the distribution of positive and negative experiences within a person's life. While this issue relates to time preference, it is analytically distinct. Even from an intemporal perspective, one may prefer a variety of positive and negative moments in her life to a steady stream of mediocre ones, even in a life with the same total net positive affect. Likewise, some people may value increments of positive net affect differently at different points along the well-being scale. For instance, moving from five to six may be more/less valuable than from seven to eight. Preference theories can, however imperfectly, account for these subtleties. It may be that the approach imbedded in Bronsteen, Buccafusco, and Masur's formulation of WBA, treating all increments of net positive affect as equally valuable, including when they are spread over different lengths of time, is better than any alternative available. Nonetheless, their defense of its theoretical underpinnings is incomplete.

An additional complication is that the concept of happiness contains significant internal ambiguities. WBA is based on ratings of overall life satisfaction, but this is just one of many measures of well-being. Other potential measurements include moment-to-moment reports of subjective utility (addressing Kahneman's experiencing self, as opposed to the remembering self),[177] the frequency and intensity of positive emotions, the prevalence of depression, and how meaningful people rate their lives as being.[178]

Cross-national studies of these measures show different countries coming out on top depending on the measure used. For overall life satisfaction, Scandinavian countries tend to score highest.[179] Latin American countries rate highest on measures of positive emotion.[180] When it comes to minimizing the prevalence of depression, Australia scores best.[181] African countries, by contrast, tend to rate highest when people are asked about

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176 *Id*. at 136.

177 Daniel Kahneman & Jason Rils, *Living, and Thinking About It: Two Perspectives on Life*, *in* THE SCIENCE OF WELL-BEING 285 (Nick Baylis, Felicia Huppert, & Barry Keverne eds., 2005).

178 Scott Alexander, *The Tails Coming Apart as Metaphor for Life*, SLATE STAR CODEX (Sept. 25, 2018), http://slatestarcodex.com/2018/09/25/the-tails-coming-apart-as-metaphor-for-life/.

179 *See* John F. Helliwell, Richard Layard & Jeffrey D. Sachs, *World Happiness Report 2018* (Mar. 14, 2018) http://worldhappiness.report/ed/2018/; Frank Martela, *Finland Is the Happiest Country in the World, and Finns Aren't Happy about It*, SCI. AM. (May 11, 2018), https://blogs.scientificamerican.com/observations/finland-is-the-happiest-country-in-the-world-and-finns-arent-happy-about-it/.

180 Jon Clifton, *Latin Americans Lead World in Emotions*, GALLUP NEWS (Aug. 27, 2015), https://news.gallup.com/poll/184631/latin-americans-lead-world-emotions.aspx.

181 Fiona J. Charlson et al., Burden of Depressive Disorders by Country, Sex, Age, and Year: Findings from the Global Burden of Disease Study 2010, 10(11) PLOS Medicine e1001547 (2013).

how meaningful they their lives are.[182] People can reasonably disagree about which of these measures, or what welfare function aggregating across multiple measures, public policy should seek to maximize. Likewise, individuals may have different preferences between moment-to-moment utility, overall life satisfaction, positive emotion, avoiding depression, and leading a meaningful life. Indeed, in addition to happiness and life satisfaction, surveyed people report caring about "other items, such as goals and achievements, freedoms, engagement, morality, self-expression relationships, and the well-being of others."[183] Measures of object-level individual preferences, at least theoretically, reflect individuals' priorities among these meta-level objectives. Collapsing well-being into a single measure substitutes the policymaker's judgment regarding the proper meta-level objective for the individuals' judgment. This heightens the burden on advocates of replacing preference-based measures with any particular form of reported well-being to prove that doing so will actually make people better off in the ways that matter most to them.

Now consider Adler and Posner's critique of objective-good accounts:

> Objective-good views of welfare are vulnerable to the following criticism: O_1 cannot be better for *P*'s welfare than O_2, if P does not (at some time) prefer O_1 to O_2. Listening to opera might be, objectively, a better use of someone's time than watching sitcoms, but unless she prefers opera to sitcoms (at least ex post, having been exposed to opera, if not ex ante) the world in which she listens to opera is not better for her than the world in which she watches sitcoms. Similar examples might be constructed for any objective good. An "objective" good (as we use that term) is necessarily some feature of the world that can occur without the subject preferring it. . . . Thus, *all these accounts overlook the crucial point that each individual is a (partial) sovereign with respect to his own welfare. Something that P doesn't want for himself, and never comes to want, can't make him better off*.[184]

The last sentence above is the crux of Adler and Posner's position. It reduces to a bare intuition that preferences trump subjective experience. Their caveat regarding the timing of preferences offers a slight concession to the affective forecasting errors objection of Bronsteen, Buccafusco, and Masur.[185] However, a paraplegic who reports life satisfaction that is not significantly lower than what she reported prior to paralysis may nonetheless maintain a strong preference not to be paralyzed. Thus, while Adler and Posner indicate some flexibility regarding which preferences are relevant to welfare, they are committed to the notion that a person "cannot be made better off in the teeth of her actual preferences."[186]

Given the evidence of a gap between *liking* and *wanting*, however, their position is vulnerable to the objection that the form of CBA they defend will fail to give people

182 Alexander, *supra* note 178.
183 Daniel J. Benjamin et al., *supra* note 152, at 2700.
184 ADLER & POSNER, *supra* note 1, at 32 (emphasis added).
185 *See* Bronsteen, Buccafusco, & Masur, *supra* note 18.
186 ADLER & POSNER, *supra* note 1, at 36.

what they like, even as it seeks to give them what they want.[187] Indeed, Yew-Kwang Ng argues that the same logic that justifies evaluating outcomes based on informed rather than actual preferences, followed to its logical conclusion, implies that happiness is what matters.

> Just as actual preferences should be discounted due to the effects of ignorance and spurious preferences, informed preferences should also be discounted due to some inborn or acquired tendencies to be irrational, such as placing insufficient weights on the welfare of the future, maximizing our biological fitness instead of our welfare.[188]

This may not be a fatal objection, but then neither is Adler and Posner's core objection to objective-good and mental-state accounts: they sometimes fail to maximize fulfillment of self-interested preferences that survive idealizations.

Ultimately, therefore, Adler and Posner only succeed in demonstrating that the mental- state, objective-good, and preferentialist accounts are truly three distinct conceptions of welfare that appeal to different intuitions. They offer examples where most people's intuitions suggest that preferences matter over and above happiness, but different cases evoke different intuitions. Ng offers the following counterpoint:

> To see that happiness is more fundamental than preference, consider advanced computers in the 21st or 22nd century that have preferences but no affective subjective feelings. Clearly their preferences should not count morally. If it is replied that only human (informed) preferences should count, not machine preferences, then consider animals now and advanced computers in the 25th century that do have subjective affective feelings, i.e. they have pain, joy, etc., then most morally sensitive persons will agree that their welfare should also count. Thus, clearly welfare is more important and fundamental than preferences, informed or not, ultimately speaking.[189]

Bronsteen, Buccafusco, and Masur add two important critiques of restricted preference accounts of welfare. First, they note that there exist clear cases, such as self-sacrifice out of a sense of obligation, where people prefer outcomes that decrease their well-being.[190] Moreover, no one has developed an adequate account of how to restrict preferences to self-interested ones that offers clearer guidance than sticking to "preferences about well-being."[191] Adler and Posner do argue against the use of contingent valuation surveys to estimate non-use values for environmental goods, but do not claim to offer a full account of how to exclude non-self-interested preferences.[192] This is indeed an important limitation both of restricting preferences accounts of welfare and of CBA.

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187 J. Wayne Aldridge, Kent C. Berridge, & Terry E. Robinson, *Dissecting Components of Reward: 'Liking', 'Wanting', and Learning*, 9 Current Opinions on Pharmacology 65 (2009).

188 Yew-Kwang Ng, *Utility, Informed Preference, or Happiness: Following Harsanyi's Argument to Its Logical Conclusion*, 16 Soc. Choice Welfare 197 (1999).

189 *Id.* at 210.

190 Bronsteen, Buccafusco, & Masur, *supra* note 18.

191 Happiness & the Law, *supra* note 117, at 138–39.

192 Adler & Posner, *supra* note 1, at 39.

Bronsteen, Buccafusco, and Masur also point out that people may be mistaken about what outcomes will be best for them.[193] In one sense, this is uncontroversial. People frequently come to regret their choices. Sometimes, this may be because there is a conflict of interest between their present and past self, but often enough regret results from mistakes, as commonly understood. Therefore, Adler and Posner's account of welfare relies on fully informed preferences, even if they do not settle on a particular account of full information.[194] In another sense, even fully informed people may have preferences that do not reliably maximize their subjective well-being. In Bronsteen, Buccafusco, and Masur's account, these preferences are also mistakes that should be disregarded in favor of more reliable and direct indicators of welfare.[195] In Adler and Posner's view, one cannot be made better off by producing an outcome he never prefers and never would prefer, even if fully informed.[196] This class of cases seems to bottom out on a fundamental divergence of intuitions, with no clear resolution. In any case, Bronsteen, Buccafusco, and Masur succeed in casting doubt on the view that preference satisfaction, even in the restricted view outlined by Adler and Posner, offers a complete account of welfare. At the very least this should make policymakers more reluctant to defer to measures of individual preferences in marginal cases like those associated with pure time preference.

VIII. LAUNDERED PREFERENCES

Adler and Posner's specific account of welfare is Sophisticated Preferentialism, which holds that: "P is better off with S1, as compared to S2, just in case (1) P prefers S1 over S2; and (2) P would prefer S1 over S2 under ideal conditions; and (3) P's preference and ideal preference are suitably restricted."[197] Preference idealization under criterion (2) is designed to counter the objection that people's preferences may be "evil, ignorant, adaptive, or otherwise misshapen."[198] Adler and Posner refrain from committing themselves philosophically to either the full information, objectivist, or historical conception of preference idealization, but do claim that administrative agencies are better equipped to "launder" poorly informed preferences that are objectively bad (e.g., racist) or adaptive (e.g., a housewife who is indoctrinated to prefer subordination to her husband) preferences.[199] The upshot of criterion (3) is exclusion of preferences that are not self-interested, such as moral preferences.[200] Adler and Posner readily acknowledge that appropriately defining the scope of self-interest is not straightforward, however.[201]

Importantly, Adler and Posner concede that preference idealization, as they conceive it, does not solve the problem of conflicting preferences. They note that conflict

193 HAPPINESS & THE LAW, *supra* note 117, at 140.
194 ADLER & POSNER, *supra* note 1, at 38, 136–38.
195 HAPPINESS & THE LAW, *supra* note 117, at 140.
196 ADLER & POSNER, *supra* note 1, at 38, 138.
197 *Id.* at 36. *See also* Matthew D. Adler, *Beyond Efficiency and Procedure: A Welfarist Theory of Regulation*, 28 FLA. ST. L. REV. 241, 265 (2000).
198 ADLER & POSNER, *supra* note 1, at 33.
199 *Id.* at 38.
200 *Id.* at 39.
201 *Id.*

between preferences can be diachronic (i.e., change over time) or synchronic (e.g., a first order preference for watching TV over reading, but a second-order preference to be the kind of person who prefers to read).[202] These preference conflicts are precisely where we would expect time preference to come into play, suggesting that whatever the other merits of preference idealization, it does not speak to the central question of this article. However, time preference is potentially bound up with both objective idealization and the self- interestedness criterion. To see why, we must return to Parfit's defense of the rationality of pure time preference and his subsequent moral condemnation of it.

Consider the self-interestedness requirement. If we take the Parfitian idea of decreasing connectedness to successive future versions of one's self seriously, the concept of self-interest starts to break down. If saving for retirement is best viewed as mostly an idiosyncratic act of generosity toward a specific future person, then restricting preferences to self-interested ones becomes quite fraught when considering both the discount rate and mortality risks. Nonetheless, if we are willing to treat self-interestedness as a continuous scalar quantity rather than a stark binary, the self-interestedness requirement can be reconciled with Parfitian ideas about personal identity. If many diachronic preference conflicts are attributable to changes in feelings of connectedness to specific future selves, this could enable Adler and Posner's framework to better handle such cases. Many cases of synchronic preference conflicts can also be reconceptualized in terms of a conflict regarding how much to discount the future (watching TV might be more fun right now, but I can expect to reap benefits in the future if I choose to follow my second-order preference to read instead).

Now consider the requirement that preferences not be objectively bad. Parfit argues that even as we exonerate pure time preference from the charge of irrationality, we should replace *rational* condemnation of those who fail to take adequate account for the welfare of their future selves with *moral* condemnation.[203] To the extent that pure time preference undervalues the interests of future people, we can condemn it as objectively bad within Adler and Posner's framework. What if we reject the Parfitian defense of the rationality of pure time preference, based on attenuated connectedness to future selves? Then pure time preference would be irrational, but not be immoral, since we might think people have a moral right to mistreat a future self they identify as much with as their current self without transgressing any moral principle. To handle this case, Adler and Posner's notion of objective badness would have to expand to include preferences that, though perhaps fully informed, are irrational. In either case, they should be willing to do so, given that their normative case for CBA depends on its status as "the welfare-maximizing decision procedure."[204] Since pure time preference severs the connection between individual preferences and social welfare, any preference patterns that reflect it are unfit inputs for CBA.

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202 *Id.* at 37.

203 PARFIT, *supra* note 27, at 170.

204 ADLER & POSNER, *supra* note 1, at 62.

IX. THE *NUDGE* DEBATE

Sunstein and Richard Thaler's *Nudge* thesis, also known as libertarian paternalism, prescribes crafting choice architecture to influence individual choices in normatively appealing directions consistent with enlightened preferences.[205] Supporters of nudges should also favor circumscribing deference to individual preferences as articulated above. If public policy is justified in acting to influence self-regarding individual behaviors, then surely it should not defer to the preferences driving those behaviors when evaluating regulations targeted primarily at other-regarding activities. Moreover, I argue that even committed anti-paternalists who reject nudges can and should embrace my tweaks to CBA outlined above, which do not entail the same (arguable) autonomy infringements as nudges.

A common critique of Sunstein and Thaler's *Nudge* thesis attacks the distinction they draw between means and ends paternalism. Sunstein himself concedes that the distinction is sensitive to "the level of generality at which people's ends are to be described."[206] At a sufficiently high level of generality, all paternalism can be characterized as ends paternalism. The distinction appears vulnerable in cases where individuals have multiple competing preferences, such as for bodily health on the one hand and unhealthy pleasures on the other. Aneil Kovvali points out that such cases are precisely the domain in which nudges operate.[207] Kovvali offers a stylized example of a high school senior, Susan, choosing between three colleges she has applied to: Amherst, Bowdoin, and Carleton. Based on her research, Susan ranks the three colleges in the subject areas that interest her as follows:[208]

Economics	Political Science	History
1. Amherst	1. Bowdoin	1. Carleton
2. Bowdoin	2. Carleton	2. Amherst
3. Carleton	3. Amherst	3. Bowdoin

Susan then adopts a decision procedure under which, upon receiving two acceptance letters, she will consult her rankings and eliminate the school that wins in fewer categories. Kovvalli continues:

> For example, if she receives acceptance letters from Amherst and Bowdoin, she will note that Amherst outperforms Bowdoin in Economics and History, while Bowdoin outperforms only in Political Science. As a result, she will discard the letter from Bowdoin.
>
> She further resolves that if she receives a third letter, she will compare it to the surviving letter from the first two. So if she receives acceptance letters from Amherst and Bowdoin, and later Carleton, she will first discard the letter from

205 SUNSTEIN & THALER, *supra* note 5.

206 CASS R. SUNSTEIN, WHY NUDGE?: THE POLITICS OF LIBERTARIAN PATERNALISM (2014). *Why Nudge?* is based on Sunstein's Storrs Lecture at Yale Law School. *See* Cass R. Sunstein, *The Storrs Lectures: Behavioral Economics and Paternalism*, 122 YALE L. J. 1826 (2013).

207 Aneil Kovvali, *Who Are You Calling Irrational?*, 110 NW. U.L. REV. 707, 712 (2016).

208 *Id.*

> Bowdoin as described above. Once the offer from Carleton arrives, she will compare it to the surviving offer from Amherst and apply the same analysis. Noting that Carleton outperforms Amherst in Political Science and History, while Amherst outperforms only in Economics, she will discard the letter from Amherst.[209]

Kovvalli maintains that Susan's procedure is not irrational in the colloquial sense and that her preferences are entitled to respect.[210] Nonetheless, Susan's choice is sensitive to choice architecture:

> If she receives letters from Amherst and Bowdoin alone, she will choose Amherst. If she receives letters from Bowdoin and Carleton alone, she will choose Bowdoin. But if she receives letters from Amherst and Carleton, she will choose Carleton. It follows that if she receives acceptance letters from all three colleges, her ultimate choice will depend on the order in which the letters are received: If she receives letters from Amherst, then Bowdoin, then Carleton, for example, she will choose Carleton; if she receives letters from Bowdoin, then Carleton, then Amherst, she will choose Amherst; if she receives letters from Amherst, then Carleton, then Bowdoin, she will choose Bowdoin; and so on. Susan's choice will depend on the context in which it is presented, even though the context conveys no relevant information.[211]

Kovvalli goes on to suggest that it would be illegitimate for Susan's father to manipulate Susan's decision by withholding the acceptance letter from his preferred option Amherst until after Susan has received acceptance letters from Carleton and Bowdoin and eliminated Carleton from consideration, leading her to ultimately select Amherst over Bowdoin. Kovvalli draws an analogy here to Sunstein and Thaler's "core cases" for nudging, where some choice architecture is inevitable. Even in such cases, Kovvalli maintains, nudges represent an exercise of power that favors one set of competing preferences over another.[212]

Whether or not Kovvalli is right that Susan's preferences, as embodied in her subjective rankings and decision procedure, are entitled to respect in the sense of noninterference, it seems clear that the outcome of procedures like Susan's should not be respected in the sense of being used as an input in setting regulatory policy. Whatever can be said about the merits of Susan's decision procedure, it does not reveal any meaningful preference between the three colleges. On the information provided in Kovvalli's stylized example, Susan cannot be said to have any true preference among them. More information could enable a more meaningful decision. For instance, if Susan had information regarding the relative magnitudes of the differences in quality of the colleges in her areas of interest, or had any inclination with regard to which of the three subjects she is most likely to major in, or had any preferences and information on features of the colleges beyond those three subjects, she might have a meaningful preference. In the stylized hypothetical, the choice is perfectly symmetric.

Let us assume that Susan has researched throughly and this is the best information available to her at a reasonable search cost. In that case, a regulator that imputed a

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209 *Id.* at 712–13.
210 *Id.* at 713.
211 *Id.*
212 *Id.* at 714–15.

revealed preference to Susan would be chasing a phantom. Whatever differences there are between the colleges in tuition, financial aid, location, campus culture, weather, alumni network, etc., are not factors into Susan's decision. Even regarding the three factors Susan does both care and have information about, it would be a mistake to infer that she cares most about economics if she chooses Amherst. That outcome would merely be a result of receiving the Amherst acceptance letter last or being rejected by Carleton, which outranks Amherst on two of the three factors.

One way of making sense of Susan's procedure is by reference to the multiple-selves model of the mind.[213] If we think of Susan as comprising three selves, each of whom *only* cares about the history, the political science, *or* the economics department, then information about the magnitudes of the differences in department quality would be irrelevant. From this perspective, Susan's decision procedure is analogous to a voting process with her three selves as the electors. Arrow's impossibility theorem holds that in cases with three or more distinct alternatives, no ordinal ranked voting system can ensure an outcome that meets a set of reasonable fairness conditions.[214] Indeed, given the preferences of Susan's selves, none of the three colleges is a Condorcet winner, meaning no college would win a majority vote against each of the other two colleges.[215] Since Susan must nonetheless pick a college, her decision procedure can be defended as a rational, if arbitrary, method of aggregating the preferences of her multiple selves. Since no procedure would ensure a fair outcome given the preference pattern of her selves, an external intervener seeking to nudge her decision would be acting based on interests outside the scope of Susan's preference. If this multiple-selves model were an accurate description of Susan's decision-making, it might sustain Kovvalli's critique of Sunstein and Thaler. However, once again, the arbitrary outcome of Susan's decision procedure would not be a solid basis for inferring any unitary preference on Susan's part. This severs any connection between any preference inferred from Susan's behavior and social welfare.

Given the specific features of Susan's case, one might expect the random contingencies of binary comparison and choice ordering to average out. In more realistic *Nudge* cases, like retirement savings or food choice, however, there are consistent patterns that would not average out. Such choices reflect the rate of time preference. Hyperbolic pure time preference is one way of explaining why some children "fail" the famous marshmallow test of delayed gratification.[216] Individuals with high rates of time preference will tend to save less for retirement and indulge more in unhealthy foods because they care less about future poverty or health problems than present consumption.

Sunstein and Thaler argue that these choices are sometimes mistakes and advocate non-coercive interventions—called nudges—to encourage more retirement savings and healthier food choices.[217] For instance, the Save More Tomorrow plan championed by Thaler enables people to commit in advance to contributing a higher percentage of

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213 *See* David Lester, *A Multiple Self Theory of the Mind*, 1 COMPREHENSIVE PSYCH. 5 (2012).

214 *See* Kenneth J. Arrow, *A Difficulty in the Concept of Social Welfare*, 58 J. OF POL. ECON. 328 (1950).

215 *See* Duncan Black, *On the Rationale of Group Decision-making*, 56 J. OF POL. ECON. 23 (1948).

216 *See* Ebbe B. Ebbesen, Walter Mischel, & Antonette Raskoff Zeiss, *Cognitive and Attentional Mechanisms in Delay of Gratification*, 21 J. PERSONALITY & SOC. PSYCH. 204 (1972).

217 SUNSTEIN & THALER, *supra* note 5.

future pay increases to a retirement savings account.[218] This works because many people exhibit hyperbolic, rather than geometric, discounting, which can lead to preference reversal as the time approaches at which a sacrifice for a greater future reward is to be made approaches.[219] Likewise, Sunstein and Thaler advocate placing fruits and vegetables in school cafeterias at eye level and desserts in inconvenient locations.[220] As applied to these cases, Kovvalli's critique would have to be that individuals have competing preferences for present consumption and for future health and wealth, and that any external intervention necessarily prioritizes one set of preferences rather than neutrally aiding individuals in fulfilling their own desires. As above, this critique, even if it is correct, offers no basis for policymakers to have confidence in relying on inferences of individual preferences in evaluating non-paternalistic regulations.

Other criticisms question the effectiveness of non-coercive nudges;[221] worry that nudges are infantilizing and undermine individuals' rational decision-making by depriving them of opportunities for practice;[222] and argue that covertly shaping individual choices may be a greater threat to liberty than open constraint.[223] None of these criticisms apply to circumscribing the deference given to measures of individual preferences in CBA. Before policymakers move forward with more paternalistic interventions to correct arguably irrational individual behavior, they should stop deferring to the preferences driving those suspect behaviors for the purpose of evaluating non-paternalistic regulations.

X. Other Alternatives to CBA

The foregoing has offered relatively mild criticism of the current practice of CBA and the potential of WBA. Perhaps the complications associated with reliance on measures of individual preference point to deeper problems with CBA. Indeed, several prominent scholars, including Frank Ackerman and Lisa Heinzerling, contend that CBA is fundamentally flawed and should be dispensed with entirely.[224] A full assessment of their arguments is beyond the scope of this article. Instead, I will focus on two aspects of Ackerman and Heinzerling's critique that relate to the present inquiry: CBA requires applying monetary values to priceless human lives, and CBA trivializes the future.

Ackerman and Heinzerling's core contention about mortality risks is that every life is sacred and no amount of financial savings can justify allowing someone to die.[225] They

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218 Shlomo Benartzi & Richard H. Thaler, *Save More Tomorrow: Using Behavioral Economics to Increase Employee Saving*, 112 J. Pol. Econ. S164 (2004).

219 R.J. Herrnstein & Kris N. Kirby, *Preference Reversals Due to Myopic Discounting of Delayed Reward*, 6 Psych. Sci. 83 (1995).

220 Sunstein & Thaler, *supra* note 5, at 57.

221 Tom Goodwin, *Why We Should Reject 'Nudge'*, 32 Pol. 85 (2012).

222 Karen Yeung, *Nudge as Fudge*, 75(1) Mod. L. Rev. 122, 145 (2012).

223 Daniel M. Hausman & Brynn Welch, *Debate: To Nudge or Not to Nudge*, J. Pol. Phil. 123 (2010).

224 Ackerman & Heinzerling, *supra* note 17, at 1553. *See also* Martha C. Nussbaum, *The Costs of Tragedy: Some Moral Limits of Cost-Benefit Analysis*, 29(2) J. Legal Stud. 1005 (2000).

225 Ackerman & Heinzerling, *supra* note 17, at 1584.

disavow the interpretation that life has infinite value, claiming instead that "there is no 'price' for life because it's value is immeasurable."[226] However, Ackerman and Heinzerling's holistic alternative to attempting to measure the value of a life does not offer clear guidance for evaluating cases where regulators must select of precise level of stringency for regulating an environmental hazard that cannot be feasibly eliminated.[227] For instance, how tightly to regulate the emission of a non-threshold pollutant. Ackerman and Heinzerling implicitly acknowledge that that society should not expend billions of dollars' worth of resources to save a single life.[228] But beyond references to a supposed consensus among "most system of ethical and religious belief," they fail to offer much justification for the view that the value of a life is not quantifiable in principle.[229]

Instead, they focus their argumentative firepower on addressing the "standard response" of CBA defenders, that CBA only prices mortality risks, not identifiable human lives.[230] For present purposes, we can grant the premise that Ackerman and Heinzerling succeed in collapsing the distinction between statistical and identifiable lives. This does not resolve the propriety of attaching a dollar value to human life, however, for two reasons. First, as Sunstein points out, there are tradeoffs between different mortality risks.[231] A strong precautionary approach to one risk may increase the total number of lost lives by magnifying another risk.[232]

A possible solution to this is risk-risk analysis, which seeks to minimize the overall mortality risk.[233] Even this approach, however, cannot capture unanticipated future mortality risks that a less wealthy society will be less able to manage effectively. Second, even if policymakers could figure out how to balance known and unknown risks to minimize overall multi-generational mortality risks, people care about things other than not dying. It is true that that no amount of money, finite or otherwise, could compensate a person for the loss of his life, if delivered after his death.[234] But people choose to accept avoidable mortality risks in the name of pleasure or convenience on a daily basis.[235] They do not act as if avoiding death is lexically superior to all other values.[236] This means they do not value their lives infinitely. But taking the idea that lives are sacred

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226 FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 67 (2004) [hereinafter PRICELESS].

227 *Id.* at 214–15.

228 Ackerman & Heinzerling, *supra* note 17, at 1584.

229 PRICELESS, *supra* note 226. Ackerman and Heinzerling offer many compelling critiques of methodologies for valuing life. The validity of these methodologies is a distinct issue, however, from their claim that life cannot be valued with precision and in terms of units in terms of common units for the purposes of weighing against other goods (i.e., in dollars).

230 *Id.*

231 Cass R. Sunstein, *Health-Health Tradeoffs*, 63(4) CHICAGO L. REV. 1533 (1996).

232 Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003 (2003).

233 W. Kip Viscusi, *Risk-Risk Analysis*, 8 J. RISK & UNCERTAINTY 5 (1994).

234 PRICELESS, *supra* note 226, at 69. Though some people are willing to sacrifice their lives to improve the financial circumstances of their surviving family members.

235 Stephen Lyng, *Edgework: A Social Psychological Analysis of Voluntary Risk Taking*, 95(4) AM. J. SOC. 851 (1990).

236 JOHN RAWLS, A THEORY OF JUSTICE 37–38 (rev. ed. 1999). A lexically superior value is given absolute priority, such that it must be fully satisfied before considered other values. It is not subject to balancing against lexically inferior values.

and priceless seriously would mean refusing to make explicit tradeoffs between saving lives and other values. Fortunately, as indicated above, Ackerman and Heinzerling do not advocate assigning infinite value to human life.[237] They merely require that policy-makers avoid specifying a finite value in terms of units that can be weighed directly against other social values.[238]

Instead, Ackerman and Heinzerling suggest relying on a menu of regulatory options that have emerged from experience, including "technology-based" regulation, pollution trading with caps set via political compromise, and information regulation.[239] Information regulation, typically mandated disclosure, is not truly an alternative to CBA.[240] It is a regulatory tool that may make sense in some contexts and not in others. CBA or another decision procedure must be used to decide whether and how much disclosure to mandate. It is true that the costs associated with information disclosure rules are typically too low to justify the decision costs associated with CBA,[241] but this does not make information regulation an alternative to CBA. Moreover, in cases where information regulation is used, a decision procedure is also needed to determine whether more robust measures are also justified.

Technology-based regulation and pollution trading, for their part, do not avoid tradeoffs between saving lives and other social objectives. At best, they hide those decisions or address them implicitly in legislative bargains. After all, technology-based standards typically do not eliminate deaths from any given form of pollution. Greater safety could be purchased with tougher standards that force the regulated industry to innovate, reduce output, or shut down entirely. Of course, this would have substantial social costs.

But if life is truly priceless, what basis do we have for declining to bear them? This is even more clear in the case of legislated targets. The legislative process may carry a badge of democratic legitimacy, but it is unlikely to produce standards that drive mortality risks down to their absolute minimum. This is both because regulated industries often have substantial political clout and because ordinary people are generally unwilling to sacrifice all other values for incremental increases in safety. Indeed, Ackerman and Heinzerling discuss a case where Congress hastily overturned a rule promulgated by the Occupational Safety and Health Administration that was justified under the agency's CBA.[242] This would be seem be more an indictment of congressional judgment than of CBA, at least from Ackerman and Heinzerling's pro-regulatory perspective. Likewise, Ackerman and Heinzeling reference Arrow's Impossibility Theorem to undermine CBA's claim to reflect a social welfare function, but Arrow's proof applies equally to any decision procedure, including the democratic decision making they prefer.[243]

Whatever advantages technology-based regulation and legislated standards may have over CBA, they cannot avoid the inevitable tradeoffs between safety and other social goods. What they can do is avoid putting an explicit monetary price on the value of a life. But this is only an aesthetic advantage. In CBA, dollars are the common unit of

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237 PRICELESS, *supra* note 226.
238 *Id.*
239 Ackerman & Heinzerling, *supra* note 17, at 1581–83.
240 *Id.*
241 LIVERMORE & REVESZ, *supra* note 8.
242 PRICELESS, *supra* note 226, at 106–07.
243 *Id.* at 209; Arrow, *supra* note 214.

social value used to allocate scarce resources to competing social goods.[244] Declining to assess competing priorities in terms of a common unit of value only means that tradeoffs will be less transparent and less likely to maximize social welfare. As Adler and Posner point out:

> [Technology-based regulation] is clearly suboptimal with regard to welfare. First, even if cutting- edge technology is optimal for some firms, it will not be optimal for all, given the heterogeneity of the welfare of firms' activities and the costs of employing the technology. Second, there is no reason to expect the process of technological development to generate a technology that is optimal on average. On the one hand, researchers motivated by prospects other than market demand, such as fame, may invent expensive technologies that firms or other actors (even if they did internalize all external effects and had good information) wouldn't buy. On the other hand, given external effects or poor information, technologies that result from market demand may fall below the welfare- maximizing level; a "technology forcing" policy might be better.[245]

Likewise, political bargaining over the level at which to set the cap for a pollution trading system *may* settle on the optimal amount of pollution, but Ackerman and Heinzerling offer no reason to expect this outcome. Certainly, their comparison between environmental protection and defense and counterterrorism spending does not inspire confidence.[246] Nonetheless, the relative simplicity of emissions trading arguably offers a circumstance in which it is reasonable to think that legislation can and should specify the target, leaving the Environmental Protection Agency with minimal discretion. If so, CBA would indeed be inappropriate. One would still hope that legislative bargaining at least consider how much more or less mortality risk would be associated with a marginally higher or lower emissions cap and weigh risk reduction against other social goods. More generally, there are many domains of regulatory law and policy where the Congress lacks the capacity to legislate with a sufficient level of specificity such that agencies do not need a decision procedure beyond simply applying the statute.[247] CBA, with all its flaws, is the best available procedure for agencies to balance conflicting social goods to maximize social welfare in these cases.

A similar analysis applies to Ackerman and Heinzerling's critique of the practice of discounting. As with mortality risk, agencies (or the Congress) must make some decision about how to balance the needs of the present and the future. One can question the merits of any choice, as this article has, but there is no way to avoid trading present welfare against future welfare. Perhaps this article does not go far enough in advocating for a lower discount rate.[248] Certainly, some of the creative discounting practices criticized by Ackerman and Heinzerling are unjustifiable. For instance, discounting the value of lost life-years, the value of which was itself calculated from VSL estimates that already

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244 ADLER & POSNER, *supra* note 1, at 91.

245 *Id*.

246 *See* PRICELESS, *supra* note 226, at 216–19.

247 *See* Harold H. Bruff, *Legislative Formality, Administrative Rationality*, 63 TEX. L. REV. 207 (1984).

248 *See* Cowen & Parfit, *supra* note 22 (arguing for a zero-discount rate, though taking account of many of its components directly).

reflect pure time preference, double-counts a preference that should only be counted once, if at all.[249] Regardless, any regulatory regime will inevitably reflect some balance between the interests of the present and the future. Just as technology-based regulations and legislated emissions caps reflect an implicit valuation of human life, they reflect an implicit judgment regarding how heavily to weigh the interests of our future selves and future generations. If we try to avoid the question and refuse to explicitly quantify the balance we strike, we will only succeed in addressing the tradeoff in an opaque and inconsistent manner.

Finally, much of Ackerman and Heinzerling's critique targets the use of CBA as a tool to justify deregulation. Many of their criticisms of implementations of CBA are compelling. However, much of this discussion cuts against Ackerman and Heinzerling's contention that CBA is *inherently* biased against regulation, rather than merely susceptible to being wielded by policy analysts with an anti-regulatory agenda.[250] Although I disagree with some of their claims, Revezs and Livermore's *Retaking Rationality* and the subsequent work of the Institute for Policy Integrity constitute an existence proof for the use of CBA to advance a pro-regulatory agenda. Similarly, Viscusi points out that refusing to apply a monetary value to mortality risks tends to produce *less* protective regulatory standards.[251] Ackerman and Heinzerling are right to point out that CBA is not inherently neutral and is subject to manipulation by anti-regulatory advocates and scholars. However, as Revesz and Livermore argue, the correct response to offer a positive vision of cost-benefit analysis that seeks to assess the true costs and benefits of regulations in good faith.[252] This article is a contribution to that effort.

XI. Conclusion

Neither current restricted-preference accounts nor happiness survey-based approaches appear to fully capture social welfare. Adler and Posner offer compelling examples of cases where happiness is unaffected by some difference in the state of the world, but nonetheless that difference seems to matter. However, there are also many cases when even preferences that are informed and survive the forms of idealization endorsed by Adler and Posner point to non-optimal outcomes. In the clearest case, relating to pure time preference and discount rates, presently existing people are imperfect proxies for their future selves.

Whether this results from a failure of rationality or of ethics, policymakers should decline to ratify this preference pattern. The case of mortality risk is more complicated, but the preference patterns that are used to justify the VSL method similarly fail on normative grounds. While treating all life-years as equally valuable is probably not the optimal approach, it is a clear improvement over treating all deaths as equally bad.

More generally, policymakers should be more open to the conclusion that certain sorts of preferences should not be deferred to. At a minimum, any domain in which paternalistic policies designed to alter individual choices are considered, even if those

249 Priceless, *supra* note 226, at 196–97.
250 Livermore & Revesz, *supra* note 8.
251 Viscusi, *supra* note 93, at 9.
252 Livermore & Revesz, *supra* note 8, at 31, 42–45.

interventions are noncoercive nudges, should give policymakers pause about evaluating regulations addressing other-regarding activities based on the preferences driving those behaviors. Even a committed opponent of all forms of paternalism need not conclude that deference to individual preferences should be absolute in the context of non-paternalistic policymaking. In addition to the restrictions endorsed by Adler and Posner, preferences must also have a plausible rational justification that maintains a connection to social welfare. This is a lax standard designed to prevent expanding the discretion of regulators unnecessarily, but nonetheless rules out a number of preference patterns currently relied upon.

However, caution is warranted in excluding preferences on the ground of irrationality. For any pattern of preferences—including intransitive preferences, preferences influenced by framing effects or irrelevant alternatives, etc.—there is generally some plausible rational justification. This justification may appeal to a multiples-selves model, to a heuristic that may be rational to adopt as a general rule given information costs, or to some form of meta-rationality (e.g., anger as a strategic pre-commitment device for costly punishment).[253] After all, if a preference had no rational basis whatsoever, one might expect natural selection to have weeded it out.[254] This evolutionary logic may cut both ways, however. Perhaps certain preferences were rational in the evolutionary environment, but no longer are.[255] Perhaps other irrational preferences are linked via gene complexes to other traits that provide enough fitness to allow the irrationality to persist.

We need not resolve this debate over the existence of irrational preferences. Instead, in considering whether a preference is a proper input for policy analysis, we should consider whether any of the plausible rational justifications maintain the connection between preferences and social welfare. In cases like Susan's procedure for picking among her college options, any preference that might be inferred from her choice carries no information of relevance to social welfare maximization. In other cases, like how to weigh the interests of foreigners, this judgment may be less clear. There may be a strong normative case for a more cosmopolitan approach to policy analysis, but this is a sufficiently contested ethical issue that we cannot really say that most people's preference for aiding their fellow citizens carries no normative weight. Indeed, the key question in this regard is whose welfare public policy should seek to maximize.

The criterion that I have advocated for determining the relevance of individual preferences assumes we know whose welfare public policy should serve. Neutrality between domestic citizens is well-established, but there is no equivalent normative consensus regarding how heavily public policy should weigh the welfare of foreigners. This article does not seek to fully resolve the debate about preferences and public policy, but to offer a framework for evaluating when we should consider measures of individual preferences

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253 *See generally* ROBERT H. FRANK, PASSIONS WITHIN REASON: THE STRATEGIC ROLE OF THE EMOTIONS (1988).

254 *See* Alan R. Rogers, *Evolution of Time Preference by Natural Selection*, 84 AM. ECON. REV. 460 (1994); Thomas Grund, Dirk Helbing, & Christian Waloszek, *How Natural Selection Can Create Both Self- and Other-Regarding Preferences, and Networked Minds*, 3 SCI. REP. 1480 (2013); Marcus Salomonsson & Jorgen W. Weibull, *Natural selection and social preferences*, 239 J. THEORETICAL BIOLOGY 79 (2006).

255 *See* John D. Balling & John H. Falk, *Evolutionary Influence on Human Landscape Preference*, 42 ENV'T & BEHAV. 479 (2009).

as proper inputs for policy evaluation. In important cases, like discounting and valuing life, it offers clear guidance. In other contexts, disputes will remain. Even in these cases, articulating disputes in terms of the framework advanced in this article should enable a more productive debate.

Gabriel Weil is a Senior Research Associate at the Climate Leadership Council and a Visiting Researcher at Georgetown University Law Center. The views expressed in this article are his own and do not necessarily reflect those of the Climate Leadership Council or its staff. *The author would like to thank Richard Revesz for a conversation that inspired this article; Arden Rowell, Alejandro Camacho, John Bronsteen, Jonathan Masur, Matthew Adler, Cass Sunstein, Julie Zauzmer, and Todd Rubin for their invaluable feedback on early drafts, and the staff of the Texas Environmental Law Journal and its external reviewers from the Texas State Bar Environmental & Natural Resources Law section for their excellent editing.*

Water to Wind: The Path Texas Groundwater Law Provides to Sever the Wind Estate and Prioritize Mutually Dominant Estates

By Robert Montgomery

I. INTRODUCTION

To understand the need for severance of the wind estate, imagine the following scenario. An elderly woman in West Texas decided to devise her ranch in her will to her ranch hand's daughter, who suffered from physical and mental disabilities. The woman assessed the financial situation as follows: the ranch hand's daughter would never be able to work, would have financial hardships stemming from medical expenses, and would have future costs resulting from someone taking care of her. When the elderly West Texas woman passed away, she left her 2,400-acre ranch to the ranch hand's daughter.

The estate taxes that were owed upon the inheritance of the ranch forced the girl's father to consider selling the ranch on his daughter's behalf. Upon consultation with a local attorney, he learned that he could contractually sever the wind estate above the ranch and try to sell the wind estate to a third party. This severance would allow his daughter to receive the future financial gains resulting from the operation of the ranch, permit her to continue living on the ranch with her father, and leave intact the option of selling the ranch for financial gain later in her life. So, the father contractually severed the wind estate from the surface estate and sold 50% of the wind estate in his daughter's 2,400-acre ranch to an investment firm in Palo Alto, California. Both the investment firm and father understood there was no legal certainty that the wind estate would be upheld as a severed estate, yet the investment firm was willing to take the risk, and the father's only options were to either sever the wind estate or sell the ranch.

The investment firm in Palo Alto bought 50% of the wind estate for two million dollars—valuing the wind estate at over $1,600 per acre. In addition to immediately having the money to pay the estate taxes, meet immediate medical needs, and invest in various stocks, the daughter retained 50% of the wind estate—so she will ultimately be paid a 50% royalty from any wind energy produced on the property in the future.

Currently, statutory law in Texas does not address the validity of wind severance, nor does it even hint at discussing the priority of where the wind estates falls in comparison to other property interests.[1] In contrast, Texas common law provides clarity and guidance for property owners with interest in mineral estates, groundwater estates, and surface estates.[2] The Texas Legislature, or Texas judiciary if a proper case arises on appeal, should act regarding this growing issue by following the precedent applied to groundwater and mineral estates and allowing the wind estate to be severed from the surface estate. This action would align with the judicial approach used to determine property rights in Texas, promote private property rights for Texans, and further wind

1 Dan Solomon, *West Texas Property Sales Don't Always Include the Wind Rights*, TEXAS MONTHLY (Dec. 14, 2017), https://www.texasmonthly.com/energy/west-texas-wind-power-rights/ (indicating that Texas law currently provides no definition of wind rights nor guidance as to how they would interact with surface and mineral rights).

2 *See, e.g.*, Edwards Aquifer Auth. v. Day, 369 S.W.3d 814 (Tex. 2012); Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53 (Tex. 2016).

energy development in Texas. Severing wind rights in Texas is now a common practice, and property owners need certainty regarding their property interests.[3]

Throughout the history of the Republic of Texas and State of Texas, property owners have been able to make decisions with their property that he or she feels is best in the given situation. For example, during the Great Depression, landowners sold portions of their mineral estates to generate income to take care of their families.[4] More recently, some landowners have decided to sell their mineral estate during oil booms for upwards of $40,000 per acre, and other landowners have decided to retain the mineral estate, benefit from royalty payments, and hope the future of the oil business will drive the value of the mineral estate higher.[5]

For these reasons, a Texas landowner should have the option to retain, convey, or bequeath all property rights, including those in the wind estate. The Texas Legislature or judiciary should support the historical stance of private property rights in Texas that has been applied to the mineral estate and was recently applied to the groundwater estate, and allow the wind estate to be a freely severable property interest. In 2012 and again in 2016, the Supreme Court of Texas aligned ownership of groundwater to the ownership of minerals, providing guidance for the Texas Legislature to determine property rights in wind.[6] It is time for the Texas Legislature to determine the priority of estates between the mineral estate, groundwater estate, wind estate, and surface estate. The Texas Legislature should pass legislation severing the wind estate from the surface estate, codify the accommodation doctrine, and the doctrine of First in Time, First in Right, to determine the priority of the wind estate.

There are no academic articles analyzing how *Coyote Lake Ranch* and *Day*—and the principles applied to mineral estates and groundwater estates—provide a foundation for determining the ownership of the wind above one's property. Thus far, only a few scholarly articles address the severance of the wind estate in Texas. This Note fills this substantial gap in the scholarly literature and provides readers with the legal and practical reasons the wind estate should be considered a severable property interest that is equal in dignity to the mineral and groundwater estates.

This Note, in Part II, provides an overview of the ownership and importance of wind, groundwater, and mineral estates in Texas. Part III analyzes the historical development of severed estates in Texas and the United States. The severability of mineral estates and groundwater estates shows how the Texas Legislature or judiciary should act regarding the severability of wind estates. Part IV reviews how the Texas Legislature has effectively passed legislation to allow Texas to lead the United States in wind energy production. The Legislature's actions supporting wind energy clearly show that it is willing to act regarding wind severance. Part V analogizes the Texas Supreme Court hold-

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3 Mose Buchele, *Texas Landowners Take the Wind Out of Their Sales*, KUT (Dec. 11, 2017), http://kut.org /post/texas-landowners-take-wind-out-their-sales/.

