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Using an Emissions Banking and Trading Program to Reduce Diesel Emissions: A Case Study in Houston

By Kenneth J. Adler, Christina Wolfe, and David E. Adelman

I. Introduction

Reducing diesel emissions and promoting sustainable freight movement is an urgent need in Houston and other cities. For example, the recent Panama Canal expansion is projected to increase freight traffic to Gulf and East Coast ports, some of which are also located in nonattainment areas (*e.g.*, Houston, Baltimore, and New York/New Jersey). The growth in freight traffic is likely to increase diesel emissions from tugs, switcher locomotives, cargo handling equipment, and the local drayage trucks used to deliver containers from the ports.

Repowering or replacing tug boats, switcher locomotives, and large horsepower nonroad equipment in the Houston-Galveston-Brazoria (HGB) nonattainment area with diesel engines that meet the Environmental Protection Agency's (EPA) Tier 4 emission standards would result in notable emission reductions. Further, Houston-area tug boat owners could finance the cost of repowering tug boats if allowed to participate in the Texas Commission for Environmental Quality's (TCEQ) Emissions Banking and

Trading (EBT) program.[1] However, inclusion of mobile sources in the TCEQ's EBT program will require approval of both the TCEQ and EPA.

To date, state emissions trading programs targeting ozone reductions have primarily focused on stationary sources of nitrogen oxides (NOx) and volatile organic compounds (VOC) emissions, such as power plants and refineries.[2] Mobile sources have not typically been included in state emissions trading programs because of the difficulty in tracking their location and accurately quantifying potential emission reductions. Including these sources in an emissions trading program would provide another means to reduce emissions associated with increased freight traffic, thus promoting more sustainable growth. Mobile sources, and especially legacy diesel engines, can represent a large portion of NOx emissions in nonattainment areas.[3] Because many areas across the country fail to meet federal air quality standards for ozone due, in part, to NOx emissions, there has been significant attention given to developing emissions inventories and strategies to reduce these pollutants.[4]

The EPA's decision to reduce the ozone National Ambient Air Quality Standard (NAAQS) from 0.075 to 0.070 parts per million (ppm) could also motivate state and local officials to consider including mobile sources in their emissions trading program. Existing and new ozone nonattainment areas will need to identify additional sources of NOx and VOC emission reductions to comply with the more stringent standard.

Commercial marine, locomotive, and nonroad vehicles and equipment generate 110 tons per day of NOx emissions in the HGB area, or 24.5% of total NOx emissions in the nonattainment area.[5] In addition, the TCEQ recently completed a statewide emissions inventory of commercial marine emissions showing that, for the HGB nonattainment area, Category 1 and 2 vessels—which include tugs, tow boats, commercial fishing vessels, ferries, and offshore support vessels operating in the HGB area—generate 15.3 tons of NOx per day.[6]

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1 30 TEX. ADMIN. CODE § 101.301 (outlining the Emission Credit Program Purpose).

2 *See, e.g.*, *id.* ch. 117.

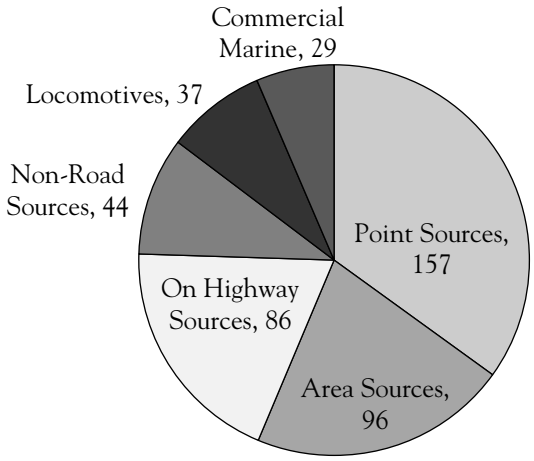
3 *See infra* Fig. 1.

4 *See, e.g.*, 40 C.F.R. pt. 75 (2018) (The EPA proposed a rule that would allow states to include alternate forms of monitoring their mass NOx emissions in Emissions Monitoring Provisions in State Implementation Plans Required Under the NOX, 83 Fed. Reg. 48,751 (Sept. 27, 2018) (proposed rule) (to be codified at 40 C.F.R. 51, 52); 30 TEX. ADMIN. CODE § 101.301.

5 TEX. COMM'N ON ENVTL. QUALITY, 2009-017-SIP-NR, REVISION TO THE STATE IMPLEMENTATION PLAN FOR THE CONTROL OF OZONE AIR POLLUTION HOUSTON-GALVESTON-BRAZORIA 1997 EIGHT-HOUR OZONE STANDARD NONATTAINMENT AREA (2010).

6 EASTERN RESEARCH GROUP, INC., 2014 TEXAS STATEWIDE COMMERCIAL MARINE VESSEL EMISSIONS INVENTORY AND 2008 THROUGH 2040 TREND INVENTORIES 7-1 to 7-3 (Heather Perez et al. eds., 2015) (Prepared for Cody McLain, Texas Commission on Environmental Quality, Air Quality Division. Identified as TCEQ Contract No. 582-15-50416 Work Order No. 582-15-51493-01 FY: 2015-10).

FIGURE 1. HGB 2014 NO_x EMISSIONS (tons per day)

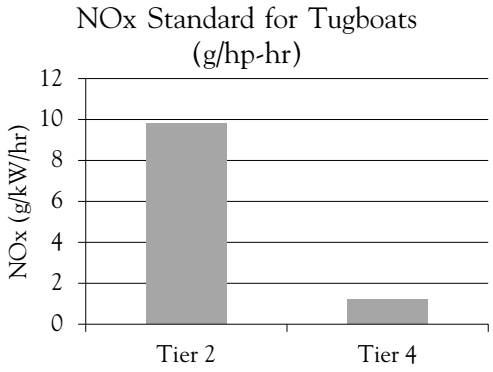


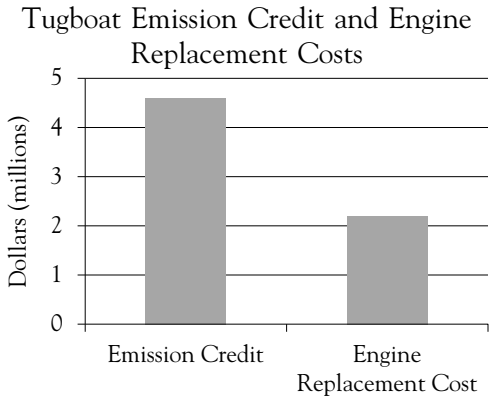
In this case study, we sought to understand whether the EPA's new Tier 4 emission standard for diesel engines, combined with the $120,000 per ton price of NOx credits in the HGB area, would make it worthwhile to consider including mobile sources in emissions trading programs. We first estimated the potential NOx emission reductions and dollar value in the TCEQ's current EBT program that would occur from repowering a fleet of tug boats that operate in the HGB nonattainment area. Then, we compared the potential emission reductions from other types of diesel vehicles and equipment to determine whether an emissions trading program would be a feasible incentive to replace or repower smaller horsepower diesel equipment, such as forklifts and construction equipment.

In Part II, we present our case study of a fleet of thirteen tug and harbor docking boats owned by G&H Towing Company ("G&H"). In Part III, using that case study as a baseline, we then conduct a comparative analysis. In Part IV, we consider whether the emission credits generated by mobile sources could meet Clean Air Act (CAA) requirements for emissions trading programs. Finally, in Part V, we consider some environmental justice implications of including mobile source credits in an emissions trading program traditionally designed for stationary sources.

II. TUG BOAT FLEET CASE STUDY

G&H, which operates in the HGB area, owns a fleet of thirteen tug and harbor docking boats. Our study indicates that a Houston tug boat owner could earn up to $4.6 million in emission reduction credits (ERCs) under the Texas program by upgrading a tug's diesel engines to the Tier 4 emission standards, which would exceed the cost of the engine repower. The high value of these credits is due to: (1) the $120,000 per ton price of NOx ERCs; (2) the 80% reduction in NOx emissions from Tier 4 propulsion engines as compared to Tier 2 engines; and (3) the large engines used on tug boats (>2000 horsepower (hp)) and their long hours of operation.





Our analysis uses a methodology approved by the TCEQ for estimating diesel emissions for the Texas Emission Reduction Program (TERP).[7] TERP is a state-administered program that provides grants to replace, repower, or retrofit older, more polluting diesel equipment in Texas nonattainment areas.[8] We selected G&H because their TERP vessel and operating data were complete, which is necessary for the emission calculations. Also, the G&H vessels were repowered in 2000 or 2003 using TERP funds, meaning that G&H had fulfilled its contractual obligations under the TERP program and, thus, would be theoretically free to take additional reductions under a new program.[9]

Our case study estimates the potential NOx emission reductions that would occur by repowering the thirteen G&H vessels from its current Tier 2 propulsion engines to Tier 4 engines. We based all calculations on the TERP guidance for Category 2 marine engines.[10] The current Tier 2 engines have a NOx emission standard of 7.9 or 8.5 grams per kilowatt hour (g/kW-hr),[11] and the Tier 4 engines are rated at 1.7 g/kW-hr.[12] Table 1 provides the TERP assumptions that we used for these calculations.[13]

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7 AIR QUALITY DIV., TEX. COMM'N ON ENVTL. QUALITY, TEXAS EMISSIONS REDUCTION PLAN (TERP) GUIDELINES FOR EMISSIONS REDUCTION INCENTIVE GRANTS (2016).

8 *Id.*

9 This is a hypothetical case study. G&H has not been contacted about the analysis, and we have no indication they would be interested in repowering their vessels.

10 AIR QUALITY DIV., TEX. COMM'N ON ENVTL. QUALITY, TEXAS EMISSIONS REDUCTION PLAN (TERP) GUIDELINES FOR EMISSIONS REDUCTION INCENTIVE GRANTS PROGRAM TECHNICAL SUPPLEMENT NO. 3. MARINE VESSELS (2016).

11 The EPA's emission standards are expressed in grams per kilowatt-hour (g/kW-hr) or grams per brake-horsepower hour (g/hp-hr).

12 These numbers represent only the NOx portion of the standard. The VOC portion has been subtracted based on TERP guidance.

13 For purposes of our analysis, we assumed that the TERP assumptions would apply to the ERC and DERC calculations.

TABLE 1

Vessel	Vessel Type	Annual Hours of Operation	Engine Model Year	Horsepower	Tier 2 NOx Emission Standard (g/kWh)	Default TERP Load Factor	TxLED Correction Factor	Tier 4 NOx Emission Standard (g/kWh)	Maximum Activity Life Category 2 Engine (years)	Maximum Remaining Useful Life (years)
1	Harbor Docking	2500	2003	6140	6.62	0.43	0.93	1.71	23	10
2	Tug Boat	3000	2000	4300	8.49	0.43	0.93	1.71	23	7
3	Tug Boat	3000	2000	4300	8.49	0.43	0.93	1.71	23	7
4	Harbor Docking	3000	2000	4300	8.49	0.43	0.93	1.71	23	7
5	Harbor Docking	3000	2000	4300	8.49	0.43	0.93	1.71	23	7
6	Tug Boat	3000	2003	3900	7.93	0.43	0.93	1.71	23	10
7	Tug Boat	3000	2003	3900	7.93	0.43	0.93	1.71	23	10
8	Harbor Docking	3000	2003	3900	7.94	0.43	0.93	1.71	23	10
9	Harbor Docking	3000	2003	3900	7.94	0.43	0.93	1.71	23	10
10	Harbor Docking	3000	2003	3900	7.94	0.43	0.93	1.71	23	10
11	Harbor Docking	3000	2003	3900	7.94	0.43	0.93	1.71	23	10
12	Tug Boat	3000	2003	3900	7.93	0.43	0.93	1.71	23	10
13	Tug Boat	3000	2003	3900	7.93	0.43	0.93	1.71	23	10

Our calculations assumed no change in hours of operation, engine horsepower, or engine load factor. To calculate the remaining life of the current Tier 2 engines in the G&H vessels, we used TERP's "Maximum Activity Life" for Category 2 vessel engine projects, which is twenty-three years.[14] For example, a G&H vessel that had been repowered in 2003 would, based on TERP guidance, continue to operate those engines until 2026.[15] For this case study, we assumed that, if the vessel engine were repowered in 2016 with a new Tier 4 engine, it could generate 10 years of additional emission reductions.

The TCEQ's EBT program has two types of emission credits: Emission Reduction Credits (ERCs) and Discrete Emission Reduction Credits (DERCs). ERCs are permanent emission-reduction credits that allow the owner of the ERC to emit for an indefinite period.[16] As of March 2016, the market price for an ERC was approximately $120,000 per ton.[17] DERCs, on the other hand, are temporary, one-year emission reductions. As of March 2016, the market price for a DERC was approximately $10,000 per ton.[18] The prices are set by companies buying and selling the credits, and the TCEQ is not involved in setting the credit value.

Table 2 provides our emission reduction estimates for the fleet of thirteen G&H vessels. Annual NOx emission reductions would range from 35 to 41 tons per year per vessel, for a total annual reduction of 478 tons of NOx. The lifetime reductions from

14 TEX. COMM'N ON ENVTL. QUALITY AIR QUALITY DIV., TEXAS EMISSIONS REDUCTION PLAN (TERP) EMISSIONS REDUCTION INCENTIVE GRANTS PROGRAM TECHNICAL SUPPLEMENT NO. 3 MARINE VESSELS 18 (2016).

15 *See id*.

16 *See* 30 TEX. ADMIN. CODE § 101.306(a) (Tex. Comm'n on Envtl. Quality, Emissions Credit Use) (providing a list of uses for emissions credits).

17 *See generally Emissions Reduction Credit Program*, TEX. COMM'N ON ENVTL. QUALITY (last visited Apr. 10, 2019), https://www.tceq.texas.gov/airquality/banking/erc_program.html. *See also* TEX. COMM'N ON ENVTL. QUALITY, TRADE REPORT, EMISSIONS REDUCTION CREDIT PROGRAM (Apr. 17, 2018).

18 *See* TEX. COMM'N ON ENVTL. QUALITY, TRADE REPORT, EMISSIONS REDUCTION CREDIT PROGRAM (Apr. 17, 2018).

these vessels would range from 289 tons to 364 tons per vessel, for a total reduction of 4,284 tons of NOx for this single fleet, over the 7-to-10-year remaining useful life of the current engines.

TABLE 2. EMISSION REDUCTIONS AND CREDITS

Vessel	Vessel Type	Baseline NOx Emission Factor (g/hr)	Reduced NOx Emission Factor (g/hr)	Annual NOx Reductions (tons/year)	Lifetime NOx Reductions (tons)	Total DERC Payments	ERC Payment
1	Harbor Docking	16255	4199	33	332	$ 3,322,295	$ 3,986,754
2	Tug Boat	14599	2940	39	270	$ 2,698,770	$ 4,626,462
3	Tug Boat	14599	2940	39	270	$ 2,698,770	$ 4,626,462
4	Harbor Docking	14599	2940	39	270	$ 2,698,770	$ 4,626,462
5	Harbor Docking	14599	2940	39	270	$ 2,698,770	$ 4,626,462
6	Tug Boat	12368	2667	32	321	$ 3,207,928	$ 3,849,514
7	Tug Boat	12368	2667	32	321	$ 3,207,928	$ 3,849,514
8	Harbor Docking	12383	2667	32	321	$ 3,213,085	$ 3,855,703
9	Harbor Docking	12383	2667	32	321	$ 3,213,085	$ 3,855,703
10	Harbor Docking	12383	2667	32	321	$ 3,213,085	$ 3,855,703
11	Harbor Docking	12383	2667	32	321	$ 3,213,085	$ 3,855,703
12	Tug Boat	12368	2667	32	321	$ 3,207,928	$ 3,849,514
13	Tug Boat	12368	2667	32	321	$ 3,207,928	$ 3,849,514

The large emission reductions required under the EPA's new Tier 4 heavy duty diesel engine standards are a compelling reason for state air quality officials to consider adding these sources to their emissions trading programs. The Tier 4 NOx standard for Category 2 marine engines, which are typically used in tug boats, decreased from 9.3 g/kW-hr to 1.7 g/kW-hr in 2016. This 80% reduction has been made possible by advances in diesel engine technology, including the use of selective catalytic reduction.

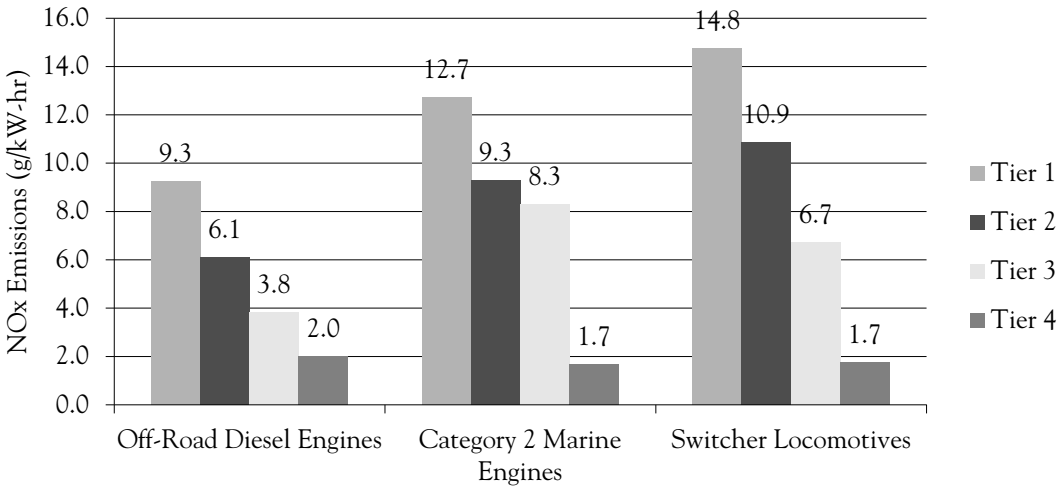
The reduction in particulate matter with a diameter of less than 2.5 micrometers ($PM_{2.5}$) emissions from replacing older diesel engines with new Tier 4 engines would generate additional health benefits for local communities. Further, the 85% to 91% reduction in $PM_{2.5}$ emissions could also help nonattainment areas, such as HGB, remain in attainment for the $PM_{2.5}$ NAAQS. A Tier 4 engine substantially reduces both NOx and $PM_{2.5}$ emissions, while a typical NOx control (e.g., selective catalytic reduction) on a stationary source reduces only NOx emissions. The $PM_{2.5}$ standard for most Tier 4 vessels is 0.04 g/kW-hr, while the Tier 2 engines range from 0.2 to 0.50 g/kW-hr.

Based on the estimates shown in Table 2, the value of the Tier 4 emission reductions to G&H could be substantial. If the TCEQ and EPA agree that the mobile NOx reductions could qualify as ERCs, the annual reductions of 35 to 41 tons of NOx would be worth $3.8 million to $4.6 million per vessel. If the NOx reductions could qualify as DERCs, the NOx reductions would be worth $320,793 to $385,539 per year per vessel. Based on the TERP useful-life estimates, these annual payments could last 7 to 10 years, for total payments per vessel of $2.6 to $3.2 million over the life of the credits. In either case, the ERC and DERC payments are likely to exceed the cost of repowering a Category 2 propulsion engine from Tier 2 to Tier 4, suggesting that emission credit trading proceeds could be strong incentives for installing cleaner engines.

III. Emission Reductions Comparison

Using the TERP guidance, we compared potential NOx emission reductions and emission credits from a variety of diesel vehicles and equipment operating in the HGB nonattainment area, in addition to tugboats, to identify additional candidates for inclusion in emissions trading. Repowering or replacing the tug boats and switcher locomotives resulted in greater emission reductions when compared to nonroad trucks, terminal tractors, and forklifts. The reduction from smaller diesel engines and drayage trucks is relatively low compared to switchers and tugs on a per vehicle basis, but the total emission reductions from these sources could be substantial. Repowering or replacing tug boats and switcher locomotives could generate the largest monetary credits.

Figure 2. EPA NOx Emission Standard (g/kW-hr)



Our analysis focuses primarily on large horsepower diesel engines and whether the emission source operates predominantly in the HGB nonattainment area. Diesel engines have a long useful life, which is a major criterion in determining the financial viability of a diesel engine for an emissions trading program. Emission sources operating predominately in the HGB nonattainment area—such as switcher locomotives—would be better candidates for a trading program than those with greater emissions that do not operate predominantly in the area, such as line haul locomotives.[19] Those vehicles operating more frequently within the nonattainment area would have a greater effect on air quality.[20]

The emission credit payments that would accrue to the owners of upgraded diesel engines are presented in Figure 4, below. Consistent with our G&H vessel case study, we used a DERC value of $10,000 per ton and an ERC value of $120,000 per ton. The useful life of the engines was based on the TERP guidance.

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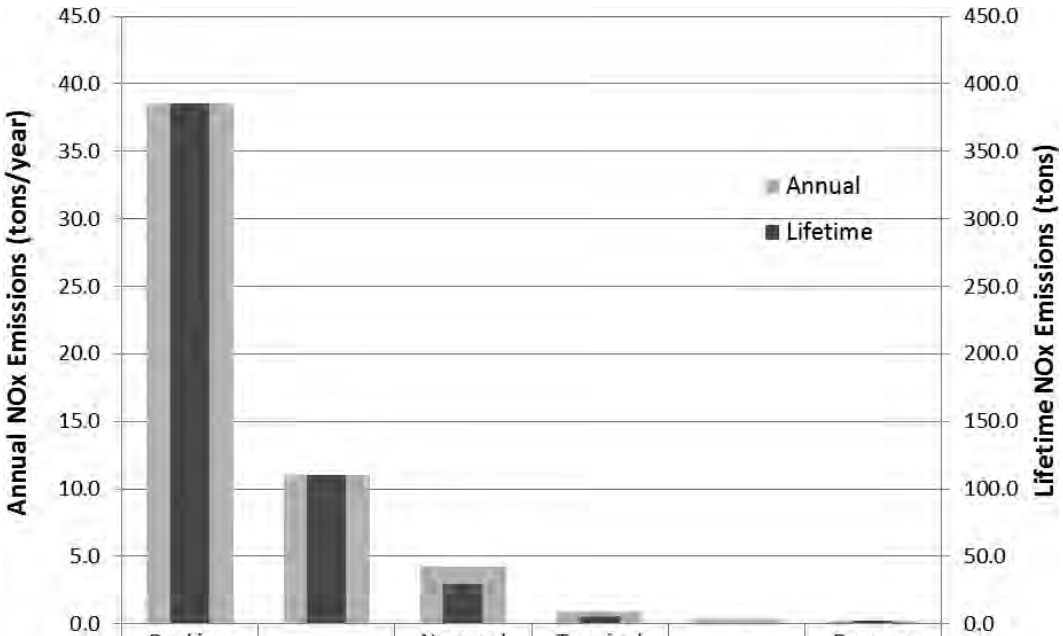
19 Air Quality Div., Tex. Comm'n on Envtl. Quality, Texas Emissions Reduction Plan (TERP) Guidelines for Emissions Reduction Incentive Grants 86–100 (2016).

