

TEXAS ENVIRONMENTAL LAW JOURNAL

Volume 50

Winter 2020

Number 2

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STATE BAR SECTION NEWS

Prepared through The University of Texas School of Law Publications Office
ISSN 0163-545X

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The University of Texas School of Law Texas Environmental Law Journal

Please cite as: TEX. ENVTL. L. J.

TEXAS ENVIRONMENTAL LAW JOURNAL

Volume 50

Winter 2020

Number 2

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TEXAS ENVIRONMENTAL LAW JOURNAL

Volume 50

Winter 2020

Number 2

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PUBLIC DRINKING WATER SYSTEMS: WHAT EVERY ENVIRONMENTAL LAWYER SHOULD KNOW

BY KELLIE E. BILLINGS-RAY

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I. INTRODUCTION

Imagine: you turn on your faucet, and the water that comes out is undrinkable. We see this situation on television and in newspapers, but despite such publicity, many people take access to clean drinking water for granted.¹ Most public water systems in Texas meet the Safe Drinking Water Act standards. The problems associated with the five percent that do not can be difficult to address.²

1 See, e.g., Dustin Renwick, *Five Years on, the Flint Water Crisis is Nowhere Near Over*, NAT’L GEOGRAPHIC (Apr. 25, 2019), <https://www.nationalgeographic.com/environment/2019/04/flint-water-crisis-fifth-anniversary-flint-river-pollution/> (discussing the Flint water crisis); Kathryn Cargo, *Corpus Christi Water: 135 Residents, Mostly in Calallen Report Concerns With Odor, Taste*, CALLER TIMES (Apr. 11, 2019), <https://www.caller.com/story/news/local/2019/04/11/state-opens-new-investigation-into-corpus-christis-water-quality/3433531002/> (discussing resident complaints about their drinking water); Claudia Alarcón, *Austin’s Water Crisis Reveals Deeper Problems-And a Potential Solution*, FORBES, (Oct. 25, 2018, 1:41 pm), <https://www.forbes.com/sites/claudiaalarcon/2018/10/25/austins-water-crisis-reveals-deeper-problems-and-a-potential-solution/#34dc287b1d60> (discussing Austin’s water outage and potential solutions for future problems).

2 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, *Improve Viability of Small Drinking Water Systems*, S. 86–5464, 86th Sess. 1 (Apr. 2019), https://www.lbb.state.tx.us/Documents/Publications/Staff_Report/2019/5464_Water_Systems.pdf.

The goals of this article are to discuss public water systems in general, consider enforcement mechanisms available for noncompliant public water systems, and to explore possible ideas to address noncompliant public water systems earlier and faster.

II. PUBLIC WATER SYSTEMS, GENERALLY

A. WHAT IS A PUBLIC WATER SYSTEM?

Texas Commission on Environmental Quality (TCEQ) rules define a “public water system” as a system that provides water to the public for human consumption through pipes or other constructed conveyances, which includes all uses described under the definition of “drinking water.”³ A public water system must have at least fifteen service connections or serve at least twenty-five individuals at least sixty days of the year.⁴ This definition includes both residents who live in a household served by the system and nonresidents who are still served by the system, such as customers, employees, or students.⁵ The term “public” refers to the community served by the system, not the owner of the system itself.⁶

Public water systems fall into one of three categories: community water systems, nontransient noncommunity water systems, and transient noncommunity water systems.⁷ A community water system is a system that has the potential to serve at least fifteen residential service connections or at least twenty-five residents on a year-round basis.⁸ Municipalities, boarding schools, and prisons often meet this definition.⁹ A nontransient, noncommunity water system is a public water system that is not a community water system and regularly serves at least twenty-five of the same people for at least six months of the year.¹⁰ Camps, schools, factories, and recreational vehicle parks with long-term residents often fall under this category.¹¹ Finally, a public water system that serves at least twenty-five people sixty days of the year, but does not meet the definition of a

3 30 Tex. Admin. Code §§ 290.38(23), (71) (2019) (Tex. Comm’n on Env’tl. Quality, Definitions). “Drinking water” means water distributed for human consumption, whether by an individual or agency, which “may be used in the preparation of foods or beverages or for the cleaning of any utensil or article used in the course of preparation or consumption of food or beverages for human beings. The term ‘drinking water’ also includes all water supplied for human consumption or used by any institution catering to the public.” *Id.* § 290.38(23).

4 *Id.* § 290.38(71).

5 *Am I a “Public Water System”?*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/drinkingwater/pws.html> (last modified Jan. 15, 2020).

6 30 Tex. Admin. Code § 290.38(71); see Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess. 1 (Apr. 2019).

7 See 30 Tex. Admin. Code §§ 290.38(15), (58), (71) (providing definitions of community, transient noncommunity, and nontransient noncommunity water systems).

8 *Id.* § 290.38(15).

9 *Am I a “Public Water System”?*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/drinkingwater/pws.html> (last modified Jan. 15, 2020).

10 30 Tex. Admin. Code § 290.38(58).

11 *Am I a “Public Water System”?*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/drinkingwater/pws.html> (last modified Jan. 15, 2020).

community water system or nontransient, noncommunity water system is a transient, noncommunity water system.¹² These systems are parks, recreational parks, convenience stores, and other businesses.¹³

Treated water purchasers may also be regulated as public water systems.¹⁴ Purchased water systems buy treated water and then redistribute that water to customers.¹⁵ Sometimes the system that sells the purchased water will voluntarily meet TCEQ rules.¹⁶ If the water seller does not meet the minimum requirements under TCEQ rules, the water purchaser remains responsible for compliance before redistributing the water.¹⁷

B. WHO IS IN CHARGE HERE?

Two state agencies have jurisdiction over public water systems: TCEQ and the Public Utility Commission of Texas (PUC).¹⁸ TCEQ remains the primary regulator for public drinking water programs regarding water quality issues, and PUC has authority over ratemaking for water and wastewater facilities, wastewater utility submetering, and certificates of convenience and necessity. The two agencies share responsibility over financial, managerial, or technical practices of the public water system.¹⁹

The state's authority to regulate water quality can be found under the Safe Drinking Water Act.²⁰ Congress enacted the Safe Drinking Water Act, at least in part, due to nationwide studies of community water systems demonstrating issues with water quality that presented risks to human health from poor system operations, inadequate infrastructure, and deficient system management.²¹ Congress authorized the United States Environmental Protection Agency (EPA) to delegate primary implementation and enforcement authority for the "Public Water Supervision Program" to states.²² Texas, like many states, has a primacy agreement (enforcement authority) with the EPA that

12 30 Tex. Admin. Code § 290.38(84).

13 *Am I a "Public Water System"?*, TEX. COMM'N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/drinkingwater/pws.html> (last modified Jan. 15, 2020).

14 *You're a Public Water System . . . Now What?*, TEX. COMM'N ON ENVTL. QUALITY, SMALL BUS. & ENVTL. ASSESSMENT DIV., at 3 (Sept. 2015), https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-496.pdf.

15 *Id.*

16 *Id.*

17 *Id.* at 3–4.

18 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 7 (Apr. 2019). *See generally* Tex. Water Code § 13. *But see* Tex. Health & Safety Code § 341.035(a).

19 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 7 (Apr. 2019).

20 Safe Drinking Water Act, 42 U.S.C. §§ 300f–300j.

21 CLAUDIA COPLAND & MARY TIEMANN, CONG. RESEARCH SERV., WATER INFRASTRUCTURE NEEDS AND INVESTMENT: REVIEW AND ANALYSIS OF KEY ISSUES 5 (2010); Safe Drinking Water Act of 1974, Pub. L. No. 93–523, 88 Stat. 1660 (1974); Safe Drinking Water Act, 42 U.S.C. §§ 300f–300j.

22 40 C.F.R. § 142, pt. B (2020); CLAUDIA COPLAND & MARY TIEMANN, CONG. RESEARCH SERV., WATER INFRASTRUCTURE NEEDS AND INVESTMENT: REVIEW AND ANALYSIS OF KEY ISSUES 5 (2010).

provides the state with implementation and oversight authority for the requirements of the Safe Drinking Water Act.²³ The EPA regulates states that do not have primacy.²⁴

TCEQ operates the state's Public Water System Supervision Program, which is designed to regulate and aid public drinking water systems.²⁵ Texas is required to maintain the program to retain primacy over its public water systems.²⁶ TCEQ's public drinking water program is a part of the state's Public Water System Supervision program.²⁷

In 2013, the Texas Legislature transferred authority for water and wastewater utility regulation in Texas from TCEQ to PUC.²⁸ PUC's supervision and regulatory oversight functions include processing applications for certified retail water and sewer utility service areas.²⁹ PUC also "regulates retail water and sewer rates with original jurisdiction over certain rate functions and appellate jurisdiction over others."³⁰ Complaints about water quality, pressure, and safety of water sources are still handled by TCEQ.³¹

Other state agencies have a role in the regulation of public water systems. Food establishments are co-regulated by the Department of State Health Services and TCEQ.³² State regulations for food establishments require the water used for food processes to meet TCEQ rules.³³ A food establishment cannot circumvent being a public water system by supplying bottled water.³⁴ In addition, the Health and Human Services Commission regulates all childcare operations and child-placement agencies and is required to ensure a drinking water supply that meets federal standards is available.³⁵

23 *Public Water System Supervision Program*, TEX. COMM'N ON ENVTL. QUALITY 1 (last updated Jan. 15, 2020), <https://www.tceq.texas.gov/drinkingwater/pwss.html>. See generally 40 C.F.R. § 141.2; 30 Tex. Admin. Code ch. 290.

24 *Public Water System Supervision Program*, TEX. COMM'N ON ENVTL. QUALITY 1 (last updated Jan. 15, 2020), <https://www.tceq.texas.gov/drinkingwater/pwss.html>.

25 *Id.*

26 *Id.*

27 *Id.* See generally 40 C.F.R. § 141.2 (2020); 30 Tex. Admin. Code ch. 290.

28 Acts of May 23, 2013, 83rd Leg., R.S., ch. 170, § 2.30 (H.B. 1600), 2013 Tex. Gen. Laws (codified at Tex. Water Code § 13.1386).

29 *Water and Sewer Utilities*, PUB. UTIL. COMM'N OF TEX., <https://www.puc.texas.gov/industry/water/utilities/utilities.aspx> (last visited Apr. 7, 2020).

30 *Id.*

31 *Utilities Not Regulated by the PUC*, PUB. UTIL. COMM'N OF TEX., <https://www.puc.texas.gov/consumer/complaint/UtilitiesNot.aspx> (last visited Apr. 7, 2020).

32 See 25 Tex. Admin. Code § 228.142 (2020) (Dep't of State Health Servs., Water, Plumbing, and Waste); *You're a Public Water System . . . Now What?*, TEX. COMM'N ON ENVTL. QUALITY, SMALL BUS. & ENVTL. ASSESSMENT DIV., at 4 (Sept. 2015), https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-496.pdf.

33 25 Tex. Admin. Code § 228.142; *You're a Public Water System . . . Now What?*, TEX. COMM'N ON ENVTL. QUALITY, SMALL BUS. & ENVTL. ASSESSMENT DIV., at 4 (Sept. 2015), https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-496.pdf.

34 40 C.F.R. § 141.101; 25 Tex. Admin. Code § 228.142; *You're a Public Water System . . . Now What?*, TEX. COMM'N ON ENVTL. QUALITY, SMALL BUS. & ENVTL. ASSESSMENT DIV., at 4 (Sept. 2015), https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-496.pdf.

35 26 Tex. Admin. Code § 746.3301(e) (2020) (Health & Human Serv. Comm'n, Nutrition and Food Service); Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 10 (Apr. 2019).

Other agencies such as the Texas Water Development Board (TWDB) assist in regulating funding sources for public water systems.³⁶

To further assist owners and operators of public water systems in Texas, both TCEQ and PUC offer numerous guidance documents and training opportunities with information about regulatory requirements for public water systems.³⁷ In addition to these resources, the state contracts with Texas Rural Water Association to provide additional financial, managerial, and technical assistance to help rural public water systems. Texas Rural Water Association provides capacity assessments, onsite assistance, drinking water operator training, and consolidation assessments to its approximately 750 retail public utilities.³⁸

C. WHAT FINANCIAL RESOURCES ARE AVAILABLE FOR PUBLIC WATER SYSTEM OWNERS AND OPERATORS?

Funding water system maintenance and improvements is often a difficult task—particularly for small systems whose rate base is unable to meet infrastructure costs associated with operating the system.³⁹ However, the state and related associations offer several grant and loan funding options for owners and operators of public drinking water systems. Three of these programs include the Drinking Water State Revolving Fund (DWSRF), Texas Water Development Fund (D Fund), and the Texas Water Infrastructure Coordination Committee (TWICC).⁴⁰

DWSRF provides financing for drinking water projects with low interest-rate loans through the TWDB for infrastructure such as distribution systems, treatment facilities, consolidation as well as source water protection.⁴¹ For some applicants that meet certain criteria, the fund can also include principal forgiveness.⁴² DWSRF is made available through an annual federal capitalization grant appropriated by Congress.⁴³ The fund is administered by the TWDB and TCEQ. The TWDB is required to review and issue

36 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 8 (Apr. 2019). *See generally* Financial Assistance, TEX. WATER DEV. BD., <http://www.twdb.texas.gov/financial/index.asp>, (last visited May 20, 2020).

37 *See, e.g., Public Water Supply: Compliance Resources*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/assistance/water/pdws> (last visited Apr. 7, 2020); *Operating a Public Water System*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/drinkingwater/operating-public-water-system> (last visited Apr. 7, 2020); *Assistance for Public Water and Sewer Utilities*, PUB. UTIL. COMM’N OF TEX., <https://www.puc.texas.gov/industry/water/utilities/fmt.aspx> (last visited Apr. 7, 2020).

38 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 10 (Apr. 2019). *See generally* TEX. RURAL WATER ASSOC., <https://www.trwa.org/> (last visited Apr. 7, 2020).

39 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess. 1 (Apr. 2019).

40 *See Water and Wastewater Funding Sources*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/assistance/water/water-and-wastewater-funding-sources> (last visited Apr. 7, 2020).

41 *Id.*

42 *Id.*

43 *Id.*

financial assistance, and the agencies must prepare an Intended Use Plan each year that describes how it intends to use and prioritize state DWSRF funds.⁴⁴ Systems seeking to “solve the most serious water quality and quantity problems are given the highest priority” to use the DWSRF.⁴⁵ TCEQ ranks the projects, and the TWDB incorporates these rankings to determine eligibility for funding. Projects are ranked in accordance with health-based factors such as low pressure, low-disinfectant residuals, or maximum contaminant levels.⁴⁶

The D Fund is a streamlined state loan program, also administered by the TWDB, that provides loans for both water and wastewater purposes in one loan.⁴⁷ The D Fund is flexible and permits the TWDB to provide loans for “conservation, water supply, wastewater collection and treatment, water quality enhancement, flood control, and municipal solid waste.”⁴⁸

Finally, another resource for owners and operators of public water systems is TWICC.⁴⁹ TWICC is “comprised of state and federal funding agencies, technical assistance providers, water and wastewater trade organizations, and regulatory agencies.”⁵⁰ Its purpose is to promote “an efficient process for affordable, sustainable, and innovative funding strategies for water and wastewater infrastructure projects that protect public health.”⁵¹

Of course, it is always in the best interest of the state for a public water system to provide safe, clean, and adequate supplies of water to the public. The programs of these state agencies and TWICC are designed to aid in this goal. But despite these funding and education programs, there are times when enforcement is the only option to bring a system back to compliance.

44 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 8 (Apr. 2019).

45 *Id.*

46 *Id.*

47 *Texas Water Development Fund (DFund)*, TEX. WATER DEV. BD., <http://www.twdb.texas.gov/financial/programs/TWDF/index.asp> (last visited Apr. 7, 2020); *Water and Wastewater Funding Sources*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/assistance/water/water-and-wastewater-funding-sources> (last updated Jan. 31, 2020).

48 *Water and Wastewater Funding Sources*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/assistance/water/water-and-wastewater-funding-sources> (last updated Jan. 31, 2020).

49 *Id.*

50 *Id.*

51 *Home*, TEX. WATER INFRASTRUCTURE COORDINATING COMM., <https://twicc.org/index.html> (last visited May 20, 2020).

III. ENFORCEMENT

A. WHY ARE NONCOMPLIANT SYSTEMS OFTEN SO HARD TO FIX?

As of 2017, approximately sixty percent of Texas's public water systems serve populations of 500 people or less.⁵² TCEQ and the TWDB have identified financial constraints as a significant impediment for compliance.⁵³ Many of these issues are due to an inadequate customer base to support the needs of the system.⁵⁴ According to studies conducted by the University of North Carolina, estimated average infrastructure needs per residential connection with less than one hundred connections is \$19,734, compared with a \$2,503 cost for systems with greater than 10,000 connections.⁵⁵

When a system's infrastructure compliance issues become too great, there is not enough rate base to support system repairs, making it even more important for problems to be caught early and corrected quickly. Therefore, prompt enforcement against recalcitrant system owners and operators is essential.

B. HOW DOES TCEQ SEEK ENFORCEMENT FOR VIOLATIONS?

TCEQ issued 21,890 Notices of Violation during the 2016–17 biennium.⁵⁶ Most of those violations were for systems that failed to employ minimally acceptable operating practices for water quality testing, water quality violations, and for failure to provide timely notifications to the public.⁵⁷ One-third of those violations were attributed to water systems improperly monitoring federally prescribed water quality indicators.⁵⁸

Each public water system is monitored and regulated by TCEQ and PUC.⁵⁹ "The [TCEQ] may regulate water and sewer utilities within its jurisdiction to ensure safe drinking water and environmental protection."⁶⁰ TCEQ assigns each public water system a seven-digit identification number, and all correspondence and documentation reference this number.⁶¹ As regulated entities, public water systems are subject to inspections by TCEQ investigators, but members of the public can also raise compliance issues at the agency.⁶² When a violation at a public water system has been identified, TCEQ will issue a Notice of Violation.⁶³

52 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess. 1 (Apr. 2019). Texas had approximately 6,977 public water systems, 4,159 of those systems serve populations of 500 or less. *Id.*

53 *Id.*

54 *Id.*

55 *Id.* at 4.

56 *Id.* at 1.

57 *Id.*

58 *Id.*

59 Tex. Water Code § 13.041(a).

60 *Id.*

61 Am I a "Public Water System"?, TEX. COMM'N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/drinkingwater/pws.html> (last updated Jan. 15, 2020).

62 Tex. Water Code § 7.0025.

63 *The TCEQ Has Inspected Your Business, What Does This Mean to You?*, TEX. COMM'N ON ENVTL. QUALITY 2 (Nov. 2014), https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-344.pdf.

The majority of TCEQ cases are handled through administrative orders that direct compliance with various injunctive provisions.⁶⁴ Enforcement actions at TCEQ are accompanied by administrative penalties that are calculated by TCEQ's enforcement coordinators according to TCEQ's penalty policy.⁶⁵ The policy considers factors such as compliance history, compliance efforts, and the severity of the violation.⁶⁶

In some cases, a water system could fall into such a state of disrepair that operations of the system have discontinued or the system has been abandoned. Here, TCEQ or PUC can appoint a temporary manager to take over operation of the system while a more permanent solution is achieved.⁶⁷ A temporary manager has the powers and duties necessary to ensure service to the public is continuous and adequate and can be appointed by either agency for a period of 180 days, unless specified otherwise by the agency or a receiver is appointed.⁶⁸ A temporary manager may be an individual, partnership, or corporation.⁶⁹ The duties of a temporary manager are to collect the assets and carry on the utility's business.⁷⁰ If a receiver has not been put into place after the expiration of the total temporary manager time, the system reverts back to the management of the owner.⁷¹

Temporary managers are paid from utility revenues.⁷² Payments are set by TCEQ, in consultation with PUC, or by the PUC at the time of appointment.⁷³ A change in the compensation agreement may be approved by the agency's executive director.⁷⁴ The appointment of a temporary manager often precedes the appointment of a long term receiver.⁷⁵

64 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 9 (Apr. 2019).

65 *Id.*; see also Tex. Comm'n on Env'tl. Quality, The TCEQ Has Inspected Your Business, What Does This Mean to You? 2 (Nov. 2014).

66 Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 9 (Apr. 2019).

67 Tex. Water Code § 13.4132 (authorizing TCEQ or PUC to appoint a temporary manager in emergency situations); 30 Tex. Admin. Code § 291.143 (authorizing TCEQ to appoint a temporary manager in emergency situations); 16 Tex. Admin. Code § 24.357 (authorizing PUC to appoint a temporary manager in emergency situations).

68 30 Tex. Admin. Code § 291.143(d); 16 Tex. Admin. Code § 24.357(d).

69 See 30 Tex. Admin. Code § 291.142(b) (“A corporation may be appointed a temporary manager.”); 16 Tex. Admin. Code § 24.355(b) (“A corporation may be appointed as a temporary manager.”).

70 30 Tex. Admin. Code § 291.143(g); 16 Tex. Admin. Code § 24.357(g).

71 See 30 Tex. Admin. Code § 291.143(i) (“[T]he certificate of convenience and necessity shall remain in the name of the utility owner.”); 16 Tex. Admin. Code § 24.357(i) (“[T]he certificate of convenience and necessity shall remain in the name of the utility owner.”).

72 See 30 Tex. Admin. Code § 291.143(f) (authorizing temporary manager compensation from utility revenues and directing compensation to be set at the time of appointment); 16 Tex. Admin. Code § 24.357(f) (authorizing temporary manager compensation from utility revenues and directing compensation to be set at the time of appointment).

73 See 30 Tex. Admin. Code § 291.143(f); 16 Tex. Admin. Code § 24.357(f).

74 30 Tex. Admin. Code § 291.143(f); 16 Tex. Admin. Code § 24.357(f).

75 See 30 Tex. Admin. Code § 291.143(d)(4) (discussing a temporary manager's 180-day term in light of a superseding action, such as the appointment of a receiver); 16 Tex. Admin.

The mission of the TCEQ is to “protect our state’s public health and natural resources consistent with sustainable economic development.”⁷⁶ Usually—when a violation is observed or detected—this mission can be achieved through the agency’s enforcement process, but on occasion, as is often the case when a temporary manager is appointed, enforcement must continue beyond the agency with a referral to the Texas Attorney General’s Office.

C. WHAT TOOLS DOES THE ATTORNEY GENERAL’S OFFICE USE FOR ENFORCEMENT?

1. CIVIL PENALTIES

In addition to the authority provided to TCEQ and PUC to correct and address violations, the Attorney General, upon referral from TCEQ or PUC, is authorized to seek injunctive relief, civil penalties, attorney’s fees, and/or a receiver for a failing, non-compliant water system.⁷⁷

Texas Health and Safety Code section 341.048 provides the Attorney General’s Office authority to seek injunctive relief and civil penalties for violations at a public water system.⁷⁸ Section 341.048(b) states that a person “who causes, suffers, allows, or permits” a violation under chapter 341, subchapter C, of the Texas Health and Safety Code, or a rule or order issued under that chapter, will be assessed a civil penalty of not less than \$50 nor more than \$5,000 for each violation.⁷⁹

2. INJUNCTIVE RELIEF

Subsection (c) of section 341.048 provides that if a person “has violated, is violating, or threatens to violate” a provision pertaining to water quality and safety, suit may be brought for injunctive relief and civil penalties.⁸⁰ Each day of a continuing violation is calculated as a separate violation.⁸¹ The Attorney General’s Office is also entitled to recover and collect reasonable attorney’s fees, investigative costs, and court costs on behalf of the State.⁸² On occasion, even the threat of court-ordered injunctive relief and civil penalties are not enough to inspire action on the part of a non-compliant water system. Here, the State may seek appointment of a receiver pursuant to section 13.412 of the Texas Water Code.⁸³

Code § 24.357(d)(4) (discussing a temporary manager’s 180-day term in light of a superseding action like the appointment of a receiver).

76 *Mission Statement and Agency Policy*, TEX. COMM’N ON ENVTL. QUALITY, <https://www.tceq.texas.gov/agency/mission.html> (last updated June 18, 2019).

77 Tex. Water Code §§ 7.105, 7.108, 13.412.

78 *See generally* Tex. Health & Safety Code § 341.048.

79 *Id.* § 341.048(b).

80 *Id.* § 341.048(c).

81 *Id.* § 341.048(b).

82 Tex. Water Code § 7.108.

83 *Id.* § 13.412.

3. COURT-APPOINTED RECEIVERS

The appointment of a receiver is an “extraordinary remedy” that should be used in limited circumstances that merit such a step.⁸⁴ The Attorney General’s Office, on behalf of TCEQ or PUC, will bring suit for the court appointment of a receiver to collect the assets and carry on the business of a water or sewer utility that has abandoned or notified the agency that the owner intends to abandon the operation of its facilities; whose owner or operator violated or allowed property owned or controlled by it to be used in violation of a final order of the agency; or where it violates a final judgment issued by a district court in a suit brought by the Attorney General’s Office.⁸⁵ “Abandonment” includes, but is not limited to, the following: 1) failure to pay a bill or obligation with the result that the utility service provider will disconnect the facility; failure to provide appropriate water or wastewater treatment so that it results in a potential health hazard; 2) failure to adequately maintain the facility that results in potential health hazards; 3) failure to secure an alternative water supply during outages; 4) displaying a pattern of hostility toward or repeatedly failing to respond to the agencies; and 5) failure to provide the agencies adequate contact information for the utility.⁸⁶

The appointment of a receiver is nondiscretionary for a court where such appointment is necessary to collect assessments, fees, and penalties, to guarantee continuous and adequate service to the customers of the utility, or to prevent continued or repeated violation of a final order.⁸⁷

A “receiver” is “a person appointed by the court to preserve property in question pendente lite.”⁸⁸ The receivership can only exist as a result of court action, and the appointment of a receiver is a matter that rests almost exclusively with the district court.⁸⁹ In that regard, “a receiver is an officer of the court, ‘the medium through which the court acts’”⁹⁰—not an agent of the company.⁹¹ When a receiver is appointed, “the rules of equity govern all matters relating to the appointment, powers, duties, and liabilities of a receiver and to the powers of a court regarding a receiver.”⁹²

A defendant that wishes to set aside the receiver’s appointment must appeal the receivership within twenty days after the original receivership order is entered.⁹³ The

84 *Elliott v. Weatherman*, 396 S.W.3d 224, 228 (Tex. App.—Austin 2013, no pet.); 64 TEX. JUR. *Receivers* § 7 (3d ed. 2020).

85 Tex. Water Code § 13.412(a).

86 *Id.* § 13.412(f).

87 *Id.* § 13.412(b).

88 *Lloyds of Tex. v. Bobbitt*, 55 S.W.2d 803, 805 (Tex. [Comm’n Op.] 1932); 64 TEX. JUR. *Receivers* § 1 (3d ed. 2020).

89 *Dillingham v. Putnam*, 14 S.W. 303, 304 (Tex. 1890); 64 TEX. JUR. *Receivers* § 10 (3d ed. 2020).

90 *Rich v. Cantilo & Bennett, LLP*, 492 S.W.3d 755, 760–61 (Tex. App.—Austin 2016, pet. denied) (citing *Sec. Trust Co. of Austin v. Lipscomb Cnty.*, 180 S.W.2d 151, 158 (Tex. 1944)); 64 TEX. JUR. *Receivers* § 2 (3d ed. 2020).

91 *Missouri, K. & T. Ry. Co. v. McFadden*, 33 S.W. 853, 854 (Tex. 1896); 64 TEX. JUR. *Receivers* § 1 (3d ed. 2020).

92 Tex. Civ. Prac. & Rem. Code § 64.004.

93 *See generally* Tex. Civ. Prac. & Rem. Code § 51.014(a)(1).

court's order will not be overturned absent a clear abuse of discretion.⁹⁴ Distinct from temporary managers, which can be an individual, partnership, or corporation, a receiver must be an individual; and a customer or operator of a nearby system can be appointed as a receiver.⁹⁵

Placement of a receiver to manage a public water system has the added benefit of allowing a disinterested court representative to seek the sale, consolidation, or repair of the public water system.⁹⁶ A district court judge will issue an order that specifies the receiver's duties regarding operating the system.⁹⁷ A receiver may meet with utility personnel, inspect and evaluate the system consolidation, conduct an inventory, establish a bank account, or transfer accounts.⁹⁸ The receiver must communicate with the court to obtain bond and financial assurance and must file an inventory of the utility and file monthly reports, or to request to sell the facility or otherwise dispose of the utility assets.⁹⁹

A receiver is also responsible for ensuring proper billing and revenue to ensure continued operation of the facility, which includes seeking rate increases.¹⁰⁰ A receiver is permitted to collect fees for their services.¹⁰¹ Fees are paid from the system's revenue, or in some cases, are paid when the receivership is dissolved.¹⁰² A receiver may purchase a system in receivership, but only after obtaining court approval for the purchase from the court and from the PUC through the sale, transfer, or merger process.¹⁰³

The process and timing for the collection of receiver fees are dependent on the system's cash flow.¹⁰⁴ The receiver should develop a budget and determine how much

94 London v. London, 342 S.W.3d 768, 771–72 (Tex. App.—Houston [14th Dist.] 2011, pet. denied); 64 TEX. JUR. *Receivers* § 12 (3d ed. 2020).

95 Tex. Civ. Prac. & Rem. Code § 64.002(a).

96 Tex. Water Code § 13.412(d); 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020).

97 Tex. Water Code § 13.412(b); 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020).

98 Tex. Water Code §§ 13.412(b)-(d); 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020).

99 Tex. Water Code §§ 13.412(c), 13.412(g); 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020); see generally *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

100 Tex. Water Code §§ 13.187, 13.4133.

101 See *id.* § 13.413(1) (allowing a receiver to sell a utility's property to pay fees for the receiver's services).

102 See *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 6 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/> (discussing fee collection).

103 Tex. Water Code § 13.412(g); 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020); see *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 31 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

104 See *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 6 (Mar.

money is left over after payment of the bills.¹⁰⁵ If money is unavailable to pay the full amount of the receiver's fee, unpaid amounts can be accrued.¹⁰⁶ The accrued fees may then be collected at a later date when funds are available from a rate increase, due to improved management practices, or a combination of these.¹⁰⁷ If the system is sold and the receivership dissolved, funds may become available.¹⁰⁸ If a receiver determines current rates are not generating the needed revenue to run the system, a system manager can request approval for a regular rate increase under section 13.187 of the Texas Water Code or for an emergency rate increase under 13.4133 of the Texas Water Code.¹⁰⁹

A receivership continues until it is dissolved by the district court.¹¹⁰ That dissolution can occur on petition to the court to return the assets and control of the system to the original owner based on a showing of good cause, or if the receiver sells the system, subject to approval by the court.¹¹¹ Finally, if a receiver determines the system cannot be rehabilitated or made viable, the court may allow the receiver to discontinue system operations and dissolve the receivership.¹¹²

Receivers are often the last enforcement step available to agencies seeking compliance for public water systems. Because receivership is meant to be an extraordinary remedy—and because it can be challenging to find a person willing to serve as a receiver—the State must sometimes consider alternative solutions. Effective solutions must identify problem water systems quickly and minimize the ultimate problems facing small water systems.

2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/> (discussing fee collection).

105 Tex. Water Code § 13.412(b); 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020); *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 6 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

106 Tex. Water Code § 13.413; 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020).

107 Tex. Water Code § 13.412(b); 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020); *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 6 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

108 *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 6 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

109 Tex. Water Code §§ 13.187, 13.412(b), 13.4133; 61 TEX. JUR. *Receivership for water or sewer utility* § 243 (3d ed. 2020); *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 26 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

110 Tex. Water Code § 13.412(d).

111 *Id.* § 13.412(e); 61 TEX. JUR. *Receivership for water or sewer utility* § 243; *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 31 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

112 *Public Utility Receiverships and Temporary Management: A Guide for Receivers and Temporary Managers of Water and Wastewater Utilities*, TEX. COMM'N ON ENVTL. QUALITY 31 (Mar. 2005), <https://texashistory.unt.edu/ark:/67531/metaph624161/m1/1/>.

IV. CONCLUSION—WHAT MORE CAN WE DO?

Prior to the 2019 legislative session, the Legislative Budget Board released a staff report discussing issues and improvement areas for small public water systems.¹¹³ In the report, staff made eight recommendations for areas of proposed improvement.¹¹⁴ These proposals included improving grant funding opportunities, increasing notification requirements for the agencies, and requiring more routine analysis of the financial stability of public water systems.¹¹⁵

The Legislative Budget Board staff proposed these possible statutory amendments:¹¹⁶

- 1) provide TCEQ with additional cost-recovery mechanisms to collect the costs of water sampling from those water systems that refuse to test their water supplies;¹¹⁷
- 2) require TCEQ to establish notification requirements, to include automated system reminders to increase water system compliance;¹¹⁸
- 3) require TCEQ to notify the Department of State Health Services and Health and Human Services Commission as well as local health departments when health-based violations are identified at entities that operate water;¹¹⁹
- 4) require state agencies to consider applying for DWSRF financial assistance to address deficiencies.¹²⁰ If an agency did not apply for this assistance, it would be required to notify the Legislative Budget Board as to why it did not apply (school districts would be required to provide similar notification to the Texas Education Agency);¹²¹
- 5) require TCEQ and PUC to periodically review and adjust financial accountability requirements for new and existing at-risk systems and evaluate the feasibility of system consolidation and reorganization of new applicants;¹²²
- 6) authorize TCEQ, PUC, or the administrator of the existing system under receivership to apply for financial assistance on behalf of the system owner.¹²³ Additionally, TCEQ, in consultation with the Texas Water Development Board, would verify if any state funding is available to increase the economic feasibility of connecting to an existing water system, rather than building a new system;¹²⁴

113 See generally Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 9 (Apr. 2019).

114 *Id.* at 2.

115 *Id.*

116 *Id.*

117 *Id.*

118 *Id.*

119 See generally Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 2 (Apr. 2019).

120 *Id.*

121 *Id.*

122 *Id.*

123 *Id.*

124 *Id.*

- 7) permit TCEQ and PUC to adopt new thresholds that would initiate the required regionalization, consolidation, or closure of systems that incur significant health-based violations during a period and initiate a public petition process to start this review; and¹²⁵
- 8) create a drinking water supply assistance grant program at TCEQ to provide additional funding for noncompliant, struggling systems.¹²⁶

Ultimately, none of these proposals were adopted by the 86th Legislature. But section 341.048(b) of the Health and Safety Code was amended to increase the maximum civil penalty for daily violations at a public water system from \$1,000 per day to \$5,000 per day per violation.¹²⁷

The Legislative Budget Board's proposals provide possible solutions and a pathway forward, alongside existing enforcement mechanisms, to help the State when customers of the problematic five percent of water systems face the very real scenario of inadequate or undrinkable water.

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125 See generally Tex. Legis. Budget Bd., Staff Reports – ID: 4830, Improve Viability of Small Drinking Water Systems, S. 86–5464, 86th Sess., at 2 (Apr. 2019).

126 *Id.*

127 Acts of 2019, 86th Leg., R. S., ch. 519, § 1 (S.B. 530), 2019 Tex. Gen. Laws. (codified at Tex. Health & Safety Code § 13.048(b)).

RED WOLF COALITION v. UNITED STATES FISH AND WILDLIFE SERVICE: RED SCARE

BY EDWARD FITZGERALD

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I. INTRODUCTION

The reintroduction of the red wolf to its historic range in North Carolina has been very controversial. Federal courts, particularly the U.S. District Court for the Eastern District of North Carolina, have been instrumental in furthering the recovery of the red wolf. The Fourth Circuit in *Gibbs v. Babbitt* determined that the Commerce Clause prevented the taking of red wolves on private land pursuant to section 9 of the Endangered Species Act (ESA).¹ The U.S. District Court for the Eastern District of North Carolina in *Red Wolf Coalition v. North Carolina Wildlife Resources Commission* granted an injunction stopping coyote hunting in red wolf recovery areas because it violated sections 9 and 10(j) of the ESA.² In the most recent litigation, the U.S. District Court for the Eastern District of North Carolina in *Red Wolf Coalition v. U.S. Fish and Wildlife Service* granted a permanent injunction against the Fish and Wildlife Service (FWS), banning the taking of non-problem red wolves on private property because it violated sections 9, 4 and 7 of

1 *Gibbs v. Babbitt*, 31 F. Supp. 2d 531 (E.D.N.C. 1998), *aff'd*, 214 F.3d 483 (4th Cir. 2000).

2 *Red Wolf Coal. v. N.C. Wildlife Res. Comm'n*, No. 2:13-CV-60-BO, 2014 WL 1922234, at *10 (E.D.N.C. May 13, 2014).

the ESA and the National Environmental Policy Act (NEPA).³ The district court also held that the FWS's abandonment of the adaptive management program, which included the release of captive red wolves, the cross fostering of red wolf pups, and sterilization of placeholder coyotes violated sections 4 and 7 of the ESA and NEPA.⁴

This article analyzes the district court's decision in *Red Wolf Coalition v. FWS*. It reviews the events preceding the litigation. It demonstrates that the district court correctly determined that the FWS violated sections 9, 4, and 7 of the ESA and NEPA. It examines the FWS's 2018 proposed regulatory changes to the red wolf program and the scientific criticism of the proposal. It reviews the National Academy of Science 2019 taxonomic study, which determined that the red wolf is a distinct species, and the discovery of red wolf ghost genes in wild canids on Galveston Island Texas and in southwest Louisiana.

II. HISTORY

A. *GIBBS V. BABBITT*

The red wolf originally inhabited the southeastern region of the U.S. from “the Atlantic Coast westward to central Texas and Oklahoma and from the Gulf of Mexico to central Missouri and southern Illinois.”⁵ Human activities—including the drainage of lands for agriculture, the construction of dams, and predator control—led to the red wolf's demise.⁶ The red wolf was viewed as a nuisance, even though it was important to the ecosystem and posed no threat to livestock where adequate prey was available.⁷

The red wolf was forced into the lower Mississippi region and then into southeast Texas.⁸ In 1967, the red wolf was declared an endangered species.⁹ Low numbers, poor health, and threats posed by inbreeding with coyotes nearly drove the red wolf to extinction. In the 1970s, the FWS captured the remaining red wolves and placed them in captive breeding programs for future reintroduction.¹⁰ Several limited experimental releases in 1976 and 1978 demonstrated that the red wolf could be reintroduced back into the wild.¹¹ In 1986, the FWS proposed the reintroduction of the red wolf into Alligator River National Wildlife Refuge (ARNWR) in northeastern North Carolina.¹² This refuge, which contains 120,000 acres of wetlands, provides the ideal habitat for the red

3 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 815 (E.D.N.C. 2018).

4 *Id.*

5 Determination of Experimental Population Status for an Introduced Population of Red Wolves In North Carolina, 51 Fed. Reg. 41,790, 41,791 (Nov. 19, 1986) (to be codified at 50 C.F.R. pt. 17).

6 *Id.*

7 *Id.*

8 *Id.*

9 *Gibbs v. Babbitt*, 214 F.3d 483, 488 (4th Cir. 2000).

10 *Id.*

11 Determination of Experimental Population Status for an Introduced Population of Red Wolves In North Carolina, 51 Fed. Reg. at 41,791–92.

12 *Gibbs*, 214 F.3d at 488.

wolves.¹³ A 47,000 acre U.S. Air Force bombing range with similar habitats and limited human activity is adjacent to the refuge.¹⁴

From September 14, 1987 through September 30, 1992, forty-two wolves were released on fifteen occasions.¹⁵ Red wolves were reintroduced as a nonessential experimental population pursuant to section 10(j) of the ESA.¹⁶ Section 10(j) permits the Secretary of the Interior to introduce an experimental population of an endangered or threatened species, which is “wholly separate geographically from nonexperimental populations of the same species” and “outside the current range of such species, if the Secretary determines that such release will further the conservation of such species.”¹⁷ Prior to the release, the Secretary must decide “whether or not such population is essential to the continued existence of an endangered species or a threatened species.”¹⁸ Essential means the loss of the experimental population “would be likely to appreciably reduce the likelihood of the survival of the species in the wild.”¹⁹ All other experimental populations are designated as nonessential.²⁰ Congress recognized that in most circumstances, experimental populations would be designated as nonessential because the loss of a single population will rarely reduce the survival of the entire species in the wild.²¹ The experimental population is treated as a threatened species and subject to section 4(d) regulation.²² The nonessential experimental population is treated as a threatened species only when existing within a national park or national wildlife refuge. All federal agencies must consult with Department of the Interior to ensure that their actions will not harm the species or its habitat.²³ If outside a national park or national wildlife refuge,

13 Determination of Experimental Population Status for an Introduced Population of Red Wolves In North Carolina, 51 Fed. Reg. at 41,791.

14 *Id.* at 41,791-92.

15 Endangered and threatened species: Red wolves in North Carolina and Tennessee; experimental populations, 58 Fed. Reg. 62,086, 62,087 (Nov. 24, 1993) (to be codified at 50 C.F.R. pt 17).

16 See 16 U.S.C. § 1539(j)(2)(A) (2018) (“The Secretary may authorize the release . . . of an endangered species or a threatened species outside the current range of such species if the Secretary determines that such release will further the conservation of such species.”); see also Edward A. Fitzgerald, *Wyoming Farm Bureau Federation v. Babbitt: The Children of the Night Return to the Northern Rocky Mountains*, 16 NAT. RES. & ENVTL. L. 79 (2001–02) (detailing the legislative history of section 10(j)).

17 16 U.S.C. § 1539(j) (2018).

18 *Id.* § 1539(j)(2)(B) (2018).

19 50 C.F.R. § 17.80(b) (2019).

20 *Id.*

21 Endangered and Threatened Wildlife and Plants; Experimental Populations, 49 Fed. Reg. 33,885, 33,888-90 (Aug. 27, 1984) (to be codified at 50 C.F.R. pt. 17) (citing H.R. REP. NO. 97-835, at 34 (1982) (Conf. Rep.)).

22 *Sierra Club v. Clark*, 755 F.2d 608, 623 n.10 (8th Cir. 1985) (citing S. REP. NO. 97-418, at 8 (1982)) (“All experimental populations . . . are to be treated as though they have been separately listed as threatened species. This provision obliges the Secretary to issue such regulations as he deems necessary and advisable to provide for the conservation of the experimental population, just as he now does under subsection 4(d) for any other threatened species.”).

23 16 U.S.C. § 1536(a)(2) (2018).

a nonessential experimental population is treated as a species proposed for listing. Federal agencies must confer with Department of the Interior, which will make conservation recommendations. However, the results of the conferral are only advisory and do not restrict the agency from proceeding with the action.²⁴

The red wolves prospered, but many migrated from the refuge onto private lands. After several counties enacted resolutions objecting to the reintroduction, North Carolina enacted a statute that permitted the taking of red wolves on private land under conditions more lenient than the federal regulations.²⁵ Several individuals and counties then brought suit, alleging that the Commerce Clause did not allow the federal government to regulate wildlife on private land, which is a traditional state function.²⁶ The Fourth Circuit in *Gibbs v. Babbitt*²⁷ determined that the Commerce Clause supports the federal regulation preventing the taking of the red wolves on private land.²⁸

B. RED WOLF COALITION V. NCWRC

The red wolf population expanded until 2006, when it began to decline significantly because of gunshot mortality.²⁹ In August 2012, the North Carolina Wildlife Resources Commission (NCWRC) allowed coyote hunting at night with artificial lights on public and private lands, including the five counties in the red wolf recovery area (Dare, Tyrell, Hyde, Washington, and Beaufort).³⁰ The Southern Environmental Law Center brought suit, alleging that the process followed by the NCWRC violated North Carolina's Administrative Procedures Act.³¹ The program allowing for night hunting with spot lights remained in place until November 2012, when it was suspended by the Wake County Superior Court.³²

The NCWRC reauthorized coyote hunting in the day and at night with spotlights in July 2013.³³ After six red wolves were shot and killed in a six-week period, the Southern Environmental Law Center sought an emergency ban on coyote hunting in the red wolf area.³⁴ In May 2014, the U.S. District Court for the Eastern District of North Carolina in *Red Wolf Coalition v. NCWRC* granted an injunction banning all coyote hunting in

24 *Id.* § 1536(a)(4).

25 *Gibbs v. Babbitt*, 31 F. Supp. 2d 531, 532–33 (E.D.N.C. 1998), *aff'd*, 214 F.3d 483 (4th Cir. 2000).

26 *Id.* at 532.

27 *Id.*

28 Edward A. Fitzgerald, *Seeing Red: Gibbs v. Babbitt*, 13 VILL. ENVTL. L.J. 1, 2 (2002).

29 *See Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 210 F. Supp. 3d 796, 799 (E.D.N.C. 2016).

30 *Court Halts N.C. Spotlighting of Coyotes after 4th Endangered Red Wolf Shot*, SOUTHERN ENVTL. L. CTR. (Nov. 26, 2012), <https://www.southernenvironment.org/news-and-press/press-releases/court-halts-nc-spotlighting-of-coyotes-after-4th-endangered-red-wolf-shot>.

31 *Id.*

32 *Id.*

33 *Court Protects World's Only Wild Red Wolves from Deadly Mistaken Identity in Five County Area*, SOUTHERN ENVTL. L. CTR. (May 14, 2014), <https://www.southernenvironment.org/news-and-press/press-releases/court-protects-worlds-only-wild-red-wolves>.

34 *Id.*

the red wolf recovery area.³⁵ The court held that the NCWRC action violated section 9 and the section 10(j) rule by disrupting breeding and pack formation. It also frustrated the placeholder strategy developed by the FWS to stop hybridization.³⁶ Eventually, a settlement agreement was reached that banned coyote hunting by spotlight at night and required a permit and reporting for coyote hunting during the day in the five-county recovery area.³⁷

C. SUBSEQUENT STUDIES AND FWS ACTIONS

Following the litigation, the Wildlife Management Institute (WMI) released its 2014 study, “A Comprehensive Review and Evaluation of the Red Wolf (*Canis rufus*) Recovery Program,” which was commissioned by the FWS.³⁸ The WMI pointed out that the FWS underestimated the habitat required to meet recovery goals.³⁹ The original recovery plan called for 144,000 acres and envisioned three self-sustaining populations, each with thirty-five to fifty red wolves. The FWS’s assumption that wolves would stay on public land was unrealistic.⁴⁰ The restoration area was expanded to 1.7 million acres (12 times larger than the original size) to accommodate red wolf population increase.⁴¹ Wolves left public lands and went to private land, with 60% of the red wolves in 2014 occupying private land.⁴²

The WMI observed that climate change would affect the Albemarle Peninsula, which is the primary red wolf habitat.⁴³ Estimates indicate that the sea level may rise between 0.4 and 1.4 meters over the next century.⁴⁴ This would adversely affect the Albemarle Peninsula and put much of the red wolf recovery area under water. Red wolves will move west to agricultural lands, which will increase conflict with humans. Even these western lands will be under threat by severe storms.⁴⁵ The WMI also noted that there is significant scientific debate regarding the taxonomy of the red wolf.⁴⁶

In January 2015, the NCWRC passed a resolution echoing the WMI report, demanding that the FWS end the red wolf program, which at the time had sixty-two wolves.⁴⁷ The NCWRC asserted that red wolves could not be managed on federal lands

35 Red Wolf Coal. v. N.C. Wildlife Res. Comm’n, No. 2:13-CV-60-BO, 2014 WL 1922234, at *10 (E.D.N.C. May 13, 2014).

36 *Id.* at *8.

37 *Settlement Reached on Protecting World’s Only Wild Red Wolves from Deadly Mistaken Identity in Five County Area*, SOUTHERN ENVTL. L. CTR. (Nov. 12, 2014), <https://www.southernenvironment.org/news-and-press/press-releases/settlement-reached-on-protecting-worlds-only-wild-red-wolves-from-deadly-mi>.

38 WILDLIFE MGMT. INST., INC., A COMPREHENSIVE REVIEW AND EVALUATION OF THE RED WOLF (*Canis rufus*) Recovery Program 1 (2014).

39 *Id.* at 3.

40 *Id.* at 3, 25, 29.

41 *Id.* at 25.

42 *Id.* at 24, 53–54, 97.

43 *See id.* at 79, 92.

44 *Id.* at 41.

45 *See id.* at 81, 91–98.

46 *Id.* at 82–83.

47 *Resolution Requesting that the United States Fish and Wildlife Service Declare the Red Wolf (*Canis rufus*) Extinct in the Wild and Terminate the Red Wolf Reintroduction Program in Beaufort,*

and now live primarily on private lands.⁴⁸ Conflicts with land owners are unresolved and increasing.⁴⁹ Climate change will inundate the red wolves' current habitat.⁵⁰ The coyote population in the recovery area has increased, resulting in hybridization and genetic introgression.⁵¹ While the existence of a pure red wolf genome has always been questioned, the expanded coyote population has eliminated any purebred red wolves.⁵² The NCWRC requested the FWS to declare the red wolf extinct, terminate any further reintroductions in North Carolina, repeal all federal rules for red wolf restoration in North Carolina, designate all wild canids other than foxes on the Albemarle Peninsula as coyotes or coyote hybrids, and declare that no federal trust canids exist on the Albemarle Peninsula and all wild canids there are state-trust resources under the jurisdiction of the NCWRC.⁵³

The red wolf population experienced a serious decline. In June 2015, the FWS estimated the red wolf population to be between fifty and seventy-five members, but might have been as low as forty-five.⁵⁴ The number of breeding pairs had also sharply reduced. The FWS estimated that there were seventeen wild breeding pairs in 2012, but only seven by 2015.⁵⁵ Thirty of the sixty-five red wolf deaths from 2012 to 2015 were attributed to gunshot.⁵⁶

In June 2015, the FWS officially halted all releases of red wolves from captivity into the recovery area.⁵⁷ The FWS announced that it would address many of the concerns raised by the WMI and the NCWRC in a study regarding the feasibility of red wolf recovery in the wild.⁵⁸ FWS declared:

Dare, Hyde, Tyrrell, and Washington Counties, North Carolina, N.C. WILDLIFE RES. COMM'N 1 (Jan. 29, 2015), <https://www.ncwildlife.org/Portals/0/About/documents/2015-01-29-NCWRC-Resolution-Asking-USFWS-Declare-Red-Wolf-Extinct-in-Wild-Terminate-Program.pdf>.

48 *Id.*

49 *Id.* at 2.

50 *Id.* at 1.

51 *Id.* at 2.

52 *Id.*

53 *Id.*

54 *Letter from Ctr. for Biological Diversity to Daniel Ashe, Dir., U.S. Fish & Wildlife Serv., Notice of Intent to Sue: Violations of the Endangered Species Act, Red Wolf Recovery Program*, CTR. FOR BIOLOGICAL DIVERSITY 3–4 (Mar. 24, 2016), https://www.biologicaldiversity.org/species/mammals/pdfs/Red_Wolf_NOI_3-24-2016.pdf.

55 *Id.* at 4.

56 *Id.*

57 *Service halts red wolf reintroductions pending examination of recovery program*, U.S. FISH & WILDLIFE SERV. (June 30, 2015), <https://www.fws.gov/southeast/news/2015/06/service-halts-red-wolf-reintroductions-pending-examination-of-recovery-program/>.

58 *Red wolf non-essential population management decision Q & A*, U.S. FISH & WILDLIFE SERV. (July 1, 2015), <https://www.fws.gov/southeast/pdf/frequently-asked-questions/red-wolf-non-essential-population-management-july-1-2015.pdf>. FWS is gathering information to meet the ESA's best available science requirement on four components: "1. appropriate taxonomic designation and historic distribution of the red wolf; 2. long-term viability of the captive red wolf population; 3. recovery needs of the red wolf population given pressures such as hybridization with coyotes, human caused mortality, and climate change; and 4. how people and red wolves can co-exist." *Update: red wolf recovery review progressing towards*

The Wildlife Management Institute's review identified a number of areas where we have been successful, a number of areas that need improvement, and highlighted a number of uncertainties and serious challenges for the ultimate recovery of the red wolf . . . As we have said before, we recognize too that there were misunderstandings, particularly about the non-essential, experimental population, and we did not always meet the expectations we set. Now, we need to do a thorough and deliberate evaluation of the red wolf recovery program.⁵⁹

The Center for Biological Diversity (CBD) announced in March 2016 its intention to bring a suit challenging the FWS red wolf recovery management.⁶⁰ CBD pointed out that the FWS reassigned the program's recovery coordinator in August 2014 and did not fill the vacant position.⁶¹ The FWS stopped investigating red wolf deaths and halted the red wolf education program, an important factor in red wolf recovery.⁶² There have been no law enforcement press releases since October 2014, although thirty-three wolves have since died.⁶³ FWS has failed to implement a recovery plan to successfully conserve the red wolf.⁶⁴ FWS has not conferred with other federal agencies regarding its decision to suspend the release of captive red wolves.

The CBD filed an emergency petition in May 2016, requesting the FWS to revise its current regulations to reduce shooting deaths and establish additional wolf populations as essential experimental populations.⁶⁵ This would provide greater protection for red wolves and fulfill the goal of the original recovery plan for three separate red wolf populations. CBD stated:

Records recently obtained via the Freedom of Information Act demonstrate that the Service's red wolf biologists recommended strengthening protections by eliminating loopholes in regulations that have facilitated excessive illegal shootings of red wolves. As recently as 2013, the Service had considered following these recommendations and had even drafted new regulations. But the biolo-

recommendations, U.S. FISH & WILDLIFE SERV. (Oct. 27, 2015), <https://www.fws.gov/south-east/news/2015/10/update-red-wolf-recovery-review-progressing-towards-recommendations/>.

59 *Service halts red wolf reintroductions pending examination of recovery program*, *supra* note 57.

60 *Letter from Ctr. for Biological Diversity to Daniel Ashe*, *supra* note 54, at 3–4.

61 *Id.* at 4.

62 *Id.*

63 *Id.*

64 “The Red Wolf Recovery Plan . . . calls for the establishment and maintenance of at least three reintroduced populations within the historic range of the red wolf. The Recovery Plan makes clear that conservation of the red wolf ‘must be based on viable populations.’ While there is no single ‘magic number’ that constitutes a ‘minimum viable population’ (‘MVP’) size for the red wolf, FWS determined that a captive population of 320 red wolves and a reintroduced wild population of 220 red wolves ‘would be able to maintain 80 to 85 percent of the original genetic diversity from the captured wild stock that probably occurred in the wild gene pool’ of the species. However, the Recovery Plan also noted that depending on the status of the species’ genetic diversity, or lack thereof, ‘the MVP might have to be 2,000 [wolves].’” *Id.* at 1.

65 *Emergency Petition Filed to Save Plummeting Red Wolf Population*, CTR. FOR BIOLOGICAL DIVERSITY (May 24, 2016), https://www.biologicaldiversity.org/news/press_releases/2016/red-wolf-05-24-2016.html.

gists' recommendations were ignored, the regulations were never finalized, and the red wolf continues to suffer unsustainable levels of mortality.⁶⁶

The FWS released its feasibility study, *Red Wolf (Canis rufus) Population Viability Analysis* (PVA), in June 2016.⁶⁷ The PVA determined that under the current conditions, without additional releases or changes in management, the current red wolf population (twenty-eight monitored individuals in five packs with three breeding pairs) might be extinct in the wild within thirty-seven years, or possibly as soon as eight years.⁶⁸ The current wild red wolf population can only retain its viability with human assistance. Several alternative management schemes project viability over the next 125 years if there is a sharp decline in mortality rates, an increase in breeding rates, and more releases from the captive population over the next 15 years, followed by intermittent releases to preserve genetic health.⁶⁹ The PVA analysis stressed that the captive population must be increased from the current 225 members to 330–400 to ensure its long-term viability and its ability to be a source of recruits to the wild population.⁷⁰

The PVA recommended continued genetic investigation, recognition of a larger historic range, expansion of the captive breeding program, retooling or termination of the North Carolina project, improvement in relations between FWS and private landowners, updating the current recovery plan, and exploring new reintroduction sites.⁷¹ The PVA also suggested that there should not be any additional releases from the captive population, failure to enforce the existing rules, or removal of wolves from the wild without a plan to humanely handle them.⁷²

There was support for red wolf recovery in North Carolina. Twenty-seven North Carolina legislators sent a letter to the FWS in August 2016 complaining that the FWS had failed to control coyote hunting in the red wolf recovery area, eviscerated the recovery program, and halted several successful management programs—including hybridization control, pup fostering, wild red wolf introductions, and red wolf education efforts.⁷³ Furthermore, there had been no prosecutions regarding the seventeen wolves killed by gunshot between 2013 and the sending of the letter.⁷⁴ The legislators urged the FWS to resume recovery efforts, follow the recommendations of the WMI study, and abandon its own feasibility study.⁷⁵

Following the PVA study, the FWS made two proposals. First, the recovery program would still be supported, but there would be a “significant shifts in the resource allocation to secure the captive [species survival plan (SSP)] population and evaluate new

66 *Id.*

67 LISA FAUST ET AL., *RED WOLF (Canis rufus) Population Viability Analysis 1* (2016).

68 *Id.* at 3.