4 *See 2018 Annual Report*, R. KING & CO. (April 10, 2019), https://rkingco.com/category/mineral-owners/.

5 Jeffery Ball & Benjamin Lowry, *Lone Star Rising,* FORTUNE (May 25, 2018), http://fortune.com/longform/permian-basin-oil-fortune-500/.

6 *Day*, 369 S.W.3d at 817 (holding that "land ownership includes an interest in groundwater in place"); *Coyote Lake Ranch*, 498 S.W.3d at 55 (holding that the accommodation doctrine applies to groundwater).

ings in *Edwards Aquifer Authority v. Day* and *Coyote Lake Ranch v. City of Lubbock* and how these respective holdings provide a firm legal foundation to determine wind ownership. Later, Part VI analyzes where the wind estate should fall in comparison to the groundwater estate, mineral estate, and surface estate based on the respective estates being determined mutually dominant. In conclusion, Part VII provides statutory language the Texas Legislature could enact to provide clarity to the wind, mineral, groundwater, and surface estate owners regarding severance of the wind estate and the respective relations between the severed estates. A thorough understanding of the dominant estate doctrine and application of the First in Time, First in Right doctrine, along with the accommodation doctrine, provide clarity to determine the priority of the wind estate.

II. OVERVIEW OF WIND, GROUNDWATER, AND MINERAL ESTATES IN TEXAS

The Texas Legislature has taken an active role in encouraging wind development within the state the past two decades and aided wind severance becoming a common practice within the state.[7] Approximately 1,000 deeds have been filed in Texas severing the wind estate from the surface estate.[8] Legislative action will either validate these severed wind estates and confirm the future severance of wind estates, or accept the validity of previously severed wind estates and proactively ban the severance of future wind estates.[9] The reservation of wind rights has severe implications regarding the financial value of the surface estate and affects the financial decisions facing property owners.[10]

The current value of wind rights in West Texas range from $100 per acre up to $1,600 per acre, depending on the level of wind and proximity to transmission lines.[11] With landowners currently reserving wind rights in the hope that wind rights will be severable from the surface estate, millions of dollars are at stake if a court denounces the severability of wind from the surface estate.[12] Moreover, if a court upholds the severance of wind rights from the surface estate, and the landowner does not reserve rights in the wind estate, the landowner will lose out on years of royalties he or she would have received if he or she did in fact reserve a portion of the wind estate.[13] Severability of the wind estates aligns with the Texas jurisprudence regarding the severability of other profitable, fugacious, severable, and natural resources once thought to be a part of the surface

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7 Interview with Roderick Wetsel, Senior Partner, Wetsel Carmichael, in Lubbock, Tex. (Nov. 11, 2018) [hereinafter Wetsel Interview].

8 *Id.*

9 *See infra* note 186 (explaining that statutes banning the severance of wind estates have only proactively applied and have validated all previously-severed wind estates).

10 Lisa Chavarria, *The Severance of Wind Rights in Texas*, STAHL, DAVIES, SEWELL, CHAVARRIA & FRIEND (Sep. 2018), http://sbaustinlaw.com/library-papers/Chavarria-The_Severance_of_Wind_Rights%20%28Final%29.pdf.

11 *See* Wetsel Interview, *supra* note 7.

12 *See id.*

13 *See id.*

estate, i.e., groundwater, oil, and gas.[14] As with groundwater and mineral estates, the landowner should be able to have the choice of profiting from selling the wind estate.

The severance of the wind estate in Texas will create a distinct property interest in the wind above one's land, similar to the distinct property interest given to the mineral estate and groundwater estate.[15] The metaphor of a property owner owning a bundle of sticks, with each stick representing a fundamental right of ownership, can apply to the severance of the wind estate. A property owner has the right to give up a stick from the bundle and lease a piece of the property; he or she only surrenders one stick, while remaining in possession of the four other sticks.[16] But if a property owner decides to sell a portion of the surface estate or sever a portion of the land, such as the mineral estate or wind estate, the property owner merely breaks all of the sticks in half, and the new owner gains a bundle of sticks. The surface estate owner and mineral estate owner then each have a bundle of sticks, representing a complete set of rights in the property. A severable wind estate would allow a surface estate owner to have the choice to sell the wind estate for immediate financial gain or remain in possession of the wind estate—in hopes of future development or to guarantee wind development does not occur, ensuring the surface estate is not devalued upon the development of the wind estate.[17] Landowners should be able to make this choice, and many factors can go into the choice of whether the surface owner should sever and sell the wind estate.[18]

The principles created to advance mineral development in Texas, and to ensure that investments in severed mineral estates are not subject to other estates' control, can be applied to the wind estate without many conflicts—similar to how the Texas Supreme Court applied these doctrines to groundwater estates in 2012 and 2016.[19]

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14 *Severance*, BLACK'S LAW DICTIONARY (11th ed. 2019) (defining "severance" as the removal of anything attached to or affixed to real property, making it personal property rather than a part of the land).

15 *See infra* notes 84–92 and accompanying text (explaining the severability of fugacious, financially valuable natural resources, such as oil and gas and groundwater).

16 *See* French v. Chevron U.S.A. Inc., 896 S.W.2d 795, 797 (Tex. 1995). The property owner, when owning an estate in fee, such as a mineral estate, possesses the rights to (1) execute a lease, (2) receive bonus for executing a lease, (3) receive delay rental payments, (4) receive royalty payments, and (5) produce oil and gas (i.e., natural resources of the estate) from the property. *Id.*

17 *But see* Derry T. Gardner, *Impact of Wind Turbines on Market Value of Texas Rural Land*, GARDNER APPRAISAL GROUP, INC. (Feb. 13, 2009), https://www.texas-wildlife.org/images/uploads/Impact-of%20Wind-Turbines-on-Market-Value-of-Texas-Rural-Land.pdf (indicating that diminution in property value by 37% on average with wind turbines in visual range); Jude Clemente, *Do Wind Turbines Lower Property Values?* FORBES (Sep. 23, 2015), https://www.forbes.com/sites/judeclemente/2015/09/23/do-wind-turbines-lower-property-values/#237b9a1248cb. The devaluation of land when wind turbines are installed fluctuates based on the physical attributes of the property and primary purposes of why a landowner would purchase the property. *See* Gardner, *supra* note 17.

18 *See* Gardner, *supra* note 17.

19 *See* Edwards Aquifer Auth. v. Day, 369 S.W.3d 814 (Tex. 2012); Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53, 64 (Tex. 2016).

The groundwater estate is important to agriculture in West Texas and the daily lives of millions of individuals residing along the southern portion of the I-35 corridor.[20] The Texas Supreme Court's application of the accommodation doctrine to groundwater in *Coyote Lake Ranch* was a significant step in the ownership of groundwater estates because the groundwater estate gains a dominant easement over the surface estate.[21] Having a dominant easement over the surface estate allows the owner of the dominant estate to drill for water and install pipelines to transport water on the surface estate without gaining permission from the landowner.[22] This fact prioritized the groundwater estate over the surface estates and promoted the commercialization of groundwater.[23]

The accommodation doctrine was developed to "balance[e] the rights of surface and mineral owners to use their respective estates while recognizing and respecting the dominant nature of the mineral estate."[24] The doctrine only applies to competing estates.[25] So for it to apply to wind estates, either the legislature or the judiciary must first indicate that wind rights are severable from the surface estate.[26] The Texas Constitution allows the legislature to pass laws and regulate natural resources.[27] Given the broad scope of wind energy, legislation is the best approach to clarify property interests in wind and determine where the wind estate falls in comparison to other property estates.[28] This Note analyzes the actions the legislature should take to recognize wind as a natural resource.[29]

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20 *See* Michelle Ho et al., *America's water: Agricultural water demands on the response of groundwater*, AMERICAN GEOPHYSICAL UNION: AGRICULTURAL WATER DEMANDS AND GROUNDWATER (Jul. 24, 2016), https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1002/2016GL069797; Brantley Hargrove, *Could a Tug-of-War Between Two Central Texas Counties Leave Residents Without Drinking Water?*, TEXAS MONTHLY (Mar. 22, 2019), https://www.texasmonthly.com/articles/central-texas-drinking-water-crisis/.

21 *See Coyote Lake Ranch*, 498 S.W.3d at 64.

22 *See* Brent Dore, *Teaching an Old Dog a New Trick: Examining the Intersection of the Accommodation Doctrine and Groundwater Rights Through the Lens of City of Lubbock v. Coyote Lake Ranch, LLC*, 3 TEX. A&M L. REV. 853, 882–83 (2016).

23 *See generally Coyote Lake Ranch*, 498 S.W.3d.

24 Getty Oil Co. v. Jones, 470 S.W.2d 618, 622 (Tex. 1971); *see* Merriman v. XTO Energy, Inc., 407 S.W.3d 244, 250 (Tex. 2013).

25 *See generally* David R. Green, *Earth and Wind Industries Playing with Fire: The Concurrent Rights of Wind Farm Operators, Oil and Gas Developers, and Landowners in Kansas*, 61 KAN. L. REV. 1089, 1095 (2013).

26 *Id.*

27 Tex. Const. art. XVI, § 59(a).

28 *Id.* ("The conservation and development of all of the natural resources of this State . . . and the preservation and conservation of all such natural resources of the State are each and all hereby declared public rights and duties; and the Legislature shall pass all such laws as may be appropriate thereto."). Wind is similar to many of the natural resources that are regulated by the Texas Legislature, such as oil and gas, mines and mining, geothermal energy, caves, and wetlands. *See* TEX. NAT. RES. CODE ANN. tits. 3–6, 9–10, 12. The Texas Water Code, which regulates groundwater as well as surface water, considers water within the state to be a natural resource. TEX. WATER CODE ANN. § 1.003.

29 Tex. Const. art. XVI, § 59(a). The Texas Legislature "passing a law recognizing that wind is a natural resource would be the initial, and perhaps only, necessary step to establish wind as a natural resource subject to legislative regulation." Alan J. Alexander, *Texas Wind Estate:*

The State of Texas leads the nation in the production of oil, gas, and wind energy.[30] Oil and gas development has been present in Texas since 1866.[31] In 1894 in Corsicana, Texas, commercial quantities of oil and gas were discovered, and Texas became the industry leader when Spindletop was drilled in 1901.[32] Over the past 100 years, the legislature and judiciary, along with the Texas Railroad Commission, have become some of the most sophisticated institutions in the world regarding natural resources.[33] As Delaware leads the nation in the number of incorporated businesses within its jurisdiction, the Delaware courts influence other jurisdictions in the interpretation of corporate laws.[34] Similarly, the Texas courts and the Texas Railroad Commission significantly impact other jurisdictions' interpretation of laws regarding natural resources and have been leading forces across the nation for the past 100 years.[35]

The first commercial wind turbine was built in Howard County in 1999, and thus wind energy has only been present in Texas for 20 years.[36] The American Wind Energy Association reports a total capital investment of $46.5 billion in Texas wind energy to date and annual lease payments to landowners of over $70 million.[37] This relatively recent development of wind energy opens the door for the legislature and judiciary to create one of the most sophisticated bodies of law regarding wind estates, just as it did for the mineral estate.

Addressing the severability of the wind estate is necessary for the following reasons: the rise of surface owners severing undeveloped wind rights, that property owners are reserving wind rights from their wind farms, the millions of dollars that are invested in wind farms across the State of Texas, and the millions of dollars at stake if wind severance is banned.[38] This issue needs to be addressed in Texas to ensure landowners of their property rights. No state, including Texas, has recognized the severance of the wind estate outright.[39]

Wind as a Natural Resource and a Severable Property Interest, 44 U. MICH. J. L. REFORM 429, 457 (2011).

30 K.K. DuVivier & Roderick E. Wetsel, *Jousting at Windmills: When Wind Power Development Collides With Oil, Gas, and Mineral Development*, 55 ROCKY MTN. MIN. L. INST. § 9.01 (2009) [hereinafter *Jousting at Windmills*].

31 *First Lone Star Discovery*, AM. OIL & GAS HISTORICAL SOC'Y, https://aoghs.org/petroleum-pioneers/first-texas-oil-well/ (last updated Sept. 9, 2019).

32 *See* John O. King, *The Early Texas Oil Industry: Beginnings at Corsicana, 1894-1901*, 32 J.S. HIST. 505, 505–06 (1966).

33 *See* Cullen M. Godfrey, *A Brief History of the Oil and Gas Practice in Texas*, 68 TEX. B.J. 812, 813, 815 (2005).

34 *See* ERNEST E. SMITH, ROCKY MTN. MIN. L. INST., MATERIALS ON INTERNATIONAL PETROLEUM TRANSACTIONS 68 (Ernest E. Smith et al. eds., 2d ed. 2000).

35 *See id.*

36 ERNEST E. SMITH ET AL., TEXAS WIND LAW § 1.02 (Ernest E. Smith et al. eds., 4th ed. 2014).

37 *Wind Energy in Texas*, AMERICAN WIND ENERGY ASSOCIATION 1 (2018), https://www.awea.org/Awea /media /Resources/StateFactSheets/Texas.pdf.

38 JACOB R. LEDERLE, TEXAS WIND SEVERANCE: ADDRESSING THE PRACTICAL CONSEQUENCE OF SEVERING WIND RIGHTS (2015) (on file with author).

39 *See* Alexander, *supra* note 30, at 451.

There have been two cases that favorably, but indirectly, addressed wind severance: *Contra Costa Water District v. Vaquero Farms, Inc.*[40] and *Romero v. Bernell.*[41] One court aligned the wind estate to the mineral estate, while the other court aligned the ownership of wind to the ownership of water.[42] In light of favorable case law supporting the severance of wind estates, South Dakota,[43] Colorado,[44] Nebraska,[45] Kansas,[46] North Dakota,[47] Oklahoma,[48] Wyoming,[49] and Montana[50] have all passed legislation proactively banning wind severance.

However, Texas is in a unique position leading the nation in the production of wind energy and has a history of taking different approaches to private property rights, and more importantly, has taken a different approach in determining ownership of groundwater estates when compared to states that have passed anti-severance laws.[51]

III. THE HISTORICAL DEVELOPMENT OF SEVERED ESTATES

Estate severance is rooted in private property rights.[52] A landowner wants the power to separately transfer, bequeath, or sell the minerals or groundwater below the land and the wind above the land, giving the landowner myriad options for property ownership and development. The landowner could sell the surface estate, so individuals could settle uncharted territory, yet keep the mineral estate for the future prosperity of an organization. The landowner could sell the mineral estate to pay estate taxes without having to sell the family ranch. The landowner could be a parent who wants to leave the surface estate to a child that currently lives on the ranch while leaving the mineral estate, groundwater estate, and wind estate to children who live out of state.

The historical approach the Republic of Texas and the State of Texas took regarding private property rights,[53] the historical analysis of the severability of groundwater es-

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40 Contra Costa Water Dist. v. Vaquero Farms, Inc., 68 Cal. Rptr. 2d 272 (Cal. Ct. App. 1997).

41 Romero v. Bernell, 603 F. Supp. 2d 1333 (D.N.M. 2009).

42 *See Contra Costa Water Dist.*, 68 Cal. Rptr. 2d at 278; *Romero*, 603 F. Supp. 2d at 1335.

43 S.D. CODIFIED LAWS § 43-13-19 (2017).

44 COLO. REV. STAT. ANN. § 38-30.7-103 (2015).

45 NEB. REV. ST. § 76-3004 (2012).

46 KAN. STAT. ANN. 58-2272 (2019).

47 N.D. CENT. CODE § 17-04-04 (2007).

48 OKLA. STAT. ANN. tit. 60 § 820.1 (2019).

49 WYO. STAT. ANN. § 34-27-103 (2011).

50 MONT. CODE ANN. § 70-17-402 (2011).

51 *See generally* Colleen Schreiber, *Landowner Attorney Discusses Private Property Rights*, TEX. A&M AGRILIFE EXTENSION (May 2, 2016), https://agrilife.org/texasaglaw/2016/05/02/landowner-attorney-discusses-private-property-rights/.

52 *See id.*

53 *See* Steven K. DeWolf & Rod E. Wetsel, *Wind Energy Seminar*, WIND LAW (Feb. 22, 2012), https://windtexenergy.com/wp-content/uploads/2013/07/2.22.12_Severance-of-Wind-Rights1.pdf.

tates,[54] and the public policy of creating certainty and stability in the energy sector all support severability of the wind estate.[55]

A. The Severability of the Mineral Estate

The development of severed mineral estates dates back to the English crown.[56] However, the California gold rush in the mid-1800s solidified the concept of severance of estates and private mineral ownership in the United States because gold miners outnumbered government officials.[57] When gold was discovered in the new territory of California in 1848, the number of miners compared to government officials were one thousand to one, favoring the gold miners.[58] Out of fear of potential armed conflict prompted by the vast disparity between the number of miners and government officials, the military governor of the territory refused to assert any claim to the minerals on behalf of the United States, instead "declar[ing] the miners free from official control."[59] Miners also did not have to pay royalties to the government and were able to profit from the minerals that they produced.[60] In 1861, the California Supreme Court held that the patent of land from the United States that encompassed 900 acres in the heart of the California gold country passed fee title to "all interests . . . in the soil, and everything inbedded in or connected therewith."[61] The Court's holding in this case laid to rest any assertion of a regalian right to gold or silver by California or the United States and supported the private ownership of minerals.[62]

As mineral discovery in the United States became more prominent and oil was discovered, Congress passed the 1872 Mining Law that allowed prospectors to stake claim to the mineral estate (separate from the surface estate), and passed title to both estates.[63] However, the government realized the system allowed for significant financial gains to the owner of the mineral estate while the government reaped essentially no reward.[64] In 1900, Congress began severing and reserving coal and other mineral estates in patents

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54 *See id.*

55 *See id.*

56 *See* K.K. DuVivier, *Sins of the Father*, 1. Tex. A&M J. Real Prop. L. 391, 394 (2014) [hereinafter *Sins of the Father*] (discussing the ownership of mineral rights in early England and indicting that precious and non-precious metals belonged to the crown, while other minerals remained the property of the landowner).

57 *See id.* Sovereign entities used to claim rights to precious metals and "other strategic deposits, such as salt," recognizing a separate mineral interest. Sylvia L. Harrison, *Disposition of the Mineral Estate on United States Public Lands: A Historical Perspective*, 10 Pub. Land L. Rev. 131, 135 (1989).

58 *Sins of the Father*, *supra* note 56, at 394.

59 *Id.*

60 *Id.*

61 Moore v. Smaw, 17 Cal. 199, 225–26 (Cal. 1861).

62 *Compare id.* (expressing the United States government has no claim to gold or silver in California and supported the surface estate owner owned all interests in the soil and minerals lying within the soil) *with* Hicks v. Bell, 3 Cal. 219, 227 (Cal. 1853) (indicating the government has a right to minerals discovered in California).

63 The General Mining Act of 1872, 30 U.S.C. § 22 (2019).

64 *See Sins of the Father*, *supra* note 56, at 391, 395.

under the Stock-Raising Homestead Act when granting surface estates to settlers.[65] Due to the reservation of mineral estates by the federal government—so it could benefit from the financial gain of developing the mineral estates—western states have fewer privately held mineral rights than eastern states. For example, the federal government owns 85% of minerals in Nevada, 65% of minerals in Utah, 61% in Alaska, and 53% in Oregon, but the federal government owns less than 1% of minerals in Pennsylvania.[66]

As the importance of energy grew throughout the United States, the mineral estate became more dominant as compared to the surface estate.[67] The discovery and production of oil and gas differed from the production of coal because, in the 1800s, the common belief was that coal was located on wastelands.[68] Upon the turn of the century when the United States was developing its industrial core, the Pennsylvania Supreme Court stated:

> The comparatively recent development of the sciences of geology and mineralogy, and the multiplication of mechanical devices for penetrating the earth's crust, have greatly changed the uses and the values of lands. Tracks that were absolutely valueless, so far as the surface was concerned, have come to be worth many times as much per acre as the best farming lands in the commonwealth, because of the rich deposits of coal, or iron, or oil, or gas known to underlie them at various depths.[69]

This holding showed the mineral estate below the land was of importance and ushered in the doctrines furthering the mineral estate as a severable estate independent of the surface estate.[70] Other states followed the Pennsylvania Supreme Court and affirmed that rights in different estates could be created in the strata that lay below the surface and could be accomplished by an exception in the deed conveying the lands.[71]

B. THE SEVERABILITY OF THE MINERAL ESTATE IN TEXAS

The ownership of mineral estates in Texas has historically differed from the ownership of mineral estates across the United States; Texas has favored private ownership of mineral estates to allow citizens to profit from property interests below the surface estate.

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65 *See id.*

66 *See* Harrison, *supra* note 57, at 137.

67 *See* Gerald J. Schissler & Joy E. Hansen, 6-200 AMERICAN LAW OF MINING § 200.02[1][b] (2d ed. 2013).

68 *See Sins of the Father*, *supra* note 57, at 395 (citing Rogers v. Brenton, 10 Q.B. 26, suggesting the mining would be conducted on "wasteland").

69 Chartiers Block Coal Co. v. Mellon, 25 A. 597, 598 (Pa. 1893).

70 *See id.* at 599.

71 *See* Moore v. Griffin, 72 Kan. 164 (Kan. 1905) ("The provision in the deed . . . is an exception as distinguished from a reservation. Its force and effect was to carve out a separate estate in the oil and gas from the estate in the surface soil."); Gordon v. Million, 154 S.W. 99, 102 (Mo. 1913) ("It must be remembered that the coal deposits, when separated by grant or reservation in a deed, is as much of an estate in lands as in the surface of the same lands. . . . Not only so, but such an estate carries with it the right to use so much of the surface estate as may be reasonably necessary for the proper use of the mineral estate."); Shell Oil Co. v. Moore, 48 N.E.2d 400, 403 (Ill. 1943) ("Here the coal and minerals are recognized to be an estate separate from the soil.").

While the severance of mineral estates in the majority of the United States originated from English common law, the severance of mineral estates in Texas originated from the laws of Spain and Mexico.[72] When Texas asserted its independence from Mexico in 1836, it retained the Spanish concept of state ownership of minerals and asserted title to all vacant lands.[73] As a Republic and the during period following its entry into the United States, Texas continued to follow Spanish and Mexican law.[74] Both the Republic of Texas and the State of Texas reserved the minerals of all public lands that they sold to benefit the Texas government.[75] Unlike other acquisitions from the era of westward expansion, the approach Texas took differed because the Republic of Texas retained all property interests and did not add any lands to the public domain of the United States.[76] Though both the Republic of Texas and the State of Texas held mineral estates for the benefit of the State, mineral rights were released to the surface estate owner in the amendments to the Texas Constitution in 1866, 1869 and 1876.[77] The first oil-producing well in Texas was discovered in Nacogdoches County in 1866.[78]

This early stance the Texas Legislature took in 1887 to promote private property rights—once Texans realized there were financially valuable property rights below the ground—gives an excellent indication of how the current legislature or judiciary should act in determining the ownership of the recently discovered and financially valuable property interest above the surface estate.

Today, under Texas law, a property can be severed horizontally in such a way that title to the surface estate is vested in one party, while the title to the mineral estate is vested in a different party.[79] The individual attributes creating the mineral estate are classified as independent property rights and may be severed into distinct property interests that can be conveyed, reserved, or bequeathed.[80] Oil, gas, groundwater, granite, caliche, and uranium are all individual mineral rights in Texas that can be individually severed.[81] The creation of severed mineral estates may affect one or more substances, but the conveyance of only one mineral severs only that specific mineral.[82] The reservation

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72 *See* Sun Oil Co. v. Whitaker 483 S.W.2d 808, 816 (Tex. 1972).

73 *See* Harrison, *supra* note 57, at 138.

74 Berte R. Haigh & Howard R. Williams, *Mineral Rights and Royalties*, HANDBOOK OF TEXAS ONLINE (2010).

75 *See* H. Philip Whitworth, *Leasing and Operating State-owned Lands for Oil and Gas Development*, 16 TEX. TECH L. REV. 673, 680 (1985) ("Texas, as both a republic and during the period following its entry into the Union, observed the practice followed under Spanish and Mexican civil law of reserving the minerals from all public lands that were sold or otherwise conveyed.").

76 *See id.*

77 Tex. Const. of 1866 art. VII, § 39; Tex. Const. of 1869, art. X, § 9; Tex. Const. art XIV, § 7.

78 *First Lone Star Discovery*, *supra* note 31.

79 *See* Harris v. Currie, 176 S.W.2d 302, 304 (Tex. 1943) ("The owner has the right to sever his land into two estates, and he may dispose of the mineral estate and retain the surface, or he may dispose of the surface estate and retain the minerals.").

80 *See* French v. Chevron U.S.A. Inc., 896 S.W.2d 795, 797 (Tex. 1995).

81 Moser v. U.S. Steel Corp., 676 S.W.2d 99, 102 (Tex. 1984).

82 Christopher M. Alspach, *Adverse Possession of Severed Mineral Interests and the Need for Statutory Guidance*, 37 TEX. TECH L. REV. 1073, 1078 (2005).

or conveyance of these distinct property interests creates a severed estate in Texas.[83] In deciding the validity of severable estates in 1915, the Texas Supreme Court held:

> [Oil and gas] have peculiar attributes not common to other minerals because of their fugitive nature or vagrant habit—the disposition to wander or percolate, and the possibility of their escape from beneath one part of the surface of the earth to another. Nevertheless, they are to be classed as minerals. . . . A purchaser of [oil and gas] within the ground assumes the hazard of their absence through the possibility of their escape from beneath the particular tract of land, and, of course, if they are not discovered, the conveyance is of no effect, just as the purchaser of solid mineral within the ground incurs the risk of its absence, and therefore a futile venture. . . . [I]f they are in place beneath the tract, they are essentially a part of the realty, and their grant, therefore, while in that condition . . . is a grant of an interest in the realty.[84]

Additionally, the Court held in 1923 that "where it is the intention of the parties to a conveyance of land to separate the title in fee to the minerals in place from the title in fee to the remainder of the land, effect will be given to this intention."[85] The Court's early holdings, addressing in detail the severability of estates, reflect the skepticism or confusion individuals might have had regarding the concept of treating a fugitive resource as a part of the reality.[86]

Due in part to the history of Texas and how it came to be a state and in part to Texas's approach to private land ownership, the United States government owns less than 1.5% of land in Texas—meaning that the federal government owns only a small percentage of minerals in Texas.[87] In comparison, the federal government owns more than 33% of the land within the State of New Mexico.[88] The private ownership of minerals has been a driving force behind the development of oil and gas production within the State of Texas; such development is apparent when one compares the amount of oil produced from the Permian Basin in Texas to the amount produced from the portion of the Permian Basin located in New Mexico.[89] The private ownership of min-

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83 Humphreys-Mexia Co. v. Gammon, 254 S.W. 296, 299 (Tex. 1923).

84 Texas Co. v. Daugherty, 176 S.W. 717, 719–20 (Tex. 1915).

85 *Humphreys-Mexia Co.*, 254 S.W. at 302 (analogizing the doctrine of merger with the mineral estate).

86 *See, e.g.*, *Daugherty*, 176 S.W. at 719.

87 *See* Eric Williams, *Public Land in Texas: A (Very) Brief History*, WIDE OPEN SPACES (Jan. 26, 2016) https://www.wideopenspaces.com/public-land-texas-brief-history/ (discussing the history of Texas's statehood and land ownership).

88 Niraj Chokshi, *A third of New Mexico is federally owned, but the state might buy some of it back*, THE WASHINGTON POST (Dec. 30, 2013), https://www.washingtonpost.com/blogs/govbeat/wp/2013/12/30/a-third-of-new-mexico-is-federally-owned-but-the-state-might-buy-some-of-it-back/. The federal government owns 47% of land in the West, but only 4% of land east of the Mississippi River. Quoctrung Bui & Margot Sanger-Katz, *Why the Government Owns So Much Land in the West*, N. Y. TIMES (Jan. 5, 2016), https://www.nytimes.com/2016/01/06/upshot/why-the-government-owns-so-much-land-in-the-west.html.

89 *See* Jeffery Ball & Benjamin Lowy, *Lone Star Rising*, FORTUNE (May 25, 2018) http://fortune.com /longform/permian-basin-oil-fortune-500/. The Permian Basin is located mostly in Texas, with part of it in Southeastern New Mexico. *Id.*

eral estates gives the owner the ability to do as he or she wishes with the property, allowing and incentivizing the development of the estate for financial gain is usually an appealing choice.

C. The Impacts of *Day* and *Coyote Lake Ranch* to Texas Groundwater Estates

Texas groundwater estates have historically been treated differently than mineral estates and have remained controlled by the surface estate.[90] However, in recent Texas Supreme Court decisions, the Court has aligned groundwater estates and mineral estates, holding the groundwater estate to be a freely severable estate.[91] The Texas approach differs from many states.[92]

In 1972, the Texas Supreme Court explicitly stated that "[w]ater, unsevered expressly by conveyance or reservation, has been held to be a part of the surface estate."[93] The Court, relied upon the holding of the Seventh Court of Appeals, which acknowledged that "surface" could be defined in various ways and adopted the view that the surface interests include "not only the soil, but also any underground water supplies at all depths under the land" but exclude "the oil, gas and other minerals therein."[94]

Though the groundwater estate was held to be a part of the surface estate, the express conveyance or reservation of the groundwater estate creates a severed estate. This reflects Texas's historical stance that Texans have the right to contract with regard to their property as they see fit.[95] Texas took a progressive approach to protect the private property interests affiliated with groundwater estates, and recent case law has supported groundwater estates as being severable and not subject to control by the surface estate.[96]

Similar to the uncertainty regarding the validity of deeds severing wind rights, the validity of deeds severing the rights in groundwater was unclear for many decades.[97] Even with uncertainties, attorneys severed many groundwater estates during this time, relying on the policy that Texans have the right to contract with regard to their property

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90 Sun Oil Co. v. Whitaker, 483 S.W.2d 808, 811 (Tex. 1972) (allowing a mineral estate owner to use underlying groundwater for oil production).

91 *See* Edwards Aquifer Auth. v. Day, 369 S.W.3d 814 (Tex. 2012); Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53 (Tex. 2016).

92 *See infra* Part V, § A.

93 *Whitaker*, 483 S.W.2d at 808, 811 (citing Fleming Found. v. Texaco, Inc., 337 S.W.2d 846 (Tex. Civ. App.—Amarillo 1960, writ ref'd n.r.e.)).

94 Fleming Found. v. Texaco, Inc., 337 S.W.2d 846, 850 (Tex. App.—Amarillo 1960, writ ref'd n.r.e.).

95 *Whitaker*, 483 S.W.2d at 814 (Daniel, J., dissenting).

96 *See generally Coyote Lake Ranch*, 498 S.W.3d at 65 ("The principle . . . that a severed mineral estate's implied right to use the surface must be exercised with due regard for the surface estate's right, and the rules common to mineral and groundwater estates, compel the conclusion that the accommodation doctrine extends to groundwater estates."); *Day*, 369 S.W.3d at 831–32 (holding that the absolute severalty that applies to oil and gas in the common law also applies to groundwater).

97 *See generally* City of Del Rio v. Clayton Sam Colt Hamilton Tr., 269 S.W.3d 613, 617–18 (Tex. App.—San Antonio 2008, pet. denied) (holding that the landowner was entitled to sever the groundwater form the surface estate when it conveyed surface estate via warranty deed).

as they see fit, and in 2008, an appellate court upheld the validity of deed provisions severing the rights of groundwater.[98] The San Antonio District Court of Appeals cited multiple Texas Supreme Court cases addressing the "absolute ownership theory" that has been applied to mineral estates for over 100 years and concluded that a grantor can reserve all groundwater rights when it conveys the remainder of the fee, thus creating a distinct groundwater estate.[99]

In 2012, the Supreme Court of Texas held that land ownership includes a distinct, divisible, and constitutionally-protectable interest in the groundwater beneath the surface estate, similar to that of oil and gas.[100] Later, in the Texas Supreme Court decision in *Day*, the Court determined the ownership of groundwater to be "in place" by adopting the ownership theory previously applied to mineral estates.[101] The ownership-in-place theory establishes that a surface owner, owning a property in fee simple, owns all the minerals and groundwater, fugitive resources, and solid resources below his surface estate. The Court analogized the mineral estate to the groundwater estate as follows:

> In our state the landowner is regarded as having absolute title in severalty to the oil and gas in place beneath his land. The only qualification of that rule of ownership is that it must be considered in connection with the law of capture and is subject to police regulations. The oil and gas beneath the soil are considered a part of the realty. Each owner of land owns separately, distinctly and exclusively all the oil and gas under his land and is accorded the usual remedies against trespassers who appropriate the minerals or destroy their market value.[102]

The Court's holding in *Day* determined the same real property ownership standards should be applied to both oil and gas and groundwater and stated that "the common law regarding the ownership of groundwater [is] in place."[103] Ownership in place as it applies to both minerals and groundwater in Texas comes from *Acton v. Blundell*, an old English case discussing the absolute ownership theory, and determines the ownership of the resource before it is produced.[104] The rule of capture doctrine determines the ownership of the resource once it is produced.[105]

In determining ownership of groundwater to be "in place," the Court considered historical views associated with groundwater, as well as future needs.[106] The Court noted the future needs of groundwater by comparing the prices of bottled water and oil, stating that "[t]o differentiate between groundwater and oil and gas in terms of importance to

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98 *See, e.g.*, *id.* at 618.

99 *Id.* at 617–18 (citing Friendswood Dev. Co. v. Smith-Southwest Indus., Inc., 576 S.W.2d 21, 25–27 (Tex. 1978); Sun Oil Co. v. Whitaker, 483 S.W.2d 808, 811 (Tex. 1972); Texas Co. v. Burkett, 296 S.W. 273, 278 (1927)).

100 *Day*, 369 S.W.3d. at 823.

101 *See id.* at 831–32. The Texas Supreme Court outlined ownership "in place" for oil and gas in Elliff v. Texon Drilling Co., 210 S.W.2d 558 (Tex. 1948).

102 *Id.* at 832 (quoting *Elliff*, 210 S.W.2d at 562).

103 *See id.*

104 *Id.* at 824. Acton's rule states: "the person who owns the surface may dig therein and apply all that is there found to his own purposes, at his free will and pleasure." *Id.* at 825 (quoting *Acton v. Blundell*, 152 Eng. Rep. 1223 (Exch. 1843)).

105 *Id.* at 829.

106 *See Day*, 369 S.W.3d at 832.

modern life would be difficult."[107] The Court also clarified that water is essential to human life, and that there was no basis to bar ownership of groundwater in place.[108]

More recently, the Texas Supreme Court, in *Coyote Lake Ranch*, applied the accommodation doctrine to groundwater estates, and took the next step in protecting the individual property rights of groundwater owners.[109] The Court again analogized the similarities between groundwater and mineral estates, homing in on the aspects that both estates consist of fugacious and fungible resources, both may be severed from the surface estate, both are subterranean reservoirs, and both are subject to the rule of capture.[110] The Court stated that it had "applied the [accommodation] doctrine only when mineral interests are involved. But similarities between mineral and groundwater estates, as well as their conflicts with surface estates, persuade us to extend the accommodation doctrine to groundwater interests."[111]

This analogy between groundwater estates and mineral estates further supports the Court's comparison of the two estates in its 2012 opinion in *Day*.[112] Groups representing private landowners submitted amicus briefs to support expanding the accommodation doctrine to groundwater estates to "lay a proper foundation for development of [real property and water rights] principles in a fair and flexible manner to ensure relative certainty and orderly development of one of Texas's most important resources."[113] The Court's holding, which applied the accommodation doctrine to groundwater estates, further supports groundwater estates as a severable property interest and advances private property rights in Texas.[114]

D. Ownership of Groundwater Estates in Similarly Situated States

Texas is the only state that has applied ownership in place to groundwater estates. Other states determine ownership or use of groundwater by the reasonable use approach, prior appropriation doctrine, or public trusts.[115] The reasonable use approach adopted by the Nebraska Supreme Court is in direct opposition to Acton's absolute ownership doctrine, or ownership in place, which Texas has adopted.[116] Nebraska, a state similarly dependent on groundwater for agricultural purposes, has held that the ownership of

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107 *Id.* at 831.

108 *See id.*

109 *See* Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53, 64 (Tex. 2016). The accommodation doctrine requires the balancing of interests of the surface estate and the groundwater or mineral owner who carry the dominant easement over the surface estate. *Id.*

110 *See id.* at 62–64.

111 *Id.* at 63.

112 *Day*, 369 S.W.3d at 831–32.

113 Brief for Texas Farm Bureau as *Amicus Curiae* Supporting Petitioners at 3, Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53 (Tex. 2016) (No. 14-0572).

114 *See Coyote Lake Ranch*, 498 S.W.3d at 65.

115 Sanjaya Raj Joshi, *Comparison of Groundwater Rights in the United States: Lessons for Texas*, Tex. Tech. Univ. 17–83 (Aug. 2005), https://aquadoc.typepad.com/files/gw_rights_thesis.pdf (summarizing groundwater laws in the United States).

116 *See* Metropolitan Utils. Dist. of Omaha v. Merritt Beach Co., 179 Neb. 783, 800 (Neb. 1966) ("[W]e adhere to the rule that [underground] waters must be reasonably used for a beneficial purpose without waste.").

groundwater is vested with the citizens of Nebraska, and use of the groundwater is determined by the reasonable use approach.[117] The well that produces the groundwater determines who may use the groundwater, so only the surface estate owner can utilize the water lying below their surface estate; water cannot be pumped out of the ground and then transported for commercial use like it can in Texas.[118] Nebraska also differs from Texas in that the production of groundwater does not follow the rule of capture, but is controlled by a permitting process that determines the specific amount of water that can be produced.[119]

States such as California and Iowa also do not recognize severed groundwater estates; however, these states have adopted a correlative use approach to determine how much a surface owner can use the groundwater.[120] The correlative use approach honors private ownership of groundwater below the surface estate.[121] This approach provides for sharing waters from a common source. Currently, in California, the landowner owns the groundwater and the rights to the groundwater are co-equal and correlative to the neighbors who also sit above the aquifer.[122] Though this approach does not reflect "ownership in place," private property rights are recognized and are not lost if the owner decides not to utilize the groundwater.

Colorado aligns with Nebraska and does not recognize a property interest in groundwater.[123] The Colorado Constitution, statutes passed by the Colorado General Assembly, and holdings from the Colorado Supreme Court reflect two main principles.[124] First, all surface water and groundwater within Colorado is owned by the public and is dedicated to the use of the people through water regulation prescribed by the laws of Colorado.[125]

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117 *See id.* States such as New York, Missouri, and New Hampshire follow the reasonable use doctrine as well; however, Nebraska is the most prominent state to analyze when discussing the reasonable use doctrine due to vast amounts of groundwater under the state and the agricultural production occurring within Nebraska. *See* Joshi, *supra* note 115, at 46, 51, 53.

118 *Ownership Preview of Groundwater Wells and Surface Water Rights*, Nebraska Dept. of Nat. Res., https://dnr.nebraska.gov/surface-water/ownership-preview-groundwater-wells-and-surface-water-rights (last visited Nov. 15, 2019).

119 *See id.*

120 *Who Owns the Water?*, WATER SYSTEM COUNCIL 5, http://www.watersystemscouncil.org/download /3436/ (last updated Aug. 2016).

121 *See* Katz v. Walkinshaw, 141 Cal. 116, 138 (Cal. 1902).

122 *Who Owns the Water?*, *supra* note 120, at 5.

123 Colorado has a unique approach to groundwater ownership and allocation of groundwater based on where the groundwater in question originates: in a designated basin, as tributary groundwater, or as non-tributary groundwater. This Note focuses on the ownership rights of non-tributary groundwater because that is how the groundwater underneath the state of Texas would be classified were it in Colorado. *See generally* Amy Huff, *Tributary or not? Decoding confusing water rules*, THE DURANGO HERALD (Oct. 8, 2011), https://durangoherald.com/articles/29832 (groundwater in the state of Texas is not connected to running streams; the vast majority of groundwater in Colorado is connected to streams); *Groundwater-Surface Water Interactions in Texas*, BUREAU OF ECONOMIC GEOLOGY (2005), http://www.beg.utexas.edu/staffinfo/pdf/scanlon_gwswr2005.pdf.

124 Justice Gregory Hobbs, Jr., *Water Law*, COLORADO ENCYCLOPEDIA, http://coloradoencyclopedia.org/article/water-law (last visited Nov. 15, 2019).

125 *See id.*

Second, groundwater permits are enforced by state officials to define the right of water use.[126] Surface estate owners in Colorado can request permits for the use of non-tributary groundwater to be utilized on the surface estate; however, one never gains a personal property interest in the groundwater.[127]

New Mexico has also taken the stance that groundwater is the property of the State, and the State has authority to allocate the water for beneficial use with the prior appropriation doctrine.[128] Though New Mexico does not recognize private ownership of water, the history of water allocation in New Mexico indicates the state is stuck honoring agreements that appropriated water when New Mexico was merely a U.S. Territory and in the early years of statehood.[129] Early in its statehood, New Mexico entered into three compacts with neighboring states, appropriating water to the respective states.[130] The federal government also played a significant role in early New Mexico water law, entering into a Treaty with Mexico for delivery of Rio Grande waters in 1906.[131] New Mexico is now a party to eight interstate compacts; thus, the water has to remain a property interest of the state so New Mexico can ensure the compacts are honored.[132] Though water is a property interest held by the public, a landowner can gain the legal right to use water from an available physical supply through a permitting process with the State Engineer.[133] Lastly, some states assert public trust ownership over groundwater in the state pursuant to state statutes that eliminate all private property interests in ground-

126 *See id*.

127 *See* Dick Wolfe, *Guide to Colorado Well Permits, Water Rights, And Water Administration*, STATE OF COLO. DEPT. OF NAT. RES. DIV. OF WATER RES. (Sept. 2012), https://www.colorado.gov/pacific/sites /default/files/wellpermitguide_1.pdf.

128 *Who Owns the Water?*, *supra* note 120, at 2.

129 *See History: The Politics of Water*, N.M. MUSEUM OF ART, http://online.nmartmuseum.org/nmhistory /people-places-and-politics/water/history-water.html (last visited Nov. 15, 2019).

130 Francesca M. Eick, Alyssa A. Moir & Craig P. Wilson, *New Mexico Files Counterclaims Against Texas and the United States in Latest Chapter of Interstate Water Compact Dispute*, K&L GATES (June 4, 2018), http://www.klgates.com/new-mexico-files-counterclaims-against-texas-and-the-united-states-in-latest-chapter-of-interstate-water-compact-dispute-06-04-2018/. New Mexico is a party to the Rio Grande Water Compact, Lower Colorado River Water Compact, Pecos River Compact, Costilla Creek Compact, Canadian River Compact, Red River Water Compact, Upper Colorado River Compact, and Aminas-La Plata Compact. *See id*.

131 *See generally* Robert Autobee, *Rio Grande Project*, BUREAU OF RECLAMATION HISTORY PROGRAM (1994). The U.S. treaty with Mexico allocates 60,000 acre-feet of water per year from the Elephant Butte Reservoir in New Mexico to Mexico, and the environmental changes, as well as population growth and consumption, have left Elephant Butte Reservoir at under 25% full since the 1990's. *Id*. at 3; *Elephant Butte Lake*, WATER DATA FOR TEXAS, https://waterdatafortexas.org/reservoirs/individual/elephant-butte (last visited Nov. 15, 2019).

132 Wilson et al., *supra* note 130.

133 Matthew G. Rawlings, *Variables to Consider when Transferring Water Rights in New Mexico*, at 2–4 (Feb. 2, 2007), http://digitalrepository.unm.edu/wr_sp/62 (explaining the permitting process to obtain a legal right to use water and discussing the differences between a legal right to use water compared to ownership of the water). In New Mexico water right holders can lose the water right if the owner does not utilize the water for four years or does not put the water to beneficial use. *See id*.

water.[134] South Dakota is one of eight states that has asserted public trust over the groundwater under the state.[135] Similar to South Dakota, Colorado, and Nebraska, groundwater in Montana is held by the state on behalf of its citizens.[136]

E. THE SEVERABILITY OF WIND RIGHTS

The same reasoning that supports severing both the groundwater and mineral estates supports severing the wind estate. Due to the insufficient body of case law addressing the severability of wind estates, additional support can be found in property ownership theories. The California Court of Appeals was the first to discuss whether wind rights could be severed from the surface estate and compared the severance of wind to the severance of subsurface minerals, specifically oil and gas.[137] The United States District Court for the District of New Mexico addressed the issue of wind severance and aligned the ownership of wind to the ownership of water.[138] The holdings in both California's *Contra* and New Mexico's *Romero* cases were narrow. *Contra* involved an eminent domain suit in which Contra Costa Water District, as part of a project to construct a reservoir, condemned part of Vaquero Farms' land where wind turbines were located.[139] To pay less during the condemnation proceedings, the Contra Costa Water District reserved the wind rights to Vaquero Farms and only condemned the underlying land.[140] On appeal, the court narrowly defined the issue, asking "[w]hen a public entity acquires property through eminent domain, are the windpower rights capable of segregation or are they so affixed to the underlying land that they must be acquired by the condemning authority?"[141] The court compared the severance of wind to the severance of subsurface minerals, specifically oil and gas, noting that capturing both hydrocarbons and wind ultimately result in the generation of energy.[142] The court ultimately held that the severance of the wind estate from the surface estate was valid.[143]

The United States District Court for the District of New Mexico addressed the issue of wind severance in *Romero*, and aligned the ownership of wind to the ownership of water.[144] *Romero* involved a partition of property owned by the parties as tenants in

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134 *Who Owns the Water?*, *supra* note 120, at 8.