20 *Id.*

A. Tug Boats and Switcher Locomotives

The large propulsion engines (>600 hp) [21] typically used on tug boats and switcher locomotives generate the largest annual- and total-emission reductions on a per-tug or -switcher basis. Repowering propulsion engines on a tug boat generated reductions of 36.4 tons of NOx per year, while repowering a switcher generated an 11.0 ton reduction.[22] Our analysis assumed the tug was being upgraded from a Tier 2 to Tier 4 engine and that the switcher was being upgraded from a Tier 1+ to Tier 4. If we assume that the original engines had 10 years of remaining useful life, then the upgraded Tier 4 switcher and tug could reduce 110 to 364 tons of NOx, respectively, over 10 years. These engine tiers were selected based on the typical age of the diesel engines in the HGB area. While upgrading Tier 0 and 1 engines would produce a larger reduction in NOx emissions, these engines are very likely beyond their useful life, as measured by the EPA, and may not be eligible for emission credits.

Figure 3. NOx Emission Reductions



	Docking Tug (2000 hp)	Switcher (1500 hp)	Nonroad Truck (750 hp)	Terminal Tractor (175 hp)	Forklift (75 hp)	Drayage Truck (2003 to 2010)
Annual	38.6	11.0	4.2	0.9	0.4	0.2
Lifetime	385.5	110.1	29.7	5.3	0.8	2.4

21 Switchers and tugs will typically have at least two engines with each engine being larger than 600 hp.

22 TEX. COMM'N ON ENVTL. QUALITY AIR QUALITY DIV., TEXAS EMISSIONS REDUCTION INCENTIVE GRANTS PROGRAM TECHNICAL SUPPLEMENT NO. 3 MARINE VESSEL 18–21 (2016).

Further, the tug and switcher examples would generate the largest monetary credits. Upgrading a tug could generate an annual DERC payment of $269,877 or a single lifetime ERC payment of $4,626,462. If a tug boat used in our example were upgraded with two 2000 hp Tier 4 engines, it would cost approximately $2,200,000 for the new engines and labor, as seen in Table 3.[23] Lower maintenance costs for the upgraded tug boat and switcher would be an additional benefit.

TABLE 3. APPROXIMATE COST OF TIER 4 ENGINE REPLACEMENT OR REPOWER

	Horsepower	Repower Cost ($)	Replacement Cost ($)
Docking Tug	2000	$2,200,000	NA
Nonroad Truck	750	NA	$1,800,000
Switcher	1200	NA	$1,200,000
Terminal Tractor	175	NA	$85,000 to $110,000
Forklift	75	NA	$50,000 to $75,000
2010 Class 8 Truck	450	NA	$14,250 to $67,500 Average=$32,500

Upgrading a switcher could generate an annual DERC payment of $110,056 or a lifetime ERC payment of $1,320,669. This would exceed the cost of a new 1200 hp switcher equipped with a Tier 4 engine, which would cost approximately $1,200,000, as seen in Table 3. Due to the complexity and size of Tier 4 engine, in most cases, it would not be practical to repower an existing Tier 2 switcher engine with a Tier 4 engine.

B. NONROAD TRUCK

We estimated that a 750 hp nonroad truck typically used for large construction projects generates 4.2 tons of NOx reductions per year, or 29.7 tons of NOx over the engine's useful life. The nonroad truck shows a relatively smaller NOx reduction because of the smaller size engine and fewer operating hours. In addition, as illustrated in Figure 2, the nonroad engine's NOx emission standard for Tier 2 is already more stringent than the same standard for marine engines and locomotives.[24] As a result, the change in emissions when going from a Tier 2 to Tier 4 nonroad engine is relatively smaller than for locomotive or marine engines on a gram per horsepower-hour basis.[25]

We estimated that the emission credit payments for a nonroad truck could equal an annual DERC payment of $27,400, or a lifetime ERC payment of $328,800. A new 759 hp nonroad truck could cost approximately $1.8 million, while repowering the engine

23 Costs include engine, labor and other components.

24 *See EPA Emissions Standards for Nonroad Engines and Vehicles*, *Emission Standards Reference Guide*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-nonroad-engines-and-vehicles (last updated July 5, 2018).

25 *See id.*

could cost $750,000 or more. The emission credits are not sufficient to pay all the cost of replacing the equipment but could cover a moderate portion of the new equipment cost.

C. Terminal Tractor and Forklift

Figure 3 also shows the NOx reductions that occur when smaller diesel equipment, such as a terminal tractor (175 hp) and forklift (75 hp), are upgraded from Tier 2 to Tier 4 engines. The annual NOx emission reductions from terminal tractors and forklifts range from 0.9 to 0.4 tons per year, or 5.3 to 0.8 lifetime tons, respectively.[26]

For smaller horsepower nonroad equipment, like terminal tractors and forklifts, the value of the DERCs and ERCs is substantially lower because of their lower emission levels and shorter useful life of their diesel engines. Furthermore, the difference between the Tier 2 nonroad NOx emission standard for these diesel engines and the new Tier 4 engines is not as substantial as it is for the marine or locomotive emission standard, as seen in Figure 1, above.

Nevertheless, replacing Tier 2 terminal tractors with new Tier 4 models could generate a lifetime payment of $69,600, while the cost of a new terminal tractor would range from $85,000 to $110,000. If a Tier 2 forklift were upgraded to a Tier 4 model, it would generate $46,800 in emission credits, while the replacement cost would be $50,000 to $75,000. The emission credits are not sufficient to pay all the cost of replacing the equipment but could cover a large portion of the new equipment cost.

D. Drayage Truck

Lastly, we assessed whether it would be worthwhile to use the EBT program to provide an incentive to replace the older drayage trucks that are a major source of emissions in the region. The annual and lifetime emissions from replacing a 2003 drayage truck with a 2010 drayage truck generates 0.2 ton of NOx reductions per year, or 2.4 tons over the useful life of the truck.[27]

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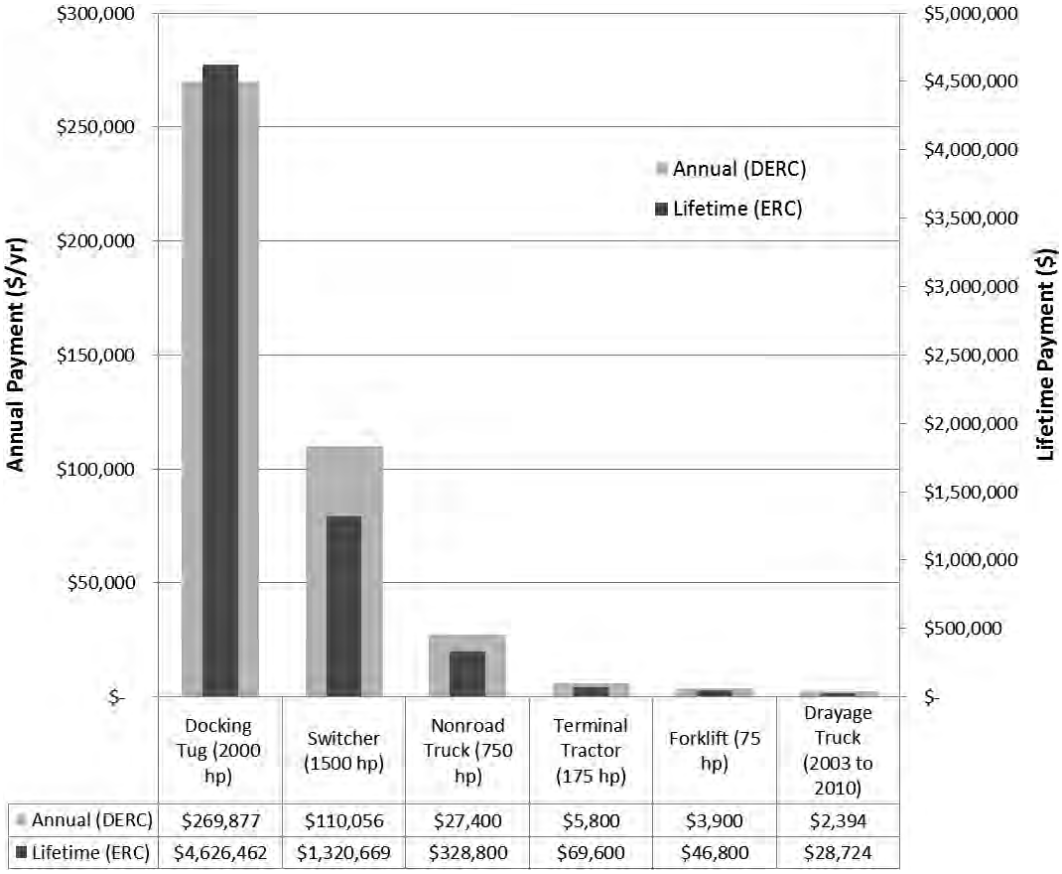
26 TEX. COMM'N ON ENVTL. QUALITY AIR QUALITY DIV., TEXAS EMISSIONS REDUCTION INCENTIVE GRANTS PROGRAM TECHNICAL SUPPLEMENT NO. 2 NON-ROAD EQUIPMENT 12–24 (2018).

27 *See id.*

FIGURE 4. EMISSION CREDIT PAYMENTS



	Docking Tug (2000 hp)	Switcher (1500 hp)	Nonroad Truck (750 hp)	Terminal Tractor (175 hp)	Forklift (75 hp)	Drayage Truck (2003 to 2010)
Annual (DERC)	$269,877	$110,056	$27,400	$5,800	$3,900	$2,394
Lifetime (ERC)	$4,626,462	$1,320,669	$328,800	$69,600	$46,800	$28,724

Replacing a 2003 Class 8 heavy duty diesel drayage truck with a 2010 model generates only a lifetime payment of $28,724. According to online truck sales in the HGB area, the average price for a used 2010 heavy duty diesel truck is $32,500 (range: $14,250 to $67,500), as seen in Table 3. Because the truck owner would need to guarantee the future emission reductions from their 2010 truck, it is likely that they would need to purchase a truck in better condition at the higher end of the price range. The emission reduction credit may provide an incentive to replace an older drayage truck, but it might not be enough to encourage widespread participation by drayage truck owners.

While the reduction from smaller diesel engines and drayage trucks is relatively low compared to switchers and tugs on a per vehicle basis, the total emission reductions from these sources is greater, which as seen in Figure 1, could largely be due to the number of these vehicles in use. We initially thought that combining these smaller sources into fleets of equipment or vehicles would result in substantial emission credits. However, as discussed in Part III.B.4, we actually found that the dollar value of these emission reduction credits was relatively small compared to the cost of replacing the smaller horsepower equipment or a heavy-duty drayage truck.

IV. MOBILE SOURCE CREDITS AND CLEAN AIR ACT EMISSIONS TRADING REQUIREMENTS

If a state air quality agency wants to include mobile sources in its emissions trading program, it would need to determine that its regulations and quantification protocol meet the requirements of the CAA. Specifically, the CAA requires that an emission credit be enforceable, permanent, quantifiable, real, and surplus.[28] The following describes how these requirements could be implemented for mobile source credits in the context of a marine vessel repower program.

A. ENFORCEABLE

By being able to move in and out of nonattainment areas, mobile sources, such as tug boats, could create new enforcement issues. For example, a tug boat owner in Houston could repower their vessel with a Tier 4 engine and sell the emission credits to a local stationary source. Further, to meet CAA requirements, the TCEQ would need to respond if the tug boat owner were to move the vessel out of the nonattainment area.

Compared to stationary sources, tracking the location of mobile emissions sources and accurately measuring their emissions is difficult, which may contribute to reluctance by state and federal officials to include them in trading programs. However, GPS and engine control module (ECM) systems that are available on new Tier 4 diesel engines help to resolve both issues and could increase the likelihood that mobile sources could meet the CAA requirements for state emissions trading programs. The U.S. Coast Guard Automatic Information System, which is required by federal regulation on most large vessels, could also be used to track vessels to verify their location within the HGB nonattainment area. These GPS devices, for example, would allow state officials or third-party auditors to ensure ERCs generated from mobile sources occur in the nonattainment area. The ECM systems also allow for much more accurate engine emissions tracking by recording detailed data on operation time and engine load.

Incorporating mobile vessels would not be wholly foreign to the TCEQ. In administering the TERP program, the TCEQ already has established contracts with numerous vessel owners.[29] This experience will be valuable in assessing the risk of a contract violation, as well as identifying options for taking enforcement actions. Additionally, vessel location can be tracked with GPS tracking that can be included as an option for the engine.

Finally, the TCEQ should be able to address bankruptcy issues or accidents that permanently or temporarily disable the vessel using the same policies or procedures used for stationary sources. Alternatively, the TCEQ could require the seller of the ERC to purchase insurance to cover any defaults, like the insurance mechanism that TERP has created in the case of defaults under the existing program.

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28 U.S. ENVTL. PROT. AGENCY, EPA-452/R-01-001, IMPROVING AIR QUALITY WITH ECONOMIC INCENTIVE PROGRAMS (2001).

29 TEX. COMM'N ON ENVTL. QUALITY, DIESEL EMISSIONS REDUCTION INCENTIVE (DERI) PROGRAM ACTIVE PROJECTS 2001 THROUGH AUGUST 31, 2016 (2016) (showing projects enrolled in emissions reduction program including marine emissions sources).

B. Permanent

Once a vessel has been repowered to a Tier 4 engine, it should be considered a permanent reduction. Any modifications to the engine that may result in an increase in emissions would be a violation of the CAA.

C. Quantifiable

The two key issues affecting accurate emissions reduction measurements reductions from Tier 4 engines are engine hours of operation and engine load factor. Most of the research on hours of operation and engine load has been done for developing area-wide emission inventories that may consist of hundreds or thousands of vessels. It is unclear if this research is sufficiently robust to accurately measure the emissions for individual vessels selling ERCs. New Tier 4 engines are equipped with an ECM that will allow vessel owners to compute accurate, actual hours of operation and engine load. ECMs provide much more accurate reporting of emissions than current TERP or the EPA guidance requires.

In addition, the TCEQ would need to address the accuracy of useful life estimates of existing Tier 2 and 3 marine engines, as well as the useful life of the vessels themselves. For the purposes of this analysis, we used the TERP guidance that assumes a useful life of 23 years for Category 2 engines. Consultation with marine engine experts should be undertaken to determine if these numbers are sufficiently robust to meet CAA requirements. Guidance would also be needed on the useful life of the vessels. For our case study, vessel manufacture dates range from 1957 to 1980. The available TERP guidance does not appear to address the useful life of a vessel.[30]

The TCEQ's EBT program, consistent with the CAA, requires an offset of 30% when purchasing emission credits.[31] For example, if a company needs to reduce NOx emissions by 1 ton per day (tpd), they must purchase at least 1.3 tpd of NOx reductions. To account for uncertainties in quantifying emission reductions from the mobile sources, the TCEQ could increase the offset to, for example, 50% (or 1.5 tpd) of NOx.

D. Real

For the emission reductions to be real, as defined by the CAA, the vessel owner must be able to document their baseline, pre-Tier 4 engine emissions. For example, in the case of Vessel 1 from Table 2, the baseline NOx emissions would be 22 tons per year. After repowering, the Tier 4 emissions would be 4 tons per year, based on TERP emissions calculation guidance.[32] The TCEQ could require vessel owners to provide baseline estimates based on a combination of their ECM data and ship logs to document actual

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30 *See* TERP Guidelines for Emissions Reduction Incentive Grants, *supra* note 10.

31 Tex. Comm'n on Envtl. Quality, 2009-017-SIP-NR, Revision to the State Implementation Plan for the Control of Ozone Air Pollution: Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Standard Nonattainment Area (2010). *See also* Tex. Comm'n on Envtl. Quality, 2016-016-SIP-NR, Revision to the State Implementation Plan for the Control of Ozone Air Pollution: Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Standard Nonattainment Area 3-35 to 3-36 (2016).

32 *See* Air Quality Div., Tex. Comm'n on Envtl. Quality, Texas Emissions Reduction Plan (TERP) Guidelines for Emissions Reduction Incentive Grants (2016).

engine load and hours of operation. This should result in a more robust baseline estimate compared to the current TERP guidance.

Viable options are available to the TCEQ to incorporate these mobile sources into its emissions trading program. The available options for these mobile sources would allow the TCEQ to ensure emission credits would be enforceable, permanent, quantifiable, real, and surplus.

V. ENVIRONMENTAL JUSTICE IMPLICATIONS

Since the 1980s, concerns about the disproportionate impacts on minority and low-income communities from pollution sources have figured prominently in debates over environmental policy.[33] In many parts of the country, these communities are disproportionately impacted by high concentrations of air pollutants associated with the movement of goods.[34] Emissions trading programs as a regulatory tool to reduce overall emissions have generated concerns from environmental justice (EJ) stakeholders, such as Air Alliance Houston, who are seeking to reduce localized pollution burdens.[35] This concern was highlighted by the RECLAIM program in Los Angeles during the 1990s and the mercury trading program for coal-fired power plants that was proposed (but never implemented) by the George H. Bush Administration in the 2000s.[36]

One reason communities object to emissions trading programs is that their flexibility can result in localized emissions hotspots.[37] Specifically, because a firm may meet its

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33 Evan J. Ringquist, *Assessing Evidence of Environmental Inequities: A MetaAnalysis*, 24 J. POL'Y ANALYSIS & MGMT. 223, 225–26 (2005); Paul Mohai, David Pellow, & J. Timmons Roberts, *Environmental Justice*, 34 ANN. REV. ENV'T & RESOURCES 405–30 (2009); Paul Mohai & Robin Saha, *Which Came First, People or Pollution? A Review of Theory and Evidence from Longitudinal Environmental Justice Studies*, 10 ENVTL. RES. LETT. (2015); Jean D. Brendor, Juliana A. Maantay & Jayajit Chakraborty, *Residential Proximity to Environmental Hazards and Adverse Health Outcomes*, 101 AM. J. PUB. HEALTH S37, S50 (2011).

34 NAT'L ENVTL. JUST. ADVISORY COUNCIL, REDUCING AIR EMISSIONS ASSOCIATED WITH GOODS MOVEMENT: WORKING TOWARDS ENVIRONMENTAL JUSTICE (2009).

35 Lily N. Chinn, *Can the Market Be Fair and Efficient? An Environmental Justice Critique of Emissions Trading*, 26 ECOLOGY L.Q. 80, 108–09 (1999); Stephen M. Johnson, *Economics v. Equity: Do Market-Based Environmental Reforms Exacerbate Environmental Injustice?*, 56 WASH. & LEE L. REV. 111, 111–12 (1999); Alice Kaswan, *Reconciling Justice and Efficiency: Integrating Environmental Justice Into Domestic Cap-and-Trade Programs for Controlling Greenhouse Gases*, *in* THE ETHICS OF GLOBAL CLIMATE CHANGE 232, 240–42 (Denis G. Arnold ed., 2011).

36 Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y F. 231, 268–69 (1999) (describing RECLAIM as a cap-and-trade program for nitrogen oxides and sulfur oxides emitted by stationary and mobile sources in the Los Angeles airshed); Catherine A. O'Neill, *Mercury, Risk, and Justice*, 34 ENVTL. L. REP. 11,070–71 (2004) (critiquing the mercury cap-and-trade program for risking the creation of "hotspots" of airborne and waterborne mercury due the lack of constraints on the number of credits individual sources could purchase).

37 Drury et al., *supra* note 36, 235, 251–58.

regulatory quota either through reducing its emissions or by purchasing pollution credits, inequities arise when large industrial facilities located in a minority or low-income communities disproportionately choose to purchase permits over reducing emissions. Whether it occurs depends on the proximity of residential homes and stationary sources and the regulations for preventing disproportionate impacts on these residents.

Further analyses will be needed to fully understand the EJ implications of including mobile sources in the TCEQ EBT program. These analyses should consider several issues, including the location of current emissions trading activities in EJ communities, the potential for mobile ERCs and DERCs to increase or decrease these impacts, and the substantial $PM_{2.5}$ reductions that would occur by repowering mobile sources with Tier 4 diesel engines. Reducing $PM_{2.5}$ emissions from diesel engines results in major health benefits—especially in $PM_{2.5}$ hotspots—and may also help the HGB area remain in attainment of the $PM_{2.5}$ NAAQS. Nevertheless, rigorous oversight of the program would be needed to protect local communities.

VI. Conclusion

Our analysis demonstrates that, in the HGB nonattainment area, focusing on the potential emission reductions from repowering or replacing existing diesel engines on tug boats, locomotives, and large horsepower nonroad equipment with new Tier 4 diesel engines could play a significant role in emissions trading programs. Tugboats, locomotives, and nonroad equipment are major sources of emissions due to the large size of their engines and long operating hours. Tugs and locomotives also have long useful lives (greater than thirty years), such that older, large diesel engines currently in use can emit up to ten times more emissions than engines meeting current Tier 4 standards. Including these mobile sources in emissions trading programs could incentivize mobile source owners to seek credits by repowering older diesel engines.