69 *Id.*

70 *Id.* at 3–4.

71 *Red Wolf Recovery Team Recommendations Facilitated and Prepared by Group Solutions, Inc.*, U.S. FISH & WILDLIFE SERV. 7 (Sept. 6, 2016), <https://www.fws.gov/southeast/pdf/report/red-wolf-recovery-team-recommendations-facilitated-by-group-solutions-inc.pdf>.

72 *Id.*

73 *NC Legislators Voice Concerns to USFWS*, RED WOLF COAL. (Aug. 31, 2016), <https://redwolves.com/newsite/nc-legislators-voice-concerns-to-usfws/>.

74 *Id.*

75 *Id.*

[non-essential experimental population (NEP)] project sites across the historic range of the species.⁷⁶ The captive breeding program would be greatly expanded from the 200 individuals and 29 breeding pairs to a minimum of 400 individuals and 52 breeding pairs.⁷⁷

Second, FWS would restrict the North Carolina recovery program to federal lands in Dare County and the ARNWR, where a self-sustaining red wolf population currently exists.⁷⁸ The FWS would remove red wolves from private and inaccessible lands and focus its attention on minimizing the risks associated with hybridization on federal lands.⁷⁹ The captive and wild populations would be managed as a single population.⁸⁰ Wolves removed from the wild would be used in the captive breeding program to improve the genetic diversity of the red wolf population.⁸¹ Small island populations would be established within the National Wildlife Refuge System in the red wolf's historical range.⁸²

Critics of the plan aptly noted that there would more red wolves in zoos than in the wild.⁸³ Representative Grijalva, ranking Democrat on the House Resources Committee, stated:

The Service is making a profoundly disappointing decision to snatch defeat from the jaws of victory This sets a terrible precedent for management of similar species The Service needs to do its job and follow the science on species recovery, not the loud voices of a few anti-government fear mongers.⁸⁴

Several scientists, whose work on the PVA was cited by the FWS, claimed that the FWS misinterpreted their work. The “most conspicuous misinterpretation” was that the captive population was at risk, which was used to justify the reduction of the wild population.⁸⁵

76 Memorandum from Assistant Reg'l Dir., Ecological Servs., Se. Region, to Reg'l Dir., Se. Region 5, *Recommended Decisions in Response to Red Wolf Recovery Program Evaluation*, U.S. FISH & WILDLIFE SERV. (Sept. 12, 2016), <https://www.fws.gov/southeast/pdf/memo/recommended-decisions-in-response-to-red-wolf-recovery-program-evaluation.pdf> (on file with the U.S. Fish and Wildlife Serv.).

77 *Id.*

78 *Id.* at 7–8.

79 *Id.* at 8.

80 *Id.*

81 *Id.*

82 *Id.* at 6–8.

83 Darryl Fears, *Red Wolves Will Still Be Protected – but More by Zoos than in the Wild*, WASH. POST (Sept. 13, 2016), <https://www.washingtonpost.com/news/energy-environment/wp/2016/09/12/red-wolves-will-still-be-protected-but-more-by-zoos-than-in-the-wild/>.

84 Grijalva: *Fish and Wildlife Service Should Follow Science*, HOUSE COMM. ON NAT. RES. (Sept. 14, 2016), <https://naturalresources.house.gov/media/press-releases/grijalva-fish-and-wildlife-service-should-follow-science-not-cave-to-red-wolf-opponents-in-protecting-north-carolina-population>.

85 Jonathan Drew, *Scientists say study was Misinterpreted in Red Wolf Decision*, ASSOC. PRESS (Oct. 18, 2016), <https://apnews.com/02132f21e5704eaabdb41cd54974a2cb>.

III. RED WOLF COALITION V. U.S. FWS

The Red Wolf Coalition brought suit in the U.S. District Court of the Eastern District of North Carolina in June 2016, challenging the FWS implementation of the red wolf recovery program.⁸⁶ The Red Wolf Coalition alleged that the FWS reinterpreted the regulation regarding the taking of red wolves on private property.⁸⁷ Previously, the FWS only allowed the taking of problem wolves—those which posed a risk to livestock, pets, or humans.⁸⁸ Beginning in 2014, the FWS also permitted the taking of non-problem wolves on private property at the request of the landowner. This resulted in the death of a six-year-old female red wolf that had previously birthed sixteen pups and was probably nursing a litter at the time.⁸⁹ This change in policy occurred at the same time the FWS stopped the reintroduction of red wolves into the wild and terminated the adaptive management program that sterilized coyotes to avoid hybridization.⁹⁰ Furthermore, these changes in policy were done without formal environmental analysis.⁹¹

Federal Judge Terrence W. Boyle granted a preliminary injunction in September 2016 halting the taking of non-problem red wolves on public and private property.⁹² The court held that the FWS's action expanding the taking of non-problem red wolves violated section 4(d) of the ESA, which mandates the FWS to issue regulations “necessary and advisable to provide for the conservation of such species,”⁹³ and section 7 of the ESA, which requires federal agencies “to utilize their authorities in order . . . [to carry] out programs for the conservation of endangered species.”⁹⁴ The court rejected the FWS's claim that it was simply following the existing regulation.⁹⁵ The court noted that the rapid decline in red wolf population since 2014 indicated a change in management focus.⁹⁶ The taking of non-problem wolves increases the chances of hybridization, disrupts pack structure, and increases the threat to the declining red wolf population.⁹⁷ This change in policy is a “major federal action significantly affecting the quality of the human environment” that requires an environmental assessment under NEPA.⁹⁸ The

86 *Court Asked to Stop USFWS from Capturing, Killing Wild Red Wolves*, SOUTHERN ENVTL. L. CTR. (June 21, 2016), <https://www.southernenvironment.org/news-and-press/news-feed/court-asked-to-stop-usfws-from-capturing-killing-wild-red-wolves>.

87 *See generally* 50 C.F.R. §§ 17.84(c)(3)–(5).

88 *See Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 210 F. Supp. 3d 796, 803 (E.D.N.C. 2016).

89 Complaint at 2, *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 210 F. Supp. 3d 796 (E.D.N.C. 2016) (No. 2:15-cv-00042-BO).

90 Plaintiffs Memorandum in Support of Motion for Preliminary Injunction at 6–9, 12–20, *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 210 F. Supp. 3d 796 (E.D.N.C. 2016) (No. 2:15-cv-00042-BO) [hereinafter *Plaintiffs' Brief*].

91 *Id.* at 20–24.

92 *Red Wolf Coal.*, 210 F. Supp. 3d at 799.

93 *Id.* at 803; 16 U.S.C. § 1533(d) (2018).

94 16 U.S.C. § 1536 (2018); *Red Wolf Coal.*, 210 F. Supp. 3d at 799.

95 *Red Wolf Coal.*, 210 F. Supp. 3d at 804.

96 *Id.*

97 *Id.* at 805.

98 42 U.S.C. § 4332(C) (2018).

FWS must take a “hard-look” at the environmental consequences of its action.⁹⁹ The Southern Environmental Law Center, which represented the Red Wolf Coalition, stated that “the court was clear that it’s the [FWS’s] job is to conserve this endangered species, not drive it to extinction.”¹⁰⁰

The FWS released the red wolf five-year review in April 2018, which concluded: “There is a consensus that the current direction and management . . . is unacceptable to the Service and stakeholders . . . and conditions for recovery of the species are not favorable and a self-sustainable population may not be possible.”¹⁰¹

The FWS doubted that the red wolf could continue to survive in the wild. It estimated that the small number of wolves and breeding pairs could result in extirpation within eight years.¹⁰² Even if the PVA recommendations were implemented, there are other dangers, such as habitat alteration, lack of genetic diversity, and hybridization with coyotes.¹⁰³

Environmental groups viewed the report as the prelude for the abandonment of red wolf recovery. Wildlands Network stated: “We’re disappointed that the . . . review appears to take great pains to describe the North Carolina wild population of red wolves as unsustainable without acknowledging . . . [abandonment of] the program is what has led to the striking recent declines in red wolf numbers since 2012.”¹⁰⁴ The CBD worried that time was “running out for the red wolf.”¹⁰⁵

The FWS issued a proposed rule for the management of the red wolf population in June 2018.¹⁰⁶ The FWS only planned to manage one to two packs consisting of no more than fifteen red wolves, exclusively in Dare County and the ARNWR.¹⁰⁷ The wild population would ensure the genetic diversity of the captive population. Any red wolf found outside the designated management area could be taken. This would decrease conflicts with state and local officials and landowners. More resources would be freed to manage the captive population and establish new reintroduction sites, which are essential for redundancy.¹⁰⁸

99 See *id.*; see also *Red Wolf Coal.*, 210 F. Supp. 3d at 805.

100 *Court Stops U.S. Fish & Wildlife Service from Capturing and Killing Wild Red Wolves*, DEFENDERS OF WILDLIFE (Sept. 29, 2016), <https://defenders.org/newsroom/court-stops-us-fish-wildlife-service-capturing-and-killing-wild-red-wolves>.

101 *Red Wolf Status 5-Year Review*, U.S. FISH & WILDLIFE SERV. 15 (2018), https://www.southernenvironment.org/uploads/words_docs/2018.04.24_Red_Wolf_Status_Review.pdf.

102 *Id.* at 11.

103 *Id.* at 11, 15.

104 Darryl Fears, *The Effort to Save Red Wolves in the Wild is Failing, a Five-Year Review Says*, WASH. POST (Apr. 25, 2018), <https://www.washingtonpost.com/news/animalia/wp/2018/04/25/the-effort-to-save-red-wolves-in-the-wild-is-failing-a-five-year-review-says/>.

105 *Id.*

106 Endangered and Threatened Wildlife and Plants; Proposed Replacement of the Regulations for the Nonessential Experimental Population of Red Wolves in Northeastern North Carolina, 83 Fed. Reg. 30,382, 30,383–84 (proposed June 28, 2018) (to be codified at 50 C.F.R. pt. 17).

107 *Id.* at 30,385.

108 *Id.* at 30,383–84.

Judge Boyle in November 2018 granted a permanent injunction and held the FWS violated sections 9, 4, and 7 of the ESA as well as NEPA.¹⁰⁹ The court found the FWS violated section 9 of ESA by authorizing private landowners to take red wolves in violation of the regulatory guidelines.¹¹⁰ No red wolves can be taken in absence of threat to humans, livestock, or pets.¹¹¹ The FWS violated section 4 of the ESA by failing to administer the red wolf recovery program to realize the conservation purposes of the ESA.¹¹² The FWS violated section 7(a)(1) of ESA by failing to administer the program in furtherance of goals of the program. The FWS violated section 7(a)(2) by failing to properly implement the regulations.¹¹³ The FWS violated NEPA by failing to assess the environmental impacts of its change in the rules regarding the taking of the red wolf and abandonment of the adaptive management program.¹¹⁴

Environmental groups praised the decision. The Defenders of Wildlife stated: “Today’s decision by the court to protect the red wolf from being shot and killed offers a glimmer of hope for species recovery and new energy to make this program successful once again.”¹¹⁵ The Animal Welfare Institute declared: “The court has ruled that it is unacceptable [to ignore recovery needs of the red wolf] and that the FWS has a duty under the ESA to implement proactive conservation measures to achieve species recovery.”¹¹⁶ The Southern Environmental Law Center stated: “The law doesn’t allow the agency to just walk away from species conservation, like it did here.”¹¹⁷

A. STANDARD OF REVIEW

Judicial review of agency action under the ESA and NEPA is governed by section 706 of the Administrative Procedures Act (APA). Under this framework, courts review an agency’s determinations to ensure that they are not “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”¹¹⁸ For policy decisions, courts often defer to agency expertise.¹¹⁹ The court does not owe deference to an agency when its action is inconsistent with the statutory mandate;¹²⁰ when there is no rational connec-

109 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 815 (E.D.N.C. 2018).

110 *Id.*

111 *Id.*

112 *Id.*

113 *Id.*

114 *Id.*

115 *Court Victory: Wild Red Wolves Get a Chance at Survival*, SOUTHERN ENVTL. L. CTR. (Nov. 5, 2018), <https://www.southernenvironment.org/news-and-press/press-releases/court-victory-wild-red-wolves-get-a-chance-at-survival>.

116 *Id.*

117 Abbie Bennett, *Fed Government Violated Endangered Species Act by Ending Red Wolf Protections*, *Judge Rules*, NEWS & OBSERVER (Nov. 5, 2018), <https://www.newsobserver.com/news/local/article221163830.html>.

118 5 U.S.C. § 706 (2018).

119 Policy questions generally “reflect political choices—accommodation of competing interests, application of value choices, and responsiveness to the electorate—methods of decision making thought to be sharply distinguishable from the chief business of the courts, and hence owed great deference.” CHRISTOPHER F. EDLEY, JR., *ADMIN. LAW* 34 (1990).

120 *Chevron U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 842–43 (1984).

tion between the facts found and the choices made by the agency;¹²¹ when the agency ignores the analysis of its own scientific experts without a credible explanation;¹²² when the agency decision, even if based on scientific expertise, is not well reasoned;¹²³ when the agency relies on factors Congress did not intend for it to consider;¹²⁴ when the agency fails to consider an important part of the problem;¹²⁵ or when the agency refuses to consider data before it.¹²⁶

Nevertheless, the court must perform a “thorough, probing, in-depth review” of agency action.¹²⁷ The court must ensure that the agency has considered all relevant factors, justified departures from past practices, furnished a detailed explanation of its decision, explained the rejection of alternatives, and demonstrated a connection between its statutory purposes and regulatory policies. Rigorous judicial review, known as the hard-look doctrine, requires the court to examine the agency action “to satisfy itself that the agency has exercised a reasoned discretion, with reasons that do not deviate from or ignore the ascertainable legislative intent.”¹²⁸ The hard-look doctrine “ensures that the agency’s decision was a ‘reasoned’ exercise of discretion and not merely a response to political pressures.”¹²⁹ Judge Leventhal, the originator of the doctrine, noted that the hard-look doctrine combines “judicial supervision with a salutary principle of judicial restraint.”¹³⁰ Agencies and courts together constitute a “partnership in furtherance of the public interest” and the “court is in a real sense part of the total administrative process, and not a hostile stranger to the office of first instance.”¹³¹

The Supreme Court endorsed the hard-look doctrine in *Motor Vehicle Manufacturers Ass’n v. State Farm Mutual Auto Insurance Co.*¹³² Notably, the Court in that case determined that rescission of an agency rule cannot be equated with “an agency’s refusal to promulgate a rule in the first place.”¹³³ Revocations are not “treated as refusals to promulgate standards.”¹³⁴ The revocation of an existing regulation “is substantially different than a failure to act.”¹³⁵ Revocation constitutes a change in “the agency’s former views as to the proper course.”¹³⁶ Adherence to current policy “embodies the agency’s informed

121 *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1984).

122 *Am. Tunaboat Ass’n v. Baldrige*, 738 F.2d 1013, 1017 (9th Cir. 1984).

123 *Brower v. Evans*, 257 F.3d 1058, 1067 (9th Cir. 2001).

124 *O’Keefe’s, Inc. v. U.S. Consumer Prod. Safety Comm.*, 92 F.3d 940, 942 (9th Cir. 1996).

125 *Motor Vehicle Mfrs. Ass’n*, 463 U.S. at 43.

126 *Am. Tunaboat Ass’n*, 738 F.2d at 1017.

127 *Nat’l Ass’n of Home Builders v. Norton*, 340 F.3d 835, 841 (9th Cir. 2003).

128 *Greater Bos. Television Corp. v. Fed. Comm’n Comm’n*, 444 F.2d 841, 850-51 (D.C. Cir. 1970).

129 Cass R. Sunstein, *Deregulation and the Hard-Look Doctrine*, 1983 SUP. CT. REV. 177, 182 (1983); William H. Rodgers Jr., *A Hard Look at Vermont Yankee: Environmental Law Under Close Scrutiny*, 67 GEO. L.J. 699, 704-07 (1979).

130 Harold Leventhal, *Environmental Decisionmaking and the Role of Courts*, 122 U. PA. L. REV. 509, 511-512 (citing *Greater Bos. Television Corp.*, 444 F.2d at 850).

131 *Id.* at 512 (citing *Greater Bos. Television Corp.*, 444 F.2d at 851-52).

132 *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1984).

133 *Id.* at 41.

134 *Id.*

135 *Id.*

136 *Id.*

judgment that, by pursuing that course, it will carry out the policies committed to it by Congress . . . best if the settled rule is adhered to.”¹³⁷ When an agency changes policy “by rescinding a rule [it] is obligated to supply a reasoned analysis for the change beyond that which may be required when an agency does not act in the first instance.”¹³⁸ Courts must scrutinize “changes in current policy that are not justified by the rulemaking record.”¹³⁹

B. SECTION 9

The district court properly held that by granting two lethal take permits in 2014 and 2015, the FWS did not comply with the 10(j) rule or the conservation mandate of section 9 of the ESA.¹⁴⁰ The 10(j) regulation only allows the FWS to authorize a lethal take by a private land owner under certain conditions, e.g. depredation or danger to humans, and only after attempts to capture the offending wolf have failed.¹⁴¹ There was no evidence of depredation or even that red wolves were on the property.¹⁴² Furthermore, the landowners refused the FWS access to their property to capture any red wolves.¹⁴³

The FWS asserted that the non-essential experimental population of red wolves was not subject to the conservation mandate in section 9 of the ESA.¹⁴⁴ But the FWS was mistaken. Section 9 of the ESA prohibits the private taking of endangered and threatened species.¹⁴⁵ Section 10(d) provides for exceptions,¹⁴⁶ but such exceptions must

137 *Id.* (citing *Atchison, Topeka & Santa Fe Ry. Co. v. Wichita Bd. of Trade*, 412 U.S. 800, 807–08 (1973)).

138 *Id.*

139 *Id.*

140 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 812 (E.D.N.C. 2018). Section 10(a)(1)(A) of ESA authorizes FWS to issue a permit for an otherwise prohibited taking of an endangered species “for scientific purposes or to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations” under section 10(j). 16 U.S.C. § 1539(a)(1)(A) (2018). However, section 10(a)(1)(A) permits may be issued only if FWS finds that they “will be consistent with the purposes and policy set forth in [ESA] section 1531.” *Id.* § 1539(d).

141 See 50 C.F.R. § 17.84(c)(4)(v) (2019) (“Any private landowner may take red wolves found on his or her property in the areas defined in paragraphs (c)(9) (i) and (ii) of this section after efforts by project personnel to capture such animals have been abandoned, Provided that the Service project leader or biologist has approved such actions in writing and all such taking shall be reported within 24 hours . . .”).

142 *Red Wolf Coal.*, 346 F. Supp. 3d at 812.

143 *Id.*

144 Defendants’ Combined Brief in Support of Defendants’ Cross-Motion for Summary Judgment and in Opposition to Plaintiffs’ Motion at 24–26, *Red Wolf Coal.*, 346 F. Supp. 3d 802 (No. 2:15-CV-00042-BO) [hereinafter *Defendants’ Brief*].

145 See 16 U.S.C. § 1538. The Trump Administration’s proposed revisions to the ESA regulations posit that section 9 only applies to endangered species. Previously, the FWS extended section 9 protections to threatened species under section 4(d), which permits similar treatment of endangered and threatened species. Under the proposed rule, species-specific regulations regarding the taking of threatened species will be established. Endangered and Threatened Wildlife and Plants; Revision of the Regulations for Prohibitions to Threatened

“be consistent with the purposes and policy set forth in section 1531 of the Act.”¹⁴⁷ Reintroduced experimental populations under section 10(j), like the red wolf, are considered a threatened species.¹⁴⁸ Federal regulations state that “an experimental population shall be treated as if it were listed as a threatened species for purposes of establishing protective regulations.”¹⁴⁹ The Secretary can establish “special rules for [an] experimental population [that] will contain applicable prohibitions, as appropriate, and exceptions for that population.”¹⁵⁰ Because the non-essential experimental population of red wolves is a threatened species, it is protected under section 9(g) of the ESA, which states “it is unlawful for any person subject to the jurisdiction of the United States to attempt to commit, solicit another to commit, or cause to be committed, any offense defined in this section.”¹⁵¹

The Secretary established specific rules for the lethal taking of red wolves under the following constrained conditions:

- i) Any person may take red wolves found on private land . . . [p]rovided that such a taking is not intentional or willful, or is in defense of that person’s own life or the lives of others

- ii) Any person may take red wolves found on lands managed by Federal, State, or local government agencies . . . [p]rovided that such taking is incidental to lawful activities, is unavoidable, unintentional, and not exhibiting a lack of reasonable due care, or is in defense of that person’s own life or the lives of others

- iii) Any private landowner, or any other individual having his or her permission, may take red wolves found on his or her property . . . when the wolves are in the act of killing livestock or pets

- iv) Any private landowner, or any other individual having his or her permission, may harass red wolves found on his or her property . . . [p]rovided that all such harassment is by methods that are not lethal or physically injurious to the red wolf

Wildlife and Plants, 83 Fed. Reg. 35,174 (proposed July 25, 2018) (to be codified at 50 C.F.R. pt. 17).

146 Section 10(a)(1)(A) of the ESA permits the Secretary to allow actions that are prohibited by section 9 for scientific purposes or to enhance the propagation or survival of affected species. 16 U.S.C. § 1539(a)(1)(A) (2018). The Secretary can issue permits for actions necessary for the establishment and maintenance of experimental populations. *Id.* The permits may authorize lethal or nonlethal “take,” which means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” *Id.* § 1532(19).

147 *Id.* § 1539(d).

148 *Id.* § 1539(j)(2)(C).

149 50 C.F.R. § 17.82 (2019).

150 *Id.* § 17.83.

151 16 U.S.C. § 1538(g) (2018).

v) Any private landowner may take red wolf found on his or her property . . . after efforts by project personnel to capture such animals have been abandoned¹⁵²

The Fourth Circuit in *Gibbs v. Babbitt* acknowledged that the red wolf is a threatened species subject to ESA restrictions.¹⁵³ The court noted that the 10(j) regulation allowed landowners to take red wolves only under specific conditions.¹⁵⁴ In absence of these limitations, any taking of red wolves would violate section 9(g) of the ESA.¹⁵⁵

The federal government must comply with section 9 and 10(j) of the ESA. The district court in *Red Wolf Coalition v. NCWRC* noted that section 9 and the 10(j) rules apply to any person who “causes to be committed” an unlawful take.¹⁵⁶ “Person” is defined by the ESA to include “any officer, employee, agent, department, or instrumentality of the Federal government.”¹⁵⁷ Other courts have held that third party liability is appropriate under the ESA and that “a governmental third party pursuant to whose authority an actor directly exacts a taking of an endangered species may be deemed to have violated the provisions of the ESA.”¹⁵⁸

The FWS explanations in the 1986 and 1995 regulations demonstrate that an effort to recapture the red wolf is a condition precedent to the issuance of a lethal take permit. The FWS explanation in the 1986 regulations state:

Service and state employees and agents would be additionally authorized to take animals which are responsible for depredations to livestock or property by means which might involve injury or death only if it has not been possible to eliminate such threat by live capturing and releasing the red wolf unharmed on the refuge. These flexible rules are considered a key to public acceptance of reintroduced population

Service and state employees and agents would be additionally authorized to take animals which need special care or which are responsible for depredation to livestock or property only if it has not been possible to eliminate such threat by live capturing and releasing the specimen unharmed on the refuge. Take procedures in such instances would involve live capture and removal to a remote are, or if the animal is clearly unfit to remain in the wild, return to the captive breeding facility. Killing of animals would be a last resort; lethal takes are authorized only if live capture attempts failed or there was some clear danger to human life.

152 50 C.F.R. § 17.84(c)(4) (2019).

153 *Gibbs v. Babbitt*, 214 F.3d 483, 497 (4th Cir. 2000).

154 *Id.*

155 *Id.*; see also *Hill v. Coggins*, 867 F.3d 499 (4th Cir. 2017).

156 *Red Wolf Coal. v. N.C. Wildlife Res. Comm’n*, No. 2:13-CV-60-BO, 2014 WL 1922234, at *7 (E.D.N.C. May 13, 2014).

157 16 U.S.C. § 1532(13).

158 *Red Wolf Coal.*, 2014 WL 1922234, at *7 (citing *Strahan v. Coxe*, 127 F.3d 155, 163 (1st Cir. 1997)); see also Edward A. Fitzgerald, *Red Wolf Coalition v. North Carolina Wildlife Resources Commission: Better Red than Dead*, 23 *ANIMAL L.* 273, 281–86 (2017).

These flexible rules are considered a key to public acceptance of the reintroduced population.¹⁵⁹

FWS also noted that the 1986 regulations provided no authority for a lethal take by a landowner when the red wolf is found off the ARNWR. Instead, the FWS stated that the landowner should “immediately contact the refuge manager,” who would have authority to handle the issue.¹⁶⁰

The FWS explained that the 1995 regulations limited private landowners’ actions, but allowed them to “harass wolves . . . and to take such animals with Service approval,” with notification allowing FWS to first attempt to remove the offending animals.¹⁶¹

The FWS claimed it had discretion in deciding to pursue the recapture of the red wolves before issuing the 2014 and 2015 lethal take permits.¹⁶² The FWS noted that its lack of staff and landowners refusal to grant access to their property precluded efforts to recapture the red wolves.¹⁶³ The district court correctly held that the landowners’ refusal to allow access could not serve as a basis for issuing the lethal take permits.¹⁶⁴ There was no evidence that red wolves were even on the landowners’ property.¹⁶⁵ The 2014 authorization refers to red wolves on the property, but their existence on the property was unconfirmed.¹⁶⁶ The May 2015 authorization did not present any evidence of red wolves on the property.¹⁶⁷ But FWS assumed that because red wolves lived on the ARNWR near the landowners’ property, red wolves were likely to venture on to the private property.¹⁶⁸ The plain language of the 10(j) rule precludes the issuance of the lethal take permit until the FWS has attempted to capture the specific red wolf. The FWS can only authorize lethal take after it abandons effort to recapture. The landowner’s refusal to allow entry to their property does not justify abandonment of the recapture effort.¹⁶⁹

FWS staff agreed that the landowner’s denial of access did not justify the issuance of the lethal take permits. Art Beyer, a FWS biologist who worked on red wolf program for twenty-five years, wrote to Field Supervisor Peter Benjamin:

159 Determination of Experimental Population Status for an Introduced Population of Red Wolves In North Carolina, 51 Fed. Reg. 41,790, 41,792–93 (Nov. 19, 1986) (to be codified at 50 C.F.R. pt. 17).

160 *Id.* at 41,794.

161 Endangered and Threatened Wildlife and Plants; Revision of the Special Rule for Nonessential Experimental Populations of Red Wolves in North Carolina and Tennessee, 60 Fed. Reg. 18,940, 18,946 (Apr. 13, 1995) (to be codified at 50 C.F.R. pt. 17).

162 *Defendants’ Brief*, *supra* note 144, at 22–26.

163 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 812 (E.D.N.C. 2018) (“USFWS states that, in light of staffing commitments and lack of access to trap on the subject property, USFWS was foreclosed from pursuing animals that may be on the subject land ‘and in that sense must abandon efforts to capture and relocate the animal ourselves.’”).

164 *Id.*

165 *Id.*

166 *Id.*

167 *Id.*

168 *Id.*

169 *Id.*

I am still unclear at what point abandonment takes place, particularly if access is never provided or removed during our effort to capture wolves. Based on previous discussions with the Solicitor, it is our understanding that foreclosure to access does not equate to abandonment of effort [W]e are not even recognizing or aware of any wolves present, have not made any capture efforts, and have denied similar requests.¹⁷⁰

Assistant Recovery Coordinator Becky Harrison noted her “concerns about issues being considered in the decision process.”¹⁷¹ The court must defer to agency expertise, but only in the event that the agency utilizes, instead of ignores, expert evidence.¹⁷²

The FWS alleged that depredation was not required before issuing lethal take permits, arguing that depredation is simply an example of the possible justifications for removal, not a condition required for such removals.¹⁷³ The FWS assertions were unpersuasive. The 1986 and 1995 regulations indicate that depredation is an important precondition for the issuance of lethal take permits, which can only be issued after recapture efforts are unsuccessful.¹⁷⁴ Furthermore, the 1995 guidelines regarding requests to remove red wolves from private lands imply that depredation is a necessary condition for removal. The definition of a “problem wolf subject to removal” includes: 1) any situation when loss of property (livestock, pets) is directly caused by the red wolf, or 2) a red wolf that is exhibiting inappropriate behavior, such as tolerance of people or dwellings, which suggests future problems.¹⁷⁵

C. SECTION 4(D)

The district court properly held that the FWS’s disregard of the 1999 management guidelines violated section 4(d),¹⁷⁶ which states that “whenever any species is listed as a threatened species . . . the Secretary shall issue such regulations as he deems necessary and advisable to provide for the conservation of such species.”¹⁷⁷

The FWS asserted that section 4(d) does not apply to nonessential experimental populations like the red wolf, but only provides for the conservation of endangered and

170 Combined Reply in Support of Plaintiffs’ Motion for Summary Judgment and Response in Opposition to Defendants’ Cross-Motion at 12, *Red Wolf Coal.*, 346 F. Supp. 3d 802 (No. 2:15-cv-00042-BO) [hereinafter *Plaintiffs’ Reply Brief*].

171 *Id.* at 13.

172 *Red Wolf Coal.*, 346 F. Supp. 3d at 812 (citing *Nat’l Wildlife Fed’n v. Nat’l Marine Fisheries Serv.*, 524 F.3d 917, 931 (9th Cir. 2008)).

173 *Defendants’ Brief*, *supra* note 144, at 24.

174 Determination of Experimental Population Status for an Introduced Population of Red Wolves In North Carolina, 51 Fed. Reg. 41,790, 41,792-93 (Nov. 19, 1986) (to be codified at 50 C.F.R. pt. 17); Endangered and Threatened Wildlife and Plants; Revision of the Special Rule for Nonessential Experimental Populations of Red Wolves in North Carolina and Tennessee, 60 Fed. Reg. 18,940, 18,946 (Apr. 13, 1995) (to be codified at 50 C.F.R. pt. 17).

175 *Guidelines for Applying the Current Red Wolf Rule (April 13, 1995) Requests to Remove Red Wolves from Private Lands*, U.S. FISH & WILDLIFE SERV. (Jan. 28, 1999), <https://www.fws.gov/southeast/pdf/guidelines/requests-to-remove-red-wolves-from-private-lands.pdf>.

176 *Red Wolf Coal.*, 346 F. Supp. 3d at 813.

177 16 U.S.C. 1533(d) (2018).

threatened species.¹⁷⁸ The FWS interpretation violated the conservation mandate of section 4(d).¹⁷⁹ But the FWS acknowledged that conservation mandate of section 4(d) applies to 10(j) nonessential experimental red wolf populations, saying that the “experimental population status means the reintroduced population will be treated as a threatened species, rather than endangered species, for the purposes of sections 4(d) and 9 of Act, which regulate taking, and other actions.”¹⁸⁰

Other courts have also acknowledged that section 4(d) applies to non-experimental populations. The Fourth Circuit in *Gibbs v. Babbitt* stated that “it would be perverse indeed if a species nearing extinction were found to be beyond Congress’s power to protect” it.¹⁸¹ The federal district court in *Red Wolf Coalition v. NCWRC*, reasoned that “[b]y designating the red wolf as protected and dedicating funding and efforts for more than twenty-five years in a program to rehabilitate the once-nearly extinct species, Congress has repeatedly demonstrated that it has chosen to preserve the red wolf.”¹⁸²

The U.S District Court for the District of Arizona addressed a similar issue in *Defenders of Wildlife v. Tuggle*.¹⁸³ The plaintiffs challenged the FWS’s interpretative rules as inconsistent with the final regulation regarding the reintroduction of the Mexican wolf.¹⁸⁴ The plaintiffs alleged that the interpretative rules, which were put in place after the final regulation, violated section 4(d) because they did not provide for the conservation of the Mexican wolf.¹⁸⁵ The FWS countered that section 4(d) does not apply to interpretative rules, but only applies to issuance of regulations. Because the regulation had only been changed, there was no violation of section 4(d).¹⁸⁶ The court held that it would have to examine the interpretative rules in the context of the final regulation to ensure that the final rule conserved the Mexican wolf.¹⁸⁷

178 FWS adopted a blanket rule that placed the same restrictions on threatened and endangered species. The D.C. Circuit Court endorsed this policy stating that “regardless of the ESA’s overall design, § 1533(d) arguably grants the FWS the discretion to extend maximum protection to all threatened species at once, if guided by its expertise in the field of wildlife protection, it finds it expeditious to do so.” Sweet Home Chapter of Cmty. for a Great Or. v. Babbitt, 1 F.3d 1, 7 (D.C. Cir. 1993). However, the Trump Administration’s proposed revision of ESA regulations ends this practice and plans to establish species-specific rules for threatened species. Endangered and Threatened Wildlife and Plants; Revision of the Regulations for Prohibitions to Threatened Wildlife and Plants, 83 Fed. Reg. at 35,174.

179 *Defendants’ Brief*, *supra* note 144, at 25–28.

180 Determination of Experimental Population Status for an Introduced Population of Red Wolves In North Carolina, 51 Fed. Reg. 41,790, 41,792 (Nov. 19, 1986) (to be codified at 50 C.F.R. pt. 17).

181 *Gibbs v. Babbitt*, 214 F.3d 483, 498 (4th Cir. 2000).

182 *Red Wolf Coal. v. N.C. Wildlife Res. Comm’n*, No. 2:13-CV-60-BO, 2014 WL 1922234, at *5 (E.D.N.C. May 13, 2014).

183 *Defenders of Wildlife v. Tuggle*, 607 F. Supp. 2d 1095 (D. Ariz. 2009).

184 *Id.* at 1097–98.

185 *Id.* at 1116.

186 *Id.* at 1117.

187 *Id.* at 1118–19.

The U.S. District Court for the District of Arizona in *CBD v. Jewell* invalidated a revised Mexican wolf rule for “failing to further the conservation of the [species.]”¹⁸⁸ The district court held that the FWS must ensure that “the issuance of individual [take] permits must not conflict with recovery of the species as a whole.”¹⁸⁹ This is bolstered by section 10(d), which ensures “that the issuance will not operate to the disadvantage of the listed species, and the permit issued must be consistent with the ESA’s conservation purpose and policy.”¹⁹⁰

The FWS cited the Fourth Circuit decision in *United States v. McKittrick*,¹⁹¹ to support its claim that section 4(d) is not applicable to the 10(j) population of red wolves.¹⁹² McKittrick was accused of killing a gray wolf, a member of the nonessential experimental population.¹⁹³ McKittrick challenged the regulation, arguing that it violated section 4(d) because the Secretary of the Interior did not determine that the regulation was “necessary and advisable.”¹⁹⁴ The Ninth Circuit rejected this assertion, not on the basis of section 4(d), but held that the FWS only had to meet the requirements of section 10(j).¹⁹⁵ The FWS asserted that even if section 4(d) applies, the agency complied with the statute. Section 4(d) gives the Secretary discretion in determining which regulations conserve the species.¹⁹⁶

In *Red Wolf Coalition v. FWS*, the Secretary determined it was appropriate to allow the landowner to take red wolves after non-lethal removal measures were unsuccessful.¹⁹⁷ The Secretary’s action was designed to increase public support for the program, which is necessary for its success.¹⁹⁸ The FWS does have discretion, but it must carry out the conservation mandate of the ESA.¹⁹⁹

The federal district court in *CBD v. Jewell* stated, “the significant ‘management flexibility’ afforded the agency under section 10(j) [does not] justify the failure to further long-term recovery of the [threatened] Mexican gray wolf.”²⁰⁰ Congress specifically enacted section 10(j) to provide greater flexibility to the Secretary.²⁰¹ Management flexibility is not designed to replace the conservation mandate. On the contrary,

188 *Ctr. for Biological Diversity v. Jewell*, No. CV-15-00019-TUC-JGZ (1), 2018 WL 1586651, at *13 (D. Ariz. Mar. 31, 2018).

189 *Id.* at *6.

190 *Id.*

191 *United States v. McKittrick*, 142 F.3d 1170, 1176 (9th Cir. 1998).

192 *Defendants’ Brief*, *supra* note 144, at 25–26.

193 *McKittrick*, 142 F.3d at 1172–73.

194 *Id.* at 1176.

195 *Id.* The district court in *Center for Biological Diversity v. Jewell* followed the Ninth Circuit on this issue. No. CV-15-00019-TUC-JGZ (1), 2018 WL 1586651, at *23 n.12 (D. Ariz. Mar. 31, 2018).

196 *McKittrick*, 142 F.3d at 1176.

197 *Defendants’ Brief*, *supra* note 144, at 25–28.

198 *Id.*

199 The ESA defines “conservation” to be “the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures . . . are no longer necessary.” 16 U.S.C. § 1532(3) (2018).

200 *Ctr. for Biological Diversity*, 2018 WL 1586651, at *30.

201 *McKittrick*, 142 F.3d at 1174; *Wyo. Farm Bureau Fed’n v. Babbitt*, 199 F.3d 1224, 1233 (10th Cir. 2000).

management flexibility “allows the Secretary to better conserve and recover endangered species.”²⁰² The FWS must recover the species “without undermining scientific integrity or subverting the statutory mandate.”²⁰³ The D.C. District Court in *Humane Society v. Kempthorne* noted that the agency must explain “how its interpretation serves the ESA’s myriad policy objectives,” including addressing “any legitimate concerns that its interpretation could undermine those policy objectives.”²⁰⁴

From 1999 to 2014 red wolf conservation was the guiding principle of the program, allowing removal of only problem red wolves. In 1999, Red Wolf Field Coordinator Brian Kelly sent Gary Henry, an attorney in DOI Office of the Regional Solicitor, a set of guidelines to respond to landowner requests to remove and take red wolves.²⁰⁵ The guidelines distinguished between problem and non-problem wolves on private lands. This distinction was important because “such removals may have a detrimental effect on red wolf recovery efforts by increasing the threat of hybridization.”²⁰⁶ The FWS and the solicitor “concluded with a consensus that the interpretation of current regulations provides the flexibility to deny requests for removing red wolves from private lands in absence of a problem.”²⁰⁷ Regional Field Office Supervisor Pete Benjamin stated that the 1999 guidelines reflected “a statement of what we intended from this point forward.” In 2013, Red Wolf Recovery Program Coordinator David Rabon declared that the “issue was fully considered and resolved in 1999.”²⁰⁸

The FWS changed its long-standing policy in 2014, but became concerned about the increasing number of requests for red wolf removals.²⁰⁹ The FWS decided to honor all the requests, abandoning its distinction between problem and non-problem wolves.²¹⁰ This contradicted the 1999 guidelines that declared landowner requests would only be honored “if possible” and if consistent with ESA.²¹¹ Dropping the distinction between problem and non-problem wolves undermined the conservation mandate of section 4(d) by increasing the chances of hybridization and decreasing the growth of the red wolf population. One FWS staff member commented that “the radical new direction of the red wolf program does not comport with my original understanding of the program.”²¹²

The federal district court in *CBD v. Jewell*, recognizing a similar problem, held that the FWS removal policy was not furthering the conservation mandate of the ESA. The district court stated that “the issuance of individual permits must not conflict with re-

202 *McKittrick*, 142 F.3d at 1174.

203 *Ctr. for Biological Diversity*, 2018 WL 1586651, at *16.

204 *Humane Soc’y of U.S. v. Kempthorne*, 579 F. Supp. 2d 7, 30 (D.D.C. 2008).

205 Combined Reply in Support of Plaintiffs’ Motion for Summary Judgment and Response in Opposition to Defendants’ Cross-Motion at 17, *Red Wolf Coal.*, 346 F. Supp. 3d 802 (No. 2:15-cv-00042-BO).

206 *Id.*

207 *Id.*

208 *Id.*

209 *Id.* at 18.

210 *Id.*

211 *Guidelines for Applying the Current Red Wolf Rule (April 13, 1995) To Requests To Remove Red Wolves from Private Lands*, *supra* note 175.

212 *Plaintiffs’ Reply Brief*, *supra* note 170, at 17–18.

covery of the species as a whole.”²¹³ The court noted that “the agency has recognized that permanent removals have the same practical effect on the wolf population as mortality”²¹⁴ and that “a species with a small population, narrowly distributed, is less likely to persist (in other words has a higher risk of extinction) than a species that is widely and abundantly distributed.”²¹⁵ The propagation of a small number of animals with limited genetic diversity can produce an “extinction vortex,” which “results in decreased fitness and lower survival rates.”²¹⁶

Policy changes in 2013 began to significantly change the red wolf program. Lethal take permits were issued to landowners in 2014 and 2015. The FWS ended releases of red wolves and stopped adaptive management in 2015.²¹⁷

Other contemporaneous events harmed red wolf recovery. The FWS had sought the cooperation of the North Carolina government. There was a shift in state government in 2012, with the new Republican Governor, Pat McCrory, succeeding three former Democratic governors.²¹⁸ Republicans increased their majority in both houses of the North Carolina Legislature.²¹⁹ Appointments to state agencies in the wake of these elections led to tangible changes for the wolves. At the same time, there was a vigorous public anti-wolf campaign by private citizens that undermined support for red wolf recovery.²²⁰ The FWS did little to counter this campaign. Public opposition and gunshot mortality increased.²²¹ The red wolf population plummeted from a high of 150 in 2006 to 45-60 by 2015.²²²

The FWS acknowledged this change in policy, but claimed it was consistent with regulations. The FWS argued that the plaintiffs’ real argument was with the 1995 regulations, not the FWS’s contemporaneous interpretation, which was not subject to judicial review.²²³ The FWS minimized the magnitude of its change in policy regarding the lethal take of non-problem wolves and abandonment of adaptive management, which violated the conservation mandate of section 4(d).²²⁴ The FWS reinterpretation of the regulations was part of the regulations, which were subject to judicial review. The federal

213 *Ctr. for Biological Diversity v. Jewell*, No. CV-15-00019-TUC-JGZ (1), 2018 WL 1586651, at *6 (D. Ariz. Mar. 31, 2018).

214 *Id.* at *11.

215 *Id.* at *12.

216 *Id.*

217 *Plaintiffs’ Brief*, *supra* note 90, at 4–6.

218 *North Carolina gubernatorial election, 2012*, BALLOTPEDIA, https://ballotpedia.org/North_Carolina_gubernatorial_election_2012 (last visited Apr. 18, 2020).

219 *North Carolina 2012 legislative election results*, BALLOTPEDIA, https://ballotpedia.org/North_Carolina_2012_legislative_election_results#Senate (last visited Apr. 18, 2020).

220 Matthew Brown, Susan Montoya Bryan & Jonathan Drew, *Illegal Killings, Political Opposition Hobble Wolf Recovery*, U.S. NEWS & WORLD REP. (May 23, 2019), <https://www.usnews.com/news/best-states/north-carolina/articles/2019-05-23/politics-killings-stifle-wolf-recovery-amid-hefty-price-tag>.

221 *Id.*

222 *Comment from Ron Sutherland, Wildlands Network, to U.S. Fish & Wildlife Serv., WILDLANDS NETWORK* (July 24, 2017), <https://wildlandsnetwork.org/wp-content/uploads/2017/08/Red-wolf-comments-Wildlands-Network-July-24-2017-Final.pdf>.

223 *Defendants’ Brief*, *supra* note 144, at 26–27.

224 *See id.* at 27.

district court in *Defenders of Wildlife v. Tuggle* held that the interpretative rules were part of the final regulation.²²⁵ The court was required to examine the interpretative rules in the context of the final regulation to ensure that the final rule “provides for the conservation of the Mexican wolf.”²²⁶

The federal district court in *Defenders of Wildlife v. Tuggle* stated that “while an interpretative rule lacks the formal force of law, as a practical matter it affects the regulatory practices of an agency or the expectations of a regulated entity as to what a law or regulation means and how it will be affected.”²²⁷

This change in policy was done without public input, adequate explanation, and was not supported by scientific findings. Judicial review of agency action under the ESA and NEPA is governed by section 706 of the APA, which prohibits agency action that is “arbitrary, capricious, an abuse of discretion or otherwise not in accordance with law.”²²⁸ The Supreme Court has noted that agency action “would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency.”²²⁹ The district court took a hard-look at the FWS decisions and correctly determined that the FWS’s failure to adequately explain its change in policy violated the APA and the conservation mandate of section 4(d).²³⁰

D. SECTION 7(A)(1)

The district court properly determined that the taking of non-problem wolves and the termination of adaptive management violated section 7 of ESA,²³¹ which creates an affirmative duty on the federal agencies to conserve endangered and threatened species.²³² Section 7(a)(1) states:

The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this chapter. All other federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered species and threatened species listed pursuant to sect 1533 of this title.²³³ Conservation requires the use of all necessary methods and procedures to bring endangered species to point at which conservation efforts are no longer necessary.²³⁴ Allowing the red wolf population to decline, while having the means to conserve species “is so implausible that it

225 See *Defs. of Wildlife v. Tuggle*, 607 F. Supp. 2d 1095, 1115 (D. Ariz. 2009).

226 *Id.* at 1118.

227 *Id.* at 1115.

228 5 U.S.C. § 706 (2018).

229 *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1984).

230 *Defs. of Wildlife*, 607 F. Supp. 2d at 1115.

231 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 815 (E.D.N.C. 2018).

232 16 U.S.C. § 1536 (2018).

233 *Id.*

234 *Id.* § 1532.

could not be ascribed to a difference in view or the product of agency expertise.”²³⁵

The FWS asserted that it was not bound by section 7(a)(1) because the language refers to “other federal agencies.”²³⁶ It argued that the FWS is not required to consult with the Secretary of Interior regarding red wolf recovery because section 7(a)(1) only applies to other federal agencies.²³⁷

The FWS assertion is inconsistent with the legislative history, which demonstrates the insertion of “other” rather than “all” was purely circumstantial. The original Senate bill stated “all,” but the House version employed “other.”²³⁸ The conference report did not address difference, which was never mentioned in “resolutions of differences” between the House and Senate bills.²³⁹ This was simply an insignificant technical change in language.²⁴⁰ Regulations implementing section 7(a)(1) do not exempt the FWS, but require all federal agencies to comply with section 7(a)(1).²⁴¹

The FWS assertion establishes an inconsistency between section 7(a)(1) and the ESA. The Supreme Court declared that the ESA was the “most comprehensive legislation for preservation of endangered species ever enacted by any nation” and manifests Congress’s desire “to halt and reverse the trend toward species extinction, whatever the cost.”²⁴² Congress intended all federal agencies to adhere to section 7(a)(1).²⁴³ The House Report on section 7 of ESA states:

This subsection requires the Secretary and the heads of all other Federal departments and agencies to use their authorities in order to carry out programs for the protection of endangered species, and it further requires that those agencies take the necessary action that will not jeopardize the continuing existence of endangered species or result in the destruction of critical habitat of those species.²⁴⁴

The declared policy of the ESA is “that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this chapter.”²⁴⁵ The declared purposes of the ESA are “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.”²⁴⁶ The ESA “reflects a conscious decision by Congress” to give endangered species primacy over the primary mission of the federal agency,²⁴⁷ and afford those species “the highest of priorities.”²⁴⁸

235 *Red Wolf Coal.*, 346 F. Supp. at 810 (citing *Motor Vehicle Mfrs.*, 463 U.S. at 43).

236 *Defendants’ Brief*, *supra* note 144, at 18.

237 *Id.* at 29–30.

238 *Plaintiffs’ Reply Brief*, *supra* note 170, at 26.

239 H.R. REP. NO. 93-740, at 23 (1973) (Conf. Rep.).

240 *Plaintiffs’ Reply Brief*, *supra* note 170, at 25–26.

241 Interagency Cooperation—Endangered Species Act of 1973, as Amended; Final Rule, 51 Fed. Reg. 19,926, 19,929, 19,934 (June 3, 1986) (to be codified at 50 C.F.R. pt. 402).

242 *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978).

243 16 U.S.C. § 1531(c) (2018).

244 H.R. REP. NO. 93-412, at 14 (1973).

245 16 U.S.C. § 1531(c)(1) (2018).

246 *Id.* § 1531(b).

247 *California ex rel. Lockyer v. U.S. Dep’t of Agric.*, 575 F.3d 999, 1018 (9th Cir. 2009).

The FWS assertion was inconsistent with case law. The U.S. District Court for District of Oregon in *Defenders of Wildlife v. Secretary of the Interior* held that section 7(a)(1) applied to the FWS, stating that “exempting the FWS from the duty to utilize its conservation authority is inconsistent with the [ESA].”²⁴⁹ The Secretary claimed he was exempt from section 7(a)(1) because the reference to “other programs” and “all other federal agencies” excluded the FWS, but the court rejected the argument and held that the exclusion of the FWS from section 7(a)(1) contradicts section 2(c), which provides, “it is further declared to be the policy of Congress that all federal departments and agencies shall seek to conserve endangered and threatened species.”²⁵⁰ Sections 2(c) and 7(a)(1) can be read consistently. The Ninth Circuit stated, “in interpreting language in one section of statute in conjunction with language of other sections, this court strives to find a reading that is consistent with the purposes of the entire statute considered as a whole.”²⁵¹ Exempting the FWS from its duty to conserve the red wolf is inconsistent with the act.²⁵²

FWS claimed that even if it was bound by section 7(a)(1), it has broad discretion regarding its implementation and thereby acted within its statutory authority when issuing the lethal take permits and terminating adaptive management, which included removing red wolves from private land, terminating the release of red wolves and cross fertilization of red wolf pups, and sterilizing placeholders.²⁵³

The FWS was correct that it has discretion, but only to carry out goals of the ESA. The Fifth Circuit in *Sierra Club v. Glickman* declared: “A mission agency’s discretion to make the final substantive decision under its program authorities does not mean that the agency has unlimited, unreviewable discretion [under section 7(a)(1).]”²⁵⁴ The U.S. District Court for the District of Arizona in *Defenders of Wildlife v. FWS* noted that when an agency’s actions “are so insignificant as to qualify as total inaction,” courts have “no trouble” finding a violation of section 7(a)(1).²⁵⁵ The federal district court in *CBD v. Jewell* determined that management flexibility does not eliminate the requirement to further long term recovery.²⁵⁶ Section 10(j) was enacted to grant the FWS flexibility “to

248 *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 194 (1978); *Or. Nat. Res. Council v. Allen*, 478 F.3d 1031, 1033 (9th Cir. 2007).

249 *Def. of Wildlife v. Sec’y, U.S. Dep’t of Interior*, 354 F. Supp. 2d 1156, 1173–74 (D. Or. 2005).

250 16 U.S.C. § 1531(c) (2018).

251 *Pyramid Lake Paiute Tribe of Indians v. U.S. Dep’t of Navy*, 898 F.2d 1410, 1417 n.15 (9th Cir. 1990).

252 Other cases also suggest that section 7(a)(1) applies to the FWS. *See, e.g., Defs. of Wildlife*, 354 F. Supp. 2d at 1173–74; *Nat’l Wildlife Fed’n v. Norton*, 386 F. Supp. 2d 553, 566–67 (D. Vt. 2005); *Sierra Club v. Glickman*, 156 F.3d 606, 615–16 (5th Cir. 1998); *Carson-Truckee Water Conservancy Dist. v. Clark*, 741 F.2d 257, 261–62 (9th Cir. 1984).

253 *Defendants’ Brief*, *supra* note 144, at 30–32.

254 *Sierra Club v. Glickman*, 156 F.3d 606, 617 (5th Cir. 1998).

255 *Defenders of Wildlife v. U.S. Fish & Wildlife Serv.*, 797 F. Supp. 2d 949, 960 (D. Az. 2011).

256 *Ctr. for Biological Diversity v. Jewell*, No. CV-15-00019-TUC-JGZ (1), 2018 WL 1586651, at *10 (D. Ariz. Mar. 31, 2018).

better conserve and recover endangered species,”²⁵⁷ not to undermine the conservation mandate.²⁵⁸

The FWS termination of adaptive management, removals, and authorized takings violated conservation mandate of section 7(a)(1). The FWS is required to provide for the recovery of the red wolf. Recovery is defined as the “improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act.”²⁵⁹ Recovery and survival are distinct concepts. The Ninth Circuit recognized the difference in *Gifford Pinchot Task Force v. FWS*. The court held that “the ESA was enacted not merely to forestall the extinction of species [i.e. to promote species survival], but to allow a species to recover to the point where it may be delisted.”²⁶⁰

The FWS must consider the long term viability of the species.²⁶¹ The Fifth Circuit in *Sierra Club v. FWS* declared that “the objective of the ESA is to enable listed species not merely to survive, but to recover from their endangered or threatened status.”²⁶² The FWS cannot just focus on survival, but must be concerned with species recovery.²⁶³ Recovery envisions a self-sustaining population that no longer requires the protection or support of the act.²⁶⁴

Recovery must be based on the viability of species in the wild, not in captivity.²⁶⁵ Congress acknowledged “that individual species should not be viewed in isolation, but must be viewed in terms of their relationship to the ecosystem of which they form a constituent element.”²⁶⁶ The Ninth Circuit noted that the agency can rely on the captive population to reestablish the species in the wild, but the goal of recovery is “to promote populations that are self-sustaining without human interference.”²⁶⁷

The FWS’s adaptive management strategy, which included the sterilization of placeholder coyotes and cross-fostering of red wolf pups, was successful. From 1993 to 2007, there were thirty-two instances of red wolves replacing coyotes.²⁶⁸ Scientist pointed out that all of the introgressed coyote genes came from one hybrid event, so minimum cross breeding was occurring.²⁶⁹ Furthermore, if current policies were maintained for the next sixty years there would be less than one percent coyote gene intro-

257 *Id.* at *16 (citing *United States v. McKittrick*, 142 F.3d 1170, 1174 (9th Cir. 1998)).

258 *Id.*

259 50 C.F.R. § 402.02 (2019).

260 *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv.*, 378 F.3d 1059, 1069 (9th Cir. 2004).

261 *Ctr. for Biological Diversity*, 2018 WL 1586651, at *7.

262 *Sierra Club v. U.S. Fish & Wildlife Serv.*, 245 F.3d 434, 438 (5th Cir. 2001).

263 *Nat’l Wildlife Fed’n v. Nat’l Marine Fisheries Serv.*, 524 F.3d 917, 932 (9th Cir. 2008).

264 *Ctr. for Biological Diversity*, 2018 WL 1586651, at *7.

265 *Id.*

266 H.R. REP. NO. 97-835, at 30 (1982) (Conf. Rep.). *See also* H.R. REP. NO. 95-1625, at 5 (1978) (noting the goal of the ESA was “to return the species to the point where they are viable components of their ecosystems”).

267 *Trout Unlimited v. Lohn*, 559 F.3d 946, 957 (9th Cir. 2009).

268 ANIMAL WELFARE INST. ET AL., PETITION FOR A RED WOLF (*Canis rufus*) Recovery Plan 23 (2016).

269 *Id.*

gression.²⁷⁰ The FWS stated that it had “effectively reduced interbreeding and coyote gene introgression using the adaptive plan and associated non-invasive techniques.”²⁷¹

The cross-fostering of red wolf pups was also successful. Cross-fostering involves the removal of pups from their biological parents and placing them with surrogate parents.²⁷² Beginning in 2002, the FWS cross-fostered twenty-one captive pups into the wild, expanding the red wolf population and its genetic diversity.²⁷³ Several cross-fostered pups sired dozens of pups in the wild.²⁷⁴ The FWS stated that “pup fostering has developed as a significant and useful population management tool in red wolf recovery.”²⁷⁵ Numerous peer reviewed studies applauded the success of the FWS adaptive management.²⁷⁶ Despite its success, the FWS abandoned adaptive management in 2015 and did not replace it with any further recovery actions. These changes that began in 2013 resulted in the red wolf population decreasing from over one hundred to around forty-five by 2015.²⁷⁷ The district court noted that allowing the red wolf population to decline, while having the means to conserve species, “is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.”²⁷⁸

After the 2016 PVA analysis concluded that the red wolf population was at risk of extinction within thirty-seven years, and possibly as soon as eight years, the FWS announced significant changes in red wolf management.²⁷⁹ The FWS decided to end adaptive management and curtail efforts to recover the wild population. The FWS planned to take the following steps: 1) secure the unsustainable captive population, 2) investigate the availability of new release, 3) revise the experimental population rule to restrict red wolves to the Dare County bombing range and ARNWR, and 4) complete a comprehensive “Species Status Assessment and 5 year status review for the red wolf.”²⁸⁰

The court must be deferential when reviewing scientific determinations within the agency’s area of expertise.²⁸¹ But the court owes no deference when the agency ignores the best available scientific evidence when it comes from inside the agency.²⁸²

Scientists who composed the PVA analysis were critical of the decision and complained that there were “many alarming misinterpretations of PVA [used] as justifica-

270 *Id.*

271 *Id.*

272 *Id.*

273 *Id.* at 23–24.