135 S.D. CODIFIED LAWS § 46-1-2 (2019) ("It is hereby declared that the protection of the public interest in the development of the water resources of the state is of vital concern to the people of the state and that the state shall determine in what way the water of the state, both surface and underground, should be developed for the greatest public benefit.").

136 MONT. CONST. art. IX, § 3 ("All surface, underground, flood, and atmospheric waters within the boundaries of the state are the property of the state for the use of its people.").

137 *See* Contra Costa Water Dist. v. Vaquero Farms, Inc., 68 Cal. Rptr. 2d 272, 278 (Cal. Ct. App. 1997) ("We agree with the Water District's assertion that '[t]he right to generate electricity from windmills harnessing the wind, and the right to sell the power so generated, is no different, either in law or common sense, from the right to pump and sell subsurface oil, or subsurface natural gas by means of wells and pumps.'").

138 Romero v. Bernell, 603 F.Supp.2d 1333, 1334–36 (D.N.M. 2009).

139 *Contra Costa Water District*, 68 Cal. Rptr. 2d at 273–74.

140 *Id.*

141 *Id.* at 276.

142 *Id.* at 278.

143 *Id.* at 273.

144 Romero v. Bernell, 603 F. Supp. 2d 1333, 1335 (D.N.M. 2009).

common.[145] The respondent argued that the land could not be partitioned because the value of the land derived from the wind farm and that "wind power rights, like mineral rights, are not capable of being partitioned."[146] The Federal District Court did not follow the logic set forth in *Contra*, rejecting the analogy to mineral severance and instead comparing the ownership of wind to the ownership of water.[147] The court found "[t]he right to 'harvest' wind energy is, then, an inchoate interest in the land which does not become 'vested' until reduced to 'possession' by employing it for a useful purpose."[148] Though taking a different approach than the court in *Contra*, the court emphasized that "only after [wind] is reduced to actual wind power can wind energy then be severed and/or quantified."[149] Because the property in question in *Romero* did not have any wind turbines installed, the court held that the wind interest was not vested or reduced to possession and ordered the property to be divided among the tenants in common.[150] This holding in *Romero* aligns with the prior appropriation doctrine that is followed by the State of New Mexico in determining the ownership of surface and groundwater.[151]

Both *Contra* and *Romero* narrowly support the existence of severable interests in wind. One court analyzed the ownership of wind with ownership theories applied to mineral estates, while the other court analyzed the ownership of wind with ownership theories applied to water. Luckily, the ownership theories applied to both groundwater estates and mineral estates are the same in Texas.

IV. Texas Legislative History Supporting Wind Development

To Texans across the state, wind farms provide essential economic and environmental benefits that the Texas Legislature has supported through the passage of tax incentives, renewable energy incentives, and educational programs that have promoted the development of wind within the state.[152] Specifically, wind power development provides "economic development to rural regions, reduces water consumption in the electric power sector, and reduces greenhouse gas production by displacing fossil fuels."[153] The economic impact the wind industry has had on the state is as positive as the legislature

145 *Id.* at 1334.

146 *Id.*

147 *See id.* at 1334–35 (arguing that "it does not appear minerals in the ground are the appropriate commodity to create a legal paradigm to analyze wind power. . . . [w]ind is never embedded in the real estate; rather, it is more like water or wild animals which traverse the surface and which do not belong to the fee owner until reduced to possession.").

148 *Id.* at 1335.

149 *Id.*

150 *Id.*

151 *Id.*

152 Morgan Smith, *Wind Money Fuels Spending and Benefits in Small Schools*, N. Y. Times (Nov. 10, 2011), https://www.nytimes.com/2011/11/11/us/wind-money-fuels-spending-and-benefits-in-small-schools.html.

153 U.S. Dep't. of Energy, *Economic Benefits, Carbon Dioxide (CO2) Emissions Reductions, and Water Conservation Benefits from 1,000 Megawatts (MW) of New Wind Power in Kansas*, The Nat. Renewable Energy Lab (June 2008), http://www.nrel.gov/docs/fyo8osti/43517.pdf.

hoped: 23,000 individuals make their living in a job connected to wind energy,[154] agreements with wind operators have allowed school districts to set up multi-million-dollar endowments,[155] wind operators made annual lease payments to landowners of roughly $70 million in 2018,[156] and installation of wind farms throughout Texas has increased the tax base for many rural schools and county districts.[157]

The Texas Legislature has played a significant role throughout the development of wind energy in Texas. Then-Governor George W. Bush helped establish Texas as the first state to provide a significant Renewable Portfolio Standard (RPS), which included a unique Renewable Energy Credit (REC) system to effectuate the program.[158] The RECs operate as a way for renewable energy to be easily traded among energy companies so that each company can satisfy the requirements outlined in the RPS program.[159] If one energy company decides to invest heavily in wind development, and therefore satisfies the amount of renewable energy the company needs to produce under RPS, the company can then sell the RECs to another company that needs to increase its RECs to satisfy RPS.[160]

In 2005, the Texas Legislature passed Senate Bill 20, which brought into being the Competitive Renewable Energy Zones (CREZ), which created and implemented an electricity transmission plan to connect renewable energy projects throughout the state to major metropolitan centers.[161] The bill furthered the development of wind energy across the state. The installation of transmission lines in rural West Texas allow energy to be marketed and transmitted to larger cities, such as Dallas and Fort Worth.[162]

In 1999, the Texas Legislature set its first goals aimed at increasing wind energy.[163] In 2005, the Texas Legislature set goals of having 10,000 megawatts of energy produced by renewable sources by 2025.[164] Texas reached this goal fifteen years ahead of schedule,

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154 Advanced Power Alliance, *New Report: Texas Dominates Wind Energy Jobs, Investment*, THE WIND COALITION, http://windcoalition.org/new-report-texas-dominates-wind-energy-jobs-investment/ (last visited Oct. 11, 2019).

155 Smith, *supra* note 152.

156 *Wind Energy in Texas*, AM. WIND ENERGY ASS'N, https://awea.org/Awea/media/Resources / StateFactSheets/Texas.pdf (last visited Oct. 11, 2019).

157 Smith, *supra* note 152.

158 *See generally* Becky H. Diffen & Ernest E. Smith, *Winds of Change: The Creation of Wind Law*, 5 TEX. J. OIL GAS & ENERGY L. 165, 170–71 (2010) [hereinafter *Winds of Change*]; *see also Jousting at Windmills*, *supra* note 30 (providing more information regarding RPS and REC systems and their implementation in states like Texas that could have wind-mineral conflicts).

159 *See* Alexander, *supra* note 29, at 436–37 (indicating that RPS legislation in Texas has allowed the state to become a major wind energy producer).

160 *See generally Winds of Change*, *supra* note 158, at 170–71 (2010); *see also Jousting at Windmills*, *supra* note 30.

161 *See Winds of Change: The Creation of Wind Law*, *supra* note 158, at 200.

162 Warren Lasher, *The Competitive Renewable Energy Zones Process,* 6–8 (Aug. 11, 2014), https://www.energy.gov/sites/prod/files/2014/08/f18/c_lasher_qer_santafe_presentation.pdf.

163 *Texas Renewable Energy*, OFFICE OF THE GOVERNOR 5 (2014), https://gov.texas.gov/uploads/files /business/renewableenergy-report.pdf.

164 *See id.*

producing 10,000 megawatts of energy from renewable sources by 2010.[165] As of 2017, Texas produces 23,262 megawatts of wind energy, with another 5,554 megawatts under construction.[166] One megawatt of energy can power roughly 200 homes during periods of peak electricity usage.[167]

In 2005, the Texas Legislature passed the Texas Emerging Technology Fund (TEFT) "to provide Texas with an advantage in the research, development, and commercialization of emerging technologies."[168] The TEFT was reauthorized in 2013, and has granted over $46 million to renewable energy-related projects.[169] The Texas Legislature has also passed property tax exemptions for renewable energy devices and landowners with windfarms.[170]

The American Wind Energy Association reports a total capital investment of $42 billion in Texas wind energy to date and annual lease payments to landowners of $60 million.[171] This capital investment into wind energy in Texas would not have happened without the benefits provided by the Texas Legislature.[172] Legislators have played a significant role in the development of wind in Texas, but have yet to determine a landowner's interest in the wind estate.

V. Severance of Wind Estates: The Theories in *Day* and *Coyote Lake Ranch* Provide a Path of Action for the Texas Legislature or Texas Supreme Court

Texas should liken wind ownership to groundwater ownership or mineral ownership. Texas should follow *Day* and *Coyote Lake Ranch* to allow the severance of undeveloped wind rights to protect private property interests of landowners in Texas and provide clarity to wind development in Texas. The Supreme Court of Texas affirmed that groundwater is a property interest that is owned in place,[173] and thus strengthened private property interests for Texans.[174] The Court then affirmed that the accommodation doctrine applies to the severable groundwater estate in *Coyote Lake Ranch*, further supporting groundwater as a freely severable estate that is not controlled by the surface estate.[175] The Texas Legislature should follow the principles applied to the groundwater estate, the legislative history of supporting wind development in Texas, and the theoret-

165 *See id*.
166 *Wind Energy in Texas*, *supra* note 156, at 2.
167 Rye Druzin, *Texas wind generation keeps growing, state remains at No. 1*, Houston Chronicle (Aug. 23, 2018), https://www.houstonchronicle.com/business/energy/article/Texas-wind-generation-keeps-growing-state-13178629.php.
168 *Texas Renewable Energy*, *supra* note 163, at 5.
169 *Id*.
170 *Id*. at 6.
171 *Wind Energy in Texas*, *supra* note 156, at 1.
172 Wetsel Interview, *supra* note 7.
173 *See* Edwards Aquifer Auth. v. Day, 369 S.W.3d 814, 831–32 (Tex. 2012).
174 *See generally* Brief for Texas Farm Bureau as *Amicus Curiae* Supporting Petitioners at 3, Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53 (Tex. 2016) (No. 14-0572).
175 Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53, 64 (Tex. 2016).

ical approach underscoring the holding in *Day*. The Texas Legislature should also understand the stances that other states have taken on severing the wind estate, keeping in mind each state's respective policy on protecting property rights.

A. THE DIFFERENCE BETWEEN TEXAS GROUNDWATER LAW AND SIMILARLY SITUATED STATES' GROUNDWATER LAW

The Supreme Court of Texas, in *Day*, ruled that groundwater under an individual's property is a property right that is owned in place.[176] The ownership in place theory was previously applied to mineral estates in Texas; however, this approach differs from how other states have analyzed the ownership of groundwater.[177] The Texas Legislature should take note of this stance made by the Texas Supreme Court, which promoted private property rights and the control over one's property.

States that utilize the correlative rights doctrine, such as California, compare the private property rights of landowners to the private property rights of neighboring landowners who are accessing the same aquifer.[178] To determine which owners are allocated use of the groundwater—and how much they can use—correlative rights courts analyze if the use of the groundwater will be reasonable and beneficial to the surface estate.[179] Though California does not recognize ownership in place, under the correlative rights approach, the state recognizes a private property interest in the groundwater that lies below the surface estate, and the property rights are not lost if the owner decides not to utilize the groundwater.[180]

Though California and Texas differ on whether the surface owner has absolute ownership in groundwater rights or mere correlative rights, California is clear that there are private property rights in groundwater estates that are not lost by the surface estate even if they are not continuously used.[181] Colorado, on the other hand, does not recognize a property interest in groundwater.[182] Surface estate owners in Colorado can request permits for the use of non-tributary groundwater to be utilized on the surface estate; however, one can never gain a personal property interest in the groundwater.[183]

Nebraska takes a similar approach to Colorado on property rights in groundwater, in direct opposition to the ownership theories expressed in *Day* and *Coyote Lake Ranch*. Nebraska follows the doctrine of reasonable use.[184] The reasonable use theory allows

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176 *Day*, 369 S.W.3d at 831–32.

177 *Id.*

178 *Who Owns the Water?*, *supra* note 120, at 2.

179 Katz v. Walkinshaw, 141 Cal. 116, 134 (Cal. 1903) (holding that the use of groundwater is limited to what "may be necessary for some useful purpose in connection with the land from which it is taken").

180 Wright v. Goleta Water Dist., 174 Cal. App. 3d 74, 84 (Ct. App. 1985) (maintaining that the correlative rights of landowners do not depend on use and are not lost by disuse).

181 *Id.*

182 *See Guide to Colorado Well Permits, Water Rights, and Water Administration*, STATE OF COLO. DEP'T OF NAT. RES. DIV. OF WATER RES. 15–16 (Sep. 2012), https://www.colorado.gov/pacific/sites/default/files /wellpermitguide_1.pdf (explaining the process to obtain a water right in Colorado).

183 *Id.* at 9–11.

184 *See Water Law: An Overview*, NAT'L AG LAW CENTER, https://nationalaglawcenter.org/overview /water-law/ (last visited Oct. 10, 2019).

landowners to use the groundwater, but the property interest in the groundwater is vested and managed by the public.[185] This doctrine was first developed in *Metropolitan Utilities District v. Merritt Beach Co.*, where the Court explicitly acknowledged that the new reasonable use rule was in direct opposition to the absolute ownership doctrine, which Texas has utilized to promote private property interests.[186]

New Mexico's history of appropriating water early in the state's development has hindered the private ownership of groundwater.[187] However, a landowner can gain the legal right to use the water from a physical supply of water if the landowner goes through the legal permitting process and is approved.[188]

In examining the approaches other states have taken with groundwater rights, the important underlying theme is the focus on honoring private property rights. When people think of California and Texas, most probably think the states have opposite positions on most topics; however, when addressing private property rights, the two states respective approaches are closer than many assume. On the other hand, Nebraska, South Dakota, Montana, and Colorado do not honor a private property interest in the groundwater below a surface estate.

B. The Congruence Between States' Stances on Groundwater Estates and Wind Estates

Just as California recognizes a correlative ownership interest in groundwater and mineral estates, California has also addressed the existence of a severable property interest in the wind estate. This was the first judicial holding in the country that supported legal severance of wind rights from the surface estate.[189]

In 2009, the U.S. District Court for the District of New Mexico addressed the issue of wind severance in *Romero v. Bernell*, drawing guidance from analogizing the ownership of wind to that of water within the state.[190] In the court's comparison between wind and water, it applied the state's "legal treatment of the most analogous natural resource, water."[191] Though the court in *Romero* recognized a property interest in the wind estate, the court concluded that the wind interest had to be vested for severance to occur. Because the surface estate owners had not developed the wind rights, the wind estate could not be severed. This aligns with the state's approach regarding its application of the doctrine of prior appropriation to water.[192]

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185 *See id.*

186 Metropolitan Utils. Dist. of Omaha v. Merritt Beach Co., 179 Neb. 783, 800 (Neb. 1966) ("[W]e adhere to the rule that [underground] waters must be reasonably used for a beneficial purpose without waste.").

187 *See New Mexico Water Basics and An Introduction to Water Markets*, The Business Water Task Force 9–12 (2010), https://aquadoc.typepad.com/files/nm-water-brochure-final.pdf.

188 *Id.* at 9.

189 *See* Contra Costa Water Dist. v. Vaquero Farms, Inc., 68 Cal. Rptr. 2d 272, 273-76 (Ct. App. 1997).

190 Romero v. Bernell, 603 F. Supp. 2d 1333, 1335 (D.N.M. 2009).

191 *Id.*

192 *See id.* ("The only right obtainable in water is the right to appropriate so much as is actually used for some beneficial purpose. . . . Once appropriated, the water right may become vested by continuous use or lost completely or partially through non-use.").

On the other hand, South Dakota, where the state owns the groundwater, was the first state to pass legislation banning the severance of wind rights.[193] In 1996, the South Dakota Legislature presented the issue when they passed legislation to "protect landowners from speculators who were buying up wind rights at $1 per acre before farmers and ranchers recognized their potential value."[194] In 2005, North Dakota followed South Dakota and passed legislature banning severing wind estates from the surface estate.[195] North Dakota was only the second state to pass legislation banning the severance of wind estates, and unlike South Dakota, the North Dakota legislature included language in the statute to clarify the banning of severing wind estates only applied *prospectively*.[196] The legislative intent behind this language, which did not affect previously-severed wind estates, was to insulate the North Dakota government from lawsuits alleging unconstitutional takings claims.[197] The apparent property interest in a wind estate above the surface estate was recognized when the North Dakota Legislature warranted that there would not be any takings claims brought forth from landowners that had previously severed their wind estate from their surface estate.[198]

Colorado, a state where water within the state is the property of its citizens, proposed legislation in 2010 in support of the creation of a severed wind estate; however, the bill did not make it out of committee.[199] Two years later Colorado's view shifted, aligning with its longstanding stance on water rights; the state passed a statute banning the severance of wind estates in 2012.[200]

Nebraska also passed a statute in 2012 banning the severance of wind rights from the surface estate.[201] Nebraska Senator Dubas introduced the bill to ban the severance of wind estates "to clarify and authorize that certain provisions be included in easements and contracts related to wind facilities and landowners."[202] When asked what thought

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193 *Sins of the Father*, *supra* note 56, at 418.

194 *Id.* at 418, n.220.

195 *Id.* at 419. *See also* N.D. CENT. CODE § 17-04-04 (2007) ("Except for a wind easement created under section 17-04-03 and as otherwise provided in this section, an interest in a resource located on a tract of land and associated with the production of energy for wind power on the tract of land may not be severed from the surface estate.").

196 *See Sins of the Father*, *supra* note 56, at 419.

197 *Id.* at 419, n.226.

198 *See generally id.*; Gary R. Barnum et al., *The Law of Wind: A Guide to Business and Legal Issues*, STOEL RIVES (8th ed. 2019), https://www.stoel.com/legal-insights/special-reports/the-law-of-wind/wind-energy-lease-agreements.

199 Will Russ, *Inheriting the Wind: A Brief Guide to Resolving Split Estate Issues when Developing Renewable Projects*, RENEWABLE ELEC. ENERGY LAW, DEV. & INV. 5–6 (2013), https://www.velaw.com /uploadedFiles/VEsite/Resources/SpecialInstituteRenewableElectricEnergyLawDevelopmentInvestment.pdf; H.R. Doc. No. 10-1158, 67th Gen. Assem. 2d Reg. Sess. (Colo. 2010).

200 COLO. REV. STAT. § 38-30.7-103 (2015) ("A wind energy right is not severable from the surface estate but, like other rights to use the surface estate, may be created, transferred, encumbered, or modified by agreement.").

201 NEB. REV. STAT. § 66-912.02 (2019) ("No interest in any wind or solar resource located on a tract of land and associated with the production or potential production of wind or solar energy on the tract of land may be severed from the surface estate.").

202 Statement of Intent for L.B. 568, 101st Leg., Reg. Sess. (Neb. 2009).

was given when introducing legislation to ban the severance of wind estates, Senator Dubas answered "it was very important [for the wind estate to] stay with the land so that, you know, you don't have people going out and severing that right with the land and keeping them . . . we just saw that there was a lot of potential for it not to serve the landowners."[203]

Nebraska Senator Karpisek advocated for the property interest of wind estates to be addressed in the floor debates of the proposed bill banning the severance of wind estates stating, "this isn't so much to say that we don't trust people, but our landowners I feel have a huge resource here and I don't want to see them miss the boat"[204] and "there is a fine line when government steps in when they shouldn't."[205] Though there was not uniform agreement in Nebraska, the bill was passed banning the severance of wind estates within the state.[206] Montana, North Dakota, South Dakota, and Wyoming have also passed legislation banning the severance of wind estates from surface estates.[207]

The wave of legislation banning the severance of wind estates mainly took place between 2005 and 2010, and one has to wonder if interest groups advocated to ban the severance of wind estates during this time and then realized the banning of wind severance was not benefitting the wind industry.[208] Though private property rights are affected and typically diminished, scholars have not seen drastic benefits from legislation banning the wind severance.[209] As of 2018, Texas, Iowa, Oklahoma, California, and Kansas led the nation in the production of wind energy.[210] Of these states, Kansas and Oklahoma are the only two that have enacted statutes banning the severance of wind estates.[211]

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203 Floor Debate of L.B. 568, 101st Leg., Reg. Sess. at 21 (April 29, 2009).

204 *Id*.

205 *Id*.

206 NEB. REV. STAT. § 66-912.02 (2012) ("No interest in any wind or solar resource located on a tract of land and associated with the production or potential production of wind or solar energy on the tract of land may be severed from the surface estate.").

207 MONT. CODE ANN. § 70-17-404(1) (2011) ("A wind energy right in the wind resource located and flowing over the real property . . . may not be severed from the real property even though a wind easement may be created pursuant to this part."); N.D. CENT. CODE § 17-04-04 (2007) ("[A]n interest in a resource located on a tract of land and associated with the production of energy for wind power on the tract of land may not be severed from the surface estate."); S.D. CODIFIED LAWS § 43-13-19 (2019) ("No interest in any resource located on a tract of land and associated with the production or potential production of energy from wind or solar power on the tract of land may be severed from the surface estate."); WYO. STAT. ANN. § 34-27-103(b) (2011) ("Wind energy rights shall not be severed from the surface estate.").

208 Telephone Interview with K.K. DuVivier, University of Denver Sturm College of Law (Nov. 5, 2018).

209 *Id*.

210 Zoe Chevalier, *These States Use the Most Renewable Energy*, U.S. NEWS & WORLD REPORT (July 23, 2018), https://www.usnews.com/news/best-states/slideshows/these-states-use-the-most-renewable-energy.

211 KAN. STAT. ANN. § 58-2272(b) (2011) ("No person other than the surface owner of a tract of land shall have the right to use such land for the production of wind or solar generated energy unless granted such right by the lawful owner of the surface estate by lease or ease-

VI. THE THEORIES OF WIND OWNERSHIP ALIGNING WITH TEXAS GROUNDWATER OWNERSHIP

There are correlations between states' approaches in determining ownership of groundwater and mineral estates and their approaches in determining ownership in wind estates. There are four commonly accepted property theories used to analyze property interests in the wind estate above a person's property, the minerals or groundwater below a person's property, and the many property interests that might cross one's property. As this Note emphasizes, the Texas Legislature should follow the ownership theories the Supreme Court of Texas has applied to groundwater estates. The application of (1) *ad coelum*[212] to determine ownership, and (2) *ferae naturae*,[213] or rule of capture, to determine the relationship wind estate owners have with each other would be the best approach. A discussion of the *ad coelom* and *ferae naturae* theories can help explain why Texas applies the ownership in place doctrine and rule of capture to groundwater and mineral estates and why Texas should follow the same approach for wind estates. Texas currently follows the "absolute ownership" approach to determine the ownership of the property interest below the ground while the rule of capture, or *ferae naturae*, determines the relations the respective owners have to each other and the ownership of the captured and produced resource.[214]

The *ad coelum* approach, or absolute ownership approach, allocates the ownership of everything from the center to the earth to the sky above to the property owner of the surface estate.[215] In *Day,* the Court applied this theory of ownership of groundwater, and for the first time confirmed the groundwater estate to be owned in place.[216] Texas also follows this ownership approach regarding the mineral estate.[217] The ownership of the earth below the surface, and the sky above the surface, extends only to the altitude of the owners' existing and effective reasonable use of the land.[218] Unlike claiming ownership

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ment for a definite period."); OKLA. STAT. tit. 60, § 820.1 (2011) ("A wind or solar energy agreement shall run with the land benefitted and burdened and shall terminate upon the conditions stated in the wind or solar agreement."). In 2017, Texas had 5,554 megawatts of wind power under construction, Oklahoma had only 1,366 megawatts under construction, and Kansas did not have any megawatts under construction. Alex Crees, *Best, worst ranked states for wind power*, CHOOSE ENERGY (Nov. 1, 2018), https://www.chooseenergy.com/news/article/best-worst-ranked-states-wind-power/.

212 *Cujus est solum, ejus est usque ad coelum et ad inferos*, BLACK'S LAW DICTIONARY (7th ed. 2017) ("[w]hoever owns the soil owns everything up to the sky and down to the depths").

213 *Ferae naturae*, BLACK'S LAW DICTIONARY (7th ed. 2017) ("of a wild nature").

214 Edwards Aquifer Auth. v. Day, 369 S.W.3d 814, 828 (Tex. 2012); Sipriano v. Great Spring Waters of Am., 1 S.W.3d 75, 75 (Tex. 1999) ("For over ninety years, this Court has adhered to the common-law rule of capture. . . . [w]hich allows, with some limited exceptions, a landowner to pump as much groundwater as the landowner chooses.").

215 *Ab Orco Usque Ad Coelum*, BLACK'S LAW DICTIONARY (11th ed. 2019) ("From the ground to the sky.").

216 *See generally Day*, 369 S.W.3d at 817.

217 *See* Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 11 (Tex. 2008).

218 *See id.*; *see also* United States v. Causby, 328 U.S. 256, 264–66 (1946) ("[I]t is obvious that if the landowner is to have full enjoyment of the land, he must have exclusive control of the immediate reaches of the enveloping atmosphere.").

to clouds that move above one's property or to the airspace in which planes fly, the claim to wind blowing over the surface estate is legitimized by the historical use of the natural resource to power windmills to produce water and grind grains.[219] Wind has been utilized for centuries years.[220]

In 1946, the United States Supreme Court held that commercial airspace is not subject to private rights and took a bold approach, stating that the *ad coelum* "doctrine has no place in the modern world."[221] However, the United States Supreme Court also found that the surface owner still owns "at least as much of the space above the ground as he can occupy or use in connection with the land."[222] The Court resolved that the use of the airspace was as an easement, and remanded the case to determine the compensation to the landowner.[223]

This determination—the government having an easement over the airspace above the property—aligns with the severance of the wind estate because the rights of the airspace above the land are severed from the surface estate and are vested with a third party. Though the United States Supreme Court expressed that *ad coelum* was not a proper approach to determine property ownership, the Court determined the airspace over one's property to be a property interest of the surface estate and the government took an easement in the airspace above the surface estate.[224]

The Texas Supreme Court follows *ad coelum* regarding mineral estates, and subsequently applied the doctrine to groundwater estates. When addressing oil and gas fractures two miles below the surface, the Court noted, "Lord Coke, who pronounced the maxim, did not consider the possibility of airplanes. But neither did he imagine oil wells."[225] Lord Coke must have, however, imagined windmills and the wind blowing *directly* above the surface estate when he announced *ad coelum*.

The ownership theory of *ferae naturae* or "ownership of wild animals" supports the laws set out in the rule of capture as it is applied in Texas. Under *ferae naturae*, a property

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219 *Basics of Wind Energy*, AMERICAN WIND ENERGY ASS'N, https://www.awea.org/wind-101/basics-of-wind-energy (last visited Nov. 15, 2019). In *Causby*, the U.S. Supreme Court held that the flight of an aircraft over one's property is lawful, unless the plane flies at such a low altitude as to interfere with the then existing use of the property. *See generally Causby*, 328 U.S. at 266. Notably, the Court found a taking claim due to the intrusion into one's airspace at low altitudes. *Id.* Also, a difference can be drawn between the wind blowing from the surface estate up to 400 feet above the surface estate and the minerals that lie two miles below the surface estate. *See Coastal Oil & Gas Corp.*, 268 S.W.3d at 1.

220 *Basics of Wind Energy*, *supra* note 219.

221 *Causby*, 328 U.S. at 260–61.

222 *Id.* at 264 (citing Hinman v. Pac. Air Transp., 84 F.2d 755, 758 (9th Cir. 1936). *But see id.* at 271–72 (Black, J., dissenting) (asserting that the United States possesses and exercises complete and exclusive control over the air space of the United States).

223 *See id.*

224 *Id.* ("*Cujus est solum ejus est usque ad coelum* . . . has no place in the modern world. The air is a public highway, as Congress has declared. Were that not true, every transcontinental flight would subject the operator to countless trespass suits. Common sense revolts at the idea. To recognize such private claims to the airspace would clog these highways, seriously interfere with their control and development in the public interest, and transfer into private ownership that to which only the public has a just claim.").

225 Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 11 (Tex. 2008).

interest, which belongs to the state, but which moves across one's land, such as a white-tail deer or a running stream, remains the property of the state until it is "*legally* removed from [its] natural liberty and made the subject[ ] of man's dominion."[226] The ownership interest under *ferae naturae* only remains while the property interest is subject to man's dominion.[227] If the landowner were to lose his right over the property interest—if white-tail deer or water he captured somehow escaped—he would have to recapture it and reestablish ownership.[228] Applying this ownership interest to wind would support the severance of developed wind estates, because the surface owner could hypothetically reduce the wind interest into personal property. However, *ferae naturae* does not support the severance of undeveloped wind estates. Further, applying this ownership theory to wind hinges on one crucial aspect: physical capture and possession, which is not possible with wind.[229]

One approach Texas could take to clarify the wind estate would be to apply the concept of *ferae naturae* to wind. *Ferae naturae* is used by states that utilize public trusts and states that apply prior appropriation to determine the ownership of water. Similar to how the state owns the groundwater, if applied to wind, the state would own the wind in a trust for the benefit of the state, and citizens would have no private property rights in the wind above their property until the wind was legally captured or reduced to power—essentially put to beneficial use. This approach would give control to the state and mandate the producer to capture the wind *legally*, the legislature would have to create regulations addressing how operators produce wind energy.[230] Texas should not adopt this approach because the stance Texas has historically taken regarding private property rights, the issue that wind does not remain in one's possession, the need for regulating the wind industry and the likely adverse side effects those regulations would have on the development of the industry in Texas.[231]

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226 State v. Bartee, 894 S.W.2d 34, 41 (Tex. App.—San Antonio 1994, no pet.).

227 *See id.* at 41–42.

228 *See id.* at 41.

229 Terry E. Hogwood, *Against the Wind*, ST. B. TEX.: OIL, GAS & ENERGY RES. L. SEC. REP., Vol. 26, No. 2, 6, 11 (Dec. 2001) (indicating that the wind passing through the blades of a wind turbine merely diverts the wind's original path and does not count as captured). *See Basics of Wind Energy*, AM. WIND ENERGY ASS'N, https://www.awea.org/wind-101/basics-of-wind-energy (last visited Oct. 18, 2019) (arguing that the only aspect of wind that is captured from a wind turbine is the wind's kinetic energy).

230 *See* Hogwood, *supra* note 229, at 9.

231 California is the number one state for wind resources, and once was the leading state for installed wind energy capacity; however, the California wind boom has significantly slowed due to the state's burdensome regulatory scheme. *See* Rebecca Saathoff, *Which Way Is the Wind Blowing: An Examination of Potential State Regulation of Wind-Powered Energy Generation in Texas*, 12 TEX. J. OIL GAS & ENERGY L. 197, 209–11 (2017); *see also* Kate Galbraith, *California and Texas: Renewable Energy's Odd Couple*, N.Y. TIMES (Oct. 17, 2009), http://www.nytimes.com/2009/10/18/weekinreview/18galbraith.html?r=O (comparing California and Texas's approaches to regulation of the alternative energy industry). The regulation of the wind industry in Texas would significantly hinder the development of wind energy and reduce investments in Texas by billions of dollars. *See* Dave Montgomery, *Lawmakers' move to regulate wind turbines could cost Texas billions, industry says*, FORT WORTH STAR-TELE-

The application of *ad coelum* to determine ownership, and *ferae naturae*, or rule of capture, to determine the relationship wind estate owners have to each other would be the best approach to clarify the wind estate in Texas. This approach would align with the theories applied to both groundwater ownership and mineral ownership. Though commentators have criticized this approach,[232] the application of these doctrines to wind estates in Texas would create a uniform foundation to determine property rights outlined by the Court in *Day*.[233] One of the more supported approaches to determine wind ownership, which has not been adopted by either a court or a legislature, mirrors the approach Louisiana and Oklahoma have taken to determine ownership of minerals and more closely aligns with *ferae naturae*.[234] Though leading scholars support a perpetual easement in the wind estate where the owner of the lease could capture property interests in the wind, the Texas Legislature has been hesitant to follow other states' approaches when the state already has a process or policy in place to determine ownership of a similar resource.[235]

A. Texas Should Sever the Wind Estate

The Texas Legislature should pass legislation allowing the severance of the wind estate from the surface estate. Texas is an industry leader in wind energy and can set a nationwide standard because no other state has validated the severance of wind estates. The Texas Supreme Court supported the private property rights of Texas landowners when it ruled that groundwater was a property estate owned in place; this ruling further supported Texas's significantly different approach to groundwater estates as compared to other states.[236] The legislation of South Dakota, North Dakota, Colorado, Montana, and Nebraska banning the severance of wind estates mirrors the respective states' approaches to determine groundwater ownership.[237] Texas should take a stance that mirrors its respective approach taken to determine mineral ownership for the past 100 years and recently applied to groundwater estates. As the Texas Supreme Court expressed in *Day*, the financial value of the groundwater estate and future need arising from the groundwater estate would be difficult to differentiate from the mineral estate, and the same holds true of wind estates.[238]

Texas values private property rights and the ability of property owners to utilize their severed property estate as they see fit—and the Texas Supreme Court affirmed these

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GRAM (Feb. 3, 2017) https://www.star-telegram.com/news/state/texas/article130639724.html.

232 *See Winds of Change: The Creation of Wind Law*, *supra* note 164, at 180–85.

233 *See* Edwards Aquifer Authority v. Day, 369 S.W.3d. 814, 823, 831 (Tex. 2012).

234 *See generally Winds of Change*, *supra* note 158, at 181 (indicating that Louisiana, Oklahoma, and many other states utilize the rule of capture approach).

235 Interview with William Keffer, Professor Tex. Tech Univ. School of Law (Nov. 12, 2018).

236 *Day*, 369 S.W.3d at 823 ("Whether groundwater can be owned in place is an issue we have never decided. But we held long ago that oil and gas are owned in place, and we find no reason to treat groundwater differently.").

237 *See* COLO. REV. STAT. ANN. § 38-30.7-103(1) (2015); MONT. CODE ANN. § 70-17-404(1) (2011); NEB. REV. STAT. § 66-912.02 (2012); N.D. CENT. CODE § 17-04-04 (2007); S.D. CODIFIED LAWS § 43-13-19 (2019); *Who Owns the Water?*, *supra* note 120.

238 *Day*, 369 S.W.3d at 831.

positions in *Day* and *Coyote Lake Ranch*.[239] The Texas Legislature should find support from the *ad coelum* theory, originating in the mid fourteenth century stating that a surface estate owner owns the ground below his estate to the center of the earth and above his estate to the skies above. The legislature should also find an obligation to act due to the legislative action that has been taken the past two decades promoting the development of the wind industry in Texas.

The severance of wind estates will benefit landowners by providing them with more options in the use of their property. For example, this would allow landowners to transfer their wind rights, for a financial gain, to companies that have the resources to develop them, in turn promoting the development of energy resources within Texas. Just as the English Crown and the U.S. federal government benefitted from retaining severed mineral estates, landowners today should be able to benefit from severed wind estates. Legislation validating the wind estates will also support already-severed wind estates and support the historical stance that Texans have the right to contract with regard to their property as they see fit.[240] The severance of wind estates will also further legitimize the wind industry. The validity of the wind estate will allow the legislature to define the priority of estates when wind, mineral, groundwater, and surface estates conflict.

Wind estates in Texas already exist.[241] If the Texas Legislature acts in the best interest of Texans, and supports private property rights, all wind estates will gain permanent validity. However, if Texas changes the approach to determining private property rights that the Texas Supreme Court has used for over one hundred years, and that now applies to both mineral and groundwater estates, and bans the severance of wind estates with enactment of a statute similar to those of Nebraska, Colorado, North Dakota or Montana, the legislation will still honor the previously-severed wind estates. The priority of where the wind estate falls, as compared to the surface, water, and mineral estates, must still be determined.

VII. PRIORITY OF MUTUALLY DOMINANT ESTATES: COMMON LAW DOCTRINES PROVIDE CLARITY "WHERE THE WIND BLOWS, GROUNDWATER FLOWS, AND OIL AND GAS LIE DOWN BELOW"

The Texas Legislature should act and follow the precedent the Supreme Court of Texas has applied to groundwater estates—on ownership in place and the severability of groundwater estates—and sever the wind estate from the surface estate. When acting in the best interest of Texans and severing the wind estate from the surface estate, the Texas Legislature or the judiciary needs to identify where this new estate falls in the priority of estates. The application and understanding of common law doctrines, such as the dominant estate doctrine, First in Time, First in Right doctrine, and the accommodation doctrine, will provide clarity as to the prioritization of the respective estates. The order of estates will be determined on a case-by-case basis with the application of the respective doctrines.

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239 *Id.* at 823; Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53, 53 (Tex. 2016).
240 Sun Oil Co. v. Whitaker, 483 S.W.2d 808, 811 (Tex. 1972) (Daniel, J., dissenting).
241 Wetsel Interview, *supra* note 7.

The issue of estate priority arises in a situation where the surface owner has severed the groundwater estate, wind estate, and mineral estate, and there is a covenanted area in question that is allocated for a wind turbine, has a vertical reef formation below, is an ideal location for a groundwater well, and the surface owner is a rancher and has a set of cattle pens in the same covenanted area. Does the windfarm operator, oil and gas operator, groundwater operator, or rancher have priority to occupy the covenanted area?

In many parts of the Panhandle and West Texas, windfarms have been, or are being, built on land that is in active mineral production. Coinciding with the development of wind farms on top of mineral estates, wind turbines are being built on top of the Ogallala Aquifer.[242] The highest wind speeds occur in West Texas and the Texas Panhandle,[243] the Permian Basin and Anadarko Basin lie under West Texas and Panhandle,[244] and the Ogallala Aquifer, which is the most critical source of water for agricultural purposes in Texas, lies under the Panhandle and portions of West Texas.[245] Because of the recent application of the accommodation doctrine to the groundwater estate and the clarity provided regarding the dominant estate doctrine in *Coyote Lake Ranch*,[246] the accommodation and dominant estate doctrines will be guideposts through this next section.

Because wind estates are severed from their respective surface estates, wind estates deserve the same protection provided to mineral estates because these estates both develop energy resources for the benefit of all Texans. Similarly, wind estates deserve the same protection provided to groundwater estates because both estates provide future benefits to Texans and financial value to landowners, which the Supreme Court of Texas decided was a reason to rule that groundwater estates are dominant over surface estates in *Coyote Lake Ranch*.[247] Aligning with the analysis in Part V of this Note, the jurisprudence applied to groundwater estates provides a path for the Texas Legislature to follow in severing the wind estate and determining its priority.

A. The Significance of the Court's Holding in *Coyote Lake Ranch*

The mineral estate in Texas has historically been considered the dominant estate when compared to the surface estate due to the dominant easement the mineral estate carries over the surface estate.[248] The dominant estate doctrine was developed to allow mineral estates access to the surface estate so they could produce the minerals lying under the surface estate.[249] When the Court of Appeals refused to apply the accommoda-

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242 Laura Parker, *What Happens to the U.S. Midwest When the Water's Gone?*, Nat'l Geographic (Aug. 2016), https://www.nationalgeographic.com/magazine/2016/08/vanishing-midwest-ogallala-aquifer-drought/.

243 U.S. Dept. of Energy, *Texas 30-Meter Residential-Scale Wind Resource Map*, U.S. Dep't of Energy Wind Energy Tech. Office, https://windexchange.energy.gov/maps-data/232 (last visited Oct. 15, 2019).

244 Bureau of Economic Geology, *Oil and Gas Map of Texas*, Univ. of Tex. at Austin Jackson School of Geosciences (2005), http://www.beg.utexas.edu/UTopia/images/pagesizemaps/oilgas.pdf.

245 Parker, *supra* note 242.

246 *See generally* Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53 (Tex. 2016).

247 *Id.* at 64.

248 *Id.* at 60.

249 *Id.* at 61.

tion doctrine in *Coyote Lake Ranch*, the Court stated that the accommodation doctrine applies only when one estate is dominant over the other.[250] The Supreme Court of Texas countered this argument, stating the dominant estate theory is a matter of explanation:

> In the law of servitudes, the mineral estate is called 'dominant' and the surface estate 'servient,' not because the mineral estate is in some sense superior, but because it receives the *benefit* of the implied right of use of the surface estate.[251]

The dominant estate doctrine allows the mineral estate owner to have reasonable access and use of the surface estate to be able to develop and utilize the mineral estate fully. This doctrine results from Texas public policy that protects and fosters the development of energy sources, which benefits everyone.[252] Clearly, the ability to develop a wind estate aligns with the policy of protecting and developing energy sources that benefit Texans.

B. First in Time, First in Right when Wind, Groundwater, and Oil Align

Aligning with the approach that wind estates and mineral estates are similar and should both have dominant easements over the surface estate, a compelling analysis provides clarity to the prioritization of the respective estates.[253] Due to the similarities of both the wind estate and mineral estate—they are both natural resources and both contribute to the development of energy within the State of Texas—the wind and mineral estate relationship should be treated how severed mineral estates are prioritized within different strata of the mineral estates.[254] The most typical method of determining the priority of the competing mineral estates is the application of the common law doctrine of First in Time, First in Right.[255]

Under this approach, a wind lessee would have priority over a subsequent oil and gas lessee in controversies over locations of turbines, drilling rigs, roads, and other matters if the wind estate owner developed the wind farm before the other estates began development. As mineral estate owners worry about this approach to determine the priority of estates, they should find comfort in the fact the mineral estates have been developed for 100 years more than the wind estates. Due to the history of mineral development in Texas, many wind farms are installed on top of developed oil and gas fields and the wind farm developers work around the producing wells when installing wind turbines.[256]

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250 City of Lubbock v. Coyote Lake Ranch, LLC, 440 S.W.3d 267, 275 (Tex. App.—Amarillo 2014), *aff'd*, 498 S.W.3d 53 (Tex. 2016) (declining to extend the accommodation doctrine to groundwater estates).

251 *Coyote Lake Ranch*, 498 S.W.3d at 60 (emphasis added).

252 *See* Qusi Alqarqaz, *Texas Renewable Energy Policy Sets an Example for the World*, IEEE SPECTRUM (Mar. 20, 2019), https://spectrum.ieee.org/news-from-around-ieee/the-institute/ieee-member-news/texas-renewable-energy-policy-sets-an-example-for-the-world (discussing Texas's renewable energy policy).

253 *See Jousting at Windmills*, *supra* note 30.

254 *See id.*

255 *See* Harrison, *supra* note 57, at 146.

256 *See* Whitney Price, *Surface Wind Farms vs. Mineral Leases: Who wins?*, BLOG: TEX. J. OF OIL, GAS, AND ENERGY LAW (Nov. 3, 2015), http://tjogel.org/surface-wind-farms-vs-mineral-

The First in Time, First in Right approach will give assurance to wind developers that once they develop a wind farm, they have priority over the competing estate's interests and oil and gas operators must work around previously-installed wind turbines. This process also aligns with Texas's public policy to advance natural resource development. If both the mineral estate and wind estate know they are competing with one another, there will be a sense of urgency to develop both estates, which would produce more energy for the State of Texas.

The application of First in Time, First in Right would also apply to the groundwater estate. The groundwater estate owner can be confident that their property interest in an already-established well will not be interfered with by wind developers or oil and gas operators. This is because the groundwater estate has a dominant easement over the surface estate, is comparable in financial value to the mineral estate, and the accommodation doctrine applies once the groundwater well is drilled.