This study's relevance outside of the HGB area is limited by the unusually high price for NOx emission credits in HGB. The most recent TCEQ ERC trade report shows that the price of approved trades over the last two years in HGB ranged from $82,500 to $247,500 per ton of NOx, with a mean of $151,333. In contrast, the prices in Los Angeles and northern New Jersey areas range from $10,000 to $15,000 per ton of NOx. However, the EPA's decision to reduce the ozone NAAQS from 0.075 to 0.070 ppm could increase these prices and provide an incentive for state air quality officials to consider mobile sources in emissions trading programs.

While this analysis does not address whether a program to repower marine vessels makes a significant contribution to improving air quality in the HGB area explicitly, it does indicate that reductions are substantial when compared to the annual emission reductions required by the CAA for the area to stay in attainment. The TCEQ estimates that for 2017, the region will need to reduce 89 tpd of NOx to meet their CAA requirements.

In comparison, repowering the fleet of 13 vessels to Tier 4 engines in the case study reduces emissions by 1.3 tpd. The TERP program has already repowered approximately 200 vessel propulsion engines. Repowered to Tier 4 emission standards, these vessel engines could potentially contribute significantly to the HGB area meeting its 2017 RFP requirement. The fact that TERP has already repowered so many vessels demonstrates

the ability and interest local marine companies already have in undertaking a major engine repower program.

We acknowledge that there are several limitations to this study. One concern is whether companies purchasing mobile emission credits could avoid emission reductions at their facilities that would harm nearby EJ communities. Our results suggest that reducing $PM_{2.5}$ emissions from mobile sources could benefit EJ communities, but more analysis is needed to fully understand all EJ implications of including mobile sources in the TCEQ emissions trading program. EJ communities would be protected if the TCEQ ensured that older point sources contributing to local hot spots were required to meet current emission standards, instead of purchasing emission credits from mobile or stationary sources. In other cases, it may be appropriate to require stationary sources to purchase higher offsets, which would increase the cost of participating in the EBT program. Imposing such requirements on large stationary sources would not materially impact the market because they represent a relatively small share of total emissions. Accordingly, the concerns of EJ communities should be relatively easy to address, as stricter standards on large sources would be offset by the lower overall costs of emissions reductions in the market. The potential for such win-win scenarios warrants further analysis at the metropolitan scale, as these types of programs could provide a model for leveraging carbon trading programs in the future at the state or national level.

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Addressing Blurred Lines: Institutional Design Solutions to Transgressions Across the Science–Policy Boundary

By Jori Reilly-Diakun

> *Frankly, [the Climate Science Special Report] ought to be subjected to . . . peer-reviewed, objective-reviewed methodology and evaluation . . . . Science should not be politicized. Science is not something that should be just thrown about to try to dictate policy in Washington, D.C.*
>
> *—Scott Pruitt, Former EPA Administrator*[1]

I. INTRODUCTION

As masters and curators of an enormous body of science-intensive law, administrative agencies have an often quixotic, dual responsibility to the American public. First, it is incumbent upon these agencies to ensure that the science guiding policy decisions is untainted by political or policy considerations. Second, the agencies have a responsibility to ensure that policy decisions, to the extent possible, are separated from objective science so the public can fairly evaluate those choices—without the patina of scientific necessity—and hold political leaders accountable. This twofold responsibility is inevitably a source of tension within these agencies because the scientific and policymaking arms approach the same questions in fundamentally different ways.

Since the 2016 election, there have been clear indications that scientific agencies are having difficulty serving as vessels for both President Trump's policies and objective science.[2] The Trump Administration has been rocked by repeated conflicts between agency scientists and policy leaders.[3] This is problematic because every scientific agency is quietly engaged in a delicate balancing act. In the modern administrative state, the government relies upon agencies to function as bureaucratically neutral experts on highly technical and scientific issues.[4] At the same time, the agencies must make policy decisions based on that expertise within the same institutional framework.[5] Both policymakers and scientists can perturb this balance by interfering with the purview of the other because science and policy serve separate roles in preserving the legitimacy of the agencies' actions and ensuring the smooth execution of those actions.

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1 WBAP 820AM Radio Interview with Scott Pruitt, Adm'r, U.S. Envtl. Prot. Agency (Aug. 10, 2017), http://www.wbap.com/2017/08/10/morning-news-epa-chief-scott-pruitt-interview/.

2 *See, e.g.*, Coral Davenport, *E.P.A. Dismisses Members of Major Scientific Review Board*, N.Y. TIMES, May 7, 2017; Alex Johnson, *EPA Accused of Interfering with Top Science Adviser's Congressional Testimony*, NBC NEWS, (June 28, 2017), http://www.nbcnews.com/news/us-news/epa-accused-interfering-top-science-adviser-s-congressional-testimony-n777916.

3 *See, e.g.*, Joel Clement, Opinion, *I'm a Scientist. I'm Blowing the Whistle on the Trump Administration*, WASH. POST, July 19, 2017; Juliet Eilperin & Brady Dennis, *Federal Agencies Ordered to Restrict Their Communications*, WASH. POST, Jan. 24, 2017.

4 For an excellent historical perspective on "agency-as-expert," *see* Wendy Wagner, *A Place for Agency Expertise: Reconciling Agency Expertise with Presidential Power*, 115 COLUM. L. REV. 2019, 2024 (2015).

5 *See generally id.* at 2028–30 (discussing the desirability of the "agency-as-expert" model of the administrative state and examples of pitfalls when policy interferes with agency science).

At its core, science seeks to describe the world as it is, was, or may be, not as it ought be.[6] The authoritative value of science is largely derivative of methodologies designed to take a postulate, subject it to rigorous testing, and then modify that postulate to fit the results of the testing to best approximate the true state of nature.[7] This inquisitorial approach serves as a major legitimizing basis for Congress and the President to entrust agencies with delegated regulatory authority on scientifically complex issues.[8]

Policymaking, on the other hand, serves to enumerate goals about how the world ought to be and to make decisions on how to reach those goals.[9] In the American system, policymakers gain the authority to make these decisions based on the democratic selection of officials to represent the policy preferences of the majority.[10] To ensure that science remains of authoritative value while being integrated into the policymaking process, there is a broad recognition across the administrative state that agency science "must be insulated to the extent feasible against the vagaries of the political world."[11]

The Obama Administration openly acknowledged that the "[s]uccessful application of science in public policy depends on the integrity of the scientific process."[12] During President Obama's term, there was a stated commitment to agency policies that engendered a "culture of scientific integrity" that respected the scientific process and guarded against political influences, provided mechanisms for hiring based on scientific, rather than political, criteria, and improved peer review of agency science where possible.[13]

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6 Robert T. Lackey, *Science, Scientists, and Policy Advocacy*, 21 CONSERVATION BIOLOGY 12, 14 (2007).

7 *See* HUGH G. GAUCH, JR., SCIENTIFIC METHOD IN PRACTICE 406 (2002).

8 *See* Wagner, *supra* note 4, at 2021–23.

9 *See, e.g.*, Lackey, *supra* note 6, at 14 ("The policy world deals legitimately and appropriately with the oughts and the shoulds").

10 *See, e.g.*, JOHN LOCKE, TWO TREATISES ON GOVERNMENT § 171 (Peter Laslett ed., 1988) (political legitimacy is bestowed by consent of the governed). In the context of policy, being a good approximation for the true state of nature is not a prerequisite for authority.

11 Holly Doremus, *Using Science in a Political World: The Importance of Transparency in Natural Resource Regulation*, *in* RESCUING SCIENCE FROM POLITICS: REGULATION AND THE DISTORTION OF SCIENTIFIC RESEARCH 143, 143 (Wendy Wagner & Rena Steinzor, eds., 2006). Without such protections, science loses the qualities that entitle it to an authoritative position in describing the world. *See generally* Wagner, *supra* note 4, at 2046 (observing that political interference with agency science undermines the rigorous processes that grant scientific decisions integrity).

12 Memorandum from John P. Holdren, Dir., Off. of Sci. & Tech. Pol'y on Scientific Integrity to the Heads of Exec. Dep'ts & Agencies (Dec. 17, 2010) [hereinafter Holdren Memorandum], https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf.

13 *Id.* However, the memorandum also refers to "inappropriate political influence," implying that policymakers in the Obama Administration do not view all political influence in agency science as inappropriate. *See id.* This suggests that even policymakers who value protecting agency science from outside influences may, if pressed, assume the view that agency science is to be protected only as long as it supports their policy objectives, similar to the litigator's perspective presented by Professor Houck. *See* Oliver Houck, *Tales from a Troubled Marriage: Science and Law in Environmental Policy*, 302 SCI. 1926, 1928 (2003) ("Every lawyer knows what "good science" is: the science that supports his or her case. All other science is bad.").

While this commitment was laudable, simultaneously protecting scientific integrity in agency science and ensuring effective policymaking presented significant challenges.

Troubling signs for this delicate balance within scientific agencies were evident even as the transition process from the Obama Administration began. From the outset, early indicators suggested the Trump Administration would allow policy preferences to influence or supersede scientific determinations.[14] This, in turn, spurred a spike in concerns about both the integrity and availability of agency science.[15] In one high-profile incident, President Trump's transition team sent requests to the Department of Energy (DOE) for "a list of all [DOE] employees or contractors who have attended any Interagency Working Group on the Social Cost of Carbon meetings," and any documents, communications, or work products produced there.[16] The questionnaire also included questions that raised concerns that political appointees would attempt to interfere with the process of selecting studies for particular scientific models and references, such as,

> EIA's assessments of levelized costs for renewable technologies do not contain back-up costs for the fossil fuel technologies that are brought on-line to replace the generation when those technologies are down. Is this a correct representation of the true levelized costs?[17]
>
> [and]
>
> There are studies that show that your high resource and technology case for oil and gas represents the shale gas and oil renaissance far better than your reference case. Why has EPA not put those assumptions in your reference case?[18]

DOE and other scientific agencies largely resisted these efforts during the transition.[19] However, concerns about the integrity of scientific agencies have not abated. The Trump Administration has proceeded to fill high-profile scientific political appointments with policymakers who were often at odds with the agencies' scientific determina-

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14 *See, e.g.*, Brady Dennis, *Trump Taps Climate-Change Skeptic to Oversee EPA Transition*, WASH. POST, Nov. 11, 2016 (discussing the appointment of Myron Ebell, a non-scientist who "has long questioned the overwhelming scientific consensus that human activity is fueling unprecedented global warming"); Coral Davenport & Eric Lipton, *Trump Picks Scott Pruitt, Climate Change Denialist, to Lead E.P.A.*, N.Y. TIMES, Dec. 7, 2016 (discussing the selection of Oklahoma Attorney General Scott Pruitt, who has long argued that "[s]cientists continue to disagree about the degree and extent of global warming and its connection to the actions of mankind," to lead EPA); Christopher Dean Hopkins, *Trump Transition Asks Energy Dept. Which Employees Work on Climate Change*, NPR NEWS: THE TWO-WAY (Dec. 9, 2016), http://www.npr.org/sections/thetwo-way/2016/12/09/505041927/trump-transition-asks-energy-dept-which-employees-work-on-climate-change (discussing attempts by the Trump transition to collect a list of career employees involved in climate science).

15 *See* Brady Dennis, *Scientists are Frantically Copying U.S. Climate Data, Fearing it Might Vanish Under Trump*, WASH. POST, Dec. 13, 2016.

16 Questionnaire from Trump Transition to U.S. Dep't of Energy, Question 27 (Dec. 2016), http://www.eenews.net/assets/2016/12/09/document_gw_06.pdf.

17 *Id.* at Question 10.

18 *Id.* at Question 13.

19 *See* David Shepardson, *U.S. Energy Department Balks at Trump Request for Names on Climate Change*, REUTERS, Dec. 13, 2016 (discussing the request from information by Trump's transition team, DOE's refusal to provide the names, and employee fears that this is "the first draft of an eventual political enemies list").

tions.[20] Further, the President has failed to staff—and often even to provide a nominee for—the vast majority of critical Senate-confirmed political appointments in science agencies over the first two years of his administration, casting a cloud of uncertainty over the policy positions of those agencies and divorcing the scientific legitimacy of the agencies from the policy decision-making process.[21] This has created a dysfunctional atmos-

20 *See, e.g.*, Coral Davenport, *Senate Confirms Scott Pruitt as E.P.A. Head*, N.Y. TIMES, Feb. 17, 2017. *See also Trump Science Nominees Have Fewer Advanced Degrees in the Field*, CBS News (Dec. 5, 2017), https://www.cbsnews.com/news/trump-science-nominees-missing-advanced-science-degrees/ (discussing the proportion of nominees to science agencies without an advanced degree in the field managed by their agency).

21 While the President has filled, at various points, all Cabinet level heads of agencies with large scientific mandates, several agency chiefs—including EPA Administrator Scott Pruitt and Secretary of Interior Ryan Zinke—have departed amid scandal and been replaced with acting heads. *See, e.g.*, Coral Davenport et al., *E.P.A. Chief Scott Pruitt Resigns Under a Cloud of Ethics Scandals*, N.Y. TIMES, July 5, 2018; Julie Turkewitz & Coral Davenport, *Ryan Zinke, Face of Trump Environmental Rollbacks, Is Leaving Interior Department*, N.Y. TIMES, Dec. 15, 2018. It also took the Trump Administration nearly two years to install a Director of the White House Office of Science and Technology Policy, the primary science advisor to the President. Lauren Morello, *Donald Trump Finally Has a White House Science Advisor*, NATURE (Jan. 3, 2019), https://www.nature.com/articles/d41586-019-00015-1. Perhaps more important, however, are vacancies in positions responsible for managing critical functions of the science agencies. *See, e.g.*, NAT'L ACAD. OF SCI. ET AL., SCIENCE AND TECHNOLOGY FOR AMERICA'S PROGRESS: ENSURING THE BEST PRESIDENTIAL APPOINTMENTS IN THE NEW ADMINISTRATION 15–16 (2008) (detailing "the most critical federal science and technology . . . appointments" identified for the report). As of the end of January 2019, the Trump Administration had filled 26 of 46 critical vacancies requiring Senate approval identified by the National Academy of Sciences. *See Tracking How Many Key Positions Trump Has Filled So Far*, WASH. POST, https://www.washingtonpost.com/graphics/politics/trump-administration-appointee-tracker/database/ (last updated Feb. 4, 2019) (providing data from a study by the Washington Post and Partnership for Public Service). Further, the Trump Administration had not even provided a nominee for 11 of 20 unfilled vacancies, including the Chairman of the Council on Environmental Quality, the Assistant Administrator for Research and Development at EPA, and the Director of the U.S. Fish and Wildlife Service. *See id. Cf.* Press Release, White House, President Donald J. Trump Announces Nomination of OIRA Administrator Neomi Rao to Replace Justice Brett Kavanaugh on the D.C. Circuit (Nov. 14, 2018), https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-announces-nomination-oira-administrator-neomi-rao-replace-justice-brett-kavanaugh-d-c-circuit/ (discussing the nomination of current OIRA Administrator Neomi Rao to fill the seat vacated by Justice Kavanaugh on the D.C. Circuit). This is an extension of a long trend by the Trump Administration of not filling critical vacancies around the executive branch, particularly where the administration takes issue with the agencies mission. *See, e.g.*, Chris Mooney, *85 Percent of the Top Science Jobs in Trump's Government Don't Even Have a Nominee*, WASH. POST, June 6, 2017 (noting that at the 6-month mark of the Trump Administration, the president had not selected a nominee for approximately 85% of critical science agency positions requiring confirmation by the Senate).

phere at the boundary of science and policy that does not serve the American people, the agencies' missions, or the credibility of the administrative state.[22]

In a similar vein, the 115th Congress continued threatening to throw the balance between agency policy and science into further disarray. On March 29, 2017, the House of Representatives passed the Honest and Open New EPA Science Treatment Act of 2017 ("HONEST Act"), reviving the Secret Science Reform Act of 2015, which passed the House but languished in the Senate during the 114th Congress.[23] The HONEST Act, like its predecessor, seems innocuous by its plain language. It simply requires that actions by the Environmental Protection Agency (EPA) be supported by the best available, specifically identified scientific or technical information that is "publicly available online in a manner that is sufficient for independent analysis and substantial reproduction of research results."[24] However, due to the massive costs that would be required for the agency to comply while using existing scientific studies,[25] the HONEST Act has a major blind spot when it comes to ensuring that both independent science and unfettered policy: it tilts the balance towards whichever party controls the budget and publication for the science agency, typically the policymaking arm of the agency.[26]

This article proposes an institutional design approach to addressing the honest issues animating the HONEST Act—concerns that scientists are coopting policymaking prerogatives and that policymakers will run roughshod over agency science—while

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22 *See, e.g.*, Coral Davenport & Eric Lipton, *Scott Pruitt is Carrying Out His E.P.A. Agenda in Secret, Critics Say*, N.Y. TIMES, Aug. 11, 2017 (discussing the lack of cooperation between agency staff and political appointees).

23 *See* Honest and Open New EPA Science Treatment (HONEST) Act, H.R. 1430, 115th Cong. (2017); Secret Science Reform Act, H.R. 1030, 114th Cong. (2015).

24 H.R. 1430, 115th Cong. (2017).

25 CONG. BUDGET OFFICE, COST ESTIMATE FOR H.R. 1430 (2017) (observing that the EPA relies upon approximately 50,000 scientific studies annually and projecting costs of compliance using existing practices at $100 million annually or $10,000 per study).

26 Ultimately, the HONEST Act died in committee in the Senate. *See* S. 1794, 115th Cong. (2017). While it is unlikely that newly elected Democratic majority in the House of Representatives will pursue another iteration of the bill during the 116th Congress, the issues animating the HONEST Act did not die in committee. In April 2008, the EPA proposed a rule embodying the essence of the HONEST Act. Strengthening Transparency in Regulatory Science, 83 Fed. Reg. 18,768, 18,773 (proposed Apr. 30, 2018) (to be codified at 40 C.F.R. pt. 30). The EPA is currently reviewing the nearly 600,000 comments it received on the proposal. *See Strengthening Transparency in Regulatory Science*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/osa/strengthening-transparency-regulatory-science (last updated Sept. 9, 2018). *Cf.* Jeremy Berg et al., Letter, *Joint Statement on EPA Proposed Rule and Public Availability of Data*, SCIENCE (May 4, 2018), http://science.sciencemag.org/content/360/6388/eaau0116 (expressing that while transparency is critical in science, "in not every case can all data be fully shared"); Robinson Meyer, *Even Geologists Hate the EPA's New Science Rule*, ATLANTIC (July 17, 2018), https://www.theatlantic.com/science/archive/2018/07/scott-pruitts-secret-science-rule-could-still-become-law/565325 (discussing the conflict such rules create for epidemiological studies used in environmental law where the underlying data about subjects is routinely kept confidential). In September 2018, the Department of Interior (DOI) followed the EPA's lead. *See* U.S. Dep't of Interior, Order No. 3369, Promoting Open Science (Sept. 28, 2018), https://www.doi.gov/sites/doi.gov/files/elips/documents/so_3369_promoting_open_science.pdf.

strengthening, rather than upsetting, the delicate balance inside scientific agencies. Part II discusses institutional challenges facing agencies from the perspective of top–down challenges as juxtaposed against bottom–up challenges. Part III looks at a sampling of agency institutional design models as case studies for addressing the challenges agencies face at the boundary between science and policy. Part IV proposes institutional design steps to address these problems. Part V considers potential pitfalls in the proposed model.

II. Challenges in Balancing Science and Policy Concerns

Every scientific agency must consider how to balance needs of policymaking and science.[27] Political judgments can undermine the integrity of scientific determinations.[28] Scientific determinations largely garner credibility from inquisitorial processes that are designed to allow the scientific conclusions to faithfully describe the world as it is.[29] However, this approach can be corrupted by improperly inserting preferences on how the world should be, otherwise known as policy, into the inquisitorial process.[30]

By the same token, however, scientific conclusions are often nuanced, not clearly supporting any particular policy.[31] A biologist studying salmon for the U.S. Fish and Wildlife Service (FWS) can tell a policymaker that putting a dam in the river will disrupt spawning patterns, that clear-cutting the surrounding area might increase water temperatures to unsustainable levels for procreation, the dire impacts on the trophic system of decreased salmon stocks, and the possible mitigation value of a salmon ladder around the dam. However, the FWS biologist cannot authoritatively tell the policymaker whether all of this science means that protecting salmon is more important than the dam, or even what policy should be selected to best balance human and environmental interests. Answering questions like this is beyond the scope of her *scientific* expertise.[32]

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27 While "science agencies," like the EPA routinely must contend with these concerns, it is also worth noting that science intersects with policy in unexpected places throughout the administrative state. For example, the Department of State is routinely involved in environmental and energy issues. *See, e.g.*, Dep't of State, Forging the Path to a Greener Future: U.S.–China Energy and Environment Cooperation Under the Ten-Year Framework (2014).

28 *See* Doremus, *supra* note 11, at 143 ("[T]he scientific process will generate more reliable information . . . if it is allowed to function according to its established norms, free of external political . . . momentum pushing toward one outcome or another.").

29 *See* Gauch, *supra* note 7, at 406.

30 Some policy choices, such as what hypotheses to pursue and other limiting factors, are inextricably linked to the scientific process. This article does not propose that we attempt to completely disentangle science and policy, but rather that we avoid inserting policy preference into scientific processes in ways that corrupt the resultant conclusions.

31 Houck, *supra* note 13, at 1927 ("[S]cience, though endlessly fascinating and constantly revelatory, is rarely dispositive.").

32 Note that this does not necessarily preclude the possibility that the FWS biologist might have policy expertise that could answer such a question. Her scientific knowledge, however, simply cannot answer these questions because they deal with the realm of how the world ought to be.

This implies a critical aspect of the science–policy relationship within the administrative state—to allow science and policy to successfully coexist there is necessarily a boundary between the scientific and policy components of an agency.[33] The boundary zone must be simultaneously a permeable membrane for communications between policymakers and staff scientists, and a wall against domination or corruption of the process by either side.[34] Without communication across the boundary, policymakers cannot take advantage of the science that underlies their policy choices and scientists, instead of policymakers, will make the policy choices that are implicit in directing scientific inquiry. However, the legitimacy of both policymakers and staff scientists is similarly undermined if either side dominates the relationship, resulting in either policymakers or scientists substituting their judgment for that of the other.