274 *Id.*

275 *Id.*

276 *Id.* at 16.

277 *Id.* at 12.

278 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 814 (E.D.N.C. 2018) (quoting *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1984)).

279 *Science leads Fish and Wildlife Service to significant changes for red wolf recovery*, U.S. Fish & Wildlife Serv. (Sept. 12, 2016), <https://www.fws.gov/southeast/news/2016/09/science-leads-fish-and-wildlife-service-to-significant-changes-for-red-wolf-recovery/>.

280 *Id.*

281 *Balt. Gas & Elec. Co. v. Nat. Res. Def. Council, Inc.*, 462 U.S. 87, 103 (1983).

282 *See Idaho Sporting Cong., Inc. v. Rittenhouse*, 305 F.3d 957, 96970 (9th Cir. 2002).

tion” for the FWS proposal.²⁸³ The most egregious misinterpretation was that the captive population would likely be lost within the next decade under current management. Scientists stressed that the captive population is “under no risk of extinction.”²⁸⁴ The FWS’s action will almost certainly result in extinction of the wild red wolf population.²⁸⁵

The FWS staff was critical of the changes. Personnel believed that adaptive management program was successful at decreasing hybridization and threats to the red wolf population, while terminating coyote sterilization and releases of captive red wolves would not further red wolf recovery.²⁸⁶

Other prominent scientists were critical of FWS proposal, too.²⁸⁷ Dr. John Vucetich of the Michigan Technology University, stated that red wolves would “face a perilously high risk of extinction” that mandated against shifting resources away from the project.²⁸⁸ Dr. Joseph Hinton of the University of Georgia believed it was clear “that red wolves [could] be saved, and that the Service should re-implement those previous management practices to ensure the long-term viability of the wild population in eastern North Carolina.”²⁸⁹

The CBD declared that the new proposal “only puts the animals on a swifter path toward extinction” and that changes would need to be made “to recover the red wolf in the wild before it is too late.”²⁹⁰

E. SECTION 7(A)(2)

The district court correctly determined that the FWS’s abandonment of adaptive management and taking of non-problem wolves violates section 7(a)(2).²⁹¹ Section 7(a)(2) requires:

283 See Jonathan Drew, *Scientists say study was misinterpreted in red wolf decision*, KSL (Oct. 18, 2016), <https://www.ksl.com/article/41898499/scientists-say-study-was-misinterpreted-in-red-wolf-decision>.

284 *Letter from Lisa Faust et al., PVA Team, to Cynthia K. Dohner, Regional Director, Se. Region of U.S. Fish & Wildlife Serv., PVA Team Response to USFWS*, COASTAL REVIEW ONLINE (Oct. 11, 2016), <https://www.coastalreview.org/wp-content/uploads/2016/10/PVA-Team-response-to-USFWS-10-12-16.pdf>.

285 *Id.*

286 *Plaintiffs’ Reply Brief*, *supra* note 170, at 22.

287 Some scientists asserted that the federal lands in Dare County cannot alone support a viable wolf population, that more red wolf populations must be established, and that red wolves are a listable entity under the ESA. *Letter from T. Delene Beeland et al. to Sally Jewell, Sec’y, Dep’t of the Interior, and Dan Ashe, Dir., U.S. Fish & Wildlife Serv., Scientists Letter in Support of Red Wolf Recovery*, CTR. FOR BIOLOGICAL DIVERSITY (Nov. 30, 2016), https://www.biologicaldiversity.org/species/mammals/red_wolf/pdfs/Red_wolf_Scientist_ltr_FWS_proposals_11-30-16.pdf.

288 *Dozens of Scientists Urge Feds to Promote, Not Curtail, Red Wolf Recovery*, CTR. FOR BIOLOGICAL DIVERSITY (Nov. 30, 2016), https://www.biologicaldiversity.org/news/press_releases/2016/red-wolf-11-30-2016.html.

289 *Id.*

290 *Id.*

291 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 811–13 (E.D.N.C. 2018).

Each federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section.²⁹²

Section 7(a)(2) imposes two obligations on federal agencies. The procedural component “requires that agencies consult with the FWS to determine the effects of their actions on endangered or threatened species and their critical habitat.”²⁹³ The substantive component “requires agencies to insure that their actions not jeopardize endangered or threatened species or their critical habitat.”²⁹⁴

Federal regulations prohibit federal agencies from “jeopardize[ing] the continued existence of” endangered and threatened species. “Jeopardy” means “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.”²⁹⁵

Federal agencies are not allowed to “expose to loss or injury” or to “imperil” endangered and threatened species. Federal agencies cannot create any new risk of harm.²⁹⁶

Agency actions that are likely to adversely affect a listed species must obtain a biological opinion from the Service discussing the effects of the action and including a finding whether the action “is likely to jeopardize the continued existence” of the spe-

292 16 U.S.C. § 1536(a)(2) (2018).

293 *Fla. Key Deer v. Paulison*, 522 F.3d 1133, 1138 (11th Cir. 2008). Regulations implementing the procedural-consultation requirement provide for informal optional consultation between acting agency and FWS prior to a determination that formal consultation is required. 50 C.F.R. § 402.02 (2019). Formal consultation is a process between the FWS and the federal agency “that commences with the Federal agency’s written request for consultation under section 7(a)(2) of the Act.” *Id.* It is required if an agency determines that any action it takes “may affect listed species or critical habitat.” *Id.* § 402.14(a). Following formal consultation, the FWS is required to issue the acting agency “a written statement setting forth the Secretary’s opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat.” 16 U.S.C. § 1536(b)(3)(A) (2018). This is referred to as the biological opinion. *Fla. Key Deer*, at 1138–39.

294 *Fla. Key Deer*, at 1138. If the FWS finds “jeopardy or adverse modification” to listed species or habitat, the FWS “shall suggest those reasonable and prudent alternatives” which it believes would not violate section 7(a)(2). 16 U.S.C. § 1536(b)(3)(A) (2018). In response to an opinion finding jeopardy or adverse modification, the acting agency must comply with the substantive mandate of section 7(a)(2) and either “terminate the action, implement the proposed alternative, or seek an exemption . . . pursuant to 16 U.S.C. § 1536(e).” *Nat’l Ass’n of Home Builders v. Defs. of Wildlife*, 551 U.S. 644, 652 (2007); *Fla. Key Deer*, 522 F.3d at 1138–39.

295 50 C.F.R. § 402.02 (2019); 16 U.S.C. § 7(a)(2) (2018).

296 *Nat’l Wildlife Fed’n v. Nat’l Marine Fisheries Serv.*, 524 F.3d 917, 930 (9th Cir. 2008).

cies.²⁹⁷ Impacts to both the survival and recovery must be addressed in the biological opinion's jeopardy finding.²⁹⁸ The jeopardy finding must be based on best available science.²⁹⁹ This standard does not require the FWS to conduct "new tests or make decisions on data that does not yet exist,"³⁰⁰ but it does prohibit the agency from disregarding available superior scientific evidence.³⁰¹

FWS contended that section 7(a)(2) does not apply to non-essential experimental populations like the red wolf when it is outside of national wildlife reserve or national park because non-essential experimental populations are only considered a species "proposed to be listed."³⁰²

But Section 10(j) focuses on non-essential experimental populations, not individuals. Red wolves were introduced into federal land. From 1987 to 1992, forty-two red wolves were released on the ARNWR.³⁰³ Some of these red wolves moved off federal land onto private land.³⁰⁴ If red wolves are indiscriminately killed on private land, this would imperil their recovery. Furthermore, the FWS must attempt to recapture red wolves before allowing their taking.³⁰⁵

Federal courts have recognized that red wolves are protected when off federal land. Restrictions on red wolf takings are substantive, not geographic. The Fourth Circuit noted: "Because so many members of this threatened species wander onto private land, the regulation of takings on private land is essential to entire program of reintroduction and eventual restoration of the species."³⁰⁶ The federal district court in *Red Wolf Coalition v. NCWRC* similarly recognized that high levels of gunshot mortality of red wolves erodes the red wolf recovery program efforts.³⁰⁷

Section 10(j) establishes definitive conditions regarding the taking of red wolves, which are protected both on public and private land.³⁰⁸ The regulations identify the specific conditions that allow for the taking of red wolves on private lands.³⁰⁹ The regulations also stress that red wolves can only be taken "after efforts by project personnel to capture such animals have been abandoned."³¹⁰

297 16 U.S.C. § 1536(a)(2) (2018); 50 C.F.R. § 402.14 (2019).

298 *Nat'l Wildlife Fed'n*, 524 F.3d at 931.

299 50 C.F.R. § 401.14(g)(8) (2019).

300 *Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv.*, 807 F.3d 1031, 1047 (9th Cir. 2015).

301 *Kern Cty. Farm Bureau v. Allen*, 450 F.3d 1072, 1080 (9th Cir. 2006).

302 *Defendants' Brief*, *supra* note 144, at 32. *See also* *New Mexico ex rel Richardson v. Bureau of Land Mgmt.*, 565 F.3d 683, 700–01 (10th Cir. 2009); *WildEarth Guardians v. U.S. Dep't of Justice*, 283 F. Supp. 783, 814 (D. Ariz. 2017).

303 *Combined Reply in Support of Plaintiffs' Motion for Summary Judgment and Response in Opposition to Defendants' Cross-Motion at 32–33*, *Red Wolf Coal.*, 346 F. Supp. 3d 802 (No. 2:15-cv-00042-BO).

304 *Id.*

305 *Id.*

306 *Gibbs v. Babbitt*, 214 F.3d 483, 494 (4th Cir. 2000).

307 *Red Wolf Coal. v. N.C. Wildlife Res. Comm'n*, No. 2:13-CV-60-BO, 2014 WL 1922234, at *8 (E.D.N.C. May 13, 2014).

308 50 C.F.R. § 17.84(c) (2019).

309 *Id.* § 17.84(c)(1)–(5).

310 *Id.* § 17.84(c)(4)(v).

The FWS asserted that section 7(a)(2) only requires consultation with respect to agency action, not agency inaction.³¹¹ The FWS argued that its “revised interpretation” regarding red wolf takings and the termination of adaptive management are not actions “authorized, funded, or carried out” by the FWS. Instead, the FWS argued that they constituted agency inaction, which is not subject to consultation required by section 7(a)(2).³¹²

But the FWS was mistaken. Federal courts have recognized that Congress intended agency action under the ESA to be read broadly.³¹³ The Ninth Circuit held that an agency’s self-described “voluntarily created policy statement” constitutes agency action under section 7(a)(2).³¹⁴ Since the FWS’s changes in policy—including liberalized taking and termination of adaptive management—were likely to jeopardize the continued existence of the red wolf in the wild, formal consultation under section 7(a)(2) was required. Furthermore, the Supreme Court noted that a change in policy constitutes federal agency action, while the continuation of policy constitutes federal agency inaction.³¹⁵

F. NATIONAL ENVIRONMENTAL POLICY ACT

The district court correctly determined that the FWS violated NEPA by failing to discuss the environmental impacts of its change in policy regarding the taking of red wolves and abandonment of adaptive management.³¹⁶ The court noted that “there is no doubt that defendants’ decisions to cease wolf introductions while simultaneously increasing the likelihood of authorized lethal takes by landowners ‘may adversely affect an endangered or threatened species.’”³¹⁷ Such “action would trigger NEPA compliance if this factor is present.”³¹⁸

NEPA establishes a national commitment by the federal government to protect the environment.³¹⁹ NEPA backs this commitment with requirements that force action.³²⁰ When a federal agency contemplates action that will significantly affect the environment, the agency must conduct an environmental impact statement, which contemplates the environmental consequences of the action.³²¹ The impact statement ensures that federal decision makers have taken a hard-look at the environmental factors regarding the proposed action. The impact statement also informs the public and other political actors about the potential consequences of the proposed federal activity.³²² NEPA

311 *Defendants’ Brief*, supra note 144, at 34.

312 *Id.* at 34–35.

313 *All. for the Wild Rockies v. U.S. Dep’t of Agric.*, 772 F.3d 592, 598 (9th Cir. 2014); *Karuk Tribe v. U.S. Forest Serv.*, 681 F.3d 1006, 1021 (9th Cir. 2012).

314 *Lane Cty. Audubon Soc’y v. Jamison*, 958 F.2d 290, 293 (9th Cir. 1992).

315 *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 41–42 (1984).

316 *Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F. Supp. 3d 802, 813 (E.D.N.C. 2018).

317 *Id.* at 814 (citing *Ctr. for Biological Diversity v. Nat’l Highway Traffic Admin.*, 538 F.3d 1172, 1220 (9th Cir. 2008)).

318 *Id.*

319 42 U.S.C. § 4221 (2018).

320 42 U.S.C. § 4332(C) (2018).

321 *Id.*

322 *Calvert Cliffs’ Coordinating Comm., Inc. v. U.S. Atomic Energy Comm’n*, 449 F.2d 1109, 1114 (D.C. Cir. 1971).

“ensures that important effects will not be overlooked or under estimated only to be discovered after resources have been committed or the die otherwise cast.”³²³ FWS’s failure to consider the environmental impacts of its change in policy violated NEPA.

IV. 2018 PROPOSED REGULATION

Prior to the court ruling, the FWS issued a new proposed rule for management of red wolf population in June 2018, which reflected the FWS’s prior decisions.³²⁴ The FWS noted that the red wolf is a conservation-reliant species, which will require intense human management.³²⁵ The FWS planned to only manage one or two packs, consisting of no more than fifteen red wolves, exclusively in Dare County and the ARNWR.³²⁶ The wild population would ensure the diversity of the captive population. Any red wolf found outside of the designated management area could be taken, which would decrease conflicts with state and local officials and landowners. Resources would be freed to manage the captive population and establish new reintroduction sites.³²⁷

The new FWS proposal was opposed by the North Carolina Department of Natural and Cultural Resources (NCDNCR) and Governor Roy Cooper, who stated: “The wild red wolf is part of the cultural and economic fabric of our state and is the only wolf unique to the United States.”³²⁸

The ESA requires the FWS to base its decisions on the best available science.³²⁹ This best available science requirement “prohibits an agency from disregarding available scientific evidence that is in some way better than the evidence it relies on.”³³⁰ The FWS “cannot ignore available biological information.”³³¹

Prominent scientists criticized the proposal for several reasons. First, the proposed management area was too small.³³² Federal lands in Dare County and ARNWR cannot support a self-sustaining red wolf population in eastern North Carolina.³³³ The current red wolf recovery area covered 5 counties and encompassed 4,500 square miles.³³⁴ The

323 *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

324 *See* Endangered and Threatened Wildlife and Plants; Proposed Replacement of the Regulations for the Nonessential Experimental Population of Red Wolves in Northeastern North Carolina, 83 Fed. Reg. 30,382 (proposed June 28, 2018) (to be codified at 50 C.F.R. pt. 17).

325 *Id.* at 30,384.

326 *Id.* at 30,385.

327 *Id.* at 30,383.

328 Alex Derosier, *North Carolina governor asks government to keep protections for red wolf*, ASSOC. PRESS (Aug. 1, 2018), <https://apnews.com/5d512eb19720473385dd1235a0303918/North-Carolina-gov:-Endangered-wolf-protection-should-stay>.

329 16 U.S.C. § 1533(b) (2018).

330 *Kern Cty. Farm Bureau v. Allen*, 450 F.3d 1072, 1080 (9th Cir. 2006).

331 *Id.* at 1080–81.

332 *Letter from Joseph W. Hinton et al. to U.S. Fish & Wildlife Serv., 2018 Scientific Response to Red Wolf Rule Changes*, RED WOLF COAL. 4 (July 30, 2018), https://redwolves.com/newsite/wp-content/uploads/2018/08/2018-scientific-response_red-wolf-rule-changes.pdf.

333 *Id.* at 3.

334 *Id.*

red wolf recovery area must be larger than before to protect red wolves against humans and prevent hybridization.³³⁵

Second, the proposed red wolf population of ten to fifteen members is too small.³³⁶ Inbreeding is likely to occur, resulting in loss of genetic diversity. This would decrease reproductive success, increase genetic anomalies, and lower resistance to diseases.³³⁷ The FWS in another context recognized that “a species with a small population, narrowly distributed, is less likely to persist (in other words it has a higher risk of extinction) than a species that is widely and abundantly distributed.”³³⁸ The combination of a small number of animals with low genetic variation is particularly harmful, as it can lead to an “‘extinction vortex,’ a self-amplifying cycle which results in decreased fitness and lower survival rates.”³³⁹

Third, red wolves would disperse onto adjacent lands seeking to breed.³⁴⁰ In the absence of other red wolves, they would mate with coyotes and create intermediate size hybrids. The red wolf’s larger size allows them to displace coyotes.³⁴¹ The smaller hybrid would not be able to competitively exclude coyotes and would increase hybridization.³⁴²

Fourth, allowing the taking of red wolves outside the designated area would jeopardize red wolf recovery.³⁴³ Previously, red wolves were protected both inside and outside federal lands. Nevertheless, gunshot mortality has been the biggest impediment to red wolf recovery.³⁴⁴

Gunshot deaths have been a major cause of red wolf mortality. The red wolf population grew until 2006.³⁴⁵ Beginning in 2007 the population began to decline, principally because of gunshot mortality.³⁴⁶ The FWS in 2007 declared that gunshot mortality posed a “serious threat” and “hamper[ed] the ability of red wolves” to recover.³⁴⁷ Gunshot deaths “reduced number of breeding pairs and pups” and “the population consequences of such mortality is highly limiting.”³⁴⁸ From 1987 to 2003, two red wolves per year were

335 *Id.*

336 *Id.* at 4.

337 *Id.*

338 *Ctr. for Biological Diversity v. Jewell*, No. CV-15-00019-TUC-JGZ (1), 2018 WL 1586651, at *12 (D. Ariz. Mar. 31, 2018).

339 *Id.*

340 *Letter from Joseph W. Hinton et al. to U.S. Fish & Wildlife Serv.*, *supra* note 332, at 4.

341 *Id.* at 4–5.

342 *Id.*

343 *Id.* at 4.

344 *Id.* at 5–6.

345 Natural History, *CTR. FOR BIOLOGICAL DIVERSITY*, https://www.biologicaldiversity.org/species/mammals/red_wolf/natural_history.html, (last visited Feb. 27, 2020).

346 *U.S. FISH & WILDLIFE SERV., RED WOLF: 5 YEAR STATUS REVIEW: SUMMARY AND EVALUATION*, 18 (September 28, 2007).

347 *Id.* at 28.

348 *Letter from Sierra B. Weaver, Senior Attorney, Southern Envtl. L. Ctr., and Ramona H. McGee, Associate Attorney, Southern Envtl. L. Ctr., to Aaron Valenta, Chief, Division of Restoration and Recovery, U.S. Fish & Wildlife Serv., Notice of Initiation of 5-Year Status Review of the Red Wolf*, *RED WOLF COAL.* 2 (Dec. 30, 2019), https://redwolves.com/newsite/wp-content/uploads/2016/01/SELC_five_year_review.pdf.

killed by gunshot.³⁴⁹ From 2004 to 2012, gunshots accounted for seven red wolf deaths per year.³⁵⁰ From 2012 to June 30, 2015 gunshots caused twenty-three of total fifty-eight red wolf deaths.³⁵¹ After a federal district court stopped coyote hunting in red wolf recovery area in May 2014, the number of gunshot deaths dropped from eight in 2012 and nine in 2013 to four in 2014 (only two following the injunction) and four in 2015.³⁵² Nevertheless, the population continued to decline from one hundred in 2014 to less than fifty by 2016.³⁵³ Most of deaths occurred during the fall hunting season, which follows the red wolf mating season.³⁵⁴

Studies show gunshot deaths constitute the largest cause of death for red wolf breeding pairs. From 1991 through 2013, human caused mortality accounted for 41% of the breeding pair disbandment, with gunshots being the primary cause of mortality.³⁵⁵ Red wolves replaced the disbanded pair more than 75% of the time when the pairs were disbanded because of natural causes or management decision.³⁵⁶ Beginning in the mid-2000s human caused mortality has caused the annual preservation rates of red wolf breeding pairs to decline by 34% and the replacement of breeding pairs by red wolves to decline by 30%.³⁵⁷ This increases hybridization and “may indirectly benefit coyotes by removing their primary competitor.”³⁵⁸ Furthermore, gunshot deaths have had a negative effect on the red wolf longevity, reducing their mean life expectancy in the wild to 3.2 years.³⁵⁹

The Department of Justice’s “McKittrick policy” has failed to discourage gunshot mortalities.³⁶⁰ The McKittrick policy is the 1998 informal, unpublished policy of the department, which holds that an individual who kills a protected species will not be prosecuted unless the government can show the individual knew of the protected status of the animal before he killed it.³⁶¹ The McKittrick policy was challenged by environmental groups. The U.S. District Court for the District of Arizona initially found the policy to be arbitrary and capricious in violation of APA.³⁶²

349 *Id.* at 3.

350 *Id.*

351 *Id.*

352 *Id.*

353 *Id.*

354 Joseph W. Hinton et al., *Effects of Anthropogenic Mortality on Critically Endangered Red Wolf (Canis rufus) Breeding Pairs: Implications from Red Wolf Recovery*, 51 *ORYX* 174, 174 (2015).

355 *Id.*

356 *Id.*

357 *Id.*

358 *Id.*

359 *Id.* at 179.

360 *The Status of the Federal Government’s Management of Wolves: Oversight Hearing Before the Subcomm. on Oversight and Investigation of the H. Comm. on Nat. Res.*, 114th Cong. 40–63 (2016) (statement of John Vucetich, Associate Professor, Michigan Technological University).

361 *Id.* at 43.

362 *WildEarth Guardians v. U.S. Dep’t of Justice*, 283 F. Supp. 783, 787 (D. Ariz. 2017) (granting Plaintiffs’ partial summary judgment), *vacated*, 752 F. Appx 421, 422–23 (9th Cir. 2018).

However, the Ninth Circuit reversed and held that the environmental groups lacked standing.³⁶³ Environmental groups asserted that their members would be injured by increased number of wolf killings, frustrating wolf conservation.³⁶⁴ Without the McKittrick policy, there would be more prosecutions of unlawful wolf takings, which would deter individuals from purposely or accidentally killing wolves. The court rejected this line of causation and pointed out that the environmental groups could not show any specific instance where the Department of Justice failed to prosecute an individual because of the McKittrick policy.³⁶⁵ The environmental appellees contentions rested on several layers of speculation, which were insufficient to establish standing.³⁶⁶

Fifth, the taking of red wolves outside the designated areas would not increase social tolerance for red wolf recovery.³⁶⁷ Research shows that the FWS is confusing tolerance for wolves with antipathy toward the federal government. Permitting liberal taking will only incentivize more killing.³⁶⁸

Scientific studies challenge the relationship between lethal predator control and social tolerance. One study found predator poaching is influenced more strongly by social factors, such as peer group norms and government sanctioned predator killing. Tolerance of predators is not enhanced by allowing people to kill them.³⁶⁹ Another study demonstrated that killing wolves does not increase social toleration, but increases wolf poaching. As wolves lost the legal protections that were designed to protect them, the political signal sent to the public resulted in four times as many wolves being killed during the period because the policies seemingly devalued wolves.³⁷⁰ These studies undermine the government's proposition that it is necessary to cull the wolf population to increase social tolerance.³⁷¹

363 *WildEarth Guardians v. U.S. Dep't of Justice*, 752 F. Appx. 421, 422–23 (9th Cir. 2018). Environmental groups were required to show: 1) concrete and particularized injury, 2) traceable to challenged conduct and 3) would likely be redressed by a favorable decision. *Id.* at 423 (citing *Lujan v. Defs. of Wildlife*, 504 U.S. 555, 560–61 (1992)).

364 *Id.* at 423.

365 *Id.*

366 *Id.*

367 *Letter from Joseph W. Hinton et al. to U.S. Fish & Wildlife Serv.*, *supra* note 332, at 5.

368 *Id.*

369 Jeremy Bruskotter & Adrian Treves, *Tolerance for Predatory Wildlife*, 344 *SCIENCE* 479, 477 (May 2, 2014).

370 Guillaume Chapron & Adrian Treves, *Blood Does Not Buy Goodwill: Allowing Culling Increases Poaching of a Large Carnivore*, 283 *PROCEEDINGS OF THE ROYAL SOCIETY B* 1, 5 (May 11, 2016).

371 The Center for Biological Diversity commented that the Treves-Chapron study “disproves a convenient myth used to rationalize government persecution of wolves . . . [by showing] that to decrease poaching, the government should sent the message that wolves have high public value.” *Study: Government Wolf-Killing Reduces Tolerance, Spurs Wolf-poaching*, *CTR. FOR BIOLOGICAL DIVERSITY* (May 11, 2016), https://www.biologicaldiversity.org/news/press_releases/2016/wolf-05-11-2016.html.

**V. RED WOLF TAXONOMY AND NATIONAL ACADEMY OF SCIENCES
REPORT**

The taxonomy of the red wolf has been very controversial. Opponents of red wolf recovery argue that the red wolf is a hybrid – an admixture of gray wolf and coyote – that is not entitled to ESA protections.³⁷² While supporters of red wolf recovery argue that the red wolf is a unique species entitled to ESA protections.

The meaning of species in the ESA is not well defined. The term “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.”³⁷³ The Secretary must use the best available scientific information to define the ESA terms.³⁷⁴ Department of Interior policy for “determining whether a particular taxon or population is a species for purposes of act” requires the Secretary to “rely on standard taxonomic distinctions and the biological expertise of the Department and scientific community concerning the relevant taxonomic group.”³⁷⁵ However, “standard taxonomic distinctions” and “expertise of the Department and the scientific community” are not always clear regarding species distinction.³⁷⁶

The concept of “species” is a tool with limitations, rather than a natural phenomenon. The current scientific definition of species is “a group of actually or potentially interbreeding populations reproductively isolated for other such groups.”³⁷⁷ Reliance on reproductive isolation is dubious because species evolve and closely related species can interbreed, e.g. dogs, coyotes, and wolves. Furthermore, taxonomic categories are suspect in border areas between species where there is often hybridization.³⁷⁸

The red wolf’s listing as a separate species in 1967 was based on morphological data. Between 1973 and 1977, 240 canids were trapped in Louisiana and Texas.³⁷⁹ Forty were selected for captive breeding of which seventeen were deemed pure wolf.³⁸⁰ Of those, fourteen wolves successfully reproduced and became founders, but only twelve are represented in the current genome.³⁸¹

372 *Resolution Requesting that the United States Fish and Wildlife Service Declare the Red Wolf (Canis rufus) Extinct in the Wild and Terminate the Red Wolf Reintroduction Program in Beaufort, Dare, Hyde, Tyrrell, and Washington Counties, North Carolina, N.C.* WILDLIFE RES. COMM’N 2 (Jan. 29, 2015), <https://www.ncwildlife.org/Portals/0/About/documents/2015-01-29-NCWRC-Resolution-Asking-USFWS-Declare-Red-Wolf-Extinct-in-Wild-Terminate-Program.pdf>.

373 16 U.S.C. § 1532 (16) (2018).

374 *Id.* § 1533(b)(1)(A).

375 50 C.F.R. § 424.11(a)–(b) (2019).

376 Oliver Frey, *When Science and the Statute Don’t Provide an Answer: Hybrid Species and the ESA*, 26 DUKE ENVTL. L. & POL’Y F. 181, 183–186 (2015).

377 Holly Doremus, *Listing Decisions Under the ESA: Why Better Science isn’t Always Better Policy*, 75 WASH. U. L.Q. 1029, 1090 (1997).

378 *Id.* at 1097-1104.

379 Heppenheimer et al., *Rediscovery of Red Wolf Ghost Alleles in a Canid Population Along American Gulf Coast*, 9 GENES 618, 619 (2018).

380 *Id.*

381 *Id.*

Genetic studies in the 1990s suggested that the red wolf is not a separate species, but a gray wolf/coyote hybrid.³⁸² This generated a great deal of controversy³⁸³ and several petitions to delist the red wolf.³⁸⁴ The FWS denied the 1997 petition on the grounds that the genetic data was derived from a few studies, which showed that past hybridization had not continued.³⁸⁵ The scientific literature demonstrated that “historic and current red wolves lacked coyote, gray wolf, or hybrid phenotypical and morphological traits.”³⁸⁶ Furthermore, all available data must be utilized and “molecular characteristics are only one piece of the puzzle and are no more valid than other types of scientific evidence, including morphology, behavior, ecology, ontogeny, and paleontology.”³⁸⁷

Nevertheless, scientific debate continued and focused on whether the hybridization was historical or recent. If the hybridization was historical (i.e. thousands of years ago), then the red wolf is an endangered species that should be protected as a vital component of the ecosystem, which disappeared due to human causation. If the hybridization was more recent (i.e. the last few hundred years) then the hybrid red wolf might not deserve ESA protection.³⁸⁸

The FWS sponsored an in-house study by Steven Chambers et al. in 2012, which reviewed the existing scientific literature regarding wolf taxonomy.³⁸⁹ The Obama Administration relied on the study when it proposed delisting the wolf across much of the United States in 2013.³⁹⁰ The Chambers study determined that there were three distinct species of North American wolves: *Canis lupus* (gray wolf), *Canis lycaon* (eastern wolf), and *Canis rufus* (red wolf).³⁹¹ The study specifically acknowledged the hybrid status of

382 See R.K. Wayne & S.M. Jenks, *Mitochondrial DNA Analysis Implying Extensive Hybridization of the Endangered Red Wolf Canis Rufus*, 351 NATURE, 565, 565–568 (1991); M.S. Roy et al., *Patterns of Differentiation and Hybridization in North American Wolflike Canids, Revealed by Analysis of Microsatellite Loci*, 11 MOLECULAR BIOLOGY & EVOLUTION 553, 553–54 (1994).

383 R.M. Nowak and N.E. Federoff, *Validity of the Red Wolf: Response to Roy et al.*, 12 CONSERVATION BIOLOGY 722 (June 1998).

384 See, e.g., *Endangered and threatened species: Red wolf*, 57 Fed. Reg. 1,246 (notice of finding on petition given Jan. 13, 1992) (to be codified at 50 C.F.R. pt. 17); *Endangered and Threatened Wildlife and Plants; 90-Day Finding for a Petition To Delist the Red Wolf*, 62 Fed. Reg. 64,799 (notice of 90-day petition finding given Dec. 9, 1997).

385 *Endangered and Threatened Wildlife and Plants; 90-Day Finding for a Petition to Delist the Red Wolf*, 62 Fed. Reg. at 64,800.

386 *Id.*

387 *Id.*

388 Fred W. Allendorf et al., *The Problems with Hybrids: Setting Conservation Guidelines*, 16 TRENDS IN ECOLOGY & EVOLUTION 613, 613–19 (2001).

389 Steven M. Chambers et al., *An Account of the Taxonomy of North American Wolves From Morphological Genetic Analysis*, 77 N. AM. FAUNA 1 (2012).

390 *Endangered and Threatened Wildlife and Plants; Removing the Gray Wolf (Canis lupus) From the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered*, 78 Fed. Reg. 35,664, 35,665 (proposed June 13, 2013) (to be codified at 50 C.F.R. pt. 17); see also Edward A. Fitzgerald, *Wolf Delisting: Old Wine in New Bottles*, 44 ENVTL. L. REP. NEWS & ANALYSIS 10,413, 10,424 (2014).

391 Steven M. Chambers et al., *An Account of the Taxonomy of North American Wolves from Morphological Genetic Analysis*, 77 N. AM. FAUNA 1 (2012).

red wolf and concluded that “genetic information confirms that most red wolves are closer to coyotes than gray wolf” and are “outside of the gray wolf lineage and . . . not within the species limits of *Canis lupus*.”³⁹² The study found that *Canis lycaon* and *Canis rufus* “remain identifiable lineages that have evolved in North America with the coyote,” but remain separate species.³⁹³ Nevertheless, the study admitted that wolf taxonomy remains open for debate and further inquiry.³⁹⁴

In light of the debate, Congress directed the FWS to conduct an independent study of the red wolf taxonomy in the 2018 Department of the Interior appropriation bill.³⁹⁵ The FWS employed the National Academy of Science (NAS) to conduct an independent assessment of the taxonomic validity of the red wolf. The NAS reached the following conclusions: First, the red wolf is taxonomic valid species that is entitled to ESA protections.³⁹⁶ Second, extant red wolves are morphologically and genetically distinct from extant gray wolves and coyotes.³⁹⁷ Red wolves are not strictly an admixture of wolves or coyotes, but have some gray wolf and coyote genes. Red wolves are genetically more closely related to coyotes than gray wolves, but their social organization and reproductive behaviors are more similar to gray wolves.³⁹⁸ Red wolves will mate with other red wolves when possible, live in packs with rigid social structure, and have one breeding season.³⁹⁹ Finally, extant red wolves have trace ancestry from a historic red wolf.⁴⁰⁰ Morphological and genetic continuity between past and present red wolves is difficult to establish because there are no samples of ancient red wolves. However, extant red wolves possess a degree of genetic ancestry not found in gray wolves or coyotes. Red wolves can trace their genetic heritage to a canid distinct from gray wolves or coyotes.⁴⁰¹ This is supported by findings from canids on Galveston Island, Texas, which possess unique red wolf genes not found in the extant red wolf population.⁴⁰²

Red wolf genes were also found in wild canids in southwest Louisiana.⁴⁰³ Scientists collected mitochondrial DNA from wild canids in southwest Louisiana and discovered that red wolf mitochondrial DNA ancestry persists in 55% of contemporary wild canids sampled.⁴⁰⁴ One animal had 75–100% red wolf ancestry, which is within range of 75% of red wolf, red wolf backcross, or putative red wolf, depending on estimation method.⁴⁰⁵

392 *Id.* at 29.

393 *Id.* at 32–33.

394 *Id.* at 42–44.

395 NAT'L ACAD. OF SCI., ENG'G, & MED., EVALUATING THE TAXONOMIC STATUS OF THE MEXICAN GRAY WOLF AND RED WOLF 1 (2019).

396 *Id.* at 6.

397 *Id.*

398 *Id.* at 4–5.

399 *Id.*

400 *Id.* at 5–6.

401 *Id.*

402 *Id.* at 5.

403 *Id.*; see also Sean M. Murphy et al., *Substantial Red Wolf Genetic Ancestry Persists in Wild Canids of Southwestern Louisiana*, 12 CONSERVATION LETTERS 12,621 (2018).

404 See NAT'L ACAD. OF SCI., ENG'G, & MED., *supra* note 395, at 62.

405 *Id.*; Murphy et al., *supra* note 403.

These recent findings pose interesting possibilities for future red wolf recovery.⁴⁰⁶ First, it may be possible to recover the ghost genes through “de-introgression,”⁴⁰⁷ which breeds admixed individuals in a specific way that is designed to recover the extinct genes. Red wolves can be bred with wild hybrid canids with the goal of recovering the lost genes and strengthening the red wolf genome.⁴⁰⁸ Second, the FWS could also extend a degree of ESA protections to wild hybrid canids in the southeast that carry red wolf genes.⁴⁰⁹ Third, the FWS could adopt an alternative policy that views introgression as a natural evolutionary process that allows the species to adapt to ecological and anthropomorphic changes, such as climate change, loss of habitat, limited reproductive possibilities.⁴¹⁰ Hybridization preserves elements of taxon, enabling it to survive. The original red wolf recovery plan called for three reintroduction sites. The FWS could establish new reintroduction sites in the southeast within the historic range of the red wolf. Extant red wolves could be released into the recovery areas and allowed to mate with wild canids, which have red wolf ghost genes.⁴¹¹ This would create a hybrid, which would be more adaptable to ecological changes and preserve the red wolf genome. The latter two alternatives would require the FWS to establish a hybrid policy.

The Department of the Interior has attempted to develop a hybrid policy. The Department of the Interior Solicitor in 1977 determined that the ESA covered hybrids. The Solicitor relied on the statutory language (“fish and wildlife”) and held that the term included any offspring of an endangered or threatened species.⁴¹² The FWS asked

406 Bridgett von Holdt, Princeton University professor, stated: “Coyote populations may more likely represent a mosaic collection of individuals with diverse histories, with some possibly carrying the remnants of an extinct species. We hope that these findings resonate with policymakers and managers, and influence how we think about endangered genetics.” Meilian Solly, *Pack of Wild Dogs in Texas carry DNA of Nearly Extinct Red Wolf*, SMITHSONIAN MAG., (Jan. 14, 2019), <https://www.smithsonianmag.com/smart-news/wild-canines-carry-dna-red-wolf-long-believed-extinct-180971252/>.

407 *See id.*

408 *See* NAT’L ACAD. OF SCI., ENG’G, & MED., *supra* note 395, at 24; *see also* Solly, *supra* note 406.

409 Solly, *supra* note 406. Dr. Ron Sutherland, a scientist with Wildlands Network, stated: “From a practical conservation biological standpoint, these animals have special DNA and they deserve to be protected.” *Extinct wolves may have found newfound cousins*, WASH. POST (Jan. 21, 2019), https://www.washingtonpost.com/lifestyle/kidspost/extinct-wolves-may-have-newfound-cousins/2019/01/18/aca3bc18-1b34-11e9-88fe-f9f77a3bcb6c_story.html. However, Texas Parks and Wildlife Department declared the Galveston discovery is “interesting, [but] we don’t anticipate any regulatory changes or implications in Texas at this time.” *Id.*

410 *See* NAT’L ACAD. OF SCI., ENG’G, & MED., *supra* note 395, at 23.

411 *See* NAT’L ACAD. OF SCI., ENG’G, & MED., *supra* note 395, at 23; *see also* Comment from Ron Sutherland, Wildlands Network, to U.S. Fish & Wildlife Serv., *supra* note 222, at 10–11; Robert K. Wayne and H. Bradley Shaffer, *Hybridization and Endangered Species Protection in the Molecular Era*, 25 MOLECULAR ECOLOGY 2680 (2016); Bridgett M. von Holdt et al., *Redefining the Role of Admixture and Genomics in Species Conservation*, 11 CONSERVATION LETTERS 12,371 (2017).

412 Kevin D. Hill, *The ESA: What Do We Mean By Species?*, 20 B.C. ENVTL. AFF. L. REV. 239, 243–45 (1993) (citing Memorandum from Assistant Solicitor, U.S. Fish & Wildlife Serv., to Chief, Division of Law Enforcement, U.S. Fish & Wildlife Serv. (May 18, 1977)).

for reconsideration. The Solicitor reversed his position and held that the ESA did not protect hybrids because they disrupt the parent gene pool and compete with natural species.⁴¹³ Furthermore, protection of hybrids was contrary to congressional intent “to preserve the genetic purity and diversity of disappearing species.”⁴¹⁴

The Solicitor reaffirmed this interpretation in 1983 and held that hybrids between two listed species—red wolf and gray wolf—were not entitled to protection.⁴¹⁵ The Solicitor stated:

While the entire genetic stock of such a hybrid would be that of the two endangered species, it would not be in such a form as to protect either of the two pure genetic stocks of the parents. If two wolves of the type at issue here (hybrids between red and gray) were themselves to be bred, they would not produce purebred red wolves and purebred gray wolves. The genetic heritage of the gray wolf and the red wolf would thus not be conserved by the protection of the hybrids.⁴¹⁶

The FWS softened its stance on hybrids in 1990.⁴¹⁷ It determined that “new scientific information concerning genetic introgression . . . [indicates] that the rigid standards set out in those previous opinions should be revisited . . . [and that] the issue of ‘hybrids’ is more properly a biological issue than a legal one.”⁴¹⁸

The FWS and National Marine Fisheries Service in 1996 proposed the “intercross policy” that would allow listing of hybrids when they “more closely resemble a parent belonging to a listed species than they resemble individuals intermediate between their listed and unlisted partner.”⁴¹⁹ The proposal was not finalized, but never withdrawn.⁴²⁰

413 *Id.*

414 *Id.* at 260 (citing Memorandum from Assistant Solicitor, U.S. Fish & Wildlife Serv., to Deputy Assoc. Dir., Federal Assistance, U.S. Fish & Wildlife Serv. (Aug. 2, 1977)).

415 *Id.* at 245–47 (citing Memorandum from Assistant Solicitor, U.S. Fish & Wildlife Serv., to the Regional Solicitor, Ne. Region, FWS (Sept. 21, 1983)).

416 *Id.* at 246 (citing Memorandum from Assistant Solicitor, U.S. Fish & Wildlife Serv., to the Regional Solicitor, Ne. Region, FWS (Sept. 21, 1983)).

417 Frey, *supra* note 376, at 188–89.

418 Endangered and Threatened Wildlife and Plants; Proposed Policy and Proposed Rule on the Treatment of Intercrosses and Intercross Progeny (the Issue of “Hybridization”); Request for Public Comment, 61 Fed. Reg. 4,710 (proposed Feb. 7, 1990) (to be codified at 50 C.F.R. pt. 424); Fred W. Allendorf & Susan M. Haig, *Hybrids and Policy*, in 2 THE ENDANGERED SPECIES ACT AT THIRTY 150, 152 (H. Michael Scott, Dale D. Goble, Frank W. Davis eds. 2006).

419 The proposed hybrid policy allowed the listing of “‘hybrid’ individuals that more closely resemble a parent belong to a listed species than they resemble individuals intermediate between their listed and unlisted parents. The Services propose to add to their joint regulations the terms ‘intercross’ and ‘intercross progeny’ and indicate the inclusion of intercross individuals within the original listing action for the parent entity. The proposed policy is intended to allow the Services to aid in the recovery of listed species by protecting and conserving intercross progeny, eliminating intercross progeny if their presence interferes with conservation efforts for a listed species, and fostering intercrossing when this would preserve remaining genetic material of a listed species. The proposed policy would only sanction these actions where recommended in an approved recovery plan, supported in an approved genetics management plan (which may or may not be part of an approved recovery plan), implemented in a scientifically controlled and approved manner, and undertaken

In 2000, both agencies adopted a new policy regarding the controlled propagation of species listed under the ESA.⁴²¹ The policy permits the use of intercross or hybrid species in a recovery plan under certain conditions.⁴²²

VI. ONGOING LITIGATION

The CBD has brought suit, alleging that the FWS's failure to develop a new recovery plan for the red wolf violates section 4(d) and 7(a)(1) of the ESA.⁴²³ The FWS must "develop and implement a recovery plan 'for the conservation and survival of any threatened or endangered species' that will benefit from such a plan."⁴²⁴ The plan must contain site management actions, objective and measurable criteria for removing species from the list, and an estimate of the time required and costs to carry out the plan's goals.⁴²⁵ The plan is "supposed to be a basic roadmap to recovery" that provides "a means for achieving the species's long-term survival in nature."⁴²⁶ The last recovery plan was created in 1990. The CBD petitioned the FWS for an updated red wolf recovery plan in 2016, but no action has been forthcoming. The CBD stated: "The red wolf can be saved . . . and hopeful[ly] this lawsuit will spur a new plan where science, not politics, drives management of the world's most endangered animal."⁴²⁷

to compensate for a loss of genetic viability in listed taxa that have been genetically isolated in the wild as result of human activity." Fred W. Allendorf & Susan M. Haig, *Hybrids and Policy*, in 2 THE ENDANGERED SPECIES ACT AT THIRTY 150, 154 (H. Michael Scott, Dale D. Goble, Frank W. Davis eds. 2006).

420 *Id.* at 152–54.

421 *Id.* at 154.

422 The policy regarding hybrids states: "Intercrossing will not be considered for use in controlled propagation programs unless recommended in an approved recovery plan; supported in an approved genetic management plan (if information is available to develop such a plan, and which may or may not be part of an approved recovery plan); implemented in a scientifically controlled and approved manner; and undertaken to compensate for a loss of genetic viability to listed taxa that have been genetically isolated in the wild as a result of human activity. Use of intercross individuals for species conservation will require the approval of the FWS Director or that of the NMFS Assistant Administrator, in accordance with all applicable policies." *Id.* at 154–55.

423 *Lawsuit launched over Trump admin failure to update red wolf recovery plan*, CTR. FOR BIOLOGICAL DIVERSITY (June 19, 2019), <https://biologicaldiversity.org/w/news/press-releases/lawsuit-launched-over-trump-administration-failure-update-outdated-red-wolf-recovery-plan-2019-06-19/>; *Letter from Ctr. for Biological Diversity to Daniel Ashe*, *supra* note 54.

424 16 U.S. § 1533(f)(1) (2018).

425 *Id.*

426 *Fund for Animals v. Babbitt*, 903 F. Supp. 96, 103 (D.D.C. 1995).

427 *Lawsuit launched over Trump admin failure to update red wolf recovery plan*, *supra* note 423; *Letter from Ctr. for Biological Diversity to Daniel Ashe*, *supra* note 54.

VII. CONCLUSION

The red wolf is one of the most endangered species on the planet.⁴²⁸ The red wolf was introduced into the ARNWR in 1987 as non-essential experimental population. Its population expanded until 2006 but has been decreasing since 2007. The FWS has been reluctant to continue the recovery of the species, but the federal courts, particularly the U.S. District Court for the Eastern District of North Carolina, have been instrumental at sustaining red wolf recovery.

In the latest round of litigation, *Red Wolf Coalition v. FWS*, the federal district court took a hard-look at the FWS's change in policy. The court correctly determined the FWS grant of lethal take permits to two landowners violated section 9 of the ESA because the FWS did not attempt to capture the red wolf before issuing the permits. The FWS violated the conservation mandates of section 4 and 7 of the ESA by authorizing the lethal take permits and abandoning adaptive management, which included the release of captive wolves, the cross fostering of red wolf pups, and the sterilization of placeholder coyotes. The FWS's failure to consider the environmental impacts of its change in policy violated NEPA.

The FWS has proposed a new rule regarding the management of the red wolf population. The proposal would restrict the area that wild red wolves can inhabit, limit the number of red wolves allowed to occupy the area, and allow the taking of red wolves outside the limited area. The FWS is required to base its decision on best available science. The FWS's proposal has been criticized by almost all prominent red wolf experts. Dr. Ron Sutherland, Wildland Network, declared: "[T]he [FWS] have got tired of trying to save controversial species like wolves. They do not have the budget or the backing of Congress. It's easier to let the wolves decline to a point where they can just pull the plug and we're very nearly at that point."⁴²⁹

The taxonomy of the red wolf has been controversial. The National Academy of Sciences in 2019 determined that the red wolf is a distinct species entitled to ESA protection. This study legitimized red wolf recovery. The academy based its conclusion in part on finding of red wolf ghost genes in wild canids in the southeast. The discovery of red wolf ghost genes poses some interesting possibilities for future red wolf recovery. These wild canids can be captured and bred with the extant red wolves. De-introgression will restore the full red wolf genome. The FWS could extend ESA protections to the wild canids as red wolf hybrids. The FWS could establish new reintroduction areas in the southeast, within the red wolf's historic range. Extant red wolves could be released in these areas and allowed to mate with the wild hybrid canines in the region. This introgression would produce a more ecologically adapted hybrid species and preserve the red wolf genome. Either of the latter two possibilities would necessitate the creation of hybrid policy that has been attempted, but never formalized.

428 Abbie Bennett, *Trump Administration 'Threatens' NC's Endangered Red Wolves, Other Species, Report Says*, NEWS & OBSERVER (Dec. 18, 2018), <https://www.newsobserver.com/news/local/article223270610.html>.

429 Oliver Milman, *Red Wolf: The Struggle to Save One of the Rarest Animals on Earth*, GUARDIAN (Mar. 7, 2019), <https://www.theguardian.com/environment/2019/mar/07/red-wolf-endangered-species>.

The FWS needs to abandon the 2018 proposal and revive adaptive management. New reintroduction sites must be established, and new policies implemented. The shooting of red wolves must be stopped, and offenders must be prosecuted. The FWS must acknowledge and meet public demands. The Defenders of Wildlife observed: “[T]he American public has expressed overwhelming support for the red wolf. FWS must heed this call, recommit to proven management strategies and work to prevent the extinction of the world’s most endangered wolf.”⁴³⁰ CBD declared: “Citizens from the recovery are, across the state and around the country clearly want the feds to do more, not less, to protect the world’s most endangered wolf.”⁴³¹

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430 *Analysis: Public Overwhelmingly Opposes Plan to Curtail Red Wolf Recovery in North Carolina*, CTR. FOR BIOLOGICAL DIVERSITY (Nov. 1, 2018), https://www.biologicaldiversity.org/news/press_releases/2018/red-wolf-11-01-2018.php.

431 *Id.*

COMPARING COMPACTS: EXAMINING THE SUPREME COURT’S DECISION IN *MONTANA V. WYOMING* TO EVALUATE *TEXAS V. NEW MEXICO* REGARDING THE RIO GRANDE COMPACT

BY EUGENE C. WHITE

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I. INTRODUCTION

The state of Colorado, the state of New Mexico and the [s]tate of Texas, desiring to remove all causes of present and future controversy among these states and between citizens of one of these states and citizens of another state with respect to the use of the waters of the Rio Grande . . . and for the purpose of effecting an equitable apportionment of such waters, have resolved to conclude a compact for the attainment of these purposes¹

1 N.M. STAT. ANN § 72-15-23 (1938).

In the arid western United States, water comes at a premium, and determining the allocation of such a precious and vital resource can be a sensitive subject. Such sensitivity increases when competing interest for a claim in water are between two separate states as opposed to private persons. To best serve the broad interests of each state, and remove the potential for controversy between states, compacts are often formed as a way to establish a baseline law for allocation.² These compacts, or interstate agreements approved by Congress, are contracts between states. Compacts are the Supreme Court-preferred method to allocate water between states.³ The Court has used interstate water compacts twenty-two times, compared to three Supreme Court decrees and two congressional allocations, to allocate water between the states.⁴ The stated purpose of these compacts, according to the above-quoted language, is to remove the potential for both present and future conflicts.⁵ But lengthy and expensive litigation often ensues.

This article explores two interstate compact cases by comparing the differences to examine any predictive quality between the two and addresses some unresolved issues that stem from *Texas v. New Mexico*. The Supreme Court's holding in *Montana v. Wyoming* established that Montana failed to state a claim, and that Wyoming's use of newer irrigation technology did not run afoul with the spirit of the compact.⁶ But Montana was entitled to some compensation for water not delivered in the amount required by the compact as determined by the Special Master appointed by the Supreme Court.⁷ In *Texas v. New Mexico*, the Court followed the Special Master's recommendation that Texas's claim is valid.⁸ Furthermore, the Court will likely determine that by delivering the water to the Elephant Butte Reservoir (EBR) as required, but then removing a portion prior to the delivered water reaching Texas, New Mexico is liable for the portion of water not delivered under the compact.⁹

To provide a comprehensive treatment of the individual cases, Part II will provide the factual and procedural history for each case denoting the similarities and differences that may affect the Court's upcoming determination.¹⁰ Next, in Part III, the paper addresses the applicable doctrines of water appropriation and discusses the conditions set forth in the Rio Grande Compact.¹¹ Part III will also address the Supreme Court's use of the Special Master in determining highly technical cases, such as the water law disputes

2 *Id.*

3 *Id.*

4 *Id.*

5 Yellowstone River Compact Comm'n, *History of the Compact*, USGS: WATER RES., https://www.usgs.gov/mission-areas/water-resources/science/yellowstone-river-compact-commission?qt-science_center_objects=0#qt-science_center_objects (last visited Mar. 3, 2020) (indicating that one of the charges of the Compact was to "further intergovernment cooperation and remove causes of controversy over distribution and use of water.").

6 *Montana v. Wyoming*, 358 U.S. 368, 368 (2011).

7 Office of the Special Master, *Opinion of the Special Master on Remedies*, No. 137, 1, 7 (Dec. 19, 2016) [hereinafter *Special Master Opinion*].

8 *Texas v. New Mexico et al.*, 138 S. Ct. 954, 960 (2018) (indicating that the Court denied New Mexico's motion to dismiss Texas's complain at the recommendation of the Special Master).

9 *See generally id.*

10 *See infra* Part II.

11 *See infra* Part III.

present in the respective cases. Part IV offers a commentary addressing the predictive value of examining the Supreme Court's holding in *Montana v. Wyoming*. Part IV also offers a suggestive holding that clarifies both states' rights claims as well as federal claims under the compact.¹² Next, Part V discusses unresolved issues in anticipation of a long and drawn-out legal battle between the compact states.¹³ Finally, Part VI concludes and recaps the comparisons between the two cases, any predictive information generated through those comparisons, and reiterates the suggestive holding that may alleviate otherwise unresolved issues.¹⁴

II. BACKGROUND: EXAMINING THE FACTUAL AND PROCEDURAL HISTORY BETWEEN THE TWO WATER COMPACT CASES

A. FACTUAL AND PROCEDURAL HISTORY: *TEXAS V. NEW MEXICO*

In 1938, the States of New Mexico, Texas, and Colorado signed the Rio Grande Compact as the result of a conflict over the apportionment of water from the Rio Grande River.¹⁵ The Compact was born of earlier legislation, including determination by an Irrigation Congress held in 1904, under which Congress established the Rio Grande Reclamation Project (the Project) of 1905.¹⁶ The Project allowed for construction of a dam along the Rio Grande, which resulted in Elephant Butte Reservoir (EBR).¹⁷ The Rio Grande Compact requires the signatory states apportion the water pursuant to the recommendation of the 1904 Irrigation Congress, which is dependent on the amount of irrigable land in each state, also known as "project lands."¹⁸

In 2014, pursuant to the United States Supreme Court's Article III original jurisdiction to hear cases between states, the Court allowed Texas to file a complaint regarding its rights under the Rio Grande Compact.¹⁹ In its complaint, Texas alleged that New Mexico violated the terms set forth in the Rio Grande Compact by allowing water delivered to the EBR to be retaken below the reservoir and used in New Mexico, which negatively affected the amount of water reaching Texas.²⁰ Further, Texas alleged that New Mexico allowed both individuals and state entities to divert surface and ground-water from downstream of the reservoir.²¹

Other interested parties add to the complexity of the case and the far-reaching implications a Supreme Court decision may have on the region. First, Colorado was also

12 See *infra* Part IV.

13 See *infra* Part V.

14 See *infra* Part VI.

15 Simon Bord & Katherine Thibodeau, *Texas v. New Mexico and Colorado*, CORNELL LAW SCH. LEGAL INFO. INST., https://www.law.cornell.edu/supct/cert/141_orig (last visited Mar. 8, 2018).

16 *Id.*

17 *Id.*

18 *Id.*

19 *Id.*

20 *Id.*

21 *Id.*

named in the complaint Texas filed as a party to the Rio Grande Compact.²² During this early stage in the litigation, Colorado did not take a strong position in the matter.²³ Second, the United States filed a complaint in intervention, claiming a right to intervene to protect certain federal interests.²⁴ Of chief concern among those federal interests is a treaty between the United States and Mexico to share a certain amount of water from the Rio Grande River.²⁵

In response, New Mexico filed motions to dismiss Texas's and the United States' complaints later in 2014.²⁶ In its motion to dismiss, New Mexico argued that both complaints failed to state a claim upon which relief can be granted because New Mexico's duty under the compact is only to deliver water to the EBR, not to ensure delivery to Texas from the reservoir.²⁷ The Supreme Court referred these motions to appointed Special Master A. Gregory Grimsal for consideration.²⁸ In his First Interim Report, Special Master Grimsal recommended that the Court deny New Mexico's motion to dismiss Texas's complaint.²⁹ The Supreme Court began hearing oral arguments on January 8, 2018.³⁰ In early 2018, the Supreme Court determined that the United States could intervene, dealing a blow to the New Mexico defense strategy.³¹ At a meeting held in August 2018, the Special Master set forth a deadline of summer 2020 for the close of discovery, meaning the case will go to trial no later than fall 2020.³²

B. FACTUAL AND PROCEDURAL HISTORY: *MONTANA V. WYOMING*

Montana v. Wyoming involved some issues like the dispute in *Texas v. New Mexico*. Namely, it centered around apportionment of irrigation water under a federal compact. The Yellowstone River is a major water source spanning nearly seven hundred miles, from its Wyoming headwaters through Montana and into North Dakota, before eventually joining the Missouri River.³³ In an area where water resources are scarce and highly sought-after, management of the Yellowstone River waters was controversial among those three states. Before it would fund any new water storage facilities, Congress required that Wyoming, Montana, and North Dakota come to an agreement on the allocation of the Yellowstone River and granted the states permission to negotiate a compact in 1932.³⁴ In what could be considered a testament to the controversial nature of water

22 See generally *Texas v. New Mexico et al.*, 138 S. Ct. 954 (2018); Mariam Morshedi, *Texas v. New Mexico and Colorado*, SUBSCRIPT L. (Jan. 3, 2018), <http://www.subscriptlaw.com/blog/texas-v-new-mexico>.