C. The Accommodation Doctrine Defining the Relationship Between Mutually Dominant Estates and the Interaction With the Surface Estate

The accommodation doctrine has become fundamental to oil and gas law, and courts have recently applied it to groundwater estates to determine the relationship the dominant estates have over the servient estate.[257] To align with the application of the doctrine to the mineral and groundwater estates, the accommodation doctrine should be applied to the wind estate. The doctrine was first established by the Texas Supreme Court in *Getty Oil Co. v. Jones* in 1971, and introduced the concept that a dominant easement holder's surface usage was not absolute, and the dominant easement holder had to use due regard for the competing interests of the surface estate.[258]

The *Jones* Court "create[d] the interplay of rights between the mineral owner and surface owner"[259] and significantly limited the use the dominant estate holder once had over the surface estate.[260] The Court in *Jones* explicitly outlined the doctrine:

> [W]here there is an existing use by the surface owner which would otherwise be precluded or impaired, and where under the established practices in the industry there are alternatives available to the lessee whereby the minerals can be recovered, the rules of reasonable usage of the surface may require the adoption of an alternative by the lessee.[261]

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leases-who-wins/ (indicating that because of the small footprint of turbines and the contracting options available, wind and mineral estates can coexist).

257 Getty Oil Co. v. Jones, 470 S.W.2d 618, 621–23 (Tex. 1971); Sun Oil Co. v. Whitaker, 483 S.W.2d 810, 812 (Tex. 1972); Merriman v. XTO Energy, 407 S.W.3d 244, 250 (Tex. 2013).

258 *Jones*, 470 S.W.2d at 622.

259 Christopher M. Alspach, *Surface Use by the Mineral Owner: How Much Accommodation Is Required Under Current Oil and Gas Law?*, 55 Okla. L. Rev. 89, 92 (2002).

260 Douglas R. Hafer, Daniel B. Mathis & Logan W. Simmons, *A Practical Guide to Operator/Surface-Owner Disputes and the Current State of the Accommodation Doctrine*, 17 Tex. Wesleyan L. Rev. 47, 58 (2010).

261 *Jones*, 470 S.W.2d at 622.

The accommodation doctrine hinges on whether the surface estate's use is reasonably necessary for the estate carrying the dominant easement.[262] If there are reasonable alternatives, such as digging a lower area to place the pump jack[263] or utilizing horizontal drilling[264] to access the estate that holds the dominant easement over the servient estate, the dominant estate owner must show due regard for the respective servient estate and utilize a reasonable alternative if available.[265]

In *Coyote Lake Ranch*, the Supreme Court of Texas applied the accommodation doctrine to groundwater estates "based on the principle that conflicting estates should act with due regard for each other's rights, [and the accommodation doctrine] has provided a sound and workable basis for resolving conflicts between ownership interests."[266] As well as providing a sound basis for resolving conflicts between property estates, the application of the accommodation doctrine to the groundwater estate promoted it to be a freely severable estate.[267] The application of the doctrine would further support the wind estate being a freely severable estate—while protecting the surface estate owner, supporting the stance of First in Time, First in Right, and defining the relationship between the wind estate and surface estate and the relationships between the groundwater, mineral, and wind estates.

The accommodation doctrine is rooted in the concept that the dominant easement holder, or dominant estate, must use due regard as he exercises his rights to produce or utilize the estate which carries the dominant easement over the surface estate.[268] This analysis of reasonableness allows the surface estate owners to have discussions with the wind estate owners to ensure interference with the surface estate will be kept to a minimum. The wind estate differs from the mineral estate in the degree specificity of where development must occur. In developing a mineral estate, the operator might have one

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262 *Id.*

263 *See id.* The height of the oil pumps installed by Getty Oil interfered with the irrigation system used by Jones to irrigate his property, and consequently much of his land could not be used to grow crops. *Id.* Jones wanted Getty Oil to either install different pumps or to dig "cellars" to lower the height of the pumps. *Id.* The Supreme Court of Texas held that Getty Oil had to "reasonably accommodate" Jones's use of the surface, despite the traditional dominance of the mineral estate. *Id.*

264 *See* Texas Genco, LP v. Valence Operating Co., 187 S.W.3d 118 (Tex. App.—Waco 2006, pet. denied).

265 Douglas R. Hafer et al., *supra* note 260, at 58; *see Jones*, 470 S.W.2d at 622. The Court outlined three elements that must be considered in determining reasonableness: (1) the mineral owner has other "non-interfering and reasonable ways and means of producing the minerals"; (2) the usage in question will force the surface owner to abandon his existing surface usage; and (3) alternatives available to the surface owner would be "impractical and unreasonable under all the conditions." *Jones*, 470 S.W.2d at 622.

266 Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53, 63 (Tex. 2016).

267 *Texas Supreme Court: Accommodation Doctrine Applies to Groundwater*, TEX. AGRIC. LAW BLOG (Jun. 8, 2016), https://agrilife.org/texasaglaw/2016/06/08/Texas-supreme-court-accommodation-doctrine-applies-groundwater/.

268 *Jones*, 470 S.W.2d at 622. In *Merriman v. XTO Energy, Inc.*, the Texas Supreme Court reaffirmed this principle, stating "[t]he accommodation doctrine focuses on balancing the respective rights of the parties." Merriman v. XTO Energy, Inc., 407 S.W.3d 244, 250 (Tex. 2013).

specific formation where development can only occur in an acre area; developing a wind estate does not hinge on a specific acre, but a larger area where accommodations to the surface estate can likely be made.[269]

As the issue of oil and gas operators needing to access more precise areas, the Texas Court of Appeals recently held that the use of industry practice, such as horizontal drilling, is a reasonable means of producing minerals if there is a conflict between the estates in question.[270] Texas Genco, the surface owner who used the surface estate as an ash-disposal landfill, successfully invoked the accommodation doctrine and enjoined the mineral estate owner, Valence Operating, from drilling a vertical well on the "cells" planned to be used by Genco as landfills.[271] The court held that directional drilling was a reasonable alternative and that vertical drilling would "substantially impair" the surface estate.[272] This holding emphasized that the mineral owner's, or conflicting dominant estate owner's, "reasonable alternative" does not have to be the least expensive or least challenging alternative.[273]

Similar to Texas, Oklahoma classifies the mineral estate as the dominant estate as compared to the surface estate.[274] Though Oklahoma has not indicated there can be multiple dominant estates like Texas has, the Northern District Court of Oklahoma addressed the possible issue of priority of estates when mineral estates and wind estates are in competition with each other.[275]

In *Osage Nation ex rel. Osage Minerals Council v. Wind Capital Group, LLC.*, Wind Capital leased approximately 8,500 acres to construct a wind farm consisting of ninety-four turbines.[276] The United States government had severed the mineral estate under the leased surface estate in 1906, and severed mineral estate was retained by the Osage Nation.[277] The Osage Nation sought an injunction against the windfarm, claiming that the windfarm facilities unlawfully interfered with their "right to use so much for the surface of the land within the Osage Mineral Estate as may be reasonable for oil and gas development . . . including the right of ingress and egress therefore, for the purpose of explor-

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269 Green, *supra* note 25, at 1122.

270 *See* Texas Genco, LP v. Valence Operating Co., 187 S.W.3d 118, 122 (Tex. App.—Waco 2006, pet. denied).

271 *See id.* at 120.

272 *See id.* at 123–24.

273 The cost of drilling a horizontal well is roughly four times more than the cost of drilling a conventional, vertical well. U.S. Dept. of Energy, *Trends in U.S. Oil and Natural Gas Upstream Costs*, U.S. ENERGY INFORMATION ADMIN., 5 (March 2016), https://www.eia.gov/analysis/studies/drilling/pdf /upstream.pdf; *see also How Does Horizontal Well Planning Differ from Other Directional Wells?*, PETROSKILLS (Dec. 5, 2017), https://www.petroskills.com/blog/entry/00_totm/dec17-sub?page=7# (discussing the complexities of drilling a horizontal well compared to a vertical well).

274 *See* Turley v. Flag-Redfern Oil Co., 783 P.2d 130, 135 (Okla. 1989) ("Although the two estates may be of equal dignity for some purposes, the surface estate is servient to the dominant mineral estate for the purposes of oil and gas development.").

275 Osage Nation *ex rel.* Osage Minerals Council v. Wind Capital Grp., LLC, 2011 WL6371384, at *1 (N.D. Okla. Dec. 20, 2011).

276 *Id.*

277 *Id.*

ing, severing, and capturing the producing oil and gas."[278] The Osage Nation was concerned its mineral interest would be negatively affected if the mineral estate lessee wanted to drill an oil well at the same time and in the same location as the wind lessee.[279] The court held the conflict was too "speculative and insufficient to establish that the windfarm will interfere with the development of the Osage Mineral Estate."[280] However, the court stated that if the wind farm operator could not comply with a request by the oil and gas lessee, then the oil and gas lessee could work around the conflict by using directional drilling or changing the location of the oil well if possible.[281]

Based on the somewhat advisory opinion from the Oklahoma Court of Appeals, the mineral estate will be able to first request that the wind operators change the location of their wind turbine(s), but would then be obliged to use industry standards, such as horizontal drilling, to avoid conflicts with the wind turbines.[282] This holding from the Oklahoma Supreme Court indicates that the mineral estate might not be classified as "dominant" as it once was, and gives an indication the accommodation doctrine would be applied in conflicts between wind estates and mineral estates in Oklahoma.[283]

Though horizontal drilling is a more expensive industry practice, 42,700 horizontal wells have been drilled in Texas since 1984, and oil and gas companies often use horizontal drilling to produce minerals from under residential neighborhoods within city limits.[284] With the continuing rise of technology in the oil and gas industry, the application of the accommodation doctrine will likely be able to determine conflicts arising between estates, similar to how it resolved the conflict in *Texas Genco*.

Though the wind energy industry has not developed alternative means to the wind turbine to generate energy from wind (like the oil and gas industry has with horizontal drilling), a wind farm operator can develop the wind estate from numerous surface locations.[285] The energy output might not be optimal in all locations, but a slight decrease in generated energy would still allow for reasonable development. The accommodation doctrine would require a turbine to be installed in an area that does not conflict with the dominant estate or estates, based on the principle of First in Time, First in Right, or the surface estate's previous use if the previous use would be substantially impaired.[286]

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278 *Id.* at *2.

279 *See id.*

280 *Id.* at *3.

281 *See id.* at *4.

282 *See id.*

283 *See id.* ("In the event a situation arises in which the defendants cannot accommodate an oil and gas lessee's request, the oil and gas industry has the ability . . . to work around conflicts by modest adjustments in the form of directional drilling or moving the oil and gas wells slightly.").

284 Mella McEwen, *Horizontal drilling gives rise to acreage pooling*, MIDLAND REPORTER-TELEGRAM (Oct. 31, 2017), https://www.mrt.com/businessinsider/oilreport/article/Horizontal-drilling-gives-rise-to-acreage-pooling-12320473.php (discussing oil and gas companies obtaining leases from residents to pool their mineral interest to drill horizontal wells under their homes).

285 Green, *supra* note 25, at 1122.

286 *Id.* The Texas Practice Series also advocates the accommodation doctrine be used when issues arise between oil and gas operators and coal operators since both estates are mineral

The adoption of the First in Time, First in Right approach, along with the accommodation doctrine, will allow all respective estate holders to know where they fall in the priority of estates and provide a legal foundation for how the estates interact with each other. In *Coyote Lake Ranch* the Supreme Court of Texas upheld there to be two dominant easement holders, or dominant estates, when applying the accommodation doctrine to groundwater estates.[287] The Court had an understanding of the technologies developed for groundwater and mineral extraction and held that good faith industry practices could be used to accommodate conflicts arising from respective parties.

VIII. The Texas Legislature should Codify the Common Law Approaches to Provide Certainty and Clarity to the Wind Estate's Severability and Priority

The common law approaches advanced above indicate the proper priority of estates should a case arise in the Texas judicial system. This Note has made frequent analogies to groundwater, other states' approaches to determine groundwater ownership, and the Supreme Court of Texas's actions on groundwater estates; however, for the benefit of Texas landowners, the Texas Legislature should pass statutory language to clarify the priority of estates.

The Texas Supreme Court left many areas unclear in *Coyote Lake Ranch* and *Day* when it applied the ownership in place and the accommodation doctrines to groundwater estates.[288] Is the groundwater estate similar to the mineral estate due to Texas's growing need for water? Is the groundwater estate equivalent to the mineral estate due to the financial similarities of both resources? Is the groundwater estate servient to the mineral estate, and only dominant to the surface estate? Due to these unaddressed questions and the importance and widespread impact of wind energy in Texas, the Texas Legislature should pass statutory language addressing the severability of the wind estate and the priority of the wind estate. Logical places to include this law would be in the Texas Property Code or Natural Resources Code.[289] The statute should clarify that wind does not become a right upon installation of turbines or when reduced to possession. The statute should express that wind is part of the real estate, like groundwater or minerals.

The similarities between the mineral estate and wind estate, with both being natural resources that support the development of energy within the state and the comparable financial values of the respective estates, are two of the most significant comparisons. The past 20 years of legislative history supporting, funding, and incentivizing wind industry development signifies the promotion of wind energy within Texas. Statutory language should be passed addressing the dominant nature of the mineral estate, wind estate, and groundwater estate; thus it would codify the common law doctrine First in

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interests and share the classification of "dominant estates." *Solutions for Operational Conflicts—The Accommodation Doctrine*, 46 Tex. Prac., Envtl. Law § 28:32 (2d ed. 2018).

287 Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53 (Tex. 2016).

288 *See id.*; Edwards Aquifer Auth. v. Day, 369 S.W.3d 814 (Tex. 2012).

289 The Texas Legislature defined ownership of groundwater in the Texas Water Code § 36.002; however, the Natural Resource Code has been used to define aspects of oil and gas.

Time, First in Right to determine the priority of the mutually-dominant estates. The legislature should statutorily enact the accommodation doctrine to address the relationship between the respective mutually-dominant estates and to address the dominant estate's dominant easement over the surface estate.

The North Dakota legislature passed a statute dealing with the potential conflicts between wind energy and the landowner and essentially codified the common law approach of the accommodation doctrine.[290] The statute specifies that a wind energy lease:

> Must preserve the right of the property owner to continue conducting business operations as currently conducted for the term of the agreement. When a wind energy facility is being constructed and when it is completed, the property owner must make accommodations to the developer, owner, or operator of the facility for the facility's business operations to allow the construction and operation of the wind energy facility.[291]

The Oklahoma legislature enacted statutory language addressing the relationship between wind operators and oil and gas producers in the passing the Exploration Rights Act of 2011, stating:

> [T]he lessee of a wind or solar energy agreement or the wind energy developer shall not unreasonably interfere with the mineral owner's right to make reasonable use of the surface estate, including the right of ingress and egress therefor, for the purpose of exploring, severing, capturing and producing the minerals.[292]

This statute mirrors the rights existing under Oklahoma common law and does not increase or decrease the historical rights of the mineral estate owners and lessees.[293] Additionally, the Oklahoma Legislature has stated that "the development of wind energy resources is important to the economic growth of the state" and has encouraged the production of clean and renewable power.[294]

Though neither the North Dakota statute nor the Oklahoma statute indicates that the wind estate is a mutually dominant estate, both legislatures understood that the relationships between competing estates needed to be determined.

A. PROPOSED WIND LEGISLATION

The Texas Legislature should enact a statute similar to the bill that Colorado Senator Mary Hodge and then-House Representative, now United States Senator, Cory Gardner introduced in 2010, which was intended to clarify "the ownership of the right to use wind flowing across real property within this state, and specifics that, for purposes of determining the priority of uses between a severed mineral interest and a severed wind interest, the first interest severed is dominant."[295]

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290 N.D. CENT. CODE § 17-04-06(1)(d) (2009).

291 *Id.*

292 OKLA. STAT. ANN. tit. 52, § 803(B) (2017).

293 Osage Nation *ex rel.* Osage Minerals Council v. Wind Capital Group, LLC, 2011 WL6371384, at *8 (N.D. Okla. Dec. 20, 2011).

294 OKLA. STAT. ANN. tit. 17, § 160.12 (2011).

295 H.B. 10-1158, 67th Gen. Assemb., Reg. Sess. (Colo. 2010); *see also* LEDERLE, *supra* note 38.

The below statute suggested for the Texas Legislature to adopt is established from Colorado House Bill 10-1158, Jake Lederle's *Severance of Wind Rights: A Model Statute*, and the application of the common law doctrines analyzed throughout this Note.

Section I. Purpose:

1) Wind is a valuable natural resource and it is in the public policy of the State of Texas to promote, to the greatest extent possible, the development of energy resources such as oil and gas and wind. As wind is a valuable natural resource, it is in the public policy of the State of Texas to honor wind as real property above the surface of the ground and allow the real property to be freely severable and treated as mineral estates and groundwater estates are treated in the State of Texas. As such, this Act must be liberally construed to effectuate the purposes of ensuring the development of wind energy and upholding the private property rights of landowners across the State.

Commentary

This provision would accomplish three things. First, declaring wind a natural resource places it within the scope of Article XVI of the Texas Constitution, thereby allowing the Legislature to regulate wind.[296] *Second, recognizing wind as real property would allow surface estate owners to sever the wind estate from the surface estate, allowing the wind estate to be passed by descent and distribution in the same manner as other estates, rights, and interests in land may be held, conveyed, enjoyed, mortgaged, or bequeathed. Third, requiring a liberal construction of this statute ensures that any subsequent interpretation of the statute or the severance of wind rights will be done in favor of promoting wind energy development and protecting the property interests of wind estate owners within the State.*

Section II. Legislative declaration and applicability.

1) It is the intent of the Texas House of Representatives and Senate to clarify the ownership of the right to use wind flowing across real property within this state. All conveyances of interests in real property and leases made on or after the effective date of this section are subject to this section. All conveyances of real property and leases made before the effective date of this section shall be construed in accordance with this section unless a person claiming an ownership interest contrary to this section establishes such ownership by a preponderance of the evidence in an action to establish ownership of such interest.

Section III. Severance.

1) The wind located on or blowing above the surface of the ground is an interest in real property. Rights to such wind may be severed by the owner of the underlying surface fee and may be conveyed or devised in any manner, subject only to the limitations expressed in Section V of this Act.

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296 Tex. Const. art. XVI, § 59 ("The conservation and development of all of the natural resources of this State . . . [are] hereby declared public rights and duties; and the Legislature shall pass all such laws as may be appropriate thereto.").

Section IV. Ownership.

1) Ownership of the wind interest is initially vested in the owners of the surface estate and the wind interest is a property right that can be severed from surface estate ownership.
2) A conveyance of the surface ownership of real property is a conveyance of the wind interest unless ownership in the wind interest has previously been severed from the surface ownership or is explicitly excluded or reserved in the conveyance. Conveyance of a wind interest shall follow the manner provided by law for the transfer of mineral interests or groundwater interests in real property. With any discrepancy between the laws governing the conveyance of different estates, the laws governing conveyance of the mineral estate will prevail in determining the manner of conveyance of the wind estate. No instrument conveying minerals, groundwater, or other interests underlying the surface conveys ownership of the wind interest unless the instrument explicitly conveys such ownership interest.
3) Any instrument severing wind rights and any subsequent conveyance of a severed wind estate must be recorded in the office of the county clerk in the county where the underlying surface estate is located. If the surface estate is located in more than one county, the instrument must be recorded in each county.
4) An instrument that conveys a wind interest shall describe the scope of the right to use the surface estate and the relationship between the wind estate and other estates and how conflicts will be resolved, should there be any, between the wind estate and other estates.
5) An instrument that conveys a wind interest shall describe and determine the priorities of and the relationships between the wind estate, mineral estate, and groundwater estate.

Section V. Limitations.

1) Any person who severs or reserves wind rights, but who does not have an ownership interest in the underlying surface estate may not reserve or retain any lease benefit that compensates the owner of the surface estate for surface damages.
2) If the wind estate is severed and the surface owner does not own an interest in the wind estate, the wind company or wind developer must follow the accommodation doctrine in the development of the wind farm as expressed in Section VI. (1) and (2) of this Act.
3) If surface damages result from the development of the wind estate, the surface estate owner is entitled to fair value compensation as determined by the county's commissioners. Determination by the county commissioners is binding, but if there is a tie between the county commissioners, the county judge will cast the fifth vote to determine the financial value of the surface damages.
    a. A petition for surface damages shall be filed in the district court of the county in which the property is located. If the property resides in more than one county, the petition shall be filed in the county in which the surface owner resides.
    b. Each party may strike one county commissioner. If either party elects to strike a commissioner, they must do so within 30 days of filing of the petition. Once the county commissioner has been stricken, the county judge will appoint a county commissioner from an adjacent county.

Section VI. Requirements.

1) An individual or party developing the wind estate must accommodate any preexisting surface use if that use would be substantially impaired or precluded by the developing party's actions, and the developing party has a reasonable, industry-accepted alternative for carrying out the party's development.

    a. This includes preexisting uses of the surface estate by the surface owner, preexisting uses of the surface estate by the owner of the mineral estate, and preexisting uses of the surface estate by the owner of the groundwater estate.

2) An individual or party developing the wind estate must accommodate any preexisting mineral or groundwater use if that use would be substantially impaired or precluded by the developing party's actions, and the developing party has a reasonable, industry-accepted alternative for carrying out the party's development.

3) A mineral estate, groundwater estate, and wind estate hold a dominant easement over the surface estate. A wind estate is equal in legal capacity to a mineral estate and a groundwater estate. Therefore, the priority of the mineral estate, groundwater estate, and wind estate will be determined based on seniority, and arising conflicts will be analyzed under the accommodation doctrine as expressed in Section IV (1) and (2) of this Act.

Commentary

Subsections (1) and (2) are self-evident and are a codification of the accommodation doctrine. However, it is written broadly to avoid the recent Supreme Court decision in Merriman,[297] *and more importantly, to allow courts discretion in defining the doctrine as applied to wind estates. Subsection (3) is meant to establish mutual dominance between the mineral estate, groundwater estate, and wind estate towards the surface estate and establish that priority will be based on the order the respective owners of each estate develop the estate. The Supreme Court of Texas's holding in* Coyote Lake Ranch *explained that the dominant estate doctrine provides a mineral estate a dominant easement over the surface estate, but did not classify the mineral estate as the general dominant estate. The dominant estate doctrine was established to ensure that the mineral estate had access to the surface estate to extract the minerals. The same applies to wind estates and groundwater estates. Without access to the surface, development of wind energy could not occur, nor groundwater estates accessed, thereby, frustrating the purpose of the estate. However, by placing the three estates on an equal legal footing, the potential for conflicts between the three dominant estates increases. The application of the First in Time, First in Right principle—to determine the priority of dominant estates—and the accommodation doctrine will be able to resolve conflicts between the groundwater estate, mineral estate, and wind estate.*

297 Merriman v. XTO Energy, 407 S.W.3d 244, 252 (Tex. 2013) (requiring a surface owner to show that it has no reasonable alternative to continue its surface use before the mineral estate is obligated to accommodate that use).

B. IMPACTS AND CLARITY PROVIDED FROM ENACTMENT OF PROPOSED WIND LEGISLATION

Upon the enactment of a statute similar to one set forth above, or the application of the common law doctrines discussed throughout this Note, the windfarm operator, oil and gas operator, groundwater operator, and rancher will better understand where their property interest lies as compared to competing property estates. The groundwater estate, wind estate, and mineral estate will be dominant easements over the surface estate; however, if the surface estate utilizes the land in a way such that it would be severely impaired from activities from the other estates, like in *Texas Genco*, the respective estates would have to utilize industry standards, such as horizontal drilling or moving the turbine to a slightly less windy location, to avoid interference with the surface estate.[298] Similarly, the wind, mineral, and groundwater estates would also be obligated to use the accommodation doctrine when conflicts arise between the "dominant" estates. Each estate's dominance would be determined based on the doctrine of First in Time, First in Right. First in Time, First in Right will allow the estate holder to know where his estate stands in the hierarchy of priority. Once investment is made and development occurs, the position of the estate will remain, and only servient estates can develop as compared to the already-developed and most dominant estate.

In determining the priority of estates in a situation where there is a covenanted area that is allocated for a wind turbine, has a vertical oil and gas reef below that the mineral estate owner hopes to produce, is an ideal location for a groundwater well, and the surface owner has a set of cattle pens in the same covenant area, the common law analysis above, along with the proposed statute below, would give clarity to all respective property interests. In the position of the wind developer, the developer would have to determine if the groundwater estate or mineral estate has been developed within the covenanted area. If there has not been development of the mineral estate or groundwater estate, and if cattle pens could be constructed and used somewhere else on the property, or if the interference with the cattle pens only creates an inconvenience or additional expense to the cattle operation, the building of a wind turbine next to, or in, the cattle pens will likely be found not to violate the accommodation doctrine, and the wind turbine can be built.[299]

Imagine the following scenario. Someone develops and installs wind turbines on a plat of land, creating a wind estate with priority of estate over any respective, and otherwise mutually-dominant estates. Later, the groundwater estate owner decides he wants to produce the groundwater to be able to sell bottled water to all the wind farm workers. He meets with the wind farm developer and they agree that is fine to drill a vertical groundwater well 500 feet away from any wind turbine. The groundwater estate owner proceeds to drill a well, developing the groundwater estate and solidifying the groundwater estate as dominant as to the mineral estate and servient as to the wind estate.

Later, oil prices climb to $75.00 per barrel and the mineral estate owner decides to try to drill into the vertical reef formation under the area occupied by the wind turbine and groundwater well. The mineral estate owner reaches out to the wind farm developer to see how close he can drill a vertical well to the wind turbine, and learns that the

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298 *See* Texas Genco, LP v. Valence Operating Co., 187 S.W.3d 118 (Tex. App.—Waco 2006, pet. denied).

299 *See Merriman*, 407 S.W.3d at 252.

groundwater estate owner drilled in the only location far enough from the wind turbine but that still has access to the "covenanted area." The mineral estate owner realizes that his historic dominant estate position has been altered—either by a judicial holding reflecting the analysis above or the enactment of the aforementioned statute—and accepts that he has to work around both the wind turbine and the groundwater well. For the mineral estate owner to develop his estate and not substantially impair either the wind estate or groundwater estate, the mineral estate owner would have to utilize accepted industry alternatives, such as horizontal drilling or directional drilling, to produce the resources in the vertical reef formation. With oil prices at $75.00 per barrel, the mineral estate owner decides to drill a horizontal well. At this point, all property estates are developed, and the wind estate and groundwater estate are dominant estates as to the mineral estate, but both the groundwater estate and mineral estate are servient to the wind estate.

The enactment of the proposed legislation or application of the common law doctrines discussed throughout this Note, would provide clarity to Texas landowners and a uniform foundation by which property rights can be determined within the State of Texas.

IX. Gone with the Wind

The wind estate is a valuable property interest for landowners across Texas. Landowners should have support from the Texas Legislature as well as from the Texas Supreme Court that the wind estate is a freely severable property interest that can be conveyed, reserved, or bequeathed. The Court supported groundwater estates to be severable estates and determined the ownership of groundwater aligned with the ownership of minerals. The reasons the Court used in this determination can and should be applied to wind estates.

The two cases that have addressed the severability of wind estates utilized theories aligning with the ownership of water or the ownership of minerals in the respective states. There is uniformity in the principles applied to the mineral and groundwater estates in Texas. These uniform principles can and should be applied to the wind estate. The states that have acted in opposition to the severance of wind estates do not align concerning how Texas has determined groundwater ownership, nor have a history of supporting private property rights or the ability to contract regarding one's property.

The English Crown and the United States have benefitted from the severability of estates for hundreds of years and, frankly my dear, Texas landowners deserve the same. The Texas landowner deserves to benefit from the severability of the wind estate and to know where the property interest lies in comparison to the mineral estate, groundwater estate, and surface estate.

Robert Montgomery, Staff Editor, Texas Tech Law Review; J.D. Candidate, May 2020, Texas Tech School of Law; M.B.A. Texas Tech, Rawls College of Business, 2020; B.A., 2017, The University of Texas at Austin. *I would like to thank Dean Jack Wade Nowlin, Professor Jamie Baker, Dr. Natalie Tarenko, Amanda Voeller and Kimberly Molina for their editorial contributions and feedback. In addition, I would like to express my utmost gratitude to Professor Roderick Wetsel for his insights, encouragement, and editorial feedback throughout the writing process of this Note.*

Keeping it Regulatory: Examining State Statutes Pertaining to Searches for Fish and Wildlife Violations

By Ryan J. Overturf

I. INTRODUCTION

Throughout the country, conservation law enforcement engages in warrantless searches of people hunting and fishing to determine compliance. While some anglers and hunters may think that their activities are private, courts have held that by engaging in such activity, hunters and anglers participate in a regulated industry and have a lower expectation of privacy. Whether it be in a state park, on private property, or in one's own boat or automobile, a multitude of state statutes allow warrantless searches relating to fish and wildlife enforcement.[1] Despite challenges to warrantless search authority for fish and wildlife violations, courts have considered the searches valid in light of the importance of natural resource conservation along with the ability of law enforcement to effectively apprehend violators.[2]

Game wardens, conservation officers, fish and wildlife agents, and state wildlife troopers are some who are tasked with enforcing laws relating to fish and wildlife, off-road and power-sports vehicles, and environmental protection.[3] Regardless of their title, state statutes allow conservation law enforcement more latitude to stop and search individuals who are engaged in hunting and fishing related activities.[4] The increased latitude reflects the idea that states have an important interest in protecting their natural resources through hunting and fishing statutes.[5] To enforce hunting and fishing laws, statutes often provide law enforcement with the expanded power to check for violations through stops and searches of suspected hunters and anglers without a warrant.[6] Depending on the jurisdiction, the power to conduct such warrantless searches may be conferred on different types of law enforcement officers. In some states, only state game wardens or conservation officers may perform warrantless searches pertaining to fish and wildlife enforcement, while in other states, the authority is conferred upon a wider range of officers.[7]

Some argue that warrantless searches for fish and wildlife violations violate the Fourth Amendment prohibition of unreasonable searches and seizures. The issue has arisen as officers will often stop and check hunters and anglers for violations without probable cause or reasonable suspicion that a crime has taken place.[8] However, many

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1 *E.g.*, MINN. STAT. § 97A.201 (2017).

2 *See, e.g.*, State v. Nobles, 107 N.C. App. 627, 632–33 (1992) (noting the heavy regulations placed on the fishing industry, the value of natural resources, and that requiring a warrant would be unreasonable for effective enforcement).

3 *What We Do*, NAT'L ASS'N OF CONSERVATION LAW ENF'T CHIEFS, https://www.naclec.org/about/ (last visited Nov. 10, 2019).

4 *See infra* Part IV.

5 *See, e.g.*, State v. Sherburne, 571 A.2d 1181, 1184 (Me. 1990) (quoting State v. Snowman, 94 Me. 99, 112 (1900)) (noting that "We have long recognized that the laws designed to protect and preserve fish and game reflect their 'great importance and value to the state.'").

6 *E.g.*, TEX. PARKS & WILD. CODE ANN. § 12.104.

7 *See, e.g.*, *id.* (granting search authority to Texas game wardens and other peace officers under the Texas Parks and Wildlife Department). *But see* NEV. REV. STAT. § 501.375 (2009) (granting warrantless search authority to all law enforcement within Nevada).

8 *See generally* Ed R. Haden & Adam K. Israel, *The Fourth Amendment, Game Wardens, and Hunters*, 46 CUMB. L. REV. 79 (2015); Bryan M. Mull, *The Hidden Cost of Rod and Rifle: Why State Fish and Game Laws Must be Amended in Order to Protect Against Unreasonable*

courts have recognized the important interest of the states to enforce fish and wildlife laws, explaining that searches for fish and wildlife violations are classified as administrative searches.[9] When tailored specifically for fish and wildlife violations, warrantless searches are generally upheld as constitutional as a form of regulatory enforcement rather than general law enforcement.[10] This Note will analyze statutory language pertaining to fish and wildlife-related searches, and will identify which statutes should serve as the model for fish and wildlife enforcement.

Although searches by game wardens may appear to be a narrow issue in terms of policing, conservation law enforcement is far from the only regulatory enforcement that is performed by certified police officers. Perhaps one of the more visible forms of regulatory enforcement measures is commercial vehicle enforcement. Often performed by state law officers, commercial vehicle inspections generally do not require a warrant or probable cause of criminal conduct.[11] Rather, state statutes often permit officers to inspect commercial vehicles at weigh stations or on public roads.[12] Another regulatory function performed by law enforcement would include inspections by state fire marshals, who may be certified police officers.[13] In order to inspect premises for violations, statutes provide fire marshals with the authority to enter and inspect commercial premises without a warrant.[14] A lesser known type of regulatory inspection includes enforcement of lottery regulations by state agents, such as the Florida Lottery Division of Security, which con-

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Searches and Seizures in the Great Outdoors, 42 U. BALT. L. REV. 801 (2013); Malin J. Stearns, *It's Good To Be The Game Warden: State V. Boyer And The Erosion Of Privacy Protection For Montana Sportsmen*, 65 MONT. L. REV. 187 (2004).

9 *See, e.g.*, *Sherburne*, 571 A.2d at 1184 (explaining the state's interest in the enforcement of fish and wildlife laws to preserve natural resources).

10 *See infra* Part III (B).

11 *See* Rebecca Gregory, *Random Stops of Commercial Vehicles – The Only Way to Go – Case Note; United States v. Alvester Fort*, 7 LAW & BUS. REV. AM. 349, 366 (2001).

12 *See, e.g.*, KAN. STAT. ANN. § 8-1910(a) (West 2019) (stating that "Any police officer having reason to believe that the gross weight of a vehicle or combination of vehicles or the gross weight on any axle or sets of axles is unlawful is authorized to require the driver to stop and submit to a weighing of the same by means of either portable or stationary scales and may require that such vehicle be driven to any scales suitable for this purpose within five miles.").

13 *See, e.g.*, ALA. CODE § 36-19-1 (2019) ("The Fire Marshal and his duly appointed deputies and assistants shall have full, general powers of peace officers in this state and may exercise such powers anywhere within the state."); *see also* MISS. CODE ANN. § 45-11-105 (1) ("The State Chief Deputy Fire Marshal and deputy fire marshals shall have the status and powers of a law enforcement officer in performing their duties under the Mississippi Fire Prevention Code . . .").

14 *See, e.g.*, CAL. HEALTH & SAFETY CODE § 13109 (West 2006) (stating that "The State Fire Marshal, his or her deputies, or his or her salaried assistants, the chief of any city or county fire department or fire protection district and their authorized representatives may enter any building or premises not used for dwelling purposes at any reasonable hour for the purpose of enforcing this chapter. The owner, lessee, manager or operator of any such building or premises shall permit the State Fire Marshal, his or her deputies, his or her salaried assistants and the chief of any city or county fire department or fire protection district and their authorized representatives to enter and inspect them at the time and for the purpose stated in this section.").

sists of sworn state law enforcement officers.[15] While the Florida Lottery Division of Security agents have general law enforcement powers, they also have the authority to perform warrantless inspections of places where lottery tickets are sold to investigate possible violations.[16] When considering the powers of law enforcement for regulatory purposes, warrantless inspections encompass a wide range of enforcement areas. As a result, the administrative search authority of game wardens could have implications far beyond conservation law enforcement.

The first part of this Note discusses the development and enforcement of fish and wildlife laws in the United States.[17] This discussion provides information on how fish and wildlife laws first came about in the United States as the protection of natural resources became an increasingly important task among the states. Additionally, this section discusses the evolving nature of fish and wildlife laws and the officers that enforce them.

The second part of this Note focuses on how the courts have interpreted the search and seizure authority granted to law enforcement officers and concerns brought about by this authority.[18] The court decisions in this section provide the general limitations (or lack thereof) regarding searches pertaining to fish and wildlife by law enforcement. Further, this section provides insight into the courts' rationales when deciding whether the searches are permitted under the Fourth Amendment. This section also includes the criticisms of those who believe statutes allowing for warrantless searches for fish and wildlife enforcement violate the Fourth Amendment. Criticism of court decisions allowing for warrantless fish and wildlife inspections is also addressed.

The third part examines how different states confer the search and seizure authority regarding fish and wildlife upon law enforcement.[19] This section provides a comprehensive outline of statutes that grant fish and wildlife enforcement authority. Additionally, it organizes search authority by law enforcement as well as what items various statutes authorize law enforcement to inspect. This overview illuminates how vague or overly broad statutes may lead to issues of abuse or unconstitutional searches by law enforcement, as well as provides insight on patterns that have developed within the statutes.

The final part will analyzes how to best address problems concerning administrative searches for fish and wildlife violations.[20] Utilizing case law and criticisms of such searches, this portion demonstrates that, with proper guidance, statutes authorizing warrantless searches for fish and wildlife violations can meet the requirements for the administrative search exception. By contrasting more effectively constructed statutes with those that may be vague, broad, or archaic, implications are drawn to show how the state's best interest is to confer the administrative search power for fish and wildlife searches and seizures to specific law enforcement officers. Further, a statute and case law comparison reveals that states should set specific standards regarding what can be searched and the type of suspicion that should be established to conduct administrative searches for fish and wildlife violations.

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15 FLA. STAT. ANN. § 24.108 (West 2019).
16 *Id.*
17 *See infra* Part II.
18 *See infra* Part III.
19 *See infra* Part IV.
20 *See infra* Part V.

II. Development and Enforcement of Fish and Wildlife Laws in the United States

The development and implementation of statutes regulating hunting and fishing has evolved as states have recognized the need for regulations protecting natural resources. Prior to the Revolutionary War, the first game laws were established in the colonies for protecting wildlife from over-harvesting.[21] However, less populated states and territories generally had little restrictions on wildlife takings.[22] As hunting and fishing enforcement increased in the late 19th century, all states and territories in the continental United States adopted some form of fish and wildlife regulations.[23] Common regulations on fish and wildlife taking generally included closed seasons, bag limits, licensing measures, and methods of taking wildlife.[24]

The duties of enforcing fish and wildlife laws became increasingly challenging. While local police officers and constables were charged with enforcement of early regulations, states began to employ game wardens to take over local police duties to enforce fish and wildlife laws.[25] From the late 19th and into the early 20th centuries, states saw the widespread adoption of fish and wildlife agencies and the employment of game wardens to enforce state fish and wildlife laws.[26] As state regulations and populations increased, game warden agencies adapted by implementing specialized training, purchasing general law enforcement equipment, and specialized equipment to increase a game warden's capabilities.[27] Throughout the 20th century, the number of game wardens not only increased, but their enforcement duties also increased along with the formation of specialized units and divisions to increase their capabilities.[28]

Today, modern conservation law enforcement is enforced by officers of varying titles. While some states retain the traditional title of game warden, others have adopted the titles including conservation officer,[29] wildlife law enforcement officer,[30] or environmen-

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21 Dean Lueck, *An Economic Guide to State Wildlife Management*, 2 PERC Research Study RS 00-2 (2000), https://www.perc.org/wp-content/uploads/old/rs00_2.pdf.

22 *See id.* at 3–4 (detailing how each state adopted fish and wildlife regulations beginning in the late 19th century).

23 *Id.* at 2.

24 *Id.*

25 *Id.* at 3.

26 *Id.* at 5.

27 *See, e.g.*, Maine Warden Serv., Warden Service History 10–11 (1989) (detailing a game warden school implementation and the purchase of equipment including firearms, duty belts, state vehicles, snowmobiles, and watercraft in the mid-20th century).

28 *See, e.g.*, Shawn Bengston et al., Texas Parks and Wildlife Department History 1963-2003 at 54, 56–57, 59 (2003) (detailing the boating enforcement and search and rescue duties of Texas game wardens and the formation of the Environmental Crimes Unit and the Marine Theft Unit).

29 *See Conservation*, Miss. Dep't of Wild., Fisheries, & Parks, https://www.mdwfp.com/conservation /mdwfp-and-conservation/le/ (last visited Nov. 10, 2019).

30 *See Become a Wildlife Law Enforcement Officer*, N.C. Wild. Res. Comm'n, https:/ /www .ncwildlife.org/Careers/Become-an-Enforcement-Officer (last visited Nov. 10, 2019).

tal conservation police officer.[31] While fish and wildlife enforcement remains a major component of conservation law enforcement, officers are tasked with a variety of duties, including enforcing boating regulations, hunter education and public outreach, state park law enforcement, and wildlife management.[32] As such, the regulatory duties of enforcing state statutes relating to fish and wildlife enforcement often make up only one major component of a game warden's job.

Despite the historical mission of fish and wildlife regulation, many state conservation law enforcement officers now have the general law enforcement authority conferred to their state police or state highway patrol counterparts.[33] The move to confer general law enforcement authority to conservation law enforcement officers may reflect the notion that game wardens often operate in rural areas with little or no backup from local officers and often encounter offenses not related to fishing or hunting.[34] Therefore, it would be impractical to limit a warden's ability to enforce crimes that fall outside their specific regulatory duties. The issue of impracticality was reflected when Louisiana granted general law enforcement authority to state Wildlife and Fisheries agents[35] after the Louisiana Supreme Court determined that an agent illegally arrested a defendant on drug charges because the agent acted beyond his limited authority.[36] However, states such as Mississippi have not granted general enforcement powers to conservation officers.[37]

Currently, conservation law enforcement's duties can vary depending on the agency charged with upholding regulatory schemes. In states such as Alaska[38] and Oregon,[39] fish

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31 *See Connecticut Environmental Conservation Police Officers; What We Do*, CONN. DEP'T OF ENERGY & ENVTL. PROT., https://www.ct.gov/deep/cwp/view.asp?a=2695&q=322624&deepNAV_GID=1649 (last visited Nov. 10, 2019).

32 *Id*.

33 *See* NAT'L ASS'N OF CONSERVATION LAW ENF'T CHIEFS, *supra* note 3 (noting that "conservation law enforcement officers in most states also have general law enforcement authority which means they can effect arrests for most crimes including traffic, and other general violations of the law.").

34 *See* Jodi Belgard, *Game Wardens Play Key Role in Drug Battle*, DAILY ADVERTISER (June 22, 2014, 8:48 PM), https://www.theadvertiser.com/story/news/local/louisiana/2014/06/22/game-wardens-play-key-role-drug-battle/11248835/ (detailing how Louisiana Wildlife and Fisheries Agents spend an increasing amount of time and effort making arrests for methamphetamine-related offenses).

35 LA. STAT. ANN. § 56:55.2(A) (2019) (provides that "duly commissioned wildlife enforcement agents of the enforcement division of the Department of Wildlife and Fisheries who have graduated from the Department of Wildlife and Fisheries enforcement training academy, the Louisiana State University law enforcement training program, the Louisiana State Police Training Academy, or the University of Louisiana at Monroe law enforcement training program shall, in addition to the authority otherwise conferred by law upon such officers, be vested with the same authority and powers conferred by law upon other law enforcement officers of this state . . .").

36 State v. Longlois, 374 So.2d 1208, 1210 (La. 1979).

37 MISS. CODE ANN. § 49-1-43(7) (West 2019) ("Nothing in this section shall be construed as granting conservation officers general police powers.").

38 *Division of Alaska Wildlife Troopers*, ST. OF ALASKA DEP'T OF PUB. SAFETY, https://dps.alaska.gov/AWT/Home (last visited Nov. 10, 2019).

and wildlife regulatory enforcement is tasked to a specialized division of the respective state police agency. These agencies fall under larger public safety agencies, which are also responsible for general crime control and other specialized law enforcement functions.[40] In contrast, many states have a single agency dedicated to all aspects of fish and wildlife enforcement that fall under the department responsible for natural resources.[41] However, other states have separate agencies that are charged with more limited duties, such as state park law enforcement[42] and commercial fisheries enforcement,[43] while their counterparts at other agencies enforce hunting and inland fishing regulations.

III. Administrative Searches

The Fourth Amendment provides individuals with the right to be free from unreasonable searches and seizures.[44] As a result, law enforcement must generally have probable cause or a warrant to conduct a search related to criminal violations.[45] However, courts have previously allowed warrantless searches by government authorities when the search relates to enforcement within a regulated industry. In *New York v. Burger*, the Supreme Court examined the constitutionality of a warrantless inspection of the defendant's junkyard by officers of the NYPD's Auto Crimes Division.[46] Finding that an operator of a vehicle-dismantling business engaged in a regulated industry, the Supreme Court reasoned that the defendant had a reduced expectation of privacy relating to his business activities.[47] The Supreme Court held that because the inspection properly fur-

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39 *Fish and Wildlife Division*, Or. St. Police, https://www.oregon.gov/osp/fw/pages/index.aspx (last visited Nov. 10, 2019).

40 *See Welcome to the Alaska Department of Public* Safety, St. of Alaska Dep't of Pub. Safety, https:/ /dps.alaska.gov/Home (last visited Nov. 10, 2019); *Oregon State Police Divisions, Programs, Sections or Units*, Or. St. Police, https://www.oregon.gov/osp/programs/Pages/OSP_Programs.aspx (last visited Nov. 10, 2019).