Inside an agency, this suggests two principal concerns at the boundary. First, there is a top–down concern. Policymakers and political appointees can influence staff scientists and undermine agency scientific determinations.[35] Second, there is a bottom–up concern. Staff scientists can subvert policymakers by presenting policy decisions as scientific conclusions or omitting evidence based on preferred policy choices.[36]

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33 To be clear from the outset, in actuality, this boundary is not a clear and unchanging line that can be drawn between staff scientists making scientific decisions and policymakers making policy choices. *See supra* note 31 and accompanying text. This article necessarily abstracts the discussion to a world where every player is either a scientist or a policymaker (and not both or neither). This is a somewhat artificial distinction because, while some staff and appointees certainly fall clearly into one box or the other, the boundaries in agency teams between scientists, policymakers, and something else entirely are usually much more nuanced. *See* Thomas O. McGarity, *The Internal Structure of EPA Rulemaking*, 54 LAW & CONTEMP. PROBS. 57 (1991) (discussing the complexities of the EPA staffing arrangements and the internal hierarchy at the EPA). Despite these complexities, this model comports with the institutional designs applied to agencies, and generally should not diminish the value of the proposed institutional designs proximate to the boundary. The boundary is also made fuzzy by "hidden policy judgments," such as default assumptions, choice of studies, and estimations, many of which may not even be readily identifiable during projects. *See* Susan E. Dudley, Regulatory Science and Policy 4–6 (Sept. 9, 2015) (The George Wash. Univ. Regulatory Studies Ctr., Working Paper), https://regulatorystudies.columbian.gwu.edu/sites/regulatorystudies.columbian.gwu.edu/files/downloads/SDudley_Regulatory_Science_NAAQS%202015-09-09.pdf. The issue of fuzziness, however, is readily accounted for by the proposed institutional design at the boundary. *See infra* Part IV.A.

34 *See generally* Doremus, *supra* note 11, at 143 (discussing the close relationship between science and policy, and the balancing act keeping policy from overwhelming science and science from overwhelming policy).

35 *See* Holly Doremus, *Scientific and Political Integrity in Environmental Policy*, 86 TEX. L. REV. 1601 (2008) (discussing the role of Bush Administration officials in second-guessing scientific determinations, bullying and stifling the voices of staff scientists, and spinning agency findings).

36 *See* Dudley, *supra* note 33, at 6 ("Key policy choices, disguised as science, rest with technical staff . . . ."); Lackey, *supra* note 6, at 14 (arguing that scientific discourse should not contain "value-laden words" that imply a preferred policy).

A. Top–Down: Policymakers Corrupting Agency Science

By the very nature of the roles of science and policy, the "top" of an agency is typically embodied by policymakers. Policymakers, including political appointees, are ultimately in a position of power over agency focus, personnel, and final agency decisions.[37] This is simultaneously practical for ensuring efficient public policy, and challenging for the preservation of scientific integrity.

Because policymakers have firm control over much of the overt power in agencies, there is great potential for power imbalances that can pierce the membrane between science and policy, and leverage policymakers' interests into the purview of staff scientists. Furthermore, policymakers have incentives to intrude into the realm of agency science to avoid unambiguous statutory directives, shield unpopular policy choices from public scrutiny under complex layers of science, and borrow the legitimacy of science to improve the public standing of controversial policy decisions. This intrusion can come in many forms, and can be both intentional and unintentional.[38] Interference damaging the integrity of agency science can generally be classified into two categories: (1) direct manipulation; and (2) indirect influence.

1. *Direct Manipulation of Agency Science*

Direct manipulation is an effort by policymakers to control, alter, or otherwise impact the methodology, results, or conclusions of agency science.[39] This can include alter-

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37 *See, e.g.*, McGarity, *supra* note 33, at 65 (discussing the hierarchy of major policymakers at the EPA and their roles in directing agency action); U.S. Envtl. Prot. Agency, EPA 202-K-92-0003, U.S. Envtl. Prot. Agency Administrator, William D. Ruckelshaus 3 (1993) (detailing the importance the first EPA administrator had in "hiring its leaders, defining its mission, deciding priorities, and selecting an organizational structure").

38 *Compare* Doremus, *supra* note 35, at 1606 (discussing direct and intentional intrusions by Deputy Assistant Secretary MacDonald of the FWS into scientific judgments by staff scientists), *with* Patricia M. Wald, *Analysts & Policymakers: A Confusion of Roles?*, 17 Stan. L. & Pol'y Rev. 241, 265 (2006) (discussing indirect pressures on staff by policymakers).

39 At this juncture, it is worth observing that this article primarily focuses on *intra-agency* issues. Accordingly, top-down subversion of agency science once it has left the organizational command structure of the agency is largely outside the scope of this paper. However, such subversion does occur—particularly when the Office of Management and Budget's Office of Information and Regulatory Affairs (OIRA) is aggressively involved—and is of great concern to the integrity of agency science. *See, e.g.*, Wagner, *supra* note 4, at 2041–42 (discussing OIRA's interference with scientific determinations in a number of rulemakings); Charlotte E. Tucker, *Original Draft Shows Coal-Ash Proposal Substantially Revised During OMB Review*, 41 Env't Rep. (BNA) 1061 (2010) (discussing OIRA's alterations to determinations by EPA staff scientists in setting coal ash regulations); Tarek Maassarani, Redacting the Science of Climate Change 54 (2007) (discussing the extraordinary steps Philip Cooney, the chief of staff of the White House Council on Environmental Quality, took to secretly edit agency climate change research to advance desired policies during the Bush Administration); Nat'l Acads. of Sci., Eng'g, & Med., Scientific Review of the Proposed Risk Assessment Bulletin from the Office of Management and Budget (2007) (discussing an attempt by the second Bush Administration for OIRA to set risk assessment modeling rules for all science agencies); Alan B. Morrison, *OMB Interference with Agency Rulemaking: The Wrong Way to Write a Regulation*, 99 Harv. L. Rev. 1059, 1066 (1986) (discussing how OMB policymakers were "involve[d in] scientific determinations").

nation of data, manipulation of models,[40] refusal to accept studies without desired conclusions, and methodological interference. Because it so completely interferes with the scientific process, direct manipulation by policymakers significantly undermines the validity of agency science.

There are many documented instances of direct interference with agency science by policymakers.[41] One notorious example occurred during the George W. Bush Adminis-

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40 Because of their susceptibility to inputs and assumptions, policymakers seeking to quietly control the agency's scientific record often stealthily target models. *See generally* Wendy Wagner et al., *Misunderstanding Models in Environmental and Public Health Regulation*, 18 N.Y.U. ENVTL. L.J. 293 (2010) (discussing agency modeling and the threat of political manipulation of models). For example, the transparency rules proposed by the EPA seem to serve as cover for excluding some epidemiological studies that have militated against the Trump Administration's preferred policies. *See* Strengthening Transparency in Regulatory Science, *supra* note 26, at 18, 773–74.

41 *See, e.g.*, Jason Samenow, *In All-Staff Email, NOAA Chief Praises Scientists After Agency's Defense of Incorrect Trump Tweet*, WASH. POST (Sept. 13, 2019), https://www.washingtonpost.com/weather/2019/09/13/with-agency-wide-email-noaa-chief-moves-regain-scientists-trust-after-defending-incorrect-trump-tweet/ (detailing policymakers' attempt to censor NOAA staff scientists and alter agency weather projections to conform with an erroneous statement by President Trump, triggering investigations by Congress and the agency inspector general into whether NOAA's scientific integrity policy was violated); Jennifer A. Dlouhy, *Trump Officials Helped Edit "Bomb Cyclone" Report to Boost Coal*, BLOOMBERG (Aug. 9, 2018), https://www.bloomberg.com/news/articles/2018-08-09/trump-officials-helped-edit-bomb-cyclone-report-to-boost-coal (describing policymakers decision to press DOE staff scientists to extoll the virtues of coal fired power plants in a report); Zack Colman & Maxine Jaselow, *White House Cut Climate Warnings from Rule on Power Plants*, E&E NEWS (Sept. 5, 2018), https://www.eenews.net/stories/1060095807 (discussing the removal of references to anthropogenic greenhouse gas emissions in the rollback and replacement of the Clean Power Plan); Adam Aton, *Researchers Say Sea-Level Report Was Censored. Here It Is*, E&E NEWS (May 21, 2018), https://www.eenews.net/stories/1060082165 (detailing an attempt to remove references to anthropogenic climate change from an NPS report on sea level rise impacts on the national park system); Scott Tong & Tom Scheck, *EPA's Late Changes to Fracking Study Downplay Risk of Drinking Water Pollution*, APM REPORTS: MARKETPLACE (Nov. 30, 2016), https://www.marketplace.org/2016/11/29/world/epa-s-late-changes-fracking-study-portray-lower-pollution-risk (discussing edits by policymakers at the EPA to the conclusions in a 5-year study on hydraulic fracturing practices' impacts on drinking water to deemphasize pollution risks); OFF. OF INSPECTOR GEN., U.S. DEP'T OF THE INTERIOR, REPORT OF INVESTIGATION, JULIE MACDONALD, DEPUTY ASSISTANT SECRETARY, FISH, WILDLIFE, AND PARKS 16 (2007) [hereinafter MACDONALD REPORT] (discussing manipulation of data and directed conclusions by a political appointee); *Crisis of Confidence: The Political Influence of the Bush Administration on Agency Science and Decision-Making: Oversight Hearing Before the H. Comm. on Nat. Res.*, 110th Cong. 105–06 (2007) (statement of Mike Kelly, former FWS and NOAA Fisheries Biologist) (describing the interaction between Mr. Kelly and Assistant Southwest Region Manager Jim Lecky during which a biological opinion was blocked until the conclusions matched a desired political outcome); OFF. OF INSPECTOR GEN., U.S. ENVTL. PROT. AGENCY, EVALUATION REPORT: ADDITIONAL ANALYSIS OF MERCURY EMISSIONS NEEDED BEFORE EPA FINALIZES RULES FOR COAL-FIRED ELECTRIC UTILITIES 13–15 (2005) (finding that EPA staff scientists were directed by policymakers to produce particular mercury emissions modeling for implementa-

tration.[42] In July 2004, Julie MacDonald, a civil engineer and senior advisor at the Department of the Interior, was appointed as the Deputy Assistant Secretary (DAS) for Fish, Wildlife, and Parks, with oversight over the Endangered Species Act (ESA) and Critical Habitat Designations at the FWS.[43] By 2006, the Inspector General for the Department of the Interior had launched an investigation of DAS MacDonald over charges that she "persistently harassed, bullied, and insulted FWS employees to change documents and 'ignore good science' related to the Endangered Species Program."[44] After investigating, the Inspector General reported several instances where DAS MacDonald pressured staff scientists to alter scientific findings for policy reasons.[45] The public revelations of her interference with the scientific prerogative of staff scientists ultimately led to DAS MacDonald resigning.[46]

While direct manipulation of agency science may be the most controlled and predictably impactful way policymakers can damage scientific integrity, it is also the most overt. This makes it the most susceptible to detection by watchdogs and whistleblowers.

2. Indirect Influence of Agency Science

Indirect influence is any influence that impacts the methodology, results, or conclusions of agency science without the direct intervention of a policymaker into the scientific process. This includes a wider variety of actions than direct manipulation, including creating institutional pressures (bonus structures, access to funding, promotion patterns, and office culture) that subtly alter the behavior of staff scientists;[47] censoring staff scien-

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tion of the Clear Skies initiative, requiring staff to conduct "at least three Integrated Planning Model (IPM) runs in order to reach the pre-determined target for national mercury emissions of 34 tons"); Nicholas A. Ashford et al., *A Hard Look at Federal Regulation of Formaldehyde: A Departure from Reasoned Decisionmaking*, 7 HARV. ENVTL. L. REV. 297, 327–28, 346–453 (1983) (describing efforts by the Reagan Administration to manipulate risk assessments to avoid regulating formaldehyde); 16 BNA, OCCUPATIONAL SAFETY AND HEALTH REPORTER 1064 (1987) (discussing an incident during the Reagan Administration where an OSHA staff scientist was threatened with insubordination if the provisions she drafted were not consistent with the administration's policy preferences).

42 Doremus, *supra* note 35, at 1604.

43 MACDONALD REPORT, *supra* note 41, at 2.

44 *Id.* at 4. *But see* Doremus, *supra* note 35, at 1605–06 (observing that a poor relationship is not sufficient to show policy interfering in the scientific purview).

45 MACDONALD REPORT, *supra* note 41, at 16 ("[DAS] MacDonald had [the field staff biologists] change the range [of the Southwest Willow Flycatcher] to 1.8 miles because she was concerned that the 2.1 radius figure would extend into California." DAS MacDonald also attempted to alter the stated range of the Kootenai River sturgeon but was unsuccessful.).

46 Elizabeth Williamson, *Interior Department Official Facing Scrutiny Resigns*, WASH. POST, May 2, 2007).

47 *See, e.g.*, OFF. OF INSPECTOR GEN., U.S. DEP'T OF THE INTERIOR, REPORT OF INVESTIGATION—ISLAND OPERATING COMPANY, ET AL. 2–6 (2010) [hereinafter IOC REPORT] (finding a widespread culture of improper ties to, and acceptance of gifts from, regulated entities at the Minerals Management Service). *See also* Wald, *supra* note 38, at 265 (observing, in the intelligence context, that "[g]iven the inevitable psychological advantage of a high or even mid-level policymaker in one-on-one interactions with the analyst, there is risk that even without any overt demands on the part of the policymaker the analyst may alter her

tists;[48] controlling the balance of agency science and industry science that is considered in policymaking;[49] changing organizational charts and staff assignments;[50] and politiciz-

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judgments based on what she thinks the policymaker wants to hear and how his good graces might benefit or injure her career.").

48 There are many different approaches to censorship. Some focus on controlling staff scientists' ability to draw attention to scientific information, such as by limiting staff scientists' ability to get approval to publish, speak to reporters, and speak at conferences. *See, e.g.*, Dino Grandoni & Juliet Eilperin, *Trump Official Said Scientists Went 'Beyond Their Wheelhouse' by Writing Climate Change 'Dramatically' Shrank Montana Glaciers*, WASH. POST, Mar. 7, 2018 (discussing "policy review" of scientific news releases at the DOI); Brittany Patterson, *Government Scientist Blocked from Talking About Climate and Wildfires*, E&E NEWS (Oct. 31, 2017), https://www.eenews.net/climatewire/2017/10/31/stories/1060065143 (discussing a decision by policymakers at U.S. Forest Service to prevent a staff ecologist from presenting at a conference on the impacts of climate change on wildfires, a series of decisions by policymakers at the EPA to stop staff scientists from presenting at a conference on climate change, and a delay in approving travel for a group of staff scientists at the U.S. Geological Survey for presentations on climate change impacts on wildfire); OFF. OF INSPECTOR GEN., NAT'L AERONAUTICS & SPACE ADMIN., INVESTIGATIVE SUMMARY REGARDING ALLEGATIONS THAT NASA SUPPRESSED CLIMATE CHANGE SCIENCE AND DENIED MEDIA ACCESS TO DR. JAMES E. HANSEN, A NASA SCIENTIST 1 (2008), (finding that, "during the fall of 2004 through early 2006, the NASA Headquarters Office of Public Affairs managed the topic of climate change in a manner that reduced, marginalized, or mischaracterized climate change science made available to the general public through those particular media over which the Office of Public Affairs had control" (i.e., news releases and media access) and "[w]hile . . . [not] all Headquarters Office of Public Affairs' adjustments to climate change news releases were politically motivated, the preponderance of the evidence does . . . point to politics inextricably interwoven into . . . [the] news dissemination process at that time"); UNION OF CONCERNED SCIENTISTS, SCIENTIFIC INTEGRITY IN POLICYMAKING, App. B at 39 (2004) (discussing a 2002 USDA directive requiring staff scientists to obtain approval to publicly disseminate research on "sensitive issues," from "[h]erbicide-resistant crop plant research" to "agricultural practices with negative health and environmental consequences"). Others focus on controlling the information itself, such as by sitting on reports and removing or obscuring data on agency websites. Annie Snider, *Sources: EPA Blocks Warnings on Cancer-Causing Chemical*, POLITICO (July 6, 2018), https://www.politico.com/story/2018/07/06/epa-formaldehyde-warnings-blocked-696628 (reporting that EPA policymakers were sitting on a formaldehyde risk assessment that linked everyday exposure to the chemical to serious health risks, including leukemia, and slow-walking other Integrated Risk Information System reports on toxics); Coral Davenport, *How Much Has 'Climate Change' Been Scrubbed from Federal Websites? A Lot*, N.Y. TIMES, Jan. 10, 2018; Chris Mooney & Juliet Eilperin, *EPA Website Removes Climate Science Site from Public View After Two Decades*, WASH. POST, Apr. 29, 2017 (discussing the EPA's decision to take down its climate science site). *But cf. Climate Change Research*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/climate-research (last updated Dec. 12, 2018) (The EPA's revised climate change research site that became accessible near the end of 2018).

49 *See, e.g.*, Eric Lipton & Roni Caryn Rabin, *E.P.A. Promised 'a New Day' for the Agriculture Industry, Documents Reveal*, N.Y. TIMES, Aug. 18, 2017 (discussing the decision by the EPA policymakers to deny a petition to ban chlorpyrifos, ignoring staff scientists assessments of the health risks of the pesticide); *White House Promises to Limit Legitimacy of EPA Climate Assessment*, INSIDE EPA (Mar. 7, 2003), https://insideepa.com/inside-epa/white-house-

ing science by transferring policy decisions to scientists, thereby shielding politically problematic choices from public scrutiny.[51]

During the Trump Administration, a major area of indirect influence has come through allocation of funding for scientific research.[52] The Administration's proposed budgets for Fiscal Years (FY) 2018 and 2019 have included significant cuts to research

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promises-limit-legitimacy-epa-climate-assessment (discussing efforts to minimize a climate report and justify continued inaction on climate issues during the Bush Administration); PHILIP J. HILTS, PROTECTING AMERICA'S HEALTH 216–17 (2003) (discussing FDA's efforts in the Reagan Administration to increase industry-affiliated scientific and policy input while minimizing contributions from staff scientists and advisory committees).

50 *See, e.g.*, Coral Davenport, *In the Trump Administration, Science is Unwelcome. So is Advice*, N.Y. TIMES, Jun. 9, 2018 (discussing policymakers' decision to reassign of staff scientists at the Department of Agriculture); Memorandum from Scott Pruitt, Adm'r, U.S. Envtl. Prot. Agency, to Assistant Adm'rs 1, 4–11 (May 9, 2018), https://www.epa.gov/sites/production/files/2018-05/documents/image2018-05-09-173219.pdf (transferring authority over the EPA's Office of Research and Development from a politically insulated science advisor to the EPA's Office of Air and Radiation, which is managed by a political appointee); U.S. DEP'T OF THE INTERIOR, OFF. OF THE INSPECTOR GEN., REASSIGNMENT OF SENIOR EXECUTIVES AT THE U.S. DEPARTMENT OF THE INTERIOR 1, 7, 9 (2018) (discussing policymakers' decision to reassign of career staff, including staff scientists, at DOI); THOMAS O. MCGARITY & SIDNEY A. SHAPIRO, WORKERS AT RISK: THE FAILED PROMISE OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION 64 (1992) (discussing the Reagan Administration's reorganization of OSHA to give a Regulation Review Committee comprised of high level policymakers authority to review technical decisions). Changes to the organization chart can also be used to reduce policymakers' influence or to transfer policy decisions to staff scientists. *See, e.g.*, Memorandum from Lisa P. Jackson, Adm'r, U.S. Envtl. Prot. Agency, to Elizabeth Craig, Acting Assistant Adm'r, Air & Radiation, & Lek Kadeli, Acting Assistant Adm'r, Research & Dev. (May 21, 2009), https://www3.epa.gov/ttn/naaqs/pdfs/NAAQSReviewProcessMemo52109.pdf (assigning sole authorship of a core NAAQS summary to technical staff).

51 Wendy Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1640–42 (1995) (observing that there is an incentive for policymakers to bury policy choices in scientific justification).

52 *See, e.g.*, Press Release, Nat'l Acads. of Sci., Eng'g, & Med., Statement Regarding National Academies Study on Potential Health Risks of Living in Proximity to Surface Coal Mining in Central Appalachia (Aug. 21, 2017), http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=8212017&_ga=2.22931899.1062050590.1503343185-880201334.1503343185 (discussing a directive from the DOI's Office of Surface Mining Reclamation and Enforcement instructing the National Academies to "cease all work" on a commissioned study into at the health risks posed by mountaintop removal mining activities while the Department conducted "an agency-wide review of its grants and cooperative agreements in excess of $100,000"). While the Trump Administration has certainly attempted to cut funding for many scientific programs, this type of indirect influence is by no means a recent development. *See, e.g.*, Philip Shabecoff, *U.S. Slashes Funds for Study on Utilities' Role in Acid Rain*, N.Y. TIMES, Dec. 2, 1982 (reporting that the Reagan Administration defunded a second acid rain report after the first report attributed acid rain to emissions from power plants).

and scientific programs.[53] Though Congress has largely ignored these proposals and protected appropriations for agency science,[54] the Trump Administration has been able to use these budget projections to influence staff scientists. For example, the Department of Interior (DOI) closed the U.S. Geological Survey's Eastern Geographic Science Center (EGSC) during FY 2018, likely partially in response to the budget projection.[55] EGSC staff scientists were largely tasked with research on a variety of different climate change and land uses issues.[56] Closing EGSC forced its twenty-five staff scientists to retire or to accept reassignment.[57] Even where there are not such visible reallocations of workers or closure of labs, repeated attempts to slash research funding signals to staff scientists that certain lines of inquiry will be viewed with hostility by policymakers and superiors within the science agency.[58]

There is no doubt that staff scientists are susceptible to these indirect influences.[59] While fear that policymakers will attempt to interfere with agency science has prompted news organizations to pay significant attention to attempts to influence staff scientists, both attempts to indirectly influence staff scientists and the biases that those influences

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53 *See* OFF. OF MGMT. & BUDGET, BUDGET OF THE U.S. GOVERNMENT: A NEW FOUNDATION FOR AMERICAN GREATNESS (2017); OFF. OF MGMT. & BUDGET, BUDGET OF THE U.S. GOVERNMENT: EFFICIENT, EFFECTIVE, ACCOUNTABLE: AN AMERICAN BUDGET (2018). *See also, e.g.*, John H. Cushman Jr., *Federal Climate Research, Targeted for Elimination by Trump, Lauded by Scientists*, INSIDE CLIMATE NEWS (Apr. 12, 2017), https://insideclimatenews.org/news/12042017/climate-change-research-national-academies-sciences-global-warming-donald-trump (discussing proposed elimination of funding for the EPA's participation in the Global Change Research Program); Chris Mooney, *Trump Wants to Slash Funds for the Outside Experts Who Make Sure EPA Gets the Science Right*, WASH. POST, Apr. 4, 2017 (discussing proposed 84% cuts to the funding the EPA's Science Advisory Board); Annie Sneed, *Trump Wants Deep Cuts in Environmental Monitoring*, SCIENTIFIC AM. (Mar. 24, 2017), https://www.scientificamerican.com/article/trump-wants-deep-cuts-in-environmental-monitoring (discussing proposed cuts to environmental monitoring funding); *What's in Trump's 2018 Budget Request for Science*, SCIENCE (May 23, 2017), http://www.sciencemag.org/news/2017/05/what-s-trump-s-2018-budget-request-science (discussing proposed cuts at the DOE of 43% to funding for biological and environmental research and 70% to funding for renewable energy and energy efficiency research and elimination of adaptation programs at NOAA).