23 Morshedi, *supra* note 22.

24 Bord & Thibodeau, *supra* note 15.

25 Morshedi, *supra* note 22.

26 Bord & Thibodeau, *supra* note 15.

27 *Id.*

28 *Id.*

29 *Id.*

30 *Id.*

31 Laura Paskus, *As NM's water situation worsens, SCOTUS battle over the Rio Grande intensifies*, NM POLITICAL REPORT (June 1, 2019 10:31PM), <https://nmpoliticalreport.com/2018/09/27/as-nms-water-situation-worsens-scotus-battle-over-the-rio-grande-intensifies-en/>.

32 *Id.*

33 *Montana v. Wyoming*, 538 U.S. 368, 371 (2011).

34 *Id.* at 372.

allocation, draft compacts were introduced in 1935, 1942, and 1944, but the states were unable to secure an agreement until in 1951, when they finally ratified the Yellowstone River Compact with the consent of Congress.³⁵

The Yellowstone River Compact divided the water into three priority tiers.³⁶ First, the Compact stated that beneficial uses existing in each state as of January 1, 1950 would continue according to the laws of the state governing them under the doctrine of prior appropriation.³⁷ Second, the quantity of water necessary for providing supplemental water supplies for the pre-1950 uses would be allocated to the states.³⁸ Third, the remaining unused or unappropriated water of each tributary would be allocated by percentage between Wyoming and Montana.³⁹

In 2008, the Supreme Court granted Montana leave to file a complaint against Wyoming for breaching the Yellowstone Compact by overconsumption on the Tongue and Powder Rivers, which are both tributaries of the Yellowstone.⁴⁰ Specifically, the complaint alleged that Wyoming was appropriating water for a number of new, post-1950 uses, including increasing consumption on existing acreage, irrigating new acreage, building new water storage facilities, and conducting new groundwater pumping.⁴¹ Wyoming responded to the complaint by filing a motion to dismiss and, as in the dispute between Texas and New Mexico, the Court referred the motion to a Special Master.⁴² The Special Master recommended the Court deny the motion and determined that at least some of Montana's allegations sufficiently stated a claim.⁴³ The Special Master also agreed with Wyoming and rejected Montana's argument that Wyoming violated the Yellowstone River Compact by changing from flood to sprinkler irrigation and effectively increasing the consumption on previous acreage.⁴⁴

The Supreme Court's holding echoed these recommendations. The Court determined that, under the basic doctrine of prior appropriative rights, followed by both Montana and Wyoming and listed in the Yellowstone River Compact, Montana had failed to state a claim as to its increased efficiency and consumption argument because increasing efficiency was not addressed at the time the Compact was entered by the parties.⁴⁵ On remand, the Special Master returned a finding that Wyoming was liable to Montana for water shortages in the Tongue River of 1,300 acre feet in 2004 and 56 acre feet in 2006.⁴⁶ This finding led to a final judgment for Montana for \$20,340 plus an award for

35 *Id.*

36 *Id.*

37 *Id.*

38 *Id.*

39 *Id.*

40 *Id.* at 372–73.

41 *Id.* at 373.

42 *Id.*

43 *Id.*

44 *Id.* at 373–74.

45 *Id.* at 368.

46 Office of the Special Master, Opinion of the Special Master on Remedies, No. 137 at 7 (Dec. 19, 2016).

costs of \$67,270.87.⁴⁷ The ruling provided only a pyrrhic victory for Montana, which incurred almost \$4.6 million in legal fees.⁴⁸

III. APPLICABLE LAW: PERTINENT WATER ALLOCATION DOCTRINE AND THE SUPREME COURT'S ENGAGEMENT OF A SPECIAL MASTER

This Part examines the relevant water law in each state and described in the compacts that form the basis for each respective dispute. In both cases, the courts primarily apply the prior appropriation doctrine. Prior appropriation is a system based on priority rather than strictly focusing on land ownership like its counterpart, the riparian rights doctrine, which predominates water rights in the eastern states.

A. PRIOR APPROPRIATION DOCTRINE

In its simplest terms, the doctrine of prior appropriation is “first in time, first in right,” where merely owning land does not provide any right to use water found in watercourses on or next to the land.⁴⁹ Instead, a water user can appropriate water by applying it to a “beneficial use.”⁵⁰ Traditionally, instream uses for fishing or recreation were not considered beneficial and could not serve as the basis of an appropriation.⁵¹ Rather, a diversion of the stream was required to support a claim.⁵² This strict diversion requirement has been relaxed in most jurisdictions over recent decades to account for appropriations favoring instream uses as well.⁵³ A water appropriator can lose their appropriation if they cease using their appropriated share of the water for the designated beneficial use or change the use for which the original appropriation was granted.⁵⁴

Following the notion of “first in time, first in right,” the prior appropriation system operates on strict seniority.⁵⁵ This means that senior appropriators’ rights are completely satisfied in times of drought before junior appropriators are allowed any water at all.⁵⁶ The strict seniority system results in the oldest, most senior rights being more valuable than many of the more junior rights in a given watercourse.⁵⁷ Although the prior appropriation doctrine was, at its origin, a common law instrument, most western states oper-

47 *Montana v. Wyoming*, OYEZ, <https://www.oyez.org/cases/2017/137-orig> (last visited Mar 12, 2018).

48 Matthew Brown, *Ruling Backs Montana’s Right to Tongue River Water for Reservoir*, BILLINGS GAZETTE (Dec. 21, 2016), http://billingsgazette.com/news/state-and-regional/montana/ruling-backs-montana-s-right-to-tongue-river-water-for/article_178ab09d-77f6-547c-b6f4-de5a6dbc5b4e.html.

49 BARTON H. THOMPSON, JR., JOHN D. LESHY & ROBERT H. ABRAMS, *LEGAL CONTROL OF WATER RESOURCES* 168 (5th ed. 2013).

50 *Id.*

51 *Id.*

52 *Id.*

53 *Id.*

54 *Id.* at 170.

55 *Id.* at 171.

56 *Id.*

57 *Id.*

ating under the doctrine have transitioned to a permit system responsible for recognizing new appropriations.⁵⁸

Although all states west of the 100th meridian function under the system of prior appropriation,⁵⁹ there is disparity between some states as to whether any riparian rights, or rights that run with the land, are given any effect. Montana, Wyoming, New Mexico, and Colorado exclusively follow the prior appropriation system exclusively, while Texas and North Dakota incorporate some riparian rights that were in use when the riparian system was abandoned.⁶⁰ These discrepancies pose challenges to interstate water allocations, which the adoption of federal compacts, such as the Yellowstone River Compact and the Rio Grande Compact, are designed to alleviate.

B. THE YELLOWSTONE RIVER COMPACT

In *Montana v. Wyoming*, the dispute offers a classic example of the need to clarify the compacting states' intent at the time the Compact was entered and the need for interpretations that are consistent with that intent going forward. The preamble of the Yellowstone River Compact addresses, in general terms, the interest in reducing interstate conflicts, stating that the goal is to "remove all causes of present and future controversy between said States . . . with respect to the waters of the Yellowstone and its tributaries."⁶¹ Under the Yellowstone River Compact's language, pre-and post-1950 water users could expect some differentiation between their appropriated rights. The Compact states that pre-1950 users possessed "appropriative rights to the beneficial uses of the river water."⁶² For post-1950 water allocations, however, the Compact states that "unused and appropriated waters" as of January 1, 1950, are appropriated under certain quantitative calculations, for water allocations based on post-1950 uses.⁶³

The Yellowstone River Compact references the prior appropriation doctrine and the idea that water uses prior in time are also prior in right, stating that this sentiment was the "cardinal rule of the doctrine."⁶⁴ The Compact goes on to address typical aspects of prior appropriation, such as the use of diversion to direct the water toward a beneficial use and the notion that the forfeiture of an appropriative right if the use ceases to be beneficial.⁶⁵ Through its Special Master, the Supreme Court interpreted the Compact's language as addressing only the amount of water that could be diverted, as opposed to consumed, by pre-1950 water uses in Wyoming.⁶⁶ This interpretation led the Court to determine that a change in the functionality of irrigation devices in Wyoming, from

58 *Id.* at 172.

59 *Montana v. Wyoming*, 538 U.S. 368, 375 (2011) (discussing the commonality of the prior appropriations doctrine amongst the western states since the 1800s).

60 THOMPSON, ET AL., *supra* note 49, at 168.

61 Yellowstone River Compact, Pub. L. No. 82-231, 65 Stat. 663 (1951).

62 Shiran Zohar, *A Deal is a Deal in the West, or is It?* *Montana v. Wyoming and the Yellowstone River Compact*, 6 DUKE J. CONST. L. & PUB. POL'Y SIDEBAR 160, 162 (2011) (discussing the distinction between pre-and post-1950 appropriative uses under the Yellowstone River Compact).

63 *Id.* at 162–63.

64 *Id.* at 164.

65 *Id.*

66 *Id.* at 166.

flood irrigation to sprinkler systems, did not run afoul of the intention of the Yellowstone River Compact at the time of its adoption.⁶⁷

C. THE RIO GRANDE COMPACT

In *Texas v. New Mexico*, the dispute centers around the intent of the compacting states to the Rio Grande Compact regarding the delivery of the agreed upon amount of water at the time the Compact was signed.⁶⁸ Indeed, the preamble of the Rio Grande Compact, similar to the Yellowstone River Compact, addresses the need to alleviate controversy among the compacting states.⁶⁹ To address potential controversy, the Rio Grande Compact requires extensive data collection through specific gauges at twelve sites, including below the disputed EBR.⁷⁰ The Compact also requires that concurrent records of the Rio Grande be kept at three specific sites along the water course, including the EBR, so that these records could be used to correlate future data.⁷¹ Article I of the Compact defines the term “project storage” as the “combined capacity of Elephant Butte Reservoir and all other reservoirs actually available for the storage of usable water below Elephant Butte and above the first diversion to lands of the Rio Grande project, but not more than a total of 2,638,860 acre-feet.”⁷²

The Rio Grande Compact also defines terms and prescribes requirements concerning water use, and debt owed by signatory states. The Compact states that for any year in which the aggregate of accrued debts of Colorado and New Mexico were in excess of the unfilled capacity of project storage, those debts would be reduced proportionally to a combined amount that equals the minimum unfilled capacity.⁷³ Article VII of the Compact requires that neither Colorado nor New Mexico increase the amount of stored water in reservoirs built after 1929 if there is less than 400,000 acre-feet of useable water in project storage.⁷⁴ Under the recommendation of the 1904 Irrigation Congress, the Compact also requires states to apportion the water dependent upon the amount of land deemed irrigable in each state, also known as “project land.”⁷⁵

In Article XVI, the Compact expressly states that nothing contained within the agreement itself should be construed to affect the obligations between the United States and Mexico.⁷⁶ Article XI also provides that the Compact’s language serves as an agreement between New Mexico and Texas that, as of the effective date, will settle how “all controversies between said states relative to the quantity or quality of the water of the Rio Grande are composed and settled.”⁷⁷ Article XI goes on to seemingly foreshadow potential new conflicts by proclaiming that nothing in the Compact prevents a signatory

67 *Montana v. Wyoming*, 538 U.S. 368, 371 (2011).

68 Morshedi, *supra* note 22.

69 *See supra* Part I.

70 N.M. STAT. ANN. § 72-15-23 (1938).

71 *Id.*

72 *Id.*

73 *Id.*

74 *Id.*

75 Bord & Thibodeau, *supra* note 15.

76 N.M. STAT. ANN. § 72-15-23 (1938).

77 *Id.*

state from seeking redress from the Supreme Court if one state causes injury to another by changing the quantity or quality of the water at the point of delivery.⁷⁸

D. IMPLEMENTATION OF A SPECIAL MASTER

One notable similarity between these two federal water compact disputes is the Court's reliance on a Special Master. Supreme Court appointments of Special Masters in original jurisdiction cases is not a new practice, but rather dates back to the early twentieth century. In 1908, the Court utilized a Special Master in a case between Virginia and West Virginia.⁷⁹ Currently, these appointments are ordinary practice. Special Masters' duties encompass a wide range of fact finding and legal decision-making, including taking evidence, issuing subpoenas, fixing conditions for additional filings, and entertaining motions.⁸⁰

One interesting aspect of interstate water disputes is the Court's departure from the typical practice of appointing either senior or retired federal judges in favor of appointing water law experts, many of whom have never sat on a judicial bench.⁸¹ Professor Elizabeth Sarine's research shows that twelve out of sixteen Special Masters appointed in interstate water disputes between 1933 and 2011 were either attorneys or law professors who specialized in water law, compared with only four who were retired judges.⁸² By appointing a Special Master with unique expertise in water law, the Court gains assistance in evaluating highly scientific and technical evidence, as well as education on specialized subject matter.⁸³ Utilizing such expertise may be invaluable to the Court when deciding cases involving interstate water compacts.

IV. COMMENTARY

A. BRIEF SYNOPSIS AND COMPARISON OF THE LEGAL ARGUMENTS

In its complaint against New Mexico, Texas alleges a violation of the Rio Grande Compact due to New Mexico allowing, and even authorizing, water delivered to the EBR to be intercepted and used in New Mexico before making it to Texas.⁸⁴ Texas alleges that New Mexico continues to allow both individuals and entities to intercept surface and groundwater that, by right, belongs to the state of Texas under the Compact.⁸⁵ New Mexico counters this position by arguing that it is delivering water to the EBR, and nothing in the Compact requires it to deliver water anywhere past the reservoir.⁸⁶ The crux of the argument turns on the intent of the parties at the time of the

78 *Id.*

79 L. Elizabeth Sarine, *The Supreme Court's Problematic Deference to Special Masters in Interstate Water Disputes*, 39 *ECOLOGY L.Q.* 535, 550 (2012) (discussing the history and expansion of the Supreme Court's reliance on Special Masters in cases of original jurisdiction).

80 *Id.* at 550–51.

81 *Id.* at 553.

82 *Id.*

83 *Id.* at 554–55.

84 Bord & Thibodeau, *supra* note 15.

85 *Id.*

86 Morshedi, *supra* note 22.

signing of the Compact and what it really means to “deliver” the water, as stated in the language of the clause at issue. To that end, Texas argues that, under the Compact, “deliver” means to “surrender” control and that, under that interpretation, New Mexico effectively contracted away any right to control the water after it reaches EBR.⁸⁷

The City of Las Cruces, New Mexico, is one of the entities Texas alleges is contributing to New Mexico’s violation of the Rio Grande Compact.⁸⁸ In its *amicus curiae* brief, Las Cruces contends that Texas’s interpretation goes against the weight of authority from courts and commentators over the past decades because the delivery obligation is clearly defined as the “Elephant Butte Reservoir” rather than the state line.⁸⁹ Additionally, Las Cruces asserts that Texas’s interpretation would require an alteration to the compact that, once ratified by the states and Congress, is binding, meaning that “no court may order relief inconsistent with its expressed terms.”⁹⁰ Conversely, the City of El Paso, Texas in its *amicus curiae* brief, echoes Texas’s complaint that pumping groundwater affects the delivery of surface water at the state line, which violates the intentions of the compact.⁹¹

Unlike the issue of water delivery in *Texas v. New Mexico*, Montana’s complaint against Wyoming centered more on the consumption of return flows that, at the time of the signing of the Yellowstone River Compact, were not anticipated due to a lack of irrigation technology.⁹² Wyoming’s consumption is not directly analogous to New Mexico’s alleged practice of delivering the requisite amount of water to the EBR but then removing some surface water prior to the water reaching the state line.⁹³

In *Montana v. Wyoming*, the Supreme Court ultimately decided to follow the Special Master’s recommendation and denied Montana’s opposition to his determination that its efficiency argument failed to state a claim on which relief could be granted.⁹⁴ But the Court entered a judgment on the recommendation of the Special Master awarding Montana some compensation for the years that Wyoming was found liable for shorting the delivery of water to the Tongue River.⁹⁵ That ruling provides some slight predictive insight for *Texas v. New Mexico*, despite the factual difference between the cases. Although the cases each present a unique set of facts that undercuts some of the predictive value, the two cases are procedurally similar enough that the states might expect similar treatment from the Special Master in *Texas v. New Mexico*.

87 *Id.*

88 Bord & Thibodeau, *supra* note 15.

89 Brief for the City of Las Cruces as Amicus Curiae Supporting Defendant, *Texas v. New Mexico*, 138 S. Ct. 954 (2018) (No. 220141), 2014 WL 2796313, at *9.

90 *Id.*

91 Brief for the City of El Paso as Amicus Curiae Supporting Plaintiff at 5, *Texas v. New Mexico*, 138 S. Ct. 954 (2018) (No. 220141), 2017 WL 3447768, at *20–*21.

92 *See generally* *Montana v. Wyoming et al.*, 563 U.S. 368, 373 (2011); *see also* Colin O’Reagan & Edan Shertzer, *Montana v. Wyoming*, CORNELL LAW SCH. LEGAL INFO. INST., <https://www.law.cornell.edu/supct/cert/137orig> (last visited May 20, 2020).

93 *Id.*

94 *See id.*

95 Office of the Special Master, Opinion of the Special Master on Remedies, No. 137 at 7 (Dec. 19, 2016).

B. EXAMINING THE SPECIAL MASTER'S CONSIDERATION OF THE MOTIONS

The two cases are most similar when examined from a procedural perspective. In *Montana v. Wyoming*, Wyoming responded to Montana's complaint with a motion to dismiss, which the Court denied based on the Special Master's recommendation.⁹⁶ Montana's argument that the Yellowstone River Compact protected Montana's pre-1950 appropriator's new surface and groundwater diversions was enough to persuade the Court to address Montana's proposed exception to the Special Master's report.⁹⁷ Although the Court overruled Montana's stated exception, the final judgment in favor of Montana awarding compensation for shortages was enough for Montana's Attorney General, Tim Fox, to declare the decision a "big win."⁹⁸ Fox went on to declare that the decision "forces Wyoming to recognize Montana's right to water in the reservoir."⁹⁹

The Court's reasoning and final holding might also be important in future interstate compact cases, such as *Texas v. New Mexico*. This may be especially true given that states seem willing to spend far more on litigation than they might ever expect to receive in the form of a judgment to vindicate their rights under a specific compact. This notion is evidenced by Montana's spending \$4.6 million over a decade long legal dispute receiving a judgment of just under \$36,000, notwithstanding legal fees.¹⁰⁰

Similarly, Texas's initial complaint resulted in New Mexico filing a motion to dismiss for failure to state a claim.¹⁰¹ New Mexico also presented a few theories as to why the Court should not exercise original jurisdiction in the case. The City of Las Cruces provides a good overview of those theories in its *amicus curiae* brief.¹⁰² First, Las Cruces assert that the Court tends to exercise original jurisdiction sparingly, particularly in cases where there is an alternative forum to litigate the dispute.¹⁰³ The city points out that the issue is already in an alternative forum; that is, it is currently before the state district court under the umbrella of the Lower Rio Grande adjudication and the federal district court on the issue of the allocation of the Rio Grande project water.¹⁰⁴ According to the City of Las Cruces, these forums are more appropriate to resolve such a dispute.¹⁰⁵ Second, the City of Las Cruces contends that by misinterpreting the delivery requirement of the compact as one designated to the state line rather than to the EBR, Texas is seeking to modify, rather than enforce, the Rio Grande Compact.¹⁰⁶ According to the City of Las Cruces, Texas's requested remedy, to modify the compact, lies beyond the jurisdiction of the Court because it is not consistent with the express terms of the compact.¹⁰⁷

96 *Montana v. Wyoming*, 538 U.S. at 373.

97 Sarine, *supra* note 79, at 558.

98 Brown, *supra* note 48.

99 *Id.*

100 *Id.*

101 Bord & Thibodeau, *supra* note 15.

102 See Brief for the City of Las Cruces as Amicus Curiae Supporting Defendant, *Texas v. New Mexico*, 138 S. Ct. 954 (2018) (No. 220141), 2014 WL 2796313 at *9.

103 *Id.* at *12.

104 *Id.* at *9.

105 *Id.*

106 *Id.* at *18.

107 *Id.*

Texas successfully argued that the Court must hear the case to settle the dispute over the interpretation of this federal instrument.¹⁰⁸ To support its position, the City of El Paso, in its *amicus curiae* brief, offered multiple counterpoints.¹⁰⁹ First, the notion of pumping hydrologically connected groundwater resulting in the reduction of surface flow delivery at the state line in violation of an interstate water compact is certainly enough to find New Mexico in violation of the terms of the compact.¹¹⁰ Second, the City of El Paso offered support to Texas's argument that the dispute involves a difference in interpreting the plain meaning of the Compact as well as the intent of the parties at the time the Compact was signed.¹¹¹ According to the Supreme Court, this fundamental difference in interpretation was enough for Texas to state a claim seeking to clarify states' rights under a federal compact.¹¹²

The Special Master's first report recommended that the Court deny New Mexico's motion to dismiss because many of Texas's claims appeared to be valid after an extended fact-finding period.¹¹³ The Special Master's initial stance—coupled with the high degree of deference typically afforded to the Special Master by the Court—foreshadowed the Court's decision to hear the claim in *Texas v. New Mexico*.¹¹⁴ At this stage in the proceedings, Texas's main goal is to secure its discovery material by the summer 2020 deadline while New Mexico works on counter claims it filed in May of 2018 against Texas and the United States.¹¹⁵

C. IMPLICATIONS OF THE U.S.—MEXICO TREATY ON THE COURT'S DETERMINATION

An analysis of the issues presented in *Texas v. New Mexico* would be incomplete without addressing the United States' complaint in intervention. The foremost concern of the United States is its treaty with Mexico for waters of the Rio Grande River.¹¹⁶ In its complaint, the United States alleged that New Mexico's potential violation of the Rio Grande Compact may prevent New Mexico from abiding by the terms of the treaty.¹¹⁷

The Special Master's first interim report included a recommendation that the Court grant New Mexico's motion to dismiss the United States' complaint.¹¹⁸ The Special Master asserted that this was the first time the United States intervened as a party-plaintiff in an original jurisdiction action.¹¹⁹ The United States refuted this, stating that

108 Brief for the City of El Paso as Amicus Curiae Supporting Plaintiff at 5, *Texas v. New Mexico*, 138 S. Ct. 954 (2018) (No. 22O141), 2017 WL 3447768, at *5.

109 *Id.* at *4–*5.

110 *Id.* at *20 (citing *Texas v. New Mexico*, 462 U.S. 554, 557 (1983)).

111 *Id.* at *11.

112 *Id.*

113 Bord & Thibodeau, *supra* note 15.

114 *Texas v. New Mexico*, 138 S. Ct. 954, 958 (2018). See also Sarine, *supra* note 79, at 546 (explaining that “the Court appears willing to defer to Special Masters even on questions of law central to motions to dismiss”).

115 Paskus, *supra* note 31.

116 Morshedi, *supra* note 22.

117 *Id.*

118 Bord & Thibodeau, *supra* note 15.

119 *Id.*

it previously intervened in a dispute between Texas and New Mexico involving the Pecos River Compact, which also had international implications between the United States and Mexico.¹²⁰ The United States argued that it could bring a claim as a third party beneficiary based on the contractual nature of the compact and the duty imposed on the signatory states.¹²¹

New Mexico unsuccessfully argued that third-party beneficiary status is an “exceptional privilege” and the United States was not justified in requesting or receiving such status in this case.¹²² Additionally, New Mexico asserted a similar argument to its motion to dismiss Texas’s complaint, arguing that allowing the United States to intervene in the present case would create a risk of re-litigating issues already under review at the state level.¹²³

The United States also argued that it had a federal interest in protecting its contractual obligations with two separate water-user associations: the Elephant Butte Irrigation District and the El Paso County Water Improvement District No. 1.¹²⁴ These irrigation districts represent components of local governments charged with delivering water to residents who are often mandatorily included within a district simply because they own property in the region.¹²⁵ Consequently, these irrigation districts rely on federal agreements with the United States to fulfill promised appropriations to their resident water users.¹²⁶ According to the United States, these agreements were already in place decades before the signing of the Rio Grande Compact.¹²⁷ Based on these prior agreements, the United States contended that it had a “distinctly federal interest” that justified its intervention in the instant case.¹²⁸

The Special Master’s initial recommendation to uphold New Mexico’s motion to dismiss the United States’ claim appeared to be primarily based on the fact that such an intervention is rarely, if ever, brought under these circumstances.¹²⁹ In any case, the United States’ arguments in favor of its intervention convinced the Supreme Court to unanimously rule in its favor.¹³⁰ With such a variety of agreements with both foreign and domestic entities, it seems prudent that the Court allowed the United States to proceed with its own claims. In his opinion for the Court, Justice Gorsuch noted that the Rio Grande Compact was “inextricably intertwined with the Rio Grande Project and the Downstream Contracts,” and that New Mexico had conceded both in pleadings and at oral argument that the United States plays “an integral role in the Compact’s operation.”¹³¹ Additionally, Gorsuch asserted that a breach of the Rio Grande Compact could jeopardize treaty obligations between the United States and Mexico.

120 *Id.*

121 *Id.*

122 *Id.*

123 *Id.*

124 *Id.*

125 THOMPSON, ET AL., *supra* note 49, at 445.

126 *See id.*

127 Bord & Thibodeau, *supra* note 15.

128 *Id.*

129 *Id.*

130 Paskus, *supra* note 31.

131 *Id.*

D. POTENTIAL OUTCOME IN *TEXAS V. NEW MEXICO*

With discovery deadlines imposed by the Special Master marking the end of the pre-trial process, the Court draws nearer to a multi-year court battle implicating multiple states, the federal government, and indirectly involving international water agreements with Mexico. However, predicting an outcome that will successfully address all the competing claims and interested parties presents a more dubious question.

The primary reason states enter interstate water compacts is to eliminate the possibility of future conflicts with other states. New Mexico provides compelling reasons that support the necessity of removing water below the EBR but before the Texas state line, including supplying adequate water to municipalities like the City of Las Cruces.¹³² If the Court allows such a practice to go unchecked, the negative implications could reach other interstate water compacts as well as the Rio Grande Compact that are focused on delivering a certain amount of water to a given state.¹³³ A Supreme Court determination that designating the EBR the site for delivery means there was no intent to deliver a similar amount to Texas at the state line could cause unrest for any state in a compact that denotes delivery to anywhere but a state line. With a total of twenty-two current compacts, an unfavorable interpretation would lead to significant turmoil and may cause states to change their practices to take advantage of a favorable delivery locale.¹³⁴ It is possible the Special Master understands this based on his initial report and recommendation to deny New Mexico's motion to dismiss Texas's claim. The detrimental nature of a potential decision that no liability attaches to New Mexico, contrasted with the likelihood that the Special Master anticipates at least some liability, points to the need for the Court to clarify the delivery question. In this instance, clarity will likely come from the Court finding New Mexico out of compliance with the intent of the Compact. This issue must be addressed because New Mexico's questionable practice of removing water post-delivery will likely encourage other states to push the boundaries of their own compacts. This could lead to more extensive litigation that threatens to waste judicial resources as well as the states themselves. Certainty of right is a key factor that contributes to states' willingness to enter interstate water compacts. Allowing a state to remove water after it is "delivered" to the designated site creates a real threat to the certainty of the Rio Grande Compact and other interstate compacts.

The Court's decision to allow the United States' intervening was reasonable and necessary. In doing so, the Court helped ensure that the federal treaty with Mexico was protected. This allowed the United States to clarify its obligations to the two irrigation districts implicated in this case. With such far-reaching and diverse federal interests at stake for the United States in relation to the Rio Grande Compact, the Court's decision to break from its lockstep adherence to Special Master recommendations in interstate compact adjudications was necessary.

132 Brief for the City of Las Cruces as Amicus Curiae Supporting Defendant, *Texas v. New Mexico*, 138 S. Ct. 954 (2018) (No. 22O141), 2014 WL 2796313 at *2.

133 See *Texas v. New Mexico*, 138 S. Ct. 954, 959 (2018).

134 Zohar, *supra* note 62, at 163.

V. UNRESOLVED ISSUES

A. THE UNDEFINED ROLE OF GROUNDWATER IN INTERSTATE WATER COMPACTS

Advances in scientific capabilities have increased the overall understanding of the interconnected nature between groundwater and surface water.¹³⁵ However, only a minority of interstate water compacts explicitly reference groundwater.¹³⁶ Thompson et al., points out in *Montana v. Wyoming* that the Special Master found the Yellowstone River Compact covered groundwater as well as surface water.¹³⁷ The fact the Court never addressed the groundwater issue could leave it open to challenge if further proceedings arise beyond the judgment entered.¹³⁸ The reactions of Montana's Attorney General as well as Wyoming's Governor to the Court's judgment seem to signal that both parties are happy to bring the dispute to an end.¹³⁹ If, indeed, no future proceedings arise from the Yellowstone River Compact dispute, the Court may be faced with a similar question in *Texas v. New Mexico*. Given that New Mexico's groundwater pumping below the EBR forms, in part, the basis of Texas's complaint, the Court may have to address the question of groundwater under the Rio Grande Compact or face renewed litigation after eventually proclaiming its holding. The potential for the groundwater issue to resurface is buttressed by the fact that only a small minority of compacts reference groundwater, leaving the vast majority open to interpretation on the issue.¹⁴⁰

B. CONFLICTS BETWEEN INTERSTATE WATER COMPACTS AND OTHER FEDERAL LAWS

The United States' complaint in intervention regarding the current dispute between Texas and New Mexico over the Rio Grande Compact spotlights another potential issue that, if left un-defined, could lead to further litigation. Thompson et al., posits this question in general terms regarding the many agencies and congressional acts connected to most of the nation's large freshwater sources and storage devices.¹⁴¹ The Court could have set this potential issue aside, at least temporarily, by following the Special Master's recommendation and granting New Mexico's motion to dismiss the United States' complaint in intervention. But by addressing the interplay of the United States' treaty with Mexico regarding the water of the Rio Grande River as it pertains to the signatory states of the Rio Grande Compact, the Court could stave off an avenue for future litigation on the topic.

135 THOMPSON, ET AL., *supra* note 49, at 445.

136 *Id.* at 912.

137 *Id.*

138 *Id.*

139 Brown, *supra* note 48.

140 THOMPSON, ET AL., *supra* note 49, at 913–14.

141 *Id.*

VI. CONCLUSION

A backwards looking inquiry into the procedural and factual settings of *Montana v. Wyoming* offers a cautious predictive value as trial preparations heat up in anticipation of a long and complex legal battle between New Mexico, Texas, and now, the United States. In deciding against dismissing the case at the behest of the Special Master, the Supreme Court somewhat echoed its decision in *Montana v. Wyoming*, meaning that the court may be on track to determine some liability must attach to New Mexico, and that New Mexico is out of compliance with the intent of the Rio Grande Compact.¹⁴² A holding supporting the practice of removing water below the designated delivery area could cause significant unrest among other states who are parties to any of the respective twenty-two compacts now in existence. Furthermore, by allowing the United States to intervene, the Court could alleviate a looming, potentially unresolved issue that, if it were left unaddressed, may have resulted in further litigation regarding the Rio Grande Compact.

Even though the Supreme Court decided to exercise original jurisdiction and hear the case between Texas and New Mexico, some issues may remain unaddressed.¹⁴³ Specifically, the issue of groundwater and its connection to surface flows at delivery could pose a threat of further litigation should the Court fail to address the topic expressly. Additionally, even though the Court denied New Mexico's motion to dismiss the United States' complaint in intervention, the issue of interplay between interstate water compacts and other federal laws could remain a grey area in interstate water law.

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142 *Texas v. New Mexico*, 138 S. Ct. 954, 960 (2018).

143 *Id.* at 959.

WATER ALLOCATION LAWS AND ENERGY PRODUCTION ACROSS THE UNITED STATES: HOW TEXAS’S UNIQUE LAWS AND POSITION AS AN ENERGY POWERHOUSE PUT IT AT AN UNFAIR ADVANTAGE

BY ZOE W. OLDHAM

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I. INTRODUCTION

The United States withdraws and consumes a considerable volume of freshwater.¹ On average, this amounts to about 875 gallons of freshwater per American per day.²

1 *How the United States Uses Water*, WATER FOOTPRINT CALCULATOR (Oct. 12, 2018), <https://www.watercalculator.org/footprints/how-united-states-uses-water/> (indicating that the average “water footprint” in the U.S. is nearly twice the global average).

2 *Total Water Use in the United States*, U.S. GEOLOGICAL SURV., <https://www.usgs.gov/special-topic/water-science-school/science/total-water-use-united-states> (last visited Dec. 20, 2019). In 2015, 322 billion gallons of water per day were used in the United States. *Id.*

Personal uses, such as drinking, bathing, watering plants, and running appliances, account for merely 44.2 billion gallons of this daily usage—about 5 percent.³ The remainder is drawn primarily for agriculture and energy production.⁴ More water is required to generate the electricity powering American life than is required for the aforementioned personal uses.⁵ This is because water is an integral part of producing power via coal, petroleum, natural gas, nuclear, biomass, geothermal, hydroelectric, and some methods of solar.⁶ Of course, some methods of energy production use saline and non-potable water,⁷ and many methods do not actually *consume* the water they use.⁸ But, for the most part, energy production in the United States uses valuable freshwater resources—both from surface and groundwater sources.⁹

Inconsistencies in surface and groundwater law across the United States lead to difficulties in properly conserving our freshwater resources because of the expansive nature of both surface and groundwater and the inevitable crossing of state lines. Current laws across the United States are becoming increasingly inadequate as our freshwater supplies become less predictable. Considering that the energy sector uses a significant portion of the nation's water resources and that such usage may be largely unnecessary,¹⁰ laws should be altered to accommodate water conservation as it relates to energy production.

Texas—the Permian Basin in particular—is exemplary for showing the impact of drought on water resources in a region that produces over 20 percent of the nation's energy.¹¹ Texas employs an “absolute dominion” scheme for allocating water rights.¹² Unlike Texas, California employs a hybrid system for allocating water rights.¹³ California's legislature responded to the state's recent drought in 2015 by enforcing water use restrictions.¹⁴ Again, Colorado is prone to drought¹⁵ and produces a significant amount

3 *Id.*

4 *Id.*

5 *Freshwater Use by U.S. Power Plants*, UNION OF CONCERNED SCIENTISTS (Nov. 16, 2011), <https://www.ucsusa.org/resources/freshwater-use-us-power-plants>.

6 *Id.*

7 Alexis Petru, *California's Hidden Water Consumer: Power Plants*, TRIPLE PUNDIT (Apr. 16, 2015), <https://www.triplepundit.com/story/2015/californias-hidden-water-consumer-power-plants/35421>.

8 *How much water does a nuclear power plant consume?*, WISE (Oct. 24, 2013), <https://www.wiseinternational.org/nuclear-monitor/770/how-much-water-does-nuclear-power-plant-consume>.

9 *Total Water Use in the United States*, *supra* note 2.

10 Dr. Ashlynn S. Stillwell, *Linking reclaimed water with power generation: Water reuse and the energy-water nexus*, GLOBAL WATER FORUM (July 22, 2014), <http://www.globalwaterforum.org/2014/07/22/linking-reclaimed-water-with-power-generation-water-reuse-and-the-energy-water-nexus/>.

11 *See Rankings: Total Energy Production, 2017*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/rankings/?sid=TX#/series/101> (last visited Dec. 20, 2019).

12 *Who Owns the Water?*, WATER SYSTEMS COUNCIL 1, <http://nationalaglawcenter.org/wp-content/uploads/2017/03/Who-Owns-the-Water-2016-Update-FINAL.pdf> (last updated Aug. 2016).

13 *See Water Law Overview*, NAT'L AGRIC. L. CTR., <https://nationalaglawcenter.org/overview/water-law/> (last visited Dec. 20, 2019).

14 *See* Petru, *supra* note 7.

of energy.¹⁶ But Colorado has created a complicated water allocation system, aimed at conserving freshwater resources and using those resources in the most beneficial way possible.¹⁷ Pennsylvania, on the other hand, does not have the drought and water scarcity issues that Texas (or California and Colorado, for that matter) does.¹⁸ For these reasons, this note will evaluate Texas's current water laws as compared to those of California, Colorado, and Pennsylvania.

First, I must disclaim any significant discussion of water quality issues. Though intimately related, this paper focuses primarily on water quantity. Water quality is especially pertinent in the discussion of thermoelectric sources of power—more so because these sources do not typically *consume* water, but merely use and return it to the stream. Additionally, one cannot ignore the great consumptive water uses in the agricultural and industrial sectors. But these uses are well-documented and at the forefront of public thought. Finally, all units of water have been converted to gallons and all units of energy output converted to megawatt hours (MWh) for consistency and convenience of examination. Gallons and MWh seem to be the most common units of measurement for water and energy production, respectively, in the sources used to support this paper.

II. WATER ALLOCATION LAWS ACROSS THE UNITED STATES

First, a brief definition of freshwater sources and an overview of water extraction and discharge laws across the United States is warranted. Generally, states regulate three types of freshwater: groundwater, surface water, and diffused surface water.¹⁹ Groundwater exists primarily in underground aquifers.²⁰ Surface water comes in the form of lakes, rivers, and other similar cavities.²¹ Diffused surface water is on the surface of the land because of rain, snowmelt, or flood.²² All bodies of water interact through the hydrologic cycle.²³ After surface water evaporates, it condenses and returns to Earth through precipitation.²⁴ A large portion of precipitation becomes diffused surface water, which then infiltrates the land.²⁵ After infiltration, some portion of the water continues

15 Chris Bianchi, *Over a quarter of Colorado is now officially in a drought*, DENVER POST (Oct. 5, 2019), <https://www.denverpost.com/2019/10/05/colorado-fall-drought-conditions/>.

16 See *Colorado – State Profile and Energy Estimates*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/analysis.php?sid=CO> (last updated Mar. 19, 2020).

17 See generally *Synopsis of Colorado Water Law*, COLO. DIV. OF NAT. RES., https://www.uawcd.com/uploads/2/5/5/3/25530864/synopsis_of_colorado_water_law.pdf (last visited Dec. 20, 2019).

18 See *Watersheds*, PA. ENVTL. COUNCIL, <https://pecpa.org/programs/watersheds/> (last visited Dec. 20, 2019).

19 See generally *Who Owns the Water?*, *supra* note 12.

20 Northwest River Forecast Ctr., *Description of the Hydrologic Cycle*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://www.nwrfc.noaa.gov/info/water_cycle/hydrology.cgi (last visited Dec. 20, 2019).

21 *Id.*

22 *Id.*

23 *Id.*

24 *Id.*

25 *Id.*

to percolate through the many layers of soil due to gravity and capillary forces.²⁶ Some portion of the percolating water will end up in aquifers, where the water continues to flow underground.²⁷ Some aquifers directly interface with surface water bodies by conducting water to the surface and creating springs or receiving water supplies from overhead streams.²⁸ The hydrologic cycle is a constant and dynamic system.²⁹ Therefore, it is particularly vulnerable to human exploitation.³⁰ To ensure continued water quality, we need to ensure that we have enough water.³¹

Generally, common law water allocation systems have developed from three doctrines: riparian, prior appropriation, and the rule of capture.³² Some states continue to use the common law system, but others have statutorily imposed new (or old) rules.³³ The federal Clean Water Act (CWA), and related federal statutes, govern how industries can dispose of unconsumed water.³⁴ Some states have adopted independent laws to supplement the CWA.³⁵ Most states' common law developed from the English doctrine of riparianism.³⁶ But the original version of riparianism only encompassed surface water, leaving groundwater extraction by the wayside.³⁷ As groundwater extraction technology has evolved, states have had to create new rules for its allocation.³⁸ Because Texas is the focus of this paper, I will go into far greater detail on the history and evolution of water allocation in Texas than for other states' allocation methods.

A. THE PUBLIC TRUST DOCTRINE

All states, at least for navigable surface water bodies, use a version of the public trust doctrine.³⁹ Though states' doctrines differ in their particulars, they all have the same bottom line: water is held in public trust, for the benefit of the public, and not by any

26 *Id.*

27 *Id.*

28 *Id.*

29 Interview with Heather Christensen, Student, Jackson Sch. of Geosciences at the Univ. of Tex. at Austin, in Austin, Tex. (Sept. 4, 2019).

30 *Id.*

31 Tara Moran, Janny Choy & Carolina Sanchez, *The Hidden Costs of Groundwater Overdraft*, WATER WEST, <https://waterinthewest.stanford.edu/groundwater/overdraft/> (last updated Sept. 9, 2014).

32 See generally *Who Owns the Water?*, *supra* note 12.

33 *Id.*

34 *Summary of the Clean Water Act*, U.S. ENVTL. PROT. AGENCY, <https://www.epa.gov/laws-regulations/summary-clean-water-act> (last visited Dec. 20, 2019).

35 See *State-Specific Water Quality Standards Effective Under the Clean Water Act (CWA)*, U.S. ENVTL. PROT. AGENCY, <https://www.epa.gov/wqs-tech/state-specific-water-quality-standards-effective-under-clean-water-act-cwa> (last visited Dec. 20, 2019).

36 *Aspects of Governing Water Allocation in the U.S.*, INST. FOR WATER RES. 34 (Dec. 2014), https://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/2014-R-4_Aspects_of_Governing_Water_Allocations_in_the_US.pdf.

37 *Id.*

38 *Id.*

39 See Robin Kundis Craig, *A Comparative Guide to the Eastern Public Trust Doctrine: Classification of States, Property Rights, and State Summaries*, 16 PENN ST. ENVTL. L. REV. 1 (2007) [hereinafter *Eastern States*]; Robin Kundis Craig, *A Comparative Guide to the Western States'*

specific individual.⁴⁰ Pennsylvania, for example, has enshrined the public trust doctrine into its constitution and obligates the commonwealth to conserve and maintain water for the benefit of the people.⁴¹

A particularly important implication of the public trust doctrine is that it may preclude takings claims. The Colorado Supreme Court has held that the curtailing of a well owner's use of water from their wells does not constitute a taking in violation of the state's constitution.⁴² In *Kobobel v. State Department of Natural Resources*, Colorado issued cease and desist orders to prohibit certain well owners from pumping groundwater.⁴³ The well owners sued and claimed the cease and desist orders violated the Colorado Constitution's clause prohibiting takings.⁴⁴ The court denied the claim, stating that "[t]he well owners' takings argument misconceives the scope of their water rights."⁴⁵ Because the well owners hold neither "title to the water in their wells" nor "an unlimited right to use water from their wells," the takings claims were invalid.⁴⁶ While the court's decision was based on Colorado's prior appropriation doctrine, the underlying assumption was that no one owns any water in the state (because of the public trust doctrine) but that some people own *rights to use* some water.⁴⁷ So if no one owns the water, no one can claim the government took the property.

B. THE RIPARIAN AND REASONABLE USE DOCTRINES: PENNSYLVANIA

The riparian doctrine as used in the U.S. evolved from the English common law that the thirteen original colonies inherited and adopted.⁴⁸ Accordingly, the states that use the doctrine are all east of the Mississippi River.⁴⁹ The basic idea of riparianism is that water rights are only available to people who own land on the banks of a stream, and those people are only entitled to that water insofar as no other riparian owners are injured.⁵⁰ The original English doctrine assumed that riparian owners were not entitled to alter the natural flow of the stream,⁵¹ but as the doctrine evolved in the eastern U.S., judges decided that riparians could alter the natural flow of a stream so long as that alteration did not injure any other riparian owner.⁵² Injury to other riparian owners can

Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust, 37 *ECOLOGY L. Q.* 53 (2010) [hereinafter *Western States*].

40 See generally *Eastern States*, *supra* note 39.

41 See *Eastern States*, note 39, at 20–21.

42 *Kobobel v. State Dep't of Nat. Res.*, 249 P.3d 1127, 1129 (Colo. 2011) (en banc).

43 *Id.*

44 *Id.*

45 *Id.* at 1130.

46 *Id.*

47 See *id.*

48 See generally T. E. Lauer, *The Common Law Background of the Riparian Doctrine*, 28 *MO. L. REV.* 60 (1963), <https://scholarship.law.missouri.edu/cgi/viewcontent.cgi?article=1798&context=mlr>.

49 See *Who Owns the Water?*, *supra* note 12.

50 See *Vill. of Four Seasons Ass'n v. Elk Mountain Ski Resort, Inc.*, 103 A.3d 814, 821 (Pa. Super. Ct. 2014).

51 Lauer, *supra* note 48, at 101–02.

52 See, e.g., *Tyler v. Wilkson*, 24 F. Cas. 472, 475 (C.C.D.R.I. 1827).

come in the form of either lesser *quantity* of water or lesser *quality* of water.⁵³ When adjudicated, most riparian states' courts use the reasonable use theory to determine how much water, and in which ways, riparians may use the water.⁵⁴

Some states use a version of riparianism called *regulated* riparianism.⁵⁵ This version requires riparian landowners to obtain a permit before diverting and using any water.⁵⁶ Because of this permitting requirement, states that use regulated riparianism can perform the reasonable use determination before any water is removed, hopefully obviating the need for litigation.⁵⁷

Pennsylvania uses both the riparian doctrine and its accompanying reasonable use theory to allocate water rights.⁵⁸ Additionally, Pennsylvania produces a significant quantity of energy.⁵⁹ Together, this makes Pennsylvania a phenomenal example by which to understand the relevant doctrines and compare those doctrines to those Texas employs. In discussing riparian rights, the Pennsylvania Supreme Court has said that “[t]he rule of law is uniform and undoubted that every riparian owner is entitled, as an incident to his land, to the natural flow of the water of a stream running through it, undiminished in quantity and unimpaired in quality.”⁶⁰ Riparian rights are limited only by “the reasonable use of the water by those similarly entitled, for the ordinary purposes of life.”⁶¹ The court recognized a hierarchy of uses, essentially making domestic purposes absolute rights, but commercial purposes subject to a requirement that any diversion for such purposes “not materially or sensibly diminish [the stream’s] quantity.”⁶² The court ultimately rejected the plaintiff’s claims against an upstream diverter because his riparian rights were only to the *use* of the water, not the ownership of it.⁶³ But in the case of non-navigable and land-locked waters, riparian landowners are entitled to full ownership of the water if they own the rights to any land underneath the water.⁶⁴ Riparian landowners are not, however, entitled to any water for non-navigable streams or flowing bodies of water.⁶⁵

Pennsylvania classifies groundwater as a natural resource that should be developed.⁶⁶ The Pennsylvania Supreme Court first discussed underground water in 1855.⁶⁷ In *Wheat-*

53 See, e.g., *Red River Roller Mills v. Wright*, 15 N.W. 167 (Minn. 1883).

54 *Water Law Overview*, *supra* note 13.

55 *Id.*

56 *Id.*

57 *Id.*

58 See *Vill. of Four Seasons Ass’n v. Elk Mountain Ski Resort, Inc.*, 103 A.3d 814, 820 (Pa. Super. Ct. 2014) (“For flowing watercourses, an upper riparian owner has the right to make reasonable use of the water flowing on or past his property.”).

59 *Pennsylvania – State Profile and Energy Estimates*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/analysis.php?sid=PA> (last updated Aug. 15, 2019).

60 *Clark v. Pa. R. Co.*, 22 A. 989, 990 (Pa. 1891).

61 *Id.*

62 *Id.*

63 *Id.* at 452. (The court also noted that plaintiff did not actually suffer any injury, since plenty of water was left in the stream).

64 *Vill. of Four Seasons Ass’n*, 103 A.3d at 820.

65 *Id.*

66 32 P.S. § 645.1 (2019).

67 *Wheatley v. Baugh*, 25 Pa. 528 (Pa. 1855).

ley v. Baugh, the defendant mining company pumped water, arresting the flow of spring water from its plaintiff-neighbor.⁶⁸ Two weeks after the mining company stopped pumping water, Baugh's spring began to flow again.⁶⁹ The court adopted the rule of capture, which Texas still uses, but limited its application to percolating water.⁷⁰ For the most part, Pennsylvania uses the riparian and reasonable use doctrines to govern water allocation—both surface and underground—in the state.

C. THE PRIOR APPROPRIATION DOCTRINE: COLORADO

The basic idea behind prior appropriation is “first in time, first in right”: water allocation rights are hierarchically given based on when those rights were asserted.⁷¹ To assert a right, water users must generally show (1) intent to put water to beneficial use, (2) diversion of the water, and (3) actual application of the water for beneficial use.⁷² Prior appropriation, unlike riparianism, does not require ownership of riparian (or any) land to gain water rights.⁷³ Most western states use prior appropriation to allocate water rights.⁷⁴

Colorado has a very sophisticated water allocation system: it uses the prior appropriation doctrine and coordinates action between the judiciary and administrative offices.⁷⁵ In pursuit of this sophistication, Colorado's allocation scheme is enshrined in statute and designates water judges nominated by the state supreme court.⁷⁶ For these reasons, and because Colorado uses water for both agriculture and energy in significant quantities,⁷⁷ Colorado will serve as a prime example of prior appropriation doctrine.

In 1876, the Colorado Constitution was amended to state that “[t]he right to divert unappropriated waters of any natural stream to beneficial uses shall never be denied” and “[p]riority of appropriation shall give the better right as between those using the water for the same purpose.”⁷⁸ Colorado courts read “waters of any natural stream” to include

68 *Id.* at 528.

69 *Id.*

70 *Id.* (“Where a subterranean flow of water has become so well defined as to constitute a regular and constant stream, the owner of the land above, through which it flows, may not divert or destroy it to the injury of the person below, on whose land it issues in the form of a spring. But where the spring depends for its supply upon percolations through the land of the owner above, and in the use of the land . . . the spring is destroyed, such owner is not liable for the damages thus done, unless the injury was occasioned by malice or negligence.”).

71 *Water Law Overview*, *supra* note 13.

72 *Id.*

73 *Id.*

74 *Who Owns the Water?*, *supra* note 12.

75 See generally *Synopsis of Colorado Water Law*, *supra* note 17.

76 See *id.*; *Water Courts*, COLO. JUDICIAL BRANCH, <https://www.courts.state.co.us/Courts/Water/Index.cfm> (last visited Dec. 20, 2019).

77 *Water Use Data for Colorado*, U.S. GEOLOGICAL SURVEY, https://waterdata.usgs.gov/co/nwis/water_use?format=html_table&rdb_compression=file&wu_area=State+Total&wu_year=2015&wu_category=ALL&wu_category_nms=-ALL%2BCategories— (last updated June 2018).

78 COLO. CONST. art. XVI, § 6.

both surface and ground water that is “tributary” to surface water.⁷⁹ Later, the Colorado Ground Water Commission was created to administer groundwater rights.⁸⁰ The Commission uses a modified prior appropriation system, which allows the Commission some discretion in allocating “designated” groundwater because it does not mandate that aquifers remain at historic levels.⁸¹ The State and Division Engineers, on the other hand, allocate all other groundwater based exclusively on the prior appropriation system.⁸²

D. HYBRID ALLOCATION SCHEMES: CALIFORNIA

A few states employ hybrid water allocation schemes, blending the riparian and prior appropriation doctrines.⁸³ These hybrid doctrines are generally a mix of common law precedent and statutory confinements.⁸⁴ They are implemented mostly in the west and probably developed because of problems associated with riparian systems in such arid states.⁸⁵ California, for example, started out recognizing riparian water rights.⁸⁶ But in 1928, California amended its constitution to limit water rights to reasonable and beneficial uses.⁸⁷ As such, “no one can have a protectable interest in the unreasonable use of water” and “holders of water rights must use water reasonably and beneficially.”⁸⁸ Around the same time, the California Legislature passed statutes in an attempt to confine riparianism in favor of prior appropriation.⁸⁹

California uses different systems for allocating surface water and groundwater.⁹⁰ California calls rights in groundwater “overlying rights.”⁹¹ Overlying rights grant a surface landowner rights to water lying underneath the land “for use on his land within the basin or watershed.”⁹² An overlying owner “has rights superior to that of other persons who lack legal priority.”⁹³ But those rights are “nonetheless restricted to a reasonable beneficial use.”⁹⁴ To decide controversies between overlying owners, California courts use correlative rights.⁹⁵ Correlative rights require each overlying owner to use “only his reasonable share” if there is insufficient water in any given aquifer.⁹⁶ In contrast to its groundwater allocation system, California uses prior appropriation for surface waterbo-

79 See *Gallegos v. Colo. Ground Water Comm’n*, 147 P.3d 20, 27 (Colo. 2006).

80 *Id.*

81 *Id.*

82 *Id.* at 28.

83 *Water Law Overview*, *supra* note 13.

84 *Id.*

85 *Id.*

86 *A Brief History of California Water*, CAL. WATER IMPACT NETWORK, <https://www.c-win.org/a-history-of-california-water> (last visited Dec. 20, 2019).

87 *City of Barstow v. Mojave Water Agency*, 5 P.3d 853, 863–64 (Cal. 2000).

88 *Id.*

89 *Id.*

90 *A Brief History of California Water*, *supra* note 86.

91 *Mojave Water Agency*, 5 P.3d at 862–63.

92 *Id.*

93 *Id.*

94 *Id.*

95 *Id.* at 863.

96 *Id.*

dies.⁹⁷ In deciding controversies between appropriators, California uses the doctrine of “first in time, first in right.”⁹⁸ California also recognizes prescriptive rights, which vest if someone wrongfully takes non-surplus water and the use is actual, open and notorious, hostile, and continuous for five years.⁹⁹ Should there be a conflict between overlying and appropriative owners, the appropriator’s rights are subservient to the overlying owner’s rights.¹⁰⁰

E. THE RULE OF CAPTURE AND THE ABSOLUTE OWNERSHIP DOCTRINE: TEXAS

Spanish influence on water law in the United States—another way in which the nation’s water law developed—is exemplified by the rule of capture.¹⁰¹ Under the rule of capture, a landowner owns everything under his land that he is able to capture (or pump, in the case of groundwater).¹⁰² The rule of capture is subject to very few limitations, but pumping in excess of your needs for the *purpose* of harming another is not allowed.¹⁰³ Because of this, the rule of capture theoretically allows a land owner whose land sits over part of a massive aquifer to deplete that aquifer as much as he wants so long as he is not doing so maliciously.¹⁰⁴

The absolute ownership doctrine, a corollary to the rule of capture, allows the rule of capture to function.¹⁰⁵ Under the absolute ownership doctrine, a landowner owns everything under his land “in place.”¹⁰⁶ This means that the landowner owns everything under his land even before he captures it.¹⁰⁷ Alongside the rule of capture, the landowner owns both everything sitting under his land *and* everything he can capture from it.¹⁰⁸ These two rules allow mineral and groundwater estates to be easily severed from the surface estate.¹⁰⁹

Texas uses both the rule of capture and the absolute ownership doctrine to govern both minerals (such as oil and gas) and groundwater.¹¹⁰ The rule of capture has been

97 *Id.*

98 *Id.*

99 *Id.*

100 *Id.* at 864.

101 *Aspects of Governing Water Allocation in the U.S.*, *supra* note 36, at 23.

102 *See* Hous. & Tex. Cent. Ry. Co. v. East, 81 S.W. 279, 280 (Tex. 1904).

103 *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 76 (Tex. 1999) (indicating that neither malice nor waste is allowed under the rule of capture); *Friendswood Dev. Co. v. Smith-Southwest Indus., Inc.*, 576 S.W.2d 21, 22 (Tex. 1978) (applying a negligence standard to subsidence caused by over-pumping).

104 *See Sipriano*, 1 S.W.3d at 76.

105 Regina M. Buono et al., *Brackish Groundwater: Current Status and Potential Benefits for Water Management*, BAKER INST. FOR PUB. POLICY 3 (April 11, 2016), https://www.bakerinstitute.org/media/files/files/282d0c4c/BI-Brief-041116-CES_Groundwater.pdf.

106 *Id.* at 7.