41 *Natural Resources: Police Officer Job Description*, W.Va. Div. of Nat. Res. Law Enf't Sec., http:// www.wvdnr.gov/lenforce/8550.shtm (last visited Nov. 10, 2019); *Connecticut Environmental Conservation Police Officers: What We Do*, Conn. Dep't of Energy & Envtl. Prot., https://www.ct.gov/deep/cwp /view.asp?a=2695&q=322624 (last visited Nov. 10, 2019); *State Game Wardens: FWP Wardens are Peace Officers*, Mont. Fish, Wild. & Parks, http://fwp.mt.gov/enforcement/wardens/ (last visited Nov. 10, 2019); *Law Enforcement*, Fla. Fish & Wild. Conservation Comm'n, http://myfwc.com /about/inside-fwc/le (last visited Nov. 10, 2019).

42 *See, e.g.*, *New York State Park Police: Committed to Protecting NY State Parks and its Patrons*, N.Y. Parks, Recreation & Hist. Pres., https://parks.ny.gov/employment/park-police/default.aspx (last visited Nov. 10, 2019).

43 *See, e.g.*, Me. Rev. Stat. Ann. tit. 12 § 6025(5) (2001).

44 U.S. Const. amend. IV. ("The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.").

45 *See id.*

46 New York v. Burger, 482 U.S. 691, 693 (1987).

47 *Id.* at 707.

thered the state's administrative scheme, the search was valid.[48] The law enforcement's administrative search authority was also upheld for activities such as warrantless inspections of mining facilities; the Supreme Court noted that one does not enjoy the same privacy protections in a commercial operation compared to a residence.[49]

A. Administrative Searches Applied to Conservation Law Enforcement

With states implementing statutes regulating hunting and fishing as well as forming agencies to specifically enforce such statutes, courts have often reasoned that the warrantless search power of conservation law enforcement is constitutional as an administrative search. Several elements must be present when evaluating the constitutionality of a warrantless search or inspection for administrative purposes.[50] The North Carolina Court of Appeals reiterated the U.S. Supreme Court's analysis of a proper administrative search:

> This warrantless inspection, however, even in the context of a pervasively regulated business, will be deemed to be reasonable only so long as three criteria are met. First, there must be a "substantial" government interest that informs the regulatory scheme pursuant to which the inspection is made. . . Second, the warrantless inspections must be "necessary to further [the] regulatory scheme." . . . Finally, "the statute's inspection program, in terms of the certainty and regularity of its application, [must] provid[e] a constitutionally adequate substitute for a warrant." In other words, the regulatory statute must perform the two basic functions of a warrant: it must advise the owner of the commercial premises that the search is being made pursuant to the law and has a properly defined scope, and it must limit the discretion of the inspecting officers.[51]

This framework has set the standard that government officials must meet prior to an administrative inspection.

When applied to conservation law enforcement, warrantless inspections for fish and wildlife violations will be upheld when the proper criteria for administrative searches are met.[52] Courts have previously emphasized the importance of state statutes regulating fish and wildlife, with the Maine Supreme Court noting that "[w]e have long recognized that the laws designed to protect and preserve fish and game reflect their 'great importance and value to the state.'"[53]

Warrantless checks and inspections may be necessary in order to effectively enforce regulations. As the North Carolina Court of Appeals stated in *State v. Nobels*, "imposing a warrant requirement renders the inspections meaningless. If fishermen or fish dealers have knowledge of upcoming checks, the probability of violations would be low since

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48 *Id.* at 713–14.
49 Donovan v. Dewey, 452 U.S. 594, 598–99, 602 (1981).
50 *Burger*, 482 U.S. at 702.
51 State v. Nobles, 107 N.C. App. 627, 631 (1992) (quoting New York v. Burger, 96 L.Ed.2d 601, 614 (1987)).
52 *See id.*
53 State v. Sherburne, 571 A.2d 1181, 1184 (Me. 1990).

violators would circumvent the law by concealing unlawful activity."[54] Finally, when evaluating the substitute for the warrant requirement, the argument has been made that by procuring the proper licenses and engaging in a regulated activity such as hunting or fishing, hunters and anglers should be aware that they are subject to compliance checks and have a lessened degree of privacy.[55]

B. Criticism Regarding the Search Authority for Fish and Wildlife Violations

Despite court decisions permitting searches by conservation law enforcement as constitutional under the administrative search exception, some argue that warrantless searches and the statutes that allow them are unconstitutional and invalid as administrative searches. Others argue that the statutory power provided to conservation law enforcement is too broad, and that some level of suspicion related to criminal activity should be present before allowing a warrantless search. Commenting on the issue of a game warden's authority to search areas such as coolers pursuant to statutory law, Malin J. Stearns criticized the Montana Supreme Court's decision in *State v. Boyer* that upheld a Montana warden's warrantless search of the defendant's boat for illegally-taken fish,[56] arguing that "[u]nder *Boyer*, wardens have almost unlimited rights to search, since the court has demonstrated a willingness to excuse wardens from the requirement of probable cause, and the searches are justified by what the wardens find, not by where or how they conduct the search."[57]

Stearns argued that in *Boyer*, the Montana Supreme Court misinterpreted the suspicion required for a game warden to conduct a search.[58] As a result, Stearns concluded that the court's decision may lead to reduced privacy protection in future cases.[59]

While some have criticized the broad nature of searches permitted under state statutes relating to fish and wildlife enforcement, others have made the argument that searches by game wardens fail to meet the regulatory requirements required to perform a warrantless administrative search. In his dissent in *State v. Sherburne*, Maine Supreme Court Justice Glassman stated that unlike regulatory highway checkpoints designed to remove potentially dangerous drivers from the road, the checkpoint for fishing violations in *Sherburne* failed to "generate any comparable threat to human health, safety or welfare justifying any such intrusion."[60] As a result, Justice Glassman argued that the checkpoint was invalid as an administrative search because the interests of the state did not warrant the level of intrusion that accompanied the warrantless stop by a Maine game warden.[61]

The argument has also been made that the hunters' and fishermen's privacy expectations do not diminish when they obtain a license and engage in the regulated activity. "[T]he rationale that hunters impliedly consent to searches and seizures for license

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54 *Nobles*, 107 N.C. App. at 633.
55 State v. Boyer, 42 P.3d 771, 776 (Mont. 2002).
56 *Id.* at 777.
57 Malin J. Stearns, *It's Good to Be the Game Warden: State v. Boyer and the Erosion of Privacy Protection for Montana Sportsmen*, 65 Mont. L. Rev. 187, 213 (2004).
58 *Id.* at 214.
59 *Id.* 215–16.
60 State v. Sherburne, 571 A.2d 1181, 1188 (Me. 1990) (Glassman, J., dissenting).
61 *Id.*

checks and searches of their containers as a condition to the 'privilege' of hunting runs afoul of the unconstitutional-conditions doctrine."[62] Haden and Israel compared hunting regulations to those of private carriers, and noted that in *Frost v. Railroad Commission*, the U.S. Supreme Court held that a state could not enact regulations that would require one to waive constitutional rights.[63] Haden and Israel further questioned conservation law enforcement's alleged inability to effectively apprehend violators without warrantless search authority, arguing that competent game wardens using long-established techniques could spot and cite violators without performing warrantless searches.[64]

In addition to judicial and scholarly criticism of the search powers, hunting, fishing, and gun-rights advocates have criticized the ability for game wardens to perform warrantless searches as unduly intrusive on the rights of sportsmen. A report compiled by the U.S. and Texas LawShield staff criticizes the search authority of Texas game wardens, arguing that the exceptions to the traditional warrant requirement often swallows the rule.[65] The report further notes that both public and private property is often subject to search by game wardens enforcing Texas's numerous hunting and fishing laws.[66] Others have noted that there are often misconceptions about what is subject to search by conservation law enforcement and that game wardens often have wide discretion when checking for fish and wildlife violations.[67]

C. Limitations of Stops and Searches — Case Law

Despite a lack of Supreme Court guidance on warrantless searches by conservation law enforcement, many state cases shed light on what is generally permitted and what is not. In *Sherburne*, the Maine Supreme Court upheld a stop as permissible after considering the constitutionality of a roadblock conducted by Maine game wardens for enforcing fishing regulations and a subsequent search of the defendant's boat.[68] The Court noted that the roadblock was tailored to further an important state interest of enforcing fish and game laws.[69] Further, the Court concluded that given the difficult task of enforcing fish and game laws with limited personnel, the checkpoint was constitutionally valid.[70]

An example of a warrantless search of a fishing vessel occurred in *State v. Colosimo*, wherein the Minnesota Supreme Court considered whether a Minnesota conservation officer had the authority to inspect the defendant's boat after the officer determined that the defendant had been fishing.[71] The Court recognized that by engaging in the highly regulated activity of fishing, the defendant did not have an objectively reasonable expec-

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62 Haden & Israel, *supra* note 8.
63 *Id.* (citing Frost v. Railroad Comm'n, 271 U.S. 584 (1926)).
64 *Id.* at 96–97.
65 *Special Report: 5 Things You Need to Know About Game Wardens*, U.S. & TEXAS LAWSHIELD BLOG, https:// www.uslawshield.com/special-report-5-things-you-need-to-know-about-game-wardens/ (last visited Nov. 21, 2019).
66 *Id.*
67 *See* Mike Leggett, *Game Wardens' Powers Shrouded in Mystery*, STATESMAN (Oct. 31, 2012, 12:01 AM), https://www.statesman.com/sports/20121031/leggett-game-wardens-powers-shrouded-in-mystery.
68 State v. Sherburne, 571 A.2d 1181, 1182 (Me. 1990).
69 *Id.* at 1184.
70 *Id.*
71 State v. Colosimo, 669 N.W.2d 1, 4 (Minn. 2003).

tation of privacy when the conservation officer checked for violations in the field.[72] The Court further noted that because of the licensing requirements and information available to angers, it was doubtful that an angler would have a reasonable expectation of privacy when refusing an officer's inspection of his or her catch.[73] The Court held that the conservation officer's nonconsensual inspection of the defendant's vessel used to store and transport fish was permissible.[74]

In *People v. Maikhio*, the California Supreme Court evaluated the constitutionality of a game warden's warrantless stop of a defendant's vehicle.[75] The warrantless stop occurred after the game warden observed the defendant fishing from a pier, taking marine life and placing it into a bag, and driving off.[76] The game warden proceeded to stop the vehicle and search the defendant's catch where he found an illegally-taken lobster.[77] The California Supreme Court reasoned that the state interest in performing the stop was not for general law enforcement purposes, but rather was regulatory in nature.[78] The Court held that after the game warden observed the defendant taking marine life and placing the catch in his vehicle, the warden had probable cause to stop the defendant and inspect his bag for fishing violations.[79]

Not all checkpoints manned by game wardens are permissible, particularly when such checkpoints are not narrowly tailored for fish and game enforcement. Unlike the checkpoint in *Sherburne*, which was set up by Maine game wardens for the specific regulatory purpose of enforcing fishing laws,[80] the checkpoint in *State v. Baldwin* was a joint operation between New Hampshire fish and game officers and New Hampshire state police troopers for both motor vehicle and fish and wildlife violations.[81] The New Hampshire Supreme Court used a balancing test to determine whether the dual purpose of the checkpoint served an important interest of the state that would permit an intrusion of privacy.[82] Although one objective of the checkpoint was to inspect for fish and wildlife violations, the Court determined that the inquiry about the defendant's possession of firearms went beyond the scope of a regulatory game check.[83] The Court held that the scope of the checkpoint went beyond any regulatory inspection for either fish and game or motor vehicle violations, and was, therefore, unconstitutional.[84]

The Arkansas Supreme Court held in *Pickle v. State* that regulatory game inspections cannot extend into more generalized criminal investigations.[85] After an Arkansas conservation officer checked a hunter for his license in the field and determined that he was in lawful compliance, the officer then ran the hunter's information through Little Rock

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72 *Id.* at 12.
73 *Id.* at 14.
74 *Id.* at 20.
75 People v. Maikhio, 253 P.3d 247, 250 (Cal. 2011).
76 *Id.* at 251–52.
77 *Id.* at 252.
78 *Id.* at 259.
79 *Id.* at 266.
80 State v. Sherburne, 571 A.2d 1181, 1182 (Me. 1990).
81 State v. Baldwin, 475 A.2d 522 (N.H. 1984).
82 *Id.* at 526.
83 *Id.*
84 *Id.* at 527.
85 Pickle v. State, 466 S.W.3d 410, 414 (Ark. 2015).

dispatch to check for warrants.[86] The Court found that once the officer had determined that the hunter was in compliance with the applicable hunting statutes, the regulatory investigation had ended.[87] The Court held that the officer did not have reasonable suspicion required to conduct any further criminal investigation.[88]

When applied to searching structures used as a dwelling, the Minnesota Supreme Court held that a warrantless search for regulatory purposes does not extend to a fishing camp.[89] The Court considered the actions of a Minnesota conservation officer who entered the defendant's fish house to check for fishing violations without his consent and discovered illegal narcotics and a fishing violation.[90] When examining the nature of the defendant's fish house, the Court recognized that the structure was not only used for fishing purposes, but was also used as living quarters.[91] The Court held that the premises was not subject to searches for regulatory purposes by a conservation officer, but rather was a place where the defendant had a reasonable expectation of privacy.[92]

The power of conservation law enforcement to perform warrantless searches was also limited in *State v. Creech*.[93] In *Creech*, a New Mexico conservation officer stopped the defendant after observing him and his companion with rifles in the defendant's truck.[94] Because the defendant was later determined to be a convicted felon, he was charged with being a felon in possession of a firearm.[95] The New Mexico Court of Appeals determined that the officer lacked the reasonable suspicion that any game laws were being violated that would justify the traffic stop.[96] The court noted that when the statute authorizing warrantless stops for game enforcement was implemented, the New Mexico legislature intended conservation officers to have individualized suspicion of a game violation prior to stopping a vehicle.[97] The court determined that the stop and seizure was invalid.[98]

IV. OVERVIEW OF STATUTORY SEARCH AUTHORITY

A. STATUTORY CONFERENCE OF AUTHORITY

The table below provides an overview of who is authorized by statute to perform searches for fish and wildlife. Generally, state statutes authorizing warrantless searches fall into three categories: (1) conferring authority to all law enforcement officers within the respective state, (2) designating specific officers who are normally tasked with fish and wildlife enforcement, and (3) conferring authority to the director or commissioner

86 *Id.* at 411.
87 *Id.* at 414.
88 *Id.*
89 State v. Larsen, 650 N.W.2d 144, 153–154 (Minn. 2002).
90 *Id.* at 146.
91 *Id.* at 149.
92 *Id.* at 153.
93 State v. Creech, 806 P.2d 1080 (N.M. Ct. App. 1991).
94 *Id.* at 1081.
95 *Id.*
96 *Id.* at 1084.
97 *Id.*
98 *Id.* at 1085.

of the state agency charged with fish and wildlife enforcement along with the officers under his or her command. This categorization reveals how vague or broad language authorizing warrantless searches for fish and wildlife violations may lead to enforcement problems when compared to statutes using more specific language.

TABLE 1 CONFERENCE OF AUTHORITY BY STATE

State Statutes	Agency/Personnel
Ala. Code § 9-11-303	"[C]ommissioner of conservation and natural resources and his designated agents or employees"
Alaska Stat. § 16.05.180	"Each peace officer designated in AS 16.05.150"
Ariz. Rev. Stat. § 17-211	"Game rangers and wildlife managers"
Ark. Code Ann. § 15-41-203	"[G]ame warden or other officer having authority to enforce the game laws of this state"
Cal. Fish & G. Code § 1006	"The department [of Fish and Game]"
Colo. Rev. Stat. Ann. § 33-6-111	"[O]fficer of the division of parks and wildlife or other peace officer empowered to enforce articles 1 to 6 of this title 33"
Conn. Gen. Stat. Ann. § 26-6	"Conservation officers, special conservation officers and patrolmen"
Del. Code. Ann. 7 § 111	"Secretary [of Natural Resources and Environmental Control] and the Fish and Wildlife Agents"
Fla. Stat. § 379.3311	"The [Fish and Wildlife Conservation] commission, the executive director and the executive director's assistants designated by her or him, and each commission officer"
Ga. Code Ann., § 27-1-20	"[G]ame wardens"
Haw. Rev. Stat. § 187A-15	"Any agent of the department [of Land and Natural Resources] upon whom the board has conferred powers of police officers or any other enforcement officer of the State"
Idaho Code § 36-1301	"The director [of the Department of Fish and Game], all conservation officers and other classified department employees, and all sheriffs, deputy sheriffs, forest supervisors, marshals, police officers, state forest department officers, and national forest rangers"
520 Ill. Comp. Stat. 5/1.19	"All authorized employees of the Department [of Natural Resources]"
Ind. Code § 14-22-39-3	"The director [of the Department of Natural Resources] and conservation officers"
Iowa Code § 462A.20	"[B]y representatives of the commission or by any peace officer who is trained"
Kan. Stat. Ann. § 32-1001(a)(4)	"[A]ny officer or employee of the department [of Wildlife, Parks and Tourism] or any officer authorized to enforce the laws of this state or rules and regulations of the secretary"
Ky. Rev. Stat. Ann. § 150.090(5)	"Conservation officers and other officers charged with the enforcement of this chapter"
La. Stat. Ann. § 56:55(A)	"The secretary [of Wildlife and Fisheries], the deputy secretary, or any commissioned wildlife enforcement agent of the enforcement division"
Me. Rev. Stat. Ann. tit. 12, § 10353	"A game warden or other official described in section 10401"

State Statutes	Agency/Personnel
Me. Rev. Stat. Ann. tit. 12, § 6025	"[M]arine patrol officer . . . sheriff, deputy sheriff, police officer, constable or inland fisheries and wildlife warden, within their respective jurisdiction"
Md. Code Ann., Nat. Res. § 4-1204	"Natural Resources police officer or any law enforcement officer"; "Natural Resources police officer, in uniform or accompanied by a uniformed police officer"
Mass. Gen. Laws Ann. ch. 130, § 9	"The director [of the Department of Environmental Protection], the deputy directors of enforcement, chiefs of enforcement, deputy chiefs of enforcement and all environmental police officers and deputy environmental police officers or a member of the state police"
Mich. Comp. Laws Ann. § 324.1602	"The department, or an officer appointed by the department"
Minn. Stat. Ann. § 97A.215	"An enforcement officer"
Miss. Code Ann. § 49-1-43	"[D]irector [of Wildlife, Fisheries, and Parks] and each conservation officer"
Mo. Rev. Stat. § 252.100	"Any authorized agent of the [Department of Conservation] commission, sheriff, marshal or their deputies"
Mont. Code Ann. § 87-1-506	"[W]arden"
Neb. Rev. Stat. § 37-607	"Conservation officer and any other peace officer"
Nev. Rev. Stat. § 501.375	"[G]ame warden, sheriff and other peace officer of this State"
N.H. Rev. Stat. § 206:26	"[E]xecutive director [of Fish and Game], if certified as a police officer in accordance with RSA 106-L:5, V, and each conservation officer"
N.H. Rev. Stat. § 211:75	"[C]onservation officer"
N.J. Stat. Ann. § 23:10-20	"A member of the Fish and Game Council and any conservation officer"
N.M. Stat. Ann. § 17-2-19	"The director of the department of game and fish, each conservation officer, each sheriff in his respective county and each member of the New Mexico state police"
N.Y. Envtl. Conserv. Law § 71-0525	"All police officers, such employees as may be designated by the commissioner, and all peace officers"
N.C. Gen. Stat. § 113-136	"Inspectors and protectors"
N.D. Cent. Code § 20.1-03-18	"[T]he director [of Game and Fish] or the director's duly authorized deputies and wardens"
Ohio Rev. Code Ann. § 1531.13	"A wildlife officer, sheriff, deputy sheriff, constable, or officer having a similar authority"
Okl. Stat. Ann. tit. 29, § 3-201	"[G]ame wardens shall be peace officers"
Or. Rev. Stat. § 496.675	"Persons mentioned in ORS 496.645"

State Statutes	Agency/Personnel
34 Pa. Cons. Stat. § 901	"Any officer whose duty it is to enforce this title or any officer investigating any alleged violation of this title"
20 R.I. Gen. Laws § 20-1-8	"The director [of Environmental Management] and each conservation officer"
S.C. Code Ann. §§§ 50-3-380, 50-5-90, 50-3-370	"[E]nforcement officers"
S.D. Codified Laws § 41-15-6	"Uniformed law enforcement officer"
Tex. Parks & Wildlife Code Ann. § 12.104	"[G]ame warden or other peace officer commissioned by the department [of Parks and Wildlife]"
Utah Code Ann. § 23-20-25	"Conservation officer"
Vt. Stat. Ann. 10 § 8005	"[I]nvestigator"
Va. Code Ann. § 29.1-208	"[C]onservation police officers"
Wash. Rev. Code § 77.15.094	"Fish and wildlife officers and ex officio fish and wildlife officers"
W. Va. Code § 20-7-4	"Natural resources police officers"
Wis. Stat. Ann. § 29.924	"The department [of Natural Resources] and its wardens"
Wyo. Stat. Ann. § 23-6-109	"Any person authorized to enforce the provisions of this act"

B. WHAT CAN BE SEARCHED WITHOUT A WARRANT

The table below provides an overview of what property can be searched or inspected by officers enforcing fish and wildlife statutes. Generally, items used to transport fish and wildlife is subject to search by officers looking for violations in most states.[99] These items also often include vehicles used by potential violators.[100] However, most states do not include structures that can be used as a dwelling or residence in authorizing warrantless searches.[101] Finally, many statutes that do not specifically confer authority to officers to search items often require persons engaging in hunting or fishing to display items such as licenses, equipment, or their catch.[102] While statutes may be worded differently, several patterns emerge across states regarding what officers can search when enforcing fish and wildlife laws.

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99 *See, e.g.*, LA. STAT. ANN. § 56:55 (1981) (where authority is granted to the head of Louisiana Wildlife and Fisheries along with the officers within the department).

100 *See, e.g.*, ALA. CODE § 9-11-303 (1940).

101 *See, e.g.*, ALA. CODE § 9-11-303 (2019); ALASKA STAT. ANN. § 16.05.180 (West 2019); ARIZ. REV. STAT. ANN. § 17-211 (2016).

102 *See, e.g.*, DEL. CODE. ANN. tit. 7, § 111 (West 2019); FLA. STAT. ANN. § 379.3311 (West 2012).

Table 2: Items that can be searched without a warrant

A: Bags, Containers, Conveyance & Similar Objects
B: Person
C: Vehicles
D: Camp, Tent, & Similar Structures

State Statutes	A	B	C	D	Notes
Ala. Code § 9-11-303	X		X		Within any wildlife management area
Alaska Stat. § 16.05.180	X		X		Written statement required by officer
Ariz. Rev. Stat. § 17-211	X		X		
Ark. Code Ann. § 15-41-203	X	X	X		
Cal. Fish & G. Code § 1006	X		X		Vehicles limited to boats, all other buildings except dwellings
Colo. Rev. Stat. Ann. § 33-6-111					Requires exhibit of license, wildlife, equipment
Conn. Gen. Stat. Ann. § 26-6	X		X		
Del. Code. Ann. 7 § 111	X	X	X	X	
Fla. Stat. § 379.3311	X	X	X	X	
Ga. Code Ann., § 27-1-20					
Haw. Rev. Stat. §§ 187A-15, 199-3	X		X		Aquatic life
Idaho Code § 36-1201					Must produce license & wildlife in possession for inspection. Must stop and report at marked wildlife check stations that are on route of travel.
520 Ill. Comp. Stat. 5/1.19	X		X	X	
Ind. Code § 14-22-39-3	X		X	X	
Iowa Code § 462A.20			X		Vehicles limited to boats
Kan. Stat. Ann. § 32-1001(a)(4)					When hunting/fishing, must allow inspection of such card or other evidence by officer
Ky. Rev. Stat. Ann. § 150.090	X				Inspection of license, equipment used to take
La. Stat. Ann. § 56:55	X		X		
Me. Rev. Stat. Ann. tit. 12, § 10353	X		X		
Me. Rev. Stat. Ann. tit.12, § 6025	X		X		Applicable to marine life
Md. Code Ann., Nat. Res. § 4-1204	X		X		Marine life
Mass. Gen. Laws Ann. ch. 130 § 9	X		X		Building other than dwelling - applicable to fishing enforcement
Mass. Gen. Laws Ann. ch. 131 § 88					Must display fish, game, equipment
Mich. Comp. Laws Ann. § 324.1602	X		X		Place other than dwelling/curtilage
Minn. Stat. Ann. § 97A.215	X		X	X	Probable cause for any violation - any place/vehicle

State Statutes	A	B	C	D	Notes
Miss. Code Ann. § 49-1-43	X		X		
Mo. Rev. Stat. § 252.100	X		X		Vehicle – boat
Mont. Code Ann. § 87-1-506	X		X		Tent not used as residence
Neb. Rev. Stat. § 37-607	X		X	X	
Nev. Rev. Stat. § 501.375	X		X	X	
N.H. Rev. Stat. § 206:26	X	X	X	X	
N.H. Rev. Stat. § 211:75	X		X		Applicable to marine species
N.J. Stat. Ann. § 23:10-20	X		X		Includes game coat
N.M. Stat. Ann. § 17-2-19 (1978)	X		X	X	Tent
N.Y. Envtl. Conserv. Law § 71-0525	X		X		
N.C. Gen. Stat. § 113-136	X				Search - when in apparent control of suspected violator
N.D. Cent. Code § 20.1-03-18					Must allow inspection of license
Ohio Rev. Code Ann. § 1531.13	X		X	X	Any place where officer suspects wildlife taken illegally
Okl. Stat. Ann. tit. 29, § 3-201					Must provide license
Or. Rev. Stat. § 496.675	X		X		Guns, boats, fishing or other apparatus used for hunting or fishing
34 Pa. Cons. Stat. § 901	X	X			Includes licenses & equipment
20 R.I. Gen. Laws § 20-1-8					Stop & inspection of boats
S.C. Code Ann. §§ 50-3-370, 50-5-90, 50-3-380					Authority to obtain information on violations & bag limits, inspect all premises used in commercial fishing, and procure search warrant for all carriers suspected of containing illegally stored wildlife
S.D. Codified Laws § 41-15-6			X		Inspection of vehicle, any conveyance attached thereto, may be stopped for such an inspection
Tenn. Code Ann. § 70-6-101					Must allow officers to ascertain violations, no inspection of dwelling
Tex. Parks & Wildlife Code Ann. § 12.104	X		X		
Utah Code Ann. § 23-20-25					Officer may inspect license, tag, device or apparatus in that person's possession used for any activity regulated in title
Vt. Stat. Ann. 10 § 8005					Investigator may perform routine inspections to determine compliance
Va. Code Ann. § 29.1-208	X	X	X		No warrantless search of dwelling
Wash. Rev. Code § 77.15.094	X		X		
W. Va. Code § 20-7-4	X		X		
Wis. Stat. Ann. § 29.924	X				
Wyo. Stat. Ann. § 23-3-308					Must produce license & wildlife

C. Problems Regarding Property Subject to Search and Nature of Search

1. *Broad Search Authority Resulting in Unreasonable Searches*

When statutes grant broad search authority to officers conducting searches for fish and wildlife enforcement, the search may be more likely to fall outside the scope of an administrative search and be held invalid. One issue is the possibility of a warrantless search of a fishing or hunting camp. While a fishing or hunting camp may be primarily used for a regulated activity, the ability to use a camp as a temporary dwelling raises concerns over expectations of privacy. In *State v. Larsen*, the Minnesota Supreme Court balanced the regulatory concerns of the state with the privacy expectations of an angler in his fish house and reasoned that the angler held a reasonable expectation of privacy within his fish house.[103] The Court concluded that even when enforcing the state's fishing laws, a conservation officer could not enter the defendant's fish house without probable cause.[104]

Some states have taken measures to exclude warrantless searches of camps or residences. An example is Maryland's statute relating to warrantless searches for fishing enforcement.[105] Within the statute is an exception to the search authority of law enforcement that states "this section does not permit entering a dwelling house without first procuring a search warrant."[106] Further, while Montana's statute regarding game wardens' enforcement powers allows warrantless searches of a tent, the statute only authorizes a search of "any tent not used as a residence."[107]

Conversely, several statutes authorize law enforcement to search camps when inspecting for fish and wildlife violations. One such statute can be found in South Carolina's conference of authority to law enforcement to enter, among other premises, any house "used in commercial fishing or any fishing industry."[108] Additionally, New Hampshire allows police and conservation officers to perform warrantless searches of "any so-called fish house or bob-house" when there is suspicion that wildlife has been illegally concealed.[109] When considering the Minnesota Supreme Court's decision in *Larsen*,[110] along with other statutes specifically excluding searches of dwelling-type structures, allowing camps or houses to be searched without a warrant could raise the argument that these statutes go beyond the bounds of an administrative search and violate the Fourth Amendment.

Another issue that should be considered when evaluating the nature of authority conferred to law enforcement through state statutes is the suspicion that must be present before initiating a search for fish and wildlife enforcement. Some statutes require the stop or search only take place when the person to be inspected is actively engaged in

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103 State v. Larsen, 650 N.W.2d 144, 149 (Minn. 2002).

104 *Id.*

105 Md. Code Ann., Nat. Res. § 4-1204 (West 2019).

106 *Id.*

107 Mont. Code Ann. § 87-1-506(b) (West 2009) *amended by* Mont. Code Ann. § 87-1-506(b) (West 2019) (language was removed during amendments to the statute effective Oct. 1, 2019).

108 S.C. Code Ann. § 50-5-90 (2019).

109 N.H. Rev. Stat. Ann. § 206:26 (2017).

110 State v. Larsen, 650 N.W.2d 144, 153–54 (Minn. 2002).

hunting or fishing,[111] while other statutes mandate that the officer performing the search must have some suspicion or belief that a fish or wildlife law was violated.[112] However, some statutes confer search authority to officers without any need for suspicion or cause.[113]

With statutes that grant search authority without requiring suspicion that a law was violated or that the regulated activity be occurring, law enforcement could potentially abuse their authority to conduct stops and searches under the guise of fish and wildlife enforcement. The lack of an officer's need for probable cause to search for fishing violations was a concern for Justice Page of the Minnesota Supreme Court in the *Colosimo* decision. In his dissent, he reasoned that mandating a conservation officer to have probable cause prior to a warrantless search of a vessel "is consistent with the statutory scheme governing the conduct of conservation officers in the field."[114] Further, in *State v. Creech*, the Court of Appeals of New Mexico considered a conservation officer's warrantless search of a defendant's vehicle when the officer lacked suspicion that a violation had occurred.[115] While the officer stopped every vehicle in his patrol zone for violations, the applicable state statute only permitted searches when an officer had an individualized suspicion that a violation had taken place.[116] As a result, the court reasoned that the officer's practice of stopping every vehicle did not meet the standard of suspicion required by the statute and thus held the search invalid.[117]

2. *Search as General Law Enforcement Rather than Administrative Search*

By allowing an administrative search to take place without a warrant, the inspection needs to further a specific state regulatory scheme rather than enforce general criminal laws.[118] Therefore, when a stop or search goes beyond the scope of the applicable statute's regulatory intent, it may be held invalid. The New Hampshire Supreme Court emphasized this notion in *State v. Baldwin* when fish and game officers and state police

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111 *See, e.g.*, ME. REV. STAT. ANN. tit. 12 § 10353(2)(E)(1) (2011) (authorizing game warden or other specified officer to stop only after determining that the person is "engaged in hunting, fishing or trapping . . . .").

112 *See, e.g.*, TEX. PARKS & WILD. CODE § 12.104(a) (West 2018) (authorizing searches of game bags, vehicles, and vessels "if the game warden or peace officer has a reasonable, articulable suspicion that the game bag, vehicle, vessel, or receptacle contains a wildlife resource that has been unlawfully killed or taken.").

113 *See, e.g.*, IND. CODE ANN. § 14-22-39-3 (West 2019) (authorizing conservation officers to search "a boat, a conveyance, a vehicle, an automobile, a fish box, a fish basket, a game bag, a game coat, or other receptacle in which game may be carried . . . .").

114 State v. Colosimo, 669 N.W.2d 1, 16 (Minn. 2003) (Page, J., dissenting).

115 State v. Creech, 806 P.2d 1080, 1081 (N.M. Ct. App. 1991).

116 *Id.* at 1084.

117 *Id.* at 1085.

118 State v. Baldwin, 475 A.2d 522, 526–27 (N.H. 1984) ("When the State, in conducting a road check for any constitutionally valid and specified purpose, begins to inquire into areas which go beyond the scope of those necessary to achieve its express purpose, the check then becomes 'unreasonable'—an impermissible 'subterfuge for uncovering evidence of other crimes.'").

conducted a joint checkpoint operation.[119] During the defendant's traffic stop, officers inquired about any weapons the defendant possessed.[120] The court reasoned that the stop would have been permissible for regulatory purposes, such as a registration check by the state police or a fish and game compliance check by fish and game officers, but the inquiry about weapons went beyond the regulatory scope of any permissible checkpoint and was thus invalid.[121] The notion that regulatory stops and searches cannot transform into general law enforcement inquiries was echoed by the Arkansas Supreme Court in *Pickle v. State*, where a game warden's inquiry into a defendant's general criminal status was deemed to be invalid because the questioning went beyond the purpose of a routine check for hunting compliance.[122]

Considering court holdings noting that general criminal inquiries are impermissible when conducted in conjunction with warrantless administrative searches, the issue of broader search authority should be examined within fish and wildlife search statutes. Where applicable, statutes granting warrantless administrative search authority to general law enforcement triggers questions about the administrative nature of such searches. While a major duty of conservation law enforcement involves fish and wildlife enforcement, police and sheriffs' departments provide general law enforcement services for their respective jurisdictions.[123] As a result, searches performed by non-conservation law enforcement officers for fish and wildlife violations could be construed as pre-textual searches for general criminal violations rather than enforcing the state's regulatory scheme.[124] Justice Glassman of the Maine Supreme Court raised concerns of officers abusing their discretion by conducting a fishing enforcement checkpoint in *Sherburne*, arguing that the broad discretion that game wardens enjoyed presented a significant danger of abuse of power to apprehend criminal violators without suspicion.[125]

3. Problematic State Statutes

Arkansas's statute granting search powers for fish and wildlife enforcement is one example of a statute that could be challenged for authorizing impermissible search authority.[126] The statute appears to give broad authority in that both game wardens (the current title being Arkansas Game and Fish Wildlife Officer[127]) and other law enforcement officers have the authority to stop and search hunters, anglers and search their

119 *Id.* at 522.
120 Id. at 523.
121 *Id.* at 526.
122 Pickle v. State, 466 S.W.3d 410, 414 (Ark. 2015).
123 *See* Jennifer Alyson, *What Are the Duties of Local Law Enforcement?*, The Hous. Chronicle, https://work.chron.com/duties-local-law-enforcement-14089.html (last visited Nov. 14, 2019).
124 *See* State v. Sherburne, 571 A.2d 1181, 1187 (Me. 1990) (Glass, J., dissenting).
125 *Id.* at 1188–89.
126 Ark. Code Ann. § 15-41-203 (West 2019) ("Any game warden or other officer having authority to enforce the game laws of this state is authorized to proceed according to law to search any person, railroad train, boat, place of business, or any other public carrier to ascertain whether or not the game and fish laws are being violated.").
127 Ark. Game & Fish Comm'n, *Becoming a Wildlife Officer*, Enforcement, https://www.agfc.com/en /enforcement/becoming-wildlife-officer/ (last visited Nov. 11, 2019).

vehicles, containers, and bags for wildlife violations.[128] Further, instead of using language that explicitly authorizes warrantless searches for violations, the statute allows officers to search "according to law," which may create a vague standard that could be subject to abuse.[129] Finally, the statute lacks any suspicion requirement that the regulated activity has taken place or that a violation has been committed, but instead authorizes searches to determine if a violation has been committed.[130]

Another potentially problematic statute could be New Mexico's statute governing the game law enforcement and conservation officers' authority.[131] While the requires suspicion of a violation,[132] law enforcement's search authority is broad in scope. The statute not only gives authority to conservation officers, but also to sheriffs and New Mexico state police officers.[133] Further, the statute authorizes officers to "open, and enter and examine all camps," which could result in the warrantless inspection of a structure used as a dwelling.[134]

V. ARGUMENT

To effectively enforce fish and wildlife statutes without violating the Fourth Amendment, states must limit any ambiguity or broad conference of power in their statutes so that fish and wildlife searches maintain their regulatory nature. Whether they hold the title of game warden, conservation officer, or fish and wildlife agent, officers who enforce the fish and wildlife statutes of a state have the duty to protect and preserve the state's natural resources. In light of the significance of this duty, courts have often recognized that statutes permitting warrantless stops and seizures are necessary to effectively protect a state's natural resources.[135] However, some have reasoned that the power of officers to stop hunters and anglers and inspect their equipment, catch, or vehicles without a warrant violates the Fourth Amendment, and statutes permitting officers to conduct such searches should be held unconstitutional.[136] A major argument against broadened search authority for conservation law enforcement is that inspections for fish and wildlife fail to qualify as administrative searches.[137] However, when considering the requirements of administrative searches, the authority to perform warrantless inspections for fish and wildlife violations meets the administrative standard when statutes are properly constructed.

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128 *Id.*
129 *Id.*
130 *Id.*
131 N.M. STAT. ANN. § 17-2-19 (West 2019).
132 *Id.* § 17-2-19(A)(3) (law enforcement officer may search "where he has reason to believe any game or fish taken or held in violation of this chapter is to be found . . . .").
133 *Id.* § 17-2-19(A).
134 *Id.* § 17-2-19(A)(3).
135 Drane v. State, 492 So.2d 294, 297 (Miss. 1986).
136 *See generally* Haden & Israel, *supra* note 8, at 79; Mull, *supra* note 8, at 801; Stearns, *supra* note 8, at 187.
137 *See* Mull, *supra* note 8, at 810–11; *see also* Haden, *supra* note 8, at 92.

A. Preservation of Natural Resources Fulfills the Requirement of an Important State Interest

An important element of an administrative search is that the nature of the search must further an important government interest.[138] Courts have often held that a game warden's inspection for fish and wildlife violations should be generally accepted as a necessary means to preserving a state's natural resources. In evaluating the constitutional validity of a checkpoint for fish and game violations, the California Court of Appeals in *People v. Perez* stated that the "state has a great and legitimate interest in the preservation and management of its natural resources, including wildlife."[139] Additionally, when determining the reasonableness of a roadblock to check for fishing violations, the Maine Supreme Court in *State v. Sherburne* noted that it has "long recognized that the laws designed to protect and preserve fish and game reflect their 'great importance and value to the state.'"[140]

In addition to court decisions affirming the importance of preserving natural resources, state statutes should note the significance of fish and wildlife. Some state statutes have declared wildlife to be property of the state, which adds a property interest to be considered when implementing statutes aimed at protecting natural resources.[141] Court decisions and state statutes regarding fish and wildlife, recognize that a state has a significant interest in preserving its natural resources and must take measures to enforce fish and wildlife laws in an effective manner. However, to bolster the argument for administrative searches pertaining to fish and wildlife violations, states should ensure that statutes are constructed in a manner that effectively reflects the notion that such searches serve to further the important interest of natural resource preservation.

B. Warrantless Search Authority Enables Effective Enforcement of the State's Regulatory Scheme

A major component in a valid administrative search includes the notion that the inspection for violations properly enforces the state's regulatory scheme.[142] Considering the limitations of officers who are responsible for enforcing fish and wildlife laws, properly-tailored warrantless search authority is necessary to effectively enforce the applicable regulatory scheme to preserve natural resources.

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138 *See* New York v. Burger, 482 U.S. 691, 702 (1987) (finding that warrantless searches may be reasonable within the meaning of the Fourth Amendment where there is substantial government interest).

139 People v. Perez, 59 Cal. Rptr. 2d 596, 599 (1996) (citing Friends of Mammoth v. Board of Supervisors, 8 Cal. 3d 247, 254 (1972)).

140 State v. Sherburne, 571 A.2d 1181, 1184 (Me. 1990) (quoting State v. Snowman, 94 Me. 99, 112 (1900)).

141 *See, e.g.*, Or. Rev. Stat. Ann. § 498.002 (West 2018); Utah Code Ann. § 23-13-3 (West 2019); Idaho Code Ann. § 36-103 (West 2019) (declaring wildlife to be property of the state).

142 *See* Burger, 482 U.S. at 702 (assessing the factors necessary for a warrantless search to be deemed reasonable).

When enforcing a state's fish and wildlife laws, game wardens are tasked with patrolling large swaths of land and waterways where fish and game are taken.[143] Game wardens not only stop and search recreational hunters and anglers, but also are tasked with inspecting commercial operations for fish and wildlife law violations.[144] But wildlife enforcement, while a major component, is far from their only responsibility.[145] Game wardens spend considerable time enforcing laws relating to commercial fishing operations,[146] environmental protection,[147] and boating and other power-sport vehicles.[148] Along with enforcement, game wardens are also tasked with hunter education efforts and outreach programs.[149]

While the territory and duties of game wardens may be expansive, their numbers and budgets are often limited.[150] State budgetary restrictions and low salaries often lead to a shortage of officers who are available to enforce the fish and wildlife laws within their respective jurisdictions.[151]

Due to the expansive duties performed by game wardens, the ability to stop and check hunters and anglers serves to make enforcement for fish and wildlife laws more efficient. Thus, coupled with limited budgets and manpower, the extensive duties of game wardens should be considered when evaluating their ability to perform warrantless stops and searches pursuant fish and wildlife states.

Those who argue that the authority to stop and inspect hunters and anglers should be scaled back claim that game wardens can just as effectively enforce hunting and fishing laws by monitoring sportsmen and using the reasonable suspicion standard to catch violators.[152] This concern, while valid, may not take into account violations not immediately detectible without further investigation. While the technique of lying in wait to observe violations is often employed by game wardens in the field,[153] certain violations would be extremely difficult to identify under this enforcement method. For example, if a game warden could not check for proper licensure without reasonable suspicion, many violators would avoid prosecution if they were not committing another visible violation in the officer's presence. Further, while larger game like deer and hogs may be visible to a game warden, smaller fauna like fish are often stored in places that are not visible, such as a cooler, bag, or live-well. In addition, a pickup truck equipped with a cap or tonneau cover could conceal larger game taken illegally. As a result, a game warden's ability to

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143 *See* Stephen L. Eliason, *Policing Natural Resources: Issues in a Conservation Law Enforcement Agency*, 6 PROF. ISSUES IN CRIM. JUST. 43, 45 (2011).

144 *See id.*

145 *See, e.g.*, LAW ENF'T DIV., MICH. DEP'T OF NAT. RES., 2018 ANNUAL PROGRAMS REPORT 3 (2018) (out of a total of 456,462 hours worked in the department in the year 2018, 183,297 were spent on fish and wildlife enforcement).

146 *Id.* at 15.

147 *Id.* at 8–9.

148 *Id.* at 20–21.

149 WASH. DEP'T OF FISH & WILD., 2008 ANNUAL REPORT 24–26 (2008).

150 *Id.* at 46–48.

151 Brian McCombie, *The Warden Shortage*, OUTDOOR LIFE (Sept. 18, 2007), https://www.outdoorlife .com/articles/brian-mccombie/2007/09/warden-shortage.

152 Haden, *supra* note 8, at 96–97.

153 *See* People v. Maikhio, 51 Cal.4th 1074, 1081 (2011) (detailing how the game wardens made an investigation based on observations from lying in wait).

detect fish and wildlife violations may be greatly reduced if required to articulate probable cause or reasonable suspicion of criminal activity for inspections of a hunter or angler's license, catch, or equipment.

C. Enforcement Authority Should be Narrowly Tailored to Maintain Administrative Nature

1. *Nature of Items Subject to Search*

To maintain their administrative nature, searches for fish and wildlife violations should be limited to property subject to regulations. While valid inspections have typically included items such as licenses, bags, and vehicles—such as boats and automobiles—the search of a structure that can be used as a residence may be an issue. Structures such as camps, fish houses, and tents may be used primarily for sporting purposes, but they also serve to provide shelter for hunters or anglers temporarily during the hunting or fishing season. As evidenced by *Larsen*, a court may be skeptical that a state's interest in regulating natural resources outweighs the expectation of privacy one has in his own dwelling, with the Montana Supreme Court noting that "[t]he right to be free from unauthorized entry into one's abode is ancient and venerable."[154]

Additionally, several state statutes exempt dwellings from authorized search locations.[155] These provisions reflect even a temporary dwelling, such as a camp, is distinct from other places to be searched, and those who use such structures enjoy a reasonable expectation of privacy from government intrusion. Given statutory exclusions to conduct warrantless dwelling searches and previous case law, statutes maintaining authority to warrantlessly search camps and other structures may venture into unconstitutional territory.[156] Therefore, an important factor in reviewing or drafting statutes relating to warrantless searches for fish or wildlife violations would be to limit searches to exclude structures where one has a reasonable expectation of privacy.