54 *See Federal Science Budget Tracker*, AM. INST. OF PHYSICS, https://www.aip.org/fyi/federal-science-budget-tracker (last updated Apr. 17, 2019).

55 Scott Streater & Rob Hotakainen, *USGS Science Center in Va. Set to Close*, E&E NEWS (Nov. 14, 2017), https://www.eenews.net/greenwire/stories/1060066503.

56 *Id.*

57 *Id.*

58 Scott Waldman, *Future Climate Scientists Concerned but Not Cowed by Trump*, E&E NEWS (May 8, 2017), https://www.eenews.net/climatewire/stories/1060054161/ ("[T]he Trump administration's proposed cuts to climate research has sent a clear signal to scientists that their work is no longer valuable to the White House.").

59 *See, e.g.*, Regina Nuzzo, *How Scientists Fool Themselves—and How They Can Stop*, NATURE (Oct. 7, 2015), http://www.nature.com/news/how-scientists-fool-themselves-and-how-they-can-stop-1.18517 (quoting Saul Perlmutter—professor and astrophysicist at the University of California, Berkeley—as stating that "[s]cience is an ongoing race between our inventing ways to fool ourselves, and our inventing ways to avoid fooling ourselves . . . .").

produce are often very difficult to detect and are even more difficult to assess.[60] For example, even if the New York Times is alerted to an incident where a staff scientist was barred from discussing a climate change study at a conference, it will likely be unclear what—if any—impact that influence may have on current or future scientific activities or staff scientists.[61] Because of this general lack of transparency, the occasions that indirect influences are detected from manifest problems likely represent only a fraction of the actual incidents of indirect influence.[62]

B. Bottom–Up: Staff Scientists Usurping Policymakers' Prerogative

While policymakers have overt power within agencies, staff scientists have an important advantage over many policymakers that can foster abuses in the other direction: access to information. Staff scientists' superior access to information stems from both the specialized scientific knowledge they possess, and their familiarity with the scientific data or research that is being passed on to policymakers.[63] This can create an information disparity where staff scientists are, in effect, translating specialized knowledge to the policymakers, who are disproportionately generalists.[64] Staff scientists, both intentionally and unintentionally, can exploit this information disparity to influence policy, creating at least two distinct subsets of problems: (1) selective reporting, and (2) scientization of policy. Both subsets of practices are attempts by staff scientists, consciously or subconsciously, to reach across the boundary zone and control policy.

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60 *See* Wald, *supra* note 38, at 264–65 (observing that "[n]ot a single analyst interviewed said his judgment had been affected by policymaker pressure" despite some evidence of "subtle evolutions in the inferences drawn from ambiguous evidence on the same topic").

61 Furthermore, when indirect influences do crop up, it is often even unclear if the incident was simply a breakdown of leadership or if a leader was attempting to indirectly encouragingencourage a particular behavior. *See, e.g.*, IOC Report, *supra* note 47, at 2–6.

62 This "gray area" hints at one major benefit to approaching this problem through improved institutional design. In most current agency models, there is simply insufficient transparency, resources, and capacity to observe, or even fully define, what indirect influences are problematic to the overall integrity of the policy-science relationship. An institutionalized approach to defining and maintaining the boundary between science and policy would help to both identify, and ultimately alleviate, these gray area cases.

63 *See generally* Doremus, *supra* note 11, at 143 (observing that "[s]cientific information does not directly or magically become policy [but] must be interpreted and applied," which is often a very complex process).

64 However, policymakers are not a monolithic group. *Compare Dr. Ernest Moniz*, U.S. Dep't of Energy, https://energy.gov/contributors/dr-ernest-moniz (last visited Dec. 15, 2016) (discussing the scientific credentials of a former Secretary of Energy, a nuclear physicist), *with EPA's Administrator Gina McCarthy*, U.S. Envtl. Prot. Agency, https://web.archive.org/web/20170101221941/https://www.epa.gov/aboutepa/epas-administrator (last visited Dec. 15, 2016) (discussing the scientific and policy credentials of former EPA Administrator Gina McCarthy), *and* Nell Greenfieldboyce, *Trump Picks Oklahoma Attorney General Scott Pruitt to Lead EPA*, NPR News (Dec. 7, 2016), http://www.npr.org/sections/thetwo-way/2016/12/07/503626660/trump-reportedly-picks-oklahoma-attorney-general-scott-pruitt-to-lead-epa (discussing the educational credentials of another former EPA Administrator, a lawyer).

1. SELECTIVE REPORTING OF AGENCY SCIENCE

Selective reporting is an omission, overstatement, or understatement by staff scientists with the intention of controlling the behavior of policymakers by creating an illusion about the degree of scientific support for a particular policy.[65] One byproduct of the information disparity is that policymakers lack sufficient knowledge to police staff scientists. This makes it very hard to detect selective reporting.[66]

There are documented instances of selective reporting. Take, for example, the curious case of botched protection of the habitat for the endangered Florida Panther. Between 1994 and 2004, FWS biologists repeatedly allowed development in the Florida Panther's range, relying upon a faulty model that had been widely called into question by the scientific community at large.[67] Even after a scathing review from an independent team of outside scientists, staff scientists at the FWS refused to stop relying on the faulty model, to the detriment of the critically endangered panthers.[68]

2. SCIENTIZATION OF AGENCY POLICY

Scientization of policy is the inclusion of policy judgments in scientific evidence by staff scientists, thereby presenting those policy judgments as scientific findings.[69] Many commentators take the broader stance that widespread scientization of policy by staff scientists is a feature (or flaw) of our administrative architecture.[70] As fisheries scientist Robert Lackey[71] notes,

> Often I hear or read in scientific discourse words such as *degradation*, *improvement*, *good*, and *poor*. Such value-laden words should not be used to convey scientific information because they imply a preferred ecological state, a desired condition, a benchmark, or a preferred class of policy options. Doing so is not science, it is policy advocacy.[72]

Scientization of policy is a related phenomenon to the top–down concern of politicization of science, as discussed above.[73] In much the same way, selective reporting

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65 There is also a related concern about scientists who advocate for deemphasizing the uncertainty in science to gain a stronger hand at the policy bargaining table. *See, e.g.*, Andrew A. Rosenburg, *Fishing for Certainty*, 449 NATURE 989 (2007).

66 Or staff incompetence for that matter, though there is little evidence to suggest that the administrative state has a large problem with incompetent staff scientists.

67 Doremus, *supra* note 35, at 1614.

68 *See id.* at 1615.

69 *See, e.g.*, Dudley, *supra* note 33, at 3–4 (discussing scientization of policy in the NAAQS context).

70 *See, e.g.*, Lackey, *supra* note 6, at 14; Daniel Sarewitz, *How Science Makes Environmental Controversies Worse*, 7 ENVTL. SCI. & POL'Y 385, 397–99 (2004) (discussing why environmental controversies must be scientized); Dudley, *supra* note 33, at 10–14 (arguing that the NAAQS program design directly leads to staff scientists scientizing policy).

71 Mr. Lackey was formerly an EPA biologist and member of the senior leadership at the EPA's research laboratories in Corvallis, Oregon. *See* Lackey, *supra* note 6.

72 Lackey, *supra* note 6, at 14.

73 *See supra* Part II.A.2. Indeed, whether an observer sees politicization of science or scientization of policy can depend on a person's political and policy persuasion. One prime example can be seen in policymakers' emails during one of the Trump Administration's "policy re-

and scientization of policy are some of the more problematic interactions across the science–policy boundary, in that this type of interference corrupts both the agency science and shifts policymaking power away from policymakers.

III. Case Studies of Institutional Designs

To better understand the science–policy boundary zone and where the top–down and bottom–up concerns enumerated above might enter agencies' decision-making processes, two case studies are presented below: the National Ambient Air Quality Standards (NAAQS) at the EPA and the Endangered Species Act (ESA) at FWS.

The NAAQS and the ESA case studies represent opposing poles on the spectrum of institutional separation between the policy and scientific arms of the scientific agencies. The NAAQS case study represents a high degree of institutional separation. The ESA case study, on the other hand, represents a low degree of separation between the policymaking and scientific components of the agency. These differences impact the nature and magnitude of science–policy boundary challenges that the agencies face in implementing the NAAQS and ESA programs.

A. Rigorous Separation Model: National Ambient Air Quality Standards

The NAAQS are standards for six criteria pollutants, which the EPA is required to review and revise every five years.[74] The Clean Air Act mandates that the EPA set standards for these pollutants with "an adequate margin of safety," as is necessary to "protect the public health."[75]

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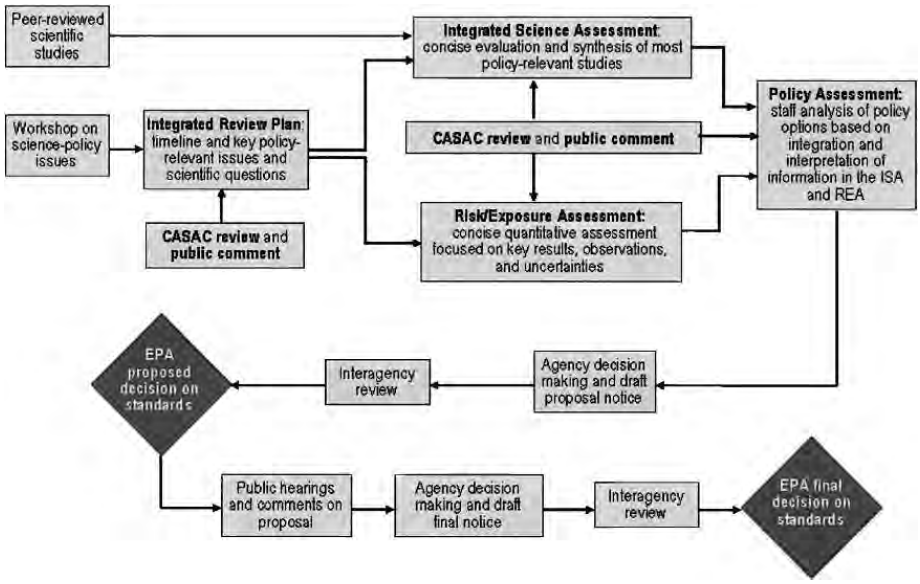
views" at DOI. *See supra* note 48 and accompanying text. Staff scientists had proposed a press release stating that "[t]he warming climate has *dramatically* reduced the size of 39 glaciers in Montana since 1966," on the basis that some glaciers had shrunk by as much as 85%. *See* Email from Douglas Domenech, Senior Advisor, U.S. Dep't of Interior, to Scott J. Cameron, Special Assistant, U.S. Dep't of Interior (May 10, 2017, 12:05 EST), http://apps.washingtonpost.com/g/documents/national/interior-appointees-debate-usgs-description-of-glacier-melt-in-montana/2804/ (emphasis added). DOI policymakers discussed how the proposed press release was "probably . . . relying on the percentages but the more basic point is we need to watch for inflammatory adverbs and adjectives in their press releases." Email from Scott J. Cameron, Special Assistant, U.S. Dep't of Interior, to Douglas Domenech, Senior Advisor, U.S. Dep't of Interior (May 10, 2017, 12:14 EST), http://apps.washingtonpost.com/g/documents/national/interior-appointees-debate-usgs-description-of-glacier-melt-in-montana/2804/. The inclusion of the word "dramatically" and the subsequent policy review arguably give rise to both the risk of politicization of science by the policymakers (in censoring the press release) and the risk of scientization of policy by staff scientists (by using a value-laden word to describe findings).

74 Clean Air Act § 109(d)(1), 42 U.S.C. § 7409(d)(1) (2012). *See also* Clean Air Act § 108, 42 U.S.C. § 7408; 40 C.F.R. pt. 50 (2019) (identifying carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particle pollution (PM), and sulfur dioxide (SO_2) as criteria air pollutants).

75 42 U.S.C. § 7409(b)(1). The EPA can only consider scientific factors, not economic concerns. Whitman v. Am, Trucking Assns., Inc., 531 U.S. 457, 464–72 (2001).

Following the most recent revisions in 2006 and 2009, there are six main phases of NAAQS program design: (1) Integrated Review Plan (IRP); (2) Integrated Science Assessment (ISA); (3) Risk/Exposure Assessment (REA); (4) Policy Assessment; (5) interagency review; and (6) rulemaking. These phases are performed through the organizational arrangement show in Diagram 1, below.[76]

DIAGRAM 1[77]



The first phase of NAAQS review is the IRP, which is largely dominated by the policy sphere. The EPA holds a workshop to determine the science and policy questions for the NAAQS review.[78] This workshop is followed by preparation of the IRP report, which is used to "identif[y] key policy-relevant issues that [will] generally be used to frame the science assessment, risk/exposure assessment, and policy assessment documents."[79] Among the policy considerations during this framing are "key uncertainties,

76 This article focuses exclusively on the first four intra-agency phases, as interagency review and the particulars of the rulemaking process are beyond its scope.

77 Memorandum from Lisa Jackson, Adm'r, U.S. Envtl. Prot. Agency on Process for Reviewing Nat'l Ambient Air Quality Standards to Elizabeth Craig, Acting Assistant Adm'r, Air & Radiation, & Lek Kadeli, Acting Assistant Adm'r, Research & Dev. 5 (May 21, 2009) [hereinafter Jackson Memorandum], https://www3.epa.gov/ttn/naaqs/pdfs/NAAQSReviewProcessMemo52109.pdf.

78 WENDY WAGNER, SCIENCE IN REGULATION: A STUDY OF AGENCY DECISIONMAKING APPROACHES 32 (2013) (observing that the workshop "focuses specifically on scientific discoveries and related developments . . . over the past five years that should inform the EPA's review.").

79 Memorandum from George Gray, Assistant Adm'r, Office of Research & Dev., & William Wehrum, Acting Assistant Adm'r, Office of Air & Radiation, on Review of Process for Setting Nat'l Ambient Air Quality Standards to Marcus Peacock, Deputy Adm'r 24 (Apr.

gaps in knowledge, and research needs," along with an expressed recognition that "new issues could arise and would need to be addressed during the course of the current review."[80]

During the first phase of the NAAQS review, the primary concern is a top–down, indirect influence on agency scientists during subsequent phases. The NAAQS review design effectively isolates IRP in the policy realm and attempts to address the top–down concern by providing for dynamic policy decisions should "new issues . . . arise . . . during the course of the current review."[81] In large part, the first phase represents an attempt by the EPA to isolate policy from science during the preparation of the IRP and to clearly establish a boundary between scientific and policy questions.[82]

The second phase of NAAQS review is the ISA, which is largely science-dominated. During this phase, the EPA staff scientists and other team members take the thousands of available studies and condense them into a single, enormous report.[83] This phase represents an attempt by the EPA to isolate science during the development of the ISA report.[84]

The major concern during the second phase of the NAAQS review process is a bottom–up, selective reporting or scientization of policy issue. There are several ways this issue can manifest, but in this stage the largest concern surrounds the studies' selection process—which studies to include and how to include them in the integrated report.[85] This may be one of the weaker points of the NAAQS model, as it is not entirely clear if, or how, the policy decisions during the first phase might help guide this embedded policy choice.[86]

The third phase of NAAQS review is the REA, which is again dominated by science. The EPA staff scientists, and other team members, apply the scientific information in the ISA to model the impacts of different NAAQS standards on public health.[87] There is no single model used for the ISA report; rather the EPA staff scientists, and

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3, 2006) [hereinafter Gray Memorandum], https://nepis.epa.gov/Exe/ZyPDF.cgi/9101PHMQ.PDF?Dockey=9101PHMQ.PDF.

80 *Id.*

81 Gray Memorandum, *supra* note 79, at 24. The goal of the first phase is to clearly isolate science and policy decisions. *See* WAGNER, *supra* note 78, at 32 n.64.

82 *See* WAGNER, *supra* note 78, at 32 n.64 (observing that a goal of this phase is to "help clarify appropriate distinctions between science and policy judgments").

83 *Id.* at 33.

84 *See id.* (further observing that the second phase includes heavy peer review, particularly from the Clean Air Scientific Advisory Committee (CASAC)).

85 Dudley, *supra* note 33, at 10 ("EPA's presentation of the available studies and data necessarily involves judgment about which studies to consider and which to exclude, as well as assumptions about what models best fit the selected data and how to extrapolate between observed and predicted exposures.").

86 There is some suggestion that the policy decision in the first phase or another process structure may include some guidelines or processes, but the extent and effectiveness is unclear. *See* Gray Memorandum, *supra* note 79, at 25–26 (discussing a "continuous process . . . for identifying, compiling, characterizing, and prioritizing relevant new scientific studies" and "coordinated, consultative internal process, consulting with subject experts . . . across the Agency").

87 WAGNER, *supra* note 78, at 33.

other team members, rely upon different models to derive uncertainty levels for each assessment, in a variety of scenarios.[88] Similar to the second phase, the third phase represents an attempt by EPA to isolate science during the production of the REA report.[89]

Of all the phases in the modern NAAQS review process, the third phase has perhaps drawn perhaps the most direct attention for concerns about bottom–up scientization of policy issues.[90] This is largely because the modeling reduces the visibility of any policy choices the staff scientists may be making with the models.[91]

The final document-producing phase of the NAAQS review process is the fourth phase: creating a policy assessment report. In this phase, the EPA staff scientists and other team members translate the scientific documentation from preceding phases into a final report that applies the literature to the policy questions, set forth in the first phase, in a way that is accessible to non-experts.[92]

The greatest concerns during the policy assessment phase are bottom–up concerns. The heavy translation during this phase makes selective reporting perhaps the most acute of these concerns.[93] However, this concern is somewhat alleviated by the multiple layers of review to which the translation is subjected prior to approval.[94]

B. LAISSEZ-FAIRE SEPARATION: ENDANGERED SPECIES ACT

Compared to the EPA's NAAQS review process, the FWS provides a robustly laissez-faire institutional design for controlling the listing process through the ESA, with significantly fewer institutionalized controls.[95] The FWS is responsible for making scientific determinations of endangerment under the ESA.[96] Under the ESA, if "any species . . . is in danger of extinction throughout all or a significant portion of its range," the FWS is to list the species as endangered.[97]

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88 *Id.* at 33–34.

89 *See id.* at 34 (further observing that the third phase includes heavy peer review, particularly from CASAC).

90 *See, e.g.*, Dudley, *supra* note 33, at 10–14 (arguing that there is significant concern that hidden policy choices are embedded in the third phase of the NAAQS review process).

91 *Id.* at 12 ("[T]he risk assessment policy judgments that are embedded in these models are not transparent. The findings . . . depend heavily on how the staff decides . . . what effects are considered 'adverse,' the shape of the exposure-response function, and whether observed associations are sufficient to assume causal effects.").

92 *See* WAGNER, *supra* note 78, at 34.

93 However, there is also a concern about scientization of policy. *See* Dudley, *supra* note 33, at 15 (arguing that "presentation of staff's judgment (informed by CASAC) regarding what is 'requisite to protect public health' further blurs the lines between science and policy judgments").

94 WAGNER, *supra* note 78, at 34 ("The policy assessment is typically reviewed by internal EPA staff, the public and by CASAC twice to ensure it is faithful to the scientific assessments and that important scientific information is not lost in translation.").

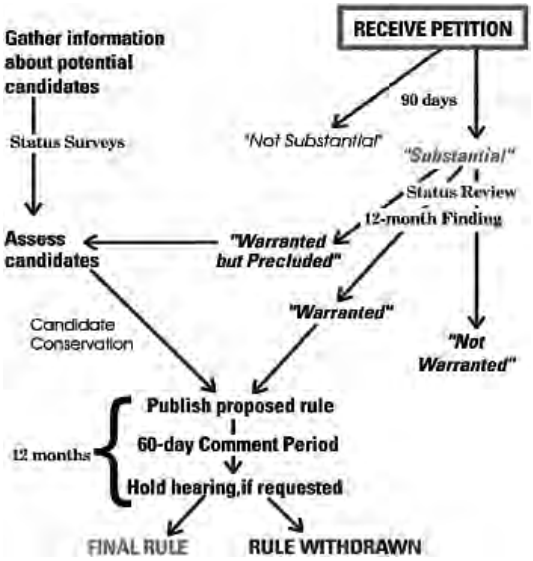
95 *See id.* at 57 ("FWS's approach to species listing and habitat designations, by contrast [to NAAQS], is much more abbreviated, limits authorship, and is less transparent.").