107 *Id.*

108 *Id.*

109 Tiffany Dowell Lashmet, *Basics of Texas Water Law*, TEX. A&M AGRILIFE EXTENSION (Jan. 2018), <https://agrillife.org/texasaglaw/files/2018/01/Basics-of-Texas-Water-Law.pdf>.

110 *See Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 823, 828 (Tex. 2012) (“But we held long ago that oil and gas are owned in place, and we find no reason to treat groundwater

used to allocate groundwater in Texas since the Supreme Court of Texas decided *Houston & Texas Central Railway Co. v. East* in 1904.¹¹¹ In *East*, the defendant railroad company pumped 25,000 gallons of water per day from a 66-foot well on its property.¹¹² East's pre-existing well was only thirty-three feet deep and dried up after the railroad company dug its well.¹¹³ The court rejected extending the reasonable use doctrine to groundwater, in favor of following the old English case, *Acton v. Blundell*.¹¹⁴ The court also relied on Ohio's *Frazier v. Brown*, which discussed the difficulty of administering an allocation scheme in the face of a complete lack of knowledge of how groundwater moves and the prevailing public policy of encouraging economic growth.¹¹⁵ The court did, however, implicitly recognize that the rule of capture is limited by "malice or wanton conduct" and waste.¹¹⁶

In 1999, the court revisited the rule of capture and reaffirmed its standing as Texas's method of allocating groundwater.¹¹⁷ In *Sipriano*, Ozarka pumped 90,000 gallons of groundwater per day from land near Sipriano's, ultimately leading to the near depletion of Sipriano's well.¹¹⁸ The court declined to provide an exception to the rule of capture requiring the pumped water to be used on the land from which it was pumped.¹¹⁹ Before reaffirming the rule of capture in *Sipriano*, the court discussed the 1917 amendment to the Texas Constitution and the legislature's corresponding authority over groundwater management.¹²⁰ The 1917 amendment reads:

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.¹²¹

To that end, the legislature has limited the rule of capture as it applies to groundwater; for areas with groundwater conservation districts (GCDs), a landowner's right to capture as much as he wants is subject to management by the area's GCD.¹²² Unfortunately, GCDs are generally underfunded—meaning they have little money to defend or institute lawsuits.¹²³ Furthermore, GCDs are not for whole aquifers, but for single coun-

differently Although we have never discussed this issue with respect to groundwater, we have done so with respect to oil and gas, to which the rule of capture also applies").

111 See *Hous. & Tex. Cent. Ry. Co. v. East*, 81 S.W. 279, 280 (Tex. 1904).

112 *Id.*

113 *Id.*

114 *Id.*

115 *Id.*

116 *Id.* at 282.

117 *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 75 (Tex. 1999).

118 *Id.* at 75–76.

119 *Id.* at 76.

120 *Id.* at 77–78.

121 TEX. CONST. art. XVI, § 59.

122 TEX. WATER CODE ANN. § 36.002 (West 2015).

123 *Issue: The Hill Country Groundwater Supply*, HILL COUNTRY ALL. 2, <http://www.hillcountryalliance.org/uploads/HCA/GroundwaterIssue.pdf> (last visited Dec. 20, 2019) ("Unfortunately, most Groundwater Conservation Districts are significantly underfunded, inadequately staffed and unable to fully regulate heavy pumping.").

ties.¹²⁴ Because of this, the Texas water allocation system has arbitrarily severed the hydrologic connection and made managing groundwater inordinately difficult. For areas without a GCD, the rule of capture still controls.¹²⁵ Many of these areas lie over multi-county or multi-state aquifers, allowing only certain landowners the right to capture as much water as they can pump.¹²⁶

The 1949 Under Ground Water Conservation Act solidified the longstanding idea that groundwater in Texas is private property.¹²⁷ The act described those rights as entitlement to “drill for and produce the groundwater below the surface of real property” but not to “capture a specific amount of groundwater below the surface of that landowner’s land.”¹²⁸ On the other hand, surface water in Texas is subject to the aforementioned public trust doctrine, and landowners need permits to gain water rights.¹²⁹ In 2012, the Texas Supreme Court extended the absolute ownership doctrine from oil and gas to groundwater.¹³⁰ In *Day*, the Court discussed “whether land ownership includes an interest in groundwater in place that cannot be taken for public use without adequate compensation guaranteed by article I, section 17(a) of the Texas Constitution.”¹³¹ Before deciding that groundwater is owned in place, the court discussed the history of oil and gas ownership in Texas.¹³² The court then likened groundwater to oil and gas, saying that groundwater similarly “exists in subterranean reservoirs in which it is fugacious.”¹³³ The court acknowledged that oil and gas and water have different properties, market values, and uses, but concluded that “[t]o differentiate between groundwater and oil and gas in terms of importance to modern life would be difficult.”¹³⁴

Together, these three authorities—*East*, the 1949 Act, and *Day*—give property owners an essentially unequivocal right to pump whatever water they can get at under their land. One problem with this is that extending the absolute ownership doctrine to groundwater is illogical because groundwater flows more freely than do oil and gas.¹³⁵ Additionally, by allocating water differently based on its hydrogeologic location, Texas has arbitrarily and unscientifically severed the hydrologic connection and undermined its goal of preserving and conserving the state’s natural resources.¹³⁶

124 *See id.*

125 *See id.* at 3.

126 *See id.* (reproducing a map of Groundwater Management Area # 9).

127 *Id.*

128 TEX. WATER CODE ANN. § 36.002(b)(1) (West 2015).

129 *Western States*, *supra* note 39, at 84–88.

130 *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 824 (Tex. 2012).

131 *Id.* at 817.

132 *Id.* at 829.

133 *Id.*

134 *Id.* at 831.

135 *See How was oil trapped beneath the Earth’s surface?*, HOW STUFF WORKS, <https://science.howstuffworks.com/environmental/energy/oil-trapped-beneath-earth-surface.htm> (last visited Dec. 20, 2019).

136 TEX. CONST. art. XVI, § 59 (“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.”).

F. MULTI-STATE COMPACTS

Multi-state compacts govern how states allocate water in some instances.¹³⁷ States come together to negotiate terms and the volumes of water that each state can appropriate.¹³⁸ But before the states can enter into multistate compacts, Article I, § 10 of the U.S. Constitution requires Congress to approve it.¹³⁹ The Colorado River Compact is an example of one such multi-state compact. The compact was signed by Arizona, California, Colorado, New Mexico, Utah, and Wyoming in 1922.¹⁴⁰ The Colorado River Compact divides the river into two basins and allocates seventy-five million acre-feet of water per year to each basin.¹⁴¹ The states in each basin are responsible for allocating their assigned water, and each state maintains its sovereignty in allocating that water amongst its citizens.¹⁴² This use is, however, constrained by the reasonable use doctrine.¹⁴³ The compact also provides for its termination, should all of the signatory states agree.¹⁴⁴

Unfortunately, compacts have not historically been created for aquifers that span below multiple states.¹⁴⁵ On top of that, new compacts have not been created in the United States since the 1990s and already-existing compacts have not been substantively amended to reflect changing circumstances.¹⁴⁶ This is, at least in part, due to the difficulty of negotiating compacts.¹⁴⁷ For interpreting and enforcing compacts, there is significant debate over whether they are more like statutes or contracts and how loosely their terms can be interpreted.¹⁴⁸ This presents a problem in cases like that of the Colorado River Compact, which was enacted nearly 100 years ago and no longer reflects the populations, economies, or environments of the states bound by it.¹⁴⁹

137 See Robert W. Adler, *Revisiting the Colorado River Compact: Time for a Change?*, 28 J. LAND RES. & ENVTL. L. 19, 20 (2008).

138 See *Understanding Interstate Compacts*, NAT'L CTR. FOR INTERSTATE COMPACTS 1, https://www.gsgp.org/media/1313/understanding_interstate_compacts-csgncic.pdf (last visited Dec. 20, 2019).

139 U.S. CONST. art I, § 10, cl. 3 (“No State shall, without the Consent of the Congress . . . enter into any Agreement or Compact with another State, or with a foreign Power. . .”).

140 *Colorado River Compact*, BUREAU OF RECLAMATION (1922), <https://www.usbr.gov/lc/region/pao/pdffiles/crcompct.pdf>.

141 *Id.*

142 *Id.*

143 *Id.* Seventy-five million acre-feet is approximately 24.4 trillion gallons. See *What's an Acre-foot?*, WATER EDUC. FOUND., <https://www.watereducation.org/general-information/whats-acre-foot> (last visited Apr. 10, 2020).

144 *Colorado River Compact*, *supra* note 140.

145 See generally *National Center for Interstate Compacts Database*, COUNCIL ST. GOV'TS (2019), <http://apps.csg.org/ncic/Default.aspx>.

146 See generally *id.*

147 Adler, *supra* note 137 (discussing the Colorado River Compact and its near failure in 1922).

148 *Id.* at 20; see also Alexandra Campbell-Ferrari, *Managing Interstate Water Resources: Tarrant Regional and Beyond*, 44 TEX. ENVTL. L. J. 235, 241 (2014).

149 Adler, *supra* note 137, at 22.

III. WATER USAGE BY ENERGY PRODUCTION METHOD

Water is required to produce most forms of energy, and energy is required to provide water.¹⁵⁰ Thus, a nexus forms from this interdependency.¹⁵¹ All in all, over forty percent of the water withdrawn in the United States is for energy production purposes.¹⁵² Further broken down, thermoelectric power generation uses forty-one percent and mining (and fracking) uses one percent.¹⁵³ To reduce this high rate of water consumption, coal and nuclear plants can be retrofitted with more water-efficient technology, fracking operations can recycle water, and wind and solar photovoltaic energy production can be more widely implemented.

A. THERMOELECTRIC POWER PLANTS

Thermoelectric plants are used to produce energy from coal, natural gas, and nuclear fuel.¹⁵⁴ Almost ninety percent of all energy produced in the United States comes from thermoelectric plants.¹⁵⁵ Basically, thermoelectric plants operate by heating water—through burning fuel or nuclear fission—to generate steam, which then turns a turbine generator and produces electricity.¹⁵⁶ More water is then used to cool the steam, which itself condenses back to liquid state.¹⁵⁷ Once-through thermoelectric plants return that water back to where they got it—usually a stream, but sometimes holding ponds.¹⁵⁸ Closed-circuit thermoelectric plants, on the other hand, reuse the same water over and over again.¹⁵⁹ Without access to adequate cooling water, thermoelectric plants cannot operate.¹⁶⁰ Different types of fuel require different amounts of cooling water, but all require over 10,000 gallons per MWh.¹⁶¹

150 *Coordinated Federal Approach Needed to Better Manage Energy and Water Tradeoffs*, GOV'T ACCOUNTABILITY OFF. 1 (Sept. 2012), <https://www.gao.gov/assets/650/648306.pdf>.

151 *Id.*

152 *See Summary of Estimated Water Use in the United States in 2015*, U.S. GEOLOGICAL SURV. 1 (2018), <https://pubs.usgs.gov/fs/2018/3035/fs20183035.pdf>.

153 *See id.* Thermoelectric power accounts for 133 billion gallons out of 321.6 billion gallons of withdrawals per day and mining accounts for 4 billion gallons. *Id.*

154 *The Water Footprint of Energy*, WATER FOOTPRINT CALCULATOR (July 1, 2017), <https://www.watercalculator.org/water-use/the-water-footprint-of-energy/>.

155 *Id.*

156 *Id.*

157 *Id.*

158 *Id.*

159 *Id.*

160 Kate Galbraith, *Drought Could Pose Power Plant Problems*, TEX. TRIB. (Sept. 16, 2011), <https://www.texastribune.org/2011/09/16/drought-could-post-problems-texas-power-plants/>.

161 Chris Clarke, *Fact Check: How Much Water Does Solar Power Really Use?*, KCET (May 6, 2014), <https://www.kcet.org/redefine/fact-check-how-much-water-does-solar-power-really-use>.

B. MINING AND REFINING

Mining for coal, crude oil, unconventional oil (fracking), and natural gas uses significant amounts of water.¹⁶² In and of itself, mining accounts for one percent, or four billion gallons of water per day on average.¹⁶³ This water usage is in addition to the water needed for thermoelectric plants to actually generate electricity from these raw resources.¹⁶⁴ Mining for resources like coal uses water for mineral processing, dust suppression, slurry transport, and workers' needs.¹⁶⁵ Water use in coal mining depends heavily on the type of coal that is being mined and whether it needs to be "washed" for impurities.¹⁶⁶ On the low end, coal mines use ninety-six gallons of water per MWh.¹⁶⁷ But on the high end, coal mines might use 360 gallons of water per MWh.¹⁶⁸

Fracking, a type of mining, also requires water for extraction.¹⁶⁹ Through fracking, about 167 gallons of "produced water" per MWh comes up with the natural gas.¹⁷⁰ This produced water is usually injected into wells, never to be touched again, even though some of it may be useful with appropriate treatment.¹⁷¹ The amount of water required to develop a fracking site depends heavily on the shale formation.¹⁷² In the Permian Basin, fracking uses approximately the volume of water that supplies the entire city of San Antonio every day.¹⁷³ In West Texas's Wolfcamp Shale, each well requires about 340,000 barrels—over 1 million gallons—of water.¹⁷⁴ But nationwide, many wells re-

162 Gavin M. Mudd et al., *Final Report: Water Use and Risks in Mining*, COLUM. WATER CTR. 2 (Dec. 2017), http://water.columbia.edu/files/2018/01/14.2017.Mudd_.Report.Water-Use-and-Risks-in-Mining.pdf.

163 *Summary of Estimated Water Use in the United States in 2015*, *supra* note 152.

164 *Id.*

165 *Managing water consumption in mining*, MINING TECH. 1 (Aug. 21, 2013), <https://www.mining-technology.com/features/feature-managing-water-consumption-mining-global-shortage/>.

166 *How it Works: Water for Coal*, UNION OF CONCERNED SCIENTISTS, <https://www.ucsusa.org/resources/water-coal> (last updated Aug. 7, 2014).

167 *See id.* (indicating that coal mining uses 800 to 3,000 gallons of water per ton of coal).

168 *See id.* (indicating that coal mining uses 800 to 3,000 gallons of water per ton of coal).

169 See Gabriel Collins, *Trash or Treasure: How is Produced Water's Economic Value Evolving in the Permian Basin?*, BAKER INST. 4 (Feb. 7, 2019), <https://www.bakerinstitute.org/media/files/files/47886004/collins-trash-or-treasure-how-is-produced-water-s-economic-value-evolving-in-the-permian-basin-7-february-2019.pdf>.

170 *Energy Demands on Water Resources*, U.S. DEP'T. ENERGY 21 (Dec. 2006), <https://www.circleofblue.org/wp-content/uploads/2010/09/121-RptToCongress-EWwEIAcomments-FINAL2.pdf> (indicating that 49 million gallons of produced water are generated each day).

171 Jackie Benton, *Recycling Fracking Water*, BUREAU OF ECON. GEOLOGY, UNIV. OF TEX. 2 (Nov. 21, 2017) <http://www.beg.utexas.edu/files/content/beg/ext-aff/17-10/Recycling%20Fracking%20Water.pdf>.

172 *See generally* Andrew Kondash & Avner Vengosh, *Water Footprint of Hydraulic Fracturing*, ENVTL. SCI. & TECH. LETTERS (Sep 15, 2015), <https://pubs.acs.org/doi/pdf/10.1021/acs.estlett.5b00211>.

173 Collins, *supra* note 169, at 4.

174 Benton, *supra* note 171, at 5.

quire much more water to frack, averaging 5 million gallons of water per well.¹⁷⁵ With this average, fracking requires roughly 4,184 gallons per MWh produced.¹⁷⁶

Refining crude oil requires water for cooling, processing, steam production, fire mains, and utilities.¹⁷⁷ Refineries operate similarly to thermoelectric plants in their cooling systems, using either once-through or closed-circuit cooling.¹⁷⁸ On average, refining uses about twenty-eight gallons of water per MWh.¹⁷⁹ In large part, refineries get most of their water from municipal fresh water or river water, but many refineries also secure water from underground aquifers.¹⁸⁰

C. RENEWABLE ENERGY SOURCES

Wind and solar power use very little water to produce energy.¹⁸¹ But not all kinds of renewable energy use such little water.¹⁸² As previously discussed, thermoelectric plants produce energy from nuclear sources.¹⁸³ In addition to that water use, nuclear plants use water as a barrier to their radioactive waste.¹⁸⁴ Overall, nuclear plants use over 4,500 gallons per MWh.¹⁸⁵ Similarly, much of the energy produced from biomass requires thermoelectric-type plants.¹⁸⁶ But in addition to the water used for the thermoelectric process, biomass requires water to produce the fuel.¹⁸⁷ And since most biomass plants use corn, which requires vast amounts of water to grow, biomass plants use significant amounts of water.¹⁸⁸ Geothermal plants operate somewhat like thermoelectric plants, pumping hot water from underground reservoirs into closed-loop systems and then in-

175 See Kondash, *supra* note 172.

176 *Id.*

177 Laura E. Weaver, Rob Henderson & John Blieszner, *Potential Vulnerability of US Petroleum Refineries to Increasing Water Temperature and/or Reduced Water Availability*, U.S. DEP'T. ENERGY 2 (Jan. 2016), <https://www.energy.gov/sites/prod/files/2016/03/f30/US%20DOE%20Refinery%20Water%20Study.pdf>.

178 *Id.* at 1.

179 See *id.* (“A typical refinery will use about 1.5 barrels of water to process 1 barrel of crude oil.”).

180 *Id.* at 3 (indicating that refineries use multiple sources for their water and that about 60% of refineries use municipal water, 50% use river water, and 15% use groundwater).

181 See Petru, *supra* note 7.

182 See, e.g., *How much water does a nuclear power plant consume?*, *supra* note 8.

183 *Id.*

184 *Importance of water at nuclear plants*, DUKE ENERGY (Jan. 22, 2014), <https://nuclear.duke-energy.com/2014/01/22/importance-of-water-at-nuclear-plants>.

185 *How much water does a nuclear power plant consume?*, *supra* note 8.

186 *Biomass For Electricity Generation*, U.S. DEP'T. ENERGY (Sept. 15, 2016), <https://www.wbdg.org/resources/biomass-electricity-generation> (“Most biopower plants use direct-fired combustion systems. They burn biomass directly to produce high-pressure steam that drives a turbine generator to make electricity.”).

187 *Water Use and Sustainable Biofuel Production*, FARM ENERGY (Apr. 3, 2019), <https://farm-energy.extension.org/water-use-and-sustainable-biofuel-production/>.

188 *Id.* (indicating that one pound of biomass requires twenty-five gallons of water and that even more water is lost through evaporation).

jecting that same water directly back into the reservoir.¹⁸⁹ Geothermal plants need water for cooling and some amount of the pumped water is lost as steam.¹⁹⁰ Per MWh, geothermal plants need between 1,700 and 4,000 gallons of water.¹⁹¹ But many geothermal plants use recycled geothermal fluids instead of freshwater for cooling.¹⁹² Hydropower is also far from saintly.¹⁹³ Building dams requires flooding areas and, usually, reducing downstream flow by building reservoirs or diverting water into canals.¹⁹⁴ Evaporation from reservoirs results in about 9,000 gallons of water lost per MWh.¹⁹⁵ That evaporation does not *consume* water, but does change where it would otherwise be located.¹⁹⁶

Even solar power plants use water to produce energy.¹⁹⁷ Solar plants come in two general forms: thermal and photovoltaic.¹⁹⁸ Thermal plants harness the sun's heat to produce energy, while photovoltaic plants convert sunlight directly into energy.¹⁹⁹ Thermal plants operate by heating water, which produces steam and turns turbines—much like thermoelectric plants.²⁰⁰ Accordingly, thermal plants require large volumes of water to operate.²⁰¹ But some thermal plants use “dry-cooling” instead of water to function, cutting down their water consumption by cooling with air.²⁰² Still, those plants must clean their solar cells, requiring at least thirty-two gallons per MWh of energy produced.²⁰³ Photovoltaic plants, on the other hand, only require water for cleaning.²⁰⁴ Estimates for how much water is necessary to clean photovoltaic cells range from less than one gallon to over 800 gallons per MWh.²⁰⁵

189 *Environmental Impacts of Geothermal Energy*, UNION OF CONCERNED SCIENTISTS (Mar. 5, 2013), https://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/environmental-impacts-geothermal-energy.html.

190 *Id.*

191 *Id.*

192 *Id.*

193 See *How Hydroelectric Power Works*, UNION OF CONCERNED SCIENTISTS, https://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/how-hydroelectric-energy.html (last updated Dec. 12, 2014).

194 *Id.*

195 *Id.*

196 *Id.*

197 Clarke, *supra* note 161.

198 *Id.*

199 *The Two Types of Solar Energy*, PLANETE ENERGIES (Nov. 21, 2014), <https://www.planete-energies.com/en/medias/close/two-types-solar-energy>.

200 *Id.*

201 *Id.*

202 Clarke, *supra* note 161.

203 *Id.*

204 *Id.*

205 *Id.*

IV. PROBLEMS RESULTING FROM ENERGY PRODUCTION'S WATER USAGE

Needing water poses several issues for the energy sector, but the first and most important is the potential for drought resulting from high water use in the sector.²⁰⁶ By relying on such large quantities of water, thermoelectric plants are at risk of shutdown in periods of severe drought.²⁰⁷ Over the last few years, at least four coal-fired plants have shut down in Texas.²⁰⁸ These shutdowns put pressure on other plants to produce more energy and put the reliability of electricity at risk.²⁰⁹ Moreover, high heat makes it harder to cool down thermoelectric plants, which then require more water.²¹⁰ With climate change, long periods of drought are becoming increasingly common and the overall temperature of the globe is expected to rise.²¹¹ These two problems only exacerbate each other.

Also problematic are sinking coastlines.²¹² Some estimates state that eighty percent of current subsidence is from pumping out groundwater.²¹³ And subsidence in turn leads to contamination of groundwater with brackish or saline water and a lessening of water quality.²¹⁴ Unless thermoelectric plants and miners begin using brackish water, that sort of intrusion into freshwater supplies will again put the industry at risk of shutdown.²¹⁵

Finally, the processes of taking in water and discharging it after use can harm wildlife.²¹⁶ Fish and other aquatic animals can get caught in water pumps or the decreased volume of water can force them to alter their behavior.²¹⁷ The increase of temperature from discharged water can also damage aquatic animals and plants.²¹⁸ Pollution, including higher salinity, can affect both wildlife and the quality of water necessary for human use and consumption.²¹⁹

206 *Everything You Need to Know About the Texas Drought*, NPR STATEIMPACT, <https://stateimpact.npr.org/texas/tag/drought/> (last visited Dec. 20, 2019).

207 L.M. Sixel, *Another Texas power plant is mothballed, raising concerns over reserves and pricing*, HOU. CHRON. (Jan. 7, 2019), <https://www.houstonchronicle.com/business/energy/article/Another-Texas-power-plant-is-mothballed-raising-13515334.php>.

208 *Id.*

209 *See id.*

210 Erin Meyer & Julie Werneau, *Power plants releasing hotter water*, CHI. TRIB. (Aug. 20, 2012), <https://www.chicagotribune.com/news/ct-xpm-2012-08-20-ct-met-nuclear-water-20120820-story.html>.

211 *See Drought and Climate Change*, CTR. FOR CLIMATE & ENERGY SOL., <https://www.c2es.org/content/drought-and-climate-change/> (last visited Dec. 20, 2019).

212 *Environmental Impacts of Geothermal Energy*, *supra* note 189.

213 *Land Subsidence*, U.S. GEOLOGICAL SURV., <https://www.usgs.gov/special-topic/water-science-school/science/land-subsidence> (last visited Dec. 20, 2019).

214 Moran et al., *supra* note 31.

215 *See* Buono et al., *supra* note 105.

216 *Power Plant Cooling and Associated Impacts*, NAT'L. RES. DEF. COUNCIL 7 (April 2014), <https://www.nrdc.org/sites/default/files/power-plant-cooling-IB.pdf>.

217 *See id.* at 6; Petru, *supra* note 7.

218 *Power Plant Cooling and Associated Impacts*, *supra* note 216, at 7.

219 *See Environmental, Health and Economic Impacts of Road Salt*, N.H. DEP'T. OF ENVTL. SERVS., <https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/im>

V. INDUSTRY-WIDE SOLUTIONS

On the production side, power generation plants can help water conservation efforts. Thermoelectric plants can use closed-circuit or dry cooling to reduce their water needs.²²⁰ With closed-circuit cooling, thermoelectric plants actually *consume* more water than with open-circuit cooling.²²¹ But using this method might be beneficial for the fish and wildlife harmed by the thermal pollution associated with open-circuit discharges.²²² Over sixty percent of thermoelectric plants in the U.S. use closed-circuit cooling systems.²²³ Dry cooling thermoelectric plants use air instead of water to cool and condense steam.²²⁴ Dry cooling systems are more effectively used in combined cycle natural gas plants because of the relatively low amount of cooling power needed.²²⁵ In general, dry cooling systems are two percent less efficient than traditional open-circuit systems.²²⁶

Recycling water is another option for reducing consumption in the energy sector. In 2015, Pioneer signed an eleven-year lease to use the City of Odessa's treated wastewater for its fracking operations in the Permian Basin.²²⁷ The deal will help Odessa's revenue stream and, hopefully, reduce truck traffic in the area.²²⁸ Prior to this contract, Pioneer experimented with using brackish, rather than fresh, water.²²⁹ Apache, another company, uses a combination of recycled frac water and brackish water in its operations.²³⁰ Pennsylvania, interestingly enough, has successfully encouraged fracking operations and other oil and gas producers to recycle water, resulting in reuse rates of over seventy percent.²³¹

Of course, the most straight-forward method of reducing the energy sector's dependency on freshwater would be to transition to production methods that do not require water. But considering the technological difficulties associated with wind and solar power, it is probably not technologically feasible to do so.²³² Solar power is inconsistent because its availability depends on the time of day, year, and relative cloud cover.²³³

pacts.htm (last visited Dec. 20, 2019) (discussing salt pollution from the application of road salt).

220 *Energy Demands on Water Resources*, *supra* note 170, at 34.

221 *See id.* at 32.

222 *Id.* at 34.

223 Suparna Ray, *Some U.S. electricity generating plants use dry cooling*, U.S. ENERGY INFO. ADMIN. (Aug. 29, 2018), <https://www.eia.gov/todayinenergy/detail.php?id=36773>.

224 *Id.*

225 *Id.*

226 *Energy Demands on Water Resources*, *supra* note 170, at 34.

227 Anna Driver, *In downturn, frackers turn to toilet water in drought-prone Texas*, REUTERS (Aug. 20, 2015), <https://www.reuters.com/article/us-pioneer-natl-rsc-fracking-water/in-downturn-frackers-turn-to-toilet-water-in-drought-prone-texas-idUSKCN0QQ0CA20150821>.

228 *Id.*

229 *Id.*

230 Benton, *supra* note 171, at 5.

231 *Id.* at 7.

232 Michael Shellenberger, *We Don't Need Solar and Wind to Save the Climate*, FORBES (May 8, 2018), <https://www.forbes.com/sites/michaelshellenberger/2018/05/08/we-dont-need-solar-and-wind-to-save-the-climate-and-its-a-good-thing-too/>.

233 *Id.*

Wind power, on the other hand, can be available all day long.²³⁴ But both solar and wind power have specific requirements for their locations, often necessitating lengthy transmission lines.²³⁵ Neither will be viable as a primary means of energy production without increased storage capacity.²³⁶ And neither wind nor solar are without environmental consequences.²³⁷

VI. LAW-SIDE SOLUTIONS

Texas has an unfair advantage over neighboring states due to the rule of capture and absolute ownership doctrines.²³⁸ With these doctrines, Texans are allowed to pump as much water as they can get from underground aquifers.²³⁹ Many of those aquifers cross state boundaries, and no other state still uses the rule of capture to govern groundwater allocation.²⁴⁰ Together, these facts make it more likely that Texans are able to pump more than their fair share of multi-state aquifers. One of these aquifers is the Ogallala, which spans underneath eight states.²⁴¹ Unfortunately, the Ogallala Aquifer is being pumped faster than it is being replenished.²⁴² And the southern part of the Ogallala, underneath Texas, is particularly at risk.²⁴³ With this potential for unfairness and impending risk of the nation's most important aquifer running dry, Texas's groundwater allocation scheme needs to change. To that end, I will explain two different suggestions for how Texas could alter its allocation schemes: adopting a new allocation method and creating multi-state aquifer compacts.

A. CORRELATIVE AND REASONABLE USE

One method of solving the gross advantage that Texans have over pumping groundwater that exists below their land is to adopt other allocation methods, such as the

234 *Id.*

235 *Advantages and Challenges of Wind Energy*, U.S. DEP'T. ENERGY, <https://www.energy.gov/eere/wind/advantages-and-challenges-wind-energy> (last visited Dec. 20, 2019).

236 See Shellenberger, *supra* note 232.

237 *Advantages and Challenges of Wind Energy*, *supra* note 235.

238 See *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 823, 828 (Tex. 2012) (discussing the rules governing water allocation in Texas, generally).

239 See *supra* Part II.E.

240 *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 81–82 (Tex. 1999) (Hecht, J., concurring) (“When this Court adopted the rule of capture as a common-law rule ninety-five years ago . . . we believed it to have been adopted in England and by the court of last resort in every state in this country except New Hampshire. Thirty-five years later only eleven of the eighteen western states still followed the rule of capture; after two more decades, only three western states still followed the rule. Now there is but one lone holdout: Texas.”).

241 Jane Braxton Little, *The Ogallala Aquifer: Saving a Vital U.S. Water Source*, SCI. AM. (Mar. 1, 2009), <https://www.scientificamerican.com/article/the-ogallala-aquifer/>.

242 Laura Parker, *What Happens to the U.S. Midwest When the Water's Gone?*, NAT'L GEO. (Aug. 2016), <https://www.nationalgeographic.com/magazine/2016/08/vanishing-midwest-ogallala-aquifer-drought/>.

243 *Id.* (indicating that the southern Ogallala has little ability to recharge).

reasonable and correlative use doctrines. Considering the significant body of case law rejecting correlative use and reasonable use in favor of the rule of capture, it is incredibly unlikely that this change would come from the court system.²⁴⁴ There is a chance that such a change might emanate from the legislature.²⁴⁵ Were Texas to adopt a new water allocation method, I would advocate for a correlative rights approach. Texas already uses correlative rights to govern disputes between oil and gas owners.²⁴⁶ Using correlative rights in oil and gas law is a “creature of regulation,” stemming from the Texas Railroad Commission’s regulation of oil and gas.²⁴⁷ Correlative rights for groundwater could similarly be a creature of regulation. In addition to a correlative rights approach, Texas should adopt the reasonable use doctrine.

B. OGALLALA COMPACT

As already discussed, multi-state river compacts have been notoriously difficult to negotiate.²⁴⁸ There is no reason to believe that a multi-state aquifer compact would be any different. In fact, because of the longstanding and incredibly diverse groundwater allocation laws, aquifer compacts may be even more difficult to negotiate. But with massive aquifers, on which much of our livelihood rely, at risk of running dry in the relatively near future, coming to agreements on how to fairly allocate groundwater resources is vital.

The Colorado River Compact is not perfect, and we should not expect any multi-state aquifer compact to be either. But negotiating and signing a compact would be a step in the right direction for water conservation and fair allocation as between states. With increasing technological sophistication, we are much better able to understand the rates at which aquifers recharge, and thus, the rates at which they can be pumped—a figure essential for groundwater conservation and management. Furthermore, interstate aquifer compacts may serve important functions for stability and reliance: groundwater pumpers will know exactly how much they are allowed to pump and can rely on that volume being available.

Below, I have supplied a draft of a potential Ogallala Aquifer Compact, to be signed by the eight states sitting over the aquifer. This draft is based largely on the Colorado River Compact.²⁴⁹

244 See *Hous. & Tex. Cent. Ry. Co. v. East*, 81 S.W. 279, 280 (Tex. 1904); *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 76 (Tex. 1999); *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 823, 828 (Tex. 2012).

245 See *Sipriano*, 1 S.W.3d at 81–82 (Hecht, J., concurring).

246 See *Day*, 369 S.W.3d at 830 (citing *Elliff v. Texon Drilling Co.*, 210 S.W.2d 558, 562 (Tex. 1948)).

247 *Id.*

248 See Adler, *supra* note 137.

249 *Colorado River Compact*, *supra* note 140.

OGALLALA AQUIFER COMPACT, 2019 DRAFT²⁵⁰

The States of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming, having resolved to enter into the compact under the Act of the Congress of the United States of America approved [DATE] and the Acts of the Legislatures of the said States, after negotiations participated in by a representative of the United States of America, have agreed upon the following articles:

ARTICLE I

The purposes of this compact are to provide for the equitable distribution and apportionment of the use of the groundwaters of the Ogallala Aquifer; to establish the relative importance of different beneficial uses of water; to promote interstate comity and remove causes of present and future controversies; to secure the continued agricultural, industrial, and municipal development of the States relying on the Ogallala's water supply; and to promote and protect the underlying water supply for the benefit of both humans and the environment. To these ends, the Ogallala Aquifer is divided in major and minor states, and an apportionment of the use of part of the water is made to each of them with the provision that further equitable apportionments may be made.

ARTICLE II

As used in this compact—

- (a) The term “Major States” means the states of Kansas, Nebraska, and Texas.
- (b) The term “Minor States” means the states of Colorado, Oklahoma, New Mexico, South Dakota, and Wyoming.
- (c) The term “Commissioner” means a representative, appointed by a signatory State's Legislature. Commissioners must have a good grasp of the geology of the Ogallala Aquifer, the current uses of the Aquifer's water in their State, and the compact's obligations in general.
- (d) The term “agricultural use” shall include the use of water for commercial farming, and shall include both crop farming and ranching and forestry and aquaculture, if appropriate.
- (e) The term “industrial use” shall include the use of water for manufacturing, and shall include oil and gas refining and processing plants but shall exclude the generation of electrical power, covered under electrical use.
- (f) The term “electrical use” shall include the use of water for electrical power generation, and shall include mining, hydraulic fracturing, and power plant operation.
- (g) The term “domestic use” shall include the use of water for household purposes, and shall include both indoor and outdoor purposes unless such outdoor purposes involve commercial farming as discussed in subsection (c).

250 This draft is a proposal written by the author.

(h) The term “municipal use” encompasses the use of water from domestic use and industrial use.

ARTICLE III

(a) The waters of the Ogallala Aquifer shall be apportioned equitably among the signatory States, with the following factors in mind:

- (1) The historical uses of such water in each signatory State.
- (2) The purposes, in each signatory State, for which such water has been historically used.
- (3) The proportion of the Aquifer that is under each signatory State.
- (4) The ability of any signatory State to further reduce its consumption of the Aquifer, without undue burden as compared to the other signatory States.
- (5) The best available scientific data.
- (6) The economic and environmental consequences of the Aquifer running dry.

(b) At no time shall the rate of pumping of the Aquifer exceed its recharge rate, as projected, using the best information available, over a three-year span.

(c) The United States Geological Survey shall preside over the initial apportionment of the waters of the Aquifer and any future alteration of such initial apportionment.

(d) The signatory States shall, for the purpose of developing information, monitor the Aquifer's levels within each State's boundaries, the amount of water withdrawn from the Aquifer, and the existence of subsidence.

(e) Each signatory State is separately responsible for monitoring and enforcing compliance with the terms of this compact within its boundaries.

ARTICLE IV

(a) Inasmuch as the rate of pumping of the Ogallala Aquifer exceeds its recharge rate and further conservation by all uses is impossible, the use of water for purposes of industrial and electrical purposes shall be subservient to the uses of such water for domestic and agricultural purposes. This provision shall apply equally in times of abundance and times of drought.

(b) Inasmuch as the pumping of the Ogallala Aquifer is shown to cause or contribute to significant subsidence in any signatory State and further conservation by all uses is impossible, the use of water for purposes of industrial and electrical purposes shall be subservient to the uses of such water for domestic and agricultural purposes.

(c) Subject to the provisions of this compact, water of the Ogallala Aquifer may not be prospectively stored by municipalities, private individuals, or otherwise for future use.

(d) The provisions of this article shall not apply to or interfere with the regulation and control by any State within its boundaries of the appropriation, use, and distribution of its allocated share of water.

ARTICLE V

Each signatory State, together with the Director of the United States Geological Survey, is charged with:

- (a) Promoting the systematic determination and coordination of the facts as to recharge, appropriation, consumption, and use of water in the Ogallala Aquifer, and the interchange of available information in such matters.
- (b) Securing the ascertainment and publication of the annual recharge rate of the Ogallala Aquifer.
- (c) Performing such other duties as may be assigned by mutual consent of the signatories from time to time.

ARTICLE VI

Should any claim or controversy arise between any two or more of the signatory States: (a) over the meaning or performance of any terms of this compact; (b) as to the allocation of the burdens incident to the performance of any article of this compact; (c) as to the diversion of water in one State for the benefit of another State, the Legislatures of the States affected, upon the request of one of them, shall forthwith appoint Commissioners with power to consider and adjust such claim or controversy, subject to the ratification by the Legislatures of the States so affected. Should the Commissioners not come to an agreement, each unaffected signatory State shall appoint its own Commissioners, at which point all eight Commissioners shall consider and adjust such claim or controversy, subject to ratification by the Legislatures of the States so affected. Only after compliance with this procedure may an affected State bring its claim or controversy to the court.

ARTICLE VII

Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian tribes.

ARTICLE VIII

Nothing in this compact shall be construed to limit or prevent any State from instituting or maintaining any proceeding, legal or equitable, for the protection of any right under this compact or the enforcement of any of its provisions after compliance with the requirements stated in Article VI. Exclusive jurisdiction over any claim or controversy arising under this compact is in the federal district courts of the United States of America. Should the question arise, interpretation of this compact shall follow the rules and canons traditionally used with constitutions, emphasizing flexibility and practicality.

ARTICLE IX

This compact may be terminated at any time by the unanimous agreement of the signatory States. In the event of termination, all rights established under it shall continue unimpaired.

ARTICLE X

This compact may be altered or amended at any time if appointed Commissioners from two Major States, four Minor States, and the Director of the United States Geological Survey agree upon such alteration or amendment. In the event of alteration or amendment, all rights already-established shall continue unimpaired.

ARTICLE XI

This compact shall become binding and obligatory when it shall have been approved by the Legislatures of each of the signatory States and by the Congress of the United States. Notice of approval by the Legislature shall be given by the appointed Commissioner of each signatory State, and to the Commissioner of each signatory State and the President of the United States. The President of the United States is requested to give notice to the Commissioners of the signatory States of approval by the Congress of the United States.

VII. CONCLUSION

With impending drought due to climate change and ever-drying aquifers, water law will likely be a focus for generations to come. Though not the largest consumer of water by any means, energy production requires a great deal of water to operate. In areas like the Permian Basin, where agriculture and power production exist side-by-side in relatively arid climates, water conservation is becoming more and more important. Governing multi-state water resources is incredibly difficult due to vast differences in states' allocation methods. Many multi-state rivers are governed by compacts, but, thus far, no aquifer is. For these reasons, I propose that Texas changes its groundwater allocation method from a combination of the rule of capture and the absolute ownership doctrine to something similar to the doctrines of correlative and reasonable use. Since it seems unlikely that Texas will change its common law groundwater doctrine anytime in the near future, I propose that Texas and surrounding states work to negotiate and sign compacts for any significant aquifers lying underneath not only just their states.

Zoe W. Oldham, J.D. Candidate, May 2021, University of Texas School of Law; B.A., Rice University.

THE FINAL STRAW?: EVALUATING POSSIBLE CHALLENGES TO SINGLE-USE PLASTIC STRAW BANS

BY DAYNA SMITH

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I. INTRODUCTION

It started with a sea turtle. A viral video of a sea turtle having a straw removed from its nose sparked a wave of anti-plastic-straw action, including some single-use plastic straw bans.¹ Turtles are not the only sea life impacted by plastic waste; many marine

1 The Leatherback Trust, *Removing a Plastic Straw from a Sea Turtle's Nostril – Short Version*, YOUTUBE (Aug. 12, 2015), <https://www.youtube.com/watch?v=D2J2qdOrW44>; see, e.g., *The Last Plastic Straw*, PLASTIC POLLUTION COAL., <https://www.plasticpollutioncoalition.org/no-straw-please/> (last visited Apr. 11, 2020) (sharing the sea turtle video as inspiration to refuse plastic straws); Brittany Shammass, *Miami Beach Wants to Expand Its Ban on Plastic*

animals become tangled in plastic debris or ingest it.² In one extreme case, a beached sperm whale's stomach was filled with sixty pounds of plastic debris and fish netting.³

Plastic waste degrades water quality and alters aesthetic properties of the ocean.⁴ In an attempt to reduce plastic waste, many public and private entities are considering banning single-use plastics, including single-use plastic straws.⁵ Some municipalities, such as Seattle and Miami Beach, have already implemented some version of a single-use plastic straw ban.⁶ Private companies, including Starbucks and The Walt Disney Company, have pledged to eliminate single-use plastic straws.⁷ Further, non-profit organizations launched initiatives to encourage companies and individuals to pledge to eliminate plastic straws and other waste.⁸

Because alternatives to single-use plastic straws are available, these entities may have believed straw bans would not be controversial.⁹ However, the common criticism of straw bans is that many disabled individuals require straws and will not be able to have

Straws, MIAMI NEW TIMES (July 20, 2018), <https://www.miaminewtimes.com/news/miami-beach-wants-to-expand-its-ban-on-plastic-straws-10544696> (quoting one of Miami Beach's expanded straw ban sponsors as saying the sea turtle video "had a huge impact on" her); Herb Weisbaum, *Fighting Pollution by Saying "No" to Plastic Straws*, NBC BETTER (Mar. 14, 2018), <https://www.nbcnews.com/better/science/fighting-pollution-avoiding-plastic-straws-ncna856296> (explaining that the sea turtle straw video inspired environmental group StrawFree.org).

2 Michelle Nowlin & Talia Sechley, *Article: An Innovative, Collaborative Approach to Addressing the Sources of Marine Debris in North Carolina*, 28 DUKE ENVTL. L. & POL'Y F. 243, 243 (2018).

3 Matthew Haag, *64 Pounds of Trash Killed a Sperm Whale in Spain, Scientists Say*, N.Y. TIMES (Apr. 12, 2018), <https://www.nytimes.com/2018/04/12/science/sperm-whale-death-spain.html>.

4 Nowlin & Sechley, *supra* note 2, at 244.

5 See NEW YORK CITY, N.Y., Int. No. 936 (proposed May 2018) (proposed straw ban legislation); see also Kat Eschner, *The EU Just Finalized an Agreement to Ban Tons of Single-use Plastics*, POPULAR SCI. (Dec. 20, 2018), <https://www.popsci.com/eu-plastic-ban> (describing an agreement to ban some plastic products, including plastic straws, in the EU).

6 Miami Beach, Fla., MUNICIPAL CODE § 46-213 (2019); Seattle, Wash., MUNICIPAL CODE § 21.36.086 (2008).

7 *Starbucks to Eliminate Plastic Straws Globally by 2020*, STARBUCKS NEWSROOM (July 9, 2018), <https://news.starbucks.com/press-releases/starbucks-to-eliminate-plastic-straws-globally-by-2020>. See Alix Langone, *All the Major Companies that are Banning Plastic Straws*, MONEY (July 18, 2018), <http://time.com/money/5333715/starbucks-hyatt-ban-plastic-straws/> (indicating that The Walt Disney Company is banning plastic straws).

8 See *Reduce Plastic Pollution*, SHEDD AQUARIUM, <https://www.sheddaquarium.org/sheddthestrav> (encouraging businesses and individuals to cease using single-use plastic items such as straws) (last visited Apr. 11, 2020); *Our Mission*, THE LAST PLASTIC STRAW, <https://thelastplasticstraw.org/> (last visited Apr. 11, 2020) (encouraging individuals and businesses to stop offering straws, except upon request).

9 See Serena Dai, *NYC Councilman Proposes a Ban on All Plastic Straws in NYC*, EATER: NYC (May 23, 2018), <https://ny.eater.com/2018/5/23/17384626/plastic-straw-ban-nyc> (indicating the New York City Councilman proposing the straw ban did not foresee much opposition).

anything to drink at a restaurant if straws are not available.¹⁰ Further, some individuals require soft, pliable straws, which are not widely available as a reusable option.¹¹

As entities consider straw bans, the possibility of disputes between environmental and individual interests increases. As such, it is useful to examine potential legal challenges to straw bans, whether government-implemented or private, and how courts may resolve those challenges. Part II of this note provides background information on both municipal and private straw bans. The background information includes the motivating factors behind straw bans and examples of municipal and private bans. Part III describes the major possible legal challenges to municipal private straw bans and the potential outcome of those challenges. Finally, Part IV makes recommendations to government and private entities for creating straw bans that stand up to those challenges, while balancing environmental and individual interests.

II. ABOUT PLASTIC STRAWS

A. WHY SINGLE-USE PLASTIC STRAW BANS?

Approximately sixteen billion pounds of plastic end up in the ocean annually.¹² About eighty percent of the annual plastic waste entering the ocean originated on land.¹³ Scientists have observed plastic fragments in oceans at concentrations of up to 580,000 plastic pieces per square kilometer.¹⁴

Plastic waste endangers the health of oceans, due in part to its degradation process.¹⁵ When plastic degrades, it breaks down into smaller pieces of plastic debris.¹⁶ However, because plastic is a relatively new product, it is unclear what the timeline is for complete

10 See Michelle Gant, *Starbucks' Straw Ban Questioned by Disability Rights Groups*, FOX NEWS (July 16, 2018), <http://www.foxnews.com/food-drink/2018/07/16/starbucks-straw-ban-questioned-by-disability-rights-groups.html> (discussing concerns about Starbucks' straw ban's impact on people with disabilities); Sarah Gibbens, *How Do Plastic Straw Bans Work?*, NAT'L GEOGRAPHIC (July 23, 2018), <https://www.nationalgeographic.com/environment/2018/07/news-how-plastic-straw-bans-work> (discussing criticism of straw bans by disability advocates); Ted Land, *People with Disabilities Concerned about Seattle's Ban on Plastic Straws*, K5 NEWS (July 10, 2018), <https://www.king5.com/article/news/local/people-with-disabilities-concerned-about-seattles-ban-on-plastic-straws/281-572575933> (discussing citizens' concerns about the straw ban's effect on people with disabilities).

11 See Gant, *supra* note 10 (explaining that some people with disabilities require bendable plastic straws and cannot use biodegradable straws as a replacement).

12 Univ. of Cal.–Santa Barbara, *Eight Million Tons: Researchers Calculate the Magnitude of Plastic Waste Going Into the Ocean*, PHYS.ORG (Feb. 12, 2105), <https://phys.org/news/2015-02-magnitude-plastic-ocean.html>.

13 Chris Sherrington, *Plastics in the Marine Environment*, EUNOMIA (June 1, 2016), <http://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/>.

14 Chris Wilcox et al., *Threat of Plastic Pollution to Seabirds is Global, Pervasive, and Increasing*, 112 PROC. OF THE NAT'L ACAD. OF SCI. 11899, 11899 (2015).

15 Nowlin & Sechley, *supra* note 2, at 244.

16 Jefferson Hopewell et al., *Plastics Recycling: Challenges and Opportunities*, 364 PHIL. TRANSACTIONS OF THE ROYAL SOC'Y B 2115, 2116 (2009).

degradation.¹⁷ It may take centuries or millennia for the base polymer making up non-biodegradable plastics to disappear, if it ever will.¹⁸ Further, these microscopic pieces of polymer absorb persistent organic pollutants from the water column, which then make their way into the stomachs of fishes.¹⁹ Organisms that are low on the food chain consume the small polymers that may contain contaminants.²⁰ Scientists have documented plastic debris in the stomachs of planktivorous (plankton-eating) fishes.²¹

Consuming plastic debris may cause fish to suffer from malnutrition and eventual starvation, altering the makeup of world fish populations.²² Scientists have also observed plastics in the stomachs of other sea animals, including sea birds, whales, and sea turtles.²³ In an extreme case, a beached sperm whale's stomach was found filled with sixty pounds of plastic debris and fish netting.²⁴ Beyond ingestion, plastic debris can also entangle sea animals, leaving them stranded, unable to hunt or feed, and vulnerable to predators.²⁵ One sea turtle died from a combination of ingesting large pieces of plastic and suffering a major entanglement injury.²⁶

Plastic debris is not only in marine ecosystems, but is also found in freshwater environments.²⁷ A study of the Danube River found that mean plastic density was higher than mean larval fish densities, displaying the high level of plastic pollution in the river.²⁸ Scientists have also found plastics in the stomachs of freshwater organisms.²⁹ In the Great Lakes, scientists found plastics from microfibers "enmeshed in the gastrointes-

17 *Id.*

18 *Id.*

19 Nowlin & Sechley, *supra* note 2, at 245 (citing Almira Van et al., *Persistent Organic Pollutants in Plastic Marine Debris Found on Beaches in San Diego*, 86 CHEMOSPHERE 258–63 (2012)) (noting the pollutants include polychlorinated biphenyl and flame retardants); see also Osnet Segev et al., *Environmental Impact of Flame Retardants (Persistence and Biodegradability)*, 6 INT'L J. OF ENVTL. RES. & PUB. HEALTH 478, 486 (2009) (explaining that flame retardants bioaccumulate through the food chain to highly toxic levels and that removing flame retardants from the environment has been difficult); AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, POLYCHLORINATED BIPHENYLS – TOXFAQ (July 2014) (explaining that PCBs bioaccumulate to high levels through the food chain, potentially harming humans if they consume an affected fish).

20 Nowlin & Sechley, *supra* note 2, at 245 (citing Patricia Burkhardt-Holm, Angela Kohler, & Nadia von Moos, *Uptake and Effects of Microplastics on Cells and Tissue of the Blue Mussel Mytilus edulis L. after an Experimental Exposure*, 46 ENVTL. SCI. & TECH. 11327, 11327 (2012)).

21 Christiana M. Boerger et al., *Plastic Ingestion by Planktivorous Fishes in the North Pacific Central Gyre*, 60 MARINE POLLUTION BULL. 2275, 2277 (2010).

22 *Id.*

23 Wilcox, *supra* note 14; Haag *supra* note 3; Rita Mascarenhas et al., *Plastic Debris Ingestion by Sea Turtle in Pariba, Brazil*, 49 MARINE POLLUTION BULL. 354, 354 (2004).

24 Haag, *supra* note 3.

25 Nowlin & Sechley, *supra* note 2.

26 *Sea Turtle Succumbs to Plastics and Entanglement*, NEW ENGLAND AQUARIUM: SEA TURTLE RESCUE (Nov. 5, 2018), <https://www.neaq.org/blog/sea-turtle-succumbs-to-plastics-and-entanglement/>.

27 Nowlin & Sechley, *supra* note 2, at 244.

28 Aaron Lechner et al., *The Danube So Colorful: A Potpourri of Plastic Litter Outnumbers Fish Larvae in Europe's Second Largest River*, 188 ENVTL. POLLUTION 177, 179 (2014).

tinal tract[s]” of fishes.³⁰ Overall, plastic debris degrades water quality, adversely affects animal health, and adversely impacts the beauty of the natural environment, demonstrating the need for controls on plastic waste.³¹

Plastic straws make up a large portion of marine debris.³² Americans alone use and discard approximately 500 million straws per day.³³ Consumers cannot recycle plastic straws due to their small size.³⁴ Environmentalists believe straws are an easy starting point from which to approach the plastic waste problem while making an actual impact.³⁵

This is where straw bans come in. Many municipalities and private businesses have either enacted or proposed straw bans for their citizens and customers.³⁶ Multiple municipal lawmakers cite sea animal health as an issue.³⁷ Non-profit organizations encouraging straw bans cite myriad environmental considerations.³⁸ Overall, straw bans may become more popular as the effects of plastics in the environment become more well-known.

B. EXAMPLES OF MUNICIPAL STRAW BANS

Multiple municipalities, such as those described below, have already enacted, or proposed, plastic straw bans.³⁹ Many municipalities besides these examples have enacted either partial or full straw bans.⁴⁰

29 Courtney Humphries, *Freshwater’s Macro Microplastic Problem*, NOVA NEXT (May 11, 2017), <http://www.pbs.org/wgbh/nova/next/earth/freshwater-microplastics/>.

30 *Id.*

31 Nowlin & Sechley, *supra* note 2, at 244.

32 *See generally* OCEAN CONSERVANCY, BUILDING A CLEAN SWELL 2018 REPORT 13 (2018) (ranking straws and stirrers as number seven of the top ten items collected from ocean and beach clean ups).

33 *The Problem of Plastic Straws (And How Each of Us can Make a Difference)*, PLASTIC POLLUTION COAL. (Jan. 3, 2017), <https://www.plasticpollutioncoalition.org/pft/2017/1/3/the-problem-of-plastic-straws-and-how-each-of-us-can-make-a-difference>.

34 *Id.*

35 Weisbaum, *supra* note 1.

36 *See, e.g.*, Seattle, Wash., MUNICIPAL CODE § 21.36.086 (2008) (banning single-use plastic straws); *Starbucks to Eliminate Plastic Straws Globally by 2020*, *supra* note 7 (eliminating single-use plastic straws).

37 *See, e.g.*, Dai, *supra* note 9 (reporting New York City councilman was inspired by a beached whale with a stomach full of plastic as inspiration for the proposed straw ban); Shammass, *supra* note 1 (quoting one of Miami Beach’s expanded straw ban sponsors as saying a video of a sea turtle with a plastic straw in its nose “had a huge impact on” her).

38 *See, e.g.*, *Impacts of Plastic*, STRAWFREE.ORG, <https://strawfree.org/impacts-of-plastic/> (last visited May 16, 2020) (listing environmental reasons to go straw free).

39 Some state legislatures have also considered straw ban legislation. *See* Elaine S. Povich, *Straw Bans Face Opposition from Disability Advocates*, DISABILITY SCOOP (July 10, 2018), <https://www.disabilityscoop.com/2018/07/10/straw-bans-opposition-disability/25270/> (indicating California, Hawaii, and New York have considered plastic straw legislation).

40 *See generally* William White, *Where are Plastic Straws Banned?*, INVESTOR PLACE (July 2, 2018), <https://investorplace.com/2018/07/where-are-plastic-straws-banned/> (listing municipalities with straw bans).

1. SEATTLE, WASHINGTON

Seattle, Washington was the first major city to implement a straw ban.⁴¹ Although the city passed the ban ten years ago, the plastic straw ban came into effect only recently; food service “[b]usinesses were expected to use existing inventory of plastic utensils and straws before July 1 [of 2018].”⁴² In lieu of plastic straws, businesses may choose to provide compostable straws to their customers.⁴³ If the business chooses to provide compostable straws or utensils, they must also provide clearly marked refuse bins for compost.⁴⁴ Seattle may fine non-compliant businesses up to \$250, though guidance documents and articles do not specify whether the city will assess the fine per incident, per day, or per year.⁴⁵ Supporters indicated the ban could eliminate one million plastic straws in the city in just one month.⁴⁶

2. NEW YORK, NEW YORK

In May 2018, a New York City Councilman Rafael Espinal, Jr., proposed a ban on plastic straws and beverage stirrers.⁴⁷ The proposed ban came as a response to increased public awareness of the growing amount of plastic waste.⁴⁸ It became more urgent to the bill’s sponsors after a sperm whale washed ashore, filled with plastic waste.⁴⁹ The ban states that “[n]o food service establishment in the city shall offer to consumers any single-use beverage straw or beverage stirrers made of plastic or any other non-biodegradable material.”⁵⁰ However, the proposed legislation does provide that food-service locations may provide plastic straws to people who require one, due to disability or medical condition.⁵¹ In non-exempt situations, the city may fine \$100 for the first violation, \$200 for the second, and \$400 for subsequent violations.⁵²

41 *Seattle Becomes the First U.S. City to Ban Plastic Utensils and Straws*, CBSNEWS (July 2, 2018), <https://www.cbsnews.com/news/seattle-becomes-first-u-s-city-to-ban-plastic-utensils-and-straws/>.

42 Sarah Wu, *Q&A: Seattle’s Plastic Straw Ban Now in Effect; Here’s What You Need to Know*, THE SEATTLE TIMES (July 1, 2018) <https://www.seattletimes.com/seattle-news/q-heres-what-you-need-to-know/>.

43 Seattle, Wash., MUNICIPAL CODE § 21.36.086 (2008); SEATTLE PUB. UTILITIES, STRAWS & UTENSILS (2018), https://www.seattle.gov/Util/cs/groups/public/@spu/@foodyard/documents/webcontent/1_072578.pdf; see Wu, *supra* note 42.