2. *Allocation of Search Authority to Conservation Law Enforcement*

Another important issue for states regarding fish and wildlife stops and searches is to ensure that the statutes conform to the administrative search exception by limiting the scope of stops and searches to the activity being regulated and to confer authority to officers charged with regulating the activity. Because stops and searches for fish and wildlife violations have been traditionally analyzed as administrative searches,[157] states could tailor their statutes to limit the scope for regulatory purposes. For example, authority to conduct such searches could be limited to law enforcement officers under the fish and wildlife regulatory agency. Statutes granting authority for general law enforcement weaken the argument that stops and searches for fish and wildlife violations are regula-

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154 State v. Larsen, 650 N.W.2d 144, 147 (Minn. 2002).

155 *See, e.g.*, 520 Ill. Comp. Stat. Ann. 5/1.19 (West 2019); Mass. Gen. Laws Ann. 130 § 9, 131 (West 2019); Mich. Comp. Laws Ann. § 324.1602 (West 2019); Mont. Code Ann. 87-1-506 (West 2019); Nev. Rev. Stat. § 501.375 (West 2019); Va. Code Ann. § 29.1-208 (West 2019) (which state that dwellings or residences are exempt from warrantless searches for fish or wildlife violations).

156 *Larsen*, 650 N.W.2d at 153–54.

157 *Id.* at 149–50, 153–54.

tory, not general criminal investigation. As the Arkansas Supreme Court in *Pickle v. State* reasoned, a search for general criminal investigation subsequent to a hunting compliance check without any suspicion is not permissible under the Fourth Amendment.[158] Because administrative stops and searches for fish and wildlife violations are distinct from general law enforcement investigations, states should consider drafting statutes that confer an administrative search power only to commissioned officers employed by the regulating agency.

By limiting search powers in this way, states make a stronger case that regulatory stops and searches for fish and wildlife violations serve the specific state interest of preserving natural resources and therefore should be classified as administrative searches. When authority is granted to a broader range of law enforcement officers in a state, the argument that these searches are used for general law enforcement purposes could gain traction. If search authority is granted to officers who do not specialize in fish and wildlife enforcement, the argument can be made that police officers may take advantage of their expanded search authority to perform pre-textual stops for general law enforcement purposes.

Another measure states can take is to modify language to limit confusion and ambiguity. In many states, the more traditional title of game warden has been replaced by titles such as "conservation officer,"[159] "environmental conservation police officer,"[160] or "fish and wildlife officer."[161] In response to these changes, many states have updated their statutes to include the proper title for these enforcement officers.[162] However, other states have not updated the titles.[163] As a result, statutes conferring authority to officers of an outdated title may cause confusion or misinterpretation. Therefore, it would be prudent to ensure that, where the specific enforcement officers or agencies are named in a statute, the proper titles are used. Another solution would be to include all commissioned law enforcement officers under a specific department, such as in Texas.[164] This would ensure that the proper officers would be included within the statute without having to continually update the titles in the future.

3. STANDARD OF SUSPICION OR ACTIVITY TAKING PLACE PRIOR TO A WARRANTLESS SEARCH

While administrative searches do not require a warrant prior to a search, case law indicates that conservation law enforcement may not perform a stop or search without

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158 Pickle v. State, 466 S.W.3d 410, 414 (Ark. 2015).

159 *MDWFP and Conservation*, CONSERVATION, https://www.mdwfp.com/conservation/mdwfp-and-conservation/le/ (last visited Nov. 12, 2019).

160 *Conneticut Environmental Conservation Police Officers: What We Do*, STATE ENVTL. CONSERVATION POLICE, https://www.ct.gov /deep/cwp/view.asp?a=2695&q=322624 (last visited Nov. 12, 2019).

161 *WDFW Enforcement*, WASH. DEP'T OF FISH & WILD., https://wdfw.wa.gov/about/enforcement (last visited Nov. 12, 2019).

162 MASS. GEN. LAWS ANN. ch. 130, § 9 (West 2019). *See, e.g.*, VA. CODE ANN. § 29.1-745 (West 2019); VA. CODE ANN. § 28.2-106 (West 2019); W. VA. CODE ANN. § 20-7-4 (West 2019). *See also* FLA. STAT. ANN. § 379.3311 (West 2019).

163 *See, e.g.*, TEX. PARKS & WILD. CODE § 12.104(a) (West 2018).

164 *See id.* (stating that a "game warden or other peace officer commissioned by the department [of Parks & Wildlife] may search . . . .").

any cause or suspicion.[165] Therefore, states should include some requirement that the person subject to a stop is currently engaging in the regulated activity or has caused suspicion that a violation has taken place prior to initiating a warrantless search. The Court of Appeals of Oregon in *State v. Odam* noted that when a statute requires a reasonable belief of a violation, there must be specific, articulable facts to justify a stop.[166] While most applicable state statutes require some form of cause or suspicion of either a violation taking place or the regulated activity taking place, others lack such provisions.[167] As a result, such statutes could create an impermissible authority to stop and search individuals without any articulable reason. Therefore, it would be beneficial to construct search statutes to require some degree of cause or suspicion prior to the stop or search.

One possible exception to a suspicion standard may be the use of checkpoints by conservation law enforcement. However, checkpoint usage is often subject to limitations.[168] The checkpoint should be set up in a manner that specifically targets violators for fish- and wildlife-related infractions. One way is to conduct the checkpoint in an area in which officers could reasonably expect to encounter a high percentage of persons engaged in a regulated activity such as hunting or fishing.[169] The checkpoint's location would be tailored to target violations for a regulated activity that is important to the state, rather than general law enforcement. The Mississippi Supreme Court in *Drane* noted that a checkpoint to stop vehicles at a game-management area was a legitimate and effective manner of enforcement because the number of conservation officers is often limited, especially compared to the large number of hunters subject to regulation.[170]

Additionally, when conducting stops at checkpoints for fish and wildlife violations, inquiries should generally be limited to questions about specific regulatory enforcement provisions. When a checkpoint is conducted in compliance with applicable state statutes, and solely for the purpose of enforcing a specific regulatory scheme such as fish and wildlife enforcement, it will generally be regarded as a valid administrative search, and the stop and temporary seizure of a driver is more likely to be held valid.[171] However, if a

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165 *See* State v. Odam, 595 P.2d 1277, 1278 (Or. Ct. App. 1979), *aff'd*, 619 P.2d 647 (Or. 1980).

166 *Id.* (concluding State Police Officers assigned to fish and wildlife division needed "specific articulable facts upon which to base a reasonable suspicion that the occupants of the vehicle committed a crime" to justify a stop to check for violations after reports of illegal hunting in the area).

167 *See, e.g.*, ARK. CODE ANN. § 15-41-203 (West 2019) (requiring only that the search be for fish or wildlife violations).

168 Illinois v. Lidster, 540 U.S. 419, 426 (2004).

169 *See, e.g.*, Drane v. State, 493 So.2d 294, 297 (Miss. 1986) (concerning a checkpoint that stopped vehicles at a game-management area); *see also* State v. Thurman, 996 P.2d 309, 312 (Idaho Ct. App. 1999) (concerning an officer who chose to operate a checkpoint at a certain time "because it was when more hunters would likely be encountered.").

170 *Drane*, 493 So.2d at 297.

171 *See, e.g.*, State v. Tourtillott, 618 P.2d 423, 434–35 (the Oregon Supreme Court noted that the purpose of the roadblock manned by State Troopers in the Game Division was clearly established as enforcement of hunting regulations and specifically tailored to check for compliance with hunting laws); *see also* Mich. Dep't of State Police v. Sitz, 496 U.S. 444,

stop without individualized suspicion is for general law enforcement or crime control purposes, the stop and seizure is likely to be held invalid.[172] Thus, where states set guidelines for checkpoints for fish and wildlife enforcement, the requirements for such roadblocks should include the requirement that officers conduct stops in an area likely to produce violations, that officers limit the purpose of enforcement specific to the regulatory scheme, and that officers limit initial inquiries to fish and wildlife enforcement unless reasonable suspicion for another criminal violation is evident. Whether in statutes,[173] regulations,[174] or policy manuals,[175] the procedures for conducting fish and wildlife enforcement checkpoints should be tailored to enforce the state's specific regulatory measures.

4. *Properly Constructed Statutes Allowing Searches for Fish and Wildlife Violations are Valid as Administrative Searches under the 4th Amendment*

Statutes allowing for warrantless searches for fish and wildlife enforcement are proper under the Fourth Amendment as administrative searches if search authority is conferred in a clear and specific manner that allows for effective enforcement of a regulated activity.[176] When the nature of stops and searches pertains to hunting and fishing enforcement, courts may analyze them as administrative searches.[177] In *New York v. Burger*, the Supreme Court determined that in a commercial operation, the "warrantless inspection of commercial premises may well be reasonable within the meaning of the Fourth Amendment."[178] For the administrative search exclusion to the Fourth Amendment to apply, there must be a "substantial government interest that informs the regulatory scheme pursuant to which the inspection is made,"[179] "the warrantless inspections must be necessary to further [the] regulatory scheme,"[180] and the state inspection must provide a "constitutionally adequate substitute for a warrant."[181]

Unlike general criminal enforcement, the enforcement of fish and wildlife laws requires officers to check for violations in an activity that is regulated through licenses, specialized equipment, time constraints, and limits on what and how much can be taken by a hunter or angler.[182] Additionally, game wardens are often tasked with enforcing

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455 (1990) (the Supreme Court, in holding a DUI checkpoint valid, stated that "the balance of the State's interest in preventing drunken driving, the extent to which this system can reasonably be said to advance that interest, and the degree of intrusion upon individual motorists who are briefly stopped, weighs in favor of the state program.").

172 *See generally* Delaware v. Prouse, 440 U.S. 648 (1979).

173 *See, e.g.*, ME. REV. STAT. ANN. tit. 12, § 10353(E)(2) (2011).

174 *See, e.g.*, 40-1 MISS. CODE R. § 1.1 (LexisNexis 2019).

175 *See, e.g.*, FLA. FISH & WILD. CONSERVATION COMM'N, DIV. OF LAW ENF'T POL'Y MANUAL GEN. ORD. 17, at 8 (2019).

176 *See* New York v. Burger, 482 U.S. 691, 692 (1987).

177 *See, e.g.*, People v. Maikhio, 253 P.3d 247 (Cal. 2011); *see also* Elzey v. State, 519 S.E.2d 751 (Ga. Ct. App. 1999).

178 *Burger*, 482 U.S. at 702.

179 *Id.*

180 *Id.* (quoting Donovan v. Dewey, 452 U.S. 594, 600 (1981)).

181 *Id.*

182 TEX. PARKS & WILD. CODE ANN. § 12.104.

commercial operations relating to natural resources.[183] As a result of the restrictions and regulations placed on hunting and fishing, courts have examined whether stops and searches by game wardens for fish and wildlife violations constituted administrative searches.[184] The interest of the states in preserving natural resources has been established, as "[t]he courts have long recognized that the laws designed to protect and preserve fish and game reflect their importance and value to the state."[185] Courts have reasoned that hunters and anglers have a reduced expectation of privacy because courts recognize that enforcement goes beyond general criminal laws and includes regulation of special interest of a state that could not be enforced without suspicion-less searches.[186] Therefore, statutes that are specifically tailored to further a state's important interest of preserving natural resources through regulatory inspections are valid as administrative searches.

5. *Effective State Statutes*

When looking for statutes that effectively construe search authority for fish and wildlife violations, Texas's statute for wildlife searches and inspections provides guidance. Texas's statute authorizes the right to search to a "game warden or other peace officer commissioned by the department [of Parks and Wildlife] . . . ." rather than a general law enforcement officer.[187] Additionally, the statute mandates that the officer have a "reasonable, articulable suspicion" that the object subject to search contains evidence of a violation.[188] Texas's statute governing inspections for wildlife violations goes on to spell out not only what can be searched under the statute ("game bag, vehicle, vessel, or other receptacle"), but also defines what types of wildlife the searches cover.[189]

Another effective statute that uses more specific language is Montana's statute governing the enforcement power of Montana wardens.[190] The statute requires that specified items may be searched without a warrant "upon probable cause to believe that any fish and game law or department rule . . . has been violated."[191] The statute only names wardens when laying out enforcement powers.[192] Further, while the items subject to search include tents, the statute enumerates the warrantless search only includes "any tent not used as a residence."[193] Unlike statutes granting broad authority, Montana's statute uses specificity to minimize concerns of unconstitutionality.

The statute that confers powers to Maine game wardens also contains detailed provisions addressing warrantless search authority.[194] Specifically, the statute sets out the re-

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183 *See, e.g.*, State of Conn. Dep't of Energy & Envtl. Prot., Annual Report of the Division of State Envtl. Conservation Police, at 9 (2012).
184 People v. Maikhio, 253 P.3d 247, 258 (Cal. 2011).
185 Cecil C. Kuhne III, The Little Book of Hunting and Fishing 28 (2011).
186 *Maikhio*, 253 P.3d at 262.
187 Tex. Parks & Wild. Code Ann. § 12.104.
188 *Id.* § 12.104(a).
189 *Id.* § 12.104.
190 Mont. Code Ann. § 87-1-506 (West 2019).
191 *Id.* § 87-1-506(1)(b).
192 *Id.*
193 *Id.*
194 Me. Stat. tit. 12, § 10353 (2011).

quirements for determining compliance with fish and wildlife laws.[195] Though the statute pertains to game wardens, other officers have the same enforcement powers.[196] However, to check for applicable permits and equipment, the person subject to stop must be engaged in the regulated activity and not in a motor vehicle.[197] Additionally, the statute details the requirements for establishing checkpoints for fish and wildlife enforcement.[198] While all law enforcement officers have the authority of game wardens in the state of Maine, the statute concerning the duties and powers of game wardens establishes clear and specific provisions regarding warrantless inspections as well as other types of regulatory enforcement within a game warden's normal duties.

VI. CONCLUSION

To maintain validity as administrative searches, state statutes authorizing law enforcement to conduct warrantless stops and searches for fish and wildlife violations should be narrowly tailored to enforce the applicable regulatory scheme. While state court decisions are not binding on other states, they offer insight into what is generally allowed in warrantless search authority for conservation law enforcement and what enforcement measures go beyond constitutional safeguards. And while states often have different enforcement needs depending on geography, wildlife populations, seasonal conditions, and regulatory goals, the language in various statutes can be used as guidance to tailor a statute that is both effective and will be upheld by courts.

By identifying statutes that have been upheld as valid and offering clear and specific regulatory authority, both statutes and case law can provide guidance of what states should strive to produce when drafting or amending statutes for fish and wildlife enforcement. By identifying what is subject to inspection, which officers can perform such inspections, and what type of suspicion is needed, states can ensure that searches are less likely to be invalidated because of an intrusion on a defendant's privacy rights. Through specific and clearly drafted laws, states can ensure that warrantless stops and searches for fish and wildlife enforcement maintain their regulatory nature and remain valid within the administrative search exception within the Fourth Amendment.

Ryan J. Overturf, Executive Articles Editor, Mississippi Law Journal; J.D. Candidate 2020, University of Mississippi School of Law. *The author wishes to thank Professor Matthew Hall for his invaluable guidance and input throughout the writing and editing process.*

195 *Id.* § 10353(E).

196 *See* ME. STAT. tit. 12, § 10401 (2011) ("Sheriffs, deputy sheriffs, police officers, constables, marine patrol officers, Baxter Park rangers, wardens of the Penobscot Indian Nation within the Penobscot Indian Territory, as defined by Title 30, section 6205, subsection 2, wardens of the Passamaquoddy Tribe within the Passamaquoddy Indian Territory, as defined by Title 30, section 6205, subsection 1, and law enforcement personnel employed by the United States Department of the Interior have the powers of game wardens.").

197 ME. REV. STAT. Ann. tit. 12, § 10353(E) (2011).

198 *Id.* § 10353(E)(2).

The Cost of Innovation: Why Bitcoin Mining Requires International Regulation

By Arya Taghdiri

I. Introduction

"Currently, the emissions from transportation, housing and food are considered the main contributors to ongoing climate change research indicates that Bitcoin should be added to this list."[1]

"Bitcoin is a technological tour de force."[2]

Bitcoin has the potential to revolutionize the Internet because it is the first digital currency to enable peer-to-peer global transactions without the need for a central authority or third-party intermediary.[3] However, Bitcoin's place in the global economy is

1 Mason K. Chock et al., *Bitcoin Emissions Alone Could Push Global Warming Above 2°C*, 8 Nature Climate Change 931, 931-33 (2018).

2 *See* Daniel Rice, *"Bitcoin is a Techno Tour De Force" Reason 1: Open Source Technology*, Medium (Nov. 28, 2016), https://medium.com/@thedrbits/bitcoin-is-a-techno-tour-de-force-reason-1-open-source-technology-98215fe95f70 (discussing of Bill Gates' praise of the Bitcoin technology).

3 *See* Omid Malekan, The Story of the Blockchain: A Beginner's Guide to the Technology That Nobody Understands 15 (2018).

an issue of tremendous ongoing debate. Venture capitalists are pouring their resources into Bitcoin-based research, yet lauded financial minds decry Bitcoin as just another Ponzi scheme.[4] Warren Buffet warns investors against investing in Bitcoin, going as far as to recently label it "rat poison squared."[5] Although the future prospects of this controversial digital currency remain uncertain, this *tour de force* is undeniably making its impact on the environment with its prolific and rapidly increasing electricity consumption.[6] In this context, Bitcoin commands everyone's attention.

Bitcoin mining, the process through which Bitcoins are created, consumes an excessive amount of electricity.[7] As of 2018, Bitcoin mining consumed 0.33% of all the electricity on earth.[8] "Aside from [B]itcoin's energy consumption . . . the problem [is] that its network is fueled by coal-fired power plants in China."[9] Considering that coal-based electricity is available for low rates in China, the likely result is a high volume of Bitcoin transactions leaving a significant carbon footprint.[10]

The mining process consumes an exorbitant amount of electricity, resulting in excess C02 emissions, which contributes to climate change,[11] meaning the extreme volume of emissions attributable to Bitcoin exacerbate global climate change.[12] Considering both Bitcoin mining's consequences and diffuse production, avoiding environmental damage attributable to Bitcoin requires widespread, international regulation.

First, this Note examines the problems that Bitcoin's excessive electricity consumption poses to the environment. Specifically, this Note details how much electricity Bitcoin mining uses, the process by which it uses so much electricity, and the impacts this energy consumption could have on the environment and international treaties already in place. Next, Section IV and V determines whether the perilous consequences of Bitcoin mining can, and should, be justified as a byproduct of innovation using a weighted test. Finally, Section VI proposes a solution to Bitcoin mining's dangerous electricity consumption: international governance of Bitcoin mining by way of a binding treaty.

Before examining the extent to which Bitcoin mining's electricity consumption poses an environmental threat, a basic understanding of Bitcoin, Bitcoin mining, and the underlying blockchain technology ensures a more comprehensive understanding of the arguments made in Sections IV, V, and VI.

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4 *See* Alex Mashinsky, *Warren Buffet Calls Bitcoin "Rat Poison Squared" – Don't Believe Him*, HACKER NOON (May 28, 2018), https://hackernoon.com/warren-buffet-calls-bitcoin-rat-poison-squared-dont-believe-him-13f269c07dcc.

5 *Id.*

6 *See* Chock et al., *supra* note 1.

7 *See Bitcoin's Energy Consumption Index Chart*, DIGICONOMIST, https://digiconomist.net/bitcoin-energy-consumption (last visited Nov. 18, 2018).

8 *Id.*

9 *Id.*

10 *See id.*

11 *See* Chock et al., *supra* note 1.

12 *See id.*

II. Explaining Blockchain Technology, Bitcoin, and Bitcoin Mining

Bitcoin is a form of digital currency, more commonly referred to as a cryptocurrency.[13] The simplest definition of a cryptocurrency is a "purely electronic form of money designed to take advantage of the distributed, decentralized and trust building nature of a blockchain."[14] Blockchain technology enables peer-to-peer transactions between two parties around the world, without the need for any centralized authority or third party intermediary.[15] These transactions are verified and validated by thousands of computers, each in a race to "solve" complex computational algorithms.[16] The network able to solve these complex mathematical algorithms in the shortest amount of time is subsequently rewarded with Bitcoin.[17] This process is commonly referred to as a "Proof-of-Work" (PoW) system.[18] This competition, pinning networks against one another in an effort to procure Bitcoins, is called "mining for Bitcoin."[19] The computers competing against one another through the PoW system are commonly referred to as "miners."[20] As noted, the process of mining requires these miners to solve complex algorithms, which involves the use of powerful computer systems, and therefore a great deal of electricity.[21] The race to verify transactions has become increasingly more difficult. Miners now require more electricity (computation power) to solve these algorithms than ever before.[22] As this arms race for electricity rages onward, and as the competitive nature of mining increases, the need for greater computation power grows.[23]

Solving complex mathematical algorithms requires an enormous amount of energy and computational power.[24] Early on, miners competed for Bitcoin from the comfort of their home computers. Today, however, the economics of modern Bitcoin mining necessitates the use of aggregate computational power (i.e., electricity) to have any realistic shot at earning Bitcoin.[25] Therein lies the major problem with Bitcoin and the blockchain: to promote a secure environment that is protected against fraudulent activity, the blockchain developers created a system that rewards those who use the most

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13 *See* Omid Malekan, The Story of the Blockchain: A Beginner's Guide to the Technology That Nobody Understands 15 (2018).

14 *Id.*

15 *Id.* at 16.

16 *Id.*

17 *Id.*

18 *Id.*

19 *Id.*

20 *Id.*

21 *See How Bitcoin Mining Works*, The Economist (Jan. 20, 2015), https://www.economist.com/the-economist-explains/2015/01/20/how-bitcoin-mining-works.

22 *See* Digiconomist, *supra* note 7.

23 *See* Benjamin Akins et al., *The Case for the Regulation of Bitcoin Mining as a Security*, 19 Va. J. L. & Tech. 669, 673-81 (2015).

24 *See* Digiconomist, *supra* note 7.

25 *See Bitcoin Mining Guide – Getting Started With Bitcoin Mining*, Bitcoin Mining, https://www.bitcoinmining.com/getting-started/ (last accessed Nov. 25, 2018).

energy.[26] Under this model, greater electricity consumption is equal to greater security in the Bitcoin network.[27] The PoW system has an extremely competitive nature and incentivizes miners to use as much computer power as possible.[28] Fundamentally, the more energy available to a miner, the more likely her chances are of solving the complex mathematical algorithm first, claiming the reward.[29]

Despite the fact that mining's profitability fluctuates wildly, mining has sustained its global popularity.[30] A recently published peer-reviewed study projected that by the end of 2018, the process of Bitcoin mining will consume 0.5% of the world's total electricity.[31] Furthermore, Bitcoin mining is on pace to consume more electricity than the whole of the U.S. by the end of 2019.[32] To curb mining emissions, the international community must regulate Bitcoin mining's electricity consumption.

However, many view regulatory intervention as unnecessary.[33] These naysayers offer alternatives to mining's current unsustainable model, which, they argue, will eventually undermine current concerns about mining's emissions.[34] Before assessing the validity of these alternatives and other arguments made in opposition to mining's regulation, the following section will provide an in-depth analysis of mining's energy consumption and disseminate the statistics underlying fears about Bitcoin mining's electricity usage.

III. HOW MUCH ENERGY IS BITCOIN MINING REALLY CONSUMING — AND AT WHAT COST?

> *"The Bitcoin network can be estimated to consume at least 2.55 gigawatts of electricity currently, and potentially 7.67 gigawatts in the future, making it comparable with countries such as Ireland (3.1 gigawatts) and Austria (8.2 gigawatts)."*[35]

Bitcoin mining's energy consumption in relation to other conventional financial transactions is particularly alarming.[36] Processing a Bitcoin transaction consumes significantly more electricity than 100,000 VISA transactions.[37] Currently, over twenty U.S.

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26 *See* OMID MALEKAN, THE STORY OF THE BLOCKCHAIN: A BEGINNER'S GUIDE TO THE TECHNOLOGY THAT NOBODY UNDERSTANDS 15 (2018).

27 *See id.*

28 *See id.*

29 *See id.*

30 *See* DIGICONOMIST, *supra* note 7.

31 *See* Alex de Vries, *Bitcoin's Growing Energy Problem*, 2 JOULE 801, 801-5 (2018).

32 *See id.*

33 *See* Sean McLeod, *Bitcoin: The Utopia or Nightmare of Regulation*, 9 ELON L. REV. 553, 557-58 (2017) ("[The] lack of regulation is to be championed. The ability of the community to steer the currency in the direction it collectively sees fit is a freedom that ensures democratic opportunity for its users.").

34 CORRIE CLARK & HEATHER GREENLEY, CONG. RESEARCH SERV., R45863, BITCOIN, BLOCKCHAIN, AND THE ENERGY SECTOR 7 (2019).

35 *Id.*

36 *See* DIGICONOMIST, *supra* note 7.

37 *Id.*

households can be powered for a single day with the electricity used from a single Bitcoin transaction.[38] In effect, Bitcoin mining's electricity usage per year equates to that of nearly 6.77 million households (per year), compared to what would be nearly 17,000 U.S. households for VISA.[39] Bitcoin's electricity consumption as a percentage of the world's electricity consumption is currently 0.26%, and that number is expected to rise.[40]

These figures become more alarming considering where most of mining's electricity usage comes from. Given that coal-fueled power plants in China largely power the Bitcoin mining network, the threat of exacerbated environmental degradation looms.[41] Bitcoin mining's current and projected future carbon footprint is not insignificant.[42] Keep in mind: "Since every blockchain is a ledger (and therefore a file or database) that exists in many copies, the computer resources and the energy required for the calculation, transmission and storage of the information increases as the blockchain grows in complexity and use."[43] Therefore, if Bitcoin's popularity were to potentially increase even faster than expected, de Vries' prediction could certainly be exceeded—a frightening prospect.

A recently published study by scientists at the University of Hawaii examined how the projected growth of Bitcoin mining's energy usage would impact the environment.[44] The research team concluded that the cumulative emissions from Bitcoin mining alone are sufficient to push global warming beyond 2°C by 2040.[45] The Intergovernmental Panel on Climate Change's recent report on the stark impacts of temperature rise warns that to prevent the worst impacts of climate change (such as coral reef extinction and Arctic ice disappearance), total global warming must be limited to 1.5°C.[46]

IV. Balancing the Factors

The following section analyzes whether Bitcoin mining requires governance on an international scale. There are three competing values and interests weighed against one another to determine whether society as a whole is better served with a regulated Bitcoin mining agenda.

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38 *Id.*

39 *See id.* (based on 2018 figures).

40 *See* Digiconomist, *supra* note 7.

41 *See* Chock et al., *supra* note 1.

42 *Id.*

43 *The Developing Role of Blockchain*, 1 World Energy Council White Paper 15, https://www.worldenergy.org/assets/downloads/Full-White-paper_the-developing-role-of-blockchain.pdf (last accessed Nov. 30, 2018).

44 Josh Gabbatiss, *Expanding Bitcoin Use Will Push Global Warming Above 2C in Two Decades, Finds Study*, The Independent (Oct. 29, 2018), https://www.independent.co.uk/environment/bitcoin-climate-change-global-warming-cryptocurrency-mining-electricity-a8607036.html ("Currently, the emissions from transportation, housing and food are considered the main contributors to ongoing climate change. . . . This research indicates that [B]itcoin should be added to this list.").

45 *Id.*

46 *Special Report: Global Warming of 1.5°C*, Intergovernmental Panel on Climate Change (Oct. 6, 2018), https://www.ipcc.ch/sr15/chapter/spm.

The first of these three considerations assess the potential long-term and short-term environmental damage resulting from mining's energy consumption. The second consideration assesses the imminence and likelihood of the aforementioned environmental damage. The third consideration weighs the perceived societal costs of unregulated Bitcoin mining against its potential societal benefits.

A. BITCOIN MINING'S POTENTIAL ENVIRONMENTAL DAMAGE

A study published by *Nature Climate Change* notes that if Bitcoin mining's electricity consumption continues to grow at current rates, emissions from mining alone, "should it follow the rate of adoption of other broadly adopted technologies," could push global warming above 2°C as early as 2033.[47] Even more alarming, Bitcoin could push global warming above 2°C within 11 years if the digital currency is adopted at the "rate at which other technologies have been incorporated."[48] This rise is inconsistent with the goals of the 176 countries that recently ratified the Paris Agreement, which aims to "mitigate GHG emissions and keep anthropogenic global warming within 2°C to avoid the impacts of ever-more-catastrophic climate hazards such as drought, heat waves, wildfire, storms, floods and sea-level rise, among others."[49]

Considering the potential for these hazards, Bitcoin mining poses a direct threat to the successful implementation of the Paris Agreement and other international treaties aimed at preventing global climate change. The scientific community is armed with the knowledge that most Bitcoin mining takes place in China, which gets about 60% of its electricity from coal.[50] Approximately 58% of the world's largest cryptocurrency mining pools[51] are located in China, followed by the United States at 16%.[52] The mining industry's energy consumption is rapidly increasing, despite Bitcoin's price plummeting in the

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47 *See* Chock et al., *supra* note 1. *But see,* Joe Romm, *Experts Debunk 'Dangerous and Misleading' Study Hyping Bitcoin Energy Use*, THINKPROGRESS (Oct. 29, 2018), https://thinkprogress.org/experts-debunk-dangerous-and-misleading-study-hyping-bitcoin-energy-use-8f8744672611/ (discussing how various experts in the field of global climate change have challenged Mora's study, its conclusions, and the underlying assumption that "the electricity demand of [individual] Bitcoin transactions and the carbon emissions from that electricity demand both remain static over the next hundred years, while at the same time Bitcoin immediately undergoes rapid adoption.").

48 *See* Chock et al., *supra* note 1.

49 UNITED NATIONS TREATY SERIES, Chapter XXVII Environment 7.d Paris Agreement, December 12, 2015.

50 *Coal is Fueling Bitcoin's Meteoric Rise*, BLOOMBERG (Dec. 14, 2017), https://www.bloomberg.com/news/articles/2017-12-15/turning-coal-into-bitcoin-dirty-secret-of-2017-s-hottest-market.

51 A mining pool is a joint group of Bitcoin miners, or any other cryptocurrency, who combine their computational resources of a network. *Mining Pool*, INVESTOPEDIA, https://www.investopedia.com/terms/m/mining-pool.asp (last accessed Nov. 26, 2018) ("Upon successful output of cryptocurrency mining, the reward is usually split among the miners based on the agreed terms and on their respective contributions to the mining activity through production of valid [Proof-of-Work].").

52 James Eernyhough, *China Deals Major Blow to Bitcoin Industry by Vowing to Stamp Out Bitcoin Mining*, THE NEW DAILY (Jan. 9, 2019), https://thenewdaily.com.au/money/finance-news/2018/01/09/china-stamp-out-bitcoin-mining/.

past few months.[53] "The energy-consumption is insane," said de Vries, who started the Digiconomist blog to show the potential pitfalls in cryptocurrency.[54] "If we start using this on a global scale, it will kill the planet."[55]

With this end in mind, Bitcoin mining poses a material, existentialist threat to our environment. While society generally places a premium on the value of innovation, the uniquely combustible threat that Bitcoin mining's electricity consumption poses is unprecedented for innovation at such an early stage in its development.[56]

B. Imminence and Likelihood of Damage

1. *Introduction: Alternatives*

Bitcoin mining's increasing electricity consumption certainly warrants global cause for concern. However, some argue that various solutions already exist to combat Bitcoin mining's energy consumption problem.[57] They argue that these alternatives could alleviate the situation entirely before any extreme damage results.[58] This section examines the following three potential ideas that may solve or alleviate Bitcoin's energy consumption problem. The first potential solution is what many refer to as a Proof-of-Stake system: an alternative to the current Proof-of-Work system that incentivizes miners to use as much electricity as possible. The second potential solution involves mining with renewable energies. The last solution is to do nothing, calling into question Bitcoin's prospects and its underlying technology and casting doubt on the long-term, sustained profitability of Bitcoin mining.

2. *Proof-of-Stake System*

Proof-of-Stake (PoS) is an alternative method of verifying the transaction or block in the Bitcoin network.[59] Unlike the Proof-of-Work (PoW) system, which requires expensive hardware and more electrical power, PoS offers no block rewards (i.e., cryptocurrencies), and instead only rewards its users with transactional fees.[60] In the PoS model, the creator of the next block (i.e., the first person to solve the complex mathematical algorithm) is chosen via various combinations of random selection and wealth or age of the cryptocoins in his or her possession.[61]

As noted, in the PoW system, miners must compete with one another to ensure a distributed consensus.[62] These miners compete and ensure a consensus by committing

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53 Bloomberg, *supra* note 50.
54 *Id.*
55 *Id.*
56 *See* Chock et al., *supra* note 1.
57 *See* Stan Schroeder, *How to Fix Bitcoin's Energy Consumption*, Mashable (Dec. 1, 2017), https://mashable.com/2017/12/01/bitcoin-energy/#OHY2wzRKZPqb; *Why Solar (and Clean) Energy is the Near Future of Cryptomining*, Medium (May 30, 2018), https://medium.com/@cryptosolartech/why-solar-and-clean-energy-is-the-near-future-of-cryptomining-42eabe5ec8a2.
58 *See id.*
59 Max Thake, *What is Proof of Stake? (PoS)*, Medium (July 8, 2018), https://medium.com/nakamo-to/what-is-proof-of-stake-pos-479a04581f3a.
60 *Id.*
61 *Id.*
62 *Id.*

computing power (i.e., electricity) to verify the transactions sent within the network.[63] These miners utilize this computer power to solve encryption puzzles that secure each transaction.[64] After these puzzles are solved, the blockchain (the platform Bitcoin and other cryptocurrencies utilize) records them as hashes in the blocks on the public ledger, and the first miner to establish a block receives a Bitcoin.[65]

Consequently, the PoS model does not provide the same competitive incentives as the PoW system.[66] The PoW system is, by its very nature, much more of a meritocracy than the PoS system.[67] Conversely, the PoS algorithm ensures that the rich, and oftentimes lucky, emerge victorious in the race for cryptocurrencies—albeit for a much smaller reward.[68] Accordingly, the PoS system does not require near the same amount of computational power and electricity as the PoW system.[69] Therefore, if Bitcoin were to adopt the PoS model, Bitcoin's global energy consumption issue would most assuredly disappear.

If the Bitcoin network were to make a switch from the PoW system to the PoS system, then Bitcoin mining would cease to pose an environmental threat. However, under the Bitcoin community's current political landscape, a switch to the PoS system in the near future is highly improbable.[70] Modifying the Bitcoin network requires consensus 50% of the miners on the network to make that switch.[71] Considering that the PoS system does not reward miners nearly as handsomely as the PoW system, this switch seems unlikely to become a reality anytime soon. Moreover, Bitcoin miners invest thousands of dollars into their mining equipment, so the prospect of a voluntary switch to a much less rewarding system with no need for their equipment seems especially unlikely.[72] Keep in mind: Bitcoin mining is more expensive than mining actual gold.[73] Therefore, the PoW system in place is unlikely to change anytime soon.[74]

Regulators could mandate the widespread implementation of the PoS system, but there is nothing inherently illegal about the PoW system in place, and governmental bodies could begin to "chill" technological innovation through regulation. Furthermore, regulating Bitcoin technology inherently corrupts a system that is decentralized in nature. For these reasons, governmental bodies should think twice about placing burden-

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63 *Id.*
64 *Id.*
65 *Id.*
66 Colin Harper, *Could Proof of Stake Eliminate Bitcoin's Energy Costs?*, COINCENTRAL (Dec. 28, 2017), https://coincentral.com/could-proof-of-stake-mend-bitcoins-energy-costs/.
67 *See id.*
68 *See id.*
69 *See id.*
70 *The Inevitable Failure of Proof-of-Stake Blockchains and Why a New Algorithm is Needed* (Op-Ed), COINTELEGRAPH (May 24, 2015), https://cointelegraph.com/news/the-inevitable-failure-of-proof-of-stake-blockchains-and-why-a-new-algorithm-is-needed.
71 *Id.*
72 *Id.*
73 *See* Aaron Hankin, *Mining Bitcoin is 3 Times More Expensive Than Mining Gold, Research Paper Finds*, MARKETWATCH (Nov. 6, 2018), https://www.marketwatch.com/story/mining-bitcoin-is-3-times-more-expensive-than-mining-gold-research-paper-finds-2018-11-06.
74 *See* Schroeder, *supra* note 57.

some restraints on the underlying mining technology. Instead, the focus should be on regulating the Bitcoin mining industry.

3. Switch to Renewable Energy Use

Katrina Kelly, Strategy Manager at the University of Pittsburg's Center for Energy, contends that global concern over carbon emissions from Bitcoin mining may be oversimplified.[75] Kelly notes that, "[r]ather than discussing the energy consumption of [B]itcoin generally, people should be discussing the carbon production of [B]itcoin, and understanding whether certain mining towns are adding to an already large environmental burden."[76] While no studies calculating Bitcoin mining's actual carbon footprint exist, most Bitcoin mining takes place in China, a largely fossil fuel-based electricity source.[77] Thus, Kelly's study fails to address the fact that the vast majority of mining occurs in countries where miners are taking advantage of cheap, fossil fuel-based electricity sources.[78] Instead, Kelly incorrectly presupposes that most mining takes place in countries like Iceland, where its "abundant supply of geothermal and hydropower energy makes [B]itcoiners' power demand cheap and nearly irrelevant."[79]

The idea that all miners will utilize renewable energy resources sounds ideal but remains unlikely. In practice, "variable renewable sources are and will always remain a poor fit for industrial processes where maximizing returns to the investment requires steady 24/7 operation."[80] Therefore, mining economics incents the continued use of the cheapest sources of 24/7 electricity available for the foreseeable future, especially considering miners' susceptibility to excessive margin pressure following frequent and extreme price plunges inherent to Bitcoin's volatile nature, leaving miners no choice but to drive overhead costs down.

4. Sustained Profitability of Mining?

The price of one Bitcoin has fallen from nearly $20,000 in December 2017, to approximately $5,500 on November 18, 2018.[81] Irrespective of the price drop, Bitcoin mining still demands a substantial investment in battery power and electricity.[82] More specifically:

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75 *See* Katrina Kelly-Pitou, *Stop Worrying About How Much Energy Bitcoin Uses*, The Conversation (Aug. 20, 2018), https://theconversation.com/stop-worrying-about-how-much-energy-bitcoin-uses-97591.

76 *Id*.

77 Jasper Pickering & Fraser Moore, *How China Became a Haven for People Looking to Cash in on the Bitcoin Gold Rush*, BusinessInsider (Dec. 12, 2017), https://www.businessinsider.com/why-china-mines-more-bitcoin-than-any-other-country-2017-12 ("By far and away, the country where most of this [Bitcoin] mining is taking place is China . . .").

78 *See id*.

79 *See* Kelly-Pitou, *supra* note 75.

80 J.M. Korhonen, *Bitcoin is Not a Good Fit for Renewable Energy. Here's Why*, jmkorhonen.net (May 25, 2018), https://jmkorhonen.net/2018/05/25/bitcoin-is-not-a-good-fit-for-renewable-energy-heres-why/.

81 *Bitcoin Price (BTC)*, Coinbase, https://www.coinbase.com/price/bitcoin (last visited Nov. 18, 2018).

82 *See* Chock et al., *supra* note 1.

> If you run an Antminer [battery] 24/7 for a year it will produce about 0.85 [B]itcoins, at a cost of about 15,000 kilowatt hours. Depending on your power prices it will cost anywhere from $600 (at 3 cents per Kwh) to $1,800 (at 9 cents per Kwh) to mine one coin. Walmart sells the Antminer s9 [a commonly used battery for Bitcoin mining] for $8,200.[83]

The mining process has become significantly less profitable over the course of the past year due to increased entry fees and decreased gross profit.[84] In effect, one would logically conclude that Bitcoin mining will lose its shine, and its electricity consumption will eventually decline, most likely at some point in the near future. However, Bitcoin mining's electricity consumption surprisingly rose in 2017.[85] The Bitcoin Energy Consumption Index Chart suggests sustained competition and interest in Bitcoin mining in spite of its decreased profitability.[86] According to the chart, annual electricity consumption from Bitcoin mining stands at 73.12 TWh, nearly a 400% increase over the course of the past year.[87] Bitcoin mining's energy consumption has only continued to rise in the face of decreasing profits.[88] Perhaps this is a result of Bitcoin and Bitcoin mining's increasing global notoriety and popularity. Either way, this data points to Bitcoin's dwindling price, and mining's diminishing profits, which are unlikely to deter miners from competing against one another anytime soon.

C. Potential Societal Costs Resulting from Bitcoin Mining's Regulation

Those in favor of leaving Bitcoin mining unregulated may argue that regulation of Bitcoin mining—and through it, energy consumption—would corrupt the integrity of the Bitcoin technology and the underlying blockchain technology as a whole.[89] This argument asserts that Bitcoin mining regulation would effectively "chill" innovation by adversely impacting the Bitcoin system and the underlying blockchain ledger.[90] This argument is premised on the following logic: by applying less computational power to confirm transactions, the Bitcoin network and the underlying blockchain ledger will become significantly less secure.[91] Because the Bitcoin reward will now be more difficult to attain (the system becomes much less of a meritocracy if there is a cap on the total

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83 Christopher Helman, *Bitcoin Mining Uses as Much Power as Ireland. Here's Why That's Not A Problem*, FORBES (Jan. 16, 2018), https://www.forbes.com/sites/christopherhelman /2018/01/16/bitcoin-mining-uses-as-much-power-as-ireland-and-why-thats-not-a-problem/#61e020414589.

84 *See* COINBASE, *supra* note 81.

85 DIGICONOMIST, *supra* note 7.

86 *Id.*

87 *Id.*

88 *Id.*

89 *See* John McGonagle et al., *Blockchain: Background, Challenges and Legal Issues*, DLA PIPER (Feb. 2, 2018), https://www.dlapiper.com/en/uk/insights/publications/2017/06/blockchain-background-challenges-legal-issues/.

90 *See id.*

91 *See id.*

allowance of energy usage), less people will be achieving consensus on transactions, thereby weakening the PoW system in place.[92]

This argument is flawed and fails to seriously consider the possibility of a switch to the PoS system as a more realistic outcome. If this scenario were to ever materialize, miners would more realistically switch to the PoS. By doing so, they could still effectively compete for Bitcoin while avoiding expending excessive capital on computational power. Another, more realistic scenario resulting from regulation would involve Bitcoin mining's popularity declining substantially and mining itself would no longer require excessive computational power and energy, thus resolving the issue.

The stronger argument regarding Bitcoin mining's societal effects is that mining is more of a burden to society than a benefit. Colin Read, Mayor of Plattsburg, New York, recently noted "a lot of complaints that electric bills have gone up by $100 or $200. You can understand why people are upset."[93] The City of Plattsburg has been adversely affected by Bitcoin mining's electric consumption.[94] According to Read, Plattsburg has the "cheapest electricity in the world" because of a hydroelectric dam on the St. Lawrence River.[95] Residents pay only 4.5 cents per kilowatt hour, and industrial complexes—including Bitcoin mines—pay only 2 cents per kilowatt hour.[96] Plattsburg only has an allotment of 104 megawatts of power per month, so it is forced to purchase electricity on the open market for much higher prices because Bitcoin mining pushed the city over its power allotment.[97]

Around the globe, Bitcoin mining is similarly burdening ordinary citizens and business owners alike.[98] Governments are beginning to notice the adverse effects of Bitcoin mining on local levels, and some have begun to take action.[99] For example, South Korean government authorities are in the process of drafting regulations to prevent miners from taking advantage of cities with cheaper electricity.[100] Similarly, various provinces in China have begun to crack down on the Bitcoin mining industry, halting the operation of a number of illegal, unregistered mining operations.[101] However, for massive

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92 *See id*.

93 Daniel Oberhaus, *This City Just Passed the First Bitcoin Mining Ban in the US*, VICE MOTHERBOARD (Mar. 15, 2018), https://motherboard.vice.com/en_us/article/8xk4qv/bitcoin-ban-plattsburgh-coinmint-mining.

94 *Id*.

95 *Id*.

96 *Id*.

97 *Id*.

98 *See* William Suberg, *South Korea Arrests 14 On Suspicion of Discount Bitcoin Mining*, COINTELEGRAPH (Apr. 2, 2018), https://cointelegraph.com/news/south-korea-arrests-14-on-suspicion-of-discount-bitcoin-mining; *see also* Joseph Young, *Cases of Illegal Bitcoin and Cryptocurrency Mining: Chicken Farms and New York*, COINTELEGRAPH (May 17, 2018), https://cointelegraph.com/news/cases-of-illegal-bitcoin-and-cryptocurrency-mining-chicken-farms-and-new-york.