96 16 U.S.C. § 1533(a) (2018). The National Marine Fisheries Service (NMFS) also participates in the ESA process, but the institutional design of that agency is not considered here.

97 16 U.S.C. §§ 1532(6), 1533. However, the FWS only considers listing if the endangerment comes from one of the five factors in 16 U.S.C. § 1533(a)(1).

The scientific review of the endangered species listing and critical habitat designation is relatively collaborative between policymakers and staff scientists and follows the general procedure set forth in Diagram 2.[98]

DIAGRAM 2[99]



The first phase of the listing and habitat designation process is most often engaged in response to a petition, typically filed by a member of the public or a non-profit organization.[100] Once such a petition has been filed, the FWS has ninety days to assess whether there is "substantial scientific or commercial data" in the petition to warrant listing the species.[101]

The second phase begins if the FWS finds that a listing is warranted based on the petition. This phase consists of a twelve-month review to determine if the species should be listed, based on the "best scientific and commercial data available."[102] If the FWS finds listing warranted after the twelve-month review, it may then promulgate a rule to list the species as endangered or threatened.[103]

Unlike in the NAAQS model, where the EPA created a structure designed to keep policymakers and staff scientists in different realms, the ESA model is designed so that "both management and staff work together to produce the analysis that supports a deci-

98 WAGNER, *supra* note 78, at 61.

99 U.S. FISH & WILDLIFE SERV., LISTING A SPECIES AS A THREATENED OR ENDANGERED SPECIES: SECTION 4 OF THE ENDANGERED SPECIES ACT 2 (2016).

100 WAGNER, *supra* note 78, at 59, 59 n.211.

101 16 U.S.C. § 1533(b)(3)(A); 50 C.F.R. § 424.14(b) (2016); *see also* WAGNER, *supra* note 78, at 59 (observing that the "decision typically involves a relatively extensive scientific analysis that relies largely on evidence submitted by a petitioner").

102 16 U.S.C. § 1533(b)(1)(A), (b)(3), (b)(5)(A)(i).

103 *Id.* § 1533(b); 50 C.F.R. § 424.14(h)–(i) (2018); *see also* WAGNER, *supra* note 78, at 60.

sion" throughout the first and second phases.[104] This produces a murky boundary between the science and policy, with limited institutional structures capable of minimizing intentional and unintentional blurring of the lines between the two throughout the listing process. Accordingly, the full spectrum of top–down and bottom–up concerns applies to this institutional design. Indeed, the FWS has had detailed incidences where the collaborative institutional design has allowed the barrier between science and policy to be significantly breached.[105]

IV. PROPOSED INSTITUTIONAL DESIGN MODEL

Scientific agencies use a wide variety of institutional designs to control the boundaries between agency science and policy.[106] Many of these designs are formed on the fly when an agency is created, and then reformed ad hoc as problems arise.[107] However, these ad hoc designs can and should be improved by applying stricter rules at the science–policy boundary.

The following reformed institutional design is modeled on the NAAQS approach. The ease with which policymakers and staff scientists can intrude into areas outside their respective sphere is pronounced in the ESA laissez-faire model, and thus that model is generally undesirable.[108] Adjusting certain aspects of the NAAQS rigorous separation model provides an opportunity to address both top–down and bottom–up concerns of staff scientists and policymakers breaching the boundary zone between science and policy.[109]

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104 WAGNER, *supra* note 78, at 61. This collaboration is primarily focused on "policy direction or policy decision-making," and conspicuously not science. E-mail from Dale Hall, Dir., Fish & Wildlife Serv., to Fish & Wildlife Serv. Directorate & Deputies (Feb. 8, 2006, 07:54 AM), https://www.fws.gov/endangered/esa-library/pdf/Directions_for_Directorate.pdf.

105 *See, e.g.*, Doremus, *supra* note 35, at 1604–07 (detailing the many top-down intrusions into scientific prerogative by FWS DAS MacDonald); *id.* at 1613–17 (detailing the Florida Panther incident at the FWS). *See also* Doremus, *supra* note 11, at 147–52 (discussing the Klamath Basin Water Conflict over the protection of three endangered species during a drought).

106 *See, e.g.*, *supra* Part III.

107 *See, e.g.*, Gorn, *supra* note 37, at 10 ("So in about four or five months—inundated with organization charts floating around my office—I just *chose* an organizational structure. It's been reorganized several times since, so obviously it wasn't a perfect structure. But it was important to provide some clear organizational framework.").

108 There are some science agencies and areas of the boundary between science and policy where a more relaxed approach to interactions may be warranted—even unavoidable in practice. However, such situations are outside the scope of this article.

109 This article focuses on a theoretical model of institutional design, rather than applying that theoretical model. However, a formal application of these theories to an existing agency design, perhaps the NAAQS model, would illuminate any flaws that might exist.

A. Setting the Burden of Proof: Policy at the Outset

The reformed institutional design model begins with an assessment by policymakers of the desired burden of proof for policymaking.[110] For public health and environmental agencies, the "level" of precautionary principle selected by policymakers will largely dictate the spectrum of acceptable proof from agency scientists before action (or inaction) is warranted.[111] Placing the initial policy considerations in this context allows policymakers to provide a guiding principle to undergird future consideration of the boundary.

Once a determination of the overarching policy objective—strong precaution, weak precaution, or something specifically enumerated in between—has been made, it must be explicitly enumerated by the policymakers in a written memorandum and justified in the context of the relevant organic legislative mandate. The written memorandum should also include a clear articulation of the policy questions that the policymakers wish staff scientists to pursue.[112] There are two principal reasons for requiring policymakers to clearly elucidate the starting policy posture of the agency.

First, providing an explicit policy posture reduces the need to completely define the boundary zone between policy and science.[113] This is important because the exact nature of the boundary is often unclear, making separation of policy and science complicated to the extent that "a proposal to separate [science] from policy may seem foolhardy [to

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110 This need not be the same for every program within the agency.

111 Doremus, *supra* note 11, at 152. Environmentalists, who place a high value on an unaltered natural world, favor "a strong precautionary principle, requiring convincing evidence that proposed development actions will not cause irreversible environmental harm." *Id.* Conversely, industrialists, who place a high value on exploitation of resources (or bear heavy burdens from regulation), favor a weak precautionary principle, "demand[ing] strong scientific proof of harm." *See id.* Between these extremes, the precautionary principle is a spectrum of acceptable and unacceptable risks that might serve as the burden of proof selected by policymakers.

112 This process would likely look similar to a modified version of the first phase of NAAQS. *See supra* notes 81–82 and accompanying text. A high level of detail and broad participation across the policy spectrum are critical at this stage. Agency policymakers should strive to be very clear in framing the scientific process, both in terms of specific policy and agency mission and objectives. *Cf.* Wagner, *supra* note 78, at 16–18 (explaining that the EPA and the FWS "are at loggerheads on how to use the best available scientific evidence to predict the adverse impacts of individual pesticide products on endangered species," in large part due to differing statutory and agency missions). *See generally* Bipartisan Policy Ctr., Improving the Use of Science in Regulatory Policy 15–16 (2009) (arguing that science agencies should "explicitly differentiate, to the extent possible, between questions that involve scientific judgments and questions that involve judgments about economics, ethics and other matters of policy").

113 The fuzziness of the boundary is largely due to embedded policy questions in agency science, including how to address "trans-science" questions (scientific questions with no practical scientific answer), how to address research or evidence that is inconclusive on the stated policy question, how to address competing and equally valid theories, and what the acceptable degrees of uncertainty are. *See, e.g.*, Dudley, *supra* note 33, at 3–4. By setting a burden of proof at the outset, these imbedded policy questions are largely answered up front, thereby reducing the fuzziness of the boundary.

those versed in science–policy studies]."[114] Stating policy postures upfront reduces the fuzziness of the boundary zone by clearly demarcating the policymakers' choices at the outset, reducing the bottom–up concern that staff scientists will scientize policy, intentionally or otherwise. This has the dual benefit of reducing the room for staff scientists to actively attempt to usurp the authority of policymakers and providing clarity for all parties about the intentions of the policymakers.

Second, requiring that the policy choice on the burden of proof be explicitly enumerated in writing directly addresses a primary source of tension at the science–policy boundary from the outset.[115] In doing so, it frames the entirety of the remaining process, while locking policymakers into a position on the burden of proof, for which they can be held accountable. This reduces the top–down concern that policymakers will be tempted to politicize science to shield themselves from scrutiny and allows policymakers to release the scientific arm of the agency to perform the science without further interference.[116]

B. Firewalling Staff Scientists from Policymakers

Once policymakers have set the burden of proof and policy objectives, agency procedures should impose a firewall between staff scientists and policymakers.[117] Building this firewall comprises several steps. First, the agency should divide the total process into discrete segments.[118] Then, the agency should establish basic rules of the road for which parties can be involved in each step of the process. Ideally, the agency would also establish a hard wall between policymakers and staff scientists by clearly identifying personnel with decision–making authority for executing particular phases of the process and trans-

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114 Wagner, *supra* note 4, at 2062. *See also* Ellen K. Silbergeld, *Risk Assessment and Risk Management: An Uneasy Divorce*, *in* ACCEPTABLE EVIDENCE: SCIENCE AND VALUES IN RISK MANAGEMENT 99, 99 (Deborah G. Mayo & Rachelle D. Hollander eds., 1991); COMM. ON THE INSTITUTIONAL MEANS FOR ASSESSMENT OF RISKS TO PUB. HEALTH, COMM'N ON LIFE SCIS., NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS 2–3 (1983).) [hereinafter RED BOOK].

115 *See generally* Doremus, *supra* note 11, at 152. The writing formality is borrowed from modifications that were made to the law of covert action following the Iran-Contra Affair. *See generally* 50 U.S.C. § 3093(a). The goal of the writing requirement in the intelligence law context is the same as in the administrative law context: encouraging accountability through public and written records.

116 Once the incentive to hide the policy ball among the scientific weeds is minimized, concerns about politicization of science largely recede to the background. *See generally* Wagner, *supra* note 51, at 1640–42 (discussing politicization of science in the administrative state).

117 *Cf.* WAGNER, *supra* note 78, at 32–34 (discussing how the NAAQS attempts to shield both the scientific and policy bodies during particular phases of the NAAQS review); RED BOOK, *supra* note 114, at 2–3 (envisioning a two step process of scientific synthesis and then policy application without formal institutional separation). For a recently published discussion of institutional firewalls to address pervasive political interference in agency science, *see* Thomas O. McGarity & Wendy E. Wagner, *Deregulation Using Stealth "Science" Strategies*, 68 DUKE L.J. 1719, 1783–1800 (2019).

118 *Cf.* WAGNER, *supra* note 78, at 31 (modeled on the NAAQS phases, as opposed to the more amorphous consideration process suggested by the FWS).

parently providing both authorship and attribution of work products.[119] A firewall greatly reduces top–down concerns that policymakers will directly manipulate staff scientists during certain phases of review by both preventing policymakers from accessing the staff scientists and by altering the balance of power.

C. Calibrating the Firewall to Allow for Necessary Communications

Without a doubt, policymakers will need the advice of staff scientists and staff scientists will need the advice of policymakers during certain phases of the fractured process. Accordingly, once the hard wall is established, the permeability of that boundary can be calibrated to allow for communication where necessary by creating specific avenues for communication in both directions. This should include identifying these avenues for communication by specifying what personnel are responsible for the communications, how the communications should be handled, and when communications are appropriate. The agency should carefully select science and policy personnel with facile interdisciplinary communication skills to fill cross-boundary communications roles.[120] All communications, particularly where the scientific process is still implicated, should be mandatorily included in the public administrative record.

Science agencies should also consider creating publicly available training sessions on both the dichotomies between science and policy and how to avoid crossing the boundary where possible. These trainings should be mandatory for any personnel selected for these communications roles.[121] It is important that any such training be more substantial than yearly agency training, which is often viewed by staff as busywork.

D. Strengthening the Firewall

After establishing the firewall and routes of communication, agency procedures should work to minimize incentives to attempt to hack the firewall in either direction. There are two aspects to this: creating disincentives to hack the firewall and creating incentives to play by the major rules.[122] Both disincentives and incentives should be

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119 Generally, science agencies do not disaggregate various pieces of their analysis. *See* Wagner, *supra* note 78, at 123. Instead, the agencies tend to speak with a single voice that does not invite inquiry into where the science and policy boundary may have been improperly violated. Transparency on authorship and attribution would both make staff scientist more accountable and clearly highlight interference by policymakers. Reducing the unitary nature of agency processes provides greater transparency at the science and policy boundary.

120 There is precedent for limiting avenues of communication between policymakers and agency staff to protect the integrity of sensitive processes from political interference. For example, under the NAAQS process, communications between staff scientists and policymakers is limited during certain phases. *See, e.g.*, *id.* at 39–40. Similarly, there have been various policies in place to limit White House political officers' contact with investigations at the Department of Justice, and other adjudicative processes in various agencies, since at least 1975. *See, e.g.*, Memorandum from Donald Rumsfeld, White House Chief of Staff, Standards of Conduct: Contacts with Regulatory Agencies and Procurement Officers (Oct. 10, 1975).

121 Training should preferably be delivered as in-person workshops.

122 In most circumstances, the classification of a particular structure as a disincentive or an incentive carries little analytic importance. However, for purposes of clarity, this section

carefully calibrated to account for the reasons parties in the particular agency may seek to politicize science or scientize policy.

1. *Disincentives to Hack the Firewall*

Perhaps the best mechanism for discouraging parties from going around the firewall is transparency, which can come in sundry forms.[123] This institutional design model focuses on two forms of transparency: audits and peer review.

To detect and expose any party that is circumventing, or attempting to circumvent, the firewall, the agency should establish a clearly defined audit process including both regular audits and special mandatory audits prior to finalizing major agency actions.[124] An independent entity—ideally either the agency's inspector general[125] or an independent agency like the Government Accountability Office[126]—should carry out these audits. Reports from each audit should be integrated into the public administrative record. It is possible to couple these audits with significant penalties for any transgressing party.[127] This may be feasible, but only if the agency can fully account for the different

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categorizes a structure as a disincentive if primarily designed to dissuade parties from hacking the firewall to avoid a negative result, and as an incentive if primarily designed to encourage parties to respect the firewall to achieve a positive result.

123 *See* Doremus, *supra* note 11, at 159 (discussing the value of transparency and mechanisms for restoring it to the agency process); WAGNER, *supra* note 78, at 37 (observing that NAAQS already employs a fairly similar model in its institutional design).

124 "Major" actions can be defined on an ad hoc basis. However, generally the goal should be to capture activities that are likely to carry high political or social stakes as is reflected in other such definitions triggering review of agency action. *See, e.g.*, 5 U.S.C. § 804(2)(A)–(C) (2018) (defining "major rule" by both monetary impact and qualitative characterizations); Exec. Order No. 12,866, § 3(f), 58 Fed. Reg. 51,735, 51,738 (Oct. 4, 1993) (a rule is significant if, *inter alia*, it might "[h]ave an annual effect on the economy of $100 million or more").

125 Agency inspectors general can be tasked with regular audits of agency programs. *See, e.g.*, 44 U.S.C. § 3555 (2018) (requiring agency inspectors general to perform annual audits of information technology security). Similarly, agency inspectors general can undertake case-by-case audits as requested by the head of the agency or Congress. *E.g.* GOV'T ACCOUNTABILITY OFFICE, GAO-18-568G, GOVERNMENT AUDITING STANDARDS 84 (2018). Inspectors general typically report to the head of their agency, but that official cannot "prohibit or prevent the Inspector General from initiating, carrying out, or completing any audit or investigation, or from issuing any subpoena during the course of any audit or investigation." *See* Inspector General Act of 1978, Pub. L. 95-452, § 3a, 92 Stat. 1101, 1101 (codified at Title 5a).

126 GAO handles many federal audits—particularly where it is critical to ensure the audit is free from even the appearance of influence by the audited agency—and establishes auditing guidance for other federal auditors (including the Offices of the Inspectors General). *See Role as an Audit Institution*, Gov't Accountability Office, https://www.gao.gov/about/what-gao-does/audit-role/ (last visited June 13, 2018). While GAO is capable of auditing science agencies, another possibility for the audit authority would be the National Academies (if specialized knowledge is required). McGarity & Wagner, *supra* note 117, at 1795–96.

127 *See, e.g.*, McGarity & Wagner, *supra* note 117, at 1795–97.

conditions for adverse actions that may apply to staff scientists and policymakers.[128] Otherwise, at best such penalties will be disproportionately impactful on policymakers and staff scientists, and at worst may become weaponized by policymakers to conduct the very interference the audits are designed to guard against.

The agency should also endeavor to ensure that agency science reflects an ideal scientific ecosystem by incorporating meaningful peer review.[129] In addition to be good scientific practice, an effective peer review process can be used to detect both attempts by policymakers to politicize science and attempts by staff scientists to scientize policy because both distort the scientific analysis in ways that often would be recognizable to other experts in the field. To ensure that peer review is effective, agencies are encouraged to carefully select peer reviewers and to establish a clear peer review process for the agency.[130]

2. Incentives to Respect the Firewall

Within the bounds of government ethics, a creative agency has a variety of soft controls that could be used to encourage both policymakers and staff scientists to respect the firewall.[131] One major structural incentive that would be possible with the support of the judiciary would be to use the audits discussed above to label "gold-star" administrative records.[132] This would allow the judiciary—now armed with a more transparent

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128 Employment laws governing federal civil and military service are complex, and it is difficult to distill the rules governing adverse actions against policymakers and staff scientists in the abstract. However, it should suffice to note that there are different requirements for adverse actions against different types of federal employees in different circumstances. *See, e.g.* 5 U.S.C. § 7543 (2018) (discussing the cause and procedure requirements for most actions removing or suspending for more than 14 days members of the Senior Executive Service); *id.* § 7513 (discussing the cause and procedure requirements for most adverse actions against members of the competitive service). Additionally, it is worth noting that the statutory mechanisms for protecting federal employees are showing strain under the Trump Administration, calling into question whether even fully accounting for the letter of the law is sufficient to guard against abuses. *See generally* Lisa Rein, *This Grievance Board for Federal Workers Has One Person Left – and He's About to Leave*, Wash. Post (Feb. 12, 2019), https://www.washingtonpost.com/politics/this-grievance-board-for-federal-workers-has-one-person-left—and-hes-about-to-leave/2019/02/12/c573e446-296e-11e9-b011-d8500644dc98_story.html.

129 Peer review is a mechanism for ensuring scientific integrity by having other experts review all aspects of the relevant science, including research procedure, results, and reports. Jacalyn Kelly et al., *Peer Review in Scientific Publications: Benefits, Critiques, and a Survival Guide*, 25 J. Int'l Fed'n Clinical Chemical & Laboratory Med. 227, 228 (2011).

130 For a discussion of benefits and critiques of peer review and suggestions on general guidelines for effectively conducting peer review, *see id.* at 233–41. For an existing agency guidance on peer review of agency science, *see* Sci. & Tech. Policy Council, U.S. Envtl. Prot. Agency, EPA/100/B-15/001, Peer Review Handbook (2015).

131 For example, an agency could include information on a staff scientist's respect for preserving the boundary and record on scientizing policy in staff reviews or bonus criteria.

132 This formulation is inspired by the "gold-plated patents" reform postulated by Professors Doug Lichtman and Mark Lemley. *See* Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 Stanford L. Rev. 45, 61–63 (2007) (discussing the idea of creating a "new, much more rigorous patent review process" that would afford pat-

process—to augment existing deference doctrines[133] to only grant the highest levels of deference to actions by science agencies if a "gold-star" administrative record supports the action.[134] By both clearly labeling "gold-star" administrative records and by ensuring such records are accorded greater deference—and the inverse—both policymakers and staff scientists would have a strong incentive to respect the boundary to protect the agency's action against subsequent legal challenges.

V. POTENTIAL PITFALLS OF THE PROPOSED MODEL

There are several potential pitfalls in implementing this reformed institutional design model, beyond those directly addressed above. These pitfalls can be categorized into three general groups: implementation, insufficient benefits, and unintended consequences.

The first category of possible pitfalls includes the challenges inherent in realizing the model, focusing particularly on the concern that the leadership of scientific agencies will refuse to voluntarily implement such a reformed institutional design model. The second category of possible pitfalls includes the concern that the reformed institutional design model will not provide sufficient benefits to justify the effort of making the transition. The final category of possible pitfalls includes the potential unintended consequences of the reformed institutional design model that are immediately foreseeable, such as entrenching existing efforts to manipulate agency science within a more legitimate shell, causing policymakers to abandon science-based support for decisions, and further inflating the already voluminous administrative record.

A. IMPLEMENTATION

This first category of concerns is likely the most serious.[135] Much of the above discussion has been presented with an eye towards allowing agencies to implement the

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ents that survive "a strong presumption of validity" where "courts would not be allowed to second-guess decisions made on any prior art that the patent examiner actually considered during this more intense review, and even new art would be considered only if it could first be shown not to be redundant to materials already reviewed").

133 *See, e.g.*, Motor Vehicle Mfrs. Ass'n v. State Farm Auto. Ins. Co., 463 U.S. 29 (1983); Chevron v. Nat. Res. Def. Council, 467 U.S. 837 (1984); Skidmore v. Swift & Co., 323 U.S. 134 (1944); U.S. v. Mead Corp., 533 U.S. 218 (2001). For a detailed discussions of deference doctrines, *see, e.g.*, William N Eskridge, Jr. & Lauren E. Baer, *The Continuum of Deference: Supreme Court Treatment of Agency Statutory Interpretations from Chevron to Hamdan*, 96 GEO. L.J. 1083 (2008); Cass R. Sunstein, *Chevron Step Zero*, 92 VA. L. REV. 187 (2006); Elena Kagan, *Presidential Administration*, 114 HARV. L. REV. 2245, 2357 (2001).

134 Ideally, this would allow the courts to chisel apart the typically cohesive block of agency work product, *see supra* note 119, to recognize situations where less deference is due because the agency's science has been manipulated (undermining the agency's role as expert). *Cf.* New Jersey v. Envtl. Prot. Agency, 517 F.3d 574 (D.C. Cir. 2008) (expressing skepticism about the agency's logic, but overturning the regulations without model manipulation by policymakers).