44 Seattle, Wash., MUNICIPAL CODE § 21.36.086 (2008).

45 SEATTLE PUB. UTILITIES, STRAWS & UTENSILS (2018) https://www.seattle.gov/Util/cs/groups/public/@spu/@foodyard/documents/webcontent/1_072578.pdf.

46 Jessica Lee, *The Last Straw?*, THE SEATTLE TIMES (Sept. 11, 2017), <https://www.seattletimes.com/seattle-news/the-last-straw-seattle-will-say-goodbye-to-plastic-straws-utensils-with-upcoming-ban/>.

47 New York City, New York, Int. No. 0936-2018 (proposed May 2018); Jessica Moore, *New York City Council Introduces Bill Banning Plastic Straws*, CBS NEW YORK (May 23, 2018), <https://newyork.cbslocal.com/2018/05/23/nyc-plastic-straw-ban-bill/>.

48 See *id.* (quoting City Councilman saying, “Right now, if we continue to use plastic at the rate we’ve been using, by 2050 we’ll have more plastic in the sea than fish living in it.”).

49 Haag, *supra* note 3.

50 *Id.*

51 *Id.*

52 *Id.*

3. *MIAMI BEACH, FLORIDA*

Miami Beach, Florida implemented a straw ban that prohibited businesses from distributing plastic straws on the beach in 2012.⁵³ In 2018, the city expanded the existing partial ban to include straw use in all city beaches, parks, boat ramps, docks, and marinas owned, leased, or managed by the city.⁵⁴ Commissioner Kristen Rosen Gonzalez, one of the bill's sponsors, said she was inspired to expand the ban, in part, after viewing the video of the sea turtle with the straw in its nose.⁵⁵ Full enforcement of the expanded straw ban will take effect on February 1, 2019.⁵⁶ The ban provides an exception for providing a single-use plastic straw to an individual "with a disability or medical condition that impairs the consumption of beverages without a single-use plastic beverage straw."⁵⁷

C. EXAMPLES OF PRIVATE STRAW BANS

Below are examples of private straw bans that are in force or are in the process of being fully enacted. Many private entities beyond these examples have enacted either partial or full straw bans.⁵⁸

1. *THE WALT DISNEY COMPANY*

In July 2018, The Walt Disney Company (Disney) announced it would eliminate single-use plastic straws at all locations except Tokyo Disney.⁵⁹ The policy excludes Tokyo Disney because another company operates that location.⁶⁰ Disney estimates their new policy will eliminate 175 million plastic straws annually.⁶¹ Disney establishments will provide paper straws to guests upon request.⁶²

2. *THE STARBUCKS COFFEE COMPANY*

On July 9, 2018, The Starbucks Coffee Company (Starbucks) announced that it would eliminate single-use plastic straws in its stores by 2020.⁶³ The President and CEO explained that the new policy would be "a significant milestone to achieve our global aspiration of sustainable coffee, served to our customers in more sustainable ways."⁶⁴ As

53 Miami Beach, Fla., Ordinance No. 2014-3884, § 2 (2012); Shammass, *supra* note 1.

54 Miami Beach, Fla., MUNICIPAL CODE § 46-92(c) (2018); Shammass, *supra* note 1.

55 See Shammass, *supra* note 1 (quoting one of Miami Beach's expanded straw ban sponsors as saying the sea turtle video "had a huge impact on" her).

56 Miami Beach, Fla., MUNICIPAL CODE § 46-92(c)(2)(c) (2018).

57 *Id.* § 46-92(c)(1).

58 See generally Langone, *supra* note 7.

59 *Id.*

60 *Id.*

61 Mark Penning, *Disney Expands Environmental Commitment by Reducing Plastic Waste*, DISNEY PARKS BLOG (July 26, 2018), <https://disney Parks.disney.go.com/blog/2018/07/disney-expands-environmental-commitment-by-reducing-plastic-waste/>.

62 Valerie Marino, *Disney to Ban Single-use Plastic Straws from All Its Parks and Resorts*, MIC (July 26, 2018), <https://mic.com/articles/190461/disney-to-ban-single-use-plastic-straws-from-all-its-parks-and-resorts-disney-world-disney-land#.0YoUyVZsV>.

63 *Starbucks to Eliminate Plastic Straws Globally by 2020*, *supra* note 7.

64 *Id.*

part of the policy, Starbucks designed a straw-free, cold-beverage lid.⁶⁵ Starbucks will offer either paper or compostable straws by request for customers that need or prefer straws.⁶⁶

3. AMERICAN AIRLINES

Starting in July 2018, American Airlines began transitioning away from single-use plastic straws.⁶⁷ In its lounges, American Airlines will replace plastic straws with eco-friendly, biodegradable straws.⁶⁸ This policy also replaces other single-use plastic items, such as beverage stirrers, with eco-friendly versions.⁶⁹ American Airlines estimates this new policy will eliminate 71,000 pounds of plastic waste per year.⁷⁰

D. CRITICISMS OF STRAW BANS

New York City Councilman Rafael Espinal, Jr., who proposed New York City's straw ban, believed there would not be any large hurdles to passing the ban.⁷¹ However, critics have raised multiple concerns. One criticism is that restricting plastic straws will not impact the plastic waste problem.⁷² Further, some critics argue that Starbucks is replacing single-use plastic straws with single-use plastic lids, which does not address the plastic problem.⁷³ While these concerns are important to address, this note is concerned with a significant criticism coming from people with disabilities.

Some individuals with disabilities need plastic straws.⁷⁴ Reusable and biodegradable straws present a variety of challenges to people with disabilities.⁷⁵ People with limited jaw control may easily bite through paper straws, which may also fall apart too quickly for practical use.⁷⁶ Silicone and metal straws are not flexible; flexibility is an important feature of a straw for people with mobility challenges.⁷⁷

65 *Id.*

66 *Id.*

67 *American Airlines Lays Down the Straw*, AMERICAN AIRLINES NEWSROOM (July 10, 2018, 10:00 AM), <http://news.aa.com/news/news-details/2018/American-Airlines-Lays-Down-the-Straw/default.aspx>.

68 *Id.*

69 *Id.*

70 *Id.*

71 Dai, *supra* note 9 (indicating the New York City Councilman proposing the straw ban did not foresee much opposition).

72 Adam Minter, *Plastic Straws Aren't the Problem*, BLOOMBERG OPINION (June 7, 2018), <https://www.bloomberg.com/view/articles/2018-06-07/plastic-straws-aren-t-the-problem>.

73 Adele Peters, *Why Starbucks's Plastic Straw Ban Might Not Help the Environment*, FAST CO. (July 26, 2018), <https://www.fastcompany.com/90208207/why-starbucks-plastic-straw-ban-might-not-help-the-environment>.

74 Gibbens, *supra* note 10.

75 Maria Godoy, *Why People with Disabilities Want Bans on Plastic Straws to be More Flexible*, NAT'L PUB. RADIO (July 11, 2018, 8:02 AM), <https://www.npr.org/sections/thesalt/2018/07/11/627773979/why-people-with-disabilities-want-bans-on-plastic-straws-to-be-more-flexible>.

76 *Id.*

77 *Id.*

This criticism is not abstract. Disability advocates raised concerns after Seattle's straw ban became effective.⁷⁸ Disability rights groups also raised concerns following Starbucks's announcement about its straw policy.⁷⁹ Starbucks responded to these concerns by advising that straws would be available upon request, but the company did not specify what material those straws would be made of.⁸⁰ Many existing or proposed municipal straw bans already include exemptions for providing straws for those with disabilities.⁸¹

Despite these accommodations, criticism from people with disabilities may lead to legal challenges to straw bans. Some potential challenges come from the Equal Protection Clause or the Americans with Disabilities Act of 1990 (ADA).⁸²

III. CHALLENGING STRAW BANS: POTENTIAL CHALLENGES AND OUTCOMES

A. CHALLENGES TO GOVERNMENT ACTION

The set of first potential challenges would be against government actions, at either the state or municipal level. This section will examine four possible methods of challenging government action: the Fourteenth Amendment's Equal Protection Clause, the Americans with Disabilities Act (ADA) challenges to state action, ADA challenges to municipal action, and preemption.

1. EQUAL PROTECTION CHALLENGE

The first potential challenge to straw bans is constitutional, under the Fourteenth Amendment's Equal Protection Clause, because of the potentially discriminatory effects of the bans. The United States Constitution provides no State shall "deny to any person within its jurisdiction the equal protection of the laws."⁸³ In practice, courts have determined that applying this constitutional language to cases differs depending on the type of discriminatory effect being challenged.⁸⁴

78 Land, *supra* note 10 (discussing citizens' concerns about the straw ban's effect on people with disabilities).

79 See Gant, *supra* note 10.

80 *Follow Up to Starbucks Sustainability News*, STARBUCKS NEWSROOM, <https://news.starbucks.com/views/follow-up-to-starbucks-sustainability-news> (last visited Dec. 6, 2018).

81 See, e.g., New York City, New York, Int. No. 0936-2018 (proposed May 2018) (providing that restaurants may provide plastic straws to people with disabilities).

82 U.S. CONST. amend XIV, § 1; *Americans with Disabilities Act*, 42 U.S.C. §§ 12111–12213 (2018).

83 U.S. CONST. amend XIV, § 1.

84 See, e.g., *Miss. Univ. for Women v. Hogan*, 458 U.S. 718, 723–25 (1982) (indicating the court will examine gender discrimination using an intermediate scrutiny standard, under which it will overturn discriminatory practices based on gender unless the discrimination is substantially related to an important government interest); *Mass. Bd. of Ret. v. Murgia*, 427 U.S. 307, 314–16 (1976) (indicating the court will evaluate age discrimination under rational basis review); *Yick Wo v. Hopkins*, 118 U.S. 356, 374 (1886) (describing that the

When reviewing equal protection challenges concerning mental or physical disabilities, courts apply rational basis review.⁸⁵ Rational basis review is a deferential standard, particularly compared to strict scrutiny.⁸⁶ To survive rational basis review, a state action must only further a legitimate state interest in a rational manner.⁸⁷ When evaluating whether the state's interest is legitimate, "the Equal Protection Clause is satisfied so long as there is a plausible policy reason" for the state's action.⁸⁸ Additionally, the relationship between the interest and the type of discrimination may not be irrational or arbitrary.⁸⁹

When applying the rational basis test to straw bans, single-use plastic straw bans are often codified as waste ordinances.⁹⁰ Managing solid waste likely qualifies as a legitimate state interest because a state can seek to create a sanitary environment for its citizens.⁹¹ If the straw ban is codified as an environmental ordinance instead, the court would likely find that environmental protection is a legitimate state interest, as a state may seek to create a clean environment for its citizens and the natural environment.⁹² Banning single-use plastic straws is rationally related to each of those legitimate interests. Because the laws would meet the rational basis standard, a court is unlikely to overturn a plastic straw ban. Therefore, governmental straw bans could be upheld, and challenges based on equal protection would fail.

2. AMERICANS WITH DISABILITIES ACT CHALLENGES TO STATE ACTION

Another potential challenge to government straw bans is under the Americans with Disabilities Act (ADA).⁹³ Congress passed the ADA in 1990 "to provide a clear and

court will examine racial discrimination with a strict scrutiny standard, under which it will overturn the law unless there is a compelling interest and no alternative means to achieve that interest).

85 *Lavia v. Pa. Dep't of Corr.*, 224 F.3d 190, 199–200 (3d Cir. 2000); see *City of Cleburne v. Cleburne Living Ctr.*, 473 U.S. 432, 432 (1985) (holding the mentally disabled are not a suspect class). *But see* *City of Cleburne v. Cleburne Living Ctr.*, 473 U.S. 432, 432 (1985) (J. Marshall, dissenting) (arguing the Court should have applied a higher standard than rational basis review for discrimination based on disability).

86 *Murgia*, 427 U.S. at 314; see also *Heller v. Doe*, 509 U.S. 312, 319 (1993) ("[R]ational-basis review . . . 'is not a license for courts to judge the wisdom, fairness, or logic of legislative choices.'") (quoting *Fed. Comm'n Comm'n v. Beach Comm'ns, Inc.*, 508 U.S. 307, 313 (1993)); *Richmond v. J.A. Croson Co.*, 488 U.S. 469, 493–94 (1989) (describing that a court applying strict scrutiny can only uphold laws pursuing "a goal important enough to warrant use of a highly suspect tool . . . [and only if] the means chosen fit the compelling goal so closely" that the motivation must be legitimate").

87 *Lavia*, 224 F.3d at 199.

88 *Nordlinger v. Hahn*, 505 U.S. 1, 11 (1992).

89 *Id.*

90 See, e.g., *Seattle, Wash.*, MUNICIPAL CODE § 21.36.086 (2008) (codified in solid waste management section).

91 See *Cooksey Bros. Disposal Co., Inc. v. Boyd Cty.*, 973 S.W.2d 64, 68 (Ky. Ct. App. 1977) (holding waste management is a legitimate state interest).

92 See *SDDS, Inc. v. South Dakota*, 47 F.3d 263, 269 n.9 (8th Cir. 1995) (indicating there is a legitimate interest in environmental protection).

93 42 U.S.C. §§ 12111–12213 (2018).

comprehensive national mandate for the elimination of discrimination against individuals with disabilities.”⁹⁴ Congress further sought to ensure the federal government played a major role in enforcing standards and preventing discrimination.⁹⁵

The ADA also attempts to hold state-operated entities responsible for violations.⁹⁶ Section 12202 seeks to eliminate Eleventh Amendment sovereign immunity for suits under the ADA.⁹⁷ It provides:

A State shall not be immune under the eleventh amendment to the Constitution of the United States from an action in Federal or State court of competent jurisdiction for a violation of this chapter. In any action against a State for a violation of the requirements of this chapter, remedies . . . are available for such a violation to the same extent as such remedies are available for such a violation to the same extent as such remedies are available for such a violation in an action against any public or private entity other than a State.⁹⁸

Section 12202 appears to create a viable cause of action against state-wide plastic straw bans, as it allows individuals to file suits challenging state laws.

However, in one instance, when a state action was challenged under the ADA, the United States District Court for the District of Delaware held that Congress exceeded its authority under the Fourteenth Amendment when enacting Section 12202.⁹⁹ In the case, the state prison released the plaintiff, who was disabled, on a freezing cold day without a coat or transportation.¹⁰⁰ The plaintiff brought the suit under Title II of the ADA, which provides that public entities cannot discriminate against qualified individuals with a disability.¹⁰¹ In its analysis, the court noted that the state had not waived its immunity.¹⁰² Further, while Congress expressed its intent to limit state immunity, the scope of Section 12202 was not proportional to the discrimination the ADA targets, and the plaintiff had not identified a history of this sort of discrimination the legislature

94 *Id.* § 12101(b)(1).

95 *Id.* § 12101(a)

96 *Id.* § 12202.

97 The Eleventh Amendment provides: “The Judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by Citizens of another State, or by Citizens or Subjects of any Foreign State.” U.S. CONST. amend. XI. Generally, due to the Eleventh Amendment, private parties cannot bring suit against states in federal court. *Jamison v. Del.*, 340 F. Supp. 2d 514, 516 (D. Del. 2004). There are exceptions if the state waives its immunity or if Congress abrogates state immunity. *Id.* Courts will apply a “simple but stringent” test to determine if Congress abrogated state immunity by asking whether Congress “unequivocally express[ed] its intent to abrogate and [if] Congress act[ed] pursuant to a valid exercise of [its] power.” *Id.* at 516–17 (quoting *Lavia v. Penn.*, 224 F.3d 190, 196 (3d Cir. 2000)).

98 42 U.S.C. § 12202.

99 *Jamison*, 340 F. Supp. 2d at 518.

100 *Id.* at 516.

101 *Id.*; see 42 U.S.C. § 12132 (“[N]o qualified individual with a disability shall, by reason of such disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of a public entity, or be subjected to discrimination by any such entity.”).

102 *Jamison*, 340 F. Supp. 2d at 518.

sought to rectify.¹⁰³ Therefore, the Delaware District Court found Section 12202 invalid in this specific situation.¹⁰⁴ The private plaintiff here could not bring his ADA suit against the state, as Congress had not properly abrogated the state's Eleventh Amendment immunity.¹⁰⁵

Contrastingly, when a student with a learning disability brought a suit against a state university, a court upheld Section 12202.¹⁰⁶ Like in *Jamison*, the Third Circuit Court of Appeals asked whether Congress unambiguously expressed its intent to limit sovereign immunity and whether the abrogation is proportional to the constitutional right at issue.¹⁰⁷ The court found a documented history of discrimination against disabled students in accessing educational experiences and opportunities, which is the type of discrimination Congress sought to correct with the ADA.¹⁰⁸ As such, the court held the abrogation was valid.¹⁰⁹

Because the question of whether a state action stands up to the ADA's abrogation of sovereign immunity is fact specific, it is difficult to predict if a state straw ban would be subject to the ADA. Based on prior cases, to evaluate the constitutionality of Section 12202, the court applies a two-prong test: the plaintiff has to show an unambiguous legislative intent to abrogate the Eleventh Amendment and a history of discrimination that is proportional to the abrogation.¹¹⁰

In the case of plastic straw bans, while Section 12202 unambiguously expresses Congressional intent, it is unlikely that a documented history of discriminating against disabled people by denying plastic straws or utensils is synonymous with a documented history of discrimination in access to education for people with disabilities.¹¹¹ Therefore, plaintiffs challenging straw bans will struggle to meet the second prong of the test regarding whether there is a permissible abrogation of state immunity. A state-enacted straw ban in state institutions likely could not be challenged under the ADA because Eleventh Amendment sovereign immunity would prevent the suit.

3. AMERICANS WITH DISABILITIES ACT CHALLENGES TO MUNICIPAL ACTION

The Eleventh Amendment only applies to states and does not extend to municipalities.¹¹² Title II of the ADA provides that no individual with a disability may be denied the benefit of a service or program provided by a public entity due to the individual's disability.¹¹³ To prove a Title II violation, a plaintiff must show:

103 *Id.* at 517.

104 *Id.* at 518. *But see* Board of Trs, v. Garrett, 531 U.S. 356, 360 n.1 (2001) (declining to address whether an unconstitutional abrogation of Eleventh Amendment immunity bars all claims under Title II of the ADA).

105 *Jamison*, 340 F. Supp. 2d at 518.

106 *Bowers v. NCAA*, 475 F.3d 524, 528 (3d Cir. 2007).

107 *Id.* at 550.

108 *Id.* at 555–56.

109 *Id.*

110 *See id.* (describing that there must be an intent and documented history of discrimination).

111 *See id.* (describing that there must be a documented history of the type of discrimination Congress intended to combat).

112 *Lincoln Cty. v. Luning*, 133 U.S. 529, 529 (1890).

113 42 U.S.C. § 12132 (2018).

(1) [T]hat he is a qualified individual with a disability; (2) that he was either excluded from participation in or denied the benefits of some public entity's services, programs, or activities, or was otherwise discriminated against by the public entity; and (3) that such exclusion, denial of benefits, or discrimination was by reason of the plaintiff's disability.¹¹⁴

Title II has been used for legal challenges against public entities related to accessibility and accommodations.¹¹⁵ But individuals have used Title II to challenge city ordinances; in *Heather K. v. Mallard*, a child with a respiratory condition challenged a city leaf burning ordinance under Title II of the ADA.¹¹⁶ The city argued that it could not be liable under Title II because citizens, rather than the city, were burning leaves.¹¹⁷ The court was unconvinced, focusing instead on whether the child could not access city services, programs, or facilities, such as streets or parks.¹¹⁸ The court denied the city's motion for summary judgment, assuming the answer to its issue would be clarified at trial.¹¹⁹

Heather K. provides a framework for examining a challenge to a municipal straw ban. An individual may be able to challenge a municipal straw ban if the ban prevented that individual from accessing the city's services or programs.¹²⁰ Eliminating plastic straws could prohibit a disabled individual from accessing the city's services, such as a café in a municipal building, a refreshment stand at a municipal beach, or even a municipal medical clinic. Therefore, if the individual can prove she has been denied access to the city service or program and also meets the other two elements of a Title II claim, the individual may have a viable cause of action.¹²¹

Overall, because the Eleventh Amendment does not extend to municipalities, a challenge to a municipal ban may succeed. The success of that ban would be dependent on the facts of the alleged discrimination, particularly if the ban prevented a disabled individual from accessing the city's public services or programs.

4. PREEMPTION CHALLENGE

Although it does not represent a direct challenge on a ban based on disability, an individual may also challenge a straw ban based on preemption. The United States Con-

114 *Lewis v. Truitt*, 960 F. Supp. 175, 177 (D. Ind. 1997) (quoting *Tyler v. Manhattan*, 857 F. Supp. 800, 817 (D. Kan. 1994)).

115 *See, e.g., Bacon v. Richmond*, 475 F.3d 633, 636 (4th Cir. 2007) (deciding whether city was required to retrofit city schools to be accessible); *Cave v. E. Meadow Union Free Sch. Dist.*, 480 F. Supp. 2d 610, 615 (E.D. N.Y. 2007) (deciding whether a plaintiff requiring a service dog must be allowed to bring the dog to school).

116 *Heather K. v. Mallard*, 946 F. Supp. 1373, 1375–76 (N. Dist. of Iowa 1996).

117 *Id.* at 1386.

118 *Id.* at 1387.

119 *Id.* at 1390.

120 *See id.* at 1387 (explaining the relevant question is whether the ordinance prevented the plaintiff from accessing city services, programs, or facilities).

121 *See Lewis v. Truitt*, 960 F. Supp. 175, 177 (D. Ind. 1997) (noting the three elements are whether the individual is a qualified individual with a disability, whether the individual could not access a public service, program, or activity, and whether the exclusion was due to the individual's disability).

stitution gives Congress the power to preempt state law.¹²² Congress may preempt state laws either expressly or implicitly.¹²³ Implied preemption may take the form of conflict preemption, in which federal law conflicts with a state law, or field preemption, in which a broad federal law “occupies the legislative field.”¹²⁴ In the case of field preemption, the federal law can either preempt an entire legislative field, leaving no room for state laws, or a portion of the field, leaving room for state laws.¹²⁵

In general, the relationship between state and municipal laws follows the same rules as federal preemption.¹²⁶ Because many current single-use plastic straw bans are municipal ordinances, a preemption challenge to a single-use plastic straw ban would probably arise in the municipal realm. Like with federal preemption, if a municipal ordinance conflicted with a state law, the municipal ordinance would be invalid because state laws trump municipal ordinances.¹²⁷

Although no individuals have challenged municipal straw bans based on preemption, entities have used preemption to challenge municipal bans on single-use plastic bag.¹²⁸ For example, the Save the Plastic Bag Coalition challenged San Francisco’s single-use plastic bag ban, alleging it was invalid because the state legislature intended to preempt municipalities from that type of action.¹²⁹ The state law at issue, the California

122 U.S. CONST. art. VI, cl. 2 (“This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treatises made, or which shall be made, under the Authority of the United States, *shall be the supreme Law of the Land . . .*”) (emphasis added).

123 *Lorillard Tobacco Co. v. Reilly*, 533 U.S. 525, 541 (2001).

124 *Id.*

125 *See, e.g., Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm’n*, 461 U.S. 190, 204 (1983) (noting a “state law is preempted to the extent that it actually conflicts with federal law”).

126 *See, e.g., First Resort, Inc. v. Herrera*, 80 F. Supp. 3d 1043, 1055 (N.D. Cal. 2015) (noting that California state laws can preempt local ordinances); *Terrance v. City of Geneva*, 799 F. Supp. 2d 250, 254 (W.D.N.Y. 2011) (noting that New York state laws can preempt local ordinances); *Giddens v. City of Shreveport*, 901 F. Supp. 1170, 1182 (D. La. 1995) (noting that Louisiana state law can preempt local ordinances).

127 *Save the Plastic Bag Coal. v. San Francisco*, 222 Cal. App. 4th 863, 883 (Cal. Ct. App. 2013).

128 Like single-use plastic straws, single-use plastic bags have garnered attention as a source of waste. Jennifer Schultz & Kim Tyrrell, *State Plastic and Paper Bag Legislation*, NAT’L CONFERENCE OF STATE LEGISLATURES (Jan. 24, 2020), <http://www.ncsl.org/research/environment-and-natural-resources/plastic-bag-legislation.aspx>. California was the first state to ban plastic bags at large stores, and other states have followed California’s lead. *Id.* Cities have also enacted their own bans. *Id.* Unlike plastic straws, however, industry is the major opponent of plastic bag bans across the globe. *See, e.g., Challenges Could Undermine Success of Plastic Bag Bans*, THE GLEANER (Sept. 24, 2018), <http://jamaica-gleaner.com/article/news/20180924/challenges-could-undermine-success-plastic-bag-ban> (describing the prominence of industries challenging plastic bag bans in multiple countries); *see also How Plastic Bag Bans Impact the Economy*, THIS IS PLASTICS, <http://www.thisisplastics.com/economic-impact/how-plastic-bag-bans-impact-the-economy/>, (last visited Nov. 30, 2018) (describing economic challenges plastic bag bans pose for industry, retailers, and consumers).

129 *Save the Plastic Bag Coal.*, 222 Cal. App. 4th at 868.

Retail Food Code,¹³⁰ concerned public health and safety in restaurants and explicitly intended to “occupy the whole field of health and sanitation standards for retail food facilities.”¹³¹ However, the California Court of Appeals determined plastic bags, even though included in the Retail Food Code, fell outside the state legislature’s intent to occupy the field of health and sanitation because the Retail Food Code sought to create uniformity in health and sanitation standards.¹³² San Francisco’s plastic bag ordinance did not seek to create health and sanitation standards for food retailers but rather regulated the use of plastic bags.¹³³ Therefore, the court held the state legislature’s intent to occupy the field of health and sanitation did not prohibit the plastic bag ordinance and upheld the ban.¹³⁴

Based on *Save the Plastic Bag Coalition*, a court would uphold a California municipal plastic straw ban that did not seek to create health and sanitation standards.¹³⁵ As written, plastic straws and plastic bags are similarly situated within the California Retail Food Code.¹³⁶ Municipal straw bans—like the plastic bag ban considered in *Save the Plastic Bag Coalition*—likely do not seek to create health and sanitation standards; instead they regulate single-use plastic straws.¹³⁷ Because straw bans do not conflict with the state legislature’s intent in enacting the California Retail Food Code, a preemption challenge would likely not succeed.¹³⁸

Importantly, though, the success of preemption challenges will vary from state to state because they are dependent on specific state laws. The Laredo Merchants Association in Texas brought a preemption challenge against a municipality’s single-use plastic bag ban.¹³⁹ The association argued the ordinance, banning plastic and paper bags to reduce litter, conflicted with the Texas Solid Waste Disposal Act.¹⁴⁰ The state law indicates “a local government . . . may not adopt an ordinance . . . [to] prohibit or restrict, for solid waste management purposes, the sale or use of a container or package in a manner not authorized by state law.”¹⁴¹ The Texas Supreme Court found that state law pre-

130 The California Retail Food Code includes legislation with the purpose of “safeguard[ing] public health and provide to consumers food that is safe, unadulterated, and honestly presented through adoption of science-based standards.” CAL. HEALTH & SAFETY CODE § 113703 (2007).

131 *Save the Plastic Bag Coal.*, 222 Cal. App. 4th at 884 (citing CAL. HEALTH & SAFETY CODE § 113705).

132 *Id.* at 884–85.

133 *Id.*

134 *Id.* at 886.

135 *Id.* at 884–85.

136 CAL. HEALTH & SAFETY CODE §§ 113914, 114081 (including plastic straws and plastic bags as single-use items).

137 *See Save the Plastic Bag Coal.*, 222 Cal. App. 4th at 884–85 (explaining the plastic bag ordinance sought to regulate the use of plastic bags rather than to create new health and sanitation standards).

138 *See id.* at 885 (noting that state laws are not preempted merely because the state legislature has enacted a law in the same field).

139 *City of Laredo v. Laredo Merchs. Ass’n*, 550 S.W.3d 586, 591 (Tex. 2018).

140 *Id.* at 589–91.

141 *Id.* (quoting TEX. HEALTH & SAFETY CODE ANN. § 361.0961(a)(1)) (internal quotations omitted).

empted the municipal bag ban ordinance, reasoning that the state legislature clearly intended to occupy the entire field and that the city had not identified an authorizing state law.¹⁴² Therefore, the court overturned the single-use bag ban.¹⁴³

Thus, in Texas, a single-use plastic straw ban codified as a solid waste ordinance may be overturned on similar grounds as the plastic bag bans in *Laredo Merchants Association*. The Texas Solid Waste Disposal Act explicitly indicates that municipalities may not regulate the use of a container or package for waste management purposes.¹⁴⁴ If the court found that plastic straws fell within container or package within the Texas Solid Waste Disposal Act, the plastic straw ban would be within the Texas legislature's express preemption of municipal solid waste laws.¹⁴⁵ Thus, the court would overturn the ban. It is not clear how a Texas court would approach a preemption challenge to a municipal straw ban codified as an environmental ordinance, as the outcome would depend on whether the Texas Legislature has enacted environmental legislation prohibiting municipalities from enacting their own environmental ordinances.

In sum, a preemption challenge to a municipal ban on plastic straws may be successful. The challenge's success depends on how the ordinance is codified and what laws the state has that may conflict with that ordinance. Overall, preemption may be a possible path for disability advocacy groups to overturn municipal straw bans.

B. CHALLENGES TO PRIVATE ACTION

Individuals cannot challenge private action using the Equal Protection Clause or preemption, as both only apply to government action.¹⁴⁶ Instead, the ADA provides the primary basis to challenge private straw bans.¹⁴⁷ As a whole, the ADA prohibits discrimination against people with disabilities.¹⁴⁸ It provides protection in many areas of life, including public accommodations.¹⁴⁹ While the ADA's overall scope is broad, Title III specifically concerns public accommodations, like restaurants and hotels, which are some of the types of private entities banning straws.¹⁵⁰

142 *Id.* at 598.

143 *Id.*

144 TEX. HEALTH & SAFETY CODE ANN. § 361.0961(a)(1).

145 *Id.*

146 *Shelley v. Kraemer*, 334 U.S. 1, 13 (1948) (“[The Fourteenth Amendment] erects no shield against merely private conduct, however discriminatory or wrongful.”); *see also* U.S. CONST. art. XIV, § 1 (“Nor shall any *state* . . . deny to any person within its jurisdiction the equal protection of the laws.”) (emphasis added); *Vatore v. Comm’r of Consumer Affairs*, 83 N.Y.2d 645, 649 (N.Y. 1994) (describing preemption and the relationship between state and local laws).

147 42 U.S.C. §§ 12111–12213 (2018).

148 CYNTHIA BROUGHER & JAMES V. DEBERGH, CONG. RESEARCH SERV., 98-921, THE AMERICANS WITH DISABILITIES ACT (ADA): STATUTORY LANGUAGE AND RECENT ISSUES (2012).

149 *Id.*

150 RUTH COLKER, THE DISABILITY PENDULUM: THE FIRST DECADE OF THE AMERICANS WITH DISABILITIES ACT (Richard Delgado & Jean Stefancic eds., 2005). Title III of the Americans with Disabilities Act provides that places of public accommodation owned by private entities may not discriminate against individuals based on disability. 42 U.S.C. §§ 12181–12189. A public accommodation includes a variety of locations, including restau-

Title III of the ADA creates a cause of action for individuals who have been discriminated against by private entities that own public accommodations.¹⁵¹ Title III indicates that a plaintiff does not need to exhaust remedies available through administrative agencies before filing a suit.¹⁵² But only injunctive relief and attorney's fees are available as remedies for a private plaintiff, while regulatory agencies like the Department of Justice can fine violators Title III.¹⁵³ This means that a private plaintiff could halt a straw ban with a successful Title III challenge but would likely not receive monetary damages.¹⁵⁴

Although no private straw bans have been challenged under the ADA so far, other cases can help predict whether a challenge may be successful. Prior case law has established that a successful plaintiff alleging discrimination must show that:

- (1) he is disabled as that term is defined by the ADA; (2) the defendant is a private entity that owns, leases, or operates a place of public accommodation; (3) the defendant employed a discriminatory policy or practice; and (4) the defendant discriminated against the plaintiff based on the plaintiff's disability by (a) failing to make a requested reasonable modification that was (b) necessary to accommodate the plaintiff's disability.¹⁵⁵

To avoid liability, the defendant, a private entity, must prove that the requested modification was unreasonable.¹⁵⁶ Under Title III, private entities operating places of public accommodation must provide supplemental services unless doing so would impose an administrative or financial burden on, or fundamentally alter the nature of, the business.¹⁵⁷ The courts have defined public accommodation broadly to promote equal access for people with disabilities.¹⁵⁸

Courts have applied the Title III analysis in a variety of cases and have noted that ADA challenges must be evaluated on an individual basis.¹⁵⁹ In *PGA Tour, Inc. v. Mar-*

rants, movie theaters, and museums, among other locations. 42 U.S.C. § 12181. Generally, "[n]o individual shall be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation." 42 U.S.C. § 12182.

151 42 U.S.C. § 12188 (2018) ("In the case of violations . . . of this title, injunctive relief shall include an order to alter facilities to make such facilities readily accessible to and usable by individuals with disabilities to the extent required by this subchapter. Where appropriate, injunctive relief shall also include requiring the provision of an auxiliary aid or service, modification of a policy, or provision of alternative methods, to the extent required by this subchapter.")

152 William D. Goren, UNDERSTANDING THE AMERICANS WITH DISABILITIES ACT 95 (3rd ed. 2010).

153 *Id.*

154 *Id.*

155 *Fortyone v. Am. Multi-Cinema, Inc.*, 364 F.3d 1075, 1082 (9th Cir. 2004).

156 *Sch. Bd. Of Nassau Cty. v. Arline*, 480 U.S. 273, 288 n.17 (1987).

157 Goren, *supra* note 152 (citing 28 C.F.R. § 36.303(a)); *see also Fortyone*, 364 F.3d at 1083 (indicating defendant can avoid liability if it proves the modification requested by the plaintiff would "fundamentally alter the nature of the public accommodation"); *Arline*, 480 U.S. at 288 n.17 (indicating accommodation is unreasonable if it imposes undue financial and administrative burdens on the defendant).

158 *PGA Tour, Inc. v. Martin*, 532 U.S. 661, 677 (2001).

159 *Id.* at 690.

tin, an individual with disabilities challenged the Professional Golf Association (PGA) because the PGA prohibited the plaintiff from using a golf cart during a walk-only tournament.¹⁶⁰ The PGA argued that allowing the plaintiff to use the cart would fundamentally alter the walk-only tournament, which sought to introduce an element of fatigue to the players as the tournament progressed.¹⁶¹ However, the Court was not convinced, as the plaintiff would still have to walk over a mile even with the use of the cart, introducing a similar element of fatigue taking into account his disability.¹⁶² Because allowing the plaintiff to use a golf cart would not frustrate the purpose of the tournament or be unduly burdensome on the PGA, the Court held that the PGA had to offer the plaintiff a golf cart.¹⁶³

In another case, *Fortyune v. American Multi-Cinema, Inc.*, a wheelchair-bound man challenged a movie theater.¹⁶⁴ The man could not see a movie because the movie theater policy prevented employees from requiring patrons to vacate the handicapped seating.¹⁶⁵ The Ninth Circuit Court of Appeals found that modifying the theater policy was necessary, reasonable, and would not fundamentally alter the theater.¹⁶⁶ As such, the court affirmed the injunction issued by the lower court, directing the theater to ensure that disabled patrons and their families could arrive and sit together until ten minutes before the movie begins.¹⁶⁷

Extrapolating from these decisions to analyze private straw bans, the success of individual challenges will depend on the specific facts of each challenge.¹⁶⁸ Generally, though, the ADA may provide a viable cause of action to enjoin private bans on plastic straws. For purposes here, let us consider a plastic straw ban that does not include any exemption for individuals with disabilities, such as making plastic straws or other alternatives available upon request.¹⁶⁹ Using the necessary elements, a challenger must first show they are disabled and that the private entity enacting the ban is a place of public accommodation as defined by the ADA.¹⁷⁰ These components are specific to the individual challenge at issue.

Assuming the hypothetical plaintiff met those preliminary elements, the next element is that the private entity enacting the ban has implemented and executed a discriminatory practice.¹⁷¹ Using the example of a ban with no exemption, the plaintiff would most likely succeed on this element. If there is no exemption for individuals with

160 *Id.* at 667–69.

161 *Id.* at 671.

162 *Id.* at 671–72.

163 *Id.* at 690.

164 *Fortyune v. Am. Multi-Cinema, Inc.*, 364 F.3d 1075, 1078 (9th Cir. 2004).

165 *Id.*

166 *Id.* at 1083–85.

167 *Id.* at 1087.

168 *See Martin*, 532 U.S. at 690 (indicating courts must evaluate challenges on an individual basis).

169 While compostable straws do not necessarily alleviate the problem for some disabled individuals, for purposes of a clear hypothetical, let us assume courts will view compostable straws as a viable alternative that would withstand a challenge. *See Godoy*, *supra* note 75 (noting that reusable straw options are not always practical for individuals with disabilities).

170 *Fortyune*, 364 F.3d at 1082.

171 *Id.*

disabilities, the plastic straw ban will most likely be found to be discriminatory, as it is well-established that many individuals with disabilities require straws.¹⁷²

The final element of proving a Title III claim is showing that the private entity discriminated against the disabled individual by failing to make a reasonable accommodation that was necessary to accommodate the plaintiff's disability.¹⁷³ A potential reasonable accommodation is having plastic straws on hand to provide upon request. While determining whether providing a straw would be necessary to accommodate the plaintiff's disability would be case-specific, a court would likely find that accommodating the individual's disability by providing a straw would be reasonable.¹⁷⁴ Having a stash of straws available for individuals with disabilities upon request is neither financially nor administratively burdensome.¹⁷⁵ Further, providing straws upon request to customers with disabilities likely would not fundamentally alter the business, as most private entities that have implemented straw bans provided straws in the past.¹⁷⁶

In sum, the ADA provides a potential cause of action to enjoin private straw bans. While a court will examine each ADA case on an individualized basis,¹⁷⁷ in a situation where the entity provides no accommodation in its straw ban policy, a court will likely put a halt to the ban until the entity provides straws upon request.

IV. RECOMMENDATIONS FOR LEGISLATURES AND PRIVATE BUSINESSES

The recommendations below seek to assist municipalities and private entities in drafting single-use plastic straw bans that can meet environmental goals of reducing plastic waste while providing individuals with disabilities access to a full range of services.

A. GOVERNMENT ENTITIES

Municipal straw bans will succeed if challenged under the Equal Protection Clause or the ADA in certain situations, but they will be overturned if a specific state law preempts the municipal ordinance or if disabled individuals cannot access municipal services or activities due to the ban.¹⁷⁸ Challenges aside, because government should represent the interests of its voters, ordinances should represent the public's interests and needs. Therefore, municipal straw bans should include language exempting individuals with disabilities.

172 See Gibbens, *supra* note 10 (indicating some individuals with disabilities require straws).

173 *Fortyune*, 364 F.3d at 1082.

174 See Godoy, *supra* note 75.

175 See *Sch. Bd. Of Nassau Cty. v. Arline*, 480 U.S. 273, 288 n.17 (1987) (indicating accommodation is unreasonable if it imposes undue financial and administrative burdens on the defendant).

176 See *Fortyune*, 364 F.3d at 1083 (indicating defendant can avoid liability if it proves the modification requested by the plaintiff would "fundamentally alter the nature of the public accommodation").

177 *PGA Tour, Inc. v. Martin*, 532 U.S. 661, 690 (2001).

178 See *supra* Section III.A (discussing possible challenges to government straw bans).

Many of the straw bans already enacted or proposed include an exemption for individuals with disabilities. The proposed ban in New York City provides that food-service locations may provide plastic straws to people who require one due to disability or medical condition.¹⁷⁹ The Miami Beach ban also provides an exception for providing a single-use plastic straw to an individual “with a disability or medical condition that impairs the consumption of beverages without a single-use plastic beverage straw.”¹⁸⁰

To promote inclusivity and garner support, municipal and state single-use plastic straw bans should include language that provides a similar exemption for individuals with disabilities.¹⁸¹ Municipalities must also examine existing state laws to ensure a ban is not preempted by the state legislature. Overall, government straw bans including an exemption for individuals with disabilities have a strong likelihood of success against challenges when they balance the needs of citizens with environmental initiatives.

B. PRIVATE ENTITIES

Private single-use plastic straw bans are susceptible to challenges under the ADA.¹⁸² A court is likely to enjoin straw bans that do not provide an exemption for providing straws to individuals with disabilities.¹⁸³ Therefore, private entities wanting to create anti-straw policies must craft the policies to avoid liability.

At the most basic level, private entities should have straws available upon request. Many entities that have implemented straw bans already include exemptions. For example, Disney’s policy says that Disney will provide paper straws to individuals upon request.¹⁸⁴ Starbucks’s policy also includes that it will provide compostable straws upon request to customers who need or prefer straws.¹⁸⁵ These alternatives still attempt to meet the entities’ environmental goals by eliminating single-use plastics.

Some individuals with disabilities are not satisfied with these alternatives because some individuals cannot use compostable or paper straws.¹⁸⁶ Although not in line with environmental goals, private entities may want to consider having single-use plastic straws available upon request. Companies rely on the satisfaction and good-will of their customers and should balance their customers’ needs against environmental initiatives. Perhaps locations could provide those who request a straw the option of compostable or plastic to allow individuals to choose the type of straw that can accommodate their needs.

179 New York City, New York, Int. No. 0936-2018 (proposed May 2018).

180 Miami Beach, Fla., MUNICIPAL CODE § 46-92(c)(1) (2018).

181 In the interest of complete inclusivity, exemptions should be specific to allowing single-use plastic straws. See Godoy, *supra* note 75. If the ban does not allow for an exemption providing single-use plastic straws, it may still be open to a challenge under the Americans with Disabilities Act, as it may still discriminate against a group of disabled individuals who cannot use non-plastic straws. *Id.*

182 See *supra* Section III.B (discussing Americans with Disabilities Act challenges to private straw bans).

183 See *supra* Section III.B.

184 Marino, *supra* note 62.

185 *Starbucks to Eliminate Plastic Straws Globally by 2020*, *supra* note 7.

186 See Godoy, *supra* note 75.

Overall, if challenged, a court may enjoin private single-use plastic straw bans under the ADA if they do not allow accommodations for individuals that require a straw due to disability. As such, private entities should include in their bans an exemption for individuals who request a straw. Though providing environmentally friendly accommodations like compostable or paper straws may be more consistent with environmental goals, entities should at least consider having single-use plastic straws upon request for those who cannot use compostable or paper straws.

V. CONCLUSION

Private and governmental plastic straw bans are both susceptible to legal challenges. As such, municipalities, states, and businesses should draft legislation and policies to accommodate people with disabilities. This includes providing plastic straws upon request. Providing this exception likely provides a workable balance between environmental interests and individual needs. Perhaps if an eco-friendly straw becomes available that can accommodate people with disabilities, the exemption should be reevaluated. For the time being, even straw bans with exemptions will reduce plastic waste in our oceans and should help keep straws out of sea turtles' noses.

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BLOCKCHAIN FOR CLEAN ENERGY – A “DISTRIBUTED” APPROACH TO SAVING THE PLANET

BY BENJAMIN R. ZETER

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I. INTRODUCTION

If you have listened to the news recently, you may have heard that climate change is becoming a bit of an issue.¹ No longer is the concern of the polar ice caps melting an ethereal specter hanging over anyone driving a Hummer. Rather, the latest projections paint a terrifying picture in the not-too-distant future where millions of people will be forced to flee rising sea levels and diseases once confined to the tropics will run rampant globally.² While everyone can “do their part” by recycling more and choosing sustainable products at the super market, it may be time to implement more drastic measures. Time and time again, throughout history, humanity has proven itself adept at innovating around potentially catastrophic situations. From the creation of the Great Wall of China to the development of vaccines, the age-old adage of “desperate times call for desperate measures” has rung true. Climate change, while potentially the most serious issue human

1 Carolyn Kormann, *The Dire Warnings of the United Nations’ Latest Climate-Change Report*, THE NEW YORKER (Oct. 8, 2018), <https://www.newyorker.com/news/news-desk/the-dire-warnings-of-the-united-nations-latest-climate-change-report>.

2 *Id.*

beings have ever faced, provides yet another opportunity for innovation to help society move forward. The advent of the technology age has propelled innovation at a staggering pace and the potential for technology to help rectify the current climate dilemma is, in the words of President Donald Trump, “huge.”

One such technological development, blockchain, may hold great promise in addressing the litany of issues climate change presents. This note presents multiple blockchain applications in the energy industry that, through their implementation, could contribute to a reduction in global greenhouse gas emissions. This note begins with a high-level overview of blockchain and how the technology works. This part includes discussion of blockchain’s inception and smart contracts. Next, this note turns to the energy industry as a whole and examines four different areas ripe for blockchain application: cap-and-trade programs, domestic energy markets and micro-grids, smart devices, and international energy trading. Finally, this note examines the possibility of a blockchain based international climate change agreement. Some of the blockchain applications this note advocates for may seem unconventional; however, if the United Nations’ most recent predictions are accurate, unconventional approaches may be necessary to save the planet.³

II. BLOCKCHAIN AND SMART CONTRACTS – A PRIMER

This part provides a broad overview of how blockchain technology operates. First, this part addresses the history of blockchain and its origin as a way to circumvent financial institutions. Next, a conceptual explanation of blockchain technology helps to demystify many of the technology’s varying nuances. Then this part defines the distinction between public and private blockchains followed by a discussion of the pros and cons of blockchain technology. This part then turns to smart contracts, defining the term and explaining how smart contracts operate on a blockchain framework.

A. BLOCKCHAIN

Blockchain technology has garnered a significant amount of attention in the media recently, largely stemming from the astronomical rise and fall of Bitcoin in 2017 and 2018.⁴ While Bitcoin illustrates one potential application of the “distributed ledger” technology that is blockchain, there are countless other possibilities for the technology to be applied to, and disrupt, various industries. As one source as put it:

the blockchain technology can be utilized in any application where it would be advantageous to avoid the necessity of a central or trusted authority in a “busy” ecosystem (where there are lots of participants that need to reduce counterparty risk), where there are problems with the existing market (which could be

3 Kormann, *supra* note 1.

4 See generally COINDESK, <https://www.coindesk.com/price/> (last visited Mar. 12 2020) (On December 16, 2017, Bitcoin was valued at \$19,343.04 per coin; Bitcoin’s value fluctuates wildly).

clumsy, unscalable or slow), where there are rules that could be implemented on a platform, or where there are governance functions that could be automated.⁵

To fully examine just how far reaching blockchain technology may be used, it is necessary to first give a broad overview of what exactly blockchain is, why it exists, and how it works.

1. *BLOCKCHAIN'S INCEPTION*

The benefit of having multiple parties individually maintaining new additions to the blockchain is fidelity, as blockchain is a system built on a presupposition of a lack of trust. Satoshi Nakamoto, the father of Bitcoin, invented blockchain to have a more secure system for financial transactions that removed third-party intermediaries, such as banks and governments.⁶ In 2008, Nakamoto first published his white paper as the world was still in the grasp of the Housing Crisis. Risky business and astronomical economic damage had eroded trust in large financial institutions. As such, the impetus for blockchain was Nakamoto's observation of the "inherent weakness of the trust based model."⁷ As Nakamoto said, "[w]e need a way for the payee to know that the previous owner did not sign any earlier transactions."⁸ To accomplish these sorts of transactions without trusted third parties, "transactions must be publicly announced, and [the world needs] a system for participants to agree on a single history of the order in which they were received."⁹

Nakamoto's main concerns with the trust-based model were a lack of completely non-reversible transactions, transaction costs associated with mediating disputes over transactions, and fraud in the form of double spending.¹⁰ Blockchain avoids these problems by "allowing any two willing parties to transact directly with each other without the need for a trusted third party."¹¹ The elimination of the trusted third party not only eliminates transaction costs, but provides for greater anonymity of the transacting parties while at the same time preventing double spending.¹²

Blockchains not only provide for transactional anonymity, they are also more secure than existing network-based transaction recording systems. "[B]lockchains are inherently resistant to modification of the data—once recorded, the data in a block cannot be

5 Judith Allison Lee, *Blockchain 101*, THOMSON REUTERS, <https://legal.thomsonreuters.com/en/insights/articles/blockchain-101> (last visited Mar. 12, 2020).

6 Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, SATOSHI NAKAMOTO INST. (Oct. 31, 2008), <https://nakamotoinstitute.org/bitcoin>. There is much debate as to whether Nakamoto was merely a pseudonym. See Sophie Bearman, *Bitcoin's creator may be worth \$6 billion – but people still don't know who it is*, CNBC (Oct. 27, 2017), <https://www.cnbc.com/2017/10/27/bitcoins-origin-story-remains-shrouded-in-mystery-heres-why-it-matters.html>.

7 *Id.*

8 *Id.*

9 *Id.*

10 *Id.*

11 *Id.*

12 Nathan Reiff, *Blockchain Won't Cut Out Intermediaries After All*, Investopedia (Aug. 13, 2018), <https://www.investopedia.com/tech/blockchain-wont-cut-out-intermediaries-after-all/>.

altered retroactively without creating an obvious incompatibility with later blocks, which depend on the original data from the earlier block as part of the hash.”¹³ The distributed nature of the blockchain also lends itself to security as there is not one, central server that can be hacked.¹⁴ To modify a past block, an attacker to the network would have to redo the proof-of-work of the block and all blocks after it and then catch up with and surpass the work of the honest nodes. Blockchains are not impervious to attacks and the method by which a blockchain is implemented can be determinative of the likely success of an attack.¹⁵

2. WHAT IS “BLOCKCHAIN”?

A blockchain is a “shared, trusted, public ledger that everyone can inspect, but which no single user controls.”¹⁶ A blockchain is thus a “distributed ledger” as anyone can access and see the information stored on it. Due to the publicly available nature of information on a blockchain, the technology is well suited to operate as a record keeping mechanism in a host of different scenarios.

A blockchain starts as random inputs of information into a “master spreadsheet” that multiple parties, or “nodes,” keep track of simultaneously.¹⁷ The Bitcoin blockchain provides a useful example to “anchor” any discussions of blockchain.¹⁸ Generally, blockchains operate by adding more blocks onto a “continuously growing list of ordered records.”¹⁹ Blocks are periodically added to a given ledger via different rules laid out by different blockchain database platforms. In the case of Bitcoin, this is “a global list of transactions that have been agreed upon via a form of consensus by a subset of the Bitcoin community.”²⁰ But Blockchains do not operate as simply as one party inputting a value and all other parties blindly acknowledging the veracity of the input. Rather, the system uses complex cryptographic functions to ensure both the validity of a given input and greater security.²¹

To illustrate how the system verifies new inputs for addition to a blockchain, let us return to the “global spreadsheet” example. When a spreadsheet has only a few different users, the total amount of information is significantly less than if that same spreadsheet were opened to the entirety of the world. To avoid the cumbersome computational task of having to review the whole spreadsheet every time the program makes a new addition,

13 Lee, *supra* note 5.

14 Tamoor Khan et al., *Blockchain Technology with Applications to Distributed Control and Cooperative Robotics: A Survey* (2018), reprinted in arXiv 1–5.

15 *Id.* at 1–3.

16 Steve Myers & Scott J. Shackelford, *Block-By-Block: Leveraging the Power of Blockchain Technology to Build Trust and Promote Cyber Peace*, 19 YALE J. L. & TECH 334, 342 (2017) (citing *The Trust Machine*, ECONOMIST (Oct. 31, 2015), <http://www.economist.com/news/leaders/21677198-technology-behind-Bitcoin-could-transform-how-economy-works-trust-machine> [<https://perma.cc/Q5XT-EXX7>]).

17 Akshay Kore, *Blockchain for dummies*, HACKERNOON (Jan. 9, 2018), <https://hacker noon.com/blockchain-for-dummies-ae786c6a5fe7>.

18 Myers & Shackelford, *supra* note 16, at 343.

19 Lee, *supra* note 5.

20 Myers & Shackelford, *supra* note 16, at 343.

21 *Id.*

blockchains use “hash” values to correspond to a specific subset of information.²² “[R]ather than checking the entire spreadsheet,” a hash value can be created which is a “single, mathematically unique value” used to identify each entry in the “master spreadsheet.”²³ That “single, mathematically unique value” is determined by way of a function.²⁴ A simple example is to create a function whereby “ $g(x) = \lfloor x/2 \rfloor$,” divides x by 2, and rounds down to the nearest integer.²⁵ If we apply the numbers 1 to 10 to this function (inputting them for the x value), it will map any number between 1 and 10 to a number between 1 and 5.²⁶ The blogger Kore on Hackernoon.com explains how blockchains use hash values in the following way:

We add the [identification numbers] of the [entity inputting the data] and the [data itself] in each column entry along with the date. . . which we store as the Hash value for the first entry in the spreadsheet. For subsequent entries, we use the same formula and add the hash value of the previous entry. This starts forming a chain of hash values that reference the entire spreadsheet.²⁷

While hash values contribute to the overall efficiency of the system, blockchains add new pieces of information at a very fast rate.²⁸ To avoid having to conduct energy intense computations on a millisecond by millisecond basis, the program takes snapshots of the spreadsheet at given time intervals.²⁹ These chunks of transaction can then be added to [the] spreadsheet chain as a block, hence the name “block chain.”³⁰ In a blockchain, “[e]ach block contains a timestamp and a link (such as a cryptographic hash) to a previous block, which creates a chronological record of the blocks.”³¹

Hash values are only one piece of the entire blockchain picture. Security and anonymity are two of the hallmarks of a blockchain. These are achieved by utilizing “cryptographic hash functions.”³² Essentially, cryptographic hash functions serve to introduce “pseudo-randomness and collision resistance.”³³ In the case of the Bitcoin blockchain, the SHA256 hash function (SHA256: $\{0,1\}^* \rightarrow \{0,1\}^{256}$) is used which “maps any finite binary string (denoted $\{0,1\}^*$) to a binary string of length 256 bits (denoted $\{0,1\}^{256}$.”³⁴ Pseudo-randomness and collision resistance come into play in the overall security of a

22 *Id.* at 382 (“A function that maps a large, possibly infinite, set of objects to a smaller set of objects is called a hash function.”).

23 Kore, *supra* note 17.

24 Myers & Shackelford, *supra* note 16, at 383 (think back to High School math where $f(x) = x + 4$, etc.).

25 *Id.*

26 *Id.*

27 Kore, *supra* note 17.

28 *Id.*

29 *Id.*

30 Lee, *supra* note 5.

31 *Id.*

32 Myers & Shackelford, *supra* note 16, at 383.

33 *Id.*

34 *Id.* at 383–84 (citing INFO. TECH. LAB., NAT’L INST. OF STANDARDS & TECH., FED. INFO. PROCESSING PUBL’N ON SECURE HASH STANDARD (SHS) SECURE HASH STANDARD (Mar. 2012), <http://csrc.nist.gov/publications/fips/fips180-4/fips-180-4.pdf> [<http://perma.cc/K7NY-6AJ3>])).

blockchain's architecture. Pseudo-randomness is the principle that "when given a random input x of a fixed size. . .that is unknown to an efficient adversary. . .the output is indistinguishable from a truly random outcome to the same adversary."³⁵ That is to say that the efficient adversary (a hacker) would have no way of differentiating between the correct output and a random output of the same function. Collision resistance is best explained by returning to our previous function, " $g(x) = \lfloor x/2 \rfloor$ ", divides x by 2, and rounds down to the nearest integer."³⁶ In this function, any even number plus one will return the same output as that same even number, meaning that multiple inputs will have the same output.³⁷ All hash functions inherently have collisions, however in a cryptographic hash function, due to the pseudo-randomness property, it is expected to take " 2^{128} iterations" to discover a collision.³⁸ All of this is to say that brute force attempts to discern the correct key to a hash function are highly inefficient and that the security of a given blockchain is directly related to the cryptographic hash function utilized.