99 *See* Young, *supra* note 98.

100 Kevin Helms, *South Korea's Crypto Regulation Shakeup: New Bureau, Agreement with China*, BITCOIN.COM (July 22, 2018), https://news.bitcoin.com/south-koreas-crypto-regulation-agreement-china/.

101 *See id*. *But see* Sara Hsu, *China's Shutdown of Bitcoin Miners Isn't Just About Electricity*, FORBES (Jan. 15, 2018), https://www.forbes.com/sites/sarahsu/2018/01/15/chinas-shutdown-

Bitcoin mining hubs (most prominently, China), to effectively curb mining's carbon emissions, more widespread implementation and monitoring of mining and mining facilities will be required.[102]

D. Conclusions on Balancing Factors

While the future of Bitcoin mining and its widespread adoption remains uncertain, research surrounding the danger of its current and projected energy consumption raises substantiated fears about its long-term impact on the environment. Studies now support the notion that Bitcoin mining's energy consumption poses an existential threat.[103] Although Bitcoin may prove a short-lived bubble and its processes may fade, the current and projected environmental threat Bitcoin mining poses puts too much at stake (specifically, considering projections regarding C02 emissions) to be left unregulated.[104] Preeminent action *must* be taken *now*, before Bitcoin mining single-handedly increases global warming by 2°C.[105] Alternatives to Bitcoin mining, while promising in theory, are unproven; in the time it takes for these alternatives (such as the PoS system) to overtake PoW system, the interim environmental damage may prove too catastrophic to bear.[106]

As an international community, we regulate emissions from transportation, housing, and food. Considering what we now know, Bitcoin mining commands at least equally stringent regulation.[107]

V. Bitcoin Mining Requires International Regulation

A. Introduction

In a study published by *Energy Research & Social Science*, Jon Truby, Associate Professor of Law and Director of the Center for Law & Development at Qatar University,

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of-bitcoin-miners-isnt-just-about-electricity/#15ec058e369b (discussing how China's crackdown on Bitcoin mining has much more to do with clamping down on the perceived risks of cryptocurrencies than with issues centered around Bitcoin mining's excessive energy consumption).

102 Rakesh Sharma, *China Intensifies Crackdown on Bitcoin Mining*, INVESTOPEDIA (Jun. 25, 2019), https://www.investopedia.com/news/china-intensifies-crackdown-bitcoin-mining/.

103 *See* Chock et al., *supra* note 1; *see also* Abhishek Kumar Jha, *Bitcoin's Terrible Impact on Energy Consumption and Ecology*, TECHWORM (Sept. 14, 2018), https://www.techworm.net/2018/03/bitcoins-terrible-impact-on-energy-consumption-and-ecology.html.

104 *See* Chock et al., *supra* note 1; *see also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 46.

105 *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 46.

106 *Compare How Does It Work? Ultimate Staking Guide*, CRYPTOKNOWMICS (May 27, 2019), https://www.cryptoknowmics.com/news/what-is-proof-of-stake-pos-how-does-it-work-ultimate-coin-staking-guide (differentiating PoS from PoW approaches by energy intensity), *and Proof-of-Work (PoW) vs. Proof-of-Stake (PoS)*, TOTAL BITCOIN (May 01, 2019), https://totalbitcoin.org/pow-vs-pos/, *with* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 46 (carbon dioxide emissions must be reined in throughout every world industry).

107 *See* UNITED NATIONS TREATY SERIES, *supra* note 49 (discussing broad measures regulating emissions worldwide).

noted that Bitcoin mining's current and future carbon emissions directly threaten the objectives of the Paris Agreement.[108] Truby argues that mining—while an innovative method of securing data—poses a threat too grave in consequence to ignore. This threatens the planet to the extent that intervention is necessary to prevent similar models from emerging.[109] Thus, mining must be dealt with in the most effective and efficient manner possible: international regulation, specifically in the shape of a multilateral treaty,[110] presents the most appropriate means for bringing about global change. Local-level regulation would require non-binding global compliance amongst nation-states—unlikely in theory and practice.[111] Therefore an international treaty is the optimal vehicle for implementing widespread global regulation. To clarify, there is a difference between an international treaty and an international agreement under United States law.

> In the United States, the word treaty is reserved for an agreement that is made 'by and with the Advice and Consent of the Senate' (Article II, section 2, clause 2 of the Constitution). International agreements not submitted to the Senate are known as 'executive agreements' in the United States.[112]
>
> [Whereas a treaty] is a binding international agreement and an executive agreement applies in domestic law only. Under international law, however, both types of agreements are considered binding. Regardless of whether an international agreement is called a convention, agreement, protocol, accord, etc.; if it is submitted to the Senate for advice and consent, it is considered a treaty under United States law.[113]

A binding international treaty, therefore, provides the most effective means for curbing Bitcoin mining's carbon emissions.

B. Likelihood of Effective Implementation

After signing a treaty, four steps are necessary to ensure that the treaty is fully binding in the United States. First, the advice and consent of the Senate is needed to ratify the treaty, then the President of the United States ratifies the treaty, followed by the exchange of ratifications, and finally a final proclamation by the President.[114] However, many countries do not have legally binding mechanisms in place to ensure that interna-

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108 *See* Jon Truby, *Decarbonizing Bitcoin: Law and Policy Choices for Reducing the Energy Consumption of Blockchain Technologies and Digital Currencies*, 44 Energy Res. & Soc. Sci. 399, 399-410 (2018).

109 *Id*.

110 Multilateral treaties are treaties between three or more countries, while bilateral treaties are treaties between two countries. Malcom Shaw, *Treaty*, Encyclopedia Britannica, https://www.britannica.com/topic/treaty (last accessed Nov. 20, 2018).

111 *See generally* Derek Kellenberg & Arik Levinson, *Waste of Effort? International Environmental Agreements*, Vox (Mar. 1, 2014), https://voxeu.org/article/international-environmental-agreements-don-t-work.

112 Cong. Res. Serv., S. Prt. 106-71, Treaties and Other International Agreements: The Role of the United States Senate (2001).

113 Marci Hoffman, *Treaties and International Agreements*, UC Berkeley Law Library (Oct. 2003), https://www.law.berkeley.edu/library/dynamic/guide.php?id=65.

114 Denys P. Myers, *Violation of Treaties: Bad Faith, Non-execution and Disregard*, 11 Am. J. Int'l L. 794 (1917).

tional treaties are respected.[115] International bodies that enforce these treaties and agreements, such as the United Nations (U.N.), are rarely able to effectively punish those who fall back on their commitment, even nations with enforcement mechanisms in place.[116]

For example, United States Secretary of State, Mike Pompeo, announced that the United States was terminating the 1955 Treaty of Amity with Iran in October 2018, and the U.S. has yet to face any serious consequences or punishment from the U.N. or its courts.[117] The treaty's purpose was to establish economic relations and consular rights between the United States and Iran.[118] The United States' decision to withdraw from the treaty came almost immediately after the top U.N. court (the International Court of Justice (ICJ)) ordered the United States to ease sanctions that the United States reimposed on Iran following President Trump's decision to withdraw from the 2015 multilateral nuclear accord between Tehran and other world powers.[119]

The United States effectively ignored the ICJ's ruling, presumably, without fear of any repercussions.[120] Iranian officials admonished U.S. foreign policy and the United States' blatant disregard for the validity of international accords and tribunals, labeling the United States "an outlaw regime."[121] However, the Iranian government is no less guilty of disregarding U.N. Court decisions in the past.[122] In fact, most nations have, at one point in time, disregarded an order from an international tribunal or court.[123]

The ICJ rules on disputes between U.N. member states.[124] Its decisions are binding and cannot be appealed, but it has no mechanism to enforce them.[125] As noted, both Washington and Tehran have ignored ICJ decisions in the past.[126] In this context, nations have negotiated over 1,000 international environmental agreements to solve environmental problems.[127] Empirical studies reveal that international agreements, specifically those aimed at reducing global emissions, are mostly ineffective.[128] Although governments routinely spend years negotiating environmental agreements, the will to implement them oftentimes fades rather quickly.[129]

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115 *See id.*
116 *See id.*
117 *US to End Treaty of Amity With Iran After ICJ Ruling*, BBC NEWS (Oct. 4, 2018), https://www.bbc.com/news/world-middle-east-45741270.
118 *See id.*
119 *See* Ishaan Tharoor, *Trump's Growing Diplomatic Isolation on Iran*, THE WASHINGTON POST (Oct. 3, 2018), https://www.washingtonpost.com/world/2018/10/04/trumps-growing-diplomatic-isolation-iran/?utm_term=.b379f4e65432.
120 *See id.*
121 *Id.*
122 *See id.*
123 *See* Myers, *supra* note 114.
124 *Id.*
125 *See id.*
126 *See* Tharoor, *supra* note 119.
127 *See* Kellenberg & Levinson, *supra* note 111.
128 *See id.*
129 *See* John Vidal, *Many Treaties to Save the Earth, but Where's the Will to Implement Them?*, THE GUARDIAN (Jun. 7, 2012), https://www.theguardian.com/environment/blog/2012/jun/07/earth-treaties-environmental-agreements.

There are many reasons for why these agreements, and the governments backing them, are often ineffective.[130] Some argue that nations will sign agreements or even treaties at international conferences, but then quietly fail to ratify them or pass them into domestic law without very many people noticing or making a fuss.[131] The most likely reason for the ineffectiveness of international environmental agreements and treaties, however, is that the U.N. lacks sufficient enforcement mechanisms to make agreements and treaties as effective as they need to be.[132]

While a few parties party to an international treaty may not adhere to the regulations and guidelines set out within the treaty, some effective regulation is better than none at all. In this light, the best hope for regulations to keep mining's emissions below 2°C in the foreseeable future is if most of the main hubs for Bitcoin mining (such as China, the U.S., and Canada) actively implement regulations and monitor them closely. Subsequently, Bitcoin miners would be forced out of these mining hubs where 24/7 electricity is cheap and abundant, and forced into countries where the cost of electricity is exponentially higher. Thereafter, Bitcoin mining will cease to be profitable for miners, if in fact they are pushed out of the market for cheap electricity. As a result, Bitcoin mining's popularity and energy consumption will dwindle.

VI. Conclusion

Bitcoin, the first digital currency to enable decentralized, peer-to-peer transactions, offers its users a completely secure platform that safely encrypts all data onto the underlying blockchain ledger through the Proof-of-Work system. This system gives way to Bitcoin mining, which utilizes an astonishing amount of energy. Bitcoin mining's extreme electricity consumption has sent shockwaves throughout the international scientific community. Most of the electricity that miners utilize is cheap, 24/7 electricity (mainly coal or gas-based), and therefore, Bitcoin mining's carbon emissions seriously threaten the environment.

Some within the scientific community argue that viable alternatives will halt Bitcoin's extreme electricity consumption before any irreparable damage results. Yet each of these alternatives has proven unlikely to succeed anytime soon. Moreover, the potential future environmental harm posed by mining's emissions, in conjunction with the societal costs that mining may potentially bring about, outweighs any current or future benefits that unregulated mining offers.

The best hope for curbing carbon emissions from Bitcoin mining's electricity consumption is to implement widespread international regulation by means of an international treaty in the U.N. Since adherence to these regulations cannot be effectively enforced by the U.N.'s top international court (the ICJ), the best hope for curbing mining's emissions will be widespread regulatory implementation by the main hubs for abundant, cheap, 24/7 electricity—i.e., China, Canada, and the United States.

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130 *Id.*

131 *See id.*

132 *See* Frederic L. Kirgis, *Enforcing International Law*, Am. Soc'y of Int'l L. (Jan. 22, 1996), https:/ /www.asil.org/insights/volume/1/issue/1/enforcing-international-law.

In several instances, provinces throughout China have been motivated to regulate and shut down Bitcoin mining operations, albeit mainly for reasons unrelated to Bitcoin mining's energy consumption. However, regulating the mining industry, as well as its carbon emissions, are not necessarily mutually exclusive endeavors. Regulating the operation of mining ensures that, by treating mining as a business operation, governments can effectively regulate and monitor mining operations, and whether these operations abide by regulations. The following proposal offers a working solution in the shape of an international treaty pushing for the regulation of Bitcoin as a property and Bitcoin mining as an industry. This note suggests limiting the amount of energy (electricity) that a miner may use for any given Bitcoin transaction.

PROPOSED ARTICLE TO INTERNATIONAL TREATY

ARTICLE 1

GENERAL OBLIGATIONS

Each State Party to this Convention undertakes to:

(a) Treat Bitcoin as a property for tax purposes. Specifically, a capital gain or loss should be recorded as if it were an exchange involving property. It should be treated like inventory if it is held for resale, and therefore, an ordinary gain or loss recorded. If it is used as payment, it should be treated like currency, but must be converted, and its fair market value checked on an exchange.[133]

(b) Create an online registry for Bitcoin miners. Registration among all Bitcoin miners will be mandatory. Implementation of this online registry will allow governments to more accurately tax and regulate Bitcoin mining and its energy (i.e., electricity) consumption, as well as its carbon footprint.

(c) Issue periodic warnings to the public about the environmental risks associated with virtual currencies, and specifically Bitcoin and the process of Bitcoin mining.[134] Promote the use of other cryptocurrencies, such as Etherium, that are more environmentally friendly.[135]

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133 Treating Bitcoin as a property for tax purposes allows for governments to more effectively track and regulate Bitcoin mining and its energy consumption. Moreover, taxing Bitcoin will make the process of Bitcoin mining less profitable, and therefore theoretically less appealing to current and prospective Bitcoin miners. *See* Francine McKenna, *Here's How the U.S. and the World Regulate Bitcoin and Other Cryptocurrencies*, MARKETWATCH (Dec. 28, 2017) https://www.marketwatch.com/story/heres-how-the-us-and-the-world-are-regulating-bitcoin-and-cryptocurrency-2017-12-18.

134 In doing so, environmentally-conscious persons may be dissuaded from the mining process or instead dissuaded from using energy-dependent cryptocurrencies like Bitcoin altogether – as a result, likely driving the price of Bitcoin down even further.

135 *See Ethereum Energy Consumption Index*, DIGICONOMIST, https://digiconomist.net/ethereum-energy-consumption (last accessed Nov. 17, 2018).

(d) Remove existing, preferential policies for Bitcoin mining companies in terms of electricity prices, taxes, or land use, and guide the orderly exit of such companies from the Bitcoin mining business.[136]
(e) Set an allowance for the amount of electricity to be used for each Bitcoin transaction. This allowance will be set to 50 TWh[137] per transaction.

Arya Taghdiri is a recent graduate of the University of Texas School of Law.

136 The widespread implementation of an online registry for Bitcoin miners in each country allows for governments to more accurately monitor the energy consumption of Bitcoin miners, thus allowing for more effective regulation. *See Regulation of Cryptocurrency: China*, LIBRARY OF CONGRESS, https://www.loc.gov/law/help/cryptocurrency/china.php (last accessed Nov. 20, 2018).

137 This is not necessarily a proposal to use that exact number, but rather just an example. Currently, the average mining transaction consumes 33 TWh of electricity. DIGICONOMIST, *supra* note 7.

ALON REF. KROTZ SPRINGS, INC. V. ENVTL. PROT. AGENCY, No. 17-1044 (D.C. Cir. Aug. 30, 2019)

INTRODUCTION

In August 2019, the United States Court of Appeals for the District of Columbia affirmed the Environmental Protection Agency's (EPA) decision not to modify its controversial "point of obligations" rule in its Renewable Fuel Standard (RFS) program for automobiles under the Clean Air Act.[1] The decision marks an important turn in the ongoing debate concerning EPA's interpretation of the statute and reaffirms the agency's discretion despite the program's substantial difficulties.[2] Independent refiners challenged the program, complaining that the "point of obligation" requirement unfairly burdens them while creating a windfall for blenders and the ethanol industry, who allegedly hoard renewable fuel credits (RINs), thereby increasing the price of the credits.[3]

THE RFS PROGRAM

The RFS program mandates that a minimum volume of renewable fuels be sold with transport fuels in the United States.[4] Originally contemplated in the Energy Policy Act of 2005, the program was expanded dramatically by the Energy Independence and Security Act of 2007.[5] The program covers four categories of renewable fuels, including (1) total renewable fuel (which includes the other three categories plus conventional renewable fuels, such as ethanol); (2) advanced biofuel; (3) cellulosic biofuel; and (4) biomass-based diesel.[6] The plan seeks gradual increases in the annual "applicable volume" requirements, raising the total percentage of renewable fuels relative to conventional liquid fuels.[7]

The statute sets the applicable volume requirements for biomass-based diesel through 2012 and for the other three categories through 2022;[8] however, it also grants EPA discretion to decrease the requirements through a broad waiver provision.[9] EPA must, after determining the waiver-adjusted volumes, translate those volumes into "re-

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1 Alon Ref. Krotz Springs, Inc. v. Envtl. Prot. Agency, 936 F.3d 628 (D.C. Cir. Aug. 30, 2019).

2 *Id.* at 639 (discussing the slow development of the biofuel industry and the "E10 blendwall," which refers to the challenges associated with running an engine on a fuel containing more than 10% ethanol).

3 *Id.* at 649.

4 Steve Hanson & Sean Hill, *EPA Finalizes Renewable Fuel Standards for 2019, Reflecting Cellulosic Biofuel Shortfalls*, U.S. ENERGY INFO. ADMIN. (Dec. 6, 2018), https://www.eia.gov/todayinenergy /detail.php?id=37712.

5 *Id.*

6 *Alon Ref. Krotz Springs*, 936 F.3d at 635.

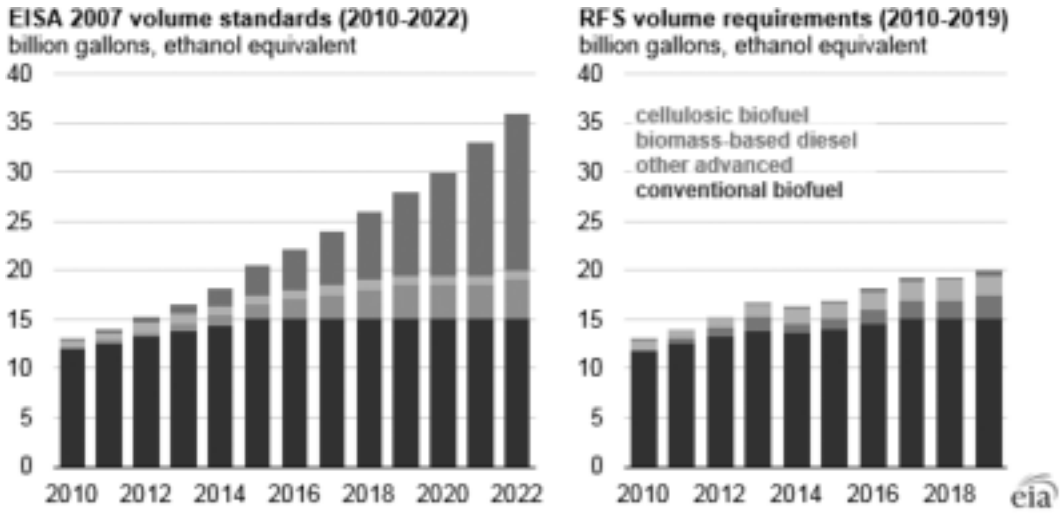
7 *Id.* at 636.

8 *Id.*

9 *Id.* at 636–37.

newable volume obligations" for each category of renewable fuel for each upcoming compliance year.[10] Volume obligations for each category of renewable fuel equal the percentage standard, which is equal to the adjusted applicable volume divided by the total anticipated volume of non-renewable transport fuel.[11]

Due to a combination of economic and technological challenges, the program has struggled.[12] Much of the problem lies with renewable fuel technology, such as the E-10 blend wall—a constructive cap that prevents further integration of ethanol into the national fuel supply.[13] As the table below from the Energy Information Agency shows[14]—despite the successful implementation of ethanol into the market—the program has fallen far short of originally intended volumes for advanced biofuels.



The "point of obligation" requirement has been the true limiting factor to the program's success. The statute requires EPA to "promulgate implementing regulations, including compliance provisions applicable to refineries, blenders, and importers, as appropriate."[15] EPA's mandate is to ensure that transport fuels sold or introduced contain *at least* the required annual percentage volume.[16] The statute distinguishes "obligated parties" from "regulated parties," with the obligated parties responsible for ensuring that the non-renewable fuel it sells is matched by selling or introducing an equivalent volume of each renewable fuel category.[17] The obligated parties must assign a RIN to each batch of renewable fuel produced or transported, and the RINs function as a type of compliance credit in which obligated parties demonstrate compliance via retiring RINs

10 *Id.* at 637 (citing 42 U.S.C. § 7545(o)(3)(B)(i)).
11 *Id.*
12 *See id.*; Hanson & Hill, *supra* note 4.
13 *Alon Ref. Krotz Springs*, 936 F.3d at 638–39.
14 Hanson & Hill, *supra* note 4.
15 *Alon Ref. Krotz Springs*, 936 F.3d at 637, 654.
16 *Id.* at 654 (citing 42 U.S.C. § 7545(o)(2)(B)(i)).
17 *Id.* at 637.

in annual compliance demonstrations to EPA.[18] These RINs remain attached to renewable fuel until the fuel is either purchased (by an obligated party) or blended.[19]

Challenge to the Point of Obligation Rule

The independent refiners challenged a number of EPA actions and interpretations, but the most significant challenge was EPA's failure to reconsider its 2010 regulations designating refineries and importers, but not blenders, as obligated parties.[20] The challenge originated from EPA's February 12, 2016 promulgated volume requirements, which the independent refiners deemed "arbitrary and capricious" for failure to impose point of obligation status on blenders as well.[21]

The independent refiners contested the rule from various angles and argued that it ultimately "misaligns incentives" by "forcing refiners to purchase RINs to satisfy their RFS obligations, jacking up their costs, while giving windfall profits to blenders, who produce (but don't consume) RINs."[22] Although the court acknowledged the program's shortcomings, EPA "reasonably explained why, in its view, there is no misalignment in the RFS program."[23] EPA's explanation of the program relied on one study that modeled the economics of RFS standards and concluded that refiners recover the cost of purchased RINs by passing that cost to customers.[24] Although numerous comments criticized that study, the independent refiners failed to raise the argument, and the court therefore did not consider contrary analysis.[25]

The obligated parties' most persuasive challenge was to EPA's textual interpretation of the statute, arguing that the statute requires EPA to reassess which entities count as an obligated party on a yearly basis.[26] The challenge took aim at EPA's interpretation of two provisions of the statute, 42 U.S.C. sections 7545(o)(2) and 7545(o)(3).[27] Specifically, subsection 7545(o)(2)(A)(iii) requires EPA to implement the RFS program and propose compliance rules applicable to "refineries, blenders, distributors, and importers, as appropriate" and set volume requirements.[28] Subsection 7545(o)(2)(A)(iii) reads:

> Regardless of the date of promulgation, the regulations promulgated . . .
> (I) shall contain compliance provisions applicable to refineries, blenders, distributors, and importers, as appropriate, to ensure that the requirements of this paragraph are met; but

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18 *Id.*
19 *Id.*
20 Regulation of Fuels and Fuel Additives: Modifications to Renewal Fuel Standard Program, 75 Fed. Reg. 14,670-01, 14,721 (Mar. 26, 2010) (codified at 40 C.F.R. § 80.1406(a)(1)).
21 *Alon Ref. Krotz Springs*, 936 F.3d at 639.
22 *Id.* at 649.
23 *Id.*
24 *Id.* (citing Christopher R. Knittel et al., The Pass-Through of RIN Prices to Wholesale and Retail Fuels Under the Renewable Fuel Standard 4 (July 2015) (noting that "73% of a change in RIN price was passed through in the form of higher petroleum prices in the same day, 98% within two business days.")).
25 *Id.* at 654.
26 *Id.* (citing 42 U.S.C. § 7545(o)(3)(B)).
27 42 U.S.C. §§ 7545(o)(2)–(o)(3).
28 *Id.* § 7545(o)(2)(A)(iii).

(II) shall not—

(aa) restrict geographical areas in which renewable fuel may be used; or

(bb) impose any per-gallon obligation for the use of renewable fuel.[29]

Subsections 7545(o)(3)(B)(i) and (ii) require that EPA set renewable fuel obligations that meet the volumes set in subsection 7545(o)(2). Subsection 7545(o)(3)(B) reads, in relevant part:

> (i) In General. Not later than November 30 of each calendar years 2005 through 2021 . . . Environmental Protection Agency shall determine and publish in the Federal Register, with respect to the following calendar year, the renewable fuel obligation that ensures that the requirements of paragraph (2) are met.
>
> (ii) Required Elements. The renewable fuel obligation determined for a calendar year under clause (i) shall—
>
> (I) be applicable to refineries, blenders, and importers, as appropriate;
>
> (II) be expressed in terms of a volume percentage of transportation fuel sold or introduced into commerce in the United States; and
>
> (III) subject to (C)(i), consist of a single applicable percentage that applies to all categories of persons specified in subclause (I).[30]

The independent refiners urged the court to interpret "applicable . . . as appropriate" to mean "applicable" in the same sense as the annual volumetric rulemakings.[31] The court disagreed with the obligated parties' interpretation by reasoning that subsection 7545(o)(3) does not specify any temporal or contextual determinations, nor does the phrase "as appropriate" relate to a temporal determination.[32] Instead, the court concluded that the statute is ambiguous and therefore reviewed whether EPA's interpretation is permissible.[33] Practical considerations and public policy arguments drove the court's reasoning, as it emphasized program characteristics, such as predictability and encouraging investment in renewable fuels.[34]

Challengers also claim that the failure to include blenders causes bankruptcies and inflicts harm on small, independent refineries.[35] EPA's refusal included inconsistent regulatory language regarding RIN prices.[36] The court, however, dismissed these complaints, noting that EPA considered evidence supporting its ultimate conclusion not to change the point of obligation rule.[37] Again, the court relied on practical concerns regarding uncertainty in the fuels market, because the parties regulated under the RFS program have invested significant resources on the basis of current regulations, and changing course might create even more uncertainty.[38]

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29 *Id.*
30 *Id.* § 7545(o)(3)(B) (emphasis added).
31 *Alon Ref. Krotz Springs*, 936 F.3d at 654–55.
32 *Id.* at 655.
33 *Id.* at 657–58.
34 *Id.* at 658.
35 *Id.* at 650.
36 *Id.*
37 *See id.* at 651–52.
38 *Id.* at 652.

There was no dissenting opinion in this case; however, Circuit Judge Stephen F. Williams argued in a concurring opinion that the majority's analysis used improperly deferential standards concerning statutory ambiguity.[39] He further argued that in the future, this will give EPA unchecked discretion when reassessing the point of obligation.[40] Given this opinion, the RFS program will likely see more controversy in the future.

John Turney is retired Senior Counsel of Richards Rodriguez & Skeith and represented regulated companies in a variety of environmental and administrative matters before the TCEQ and other regulatory agencies.

Patrick Maloney is a third-year student at The University of Texas School of Law and Articles & Notes Editor of the Texas Environmental Law Journal.

39 *Id.* at 676–77 (Williams, S., concurring); Keith Goldberg, *DC Circ. Backs EPA Refusal to Shift Biofuel Obligations*, LAW360 (August 30, 2019), https://www-law360-com.eu1.proxy.openathens.net/articles/1194364/dc-circ-backs-epa-refusal-to-shift-biofuel-obligations.

40 *Id.* at 676.

LEGISLATIVE UPDATE 2019 FLOOD RESPONSE

BACKGROUND

In 2017, Hurricane Harvey caused historic devastation to coastal Texas.[1] This event inspired Texas Governor Greg Abbott to declare disaster response as an emergency item in his 2019 State of the State Address.[2] The Governor agrees with the House and the Senate "that we must apply the lessons of Harvey to improve the way Texas responds to natural disasters[,]"[3] and he supports the proposals of Senator Charles Perry (R-Lubbock) and Representative Dade Phelan (R-Orange), who have proposed to "extend disaster solutions beyond just funding and beyond the coastal region."[4] The 2019 legislative session had a tremendous impact on how Texas handles and funds flood response. The following examines flood-related bills that passed in the 86th Regular Session.

SENATE

The Senate passed seven bills during the session—including several bills by Senator Perry, a tax related bill, and bills that create several workgroups—reforming various aspects of statewide disaster response.

Senate Bill (SB) 339 by Senator Joan Huffman (R-Houston) relates "to a seller's disclosure notice for residential property regarding floodplains, flood pools, floodways, or reservoirs."[5] SB 339 changes required disclosures for real estate sales that take place after September 1, 2019, the effective date of the bill.[6] The act requires the seller to disclose knowledge of previous flooding events,[7] current flood insurance coverage,[8] and past flood damage claims.[9] This includes areas adjacent to reservoirs that are "subject to controlled inundation under the management of the United States Army Corps of Engineers."[10]

SB 812, co-authored by Senators Eddie Lucio Jr. (D-Brownsville) and Paul Bettencourt (R-Houston), addresses a problem with "the application of the limit on appraised value of a residence homestead for ad valorem tax purposes to an improvement that is a replacement structure for a structure that was rendered uninhabitable or

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1 *See* NAT'L HURRICANE CENTER, NAT'L OCEANIC & ATMOSPHERIC ADMIN., COSTLIEST U.S. TROPICAL CYCLONES TABLES UPDATED 2 (Jan. 26, 2018).

2 *Governor Abbott Delivers State of the State Address*, OFFICE OF TEX. GOVERNOR, https://gov.texas.gov/news /post/governor-greg-abbott-delivers-state-of-the-state-address (last updated Feb. 5, 2019).

3 *Id.*

4 *Id.* Senator Perry Chairs the Senate Water & Rural Affairs Committee and Rep. Phelan Chairs the House State Affairs Committee.

5 Acts of June 14, 2019, 86th Leg., R.S., ch. 1337, §1, sec. 5.008, 2019 Tex. Sess. Law Serv. ch. 1337 (S.B. 339), at 1 (codified at Tex. Prop. Code §5.008(b)).

6 *Id.* at 8–9.

7 *Id.* at 5.

8 *Id.*

9 *Id.* at 6–7.

10 *Id.* at 6.

unusable by a casualty or by win or water damage."[11] It broadens the Tax Code's definition of "disaster recovery program" to include programs administered "by a political subdivision of this state."[12] In the second section, it commands the General Land Office and each "political subdivision that administers a disaster recovery program"[13] to prepare lists of structures "constructed since January 1, 2018"[14] and correct appraisal values, including potentially refunding excess taxation.[15] This bill is limited in that it "applies only to the appraisal of a residence homestead for ad valorem tax purposes for a tax year that begins on or after January 1, 2019."[16]

SB 799 is a robust bill by Senator Carol Alvarado (D-Houston) focusing on a range of "emergency management and disaster recovery"[17] issues. It starts with transferring the Texas Division of Emergency Management to the Texas A&M University system.[18] The bill also requires the governor "at least once each biennium . . . [to] review the composition of the [emergency management] council and, if necessary, update or expand the participating entities."[19] Section 7 of the bill establishes three governmental entities: the Business Advisory Council, the Wet Debris Work Group, and a Disaster Recovery Task Force.[20]

Another bill by Senator Perry, SB 563, relates "to the reporting of information about the use of federal money for flood research, planning, and mitigation projects."[21] This bill requires state agencies, including general academic teaching institutions, to file quarterly reports concerning federal money used or disbursed "for flood research planning, or mitigation projects[.]"[22] These reports will be publicly available and accessible on the Texas Water Development Board's website.[23]

The Legislature also passed several bills as part of a disaster relief package. SB 6, authored by Senator Lois Kolkhorst (R-Brenham), intends to "reduce the confusion and delay after an event."[24] The bill achieves this with a disaster response plan consisting of many statewide disasters planning initiatives, including a disaster response guide for local

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11 Acts of May 7, 2019, 86th Leg., R.S., ch. 24, §1, sec. 23.23, 2019 Tex. Sess. Law Serv. ch. 24 (S.B. 812), at 1 (codified at Tex. Tax Code §23.23(g)).

12 *Id.*

13 *Id.* at 2.

14 *Id.*

15 *Id.* at 2–3.

16 *Id.* at 3.

17 Acts of June 10, 2019, 86th Leg., R.S., ch. 602, §§ 1–2, 2019 Tex. Sess. Law Serv. ch. 602 (S.B. 799), at 1 (codified at Tex. Educ. Code §§ 63.003(6), 88.001).

18 Acts of June 10, 2019, 86th Leg., R.S., ch. 602, §§ 3–4, 2019 Tex. Sess. Law Serv. ch. 602 (S.B. 799), at 3 (codified at Tex. Gov't Code §§ 418.013(b), 418.041).

19 *Id.* at 2.

20 Acts of June 10, 2019, 86th Leg., R.S., ch. 602, § 7, secs 418.054–.056, 2019 Tex. Sess. Law Serv. ch. 602 (S.B. 799), at 5–10 (codified at Tex. Gov't Code § 418.054–.056).

21 Acts of June 10, 2019, 86th Leg., R.S., ch. 587, §§ 1–2, secs 2061.001–.002, 2019 Tex. Sess. Law Serv. ch. 587 (S.B. 563), at 1 (codified at Tex. Gov't Code §§ 2061.001–.002).

22 *Id.*

23 *Id.* at 2.

24 Acts of June 13, 2019, 86th Leg., R.S., ch. 946, §§ 1–3, secs 418.005, 418.054–.057, 418.061–.067, 2019 Tex. Sess. Law Serv. ch. 946 (S.B. 6), at 1 (codified at Tex. Gov't Code §§ 418.005, 418.054–.057, 418.061–.067).

officials,[25] a Catastrophic Debris Management Plan,[26] a Wet Debris Study Group,[27] and an Emergency Management Workgroup.[28] The bill also creates a "Disaster Recovery Loan Program," which allows eligible counties, municipalities, and school districts to apply for "short-term loans for disaster recovery projects."[29] January 1, 2020 was the deadline to develop "the catastrophic debris management plan and model guide[.]"[30] The plan and guide were successfully published in December 2019.[31]

Senator Brandon Creighton (R-Conroe) authored SB 7, which funds flood infrastructure. Senator Creighton describes the bill package as the "most comprehensive, forward-reaching approach that any state has offered following a disaster."[32] The bill creates the Texas Infrastructure Resiliency Fund, a special fund designed with several specified accounts.[33] The first is a flood infrastructure fund, which finances flood infrastructure projects across the state.[34] The second is a floodplain management account, which funds flood-related projects statewide.[35] The third is the Hurricane Harvey account, which grants funding to eligible political subdivisions for flood mitigation measures based on a points system, with a focus on counties that have been impacted by a statewide emergency declaration.[36] The fourth account is the flood plan implementation account, which funds flood projects more generally.[37] The fifth account is the federal matching account, which can only be used "to meet matching requirements for projects funded partially by federal money, including projects funded by the United States Army Corps of Engineers."[38] The bill also creates an advisory committee to monitor the fund as a whole.[39] A quarterly reporting requirement is created for "a state agency that uses or disburses federal money for flood research, planning, or mitigation projects[.]"[40] Contingent on the passage of a state flood plan (detailed under SB 8, below), the bill authorizes the creation of a final additional account in the Texas Infrastructure Resiliency Fund, referred to as the flood plan implementation fund, which provides funding "for projects

25 *Id.*
26 *Id.* at 2.
27 *Id.* at 3.
28 *Id.* at 4.
29 *Id.* at 7.
30 *Id.* at 10.
31 TEX. DIV. OF EMERGENCY MGMT., STATE OF TEXAS EMERGENCY MANAGEMENT PLAN CATASTROPHIC DEBRIS MANAGEMENT ANNEX, i (December 20, 2019); TEX. DIV. OF EMERGENCY MGMT., STATE OF TEXAS LOCAL CATASTROPHIC DEBRIS MANAGEMENT GUIDE, i (December 19, 2019).
32 Acts of June 13, 2019, 86th Leg., R.S., ch. 947, §§ 2.01–3.01, 5.01, 2019 Tex. Sess. Law Serv. ch. 947 (S.B. 7), at 1 (to be codified at Tex. Water Code §§ 15.531–.540, 49.239, 15.5341, 16.451–.460, 16.4545).
33 *Id.*
34 *Id.* at 2.
35 *Id.* at 10.
36 *Id.* at 11.
37 *Id.* at 20.
38 *Id.* at 14.
39 *Id.* at 7.
40 *Id.* at 16.

included in the state flood plan."[41] Most of the bill was effective upon the bill's passage, but Article 2 is contingent on the passage of HJR 4.[42] HJR 4 was a proposal for a constitutional amendment allowing for the creation of a Flood Infrastructure Fund to assist in financing drainage, flood mitigation, and flood control projects.[43] HJR 4 passed May 28, 2019.[44]

Senator Perry's SB 8 mandates the creation of a State Flood Plan no later than September 1, 2024, to be updated every 5 years after that date.[45] This statewide plan incorporates regional flood plans created for each river basin.[46] Addressing infrastructure specifically, the bill requires the creation of a ten-year dam repair and maintenance plan.[47] The bill also creates a State Flood Plan Implementation Advisory Committee, which will "review the overall operation, function, and structure of the state flood plan and rules adopted by the board to implement the state flood plan at least semiannually and may provide comments and recommendations to the board on any matter."[48] Finally, the bill outlines a series of deadlines relating to regional water plans: September 1, 2021 for guidance principles for the regional flood plans and the designation of flood planning regions by the Texas Water Development Board, and January 10, 2023 for regional flood plans to be submitted to the Texas Water Development Board.[49]

HOUSE

Seven House bills passed related to flooding and flood response, which may impact many areas of disaster response and recovery. HB 5 by Representative Phelan is designed to impact "debris management and other disaster recovery efforts."[50] It requires the Texas Division of Emergency Management (TDEM) to "develop a catastrophic debris management plan and model guide for use by political subdivisions in the event of a disaster."[51] The bill also requires TDEM to "develop and publish a model contract for debris removal services to be used by political subdivisions following a disaster."[52] The bill codifies the Wet Debris Study Group[53] and a Work Group on Local Restrictions That Impede Disaster Recovery Efforts[54] (Work Group). The Work Group is required to submit by November 1, 2020, "a written report to the members of the legislature with

41 *Id.* at 20.
42 *Id.* at 21–22.
43 Acts of May 28, 2019, 86th Leg., R.S., § 1, 2019 Tex. Sess. Law Serv. Hs. Jt. Res. 4, at 1 (codified at Tex. Const. art. 3 § 49-d-14).
44 *Id.*
45 Acts of June 10, 2019, 86th Leg., R.S., ch. 565, § 1, secs 16.061–.062, 2019 Tex. Sess. Law Serv. ch. 565 (S.B. 8), at 1 (codified at Tex. Water Code § 16.061–.062).
46 *Id.* at 3.
47 *Id.* at 6–7.
48 *Id.* at 9.
49 *Id.* at 10.
50 Acts of June 10, 2019, 86th Leg., R.S., ch. 703, §§ 1–3, secs 418.054–.057, 2019 Tex. Sess. Law Serv. ch. 703 (H.B. 5), at 1 (codified at Tex. Gov't Code §418.054–.057).
51 *Id.*
52 *Id.* at 2.
53 *Id.*
54 *Id.* at 3.

the results of the study" it must conduct "on local restrictions that impede disaster recovery efforts,"[55] and by January 1, 2021, the work group will be abolished.[56]

HB 6, sponsored by numerous representatives, creates the Disaster Recovery Task Force.[57] The TDEM will develop this task force "to operate throughout the long-term recovery period following natural and man-made disasters by providing specialized assistance for communities and individuals to address financial issues, available federal assistance programs, and recovery and resiliency planning to speed recovery efforts at the local level."[58] This task force is required to submit quarterly reports to the legislature about "the response and recovery efforts for previous disasters and any preparation or planning for potential future hazards, threats, or disasters."[59] Section 5 of the bill contains additions to the Tax Code, which allocate a portion of coastal hotel tax revenue to the "coastal erosion response account[.]"[60] Section 8 requires "each county [to] provide for catastrophic debris management in the county's emergency management program" by January 1, 2020.[61]

HB 492 creates "a temporary exemption from ad valorem taxation of a portion of the appraised value of certain property damaged by a disaster."[62] Only "qualified property"[63] under the new rule would qualify for this tax exemption, which is designed to scale with the level of damage the property receives.[64]

HB 2325 concerns "information and communication of governmental and other entities regarding disasters and health and human services."[65] These efforts include making 911 available through text message,[66] the development of social media communication standards,[67] a disaster mobile application,[68] and a disaster webpage.[69] The bill encourages the use of data analytics "to integrate data from federal, state, local, and nongovernmen-

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55 *Id.* at 3.
56 *Id.* at 4.
57 Acts of June 14, 2019, 86th Leg., R.S., ch. 1018, §§ 1–3, 2019 Tex. Sess. Law Serv. ch. 1018 (H.B. 6), at 1 (codified at Tex. Gov't Code §§ 418.005, 418.054, 418.102).
58 *Id.* at 2–3.
59 *Id.* at 3.
60 Acts of June 14, 2019, 86th Leg., R.S., ch. 1018, § 5, sec 156.252, 2019 Tex. Sess. Law Serv. ch. 1018 (H.B. 6), at 4 (codified at Tex. Tax Code §156.252).
61 Acts of June 14, 2019, 86th Leg., R.S., ch. 1018, § 8, 2019 Tex. Sess. Law Serv. ch. 1018 (H.B. 6), at 5.
62 Acts of June 14, 2019, 86th Leg., R.S., ch. 1034, §§ 1–9, secs 11.35, 11.42–43, 11.45, 26.012, 41.03, 41.41, 41.44, 403.302, 2019 Tex. Sess. Law Serv. ch. 1034 (H.B. 492), at 1 (codified at Tex. Tax Code §§ 11.35, 11.42–43, 11.45, 26.012, 41.03, 41.41, 41.44, and Tex. Gov't Code § 403.302).
63 *Id.*
64 *Id.* at 4.
65 Acts of June 14, 2019, 86th Leg., R.S., ch. 1116, §§1–7, secs 418.054–.059, 418.127, 418.193–94, 531.0312, 2157.068, 2170.004, 2019 Tex. Sess. Law Serv. ch. 1116 (H.B. 2325), at 1 (codified at Tex. Gov't Code §§ 418.054–.059, 418.127, 418.193–94, 531.0312, 2157.068, 2170.004).
66 *Id.*
67 *Id.*
68 *Id.* at 2.
69 *Id.*

tal sources to more effectively manage disaster response and recovery."[70] It requires TDEM to "conduct a study on the use of a standard communication format by first responders to create a common interoperable operating framework during a disaster."[71] A report detailing the study's findings shall be submitted "to the governor, lieutenant governor, and members of the legislature" by September 1, 2020.[72] The bill also expands disaster preparedness community outreach,[73] allows certain entities to "purchase commodity items through the Department of Information Resources . . . if [entity] finds that the purchase of these commodity items will assist the [entity] in providing disaster education of preparing for a disaster[,]"[74] and features many revisions to facilitate certain disaster related public purchases.[75]

HB 26 relates "to the notification of affected persons of certain releases of water from certain dams."[76] The bill would amend to the Texas Water Code by requiring the Texas Commission on Environmental Quality (TCEQ) to create and enforce dam safety rules.[77] The bill has two deadlines. TCEQ must "provide guidance for developing a notification plan through a dam owner's emergency action plan for state-regulated dams that have a spillway with gates used to regulate flood waters" by January 1, 2020.[78] Dam operators will be required to deliver a notification plan to the TCEQ by June 1, 2020.

HB 2340 amends the Texas Disaster Act, establishing several groups, including the Unmanned Aircraft Study Group,[79] an Information Sharing Work Group,[80] and a Permitting Task Force.[81] The bill also includes an initiative to study and suggest improvements in disaster management.[82]

HB 2345 creates "the Institute for a Disaster Resilient Texas,"[83] which is intended to function as "a component of Texas A&M University."[84] The institute's ultimate purpose is to "develop analytics tools[,]" "create and maintain web-based analytical and visual tools to communicate disaster risks and ways to reduce those risks,"[85] and collect and distribute disaster planning information.[86]

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70 *Id.*
71 *Id.* at 3.
72 *Id.*
73 *See id.*
74 *Id.* at 4.
75 *Id.* at 4–7.
76 Acts of June 14, 2019, 86th Leg., R.S., ch. 1020, §§ 1–3, sec 12.052, 2019 Tex. Sess. Law Serv. ch. 1020 (H.B. 26), at 1 (codified at Tex. Water Code § 12.052).
77 *Id.*
78 *Id.* at 2.
79 Acts of May 29, 2019, 86th Leg., R.S., ch. 286, § 1–5, secs 418.002, 418.054–.056, 751.017, 2019 Tex. Sess. Law Serv. ch. 286 (H.B. 2340), at 2 (codified at Tex. Gov't Code 418.002, 418.054–.056, 751.017).
80 *Id.* at 3.
81 *Id.* at 4.
82 *Id.* at 5.
83 Acts of June 14, 2019, 86th Leg., R.S., ch. 1118, §§ 1–3, sec 86.82, 2019 Tex. Sess. Law Serv. ch. 1118 (H.B. 2345), at 1 (codified at Tex. Educ. Code § 86.82).
84 *Id.*
85 *Id.*
86 *Id.* at 1–2.