135 This is particularly true in the aftermath of the 2016 election because the Trump Administration has been particularly aggressive in inserting policy into the scientific discussion and

reformed institutional design model without requiring Congress to delve significantly into the weeds of agency organization. However, it is entirely plausible that leaders of science agencies may refuse to voluntarily apply the theoretical model.[136] In the modern administrative state, agencies are often in an impossible situation, with Congress already having ceded difficult political and policy decisions to the agencies and purists from both ends of the precautionary spectrum waiting in the wings.[137] Accordingly, the leaders of science agencies often feel strong institutional and political pressures to shield their agency—even at the cost of scientific integrity—from the political fallout of the many difficult decisions outsourced to the agencies.[138] This could encourage these leaders to resist institutional design changes aimed at insulating agency science out of a desire to preserve the cover afforded by complex science.[139]

While acknowledging this reality, agencies should be given the opportunity to voluntarily make changes to the architecture governing the boundary zone as experts in the balance of science and policy in their respective fields. The public, members of the many regulated communities, and leaders in each branch of government can put political pressure on the leadership in science agencies if such a reformed institutional design model is indeed meritorious. That being said, Congress could also legislate the reformed institutional design model for science agencies that cannot find the will to begin the process of reforming their institutional design.[140] However, the legislative avenue would require trust—trust between political adversaries and frequent legal opponents, each advocating

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there is little evidence that Congress's partisan gridlock on scientific policy has thawed. *See, e.g.*, Juliet Eilperin et al., *White House Blocked Intelligence Agency's Written Testimony Calling Climate Change 'Possibly Catastrophic*,' WASH. POST (June 8, 2019), https://www.washingtonpost.com/climate-environment/2019/06/08/white-house-blocked-intelligence-aides-written-testimony-saying-human-caused-climate-change-could-be-possibly-catastrophic/; Juliet Eilperin & Brady Dennis, *Schiff Demands Intelligence Agencies Provide Documents on White House's Suppression of Climate Testimony*, WASH. POST (June 11, 2019), https://www.washingtonpost.com/climate-environment/2019/06/11/schiff-demands-intelligence-agencies-provide-documents-white-houses-suppression-climate-testimony/.

136 Policymakers may very well see benefits in systems that allow politicization of science or that otherwise do not significantly insulate staff scientists from influence. Indeed, many political appointees and policymakers are primarily loyal to the political apparatus that supports their career rather than the missions of whichever institutions or agency they ostensibly serve. *See, e.g.*, *Allegations of Political Interference with Government Climate Change Science: Hearing Before the H. Comm. on Oversight and Gov't Reform*, 110th Cong. 327 (2007) (statement of Philip Cooney, former Chief of Staff, White House Council on Environmental Quality) (exploring the motivations of Philip Cooney in editing climate change reports).

137 Doremus, *supra* note 11, at 154.

138 *Id.* ("[Agencies] have every incentive to hide [their] judgments.").

139 *See id.* ("Appeals to science can deflect . . . criticism by making it appear that any trade-offs were necessitated by nature rather than chosen by a political actor.").

140 *See, e.g.*, *id.* at 159–61 (discussing Congress and the courts as an avenue to instilling institutional design changes). For example, Congress could pass an administrative law statute directed at enshrining a clear institutional firewall for all science agencies, thereby bypassing the initial hurdle of encouraging agency action. *See* McGarity & Wagner, *supra* note 117, at 1799–1800. Congress could also elect to partially implement the reformed institutional design model by creating the basic structures and oversight, while leaving each

for different ways to improve agency science, that each earnestly wants to protect the science agencies rather than coopt the agencies to improve their own political or economic standing.

B. INSUFFICIENT BENEFITS

It is arguable that implementing this theoretical model may not yield sufficient improvements to the integrity of agency science to justify the resources and agency disruptions necessary to making the transition. However, this concern can be addressed relatively quickly. While a careful consideration of the resources needed to apply any institutional change is incumbent upon any agency, in this case there are manifest reasons to believe that such costs are warranted.It is increasingly clear that segments of the American public view agency science as being either untrustworthy or polarized.[141] Further, there is a clear record of abuses by officials at science agencies with weaker safeguards at the boundary between science and policy.[142] The Trump Administration has even tested fairly hardy institutional structures.[143] Finally, there is evidence that institutional designs comparable to the proposed institutional design can be successful. The EPA is generally acknowledged to have successfully insulated its scientific process for establishing the NAAQS using the program's similarly robust institutional design.[144] The above militates for taking reasonable steps to shore up the transparency and accountability of our existing institutional designs. This theoretical model presents a relatively straightforward avenue to stabilize agencies between political swings, provide better protections for staff scientists, and ultimately improve the trustworthiness of the science the agency produces.

C. UNINTENDED CONSEQUENCES

Finally, there is a litany of possible unintended consequences that might stem from implementing the reformed institutional design model, many of which are admittedly unforeseeable at this juncture. One possible concern is that the proposed institutional design will backfire by either providing existing efforts to manipulate agency science an even more potent veneer of legitimacy or by driving policymakers to abandon science-

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agency some flexibility in calibrating the firewall to meet the particular needs of their science and policy boundary.

141 *See, e.g.*, Teresa A. Myers et al., *Predictors of Trust in the General Science and Climate Science Research of U.S. Federal Agencies*, 26 PUB. UNDERSTANDING OF SCI. 843 (2017) (while many respondents viewed agencies science as trustworthy or had no opinion, significant minorities—especially among conservative, less educated, and less affluent respondents—did not trust agency science, particularly agency climate change science); *see also Environment*, GALLUP, http://www.gallup.com/poll/1615/environment.aspx (last visited Aug. 8, 2017) (discussing historical views on environmental protection and public trust of agencies).

142 *See, e.g.*, Doremus, *supra* note 35, at 1604.

143 *See, e.g.*, Juliet Eilperin & Brady Dennis, *EPA Dismisses Half of Key Board's Scientific Advisors; Interior Suspends More Than 200 Advisory Panels*, WASH. POST, May 8, 2017 (discussing restructuring of scientific advisory committees at EPA and the Department of the Interior).

144 *See, e.g.*, Wagner, *supra* note 78, at 5, 23–24 (noting that the "NAAQS program is renowned for its scientific quality and also for the extraordinary size of the literature that informs EPS's review").

based support for decisions.[145] While there is no way to perfectly ensure that this will never occur, detecting such abuses the principal purpose of the audit mechanism.[146] Further, if the boundary between science and policy is better clarified by the proposed institutional design, the audit process should be able to access a clearer picture of where and when abuses occur than is currently available.

Another concern is that the proposed institutional design might balloon the already voluminous administrative record, possibly to the point of further ossifying the administrative process. This is a recurrent concern anytime new process requirements are added to a government agency. Generally, even a voluminous record is preferable to a completely opaque system, but to the extent that expanding the administrative record slows the administrative process, wastes taxpayer dollars, increase the burden on the legal system, or might be used to obscure information from public scrutiny, it is important to consider how to remedy this issue.[147] Requiring agency documents stemming from the reformed institutional design—from audits to scientific reports to communications across the boundary—to be produced and integrated into the record with an eye towards transparency can largely alleviate this concern.[148] Ideally, the agency should consider codifying procedures supporting transparency in regulations or agency guidance.

VI. Conclusion

> *[T]here is no good reason for a President to displace or ignore purely scientific determinations . . . . The exercise of presidential power in this context would threaten a kind of impartiality and objective in decisionmaking that conduces to both the effectiveness and the legitimacy of the administrative process.*
>
> —*Justice Elena Kagan*[149]

There will always be tension within science agencies between science and policy and balancing the ever-changing relationship between the two has no single, simple fix. However, focusing on institutional design solutions to improving the boundary between science and policy can increase the quality and legitimacy of agency deliberation while

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145 For example, it is possible that policymakers and staff scientists shift could simply attempt to hide their misbehavior in new places within the process, such as in allowable communications at the boundary.

146 *See supra* Part IV.D.

147 *See, e.g.*, Wendy E. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 Duke L.J. 1324–28 (2010) ("What few administrative architects anticipated from the new commitment to 'sunlight' was that a dense cloud of detailed, technical, and voluminous information would move in to obscure the benefits of transparency.")

148 For example, the agency could require that "[a]ll significant science-policy choices made . . . in reaching a decision . . . be identified and explained in clear and understandable terms." Wagner, *supra* note 78, at 124. Such requirements should be accompanied by specifics of how the personnel can meet this aspiration, such as imposing page limits, requiring executive summaries, and having a review process for work products with an eye towards minimizing bloat in documents being integrated into the record.

149 Kagan, *supra* note 133, at 2245, 2357.

also addressing the growing political divide on allowing science to guide policy.[150] An institutional design that addresses the honest concerns animating both sides of the political divide—that politics and policymakers are controverting agency science and, reciprocally, that agency science is undermining policy choices[151]—is critical to restoring a healthy balance between science and policy in science agencies.

Science agencies exist to provide the scientific and technical expertise that Congress and the courts lack in policymaking on issues such as environmental protection. Agencies imbalanced towards policy or science ultimately run afoul of separation of powers. A science agency that corrupts its own science loses its legitimacy as an expert in the science that supports its policy; a science agency that usurps its policymakers loses its link to democratic accountability.

Science is not policymaking—it does not tell us what decisions to make, merely what will happen if we make them.[152] By the same token, policymaking is not science—it guides our decisions but cannot alone tell us the shape of the world and the ramifications of our actions.[153] It is healthy for agency policy and agency science to stand apart where possible, and together where necessary, while allowing both room to coexist unperturbed. This is the delicate balance that underlies all science agencies, and it must be preserved.

Discussions of administrative structures and institutional design will not galvanize millions through snappy campaign commercials or make for riveting television dramas. Improvements of the institutional design of science agencies will not headline news coverage in primetime or warrant departures from regularly schedule content. But such improvements are the foundation of preserving the integrity of scientific agencies, allowing the American public to be confident that agency science is uncorrupted and that agency policymaking is accountable to the democratic process. The modified institutional design proposed above is only a small part of this larger architecture, but it has the promise to be a part of restoring trust in scientific agencies across the political spectrum.

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150 *See generally* Steven Mufson & Juliet Eilperin, *Trump Transition Team for Energy Department Seeks Names of Employees Involved in Climate Meetings*, WASH. POST, Dec. 9, 2016 (observing the trend since at least 1980 of Republican administrations being more prone to interfering with agency science).

151 *Compare, e.g.*, Scott Pruitt & Luther Strange, *The Climate-Change Gang*, NAT'L REV. (May 17, 2016), http://www.nationalreview.com/article/435470/climate-change-attorneys-general (framing agency climate science as liberal policy masked as science), *with* David Heath & Ronnie Greene, *Chromium VI: Contaminated by Conflict of Interest*, PBS NEWSHOUR (Feb. 13, 2013), http://www.pbs.org/newshour/spc/multimedia/epa-corporate/ (framing the EPA toxins science as captured by corporate policy interests).

152 *See* Lackey, *supra* note 6, at 14.

153 *See id.*

PFAS: Ubiquitous and Persistent Chemicals: Assessing Liability and Allocating Risk; Applying Lessons Learned in Industry-Wide Litigation

By Michael Walsh and Patrick Larkin

I. Introduction

There is a growing focus of regulatory and judicial attention on a ubiquitous substance once generally recognized as safe but now questioned as pernicious. The United States Congress held a series of hearings entitled: "*The Devil They Knew: PFAS Contami-*

nation and the Need for Corporate Accountability."[1] In May 2018, the United States Environmental Protection Agency (EPA) opened a new docket with the intention of addressing Per- and Polyfluoroalkyl Substances (PFAS).[2] The same month, the EPA hosted a Summit with the goal of finding a solution to PFAS issues in drinking water and contaminated sites.[3] On February 13, 2019, the EPA announced its PFAS Action Plan.[4] According to the EPA, PFAS "are a group of synthetic chemicals that have been in use since the 1940s" that "are found in a wide array of consumer and industrial products."[5] Contributors of PFAS releases into the air, soil, and water include "PFAS manufacturing and processing facilities, facilities using PFAS in production of other products, airports, and military installations."[6] Further, "[d]ue to their widespread use"—because of their stain-resistant, waterproof, and nonstick properties—"and persistence in the environment, most people in the United States have been exposed to PFAS."[7] Finally, the EPA acknowledged that "[t]here is evidence that continued exposure above specific levels to certain PFAS may lead to adverse health effects."[8]

Beyond explaining how the federal government is responding under its authority under the Toxic Substances Control Act (TSCA), the Safe Drinking Water Act (SDWA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the EPA's Action Plan sets priority actions, short-term actions, risk communication and engagement, and long-term actions.[9] Further, it aims to "hold responsible parties accountable for PFAS releases into the environment."[10] The PFAS Action Plan also includes a process to set an maximum contaminant level (MCL) under the SDWA.[11] The EPA expects to propose a regulatory determination by the end of 2019, which is the first step to setting the MCL.[12] The EPA intends to continue enforcement actions and expand its focus to monitoring drinking water.

PFAS users, processors, manufacturers, packers, and sellers should look to lessons learned from enforcement and tort litigation concerning other chemicals to better understand the risk profile of PFAS in the current regulatory and litigation climate. In Part I, we explore PFAS as an emerging contaminant in the United States. The regulatory and litigation backdrop concerning PFAS is familiar: decades ago, industry developed a

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1 House of Representatives, Committee on Oversight and Reform, https://oversight.house.gov/legislation/hearings/the-devil-they-knew-pfas-contamination-and-the-need-for-corporate-0.

2 Memorandum from U.S. Envtl. Prot. Agency, Posting EPA-HQ-OW-2018-0270 to Regulations.gov for Public Access (May 11, 2018).

3 *PFAS National Leadership Summit and Engagement*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/pfas/pfas-national-leadership-summit-and-engagement (last visited Apr. 15, 2019).

4 *Media Advisory: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan*, U.S. ENVTL. PROT. AGENCY (Feb. 13, 2019), https://www.epa.gov/newsreleases/media-advisory-epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan-0.

5 U.S. ENVTL. PROT. AGENCY, EPA 823R18004, PFAS ACTION PLAN 1 (Feb. 2019).

6 *Id.*

7 *Id.*

8 *Id.*

9 *Id.* at 4.

10 *Id.*

11 *Id.* at 3.

12 *Id.*

product with important and unquestioned utility, but after decades of increased human exposure, questions about the utility of PFAS emerged as new discoveries regarding the environmental and health associations attributable to PFAS came to light. As federal and state regulatory initiatives and the scientific and medical literature expand, the mass of enforcement actions and litigation concerning PFAS grows.

While the breadth and scope of the litigation and regulatory enforcement action for PFAS are currently unknown, in Part III, we consider how PFAS regulation and litigation may unfold by looking to comparable industry challenges and lessons learned. The risk analysis falls into two general categories: groundwater contamination and personal injury claims.[13] We discuss what makes PFAS similar to other chemical contamination and exposure cases, and how prior litigation and enforcement experience helps guide businesses and legal risk management in this emerging area.

II. PFAS: An Emerging Contaminant

PFAS were developed and initially manufactured by 3M Corporation in the late 1930s.[14] Several other companies produced PFAS, including DuPont (whose PFAS manufacturing unit was later spun-off as Chemours). Many other companies used these chemicals in product manufacturing and processing.[15] PFAS impart oil and water repellency, temperature resistance, and friction reduction to a wide range of products used by consumers and industry.[16]

Initially, two PFAS compounds, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), dominated in the market.[17] Related compounds proliferated and now as many as 3,000 PFAS exist.[18] In discussing the scope of exposure, the EPA has concluded that PFAS are ubiquitous and can be found in:

- Food packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water.[19]
- Commercial household products, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).[20]

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13 *See* Matthew Thurlow, *Fear and Loathing of PFAS*, Am. Bar Ass'n (Dec. 27, 2018), https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2018-2019/january-february-2019/fear-and-loathing/.

14 *See* U.S. Envtl. Prot. Agency, Long-Chain Perfluorinated Chemicals (PFCs) Action Plan (2009); Interstate Tech. Regulatory Council, History and Use of Per- and Polyfluoroalkyl Substances (PFAS) (Nov. 13, 2017).

15 Interstate Tech. Regulatory Council, *supra* note 14.

16 *Id.*

17 *See id.*

18 *Id.*

19 PFAS Action Plan 1, *supra* note 5, at 11.

20 *Id.* at 11–12.

- Workplaces, including production facilities or industries (e.g., chrome plating, electronics manufacturing, or oil recovery) that use PFAS.[21]
- Drinking water, typically localized and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).[22]
- Living organisms, including fish, animals and humans, where PFAS have the ability to build up and persist over time.[23]
- Facilities, as a legacy chemical, where they were manufactured or used in production or processing.[24]

A. History of Regulation/Legislation

Prior to March 2017, the EPA stated that it had "not yet made a determination as to whether PFOA poses an unreasonable risk to the public" and did not recommend that consumers take action to reduce exposures to PFOA.[25] But, in 2017, the EPA modified its statement to say that "the information that the EPA has available does not indicate that the routine use of consumer products containing PFASs poses a concern."[26]

When, in the late-1990s and early-2000s, regulatory concerns were raised about long-chain PFAS, manufacturers voluntarily agreed to eliminate PFOA and related long-chain fluorinated substances, including long-chain fluorotelomer-based products, from facility emissions and product formulation.[27] As a result, companies developed alternatives, including short-chain fluorotelomer-based products with benign environmental and health profiles.[28]

The following is a timeline of key events:

- 1930s–2000s: Perfluorinated compounds were manufactured for use in production processes to enhance mixing and in finished products for fire resistance and oil, stain, grease, and water repellency qualities. The scientific consensus was that PFAS were generally not toxic and regulators did not consider these chemicals to be of regulatory concern.[29]

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21 *Id.*

22 *Id.* at 21.

23 *Basic Information on PFAS*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/pfas/basic-information-pfas (last visited Jan. 9, 2019).

24 *See* PFAS ACTION PLAN 1, *supra* note 5, at 8.

25 Bill Chameides, *The Chemical Marketplace: PFOA*, HUFFPOST, https://www.huffpost.com/entry/the-chemical-marketplace_b_612895 (last updated Dec. 6, 2017).

26 *Risk Management for Per- and Polyfluoroalkyl Substances (PFASs) under TSCA Background, Assessing and Managing Chemicals Under TSCA*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfass (last visited Nov. 7, 2019).

27 *Scientific Studies*, FLUOROCOUNCIL GLOBAL INDUSTRY COUNCIL FOR FLUOROTECHNOLOGY, http://accfc.sachsdigital.com/health-environment/scientific-studies/ (last visited Apr. 8, 2019).

28 *Id.*

29 LONG-CHAIN PERFLUORINATED CHEMICALS (PFCS) ACTION PLAN, *supra* note 14, at 1 ("To date, significant adverse effects have not been found in the general human population.").

- 1970s: DuPont learned that PFOA was persistent in the bodies of workers.[30]
- 1999–2000: Detection of PFAS in the blood of the general human population began in the 1990s. 3M provided information to the EPA on its studies of PFOS. PFAS became chemicals of potential regulatory concern as studies emerged suggesting the chemicals were resistant to degradation in the environment. In humans and animals, the chemicals were well absorbed but poorly metabolized through blood circulation and crossing the placental barrier.[31]
- 2002: 3M voluntarily phased-out its manufacture of PFAS chemicals in the United States.[32]
- 2002–2015: The EPA issued Significant New Use Rules (SNURs) involving PFOS and 183 other PFA chemicals in 2007, and another 20 proposed new SNURs for long-chain perfluoroalkyl carboxylates in 2015.[33]
- 2005: The EPA levied a civil penalty of $10.25 million and required a supplement payment of $6.25 million in a voluntary settlement of a Toxic Substances Control Act (TSCA), Section 8(e) allegation that DuPont failed to disclose "significant risk" information associated with PFASs which ultimately led to a cleanup action against the manufacturer.[34]
- 2006: DuPont signed a consent order requiring it to offer alternative drinking water or treatment to all public and private water systems that had PFOA levels above 0.50 parts per billion (ppb); eight major manufacturers agreed to a 95 percent reduction in global emissions and product content of PFOA and related chemicals by 2010, and to work toward eliminating emissions and product content by 2015.[35] This response was prompted by the presence of PFAS in human blood and animal studies. The EPA took a voluntary phase-out approach, as opposed to a ban, because it found no reasonable basis to conclude that manufacturing, processing, distributing, using, or disposing of PFOA "presents,[something missing] presented an unreasonable risk of injury to health or the environment,"[36] the statutory threshold for a ban under TSCA.

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30 DuPont, DuPont Position Statement on PFOA, http://www.gpb.org/files/pdfs/georgia-gazette/dupont_website_PFOA_position.pdf (last visited Apr. 8, 2019).

31 Long-Chain Perfluorinated Chemicals (PFCs) Action Plan, *supra* note 14, at 6 (citing long-chain PFC's presence in human blood; persistent, bioaccumulative, and toxic (PBT)3 characteristics; use in consumer products; production volume; and other similar factors).

32 *Id.* at 4.

33 Long-Chain Perfluoroalkyl Carboxylate and Perfluoroalkyl Sulfonate Chemical Substances; Significant New Use Rule, 80 Fed. Reg. 2,885 (Jan. 21, 2015) (to be codified at 40 CFR pt. 721).

34 Memorandum from Granta Y. Nakayama, Assistant Adm'r, Off. of Enforcement & Compliance Assurance, Consent Agreement and Proposed Final Order to Resolve DuPont's Alleged Failure to Submit Substantial Risk Information Under the Toxic Substances Control Act (TSCA) and Failure to Submit Data Requested Under the Resource Conservation and Recovery Act (RCRA) (2005).

35 *Fact Sheet: 2010/2015 PFOA Stewardship Program*, U.S. Envtl. Prot. Agency, https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program (last updated Aug. 9, 2018).