Continuing on our crash course of blockchain technology comes the all-important concept of "proof-of-work." The basic goal of a proof-of-work" is "to allow one party to prove to another that they have spent a certain amount of time working on a given problem."³⁹ Essentially, this is like giving someone a puzzle with no picture to guide them; the proof of work is the finished picture.⁴⁰ "To cryptographically achieve this same concept, we are going to ask you to find the output of a cryptographic hash function with certain properties."⁴¹ A specific string, or data output, specified to a given hash function is analogous to the finished picture after the puzzle.⁴² Finally, blockchains utilize digital signatures to ensure that only trusted parties can execute given transactions. "Anyone who has the key can retrieve the signing stamp and use it to 'sign' the signature of the individual whose name is on the stamp."⁴³ Digital signatures are used "to prove that a message originates from a specific person and no one else, like a hacker."⁴⁴

To bring all of this together, consider the mosquito trapped in amber atop John Hammond's cane from *Jurassic Park*.⁴⁵ The mosquito in this scenario is the piece of information stored on the ledger. When the mosquito lands on the original tree sap, it becomes lodged on the ledger. The process of additional blocks can be visualized through the additional tree sap that entombs the mosquito, however the mosquito is always visible despite the amount of sap that coats it. This is analogous to using a hash to refer back to a specific piece of information. While a given blockchain does not take the millennia to generate as a fossil does, the "blockchain" can be visualized as the piece of amber that

35 *Id.*

36 *Id.* at 383.

37 *Id.*

38 *Id.*

39 *Id.* at 386.

40 *Id.*

41 *Id.*

42 *Id.*

43 *Id.* at 387.

44 *Id.*

45 *Nick Szabo Interview, THE TIM FERRIS SHOW* (Aug. 11, 2017), <https://www.youtube.com/watch?v=3FA3UjA0igY>.

is seen on John Hammond's cane in the movie, the result of countless additions of amber entombing the mosquito, or blocks entombing a piece of information.⁴⁶

3. PUBLIC VS. PRIVATE BLOCKCHAINS

Blockchains can operate both publicly and privately. In a public blockchain, “[t]he public nature stems from the free and unconditional participation of everyone in the process of determining what blocks are added to the chain, and what its current state is.”⁴⁷ The hallmark of a public blockchain is that it is accessible to all internet users. Bitcoin provides a good example of what a public blockchain is and how it works.⁴⁸ The Bitcoin blockchain creates a continuous ledger of transactions completed using bitcoins.⁴⁹ A reward is necessary to incentivize computers to carry out the complex mathematical equations to verify subsequent blocks, and in Bitcoin, the Bitcoin itself operates as the reward.⁵⁰

In contrast to the open world of the Bitcoin blockchain, “[i]n a fully private ledger, write-permissions are monitored by a central locus of decision-making.”⁵¹ This means that private blockchains operate similar to any existing server that safeguards information in one location. A private blockchain “amounts to a permissioned ledger.”⁵² Commentators have expressed skepticism as to whether blockchain can truly operate as a “blockchain” absent some underlying lack of trust between transacting parties.⁵³ After all, if the impetus for developing the blockchain was to circumvent trust issues with third parties, ceding control over who can and cannot contribute to the validity of the blockchain defeats the underlying purpose of the system.⁵⁴

4. POTENTIAL BLOCKCHAIN ISSUES

While blockchain has been held out as a potential technological panacea to many problems facing modern society, the technology is not without its issues. Such statements connote Thomas Huxley's famous quote, “[t]he great tragedy of science [is] the slaying of a beautiful hypothesis by an ugly fact.”⁵⁵ That is to say that while blockchain technology has great hypothetical promise, actual implementation of blockchain systems has left something to be desired. Blockchain technology is subject to many of the same

46 *Id.*

47 Marc Pilkington, *Blockchain Technology: Principles and Applications* (Aug. 7, 2015), <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/> (citing Vitalik Buterin, *On Public and Private Blockchains*, ETHEREUM BLOG (Aug. 6, 2015), <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/>).

48 *Id.*

49 *Id.*

50 *Id.*

51 *Id.* at 11.

52 *Id.*

53 Interview with Taeho J. Jung, Assistant Professor, University of Notre Dame, South Bend, Ind. (Sep. 19, 2018).

54 Paolo Tasca, *The Hope and Betrayal of Blockchain*, N.Y. TIMES (Dec. 4, 2018), <https://www.nytimes.com/2018/12/04/opinion/blockchain-bitcoin-technology-revolution.html>.

55 Tania Lombrozo, *Must Science Murder Its Darlings?*, NAT'L PUB. RADIO (Jan. 27, 2014), <https://www.npr.org/sections/13.7/2014/01/26/266784786/must-science-murder-its-darlings>.

concerns as any other computer program such as hacks.⁵⁶ A particular concern for any blockchain system is a majority attack, or “51% attack.”⁵⁷ A 51% attack is where a majority of the nodes in a network are controlled by a hacker. This means that the hacker can then substitute their own, falsified record, for the true chain and in the process reverse transactions that may have taken place or invent completely fictional transactions altogether.⁵⁸

Another major issue facing blockchain is the current lack of regulation over its use. “Due to the lack of regulatory oversight, scams and market manipulation are commonplace.”⁵⁹ Somewhat paradoxical to the core purpose of blockchain, a Pricewaterhouse Cooper (PwC) study found that “[r]egulatory uncertainty and trust are major barriers to blockchain adoption among businesses.”⁶⁰ But this perceived problem with blockchain may actually be to its benefit. “An immature technology is a malleable technology and as blockchains inevitably have to develop, there is an opportunity to engrain compliance and respect for public policy objectives since the beginning.”⁶¹ Much as is the case for regulating any new technology, “[r]egulation should . . . allow for the protection of public interest objectives and stimulate innovation at the same time.”⁶² A complete discourse on blockchain regulation is beyond the scope of this note, however several articles have been published on the topic.⁶³

The same PwC study previously mentioned also found that the ability to bring a network together posed another significant impediment to wider adoption of blockchain.⁶⁴ Further, “[t]he ‘Establishment’ has a vested interest in blockchain failing.”⁶⁵ While this observation contains a healthy dose of cynicism, it is not entirely wrong. Centralized governments and financial institutions are inherently at odds with a system designed to disrupt centralized power. Banks, for example, “make huge amounts of profit from playing the middle-man role.”⁶⁶ A former boss at Barclay’s, in 2015, “de-

56 David Black, *Blockchain Hacks and Losses Mount; Why Do Supporters Ignore The Facts?*, FORBES (Jan. 22, 2019), <https://www.forbes.com/sites/davidblack/2019/01/22/blockchain-hacks-and-losses-mount-why-do-supporters-ignore-the-facts/#3c48d2452ca8>.

57 *51% Attack*, INVESTOPEDIA (last visited Nov. 9, 2018), <https://www.investopedia.com/terms/1/51-attack.asp>.

58 Jimi S., *Blockchain: how a 51% attack works (double spend attack)*, MEDIUM (May 5, 2018), <https://medium.com/coinmonks/what-is-a-51-attack-or-double-spend-attack-aa108db63474>.

59 Bernard Marr, *The 5 Big Problems With Blockchain Everyone Should Be Aware Of*, FORBES (Feb. 19, 2018), <https://www.forbes.com/sites/bernardmarr/2018/02/19/the-5-big-problems-with-blockchain-everyone-should-be-aware-of/#f423d491670c>.

60 Ana Alexandre, *PwC: Regulatory Uncertainty and Lack of User Trust Inhibit Blockchain Adoption*, COINTELEGRAPH (Aug. 28, 2018), <https://cointelegraph.com/news/pwc-regulatory-uncertainty-and-lack-of-user-trust-inhibit-blockchain-adoption>.

61 Michelle Finck, *Blockchains: Regulating the Unknown*, 19 GERMAN L. J. 665, 682 (2018).

62 *Id.*

63 See generally *id.*; Tiffany L. Minks, *Ethereum and the SEC: Why Most Distributed Autonomous Organizations are Subject to the Registration Requirements of the Securities Act of 1933 and a Proposal for New Regulation*, 5 TEX. A&M L. REV. 405 (2018); Angela Walch, *The Path of the Blockchain Lexicon (And the Law)*, 36 REV. BANKING & FIN. L. 713 (2017).

64 Alexandre, *supra* note 60.

65 Marr, *supra* note 59.

66 *Id.*

scribed the interest and apparent enthusiasm of his sector as ‘cynical’ – stating that it stems from a desire to exert control or even block the usefulness of the emerging technology.”⁶⁷ Whether blockchain will evolve and adapt to surmount these potential hurdles remains to be seen. If excitement around the technology continues at its current rate, enthusiasm for developing better applications of the technology will propel it forward.

B. SMART CONTRACTS

A smart contract, conceptually, is a contract that is represented in code and executed by a computer.⁶⁸ Vending machines provide a useful illustration of how smart contracts work. “Smart contracts exist in digital code written to execute performance in the same manner as [a] vending machine.”⁶⁹ This means that smart contracts operate on the same sort of “if, then” principle as a vending machine. In the case of a vending machine, when a coin is inserted, the machine assesses whether it is the correct denomination. Then, if the denomination is correct, the machine dispenses the appropriately selected item. The machine recognizes that a specific event has occurred and completes performance accordingly. This is the end of the transaction; “[a]fter money is deposited and a selection is made, delivery of the purchased item is irrevocably triggered.”⁷⁰ One advantage of smart contracts is that “[g]iving machines the ability to determine whether a contract has been performed can dramatically reduce transaction costs.”⁷¹ Smart contracts are not limited to simple “if, then” scenarios and have recently utilized blockchain technology to carry out increasingly complex transactions.

Smart contracts are essentially the nexus of “two lines of technological development: electronic contracting and cryptography.”⁷² “Just as there are reasons to use a decentralized digital currency system even though traditional currencies are successful, there are reasons to use decentralized digital contracts to solve problems that the conventional contract system cannot.”⁷³ Blockchain-based smart contracts provide many of the same benefits that blockchain-based currency does, namely “electronic enforcement” of promises. To illustrate the efficacy of smart contracts, consider a routine real estate sale. In most real estate sales in the United States, two parties agree upon a price, then the money is placed in “escrow,” or with a trusted third party, until the “closing” of the deal. Closing is usually confined to a single date and criteria must be met prior to the transfer of money to one party and the transfer of title to the property to another. A trusted third party or intermediary is needed to watch over the money that is placed in escrow and to determine whether the criteria have been satisfied to trigger disbursement of the funds.

Now consider a scenario where the two parties conduct the exact same transaction, this time using a smart contract. The transaction from A to B is now encapsulated in self-executing code that will only trigger a disbursement of money from one party to the

67 *Id.*

68 Eliza Mik, *Smart Contracts: Terminology, Technical Limitations and Real World Complexity*, 2 L. INNOVATION & TECH. 269-300 (2017).

69 Susan George, *Smart Contracts*, 81 TEX. B. J. 403 (2018).

70 *Id.*

71 Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L. J. 313, 320 (2017).

72 *Id.*

73 *Id.* at 331.

other and *vice versa* transfer of the title in the property once certain criteria are met. If the specific criteria, such as abandoning the property and removing articles from the property, are met, then the code self-executes and money is transferred from A's account to B while title of the property is transferred from B to A. The third-party intermediary is completely eliminated. This sort of contract is dependent on the code being able to access the financial accounts of both parties and a land title registry. Bitcoin and other blockchain-based currencies already provide an avenue for the financial side and some locations have already tested blockchain-based land registries.⁷⁴

Another benefit of smart contracts operating on blockchain is that verification of contractual terms is a built-in feature. Remember that blockchains are ledgers used for record-keeping in a variety of situations. If a smart contract is entirely based on the blockchain, there is a clear record of any contractual terms agreed to by transacting parties.

Smart contracts, in conjunction with blockchain based systems, provide a potential avenue for automating many of the transactions that define daily life. The preceding primer on these technologies has attempted to provide a high-level explanation of how the technologies work. This note next turns to various applications for blockchain and smart contracts in the energy industry. From preventing double spending in a carbon trading market to ensuring that parties adhere to international climate change agreements, blockchain and smart contracts have the potential to revolutionize the modern energy environment.

III. ENERGY SECTOR BLOCKCHAIN AND SMART CONTRACT APPLICATIONS

The American energy industry has seen dramatic changes over the course of the past twenty years.⁷⁵ New technologies for natural gas extraction have generated a nearly ten quadrillion BTU increase in the use of the resource since 1990.⁷⁶ Renewable energy has also risen dramatically and now accounts for some 20 quadrillion BTUs, a little more than half of what petroleum and other liquids account for.⁷⁷ As the economy continues to grow at a rate of 2% annually, experts project that energy consumption will grow at 0.4% a year, "surpassing the 2007 peak by 2033."⁷⁸ Growth in the American energy industry must be juxtaposed against state laws that mandate reductions in greenhouse gas emissions. In total, "[t]wenty states plus the District of Columbia have adopted specific

74 Molly Jane Zuckerman, *Swedish Government Land Registry Soon to Conduct First Blockchain Property Transaction*, COINTELEGRAPH (Mar. 7, 2018), <https://cointelegraph.com/news/swedish-government-land-registry-soon-to-conduct-first-blockchain-property-transaction>.

75 *Annual Energy Outlook through 2050 Released by the US EIA*, PENN STATE EXTENSION (Feb. 7, 2018), <https://extension.psu.edu/annual-energy-outlook-through-2050-released-by-the-us-eia>.

76 *Id.*

77 *Id.*

78 U.S. ENERGY INFO. ADMIN., *ANNUAL ENERGY OUTLOOK WITH PROJECTIONS TO 2050* (2017).

greenhouse gas reduction targets to address climate change.”⁷⁹ The competing principles of a growing economy and growing energy demands on one hand and state legislation targeting how clean given energy production must be on the other have created an environment that is ripe for innovation. Increasingly, research is being done into blockchain technology’s potential application to various aspects of the energy industry. The Department of Energy has even “requested proposals on the use of blockchain distributed ledger technology to ensure the security of energy transactions.”⁸⁰

This part will analyze in detail many of the different energy industry areas in which blockchain can be applied. First, this part analyzes how blockchain may be used to make cap-and-trade systems more efficient. Next, this part turns to a broad overview of the United States’ energy industry and describes how power is generated, transmitted, and distributed to consumers, a process that many other countries mimic. An analysis of domestic energy industry applications follows, specifically focusing on micro-grids. Finally, this part concludes with discussions on smart devices and potential blockchain applications in international energy trading.

A. CAP AND TRADE

“Cap-and-trade” systems operate by “capping,” or placing a ceiling on the total amount of greenhouse gases that can be emitted by an industry in a calendar year.⁸¹ The “trade” element “is a market for companies to buy and sell allowances that let them emit only a certain amount, as supply and demand set the price.”⁸² To encourage companies in a given industry to reduce their overall greenhouse gas emissions, regulators decrease the “cap” on the industry over time.⁸³ The various greenhouse gases subject to a cap-and-trade program include, “Carbon Dioxide (CO₂), Methane (CH₄) and Nitrous Oxide (N₂O).”⁸⁴ The goal behind cap-and-trade programs is to encourage companies to emit less greenhouse gases than they are authorized under their allotted credits and then sell those credits to companies that emit more emissions than their allotted credits.⁸⁵ In this way, greenhouse gas emissions are effectively “taxed” without really being taxed. As the total emissions ceiling for a given industry shrinks over time, the hope is that companies emitting more than their allotted credits will be forced to cut their emissions or continue to purchase credits from others.⁸⁶ The credits will, in theory, become more costly over time as the total supply shrinks, forcing companies to make difficult decisions about

79 *State Climate Policy Maps*, C2ES, <https://www.c2es.org/content/state-climate-policy> (last visited Feb. 7, 2020).

80 Keith Townsend, *Blockchain Technology Impact on Energy Market Transformation: Secured Distributed Energy Transactions in the Cloud*, 1 GEO. L. TECH. REV. 469, 474–75 (2017) (citing U.S. DEPT OF ENERGY, SMALL BUSINESS INNOVATION RESEARCH AND SMALL BUSINESS TECHNOLOGY TRANSFER PROGRAMS, <https://www.energy.gov/science/sbir/small-business-innovation-research-and-small-business-technology-transfer>).

81 INT’L EMISSIONS TRADING ASS’N, CAP AND TRADE: THE BASICS (Apr. 2015).

82 ENVTL. DEF. FUND, *How cap and trade works*, <https://www.edf.org/climate/how-cap-and-trade-works> (last visited Mar. 29, 2020).

83 *Id.*

84 INT’L EMISSIONS TRADING ASS’N, CAP AND TRADE: THE BASICS (Apr. 2015).

85 *Id.*

86 *Id.*

whether to cut emissions or face the costly endeavor of continuing to subsidize their own pollution.⁸⁷

A major issue facing any cap-and-trade system is effectively monitoring emissions and enforcing the caps imposed. “[T]o administer a cap-and-trade program, a regulatory agency needs a full accounting of the emissions from each regulated facility in the program.”⁸⁸ One can imagine just how complex this sort of monitoring becomes as cap-and-trade programs are scaled up from municipalities to states to entire countries. There are several different technological methods available for regulators to monitor emissions in a cap and trade system. One such method is through direct measurement using continuous emissions monitoring systems (CEMS).⁸⁹ CEMS are “a packaged system of gas analyzers, gas sampling system, temperature, flow and opacity monitors that are integrated with a data [acquisition] system to demonstrate environmental regulatory compliance of various industrial sources of air pollutants.”⁹⁰ Another method to monitor emissions for cap-and-trade is “estimation using emissions factors.”⁹¹ Estimation using emissions factors provides a less expensive means of monitoring as compared to direct monitoring. “An emissions factor quantifies the amount of emissions produced per unit of an activity that emits pollutant. The general equation for emissions estimates is: ‘Activity Rate x Emissions Factor = Emissions.’”⁹² In instituting a cap-and-trade program, regulators must conduct cost-benefit analyses to determine whether it is more efficient for direct monitoring or estimations to be utilized.⁹³ The clear tradeoff is that direct monitoring is significantly more accurate than estimations, however these considerations are beyond the scope of this note.

Using blockchain technology can make cap-and-trade systems more effective. “The process of calculating carbon emissions and trading credits . . . can be a manual, time consuming and expensive process.”⁹⁴ The first way in which blockchain can benefit cap-and-trade systems is through more effective monitoring of emissions.⁹⁵ One of the

87 *Id.*

88 Lesley K. McAllister, *The Enforcement Challenge of Cap-And-Trade Regulation*, 40 ENVTL. L. 1195 (2010) (citing Barbara Baird et al., *S. COAST AIR QUALITY MGMT. DIST.*, Chapter Three - Legal Issues, in *Over a Dozen Years of RECLAIM Implementation: Key Lessons Learned in California’s First Air Pollution Cap-and-Trade Program 1-3-2* (June 2007), available at http://aqmd.gov/reclaim/docs/Policy_Paper_Part1.pdf).

89 *Id.* at 1203.

90 *Continuous Emission Monitoring System Products*, K2BW ENVTL. EQUIPMENT CO., <http://www.k2bw.com/continuousemissionmonitor.htm> (last visited Mar. 30, 2020).

91 Lesley K. McAllister, *The Enforcement Challenge of Cap-And-Trade Regulation*, 40 ENVTL. L. 1195, 1205 (2010).

92 *Id.* at 1206 (citing OFFICE OF INSPECTOR GEN., U.S. ENVTL. PROT. AGENCY, *EVALUATION REPORT: EPA CAN IMPROVE EMISSIONS FACTORS DEVELOPMENT AND MANAGEMENT 3* (2006)).

93 *Id.* at 1210–11.

94 Lucas Mearian, *Now, Blockchain Can Turn Carbon Credits Into Tokens For Trading*, COMPUTERWORLD (May 31, 2018), <https://www.computerworld.com/article/3277207/blockchain-now-blockchain-can-turn-carbon-credits-into-tokens-for-trading.html>.

95 Robert Greenfield IV, *Blockchain Enabled Carbon Credit Markets*, MEDIUM (Sept. 11, 2019), <https://medium.com/@robertgreenfieldiv/blockchain-enabled-carbon-credit-markets-1a195520f0e1>.

hallmarks of a blockchain is the fidelity with which it can store information.⁹⁶ As such, in putting a cap and trade system on a blockchain, there is a built-in “accounting methodology to automatically calculate the carbon footprint” while simultaneously creating an instrument that can be traded.⁹⁷ Blockchain helps to introduce transparency into transactions for carbon shares by having “‘miners’. . . confirm that corporations have the proper amount of shares relative to their emissions.”⁹⁸

Blockchain technology may also be able to make the “trade” element of cap-and-trade more efficient. In May of 2018, “IBM announced [that it is] working with environmental fintech company Veridium Labs Ltd. to tokenize carbon credits.”⁹⁹ These “tokenized” carbon credits could be traded on a blockchain platform such as Stellar, an open-source blockchain exchange.¹⁰⁰ In the IBM-Veridium context, and more broadly, “[t]he tokens will represent a portion of carbon credits” issued by governments under cap and trade systems.¹⁰¹ Carbon credits are “equal to one metric tonne of carbon dioxide.”¹⁰² In creating a market for carbon credits that is more accessible to the average investor, cap and trade systems gain legitimacy in the eyes of the masses and can potentially become a more seriously considered option by regulators.

B. ENERGY MARKETS

1. OVERVIEW OF THE ELECTRICITY SECTOR

The electricity sector in the United States is defined by three main “phases:” generation, transmission, and distribution. Generation encompasses any process that “creates” electricity, from coal fired power plants to renewables. “The three major categories of energy for electricity generation are fossil fuels (coal, natural gas, and petroleum), nuclear energy, and renewable energy sources,” with the majority of electricity in the United States coming from steam turbines powered by “fossil fuels, nuclear, biomass, geothermal, and solar thermal energy.”¹⁰³ The next phase, transmission, is potentially the most limiting factor for the electric grid due in large part to the nature of electricity. Unlike capturing a stream of water in a bucket, the electrons that power everything from light bulbs to cars cannot be contained efficiently. This means that electricity must be transmitted from a production point to the place where it is to be used, resulting in massive, interstate wires interlinking electricity generators with their final destinations. More will be said about the transmission “grid” of the United States later, but for now it is sufficient to understand that the gigantic wires near your local power plant play an integral part in America’s electricity industry. Finally, electricity must be distributed to

96 Myers & Shackelford, *supra* note 16, at 342–43.

97 Mearian, *supra* note 94.

98 Grant Avalon, *BitTrade: Fair and Inexpensive Cap and Trade with the Blockchain (w/Dividends)*, CLIMATE COLAB (June 5, 2015), <https://www.climatecolab.org/contests/2015/us-carbon-price/phase/1306799/proposal/> 1319401.

99 Mearian, *supra* note 94.

100 *Id.*; see generally STELLAR, <https://www.stellar.org/how-it-works/stellar-basics/> (last accessed Apr. 1, 2020).

101 Mearian, *supra* note 94.

102 *Id.*

103 *Electricity in the United States*, U.S. ENERGY INFO. ADMIN. (Mar. 20, 2020), https://www.eia.gov/energyexplained/index.php?page=electricity_in_the_united_states.

consumers. The electricity that comes from power plants “is transmitted at very high voltages and low currents to reduce the heat, eddy currents, and other transmission losses.”¹⁰⁴ High voltages would fry home appliances though, necessitating transformer stations tasked with converting the electricity to a lower voltage for consumers to utilize it. From there, electricity flows to homes through a set of wires, sometimes from a phone pole and other times subterranean, where it can be used to power everything from a dryer to a television.

As the previous paragraph illustrates, electricity is unlike most other commodities in that there are inherent physical limitations on how a given individual can procure it. It is a direct byproduct of the nature of electricity that a person cannot go to a local “power store” and decide between several competing brands for where their power comes from as the requisite infrastructure for power transmission bars a given house or apartment building from having multiple power lines running to it from multiple producers. Power production in the United States enjoys a state granted monopoly similar to other common carriers, however federalism has had interesting consequences on how states and the federal government are able to regulate power production. Nationally, the Federal Energy Regulatory Commission (FERC) maintains jurisdiction over interstate power generation and wholesale power distribution.¹⁰⁵ States have authority over the regulation of public utilities and how prices are set. As a point of comparison, in the European Union “[e]nergy networks. . . have historically been constructed and operated on a national basis by vertically integrated monopolies, usually in full or partial state ownership, with the state’s interest exercised either by central or regional governments.”¹⁰⁶ The sheer geographic size of the United States has resulted in its differences from European regulation. Both systems, however, utilize centralization of power production and distribution. Centralization of a country’s energy markets results from the nature of electricity in much the same way that the physical properties of electrons limit consumers’ ability to choose from multiple power providers. But recent technological developments have resulted in a push for a more “decentralized” power production networks.¹⁰⁷

Decentralization in power production and regulation, also known as “distributed generation,” “refers to a variety of technologies that generate electricity at or near where it will be used, such as solar panels and combined heat and power.”¹⁰⁸ As opposed to traditional power generation, which relies on a single producer supplying power to many consumers, distributed generation can “serve a single structure, such as a home or busi-

104 Sunita Sanguri, *How Does an Electrical Substation Work?*, BRIGHT HUB ENG’G, <https://www.brighthubengineering.com/power-generation-distribution/71084-how-a-substation-works/> (last accessed Apr. 1, 2020).

105 Lawrence R. Greenfield, *An Overview of the Federal Energy Regulatory Commission and Federal Regulation of Public Utilities*, FED. ENERGY REG. COMM’N, (June 2018), <https://www.ferc.gov/about/ferc-does/ferc101.pdf>.

106 *European Union Energy Regulation*, ORG. FOR ECON. CO-OPERATION AND DEV., <http://www.oecd.org/gov/regulatory-policy/euenergyregulation.htm> (last accessed Apr. 1, 2020).

107 See Eco Matser, *Why We Need Decentralized Renewable Energy to Power the World*, INTER PRESS SERV., (Aug. 7, 2018), <http://www.ipsnews.net/2018/08/why-we-need-decentralized-renewable-energy-to-power-the-world/>.

108 *Distributed Generation of Electricity and its Environmental Impacts*, ENVTL. PROT. AGENCY (Feb. 13, 2020), <https://www.epa.gov/energy/distributed-generation-electricity-and-its-environmental-impacts>.

ness, or it may be part of a microgrid (a smaller grid that is also tied into the larger electricity delivery system), such as at a major industrial facility, a military base, or a large college campus.”¹⁰⁹ Distributed power has clean energy benefits as well insofar as when distributed producers are “connected to the electric utility’s lower voltage distribution lines, distributed generation can help support delivery of clean, reliable power to additional customers and reduce electricity losses along transmission and distribution lines.”¹¹⁰ This part will discuss how energy markets can apply blockchain to maximize efficiency as well as promote clean energy.

2. BLOCKCHAIN AND DOMESTIC ENERGY MARKETS

Distributed power generation is an area of energy markets that blockchain could dramatically impact. Solar energy generation, both residentially and by companies, is one of the fastest growing areas of energy production in the United States.¹¹¹ At present in the United States “[m]ore than 58 [gigawatts (GW)] of total solar capacity [is] now installed,” which translates to “enough electricity to power 11 million homes.”¹¹² Each new solar installation brings with it a new energy “generator” per the overview of the electricity sector previously discussed. A potential benefit of such production is that energy produced in excess of the needs of the individual producer can be fed back into the grid.¹¹³ In some cases, under principles such as “net metering,” the system can compensate individual producers for that excess production.¹¹⁴ “Net metering is a billing mechanism that credits solar energy system owners for the electricity they add to the grid.”¹¹⁵ A potential shortcoming of net metering is that it relies on compensation from a utility company which inherently “undercuts the utility’s core business of generating and selling electricity.”¹¹⁶ In fact, “[i]n parts of the country . . . utilities have gone to great lengths to curtail this practice.”¹¹⁷

Blockchain has the potential to help “democratize” energy markets by cutting out the middleman, or utility company, altogether. Under traditional net metering or an analogous system, there is no way for someone who produces electricity at their home to

109 *Id.*

110 *Id.*

111 *Solar Industry Research Data*, SOLAR ENERGY INDUS. ASS’N (Feb. 13, 2020), <https://www.seia.org/solar-industry-research-data>.

112 *Id.*

113 *What is Solar Energy and How Do Solar Panels Work?*, SUNPOWER (Feb. 13, 2020), <https://us.sunpower.com/what-solar-energy-and-how-do-solar-panels-work>.

114 *Net Metering*, SOLAR ENERGY INDUS. ASS’N (Feb. 13, 2020), <https://www.seia.org/initiatives/net-metering>.

115 *Id.*

116 Jeremy Deaton, *These Companies Claim Blockchain Could Help Fight Climate Change*, POPULAR SCI. (Jan. 17, 2018), <https://www.popsci.com/blockchain-climate-change>.

117 *Id.* (citing Jeremy Deaton, *The Things Some Utilities Will Do*, NEXUS MEDIA (July 31, 2017), <https://nexusmedianews.com/the-things-some-utilities-will-do-22e27a9eea77> (“Over the last several years, the Arizona Public Service Company (APS), the largest power provider in the state, has tried thwarting rooftop solar by getting utility-friendly candidates elected to the Arizona Corporation Commission, which regulates the state’s utilities.”)).

sell that power directly to other consumers.¹¹⁸ Blockchain technology may provide an avenue for immediate transactions to take place between energy producers and consumers. This may be accomplished because “[b]lockchain, which functions as a public ledger or record, can take inputs like amount of energy produced from smart devices like solar panels, record them, assign a price and then send it out to smart homes on the grid while recording incoming payments for energy purchased.”¹¹⁹ Blockchain based energy markets could result in a situation where A, who produces enough energy to meet its own needs as well as excess electricity, can directly sell that excess to B, A’s neighbor who does not produce its own electricity. Such a system would incorporate both companies and individual producers. This sort of system is what is known as a “microgrid,” because it does not rely “exclusively upon a power plant that produces electricity for a region,” but rather “allows residents in the area to better manage local usage and even generate and sell power through solar panels or other alternative energy methods.”¹²⁰

Local blockchain-based microgrid energy markets are already being used in various capacities around the world. LO3 Energy has already instituted a trial project in Brooklyn, New York utilizing the existing grid, smart meters and blockchain technology.¹²¹ In the ‘Brooklyn Microgrid,’ “[w]hile the utility provider still maintains the electrical grid that delivers power, the actual energy is generated, stored, and traded locally by members of the community, for a more resilient and sustainable clean energy model.”¹²² These transactions utilize blockchain by storing and validating “data that permits direct transactions between energy producers and consumers.”¹²³ This allows for scenarios where “when one user produces excess energy, it is automatically sold to another user in the neighborhood, which allows the neighborhood to lessen the amount of energy it draws from the central grid.”¹²⁴ Further afield, in December of 2017 it was reported that “Korea Electric Power Corporation (KEPCO) will test” a blockchain-based service where consumers can sell electricity to their neighbors in Seoul.¹²⁵ Whether larger scale projects will be instituted remains to be seen, but success on a small scale in two of the most densely populated cities in the world¹²⁶ may yield greater utilization of blockchain for energy markets both domestically and abroad.

118 Ben Hertz-Shargel & David Livingston, *Assessing Blockchain’s Future in Transactive Energy*, ATLANTIC COUNCIL (Feb. 13, 2020), <https://www.atlanticcouncil.org/in-depth-research-reports/report/assessing-blockchains-future-in-transactive-energy/>.

119 Nikolaj Martyniuk, *Blockchain Establishes Decentralized Energy Market*, MEDIUM (Mar. 11, 2018) <https://medium.com/wepower/blockchain-establishes-decentralized-energy-market-ae413952f6da>.

120 Alan Cohn et al., *Smart After All: Blockchain, Smart Contracts, Parametric Insurance, and Smart Energy Grids*, 1 GEO. L. TECH. REV. 273, 301-02 (2017).

121 LO3 ENERGY, <https://lo3energy.com/> (last visited May 22, 2020).

122 *Id.*

123 Townsend, *supra* note 80.

124 Cohn et al., *supra* note 120, at 302.

125 Cho Mu-Hyun, *South Korea to Trial Blockchain Electricity market for Consumers*, ZDNET (Dec. 5, 2017), <https://www.zdnet.com/article/south-korea-to-trial-blockchain-electricity-market-for-consumers/>.

126 See Joseph Gedeon, *30 Most Crowded Cities in the World*, MSN (July 24, 2017), <https://www.msn.com/en-us/money/realestate/30-most-crowded-cities-in-the-world/ar-AAoMnhe> (New York at #29; Seoul at #15 for population density).

3. BLOCKCHAIN AND SMART DEVICES

Another way in which blockchain may revolutionize the domestic energy industry is by better connecting smart devices to the grid. Smart meters, which are simply conventional electric meters that can send information to a utility about a users' rates of consumption,¹²⁷ are one such smart device. When a retail energy provider supplies energy to a consumer through the grid, it monitors "a customer's power consumption through a meter installed at the customer's home."¹²⁸ Billing then occurs on a monthly basis.¹²⁹ In contrast, smart meters allow a utility company to "provide a more accurate and up-to-date bill while also freeing the company from needing to send inspectors out every month to read the meters."¹³⁰ The positive here for consumers is that in theory, the rate for electricity at which they are charged will be based on when they used the electricity. Electricity rates are market based, in that when there is high demand and it is more expensive to produce the electricity, it is more expensive for consumers. In allowing consumers to see in real-time the price of electricity, non-essential power uses may be curtailed in an effort to save money.¹³¹ A setback for smart meter technology has been the risk that hackers pose.¹³² As one commenter has noted, "if smart meters are not properly secured, hackers could have large-scale access to sensitive consumer data."¹³³ The German Energy Agency, DENA, has commented that smart meters "can serve as an enabler of autonomy (freedom of choice), source of additional income and a means to contribute to sustainable use of resources, but they can also be exploited as a means of control, surveillance and illegal intrusion into the privacy of one's home."¹³⁴

According to Andrew Arnold, there are two main security issues with a smart grid: "Authentication – The verification that someone 'entering' the grid technology is who they say they are; [and] Authorization – The verification that someone who does enter has the authority to do what they plan to do."¹³⁵ Blockchain provides protection from potential attacks to the smart grid due to its decentralized nature. As Christoph Jentsch notes:

[Through blockchain, single] points of failure can be avoided. When [information hubs, or nodes] are distributed, an attacker would have to hack each single device to obtain each single key. In addition, [the devices] talk to each other

127 Hayden McGovern, *What is a Smart Meter?*, SMARTENERGY (Dec. 16, 2016), <https://www.smartenergy.com/what-is-a-smart-meter/>.

128 Cohn et al., *supra* note 120, at 298.

129 *Id.*

130 *Id.*

131 Will Gans et al., *Smart Meter Devices and the Effect of Feedback on Residential Electricity Consumption: Evidence from a Natural Experiment in Northern Ireland*, 36 ENERGY ECON. 729, 729 (2013).

132 Andrew Arnold, *How Blockchain Can Help Increase The Security Of Smart Grids*, FORBES (Apr. 16, 2018), <https://www.forbes.com/sites/andrewarnold/2018/04/16/how-blockchain-can-help-increase-the-security-of-smart-grids/#56565e20b489>.

133 Isabelle Reiff, *Smart meters become more secure with the blockchain*, CEBIT (Mar. 9, 2018), https://www.cebit.de/en/news-trends/news/article_19520-854273.

134 CHRISTOPH BURGER ET AL., VULNERABILITIES IN SMART METER INFRASTRUCTURE – CAN BLOCKCHAIN PROVIDE A SOLUTION? 13 (Philipp Richard ed., DENA 2018).

135 Arnold, *supra* note 132.

over this decentralized blockchain, which does not have a single point of failure, too, for shutting it down. That is why there is such a good fit between blockchain and smart meters.¹³⁶

A test case in 2016 showed that if a single wind turbine in a system was hacked, control of the entire system could be taken by an attacker.¹³⁷ Blockchain could prevent this from happening due to “identification security through public-private encryption” that underlies the technology.¹³⁸

4. *BLOCKCHAIN AND INTERNATIONAL ENERGY MARKETS*

Just as the electricity sector in the United States pays no mind to state borders, countries around the world trade electricity on a daily basis. A 2010 estimate put “the energy share of the global economy [at about] 8.2 percent.”¹³⁹ Considering that the Energy Information Administration (EIA) projects a “28% increase in world energy use by 2040,”¹⁴⁰ it is no surprise that novel approaches to energy distribution and markets are a hot button issue. Just as commentators have proposed blockchain as a solution for domestic energy market decentralization, international pundits see great potential for the technology as well. The hallmarks of blockchain, streamlined transactions and removal of third-party intermediaries, coupled with the increased security and transparency of the technology, lend themselves to making the lifeblood of the global economy function better.

As anyone who has ever had to fill up a gas tank during some far-flung international crisis can attest to, the international energy trade is frustratingly dependent on factors outside the control of the market. Further, the global energy industry is one that is consistently marred by corruption and deceit.¹⁴¹ This does not have to be the case, though, and blockchain offers a potential avenue to side-step many of the issues that plague the energy industry. As previously mentioned, transparency is effectively “built-in” to the blockchain architecture via its distributed nature.¹⁴² Removing the possibility of human “error” and other abuses of accounting systems creates the possibility that every drop of oil or electron generated in a hydroelectric facility is tracked from creation to final use. Two Canadian companies, Blox Labs Inc. and Sonoro Energy Ltd., have already implemented this concept. The companies have “commenced development of

136 BURGER ET AL., *supra* note 134, at 20.

137 *Id.* at 16.

138 *Id.*

139 *A Primer on Energy and the Economy: Energy's Share of the Economy Requires Caution in Determining Policies That Affect It*, INST. FOR ENERGY RESEARCH (Feb. 16, 2010), <https://www.instituteforenergyresearch.org/uncategorized/a-primer-on-energy-and-the-economy-energys-large-share-of-the-economy-requires-caution-in-determining-policies-that-affect-it/>.

140 *EIA Projects 28% Increase in World Energy Use by 2040*, U.S. ENERGY INFO. ADMIN. (Sept. 14, 2017), <https://www.eia.gov/todayinenergy/detail.php?id=32912>.

141 Rachel Owens, *Corruption in the Energy Sector is a Transnational Problem, Enforcement Must be Too*, GLOBAL WITNESS (Dec. 20, 2016), <https://www.globalwitness.org/en/blog/corruption-energy-sector-transnational-problem-enforcement-efforts-must-be-too/>.

142 Avalon, *supra* note 98.

PetroBLOX, a blockchain-based smart contract supply chain management platform for the global oil and gas industry.”¹⁴³

Blockchain as applied to the global energy industry does have skeptics though. One such criticism is that “the need to update a transaction on every single blockchain node creates significant inefficiencies.”¹⁴⁴ Further, “proof of work,” the concept underlying the veracity of blockchain, magnifies these inefficiencies because as the value of the blockchain transaction increases, the system requires increasingly challenging amounts of effort.¹⁴⁵ This may, in theory, be a byproduct of the lack of computational power presently devoted to blockchain. However, it could be a sign of a significant issue blockchain technology will face if it is to be scaled up to meet the demands of the global economy. As compared to Bitcoin’s current maximum transaction speed of seven transactions per second, “Visa’s blockchain-free payment platform is capable of handling up to 24,000 transactions per second.”¹⁴⁶ Another oft-cited issue with blockchain is the energy *consumption* required to mine Bitcoins, which “is currently estimated to top 73 terawatt-hours a year, [which is] more than [the country of] Austria uses in a year.”¹⁴⁷ Whether blockchain technology will be able to be scaled to accommodate the requisite deluge of transactions any application in international commerce would require brings to mind Thomas Henry Huxley’s quote, “[t]he great tragedy of science [is] the slaying of a beautiful hypothesis by an ugly fact.”¹⁴⁸

Despite the potential technical issues facing blockchain, there are plenty of supporters for its use as a platform for energy markets. To address the truly astronomical energy demands of blockchain, Ethereum, a public blockchain network, “is readying for a shift away from proof-of-work to an alternative low-energy consensus mechanism called proof-of-stake.”¹⁴⁹ Regarding the scalability issues of blockchain, one proposal is to change the time period over which transactions are verified. As opposed to a second-by-second basis, “there is no reason why a day’s worth of energy transactions could not be registered at one time, on a single blockchain block.”¹⁵⁰ Further, future iterations of blockchain technology may be able to sustain significantly more throughput than ex-

143 *Blockchain Market in the Global Energy Sector - Forecast to 2023: CAGR to Grow at 50% - Smart Contracts to Witness the Fastest Growth - ResearchAndMarkets.com*, BUSINESS WIRE (Aug. 17, 2018), <https://www.businesswire.com/news/home/20180817005254/en/Blockchain-Market-Global-Energy-Sector—Forecast>.

144 Jason Deign, *Why Blockchain May Not Be the Best Tool for Energy Trading*, GREENTECH MEDIA (July 2, 2018), <https://www.greentechmedia.com/articles/read/blockchain-might-not-be-best-for-energy-trading#gs.2XDCYFA>.

145 *Id.*

146 *Id.*

147 Jason Deign, *Energy-Blockchain Advocates Hit Back at Criticisms of the Technology*, GREENTECH MEDIA (Aug. 7, 2018), <https://www.greentechmedia.com/articles/read/energy-blockchain-advocates-hit-back#gs.0H0BXIs>.

148 Tania Lambrozo, *Must Science Murder its Darlings?*, NAT’L PUB. RADIO (Jan. 27, 2014), <https://www.npr.org/sections/13.7/2014/01/26/266784786/must-science-murder-its-darlings>.

149 Deign, *supra* note 148.

150 *Id.*

isting blockchain networks.¹⁵¹ Current blockchain networks were not designed to handle the transactional load of a system to accommodate real-time trading of energy.¹⁵² There is nothing to say that future blockchain systems designed for the express purpose of commercial energy trading will not be able to surmount current scalability issues.

IV. INTERNATIONAL CLIMATE CHANGE AGREEMENTS AND BLOCKCHAIN

The third area of potential applicability for blockchain to impact climate change is to generate more robust international climate change agreements. A major pitfall of past climate change agreements has been ensuring compliance.¹⁵³ This challenge arises in part because climate change agreements, like all international agreements, are voluntary.¹⁵⁴ While such climate conferences as the Paris Climate Accords in 2015 have produced robust approaches to combat climate change and reduce global greenhouse gas emissions, inherent issues with the enforcing such agreements persists. The most influential climate agreement to date, the 1997 Kyoto Protocol,¹⁵⁵ has seen mixed results in terms of adherence. Sweden, which allowed a 4% increase in emissions, achieved a reduction of 13%.¹⁵⁶ Canada, on the other hand, aimed for a 6% reduction, but actually increased emissions by 27% which precipitated Canada's withdrawal from the Kyoto protocol in 2011 to avoid "a legal violation of its commitments."¹⁵⁷ It is highly problematic that a country would be able to simply "withdraw" from an agreement on the predicate that they had failed to meet its obligations. Withdrawal sans repercussions represents an entirely unacceptable possible outcome to an agreement tailored to protecting the planet; in United States contract law, Canada's action would be considered a breach and is an actionable offense. Using blockchain to memorialize international climate change agreements may result in better adherence and easier enforcement.

Blockchain as applied to international climate change agreements could hypothetically work by combining many of the previously discussed technological advances. At its inception, a blockchain-based international agreement on climate change would operate

151 *Id.* ("EWF, for example, is designing its platform to handle 30 times as much throughput as public Ethereum. Another technology, Iota, is supposed to be infinitely scalable, so transaction costs disappear.").

152 Hertz-Shargel & Livingston, *supra* note 118, at 2.

153 See Anders Corr, *Expect Climate Catastrophe: Paris Agreement Lacks Enforcement*, FORBES, (Dec. 1, 2016, 10:34 pm), <https://www.forbes.com/sites/anderscorr/2016/12/01/expect-climate-catastrophe-paris-agreement-lacks-enforcement/#945108433130>.

154 See Michael Greenstone, *Surprisingly, a Voluntary Climate Treaty Could Actually Work*, N.Y. TIMES: THE UPSHOT (Feb. 13, 2015), <https://www.nytimes.com/2015/02/15/upshot/surprisingly-a-voluntary-climate-treaty-could-actually-work.html>.

155 *Kyoto Protocol Fast Facts*, CNN (Mar. 21, 2018), <https://www.cnn.com/2013/07/26/world/kyoto-protocol-fast-facts/index.html>.

156 Paul G. Harris and Taedong Lee, *Compliance with Climate Change Agreements: the Constraints of Consumption*, 17 INT'L ENVTL. AGREEMENTS 779, 780 (2017) (citing UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, KYOTO PROTOCOL REFERENCE MANUAL ON ACCOUNTING OF EMISSIONS AND ASSIGNED AMOUNTS (2008), http://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf).

157 *Id.*

no differently than any other international climate change agreement. Parties would have to come together to determine acceptable limits placed on carbon emissions and then each party would have to determine their own commitment. The first real “blockchain”-based aspect of this agreement would be memorializing the parties’ commitments on the blockchain. This would theoretically be no different than a traditional international agreement as it would serve the purpose of providing a secure record to rely back on when assessing various parties’ performance under the agreement. Next, the system would need to institute some form of carbon monitoring to ensure parties are keeping with their promises. A discussion on international monitoring of carbon emissions follows. Whatever monitoring mechanism is used, it would also have to feed back into the blockchain to verify parties’ performance in real time. A blockchain-based climate change agreement would assess performance on a pre-determined time scale, such as annually, every five years, or every decade, just as existing climate change agreements do. The novel approach of putting the agreement on the blockchain would result in the potential for “smart contracts” to self-execute when performance is met or not met. A discussion on how these smart contracts may work and the types of collateral to be used follows.

Real-time monitoring of signatory countries’ greenhouse gas emissions would form the backbone for any agreement. While it is not feasible to require every carbon emitting source in a country to be monitored due to the cost and the sheer magnitude of such a program, there are other more cost-effective methods for measuring carbon output.¹⁵⁸ One such approach would be to put carbon sensors on commercial aircraft that could then monitor the carbon emissions over the area that the plane travels.¹⁵⁹ As noted in a *Scientific American* article, “[c]ommercial aircraft provide scientists a unique high-altitude platform for monitoring real-life atmospheric conditions.”¹⁶⁰ At present though, such an idea has not “taken off” in the United States.¹⁶¹ Another option would be to utilize satellites to monitor carbon emissions. This option also presents issues though, based on cost and the fact that computer models “‘have all kinds of biases’ that make it difficult to reach the precision needed to accurately measure man-made emissions.”¹⁶² However, choosing the definitive technological source for measuring carbon output is beyond the scope of this note. More relevant to a discussion of blockchain is the fact that whatever monitoring system is put in place needs to be able to send information directly to the blockchain for verification.

Blockchain, under Bitcoin, was developed to facilitate transactions in a system affected by trust issues and there is no greater system marred by trust issues than international relations. As noted by one scholar, “[t]rust is the belief that another has assurance game rather than prisoner’s dilemma game preferences—that he or she prefers mutual

158 D. Bastviken, et al., *Technical Note: Cost-Efficient Approaches to Measure Carbon Dioxide (CO₂) Fluxes and Concentrations in Terrestrial and Aquatic Environments Using Mini Loggers*, 12 *BIOGEOSCIENCES* 3849 (2015).

159 John Fialka, *Inside the Quest to Monitor Countries’ CO₂ Emissions*, *SCI. AM.* (Feb. 28, 2017), <https://www.scientificamerican.com/article/inside-the-quest-to-monitor-countries-co2-emissions/>.

160 *Id.*

161 *Id.*

162 *Id.*

cooperation to exploiting and suckering others.”¹⁶³ The constant second guessing of whether an adversary or ally will adhere to or disregard an international agreement likely results in promises made with apprehension because, “[t]rust is fragile, and once lost it is hard to rebuild.”¹⁶⁴ The inherent lack of trust that overshadows most, if not all, international agreements provides a prime area for blockchain to make a difference. Removing enforcement responsibilities from the purview of an international body and placing them with self-executing code under a smart contract automatically reduces the ability of a party to renege on a promise made using blockchain. As previously outlined, smart contracts operate by self-executing once a specified condition occurs. This approach has wide ranging benefits as applied to international agreements because it removes the requirement that a centralized body waste resources prosecuting an entity that may not end up fulfilling their promise for several reasons. Bernhard Reinsberg has noted that blockchain, as applied to international agreements, can be thought of as a sort of “institution.”¹⁶⁵

[B]lockchain technology can enhance the credibility of state commitments by allowing for guaranteed execution of inter-state contracts. In addition, it offers a secure way of making side payments as part of agreements, hence allaying distribution problems. Finally, blockchain technology can also address information problems by leveraging distributed consensus to generate reliable information.¹⁶⁶

Returning to the application of blockchain to international climate change agreements, the collateral for ensuring a party cooperates with its promises may be as simple as a monetary amount. However, as smart contracts become more sophisticated, and depending on a given country’s willingness to cede control of certain processes, it does not seem farfetched to hypothesize that certain elements of a country’s electric production infrastructure could be tied to a smart contract as well. Consider a scenario where in lieu of a fine, to be imposed via smart contract, a country agrees to allow a certain number of its power plants to be shut down or severely limited in capacity due to their non-compliance with an agreement. This is sure to be seen as a drastic and highly unlikely scenario to unfold but “drastic times call for drastic measures.”

163 Brian Christopher Rathbun, *Trust in International Relations*, THE OXFORD HANDBOOK OF SOCIAL AND POLITICAL TRUST (Aug. 2017), <http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780190274801.001.0001/oxfordhb-9780190274801-e-31> (citing Andrew H. Kydd, TRUST AND MISTRUST IN INTERNATIONAL RELATIONS (2005)).

164 Stan Wissemann, *Broken Promises: How Trust Affects Cybersecurity*, TECHBEACON (2016), <https://techbeacon.com/broken-promises-how-trust-affects-cybersecurity>.

165 Bernhard Reinsberg, *Blockchain Technology and International Relations: Decentralized Solutions to Foster Cooperation in an Anarchic World?*, CTR. FOR BUS. RESEARCH, UNIV. OF CAMBRIDGE, WORKING PAPER NO. 508 (Sept. 2018).

166 *Id.*

V. CONCLUSION

Blockchain technology, which reached international attention through Bitcoin, has received the aplomb of many.¹⁶⁷ Clear cut applications in many industries, from finance to real estate, have caused many to wonder whether blockchain will supplant the need for bankers, brokers, and in some cases, lawyers.¹⁶⁸ Less conventional applications of blockchain could include changing how voting works and even smart property.¹⁶⁹ Considering that it has only been a decade since Satoshi Nakamoto first published his white paper on Bitcoin,¹⁷⁰ the true potential of blockchain technology is yet to be seen. One thing is for certain though, blockchain provides a unique framework to operate various systems and for this reason, this note has largely concerned itself with applying blockchain to addressing climate change. While the technology itself has no real positive or negative impact on the climate,¹⁷¹ through applications as a backbone for cap and trade systems, decentralizing energy markets, and providing a stronger framework for international climate change agreements, blockchain can positively impact global efforts to stop climate change. Relying on the “ledger” function of blockchain, cap and trade systems may be revolutionized to better account for carbon transactions and also make these systems more efficient. As applied to energy markets, blockchain has the potential to help “decentralize” the grid into a system where local energy production can be used to directly meet local energy needs, such as the microgrid currently in use in Brooklyn, New York. Smart devices that tie into the grid may also be positively impacted by blockchain due to greater data security resulting from the distributed nature of the technology. Finally, blockchain may prove to be a boon for international climate change agreements through smart contracts. No longer will any international action need to be taken to enforce an agreement as the self-executing nature of a smart contract removes any doubt as to whether performance has been fulfilled. It is not the opinion of this note that blockchain is a panacea to be applied to all conceivable aspects of daily life, rather, blockchain is seen the same as any other tool developed to confront a specific problem. Just as one would not use a hammer to paint a picture, blockchain cannot be used to cure the common cold. However, the energy industry is one of many that blockchain will likely impact, so the industry should encourage, rather than stymie, its utilization.

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167 *The promise of the blockchain technology*, THE ECONOMIST (Sept. 1, 2018), <https://www.economist.com/technology-quarterly/2018/09/01/the-promise-of-the-blockchain-technology>.

168 John White, *9 Industries That Will Soon Be Disrupted By Blockchain*, INC. (2018), <https://www.inc.com/john-white/9-industries-that-will-soon-be-disrupted-by-blockchain.html>.

169 George Foroglou & Anna-Lali Tsilidou, *Further Applications of the Blockchain*, Conference Paper (May 2015).

170 Nakamoto, *supra* note 6.

171 This may not be entirely true, due to the astronomical energy demands of Bitcoin mining; however, new and improved iterations of the technology may result in more energy efficiency.

**TCEQ ADOPTS PROPOSED BEXAR COUNTY 2015 EIGHT-HOUR OZONE
NONATTAINMENT AREA FCAA, §179B DEMONSTRATION SIP REVISION**

SUMMARY

On July 1, 2020, the Texas Commission on Environmental Quality (TCEQ) adopted the propose State Implementation Plan (SIP) Revision for Bexar County concerning the 2015 Eight-Hour National Ambient Air Quality Standard (NAAQS) for Ozone.¹ The SIP revision demonstrates, pursuant to Section 179B of the Federal Clean Air Act (FCAA), that the Bexar County marginal ozone nonattainment area would attain the 2015 standard “but for” anthropogenic emissions emanating from outside the United States.² Given emissions and air flow trajectories, the proposal concludes sufficient ozone transport occurs from Mexico to prevent Bexar County’s from attaining the standard.³

BACKGROUND

BRIEF OVERVIEW OF THE OZONE STANDARDS UNDER THE FCAA

As authorized by the FCAA, the United States Environmental Protection Agency (EPA) issues NAAQS that individual states are required to meet by proposing and completing SIPs.⁴ Previously, the EPA’s requirements for ozone levels were based on a one-hour standard, but this was phased out in favor of eight-hour standards.⁵

The 1997 eight-hour standard was 0.08 parts per million (ppm), or 80 parts per billion (ppb).⁶ In 2008, the standard was lowered to 0.075 ppm (75 ppb) and in 2015, it was lowered again to 0.070 ppm (70 ppb), with anti-backsliding requirements for areas that did not qualify as attaining the standard.⁷ Under the ozone standard, nonattainment areas can be designated as marginal, moderate, serious, severe, or extreme—depending on the extent of exceedance.⁸

1 *San Antonio: Latest Ozone Planning Activities*, TEX. COMM’N ON ENVTL. QUALITY (Aug. 11, 2020), <https://www.tceq.texas.gov/airquality/sip/san/san-latest-ozone>.

2 *Id.*

3 See TEX. COMM’N ON ENVTL. QUALITY, AGENDA ITEM REQUEST FOR PROPOSED REVISION OF THE STATE IMPLEMENTATION PLAN 1 (Jan. 15, 2020).

4 Evan Z. Pearson & John B. Turney, *TCEQ Redesignation Request and Maintenance Plan for the HGB Area’s One-Hour and 1997 Eight-Hour Ozone National Ambient Air Quality Standards*, 49 Tex. Env’tl. L.J. 339 (2019).

5 *Id.*

6 *Id.*

7 *Id.*

8 *Id.*

BEXAR COUNTY'S STATUS UNDER THE 1997 EPA EIGHT-HOUR OZONE NAAQS

The San Antonio area, along with twelve other Early Action Compact areas, reached attainment under the EPA's 1997 Eight-Hour Ozone Standard in 2008.⁹ Upon reaching this attainment, the one-hour ozone standard was revoked for the San Antonio area in April 2009.¹⁰ As a result of being designated as attainment for the 1997 standard, the San Antonio area was no longer required to make any additional SIP revisions if the area continued to monitor attainment for the standard.¹¹

PURPOSE OF THE BEXAR COUNTY SIP REVISION PROPOSAL

Bexar County is currently working toward attainment under the 2015 Eight-Hour Ozone NAAQS and proposed a SIP revision to adjust its requirements for satisfying this standard.

On September 24, 2018, EPA designated Bexar County as marginal nonattainment (the least severe nonattainment level) under the 2015 NAAQS eight-hour ozone standard of 0.070 ppm, with a deadline of September 24, 2021 to achieve attainment.¹² Under EPA's standards, attainment is measured based on three full years of monitoring data for marginal nonattainment areas, so Bexar County will need to meet the NAAQS standard based on its monitor data in 2018, 2019, and 2020.¹³

For nonattainment areas that might be influenced by emissions sources outside of the United States, states are allowed to submit to the EPA an analysis of the influence of international emissions on the nonattainment areas under FCAA §179B, and seek relief from some of the NAAQS requirements.¹⁴ If a nonattainment area can show that it is affected by emissions from outside of the United States, EPA has discretion to approve a plan that demonstrates that the area will achieve NAAQS standard attainment by the required date, without including these international emissions in the calculation.¹⁵ This is very beneficial for a nonattainment area because if the EPA approves such a revision, the area would no longer be required to meet certain benchmarks that normally apply, such as mandatory reclassification provisions for failing to reach the NAAQS standard by the deadline.¹⁶

BEXAR COUNTY'S SIP REVISION

The Bexar County's 2015 eight-hour ozone nonattainment area is seeking this EPA approval under FCAA §179b to prevent being reclassified from marginal to moderate nonattainment if the area were not to meet the NAAQS standard during the 2018-2020

9 *San Antonio: Latest Ozone Planning Activities*, TEX. COMM'N ON ENVTL. QUALITY (Aug. 11, 2020), <https://www.tceq.texas.gov/airquality/sip/san/san-latest-ozone>.