Conclusion

The 2019 legislative session, like all that occur after environmental turmoil, was transformative for the future of Texas. The bills detailed above have the potential to dramatically expand flood control planning and infrastructure. Ideally, the entire state will benefit from this tremendous legislative effort to combat flooding.

Shana Horton recently joined the Texas Alcoholic Beverage Commission as its Rules Attorney. Prior to her tenure at TABC, Ms. Horton practiced in administrative law focusing on water rights and water quality for 16 years, both at the Texas Commission on Environmental Quality and in private practice.

Zachary Tavlin is a third-year student at The University of Texas School of Law and Senior Editor of the Texas Environmental Law Journal.

DEVELOPMENTS IN THE USE OF NUISANCE LAW AS A MECHANISM TO COMBAT GREENHOUSE GAS EMISSIONS

INTRODUCTION

For decades, scholars and activists have suggested that common law remedies could effectively deter parties contributing the most to climate change.[1] The Supreme Court stalled this idea when it interpreted the Clean Air Act[2] as preempting federal common law claims for nuisance caused by greenhouse gas emissions.[3] In response, litigants now focus on state law nuisance claims, which can be shielded from preemption by federal law because of a heightened standard of review.[4]

This article first reviews the legal history and feasibility of nuisance claims—both state and federal—to combat greenhouse gas emissions. Next, it examines a recent scholarly project analyzing the effect of damages as a mechanism to control greenhouse gases, as well as related incentives for future innovation. Finally, this article considers the current and prospects of these cases.

DISCUSSION

PART I: LEGAL FEASIBILITY OF NUISANCE CLAIMS

In *American Electric Power Co. v. Connecticut*, the Supreme Court held that the Clean Air Act preempted federal common law actions seeking injunctions against corporations releasing greenhouse gas emissions.[5] Because the Clean Air Act[6] delegated greenhouse gas emissions regulation to the Environmental Protection Agency (EPA), the Court held that litigants could not pursue federal common law nuisance claims for the same behavior.[7] But in doing so, the Court also noted that preemption by a federal statute of federal common law requires a much lower showing of intent than preemption of state law.[8] Preempting federal common law requires only that "the statute speak[s] directly to [the] question at issue."[9] But preemption of state law requires a "clear and manifest congressional purpose."[10] Previously, the court addressed issues of preemption by the Clean Water Act,[11] the Clean Air Act's structural successor and inspiration, and

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1 *See, e.g.*, Frank E. Maloney, *Judicial Protection of the Environment: A New Role for Common-Law Remedies*, 25 VAND. L. REV. 145 (1972).
2 42 U.S.C. §§ 7401–7671q (2012).
3 Am. Elec. Power Co. v. Connecticut, 564 U.S. 410, 424 (2011).
4 *See id.* at 423–24. *But see* Int'l Paper Co. v. Ouellette, 479 U.S. 481, 494 (1987) (holding that the Clean Water Act preempted state nuisance claims for water pollution).
5 *Am. Elec. Power*, 564 U.S. at 424.
6 42 U.S.C. §§ 7401–7671q.
7 *Am. Elec. Power*, 564 U.S. at 429.
8 *Id.* at 423.
9 *Id.* at 424 (citing Mobil Oil Corp. v. Higginbotham, 436 U.S. 618, 625 (2010) (internal quotation marks omitted)).
10 *Id.* at 423.
11 33 U.S.C. §§ 1281–1357 (2012).

it stated that the Clean Water Act does not automatically preempt state law (although it found preemption on the particular facts of the case).[12] In *American Electric Power Co.*, the Court explicitly left open the question of whether the Clean Air Act indeed preempted any state law.[13]

While federal nuisance claims have become more limited, the door has not closed on state nuisance law claims. As discussed in Part III of this article,[14] this ambiguity has created varied results.

PART II: EFFECTIVENESS OF SUCH CLAIMS

Authors Victor B. Flatt and Richard O. Zerb recently performed a legal efficiency analysis to argue that state law nuisance claims could be an effective control on greenhouse gas emissions and should not be barred by federal statute.[15] The authors acknowledge the uncertain legal standing for state-level claims following the courts' treatment of federal common law claims and consider the possible resulting economic outcomes.[16] Building on the interconnection of tort and economic theories, the authors encourage courts to view "[s]trict liability through nuisance with damages [as] superior to negligence or optimal cost-benefit regulation" due to increased incentive for innovation.[17]

The authors first compare damages from private nuisance suits for the emission of greenhouse gases with other possible mechanisms: negligence and cost-benefit regulation.[18] The authors consider three hypothetical cost-benefit regulation scenarios where the allowed emission levels are: too lenient, just right, and too strict.[19] The authors reason that too lenient of regulations will permit an unacceptable amount of greenhouse gas emissions.[20] Alternatively, an overly restrictive regulation would cause more economic damage than that particular solution is worth.[21] While a "just right" regulation would properly fit this balance, it would not spur additional, innovative inventions to reduce greenhouse gas emissions that may arise from a case where parties are allowed to emit but are still required to pay a price.[22] So even in the rare—or even virtually impossible—scenario where the regulation is tuned to perfect efficiency, the authors argue that the result is still less efficient than the incentives created by nuisance damages.[23]

The authors analyze the damages calculations that would have applied in *American Electric Power Co.* to determine that "damages reasonably attributable to defendants can be made, that these are large, and that they are nevertheless within the power of these

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12 *Ouellette*, 479 U.S. at 494.
13 *Am. Elec. Power*, 564 U.S. at 429.
14 *See infra* Part III.
15 Victor Flatt & Richard O. Zerbe, *Climate Change Common Law Nuisance Suits: A Legal-Efficiency Analysis*, 49 ENVTL. L. 683, 689 (2019).
16 *Id.* at 686–700.
17 *Id.* at 692.
18 *Id.* at 693.
19 *Id.*
20 *Id.* at 693–94.
21 *Id.* at 693.
22 *Id.* at 694.
23 *Id.* at 694–95.

companies to pay."[24] Through this example, the authors demonstrate that applying damages would be actually practical in the real world, not just philosophical.

Although these views do not represent a consensus among all scholars, there are strong practicality arguments to back the legal and procedural theories for such nuisance cases.

Part III: Current Posture of Nuisance Law Cases

Current suits can now be analyzed through the lens of this theoretical background. Spurred in part by investigations into internal knowledge on climate change at oil and gas companies,[25] cities, states, and activist groups have begun legal action against these companies.[26] Cities throughout the country, as well as the state of Rhode Island, have made public nuisance claims against Exxon, with varying levels of success thus far.[27]

Some of these cases have been removed to federal court, with defendants arguing that these types of claims inherently raise federal questions.[28] Although removal caused scholars to doubt the viability of these cases,[29] some are moving forward and can potentially create economic incentives like those considered by Flatt and Zerbe.[30]

Rhode Island's suit against twenty-one oil and gas companies in state court was initially removed to federal court.[31] But, a federal judge held that there was no federal question and thereby no jurisdiction for a federal court to hear the case, remanding the case back to the state court.[32] Similarly, federal judges remanded suits in Baltimore, Maryland[33] and Marin County, California[34] back to state court after removal. Interest-

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24 *Id.* at 700.

25 *See* Masako Melissa Hirsch et al., *What Exxon knew about the Earth's melting Arctic*, L.A. Times (Oct. 9, 2015), https://graphics.latimes.com/exxon-arctic/.

26 David Hasemyer, *Fossil Fuels on Trial: Where the Major Climate Change Lawsuits Stand Today*, Inside Climate News (July 22, 2019), https://insideclimatenews.org/news/04042018/climate-change-fossil-fuel-company-lawsuits-timeline-exxon-children-california-cities-attorney-general.

27 *Id.*

28 Jennifer Hijazi, *Climate nuisance cases: Where things stand*, E&E News (Sep. 11, 2019), https://www. eenews.net/stories/1061111983.

29 *See* Michael Burger, *Do State Common Law Nuisance Claims for Climate Change-Related Harms Even Exist Anymore?*, Climate L. Blog (Sep. 14, 2017), http://blogs.law.columbia.edu/climatechange/2017/09/14/do-state-common-law-nuisance-claims-for-climate-change-related-harms-even-exist-anymore/.

30 *See supra* Part II.

31 Karen Savage, *Rhode Island Becomes the First State to File Climate Suit Vs. Oil Industry*, Climate Liability News (July 2, 2018), https://www.climateliabilitynews.org/2018/07/02/rhode-island-climate-liability-suit/.

32 Karen Savage, *R.I. Wins Battle to Keep Climate Suit Vs. Big Oil in State Court*, Climate Liability News (July 22, 2019), https://www.climateliabilitynews.org/2019/07/22/rhode-island-climate-liability-suit-2/.

33 Karen Savage, *Federal Judge Rules Against Big Oil, Sends Baltimore Climate Suit to State Court*, Climate Liability News (June 11, 2019), https://www.climateliabilitynews.org/2019/06/11/baltimore-climate-suit-oil-industry/.

34 Dana Drugmand, *Three California Climate Suits Sent Back to State Court*, Climate Liability News (Mar. 17, 2018), https://www.climateliabilitynews.org/2018/03/17/california-climate-suits-san-mateo-marin-imperial-beach/.

ingly, similar cases filed by the cities of San Francisco and Oakland, California were denied remand to state court and dismissed by a different federal judge.[35]

With federal district court judges ruling differently on these issues, federal circuits or even the Supreme Court may need to take up these cases to provide guidance before this issue is resolved. Previously, the Supreme Court refused to block a state-level case from proceeding, but has yet to weight in more substantively.[36] As it currently stands, at least some claims for state law nuisance causes of action have moved forward.

CONCLUSION

Little on this matter seems clear, except for the inevitability of continued litigation. Despite some setbacks—such as preemption of federal nuisance claims for injunction—some state law nuisance claims against greenhouse gas emitters may eventually reach a final verdict with potential for damages. Additionally, research supports the idea that damages could be one of the most efficient mechanisms not only to control the emission of greenhouse gases but also to incentivize further technological innovation.

Joshua D. Katz is a partner at Bickerstaff Heath Delgado Acosta LLP and represents public and private entities before agencies and in state and federal court in the areas of environmental law, municipal law, water rights, and utilities.

Drew Roberts is a third-year student at The University of Texas School of Law and Lead Article & Notes Editor of the Texas Environmental Law Journal.

35 John Schwartz, *Judge Dismisses Suit Against Oil Companies Over Climate Change Costs*, N.Y. TIMES (June 25, 2018), https://www.nytimes.com/2018/06/25/climate/climate-change-law-suit-san-francisco-oakland.html.

36 Adam Liptak, *Supreme Court Lets Climate Change Lawsuit Proceed*, N.Y. TIMES (Oct. 22, 2019), https://www.nytimes.com/2019/10/22/us/supreme-court-climate-change.html.

BRAZOS ELEC. POWER COOP., INC. V. TEX. COMM'N ON ENVTL. QUALITY, 576 S.W.3D 374 (TEX. 2019)

BACKGROUND

This case arose when the Executive Director of the Texas Commission on Environmental Quality (TCEQ) allowed a negative use determination.[1] The Executive Director determined that Brazos Electric Power Cooperative's (Brazos Electric) installation and use of a heat recovery steam generator (HRSG) did not qualify for statutory ad valorem tax exemptions.[2] Brazos Electric appealed to TCEQ, which affirmed the Executive Director's determination, before seeking judicial review in Travis County district court.[3] The district court again affirmed the Executive Director's determinations.[4] Brazos Electric appealed.[5]

While the case was pending, the Third Court of Appeals issued an opinion in a similar case, holding that a "k-list property cannot be determined to be 100% non-pollution-control property."[6] But only two months later, the Eight Court of Appeals issued a contrary opinion in the *Brazos Electric* case.[7] Accordingly, the Texas Supreme Court granted Brazos Electric's petition for review to resolve the appellate court split.[8]

THE COURT'S ANALYSIS

The Court first examined the authority under which TCEQ can exempt certain property from ad valorem taxes. The Texas Constitution allows the Legislature to exempt "all or part of real and personal property" from ad valorem taxes *if* that property is "used, constructed, acquired, or installed wholly or partly" to at least meet any rules or regulations adopted by the Environmental Protection Agency (EPA) or TCEQ that prevent, monitor, control, or reduce air, water, or land pollution.[9] The Legislature has taken that provision of the Constitution and statutorily created an ad valorem tax exemption for "all or part of real and personal property . . . that is used wholly or partly as a facility,

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1 *See* Brazos Elec. Power Coop., Inc. v. Tex. Comm'n on Envtl. Quality, 576 S.W.3d 374, 382 (Tex. 2019).

2 *Id.* at 374, 379, 382.

3 *Id.* at 382.

4 *Id.*

5 *Id.*

6 Freestone Power Generation, LLC v. Tex. Comm'n on Envtl. Quality, 564 S.W.3d 1, 15 (Tex. App.—Austin 2017) (mem. op.), aff'd sub nom. Texas Comm'n on Envtl. Quality v. Brazos Valley Energy, LLC, 582 S.W.3d 277 (Tex. 2019). A k-list property is a facility, device, or method for the control of air, water or land pollution under Texas Tax Code section 11.31(k).

7 Brazos Elec. Power Coop., Inc. v. Texas Comm'n on Envtl. Quality, 538 S.W.3d 666 (Tex. App.—El Paso 2017), rev'd, 576 S.W.3d 374 (Tex. 2019).

8 *Brazos Elec.*, 576 S.W.3d at 383.

9 TEX. CONST. art VIII, § 1-*l*(a).

device, or method for the control of air, water, or land pollution."[10] The Court pointed out the similarity of the constitutional language and the statute, emphasizing the canon of statutory construction that presumes the Legislature intended their enacted statutes to comply with the Constitution.[11]

Next, the Court discussed the exemption process and statutory and regulatory standards for making such exemption determinations. First, a property owner must apply for an exemption, providing the specific information detailed in Texas Tax Code section 11.31(c).[12] If property is partly for production and partly for pollution control (as HRSGs are), the applicant must "present such financial or other data as the executive director requires by rule."[13] Then, the Executive Director must make either a "positive use determination," meaning that the applicant qualifies for a tax exemption, or a "negative use determination," meaning that the applicant does *not* qualify for a tax exemption.[14] If the Executive Director makes a positive use determination, he or she must then determine what proportion of the property qualifies for the tax exemption.[15]

At the crux of this case, Texas Tax Code subsection 11.31(k) requires TCEQ to "adopt rules establishing a nonexclusive list of facilities, devices, or methods for the control of air, water or land pollution."[16] A HRSG is among seventeen other types of pollution-control property listed under that subsection.[17] Subsection (l) requires TCEQ to update the list at least every three years and allows for items to be removed "if the commission finds compelling evidence to support the conclusion that the item does not provide pollution control benefits."[18]

The Court detailed the history of determinations after adding subsection (k) to section 11.31.[19] This case resulted from a TCEQ interpretation that "k-list" property should be evaluated using a standard cost analysis procedure calculation, with which other non-k-list applicants were evaluated.[20] The Court repudiated TCEQ's interpretation, because it prevented a HRSG from qualifying for the ad valorem tax exemption.[21] Instead, TCEQ must find that HRSGs and other k-list properties are at least partly pollution control property.[22] With this issue settled, the Executive Director can only address the second issue of the tax exemption analysis: determining what proportion of the HRSG is for pollution control.[23] The Executive Director "may not determine the pollution con-

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10 TEX. TAX CODE § 11.31(a).
11 *See Brazos Elec.*, 576 S.W.3d at 382, 387–88.
12 *See* TEX. TAX CODE § 11.31(c).
13 *Id.*
14 *Id.* § 11.31(d).
15 *Id.*
16 *Id.* § 11.31(k).
17 *See id.*
18 *Id.* § 11.31(l).
19 *See Brazos Elec.*, 576 S.W.3d at 380–81.
20 *Id.* at 381.
21 *See id.* at 385–86.
22 *Id.*
23 *Id.* at 386.

trol proportion is zero or negative" for a k-list property.[24] Similarly, the Executive Director may not determine the pollution control proportion is 100% for a k-list property.[25]

The Court then discussed and rejected TCEQ's arguments that its reading would render subsections (c), (g)(3), (g-1), and (h) of section 11.31 meaningless.[26] The Court determined that subsections (c) and (g)(3) merely direct TCEQ to "determine *how much* of the property at issue is pollution control property."[27] Subsection (g-1), however, requires TCEQ to apply its rules uniformly to all applications.[28] The Court reasoned that its holding does not require disparate treatment of applicants; the holding only requires TCEQ to determine that k-list property is at least partly pollution control property.[29]

Implications of the Decision

Because the Texas Supreme Court decided that a HRSG and other k-list property must be classified as at least partly pollution control property, and thus exempt from a portion of ad valorem taxes, several consequences could arise. First, all HRSGs and other k-list property will be eligible for ad valorem tax exemptions even if they were built or implemented purely for production reasons. Second, this requirement gives TCEQ a greater incentive to remove k-list property from the list pursuant to subsection (l). But TCEQ's ability to remove property from the list is not without bounds; there must be "compelling evidence" that the property provides no pollution control benefits.[30] It would be difficult to meet the "compelling evidence" standard, given the types of property enumerated on the list.[31] Finally, the Texas Supreme Court's reading of section 11.31 will likely lead to at least slightly more focus on the proportion calculations.

If all k-list property is necessarily eligible for at least some tax exemption, the most important question becomes *how much*. The importance of this question may incentivize TCEQ to create a new formula for determining what proportion of pollution control property is entitled to an exemption. Altogether, this decision probably will not create significant changes for TCEQ or tax exemption applicants, but it will certainly be interesting to track how either the agency or applicants adjust in the future.

Stacie M. Dowell is associate counsel for the Trinity River Authority of Texas and works on a wide variety of legal issues spanning contract, employment, business, property, and water law.

Zoe Oldham is a second-year student at The University of Texas School of Law and Symposium Director of the Texas Environmental Law Journal.

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24 *Id.*
25 *Id.*
26 *Id.* at 387.
27 *Id.*
28 Tex. Tax Code §§ 11.31(g)–(l).
29 *Brazos Elec.*, 576 S.W.3d at 387.
30 Tex. Tax Code § 11.31(l).
31 *See id.* §11.31(k) (the list includes other types of property: coal cleaning facilities, coal cleaning or drying process, enhanced heat recovery systems, syngas purification units, and hydrogen fuel cells).

MOVING FROM GROUND TO SURFACE WATER: THE SURPRISING CHALLENGE OF THE EXPEDITED DECLARATORY JUDGMENT ACT

INTRODUCTION

The Expedited Declaratory Judgment Act[1] (EDJA) is a procedural tool utilized by issuers of public securities to facilitate the "initial approval, issuance, and sale of public securities by Texas governmental entities" through declarations relating to a bond issuer's legal authority to issue bonds.[2] Under the EDJA, a case becomes an *in rem* proceeding and creates a class action to bind all "interested parties" (who receive publication notice), to declaratory judgments deciding the "legality" or "validity" of pubic securities where only the Texas Attorney General participates personally.[3] However, the question remains whether the EDJA is a valid mechanism to determine contractual rights and party liability for contract breaches when revenues under the contract are used as security for "incontestable," previously-issued public securities.

DISCUSSION

Courts addressed this question for the first time in *Cities of Conroe, Magnolia, & Splendora v. Paxton*, when the San Jacinto River Authority (SJRA) and many of its large-volume water customers clashed over the customers' refusal to pay increased rates for surface water. The court grappled with whether the EDJA could be used to determine water customers' liability for breach of contract under a water sales contracts with a river authority, even when the river authority had already issued bonds secured by those contracts.[4] Although the Texas Third Court of Appeals recently considered this issue, it remains unresolved because the Texas Supreme Court granted petition for review on October 4, 2019.[5]

This case is rooted in events spanning more than a decade within Montgomery County, Texas. Large-volume water users in Montgomery County historically relied upon groundwater from the Gulf Coast Aquifer for their customers' needs; however, the rising county population raised concerns over whether the current water extraction rate would drain the aquifer.[6] In 2003, Lone Star Groundwater Conservation District (LSGCD) determined that Montgomery County would need to restrict its total water

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1 TEX. GOV'T CODE § 1205.

2 Cities of Conroe, Magnolia, & Splendora v. Paxton, 559 S.W.3d 656, 664–65 (Tex. App.—Austin 2018, pet. granted).

3 *Id.*

4 *See id.* at 659.

5 Letter from Blake Hawthorne, Clerk of the Texas Supreme Court, to counsel in Cities of Conroe, Magnolia, and Splendora v. Paxton, 559 S.W.3d 656 (Tex. App.—Austin 2018, pet. granted) (Oct. 4, 2019), http://www.search.txcourts.gov/SearchMedia.aspx?MediaVersionID=3d459362-6c3d-4d00-888c-5ff14424c022&coa=cossup&DT=SUBMISSION%20SET&MediaID=19c059d1-21a2-489c-94e0-ea56fa4bc45e.

6 *Id.* at 659.

consumption to 64,000 acre-feet per year beginning in 2016.[7] In light of this restriction, more than 80 entities (Participants) contracted with the SJRA under a Groundwater Reduction Plan (GRP), which would allow the entities to comply with the LSGCD's groundwater usage cutbacks by utilizing an increasing proportion of surface water from Lake Conroe.[8] Under the GRP contracts, Participants would pay the SJRA monthly volume-based usage charges and allow the SJRA to establish Rate Orders setting "necessary" rates, fees, and charges to cover its costs for the GRP project. These costs included the repayment of close to $520 million worth of bonds issued between 2009 and 2016 to construct and operate a water treatment and distribution system to treat and deliver surface water to the Participants.[9]

A problem between the SJRA and some Participants, principally the City of Conroe ("Conroe"), arose when the SJRA adopted a new rate order for 2017 that would substantially increase the rates and charges under the GRP contracts.[10] The SJRA attributed the increase to an unexpected revenue shortfall from prior years and contended the rate increase was necessary and proper pursuant to the GRP contracts to repay the bonds for the GRP project. However, Conroe and other Participants alleged that this increase violated the GRP contracts and that the GRP project itself was legally suspect.[11] Consequently, cities like Conroe and Magnolia refused to pay the SJRA the new rates and charges, resulting in SJRA filing lawsuits against Conroe under the framework of the EDJA in Travis County district court.[12]

The SJRA sought four declarations under the EDJA:

1. "that Conroe's refusal to pay the fiscal year 2017 rate is illegal and invalid, and its failure to pay is a breach of the GRP Contract";[13]
2. "that the SJRA is authorized to set rates for Participants pursuant to the procedures set forth in the GRP Contracts";[14]
3. "that the SJRA issued its fiscal year 2017 Rate Order, including the setting of its fiscal year 2017 rate, in accordance with the procedures set forth in the GRP Contracts";[15] and
4. "that the SJRA's fiscal year 2017 rate, Rate Order, and the GRP Contracts, including the Contract with Conroe, are legal and valid."[16]

By bringing the suit under the EDJA, SJRA had the opportunity to bind every Participant of the GRP contracts to the judgments it sought.[17] In response, cities and various utility companies filed pleas to jurisdiction denying the applicability of the EDJA to

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7 Wendy Cawthon & Jesse Mendoza, *Conroe and Magnolia City Officials Contest San Jacinto River Authority Lawsuit*, CMTY. IMPACT NEWSPAPER (Oct. 2016), https://c4c5h4b3jv11qq3kf399hf3c-wpengine.netdna-ssl.com/wp-content/uploads/2016/10/COM_10_2016-1.pdf.

8 *Cities of Conroe*, 599 S.W.3d at 660.

9 *Id.*

10 *Id.* at 663.

11 *Id.*

12 *Id.*

13 *Id.*

14 *Id.*

15 *Id.*

16 *Id.*

17 *Id.* at 667, n.34.

the conflict and motions to transfer venue to Montgomery County.[18] They argued that the SJRA erroneously invoked the EDJA because the SJRA's disputes were regarding contractual rights under the GRP contracts themselves, rather than disputing the legality and validity of the bonds.[19] Further, the cities independently asserted governmental immunity as a bar to jurisdiction[20] and that the proper venue for this suit was in Montgomery County, notwithstanding the applicability of the EDJA, because of Texas Civil Practices and Remedies Code Section 15.020 and the GRP contracts' venue provision.[21] When the district court denied all of the cities' and utility companies' motions, the parties perfected an interlocutory appeal as to the denial of the pleas to jurisdiction, and the cities and utility companies filed a petition for writ of mandamus relating to the denial of their motions to transfer venue.[22]

SJRA claimed that although the dispute did not center around the SJRA's statutory or constitutional authority to issue public securities, the GRP contracts were inextricably tied to the bonds it is authorized to issue; therefore, it is not attempting to litigate "an ordinary contract dispute involving a governmental entity or private parties," but it is operating from a statutory framework to invoke the EDJA and increased rates pursuant to its statutory and contractual obligations.[23]

In contrast, the cities and utilities companies raised the following arguments on appeal: that the EDJA cannot be used to adjudicate contractual rights, but are limited to determining issues relating to the public securities issuer's constitutional or statutory authority to "undertake official actions relating to public securities"; that the EDJA only allows litigation of "public rights" relating to an issuer's constitutional or statutory authority to take government actions rather than particular contract rights between parties due to the *in rem* nature; and that the EDJA should be construed to only apply to resolving public rights because private rights that have due process protections would be violated by the statutory allowance for notice by publication of interested parties for *in rem* proceedings.[24]

Ultimately, the Third Court of Appeals sided with the SJRA on declarations (2) – (4) ("Remaining Claims"), but importantly, agreed with the cities and utility companies on SJRA's declaration (1) that the EDJA could not be used to adjudicate personal liability and breach of the GRP contracts.[25] The court reasoned that because the suit was an *in rem* proceeding, the EDJA could only bind interested parties to a judgment regarding their property rights in litigating the legality or validity of public securities—in this case, the GRP bonds and contracts—but the EDJA could not determine personal liability.[26] Consequently, a court would not have jurisdiction to decide a declaration about the Participant's personal liability under the GRP contracts.[27] However, because the Re-

18 *Id.* at 667–68.
19 *Id.* at 668.
20 *Id.* at 669.
21 *Id.* at 668.
22 *Id.* at 668–69.
23 *See id.* at 675–76.
24 *Id.* 668–75.
25 *Id.* at 680.
26 *Id.* at 677–78.
27 *Id.*

maining Claims were not seeking adjudications of personal liability of the cities and utility companies but were seeking "declarations as to SJRA's own rights and the legal status of its own acts, without explicit regard to any other person or party," these declarations were properly within the bounds of the EDJA.[28]

Important to this decision was the court's determination that the SJRA's declarations regarding the GRP contracts were "ultimately rooted in statutory law" and thus within the scope of the EDJA.[29] The SJRA was not seeking declarations substantively in the nature of ordinary contracts; instead, the SJRA was "seeking confirmation that the GRP Contracts, like the bonds they secure are 'incontestable'; that its bond covenants and/or enabling statute compelled it to raise its rates . . . and that it otherwise complied with the bond covenants."[30] Consequently, the court suggests that although the dispute between the Participants and the SJRA regarding the validity of the increased rates under the GRP contracts was not strictly a dispute relating to the SJRA's authority to issue bonds, SJRA's claims relating to the GRP contracts, rates, and rate order, were sufficiently connected to the GRP bonds to fall within the scope of the EDJA.[31]

The court rejected the cities' and utility companies' remaining arguments and motions relating to governmental immunity and transfer of venue.[32] The court determined that even if governmental immunity potentially applied to the Remaining Claims, the SJRA would have an exception to governmental immunity, and therefore the cities would have no defense against the Remaining Claims.[33] Further, the cities' and utility companies' mandamus petitions failed because (1) the Remaining Claims properly fell within the scope of the EDJA, and therefore the EDJA's venue provision would apply, and (2) Section 15.020 of the Texas Civil Practices and Remedies Code did not apply because the EDJA venue provision applied.[34]

Although the appellate court decided this case in August of 2018, this decision did not end the conflict in Montgomery County. In 2015, Participants sued the LSGCD for mandating that the Participants reduce groundwater usage, and in October 2018, the district court ruled that LSGCD's water reduction rule was invalid.[35] Although LSGCD appealed this decision, the parties eventually settled in January 2019, which resulted in the LSGCD's appeal being dismissed and the adjudicated rule remaining void and unen-

28 *Id.* at 678.
29 *Id.* at 676.
30 *Id.*
31 *See id.* at 670–80.
32 *Id.* at 680–83.
33 *Id.* at 680–82 (stating "[governmental] immunity is not implicated by claims that would enforce an underlying statutory or constitutional requirement that government contracts be made or performed in a certain way, leaving no room for discretion. Such requirements or duties in this case would be formed by SJRA's enabling statute and the statutes deeming incontestable the GRP bonds (including bond covenants) and the GRP Contracts.").
34 *Id.* at 682–83.
35 Catherine Dominguez, *Judge Rules LSGCD Acted Outside Its Authority to Reduce Water Usage in Conroe*, THE COURIER (Oct. 2, 2018, 4:00 PM), https://www.yourconroenews.com/neighborhood/moco/news/article/Judge-rules-LSGCD-acted-outside-its-authority-to-13276010.php.

forceable.[36] However, the conflict relating to the GRP Contracts and the EDJA will endure until the Texas Supreme Court hears oral arguments on January 9, 2020 and settles this hotly-contested dispute.[37]

Emily Williams Rogers is the Managing Partner of Bickerstaff Heath Delgado Acosta LLP and represents public and private clients in water rights, water quality, utility, and environmental law matters.

Kevin Taki is a third-year student at The University of Texas School of Law and a Staff Editor of the Issue for Vol. 50 Issue 1 of the Texas Environmental Law Journal.

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36 Kelly Shafler, *UPDATED: Conroe City Council Approves Settlement Agreement in Lawsuit Against Lone Star Groundwater Conservation District*, CMTY. IMPACT NEWSPAPER (Jan. 25, 2019, 10:45 AM), https://communityimpact.com/houston/conroe-montgomery/environment/2019/01/24/breaking-conroe-city-council-approves-settlement-agreement-in-lawsuit-against-lone-star-groundwater-conservation-district/.

37 Letter from Blake Hawthorne, Clerk of the Texas Supreme Court, to counsel in Cities of Conroe, Magnolia, and Splendora v. Paxton, 559 S.W.3d 656 (Tex. App.—Austin 2018, pet. granted) (Oct. 4, 2019), http://www.search.txcourts.gov/SearchMedia.aspx?MediaVersionID=3d459362-6c3d-4d00-888c-5ff14424c022&coa=cossup&DT=SUBMISSION%20SET&MediaID=19c059d1-21a2-489c-94e0-ea56fa4bc45e.

THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) CASES—A LOOK AT THE CIRCUIT SPLIT AND UNITED STATES SUPREME COURT DECISION

BACKGROUND

The Clean Water Act (CWA)[1] established the National Pollutant Discharge Elimination System (NPDES)[2] permitting program in 1972.[3] The program regulates point sources by prohibiting the discharge of pollutants into the waters of the United States.[4] In most cases, an NPDES permit specifies the acceptable pollutant level or pollutant parameter of point source discharges.[5]

The CWA defines the term "waters of the United States" and explicitly excludes groundwater from this category.[6] In April 2019, the Environmental Protection Agency (EPA) released a statement clarifying CWA permit requirements relating to groundwater.[7] In the statement, the EPA concluded that pollutants released to groundwater are excluded from permitting requirements regardless of the groundwater's hydrological connection to surface water.[8] Additionally, the EPA's statement highlighted that Congress explicitly left to the states and other statutory schemes the regulatory authority over pollutant discharges into groundwater.[9]

Ambiguous agency guidance and conflicting court decisions interpreting the term "waters of the United States" have caused uncertainty in enforcing and regulating NPDES permits.[10] The Ninth Circuit concluded that an NPDES permit was required when pollutants traveled from a point source via groundwater to navigable waters (considered waters of the United States); but the Fifth, Sixth, and Seventh Circuits all concluded that an NPDES permit was not needed because groundwater is not protected under the CWA, and pollution that travels via groundwater is insufficient to establish liability under the NPDES program.[11] The Supreme Court granted certiorari in that

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1 33 U.S.C. §§ 1251–1388 (2020).

2 *Id.* § 1342.

3 *About NPDES*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/npdes/about-npdes (last updated Nov. 29, 2016).

4 *NPDES*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/npdes/npdes-permit-basics (last updated July 12, 2019).

5 *Id.*

6 40 C.F.R. § 122.2 (2019).

7 *Releases from a Point Source to Groundwater*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/npdes /releases-point-source-groundwater (last updated April 23, 2019).

8 *Id.*

9 *Id.*

10 *Id.*

11 *See* Heather Foxx, *The Jurisdiction of the Clean Water Act Includes Some Discharges into Groundwater*, AM. BAR ASS'N (Aug. 27, 2019), https://www.americanbar.org/groups/environment_energy_resources/publications /wr/20180826-the-jurisdiction-of-the-clean-water-act/.

Ninth Circuit case and it ultimately held that a NPDES permit is required when a direct discharge from a point source into navigable waters occurs or when there is the functional equivalent of a direct discharge.[12] The Court further explains that the permitting requirement would apply to a discharge that reaches navigable waters via groundwater if "that discharge is the functional equivalent of a direct discharge from the point source."[13]

THE NINTH CIRCUIT CASE

In *Hawai'i Wildlife Fund v. County of Maui*, the Ninth Circuit affirmed a district court's summary judgment ruling, holding that the County of Maui violated the CWA by discharging pollutants from its wells into the Pacific Ocean via groundwater, and the County had fair notice of its violations.[14] This opinion effectively recognized that pollutants discharged into navigable waters via groundwater should be regulated by the NPDES permit program.[15]

The County operates four wells at the Lahaina Wastewater Reclamation Facility, Maui's principal wastewater treatment plant.[16] The facility receives and treats sewage, and then it injects the treated sewage into the groundwater via wells.[17] The fact that some of the treated wastewater then reaches the Pacific Ocean was undisputed.[18]

The County appealed the district court's ruling that the County was liable for discharging effluent through groundwater and into the Pacific Ocean without the required NPDES permit.[19] Specifically, the district court found that: "(1) the County 'indirectly discharge[d] a pollutant into the ocean through a groundwater conduit,' (2) the groundwater is a 'point source' under the CWA, and (3) the groundwater is a 'navigable water' under the Act."[20] The County also appealed the district court's ruling that it could not claim a due process violation because the County had fair notice that it could not discharge effluent into the ocean through groundwater.[21]

Neither side disputed that each of the four wells constituted a "point source" under the CWA.[22] However, the County argued that the court should not solely focus on the original pollutant source to determine if a NPDES permit was required.[23] It further highlighted the importance of the mode of the pollutant's transportation, arguing that "the point source itself must convey the pollutants *directly* into the navigable water under the CWA."[24] The Ninth Circuit described how the County "collected and channeled" the

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12 Cty. of Maui v. Hawai'i Wildlife Fund, No. 18-260, 2020 WL 191966 at *11 (April 23, 2020).
13 *Id.*
14 Hawai'i Wildlife Fund v. Cty. of Maui, 886 F.3d 737, 742 (9th Cir. 2018), *cert. granted*, 139 S.Ct. 1164 (U.S. Feb. 19, 2019) (No. 18–260).
15 *See id.* at 747.
16 *Id.* at 742.
17 *Id.*
18 *Id.*
19 *Id.* at 743.
20 *Id.*
21 *Id.*
22 *Id.* at 744.
23 *Id.* at 745.
24 *Id.*

pollutants in its wells before discharging them into the ground and eventually the surface water.[25] The appellate court commented that the County knew from the beginning that effluent from the wells would reach the ocean; that the groundwater delivered the pollutants to navigable water does not preclude liability.[26]

The Ninth Circuit held the County liable, given that the pollutants were fairly traceable from the point source to a navigable water, making the discharge the functional equivalent of a discharge straight into navigable water, and that the pollutant levels were more than minor.[27] This court "[left] for another day the task of determining when, if ever, the connection between a point source and a navigable water is too tenuous to support liability under the CWA."[28] Addressing the County's contention that the injections into the wells are not discharges into navigable waters but disposals of pollutants into their wells, the court cited the plain language of the NPDES program in the statute, which "clearly permits States to issue NPDES permits for well disposals."[29] The Ninth Circuit also relied upon the plain statutory language to conclude that the County had fair notice its actions violated the CWA.[30]

A Circuit Split: The Fifth, Sixth, and Seventh Circuits' Decision

The Fifth, Sixth, and Seventh Circuits all came to the same conclusion regarding the NPDES permitting issue—the CWA does not protect groundwater, and the NPDES program does not apply to pollutants that reach navigable waters through groundwater.[31] The Fifth Circuit addressed the meaning of "navigable waters" within the Oil Pollution Act of 1990 (OPA) and whether the district court properly excluded groundwater from its analysis of "waters of the United States" in its review of *Rice v. Harken Expl. Co.*[32] *Rice* involved an oil exploration company that owned and operated oil and gas properties pursuant to leases on the appellants' Big Creek Ranch.[33] Rice alleged that the oil company was discharging hydrocarbons and other pollutants onto Big Creek Ranch, into Big Creek, and "other 'independent ground and surface waters.'"[34] Harken argued that the discharges never threatened navigable waters within the meaning of the OPA.[35]

In its analysis, the Fifth Circuit assessed the meaning of navigable waters under the OPA and stated, "the law in this Circuit is clear that ground waters are not protected waters under the CWA."[36] The appellate court determined there was no reason to construe the term more expansively under the OPA than in the CWA, so it held "that

25 *Id.* at 747.
26 *Id.*
27 *Id.* at 749.
28 *Id.*
29 *Id.* at 750.
30 *Id.* at 751.
31 Ky. Waterways All. v. Ky. Util. Co., 905 F.3d 925, 940 (6th Cir. 2018); Rice v. Harken Expl. Co., 250 F.3d 264, 272 (5th Cir. 2001); Vill. of Oconomowoc Lake v. Dayton Hudson Corp., 24 F.3d 962, 965 (7th Cir. 1994).
32 Rice v. Harken Expl. Co., 250 F.3d 264, 267 (5th Cir. 2001).
33 *Id.* at 265.
34 *Id.*
35 *Id.* at 266.
36 *Id.* at 269.

subsurface waters are not 'waters of the United States' under the OPA."[37] Additionally, the court held that surface waters that would eventually be affected by "remote, gradual, [or] natural seepage" from pollutants in groundwater were not enough to establish liability under the OPA.[38]

The Sixth Circuit considered pollution that reaches surface waters via groundwater in *Kentucky Waterways Alliance v. Kentucky Utilities Co.*[39] The appellants—two environmental conservation groups—argued that Kentucky Utilities Co.'s coal ash storage in its man-made ponds was contaminating surrounding groundwater and thus a nearby lake.[40] Kentucky Waterways argued that the groundwater was a point source depositing pollutants into the lake, and the terrain carrying the groundwater was a point source that amounted to a conduit.[41] Furthermore, they adopted the "hydrological connection" theory in which groundwater is not a point source but a medium through which pollutants pass before being discharged into navigable waters.[42]

The Sixth Circuit defined a point source as a "discernible, confined, and discrete conveyance" and described groundwater as a "diffuse medium" that goes in all directions, meaning it is "neither confined nor discrete."[43] The court used the same reasoning concerning the conduit argument, explaining that it still treats groundwater as the point source.[44] Regarding the hydrological connection theory, the appellants argued that the CWA provision does not include the word "directly," and instead bars the discharge of pollutants to "navigable waters from any point source."[45] The court examined the language "discharged from point sources into navigable waters" to discuss how the word "into" indicated directness.[46] Thus, the point source would need to dump directly into the navigable waters for this scheme to apply.[47] For these reasons, the Sixth Circuit held that "the CWA does not impose liability on surface water pollution that comes by way of groundwater."[48]

In *Village of Oconomowoc Lake v. Dayton Hudson Corp.*, the Seventh Circuit examined the limitations of the CWA's coverage to the "waters of the United States."[49] The Dayton Hudson Corp. was building a warehouse that had a retention pond, and the appellants feared water would seep into the ground, transporting pollutants.[50] This court discussed how neither the CWA's nor the EPA's definition of "waters of the United States" established authority over groundwater just because a hydrological connection may exist.[51] The omission of groundwater regulations was not an oversight because ad-

37 *Id.* at 270.
38 *Id.* at 272.
39 Ky. Waterways All. v. Ky. Util. Co., 905 F.3d 925, 927 (6th Cir. 2018).
40 *Id.*
41 *Id.* at 932–933.
42 *Id.*
43 *Id.* at 933.
44 *Id.* at 934.
45 *Id.*
46 *Id.*
47 *See id.*
48 *Id.* at 940.
49 Vill. of Oconomowoc Lake v. Dayton Hudson Corp., 24 F.3d 962, 964 (7th Cir. 1994).
50 *Id.* at 963.
51 *Id.* at 965.

ding groundwater to the scope of the CWA had been proposed but defeated.[52] Moreover, the EPA has considered a potential connection between ground and surface waters and continues to leave the regulatory definition alone.[53] Thus, the court held that in the statute's current state, the government has not asserted a claim of authority over artificial ponds that drain into groundwater.[54]

The Supreme Court Decision

On February 19, 2019, the United States Supreme Court granted certiorari to the appellants in the *County of Maui* case.[55] The Court reviewed whether the CWA requires an NPDES permit when the pollutants from a point source are conveyed to navigable waters by a nonpoint source like groundwater.[56] On April 23, 2020, the Supreme Court vacated and remanded the case, and held that the "statute requires a permit when there is a direct discharge from a point source into navigable waters or when there is the *functional equivalent of a direct discharge*."[57]

The Court first examined the statutory language "from any point source."[58] Focusing on the word "from," the Court considered whether pollution is "from" a point source if it only reaches navigable waters through groundwater.[59] The Court concluded that the phrase "from any point source" applies to a range narrower than the Ninth Circuit's fairly traceable test but broader than Maui's total exclusion of all pollution discharges through groundwater.[60]

The fairly traceable test could potentially allow the EPA to require permits for the release of pollutants that take many years to reach navigable waters.[61] The Court determined that Congress did not intend to provide the EPA with such broad authority.[62] First, the Ninth Circuit's interpretation of "from" could require a permit in unexpected circumstances such as a pollutant's 100-year migration through groundwater to a river.[63] Second, the structure of the statute indicates congressional intent to leave groundwater and nonpoint source regulation to the States.[64] Third, the legislative history supports the Court's conclusion that the permitting provisions do not extend so far as the Ninth Circuit's fairly traceable test.[65] Finally, the EPA has already successfully applied permitting provisions to point source pollutants that have reached navigable waters through groundwater using a narrower interpretation than that of the Ninth Circuit.[66]

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52 *Id.*
53 *Id.* at 964.
54 *Id.* at 966.
55 Cty. of Maui v. Hawai'i Wildlife Fund, 139 S. Ct. 1164 (2019).
56 *Id.*
57 *Id.* at *9 (emphasis added).
58 *Id.* at *4.
59 *Id.*
60 *Id.* at *5.
61 *Id.*
62 *Id.*
63 *Id.* at *5.
64 *Id.* at *6.
65 *Id.*
66 *Id.* at *7.

Last, the Court examined the statute in light of congressional intent to avoid undermining the States' longstanding regulatory authority over groundwater.[67] In examining this issue, the Court held that the reading best capturing congressional intent was that the "statute requires a permit when there is a direct discharge from a point source into navigable waters or when there is the *functional equivalent of a direct discharge*."[68] In determining whether a discharge is the functional equivalent of a direct discharge, factors such as time and distance, nature of the material the pollutant travels through, and the extent to which the pollutant is diluted or chemically altered as it travels should be considered.[69] The Court concluded by recognizing that a "more absolute position" may be easier to administer, but those positions have consequences that are inconsistent with congressional objectives revealed by the language, structure, and purpose of the statute.[70]

David J. Klein is a Principal of Lloyd Gosselink Rochelle & Townsend and represents public and private clients in water quality, supply, and utility service interests.

Jensen Martinez is a second-year student at The University of Texas School of Law and Managing Editor of the Texas Environmental Law Journal.

67 *Id.* at *9.
68 *Id.* (emphasis added).
69 *Id.* at *10.
70 *Id.* at *11.

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