10 *Id.*

11 *Id.*

12 TEX. COMM'N ON ENVTL. QUALITY, AGENDA ITEM REQUEST FOR PROPOSED REVISION TO THE STATE IMPLEMENTATION PLAN at 1 (Jan. 15, 2020).

13 *Id.*

14 *Id.*

15 *Id.*

16 *Id.*

monitoring period.¹⁷ With EPA approval, the area would still be designated as marginal nonattainment until it ultimately meets the 2015 standard, even if it doesn't meet the requirements during the 2018-2020 monitoring period.¹⁸

To determine the extent of international emissions on Bexar County's 2015 eight-hour ozone nonattainment area, TCEQ conducted an analysis that examined several factors.¹⁹ The analysis looked at the nonattainment area's modeled 2020 future-year design value (DVF), the estimated international anthropogenic contribution, the effect of local versus boundary conditions, and the area's current monitored design value.²⁰ The analysis included sophisticated photochemical modeling utilizing meteorological and detailed emission inputs to simulate the formation and transport of ozone.²¹ TCEQ determined that while most of the air flow trajectories across Mexico correspond to monitored ozone concentrations under the 70 ppb standard, a sufficient number of those trajectories corresponded to concentrations above 70 ppb, to compromise Bexar County's status.²² Accordingly, the analysis concludes that the Bexar County nonattainment area would achieve the NAAQS standard by the end of the 2018-2020 monitoring period, "but for" international anthropogenic contributions.²³

A complicating factor affecting the proposal is that the EPA has not yet published guidance regarding FCAA §179B transport demonstrations, though such guidance is under development. The proposal notes this lack of guidance and commits to appropriate amendments when it is issued.²⁴

Bexar County officials supported the TCEQ analysis and requested its submittal to the EPA as sufficient under the requirements of FCAA §179B, as discussed above.²⁵ On January 15, 2020, the TCEQ approved this request.²⁶ Following TCEQ approval, the proposed SIP revision was subject to a public comment period from January 17 through February 19, 2020. There was a public hearing scheduled for February 18, 2020. TCEQ adopted the SIP revision on July 1, 2020.²⁷

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17 *Id.*

18 *Id.*

19 *Id.* at 2.

20 *Id.*

21 Revisions to the State of Texas Air Quality Implementation Plan for the Control of Ozone Air Pollution at 2-3, *supra* note 3.

22 *Id.* at 2-41.

23 TEX. COMM'N ON ENVTL. QUALITY, AGENDA ITEM REQUEST FOR PROPOSED REVISION TO THE STATE IMPLEMENTATION PLAN at 2 (Jan. 15, 2020).

24 *Id.* at 3.

25 *Id.* at 2.

26 *Id.*

27 *San Antonio: Latest Ozone Planning Activities*, TEX. COMM'N ON ENVTL. QUALITY (Aug. 11, 2020), <https://www.tceq.texas.gov/airquality/sip/san/san-latest-ozone#Bexar179B2020>.

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NOT A DROP TO DRINK: WATER SCARCITY AND CLIMATE CHANGE CONSEQUENCES AT THE US-MEXICO BORDER

INTRODUCTION

Climate change is a cognizable, widely recognized source of insecurity globally.¹ At the US-Mexico border, climate change is already negatively impacting the ability of inhabitants to access and control water at this crucial boundary area. As climate change intensifies, the Rio Grande and Colorado Rivers—the primary sources of water for much of the US-Mexico border—will likely face increasing aridity and heightened water insecurity and demand.² Climate scientists predict that, if greenhouse gas emissions continue unabated, there is a ninety-nine percent chance that a “mega-drought” will hit the Southwest region of the United States before the end of the twenty-first century.³ One study concluded that, as drought occurs and becomes more severe and more likely, these conditions will negatively impact both northern Mexico water supplies and groundwater recharge.⁴ Water scarcity will potentially displace millions of people; scientists predict that lack of water and extreme temperatures may force residents living in the border region may be forced to move within the next eighty years.⁵

THE ISSUE AND COMPILING FACTORS

Six million residents and two million acres of farmland in the Rio Grande Valley on the eastern end of the US-Mexico border rely on the Rio Grande River as their primary water source; yet, the Rio Grande remains one of the most endangered rivers in the country.⁶ Scientists predict that residents of the Rio Grande Valley will face a water supply shortage of 600,000 acre-feet (or, 1.955106e+11 liquid gallons) by 2060.⁷ This reduction will likely result in conflict over the remaining water resources amongst farm-

1 THE NATIONAL SECURITY, MILITARY, AND INTELLIGENCE PANEL ON CLIMATE CHANGE OF THE CENTER FOR CLIMATE AND SECURITY, A SECURITY THREAT ASSESSMENT OF GLOBAL CLIMATE CHANGE 6 (Feb. 2020).

2 Naveena Sadasivam, *One of the Fastest Growing Regions of the US Could Run Out of Water*, QUARTZ & THE TEX. OBSERVER (Aug. 21, 2018), <https://qz.com/1353697/one-of-the-fastest-growing-regions-of-the-us-could-run-out-of-water/>.

3 Robinson Meyer, *A Mega-Drought is Coming to America's Southwest*, THE ATLANTIC (Oct. 11, 2016), theatlantic.com/science/archive/2016/10/megadroughts-arizona-new-mexico/503531/.

4 Margaret Wilder et al., IN ASSESSMENT OF CLIMATE CHANGE IN THE SOUTHWEST UNITED STATES: A REPORT PREPARED FOR THE NATIONAL CLIMATE ASSESSMENT ch. 16 (G. Garfin et al. eds., Island Press 2013).

5 Meyer, *supra* note 3.

6 Zoe Schlanger et al., *In a Warming World, The Fight for Water Can Push Nations Apart—Or Bring Them Together*, QUARTZ & THE TEX. OBSERVER (Aug. 16, 2018), <https://qz.com/1353831/in-a-warming-world-the-fight-for-water-can-push-nations-apart-or-bring-them-together/>.

7 Sadasivam, *supra* note 2.

ers, ranchers, and residents of the quickly-urbanizing region. Already, this conflict has begun. According to one 2015 study, five of the irrigation districts serving about 340,000 acres of farmland in the Rio Grande Valley were at “the highest risk of needing push water”⁸ during periods of drought.⁹ This uptick in agricultural water needs runs up against human consumers of water in the Valley, thirty-five percent of whom live below the poverty line.¹⁰ According to the same study, “there are likely to be significant public health and economic impacts” if cities in the Valley cannot secure water for their residents.¹¹

The public health impact could likely be even more acute in border *colonias*. These unincorporated, low-income neighborhoods often sit far from established cities and towns and lack access to typical municipal services such as water and electricity hook-ups.¹² In *colonias* along the border in New Mexico, residents rely on hand-dug wells for drinking water, which cannot access water as deeply as professionally-installed wells.¹³ Because of this, when the water table drops below the deepest point of *colonia* wells during the hottest months of the year, *colonia* residents do not have access to any groundwater whatsoever.¹⁴ The State of New Mexico faces some of the most acute water stress in the world, comparable to that of the United Arab Emirates.¹⁵

Thus, how should water resources be distributed between residential and agricultural consumers? What is the correct crisis response if an aquifer dries up? Such questions are even more complicated for border states; due to their immediate proximity to Mexico and their reliance on shared water resources, solutions to water scarcity problems inherently must be binational and reflective of the intertwined nature of water dependence. Texas and Mexico alone share fifteen aquifers, for example.¹⁶ The population concentration along the border only exacerbates the problem; there are fourteen discrete “binational urban systems” that feature dense, interconnected populations that are particularly vulnerable to water scarcity.¹⁷ The potential for systemic water scarcity along the entire US-Mexico border is magnified when meaningful water management and climate change policies are not pursued and implemented.

8 *Id.* “Push water” is a source of surplus water to be tapped into during periods of drought.

9 *Id.*

10 Jason Cohen, *Rio Grande Valley Tops List of “America’s Poorest Cities”*, TEXAS MONTHLY (Jan. 21, 2013), <https://www.texasmonthly.com/articles/rio-grande-valley-tops-list-of-america-poorest-cities/>.

11 Sadasivam, *supra* note 2.

12 Daniel Salinas, *Drinking Water Along The US-Mexico Border Threatened by Global Warming*, KBPS SAN DIEGO (Jun. 12, 2017), <https://www.kpbs.org/news/2017/jun/12/drinking-water-along-us-mexico-border-threatened-g/>.

13 *Id.*

14 *Id.*

15 Morgan McFall-Johnsen, *New Mexico faces extreme water scarcity on par with the United Arab Emirates. Experts warn more ‘day zeros’ are looming*, BUSINESS INSIDER (Aug. 7, 2019), <https://www.businessinsider.com/new-mexico-faces-extreme-water-stress-2019-8>.

16 Schlanger, *supra* note 6.

17 Greg Garfin et al., *ASSESSMENT OF CLIMATE CHANGE IN THE SOUTHWEST UNITED STATES*, SOUTHWEST CLIMATE ALLIANCE 343 (2013).

POTENTIAL SOLUTIONS

The federal governments of both Mexico and the United States have recognized the need for a bilateral response to water management. Bilateral cooperation, political and scientific, as well as agreements, formal and informal, are the best available tools for navigating an increasingly complex resource management future, and there are noteworthy successes, too. For example, the Climate Assessment for the Southwest (CLIMAS), a National Oceanic and Atmospheric Administration (NOAA) program housed at the University of Arizona, often works with Mexican academic counterparts, such as the Colegio de Sonora and the Universidad de Sonora, on climate science research undertakings.¹⁸

Furthermore, the International Boundary and Water Commission (IBWC) is successfully pursuing binational cooperation in water management. With a Mexican section based in Ciudad Juarez, Chihuahua, and an American section based in El Paso, Texas, the IBWC is a binational body charged with monitoring and managing the implementation of water-related treaties between the United States and Mexico.¹⁹ While the IBWC boasts a thick catalog of treaties and evidence of cooperation and agreement between the United States and Mexico—the IBWC in its original form was created soon after the original drawing of the border line in the Treaty of Guadalupe Hidalgo²⁰—critics have characterized it as anachronistic and insufficiently responsive to the modern environmental challenges that face binational negotiators today.²¹ An audit of much of the IBWC's recent work reveals that it perhaps best functions as a mechanic rather than as a strategist; that is, it is calibrated to implement the specifications of a broader water policy, not to create the policy itself. As such, despite its staying power as a source of binational negotiation, the IBWC may not be the right place to turn for a source of policy when faced with imminent water scarcity (though it is certainly a major player in policy fulfillment); this is perhaps exemplified by the fact that the majority of the American IBWC Commissioners have had professional and academic backgrounds in engineering, hydrology, geology, and topography.²²

If broader policy is not in the wheelhouse of the IBWC Commissioners, then perhaps it belongs in a more political sphere. The Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area (the “La Paz Agreement”), signed in 1983 by then-U.S. President Ronald Reagan and Mexico's President Miguel de la Madrid, is the chief political-level agreement made between the two countries that still shapes and underscores modern approaches to water management and environmental protection more broadly at the border. The stated objective of the La Paz Agreement is to “establish the basis for cooperation between the Parties for the protec-

18 *Id.*

19 Nicole T. Carter et al., U.S.-MEXICAN WATER SHARING: BACKGROUND AND RECENT DEVELOPMENTS, CONGRESSIONAL RESEARCH SERVICE 5 (2017).

20 *History of the International Boundary and Water Commission*, INT'L BOUNDARY & WATER COMM'N, https://www.ibwc.gov/About_Us/history.html, (last visited Mar. 15, 2020).

21 Helen Ingram & David R. White, *International Boundary and Water Commission: An Institutional Mismatch for Resolving Transboundary Water Problems*, 33 NAT. RES. J., 153, 153 (1993).

22 *History of U.S. Section Commissioners*, INT'L BOUNDARY & WATER COMM'N, https://www.ibwc.gov/About_Us/Commish_History.html (last visited Apr. 6, 2020).

tion, improvement and conservation of the environment and the problems which affect it, as well as to agree on necessary measures to prevent and control pollution in the border area, and to provide the framework for development of a system of notification for emergency situations.”²³ Functionally the La Paz Agreement has served as a launching pad for a number of binational programs aimed at environmental protection and water conservation, including most recently the Border 2020 initiative, launched as a partnership between the American Environmental Protection Agency (EPA) and Mexico’s Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT).²⁴

Introduced in 2012, Border 2020 set out to achieve a number of “sustainable development” goals, one of which was to improve access to clean drinking water for the inhabitants of the border region.²⁵ Border 2020 also made explicit mention of involving stakeholders from all levels as program partners, implementing a regional, “bottom-up” approach to goal setting and implementation.²⁶ Border 2020 works primarily through grant-funded initiatives financed by the North American Development Bank (NADB), and regional EPA offices oversee its implementation, providing resources and accountability for the community-level programs working on water protection and conservation.²⁷

Despite its lofty goals, the Border 2020 initiative has been plagued with a number of problems, including insufficient reporting on outcomes, a lack of transparency, and failure to monitor important environmental indicators, according to the EPA Inspector General (IG) office. Chief among these challenges is the absence of meaningful documentation of progress. Regarding the composition of regional action plans meant to keep track of the grant-funded programs, for example, the IG reported that they were frequently inconsistent in format, lacked the requisite information, or failed to provide updated information.²⁸ The EPA also failed to share any metrics on success with the public, or any information on which programs received grants and whether or not they were successful.²⁹ Finally, despite the initiative’s stated goal of protecting the environment and public health in the border region, Border 2020 has failed to track how its work, or lack thereof, has affected the area’s environmental health; the most recent overview available on the environmental conditions at the border is a 2016 interim report.³⁰ Many of these failures can be attributed to a lack of funding; according to the IG, the EPA reported that it did not have the resources to track progress in the way that it should, and that “[w]ithout an additional means to track established Border 2020 Pro-

23 Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area, U.S.-Mex., art. I, Aug. 14, 1983, 35 U.S.T. 2916.

24 U.S. ENVTL. PROT. AGENCY & MEX. SEC. OF ENV. & NAT. RES., EPA-160-R-12-001, BORDER 2020: U.S.-MEX. ENVTL. PROGRAM (2012).

25 *Id.* at 1.

26 *Id.* at 8.

27 U.S. ENVTL. PROT. AGENCY OFF. OF THE INSPECTOR GEN., 20-P-0083, BORDER 2020: MGMT. CONTROLS NEEDED TO VERIFY AND REP. BORDER 2020 PROGRAM ACCOMPLISHMENTS 3 (Feb. 18, 2020).

28 *Id.* at 8–9.

29 *Id.* at 10–11.

30 *Id.* at 9.

gram environmental indicators, the program remains unable to determine whether it is accomplishing its stated goals and objectives."³¹

A HOLISTIC APPROACH

But because the above agreements are between countries as equal partners, cooperation and inclusion must be not only vertical, with regional and municipal stakeholders, but respected in good faith horizontally by both country partners. Such respect is difficult to consistently achieve, as political turnover occurs much more quickly in both countries than it often takes to achieve meaningful progress. Additionally, consistent violation of binational agreements can decrease goodwill between signatories; for example, some critics argue that the American pursuit of the construction of a border barrier across administrations violates the letter and spirit of the La Paz Agreement.³² Is there a happy medium between the granular consistency of the IBWC and the political volatility of the La Paz Agreement and its ilk? With so many stakeholders with so many interests at so many levels, it is difficult to conceive of an agreement that could possibly take all perspectives into account. But perhaps as the danger of aridity and water shortages becomes increasingly stark and imminent, interests will coalesce, and differences between stakeholders will not matter as much as the existential need to secure water, in a sustainable way, for those living at the US-Mexico border.

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31 *Id.* at 10.

32 Oscar Ibanez & Stephen P. Mumme, *U.S.-Mexico Environmental Treaty Impediments to Tactical Security Infrastructure Along the International Boundary*, NAT. RES. J., 817-18 (2009).

RAPANOS AND THE NEW DEFINITION OF “WATERS OF THE UNITED STATES”

INTRODUCTION

The Clean Water Act (CWA) defines “navigable waters” as “the waters of the United States, including the territorial seas,” hereafter referred to as WOTUS.¹ Through the CWA, Congress directed the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (the Corps) to protect “navigable waters.”² The Navigable Waters Protection Rule regulates these waters and the tributary systems that flow into them.³ A clear definition of “waters of the United States” is necessary to determine the scope of federal jurisdiction over bodies of water and wetlands.⁴ By redefining WOTUS, the rule restricts federal jurisdiction to only those waters that are sufficiently and visibly connected to traditionally navigable waters or seas.⁵ This article discusses the reasoning behind the redefinition of WOTUS.

BACKGROUND

The United States Supreme Court issued its opinion on WOTUS in *Rapanos v. United States*.⁶ Justice Scalia, writing for a four-justice plurality, interpreted “waters of the United States” to include “only those relatively permanent, standing or continuously flowing bodies of water,” and only those wetlands with a “continuous surface connection” to jurisdictional bodies “so that there is no clear demarcation between ‘waters’ and wetlands.”⁷ Essentially, the plurality held that an adjacent wetland is not within WOTUS just because that wetland has “a mere hydrologic connection” with the jurisdictional water.⁸

In his concurring opinion, Justice Kennedy took a different and broader interpretive approach. He stated that there is a “significant nexus” when tributaries or wetlands, “either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity” of traditionally covered bodies of

1 33 U.S.C. § 1362(7).

2 *Definition of “Waters of the United States” under the Clean Water Act*, ENVTL. PROT. AGENCY, <https://www.epa.gov/cwa-404/definition-waters-united-states-under-clean-water-act> (last visited Feb. 18, 2020).

3 *Id.*

4 *See* *Solid Waste Agency of Northern Cook Cty. v. U.S. Army Corps of Eng’rs*, 531 U.S. 159 (2001); *see also* *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 134 (1985).

5 *The Navigable Waters Protection Rule: Definition of “Waters of the United States,”* 85 Fed. Reg. 22,250 (Apr. 21, 2020) (to be codified at 33 C.F.R. pt. 328 and 40 C.F.R. pts. 110, 112, 116, 117, 120, 122, 230, 232, 300, 302, and 401).

6 *Rapanos v. United States*, 547 U.S. 715 (2006).

7 *Id.* at 739.

8 *Id.* at 740.

water typically understood as navigable.⁹ This created the “significant nexus” test, which originates from a combination of the Court’s decisions in *Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers* and *United States v. Riverside Bayview Homes, Inc.*¹⁰ The Court in *SWANCC* interpreted the Court’s decision in *Riverside Bayview Homes* as supporting a significant nexus theory: “it was the significant nexus between the wetlands and ‘navigable waters’ that informed [the Court’s] reading of the CWA in *Riverside Bayview Homes*.”¹¹ Rather than the surface-connection approach advanced by the plurality, Justice Kennedy articulated a test that gauges whether the wetlands that the EPA and the Corps’ seek to regulate have a significant enough negative impact on navigable waters.

But Justice Stevens—writing for the four-justice dissent—stated that the EPA and the Corps decided “that wetlands adjacent to tributaries of traditionally navigable waters preserve the quality of our Nation’s waters” and that EPA and the Corps’ decision “to treat these wetlands as encompassed within the term ‘waters of the United States’ is a quintessential example of the Executive’s reasonable interpretation of a statutory provision.”¹² The dissent declared that “waters” in “waters of the United States” is an ambiguous term, and the EPA and the Corps have “reasonably interpreted” federal jurisdiction to cover “nonisolated wetlands.”¹³ Justice Stevens essentially eschewed a need for a separate test altogether, as long as federal jurisdiction over wetlands is reasonable under the CWA.

In 2015, in response to the Court’s interpretation of WOTUS in *Rapanos*, the EPA and the Corps provided a new basis for federal jurisdiction by applying Justice Kennedy’s “significant nexus” test in the clarifying document “Clean Water Rule: Definition of ‘Waters of the United States.’”¹⁴ In support of Justice Kennedy’s test, the EPA and the Corps used the EPA’s “Connectivity Report,” a synthesis of 1,200 peer-reviewed articles on hydrologic connection.¹⁵ According to the EPA and the Corps’ interpretation of the “significant nexus” test, waters under federal jurisdiction included ephemeral tributaries, their adjacent wetlands, and other waters that EPA and the Corps decided were jurisdictional using a categorical or case-by-case basis.¹⁶ The 2015 Clean Water Rule addressed the major issue in *Rapanos*: can the connection between jurisdictional waters and adjacent wetlands be underground? The EPA and the Corps incorporated certain accepted scientific principles of hydrology into the definition of jurisdictional waters and rejected the surface-connection theory as stated by the plurality in *Rapanos*.¹⁷

9 *Id.* at 780.

10 *See Solid Waste Agency of Northern Cook Cty. v. U.S. Army Corps of Eng’rs*, 531 U.S. 159 (2001); *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 134 (1985).

11 *SWANCC*, 531 U.S. at 167 (2001).

12 *Rapanos*, 547 U.S. at 788.

13 *Id.* at 798.

14 *See Clean Water Rule: Definition of “Waters of the United States,”* 80 Fed. Reg. 37,054 (June 29, 2015) (to be codified at 33 CFR pt. 328 and 40 CFR pts. 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401).

15 *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*, ENVTL. PROT. AGENCY, <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=296414>, (last visited May 22, 2020).

16 Clean Water Rule, 80 Fed. Reg. at 37,056.

17 AMY KELLY, *WATERS AND WATER RIGHTS* § 61.03 (Matthew Bender eds., 3rd ed. 2020).

DEVELOPMENTS SINCE *RAPANOS*

In February 2017, President Trump issued an Executive Order directing the EPA and the Corps to conduct a rulemaking in order to redefine CWA jurisdiction “in a manner consistent with the opinion of Justice Antonin Scalia in *Rapanos v. United States*.”¹⁸ On October 22, 2019, the EPA and the Corps published a final rule to repeal the 2015 rule defining “waters of the United States.”¹⁹ The final rule repealing the 2015 rule was published in the *Federal Register* on October 22, 2019, and became effective on December 23, 2019.²⁰

On January 23, 2020, the EPA and the Corps finalized the new “Navigable Waters Protection Rule,” redefining WOTUS to comply with the president’s order, which became effective on June 22, 2020.²¹ The final rule excludes from the definition of WOTUS, “groundwater, including groundwater drained through subsurface drainage systems; ephemeral features that flow only in direct response to precipitation, including ephemeral streams, swales, gullies, rills, and pools” and “waste treatment systems,” among others.²² More generally, the rule states that federal jurisdiction will be restricted to those waters and wetlands that “maintain a sufficient surface water connection to traditional navigable waters or the territorial seas.”²³ This is the end, for now, of the “significant nexus” test within the CWA. Rather than a hydrological or ecological connection, the only connection that will allow for federal regulation over other waters and wetlands is one that is surface level.

In the final rule, the EPA and the Corps assert that “ensuring that States and Tribes retain authority over their land and water resources [. . .] helps carry out the overall objective of the CWA and ensures that the agencies are giving full effect and consideration to the entire structure and function of the Act.”²⁴ The EPA and the Corps cite Justice Scalia’s opinion in *Rapanos* in support: “clean water is not the *only* purpose of the statute. So is the preservation of primary state responsibility for ordinary land-use deci-

18 *Presidential Executive Order on Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the “Waters of the United States” Rule*, WHITE HOUSE (Feb. 28, 2017), <https://www.whitehouse.gov/presidential-actions/presidential-executive-order-restoring-rule-law-federalism-economic-growth-reviewing-waters-united-states-rule/>.

19 *Definition of “Waters of the United States” under the Clean Water Act*, U.S. ENVTL. PROT. AGENCY, <https://www.epa.gov/cwa-404/definition-waters-united-states-under-clean-water-act> (last visited Feb. 18, 2020).

20 *Definition of “Waters of the United States”—Recodification of Pre-Existing Rules*, 84 Fed. Reg. 56,626 (Oct. 22, 2019) (to be codified at 33 C.F.R. pt. 328 and 40 C.F.R. pts. 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401).

21 *Final Rule: The Navigable Waters Protection Rule*, ENVTL. PROT. AGENCY, <https://www.epa.gov/nwpr/final-rule-navigable-waters-protection-rule> (last visited Feb. 18, 2020); see *Presidential Executive Order on Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the “Waters of the United States” Rule*, WHITE HOUSE (Feb. 28, 2017) <https://www.whitehouse.gov/presidential-actions/presidential-executive-order-restoring-rule-law-federalism-economic-growth-reviewing-waters-united-states-rule/>.

22 *The Navigable Waters Protection Rule: Definition of “Waters of the United States,”* 85 Fed. Reg. 22,250 (Apr. 21, 2020) (to be codified at 33 C.F.R. pt. 328 and 40 C.F.R. pts. 110, 112, 116, 117, 120, 122, 230, 232, 300, 302, and 401).

23 *Id.* at 22,259.

24 *Id.* at 22,320.

sions.”²⁵ While clean water may not be the *only* purpose of the CWA, it is arguably the primary one. However, because the EPA and the Corps “recognize that science cannot dictate where to draw the line between Federal and State waters,” perhaps ensuring clean water through scientific processes has become less important.²⁶

While this new rule recently became effective, how it is implemented will most certainly be influenced by the Supreme Court’s recent decision in *County of Maui v. Hawaii Wildlife Fund* interpreting *Rapanos* and establishing the “functional equivalent” test for indirect discharges into WOTUS.²⁷

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25 *Id.*; *Rapanos*, 547 U.S. at 755–56.

26 Navigable Waters Protection Rule, 85 Fed. Reg. at 22,292.

27 *Cty. of Maui, Hawaii v. Hawaii Wildlife Fund*, 140 S. Ct. 1462 (2020).

AN ANALYSIS OF “PRIVATE ENERGY” BY Yael R. LIFSHITZ

INTRODUCTION

In her article “Private Energy,” Yael R. Lifshitz contributes to the growing legal discussion around distributed generation. Distributed generation (DG) encompasses various technologies that generate electricity at or near where it will be used.¹ Using this approach, Lifshitz evaluates the DG market through the lens of a private law regime² and focuses on aspects of property law and the apparent connection to energy. Lifshitz argues that the role of property law in energy production and consumption is often ignored, and this oversight stands in the way of effective policy.

LIFSHITZ’S ANALYSIS

Lifshitz begins her discussion by pointing out the function of property entitlements in the realm of the energy industry.³ She highlights the importance of the locations that energy production and consumption take place. Property entitlements provide access to these unique locations. For example, oil production is ruled by the ability of developers to gain “mineral rights” to drill. Compare this to wind energy, which requires developers to gain “wind rights” to build a large-scale wind farm. In sum, the different energy resources require distinct property entitlements.⁴

Next, Lifshitz connects property entitlements to the greater energy market and its management, examining the influence of property law on the field of energy.⁵ For example, according to the National Renewable Energy Laboratory, over one third of households and commercial enterprises nationwide rent or lease their dwellings.⁶ The typical rental or lease agreement prohibits renters from participating in the distributed generation market making it impossible to host a solar photo-voltaic system.⁷ Lifshitz calls this the “renters’ problem,” and proposes a change in the standard landlord-tenant leases to include “distributed energy enabling clauses.” These clauses would allow renters to safeguard a right to use solar panels through their lease agreements.⁸

Lifshitz also suggests a novel solution to the renters’ problem called “we-solar.” Under this model, renters would share an interest in pooled-energy and distributed generation resources. Analogous to a carshare program or a co-working space,⁹ we-solar

1 *Distributed Generation of Electricity and its Environmental Impacts*, ENVTL. PROT. AGENCY, <https://www.epa.gov/energy/distributed-generation-electricity-and-its-environmental-impacts> (last visited Mar. 20, 2020).

2 Yael R. Lifshitz, *Private Energy*, 38 STAN. ENVTL. L.J. 119 (2019).

3 *Id.* at 128.

4 *Id.* at 129.

5 *Id.*

6 *Id.* at 140–42.

7 *Id.* at 126.

8 *Id.*

9 *Id.* at 146.

would allow renters to access distributed energy when and where they need it.¹⁰ Lifshitz's model differs from "community solar" because it allows for a broader range of energy resources—off-site projects, on-site projects, microgrids, and crowd-funding solar.¹¹ Moreover, this model gives renters—or even homeowners who do not have the necessary property rights to install solar panels—access to distributed energy.¹²

Finally, from a policy standpoint, Lifshitz establishes three pillars for which policy makers should pay attention if they wish to advocate for the use of distributed generation in their respective states and municipalities.¹³ First, they should focus on property entitlements throughout the entire energy cycle, from production, to transmission, and ultimately consumption.¹⁴ Second, policy makers should look to private law tools when approaching the interaction of energy policy and climate change.¹⁵ Third, policy makers need to think about property law as a facilitator and shaper of public policy.¹⁶

CONCLUSION

Lifshitz's proposal utilizes property law in energy production and consumption in a way that has never been considered. Her novel policy proposals could affect the general public's access to solar energy in the future, and she even considers potentially expanding into implications of the peer-to-peer trading we are currently seeing. Research plays an important role in shaping how policy is formed and how legal communities will need to increasingly utilize creative problem-solving skills.

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10 *Id.* at 149.

11 *Id.* at 153–56.

12 *Id.*

13 *Id.* at 127.

14 *Id.*

15 *Id.*

16 *Id.*

STATE OF TEXAS V. ITC

INTRODUCTION

The State of Texas, acting on behalf of the Texas Commission on Environmental Quality (TCEQ), recently brought suit against International Terminals Company, LLC (ITC) for violations of the Texas Clean Air Act, the Texas Water Code, the Texas Solid Waste Disposal Act, and TCEQ rules implementing those statutes.¹ These claims arise from chemical fires that occurred at ITC's plant in Deer Park, Texas in March 2019.² The case is currently pending trial in the 261st District Court of Texas.³ The decision to sue ITC immediately after the chemical fires occurred is notable because the state has not pursued environmental claims as aggressively in the past.⁴

BACKGROUND

ITC owns and operates an independent storage facility for various petrochemical and chemical companies. According to ITC, one of their storage tanks caught fire on March 17, 2019 after a pipe began leaking naphtha, a flammable chemical distilled from petroleum.⁵ This fire spread to several other tanks, and by March 19, 2019, ten of ITC's tanks storing "naphtha and xylene (fuels used in gasoline and plastics), toluene (a volatile liquid used to make nail polish remover and paint thinner), pyrolysis gas, and blended oils" were ablaze.⁶

These fires resulted in "elevated levels of VOCs [Volatile Organic Compounds]" and the "release of several air contaminants including, but not limited to, PM_{2.5}, PM₁₀, benzene, NO_x, toluene, and xylene."⁷ The air contaminants released by fires resulted in several school closures and two "shelter-in-place" orders, which required residents of Deer County and the surrounding areas to stay inside and avoid hazardous air quality in the area.⁸

After the fires were contained, a "secondary containment area at the Site—that collected a mixture of foam, firefighting water, and petrochemicals, including, but not limited to, toluene, benzene, xylene, and naphthalene—collapsed and resulted in a re-

1 State of Texas's First Amended Original Petition and Application for Injunctive Relief, *State of Texas v. Intercontinental Terminals Co., LLC*, (No. D-1-GN-19-001593), 2019 WL 2869894 (261st Dist. Ct., Travis Cty, Tex. Mar. 26, 2019) [hereinafter *ITC Plaintiff's Petition*].

2 *ITC Fire Updates*, Deer Park Emergency Services (last visited Feb. 11, 2020), <https://www.deerparktx.gov/1778/ITC-Fire>.

3 *ITC Plaintiff's Petition*, *supra* note 1.

4 Kiah Collier, *Why has Texas suddenly decided to immediately sue industrial polluters?*, TEX. TRIBUNE (Apr. 5, 2019), <https://www.texastribune.org/2019/04/05/texas-attorney-general-ken-paxton-quickly-sue-industrial-polluters/>.

5 *ITC Plaintiff's Petition*, *supra* note 1, at ¶ 5.2.

6 *Id.* at ¶¶ 5.2–5.13.

7 *Id.* at ¶ 5.12.

8 *Id.* at ¶¶ 5.2–5.13.

lease of wastewater from the Site.”⁹ The wastewater was released into a drainage ditch that feeds into Tucker Bayou and the Houston Ship Channel.¹⁰

CLAIMS

The State of Texas alleges that the release of these air contaminants, water pollutants, and solid wastes violates TCEQ permits and rules. The State of Texas is seeking civil penalties for: (1) “Unauthorized Air Pollution at the Site,” (2) “Unauthorized Outdoor Burning at the Site,” (3) “Nuisance,” (4) “Unauthorized Visible Emissions,” (5) “Unauthorized Discharge of Wastewater,” and (6) “Unauthorized Discharge of Industrial Solid Waste and Hazardous Waste.”¹¹

First, regarding the cause of action for unauthorized air pollution at the Site, the State of Texas alleges that “ITC caused, suffered, allowed, or permitted the emission of air contaminants from the Site in violation of Texas Health and Safety Code Section 382.085(a) and (b), and Texas Water Code section 7.101 each day from March 17, 2019, until at least March 22, 2019.”¹² These provisions restrict the emission of air contaminants to what the TCEQ authorizes or permits. The chemical fire caused levels of air contaminant emissions that exceeded ITC’s authorized levels.¹³

Second, regarding the cause of action for unauthorized outdoor burning at the Site, the State of Texas alleges that “ITC caused, suffered, allowed, or permitted outdoor burning at the Site in violation of Title 30 Texas Administrative Code Section 111.201 and Texas Water Code section 7.101 each day from March 17, 2019 until March 20, 2019, and on March 22, 2019.”¹⁴ Similar to the first claim, ITC allegedly exceeded its permissible limits for outdoor burning during the chemical fires.¹⁵

Third, the State of Texas has brought a nuisance claim against ITC. Texas alleges that the emissions from the fires created a nuisance when they caused “fatigue, dizziness, and headaches from short-term exposure” in people near the plant both when the two “shelter-in-place” orders were issued on March 17 and March 21, 2019 and when various public and private schools were forced to close in the area.¹⁶ The State of Texas claims that this nuisance was created “in violation of Title 30 Texas Administrative Code Section 101.4 and Texas Water Code Section 7.101.”¹⁷

Fourth, the State of Texas alleges that there were “Unauthorized Visible Emissions” as a result of the fires.¹⁸ The State of Texas claims that a “large, dark emissions plume” was visible beyond the Site without a TCEQ permit.¹⁹ As a result, Texas alleges that ITC “caused, suffered, allowed, or permitted unauthorized visible emissions at the Site in

9 *Id.* at ¶¶ 5.9–5.13.

10 *Id.*

11 *Id.*

12 *Id.* at ¶¶ 6.1–6.5.

13 *Id.*

14 *Id.* at ¶¶ 6.6–6.9.

15 *Id.* at ¶ 5.6.

16 *Id.* at ¶¶ 6.10–6.13.

17 *Id.*

18 *Id.* at ¶¶ 6.14–6.17.

19 *Id.*

violation of Title 30 Texas Administrative Code Section 111.111 and Texas Water Code Section 7.101.”²⁰

Fifth, the State of Texas alleges that ITC violated an important section of the Texas Water Code.

[U]nder section 26.121 (a) of the Texas Water Code, except as authorized by TCEQ, no person may: (1) discharge municipal, recreational, agricultural, or industrial waste into or adjacent to any water in the State; (2) discharge other waste into or adjacent to any water in the state which may cause pollution of the water; or (3) “commit any other act or engage in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state.”²¹

The State of Texas alleges that ITC violated this provision when it discharged wastewater into a drainage ditch that feeds into Tucker Bayou and the Houston Ship Channel without a TCEQ permit. Therefore, the State of Texas alleges that “ITC has caused, suffered, allowed, or permitted the discharge of wastewater from the Site in the waters of the state in violation of Texas Water Code Sections 26.121 and 7.101.”²²

Sixth, and related to the discharge of wastewater, the State of Texas alleges that ITC “caused, suffered, allowed, or permitted the continual disposal of hazardous waste from the Site in a manner that caused: (1) the discharge or imminent threat of discharge of industrial solid waste into or adjacent to the waters in the state; (2) the creation and maintenance of a nuisance; or (3) the endangerment of the public health and welfare, in violation of Title 30 Texas Administrative Code section 335.4 and Texas Water Code Section 7.101.”²³ The hazardous waste entered into the “Waters of Texas” when the on-site storage pond collapsed and discharged into Tucker Bayou.²⁴

Finally, all of these causes of action seek damages under the same provision, Texas Water Code Section 7.102.²⁵ Section 7.102 provides that “the State is entitled to civil penalties against ITC within the statutory range of not less than \$50 nor greater than \$25,000 for each day of each violation alleged.”²⁶ Additionally, the State of Texas seeks injunctive relief against ITC for continuing violations of the Texas Clean Air Act, the Texas Water Code, the Texas Solid Waste Disposal Act, and regulations promulgated by TCEQ.²⁷ Furthermore, the State seeks “reasonable attorney’s fees, investigative costs, and court costs incurred in relation to this proceeding.”²⁸

ITC has entered a “general denial to every allegation” and “demands that the plaintiff prove each allegation as applicable by law.”²⁹ Additionally, ITC has raised defenses “under the Eighth Amendment to the United States Constitution and Section 13. Arti-

20 *Id.* at ¶¶ 6.18–6.24.

21 *Id.*

22 *Id.*

23 *Id.* at ¶¶ 6.25–6.32.

24 *Id.* at ¶¶ 6.5; 6.9; 6.13; 6.17; 6.24; 6.32.

25 Tex. Water Code Ann. § 7.102.

26 *ITC Plaintiff’s Petition*, *supra* note 1, at ¶¶ 7.1–7.4.

27 *Id.* at ¶ 8.1.

28 *Id.*

29 Defendant’s Original Answer, *State of Texas v. Intercontinental Terminals Co., LLC*, (No. D-1-GN-19-001593), 2019 WL 2869895 (261st Dist. Ct., Travis Cty, Tex. Apr. 15, 2019).

cle I of the Texas Constitution” as well as “the Fourteenth Amendment to the United States Constitution and by Section 19. Article I of the Texas Constitution,” stating that multiple claims for the same underlying event would impose excessive fines and violate due process protections.³⁰ The case is ongoing and awaiting trial in the 261st District Court of Texas.³¹

ENFORCEMENT SHIFT

Aside from being a disaster for both the State of Texas and ITC, this lawsuit is illustrative of a potential shift in enforcement against environmental violations. Emission events like this typically result in favorable settlements or non-enforcement of environmental statutes. For example, a report from Environment Texas concluded that from 2011 to 2017, less than three percent of emission events result in penalties.³² Therefore, the decision to bring a suit against ITC so soon after the incident may be a signal that Texas is changing its enforcement procedures for environmental regulations.³³

The State’s petition was filed on March 26, 2019, just days after the fires at the ITC plant had been extinguished.³⁴ This is markedly faster than several similar incidents in the past. For example, after a chemical explosion at a fertilizer plant in West, Texas in 2013, the State of Texas and the TCEQ never sued at all.³⁵ Instead, individual cities, counties, and victims of the incident brought the bulk of the lawsuits.³⁶ The State has been criticized for other instances of lax enforcement, including: waiting over a year to sue after a 2005 explosion at a British Petroleum oil refinery,³⁷ requesting that counties refrain from suing Volkswagen after it cheated on the EPA emissions tests,³⁸ and waiting roughly three years to sue BP after the notorious 2010 Deepwater Horizon incident.³⁹

30 *Id.*

31 *Id.*

32 Grant Durow & Luke Metzger, *Major Malfunction Air Pollution from Industrial Malfunctions and Maintenance in Texas in 2017*, ENV’T TEX. (Jan. 2019), https://environmenttexas.org/sites/environment/files/reports/TX_MajorMal_scrn.pdf.

33 Patrick Michels, *Is Ken Paxton an Environmental Champion?*, SIERRA CLUB LONE STAR CHAPTER (Sept. 16, 2019), <https://www.sierraclub.org/texas/blog/2019/09/ken-paxton-environmental-champion> (describing Ken Paxton’s change in environmental enforcement).

34 *ITC Plaintiff’s Petition*, *supra* note 1.

35 *Id.*

36 See Jarod Cassidy, *West, Texas Receives \$10 Million In Fertilizer Plant Explosion Lawsuit*, THOMAS J. HENRY, <https://thomasjhenrylaw.com/blog/workplace-accidents/west-texas-receives-10-million-fertilizer-plant-explosion-lawsuit/> (last visited May 22, 2020); see also Paul J. Gately, *West: Only a few explosion lawsuits remain unsettled*, KWTX (Apr. 7, 2018), <https://www.kwtx.com/content/misc/West—Only-a-few-explosion-lawsuits-remain-unsettled-480030113.html>.

37 See Morgan Smith, *The Other BP Catastrophe*, TEX. TRIBUNE (Aug. 20, 2010), <https://www.texastribune.org/2010/08/20/beleBP-texas-city-refinery-faces-two-lawsuits/>.

38 See Jim Malewitz, *Harris County to Paxton: We’re Still Suing Volkswagen*, TEX. TRIBUNE (Oct. 19, 2015), <https://www.texastribune.org/2015/10/19/harris-county-paxton-well-continue-volkswagen-suit/>.

39 P.J. Huffstutter, *Texas joins flood of states suing BP over 2010 Gulf spill*, THOMPSON REUTERS (May 18, 2013), <https://www.reuters.com/article/us-usa-bp-texas-lawsuit/texas-joins-flood-of-states-suing-bp-over-2010-gulf-spill-idUSBRE94H0CE20130518>.

The promptness of the ITC suit is a sharp contrast from previous enforcement and may be a harbinger of stricter enforcement.⁴⁰ However, some critics have described the enforcement against ITC as selective-enforcement against a lesser-known company rather than as a shift in policy.⁴¹

These concerns are informed by Ken Paxton's record on environmental issues. Paxton has brought several suits on behalf of Texas against the EPA, such as opposing the Obama-era Clean Power Plan, challenging several ozone and sulfur oxide nonattainment determinations, and suing the EPA over regulations that aimed to cut methane emissions.⁴² However, these are challenges against federal action rather than enforcement of state environmental statutes, and Mr. Paxton's opinion on enforcement of Texas Environmental Law could still be in favor of greater enforcement.

Regardless, it is important to note the promptness of the lawsuit against ITC and monitor how this could reflect a change in environmental enforcement across the state. Notably, several other lawsuits have been brought by the State of Texas against polluters for similar incidents,⁴³ indicating that the ITC case may not be an outlier, and undercutting the criticism that the ITC suit is merely selective enforcement against a lesser-known company. Looking forward, this lawsuit and the legal claims advanced could provide a blueprint for how Texas and the TCEQ will operate in future environmental suits against polluters involved in environmental disasters.

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40 Collier, *supra* note 4.

41 *Id.*

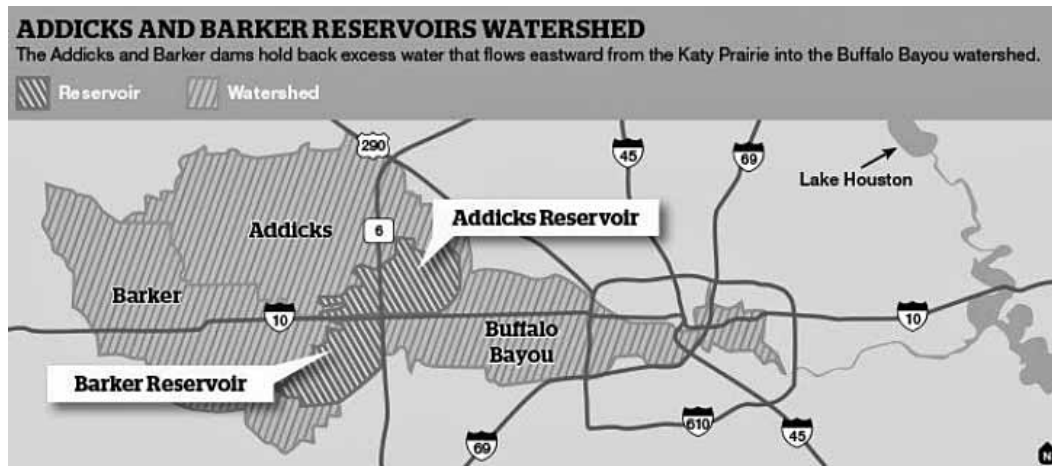
42 Michels, *supra* note 33.

43 See Defendant's Original Answer, State of Texas v. KMCO, LLC, (No. D-1-GN-19-001795), 2019 WL 2607534 (261st Dist. Ct., Travis Cty, Tex. Apr. 29, 2019); see also Petition at 1, State of Texas v. Valero Energy Corp. & The Premcor Ref. Grp., Inc., No. D-1-GN-19-004121 (419th Dist. Ct., Travis County, Tex. Jul. 19, 2019).

TEXAS FLOOD-CONTROLLED RESERVOIRS

INTRODUCTION

Houston is located at the junction of the Buffalo Bayou and the White Oak Bayou, which drains into the Galveston Bay. As a result, Houston has a history of flooding and is familiar with flooding hazards. In response, Congress created flood control measures with the Rivers and Harbors Act of 1938.¹ Through this Act, the U.S. Army Corps of Engineers (the Corps) built both Addicks and Barker Dams and connected them to the Buffalo Bayou as part of an extensive flood control effort.² The purpose of the program was to protect Houston as it existed at the time the law passed, namely downtown Houston and the areas nearby.



The city originally purchased substantial amounts of land upstream of the dams to create reservoirs to hold flood water.³ While the Corps acquired a significant amount of upstream land, it acquired less than initially planned, meaning that “the dams were designed to contain more water than the acquired land could hold.”⁴ The Corps diminished its land requirements based off a large 1935 storm, although the risk of a more significant storm was considered—approximately the size of Hurricane Harvey—that could occur once every fifty years.⁵ However, the Corps expected that the rural areas surrounding the reservoirs would stay rural, therefore mitigating the potential risk posed

1 *In re Upstream Addicks and Barker (Texas) Flood-Control Reservoirs*, 146 Fed. Cl. 219 (U.S. Ct. of Fed. Claims 2019).
 2 *Id.* at 230.
 3 *Id.* at 230–33.
 4 *In re Upstream Addicks and Barker (Texas) Flood-Control Reservoirs*, 146 Fed. Cl. 219, 230–33 (U.S. Ct. of Fed. Claims 2019).
 5 *Id.*

by flooding.⁶ Despite the Corps' original expectations, rapid urbanization ensued, and by the late 1970s, the area upstream of the reservoirs were no longer rural.⁷

In 2017, Hurricane Harvey unexpectedly poured an average of thirty-four inches of water on Houston in four days.⁸ The Corps followed its mandate and protected downtown Houston. Thus, the area upstream of the dams experienced significant flooding, causing extensive property damage.⁹ According to the Corps, the dams functioned properly and per their original purpose.¹⁰

UPSTREAM ADDICKS AND BARKER TAKINGS CLAIMS

With the wave of litigation against the Corps that followed, the cases were split between the upstream properties and the downstream properties.¹¹ This article analyzes upstream property owners' cases who successfully argued that the Corps is liable for taking. Interestingly, the claims court found the downstream property owners did not own a protected property interest and therefore could not recover.

Takings derive from the Takings Clause of the Fifth Amendment, which states that "private property [shall not] be taken for public use without just compensation."¹² The Takings Clause holds the government liable for negatively affecting the value of private property in exchange for a public purpose. There are two, layered elements to a takings analysis. The first element is whether the plaintiff has a property interest within the meaning of the Fifth Amendment.¹³ The second element is whether the government's action amounted to a compensable taking of that interest.¹⁴

PROPERTY INTEREST

The court began its analysis by noting that the homeowners own private property without flowage easements, ultimately concluding that the plaintiffs maintained a property interest within the meaning of the Fifth Amendment.¹⁵ The Corps provided three reasons why the homeowners do not hold compensable property interests, all of which the court rejected. First, the Corps argued that under Texas law, it has the right to mitigate floodwaters.¹⁶ The court disagreed, explaining that the law the Corps cited was an exception for the specific circumstance of constructing or maintaining levees, not for consciously diverting water onto private property.¹⁷ Second, the Corps argued that the upstream homeowners purchased their property after the dams' construction and there-

6 *Id.* at 233.

7 *Id.* at 256. In fact, a Corps' report in 1974 stated, "Development of the area will eventually place the Government in the position of having to flood the area within the reservoir with the accompanying damages in order to protect downstream improvements in the event of a severe future storm." *Id.*

8 *Id.* at 227.

9 *Id.* at 230.

10 *Id.*

11 *Id.*

12 *Id.* at 247.

13 *Id.*

14 *Id.*

15 *Id.*

16 *Id.* at 249.

17 *Id.*

fore, cannot argue that they should be free from flooding.¹⁸ The court disagreed, noting that this argument is more appropriate for analyzing the homeowners' reasonable investment-backed expectations.¹⁹ Third, the Corps argued that under the Flood Control Act of 1928, the homeowners' right to compensation is limited. Again, the court disagreed, maintaining that the Flood Control Act did not override the Constitution's requirement that the government compensate when it takes private property for public use.²⁰ With this analysis, the court established that the plaintiffs maintained a vested property interest under the Fifth Amendment.²¹

TAKINGS

Whether government action requires compensation for taking requires considering six elements articulated by the Supreme Court in *Arkansas Game and Fish Commission v. United States*.²² The factors include (1) time and duration, (2) intent, (3) foreseeability, (4) character of the land, (5) reasonable investment-backed expectations, and (6) severity.²³ The court addressed all factors except for the "character of the land."

1. TIME AND DURATION

The time factor is highly weighted. When the taking is permanent, then a taking is virtually conclusive.²⁴ The court shot down the Corps' argument that its actions only temporarily took the homeowners' properties since the floodwater dissipated within days.²⁵ Instead, the court concluded that the Corps' history with the dams, including construction, maintenance, and operation, demonstrates that the Corps took a permanent flowage easement.²⁶ The court reasoned that ever since the dams' construction, the Corps' actions subjected the upstream homeowners to the "probability" that the Corps will induce flooding.²⁷ That is, the time and duration does not mean the duration of the flooding; rather it involved the government's permanent right to inundate the property with floodwater. But the court did not address the fact that the homeowners purchased their property after the construction of the dams.

2. SEVERITY

The court cited precedent holding that in "the flooding context, 'property may be taken by the invasion of water where subjected to intermittent, but inevitably recurring, inundation due to authorized government action.'"²⁸ Flooding by means of flood control is defined as a taking when the government retains the right to flood it in the future,

18 *Id.*

19 *Id.*

20 *Id.*

21 *Id.*

22 568 U.S. 23 (2012).

23 *In re Upstream Addicks and Barker (Texas) Flood-Control Reservoirs*, 146 Fed. Cl. at 248.

24 *Id.* at 249–50.

25 *Id.*

26 *Id.*

27 *Id.*

28 *Id.* at 250. (citing *Barnes v. United States*, 538 F.2d 865, 870 (Ct. Cl. 1976)).

since reserving such a right is more than an “isolated invasion.”²⁹ It is essentially a flowage easement.³⁰ The Corps responded by arguing that each upstream property was repairable, and therefore, the damage was temporary.³¹ Even if the properties are repairable, however, the court countered that the likelihood of a similar event in the future is determinative.³² Some properties required months for repairs due to structural damage; furthermore, the fact that the owners can repair the property to its previous condition is irrelevant in a severity analysis, especially when the Corps may flood the property again.³³

3. *INTENT*

Intent is defined as whether the Corps intended to occupy the homeowners’ property without authority or excuse, meaning that intent to occupy is sufficient without requiring intent to create a taking.³⁴ The court drew on the Corps’ failure to purchase the proper amount of land to affect the dams’ original design requirements.³⁵ Even though the Corps knew it did not have enough land upstream of the dams to prevent flooding for a storm the size of Harvey, it also knew that a storm the size of Harvey was probable.³⁶ Moreover, even though the Corps knew that if a storm like Harvey would occur, it never strayed from the primary objective to prevent downstream flooding.³⁷ The Corps’ decision to prevent downstream flooding, then, showed its intent to use the upstream homeowners’ properties for flood control because it knew a storm like Harvey would occur.³⁸

4. *FORESEEABILITY*

The bulk of the court’s decision lies in its foreseeability analysis. Whether an invasion of private property is the foreseeable result of government action addresses whether the government intended to invade as the “direct, natural, or probable result of an authorized activity,” and not invasions incidental or consequential injuries from an action.³⁹ The distinction between intent and foreseeability is that the foreseeable result may not have been intended, but an action cannot be intended without being foreseeable.⁴⁰ As noted above, the court found intent, and therefore the taking was foreseeable.⁴¹

The court rejected two of the Corps’ important arguments. First, the Corps argued that the foreseeability analysis should focus on the time the Corps constructed the

29 *Id.* (citing *U.S. v. Cress*, 243 U.S. 316 (1917); *Quebedeaux v. United States*, 112 Fed. Cl. 317 (2013)).

30 *Id.*

31 *Id.* at 251.

32 *Id.*

33 *Id.*

34 *Id.* at 254–60.

35 *Id.*

36 *Id.*

37 *Id.*

38 *Id.*

39 *Id.* at 254–60.

40 *Id.*

41 *Id.*

dams.⁴² The Corps' argument here focused on the fact that it could never have anticipated the vast urbanization that would occur in the late 20th century, and that while the upstream flooding was possible, it was not the "direct, natural, or probable result."⁴³ The court responded by saying that foreseeability "should not be so constrained" because foreseeability is an objective measurement.⁴⁴ The court asked, "would an objective person reasonably foresee that the actual results which occurred would have been the direct, natural or probably results of the government's actions? Whether the Corps subjectively foresaw the results may bear on objective foreseeability, but it is not the only consideration."⁴⁵ The court eventually concluded that measuring the date of foreseeability is irrelevant because the Corps objectively should have known that the water would invade private property.⁴⁶ Moreover, the Corps' ongoing operation and modification of the dams occurred even as the possibility of flooding increased.⁴⁷

The second notable argument focused on the extent of damages. The Corps argued that "the *claimed losses* were not the direct, natural, or probably result" since the Corps could not have anticipated the urbanization upstream of the dams.⁴⁸ Instead, the Corps said it should not be liable for damages to businesses and homes that did not exist in the 1940s.⁴⁹ The court cast the Corps' argument aside and stated that unforeseeable urbanization is irrelevant.⁵⁰ Instead, the court focused on the fact that the Corps should have foreseen that when it did not purchase all of the required by the original project's design, it effectively guaranteed a taking of private property via flooding easement.⁵¹

5. *REASONABLE INVESTMENT-BACKED EXPECTATIONS*

Two factors are relevant to investment-backed expectations. First, the expectation must be objectively reasonable.⁵² Second, the court must consider the extent that the Corps' action interfered with reasonable expectations.⁵³ The court concluded that the homeowners' expectations were reasonable, and notice does not immunize the government. Further, the court said that even if the various forms of notice were sufficient, the Corps did not show that the homeowners were aware of the scale of the risk.⁵⁴ Whether the Corps' action interfered with reasonable expectations, the court concluded that the degree of interference was substantial.⁵⁵ Importantly, the court also noted that after Harvey, the Texas Legislature passed a statute mandating disclosure if a property is located

42 *Id.*

43 *Id.*

44 *Id.*

45 *Id.* at 254–60.

46 *Id.*

47 *Id.*

48 *Id.*

49 *Id.*

50 *Id.*

51 *Id.*

52 *Id.* at 260–63.

53 *Id.*

54 *Id.*

55 *Id.*

in a reservoir.⁵⁶ An interesting question is whether such a disclosure would bar future claims of this sort by upstream homeowners.

CONCLUSION

The potential ramifications of this case are significant. In a world where the government necessarily has limited resources requiring it to make incremental decisions, this case appears to hold the government liable for the ripple effects of decisions made generations ago that were considered reasonable by the Corps at the time. The fact that the Corps knew at all times that it would need to flood private property eventually appears to be central to the court's decision. The fact that landowners may have had notice of the potential for flooding was equally unpersuasive, with the court noting that the government cannot escape liability by simply notifying the landowner of a potential taking. The court reserved the question of damages for later proceedings.

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⁵⁶ *Id.*

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