36 *Id.*

- January 8, 2009: The EPA issued a PFOA drinking water advisory of 0.40 μg/L, which was used to lower allowable limits in the EPA administrative order issued against DuPont.[37]
- December 30, 2009: The EPA issued its Long-Chain Perfluorinated Chemicals (PFCs) Action Plan.[38]
- November 15, 2016: The EPA issued a nonbinding PFOA and PFOS drinking water advisory of 0.07 μg/L (70 parts per trillion).[39]
- November 22, 2016: Noting that industry had already abandoned the use of these substances, the Federal Food and Drug Administration (FDA) amended the food additive regulations to no longer provide for the use of two specific "long-chain" perfluorinated substances as oil and water repellants for paper and paperboard in contact with aqueous and fatty foods in food-contact substances (FCS). This was based on toxicity data for structurally similar substances, suggesting there is no longer a reasonable certainty of no harm from use of the these chemicals in FCS.[40]
- 2016–2019: Seven states, Health Canada, and Australia issued drinking water standards or advisories for PFOA, ranging from 0.014 to 1.6 μg/L.[41] New Hampshire proposed a PFOA drinking water standard of 0.038 μg/L.[42]
- November 2017: PFOA and PFOS were listed by California as Proposition 65 chemicals known to cause reproductive toxicity. This listing also applies to products containing PFOA and PFOS imported into the U.S.[43]
- December 13, 2017: Michigan established a multi-agency team to address PFAC contamination.[44]

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37 LONG-CHAIN PERFLUORINATED CHEMICALS (PFCS) ACTION PLAN, *supra* note 14, at 18.

38 *Id*.

39 *See Drinking Water Health Advisories for PFOA and PFOS*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos (last visited Apr. 15, 2019).

40 21 C.F.R. § 176 (2016).

41 Maine 0.07 μg/L (guidance, 2016); Michigan 0.42 μg/L (guidance, 2016); Minnesota 0.3 μg/L (chronic limit, 2017) (0.035 μg/L, health-based guidance value, 2017); Nevada (0.667 μg/L, guidance, 2017); New Jersey 0.014 μg/L (chronic limit, 2015, 2017); North Carolina 1.1-1.6 μg/L (interim guidance, 2012, 2013); Vermont 0.02 μg/L (guidance, 2017). Toxicological Profile: Perfluoroalkyls, 83 Fed. Reg. 120 (proposed Jun. 21, 2018) (request for comments).

42 NEW HAMPSHIRE DEP'T OF ENVTL. SERVICES, R-WD-19-01, SUMMARY REPORT ON THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES DEVELOPMENT OF MAXIMUM CONTAMINANT LEVELS AND AMBIENT GROUNDWATER QUALITY STANDARDS FOR PFOS, PFOA, PFNA, AND PFHXS 46 (Jan. 4, 2019).

43 CAL. ENVTL. PROT. AGENCY, OFF. OF ENVTL. HEALTH HAZARD ASSESSMENT, CHEMICALS LISTED EFFECTIVE NOVEMBER 10, 2019 AS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE REPRODUCTIVE TOXICITY: PERFLUUOROOCTANOIC ACID (PFOA) AND PERFLUOROOCTANE SULFONATE (PFOS) (Nov. 10, 2017).

44 *PFAS Response Tacking Action, Protecting Michigan*, MICHIGAN.GOV, https://www.michigan.gov/pfasresponse/ (last visited Feb. 23, 2019).

- April 2018: The Environmental Working Group advocated for a 1 ppt drinking water standard.[45]
- July 20, 2018: National Association of Clean Water Agencies (NACWA), which represents sewer authorities and drinking water suppliers, urged the EPA to focus its PFAS Action Plan on placing liability with those entities that are the source of PFAS[46] in drinking water or municipal wastewater and biosolids.
- 2018–2019: Increasing levels of information, research, and guidance issue from states, ITRC, DOD, DOE, and other groups, along with site specific information from cleanup efforts become available.[47] These actions focus on remediation of PFAS in drinking water, groundwater, and soil. According to the litigation advocacy group the Environmental Working Group, the EPA suggests that up to 110 million Americans could have PFAS in their water at concentrations of 1 ppt or greater.[48]

These actions and reports received intense media coverage, much of which criticized the EPA's regulatory action as inadequate.[49] In turn, this heightened attention increased pressure for groundwater and soil remediation actions, not only against manufacturers of PFOA and PFOS, but also companies that use PFCs in making their products (*e.g.*, fire-fighting foam, stain proof carpets, furniture, and other textiles).[50] These developments have given rise to personal-injury and property-damage litigation. At least one series of settlements involving a site are valued at close to $1 billion.[51]

B. Science and Causation

Since the early reports of global detection of PFAS in wildlife and human blood, publications on the environmental and toxicological aspects of these chemicals seemed to grow exponentially. While the volume of publications provides no measure of the

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45 Bill Walker, *Update: Mapping the Expanding PFAS Crisis Known Contamination from Toxic Fluorinated Chemicals Keeps Spreading, With No End in Sight*, Envtl. Working Group, https://www.ewg.org/research/update-mapping-expanding-pfas-crisis (last updated Jul. 30, 2018).

46 Nat'l Ass'n of Clean Water Agencies, Comment Letter on Posting EPA-HQ-OW-2018-0270 to Regulations.gov for Public Access (2018), https://www.regulations.gov/document?D=EPA-HQ-OW-2018-0270-0643.

47 Interstate Tech. Regulatory Council, Remediation Technologies and Methods for PFAS (Mar. 15, 2018), https://pfas-1.itrcweb.org/wp-content/uploads/2018/03/pfas_fact_sheet_remediation_3_15_18.pdf.

48 *See* Walker, *supra* note 45.

49 *See, e.g.*, Cecelia Smith-Schoenwalder, *Frustrated by EPA, States Blaze Ahead on PFAS*, E&E News (Mar. 4, 2019), https://www.eenews.net/stories/1060123043.

50 *See* William Walsh, *Manufacturers Using Perfluorinated Chemicals Should Follow New Regulations*, Rubber & Plastics News (Mar. 12, 2018), https://www.rubbernews.com/article/20180312/NEWS/180319997/manufacturers-using-perfluorinated-chemicals-should-follow-new-regulations.

51 *See* Jeff Mordock, *DuPont, Chemours to pay $670 million over PFOA Suits*, Delaware Online (Feb. 13, 2017), https://www.delawareonline.com/story/news/2017/02/13/dupont-and-chemours-pay-670m-settle-pfoa-litigation/97842870/. In 2005, DuPont agreed to pay at least $107.6 million and was liable to pay up to another $235 million for medical monitoring of local residents, depending on the outcome of a new C8 study.

quality of the underlying data or the conclusions of any reports, the scale and scope of the exposure issues does serve as a barometer for the prospect of increased risk to businesses that have produced or used these chemicals.

Media attention has paralleled this surge in publications, with attention-grabbing headlines often outpacing equivocal, fact-based examinations of established environmental and health risks. As one example, claims circulated more than a decade ago that Teflon cookware was unsafe because it released perfluorinated chemicals when heated to high temperatures.[52] The manufacturer responded aggressively, citing EPA, FDA, and Consumer Product Safety Commission scientific positions on the safety of Teflon.[53] Similarly, the American Cancer Society stated that "[o]ther than the possible risk of flu-like symptoms from breathing in fumes from an overheated Teflon-coated pan, there are no known risks to humans from using Teflon-coated cookware. While PFOA is used in making Teflon, it is present in extremely small amounts in Teflon-coated products."[54]

1. *Epidemiological Studies*

In personal-injury litigation brought against DuPont, a science panel that convened in 2005 for settlement purposes found "no probable link" for 18 diseases (including broad categories of diseases).[55] The panel's findings of a "probable link" between exposure to PFOA and high cholesterol, ulcerative colitis, pregnancy-induced hypertension, and kidney cancer were not found to demonstrate causation and the term "probable link" was based on statistical association, not causation.[56]

Reviews conducted by the EPA, Health Canada,[57] the European Chemical Agency,[58] the CDC,[59] and the Agency for Toxic Substances & Disease Registry

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52 Leslie Savan, *Teflon is Forever*, MOTHER JONES (May/Jun. 2007).

53 *See Safety of Teflon Nonstick Coating Systems*, CHEMOURS (last visited Feb. 22, 2019), https://www.chemours.com/Teflon/en_US/products/safety/key_questions.html#q1.

54 *What Causes Cancer: Teflon and Perfluorooctanoic Acid (PFOA)*, AM. CANCER SOC'Y, https://www.cancer.org/cancer/cancer-causes/teflon-and-perfluorooctanoic-acid-pfoa.html (last updated Jan. 5, 2016). *See also Hazards and risk associated to Perfluorooctanoic acid (PFOA), its salts and PFOA-related substances*, GREEN FACTS, https://www.greenfacts.org/en/pfoa-cookware-waterproofing/index.htm (last updated Mar. 31, 2017).

55 *C8 Probable Link Reports*, C8 SCIENCE PANEL, http://www.c8sciencepanel.org/prob_link.html (last updated Jan. 4, 2017).

56 *Id.*

57 According to Health Canada, the epidemiological studies showing statistical associations between exposure to PFOA and multiple non-cancer health outcomes "cannot be used to derive the non-cancer" limit for PFOA "due to limitations in terms of design, bias, confounding, and possibility of chance findings." HEALTH CANADA, GUIDELINES FOR CANADIAN DRINKING WATER QUALITY GUIDELINE TECHNICAL DOCUMENT PERFLUOROOCTANOIC ACID (PFOA) 1, 80 (Dec. 7, 2018), https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-technical-document-perfluorooctanoic-acid/document/PFOA_2018-1130-eng.pdf.

58 "Due to unclear adversity and uncertainties in dose-response, RAC is of the opinion that this does not allow for the use of these epidemiology data in a quantitative way for risk characterization." EUROPEAN CHEM. AGENCY, COMMITTEE FOR RISK ASSESSMENT (RAC) & COMMITTEE FOR SOCIO-ECONOMIC ANALYSIS (SEAC) OPINION ON AN ANNEX XV DOSSIER PROPOSING RESTRICTIONS ON PERFLUOROOCTANOIC ACID (PFOA), ITS SALTS AND

(ATSDR),[60] concluded that epidemiological studies of PFOA and PFOS do not establish causality between exposure and toxicological endpoints. The International Agency for Research on Cancer (IARC), an international regulatory body that classifies substances as to their carcinogenicity, stated that its listing of PFOA as "possibly carcinogenic to humans" was based on "limited evidence in humans" and "limited evidence in animals."[61]

The most recent review, the June 2018 Agency for Toxic Substances and Disease Registry (ATSDR) draft Toxicological Profile, concluded that "[a]lthough a large number of epidemiology studies have examined the potential of perfluoroalkyl compounds to induce adverse health effects, most of the studies are cross-sectional in design and do not establish causality."[62] In fact, the study concluded that "based on a number of factors . . . including the consistency of findings across studies, the available epidemiology studies suggest associations between perfluoroalkyl exposure and several health outcomes."[63] Thus, the scientific consensus to date is that, while there is suggestive evidence of carcinogenicity, "there is no conclusive evidence of causation for PFAs."[64]

2. Animal Studies

Animal studies of PFAS also have not reached definitive conclusions. Many governmental,[65] international, and other scientific literature have concluded that animal data may not be relevant to humans. Health Canada concluded that the relevance of PFOA-induced liver tumors to humans is limited, given differing biological mechanisms of action as between rats and humans.[66]

PFOA-related substances (Dec. 4, 2015), https://echa.europa.eu/documents/10162/23665416/rest_pfoa_opinion_final_11131_en.pdf/d5edcc90-ac86-64ed-11c1-3daeb14fad89.

59 "Due to marked intergender differences in the elimination of PFOA in rats and substantial differences in the half-life of PFOA in rats, monkeys, and humans, the potential to estimate risks to humans from animal doses is uncertain." *Biomonitoring Summary: Perfluorochemicals*, Ctr. for Disease Control, https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html (last updated Oct. 12, 2017).

60 Agency for Toxic Substances & Disease Registry, Toxicological Profile for Perfluoroalkyls 10, 186 (2018) ("In general, no consistent associations were found between serum PFOA and HDL cholesterol or triglyceride levels.").

61 Int'l Agency for Research on Cancer, Monograph on PFOA 97–98, https://monographs.iarc.fr/wp-content/uploads/2018/06/mono110-01.pdf (last updated Dec. 22, 2016).

62 Agency for Toxic Substances & Disease Registry, *supra* note 60, at 5.

63 *Id.*

64 *Id.*

65 *See, e.g.*, U.S. Envtl. Prot. Agency, EPA Response to External Peer Review Comments on EPA Draft Documents 7, 8, 13–14, 16–17, 38, 43 (2016), https://www.epa.gov/sites/production/files/2016-05/documents/response_to_pfoa_pfos_peer_review_comments_508.pdf; Agency for Toxic Substances & Disease Registry, *supra* note 60, at 10, 187.

66 Health Canada, *supra* note 57, at 66–67.

Unclear adverse effects and uncertainties in dose-response on decreased birth weights or elevated cholesterol, as well as epidemiology[67] studies on other endpoints (e.g. immunotoxicity), were not considered robust enough to be included in a quantitative assessment characterization.[68] The December 2018 draft ATSDR report noted that many adverse health effects observed in laboratory animals were subject to differing sensitivity among species, limiting the ability to extrapolate results to humans.[69]

3. *Finding PFAS in Blood and Tissue Does Not Prove Causation*

The CDC biomonitoring program has measured PFAS in the general population since 1999 and, since then, the 50th percentile concentration of PFOA decreased from 5.2 to 3.20 micrograms per liter (μg/L) in blood.[70] While the values may be declining, most Americans still have detectable levels of PFAS in their blood or tissue.[71] PFAS have no signature from which a particular source can be determined.[72] In light of these exposure statistics, the CDC has repeatedly stated, "[f]inding a measurable amount of" PFCs or PFOA "in serum does not imply that the levels of PFCs cause an adverse health effect. Biomonitoring studies on levels of PFCs provide physicians and public health officials with reference values so that they can determine whether people have been exposed to higher levels."[73]

The 2018 ATSDR draft report concludes that "for the most part, adverse health effects in studies in animals have been associated with exposure concentrations or doses that resulted in blood levels of perfluoroalkyl compounds that were significantly higher than those reported in perfluoroalkyl workers or in the general population."[74] Further,"the human health effects from exposure to low environmental levels of PFOA are unknown;" and "[h]uman health effects from PFCs [which include PFOA] at low environmental doses or at biomonitored levels from low environmental exposures are unknown."[75]

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67 *Hazards and risk associated to Perfluorooctanoic acid (PFOA), its salts and PFOA-related substances*, GREEN FACTS, https://www.greenfacts.org/en/pfoa-cookware-waterproofing/index.htm (last updated Mar. 31, 2017).

68 *Id.*

69 *See* AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, *supra* note 60, at 10.

70 CTR. FOR DISEASE CONTROL, FOURTH NATIONAL REPORT ON HUMAN EXPOSURE TO ENVIRONMENTAL CHEMICALS UPDATED TABLES, MARCH 2018, VOLUME ONE 403 (2018).

71 *Id.* at 4.

72 *See Biomonitoring Summary, Perfluorochemicals*, CTR. FOR DISEASE CONTROL https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html (last visited Apr. 11, 2019).

73 *Id.* ("[The] animal and human serum PFOA levels have been compared: serum levels associated with toxic effects in animals were 66–11,108 times higher than background serum levels in humans . . . . A study of workers chronically exposed to primarily PFOA showed no biochemical evidence of hepatotoxicity or hormonal changes (adrenal, reproductive, thyroidal), and there was no clear evidence of excess all-cause or disease-specific mortality, or increased cancer rates . . . . Serum PFOS levels associated with toxicity in test animals were 310–1550 times higher than 95 percent of the levels found in a study of adults.").

74 AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, *supra* note 60, at 10.

75 *Id.*

C. Other Scientific Issues: Shorter Chain PFAS

While the spotlight has focused on PFOA and PFOS, other PFAS have also received scrutiny, in part because of general concern among advocates about all chemicals containing fluorine.[76] For example, a study assessed the PFAS in food contact substances, such as paper and wrapping, by measuring total fluorine in the samples.[77] Many state regulatory agencies now require an expanded list of perfluoroalkyl substances (short- and long-chain), and fluorotelomers and polyfluoroalkyl substances are also receiving increased attention.[78]

Many short-chain fluorotelomer-based products have been well-studied by the scientific community, including scientists from academia, industry, and governmental agencies. Data has also been developed and provided to regulators as part of international chemical review processes. Much of the scientific research has focused on the impact of short-chain fluorotelomer-based products on human health and the environment.[79]

The EPA has repeatedly acknowledged that short-chain PFAS are likely less toxic than long-chain PFAS. For example, in 2009, the EPA reported that "PFCA chemicals with fewer than eight carbons, such as perfluorohexanoic acid (PFHxA), and PFAS chemicals with fewer than six carbons, such as perfluorobutane sulfonic acid (PFBS), are generally less toxic and less bioaccumulative in wildlife and humans."[80] The EPA's chronic reference levels for PFOA and PFOS differ by a factor of 500 μg/kg-day from the higher exposure limits it has set for other PFAS compounds.[81]

Based on scientific reviews, short-chain, fluorotelomer-based PFAS do not trigger the criteria for regulation laid out in international treaties and European Union regulations, as well as U.S. criteria.[82] In addition, the materials used to produce these products (manufacturing intermediates) and the degradation products formed as these materials break down in the environment do not meet these criteria.

D. History of Litigation

PFAS are chemicals that do not occur naturally in the environment and, when released into groundwater, the fate and transport issues for PFAS have common attributes to the gasoline additive methyl tertiary butyl ether (MTBE).[83] The MTBE litigation is currently entering its third decade and provides helpful insight into how PFAS claims

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76 *See* Safer Chemicals Healthy Families et al., Take Out Toxics: PFAS Chemicals in Food Packaging (2018), https://saferchemicals.org/wp-content/uploads/2018/12/saferchemicals.org_take_out_toxics_pfas_chemicals_in_food_packaging.pdf.

77 Laurel Schaider, et al., *Fluorinated Compounds in U.S. Fast Food Packaging*, 2017 4(3) Envtl. Sci. Tech. Letter 105, 105–111 (2017). The coauthors included members of Silent Spring Institute and the Environmental Working Group. The study also cites preliminary toxicity testing that suggests certain short-chain PFAs have "some of the same adverse effects.

78 Interstate Tech. Regulatory Council, *supra* note 14.

79 *Scientific Studies*, *supra* note 27.

80 *Supra* note 26.

81 U.S. Envtl. Prot. Agency, Fact Sheet: Draft Toxicity Assessments for GenX Chemicals and PFBS 3 (Nov. 2018).

82 *Scientific Studies*, *supra* note 27.

83 Jennifer L. Guelfo et. al., *Evaluation and Management Strategies for PFASs in Drinking Water Aquifers*, 126(6) Envtl. Health Perspect. 065001-1, 065001-3 (Jun. 2018).

may evolve, what defenses may prevail, and what steps may be taken before litigation mushrooms, so risk and expense may be mitigated. While MTBE litigation did not result in successful claims concerning adverse health outcomes, PFAS have a greater depth and breadth of scientific and medical evidence suggesting a potential association with possible adverse health outcomes.

The litigation and regulatory initiatives arise from the physical properties of persistent chemicals that allegedly migrate from disposal, spills, or run-off into drinking water supplies.[84] As these chemicals are now being detected away from source areas, water treatment utilities are focusing efforts on monitoring and treating drinking water to reduce public exposure to these chemicals.[85] Public water utilities serve to quantify the cost as the litigation attempts to frame the liability and causation issues.

Neither courts nor legislatures have defined the universal "cleanup" strategy or financial responsibility for emerging contaminants. Accordingly, an anticipatory response to persistent chemical claims will coordinate resolution of civil damage claims, if efforts ensure that future costs are properly mitigated and a significant percentage of responsible parties participate, with responsibility apportioned equitably. If not addressed early, litigation can be a poor arbiter of liability, causation, and damages.

For PFAS, there are no legally binding federal drinking water regulatory limits, but some states have issued legally binding drinking water limits.[86] With the growing number of PFAS groundwater and soil remedial actions, the guidance, advisories, and other screening levels are relied upon to support claims for further evaluation of potential remedial options. Complicating the damage equation, remediation levels may vary from one EPA Region to another, from state to state, and even from site to site within an EPA Region or state.

III. THE MODEL FROM OTHER CONTAMINANTS: THE STATE AS PLAINTIFF IN LARGE-SCALE ENVIRONMENTAL LITIGATION

While the products, relevant regulatory scheme and available remedies differ, industry-wide environmental tort litigation shares common themes that are of general applicability in cases involving products or ingredients widely produced or distributed in the marketplace and with broad environmental and human exposure. There are many examples of large-scale class actions and multi-district litigation (MDL), but few, if any, situations are comparable to PFAS, with claims against multiple products said to have caused a single indivisible harm.

As mentioned, the MTBE litigation shares similar manufacturing history, widespread exposure data and comparable environmental fate and transport attributes as PFAS. The MTBE cases involve industry-wide litigation in which multiple participants in the verti-

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84 Katie Dwyer, *The 'Next Big Environmental Threat' Is Already Here*, RISK & INSURANCE (Sept. 28, 2018), https://riskandinsurance.com/pfas/.

85 Press Release, U.S. Envtl. Prot. Agency, EPA Launches Cross-Agency Effort to Address PFAS (Dec. 4, 2017), https://www.epa.gov/newsreleases/epa-launches-cross-agency-effort-address-pfas.

86 *PFAS Laws and Regulations*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/pfas/pfas-laws-and-regulations (last visited Apr. 12, 2019).

cal distribution chain were alleged to have caused a single indivisible harm for a product that is prevalent, travels in the subsurface, and is resistant to bioremediation.[87] Examining the MTBE litigation illustrates how this type of litigation is established, how target defendants are selected, how the litigation matures, how damages are modeled, and what steps can be taken to mitigate for exposure to PFAS claims.

It is often surprising that the target defendants are not necessarily those parties that might appear to have the greatest culpability. Invariably, the target defendants are the parties with the greatest resources, irrespective of and despite intervening or superseding causes under traditional causation approaches. For example, in the opioid litigation, the target defendants are not the parties who prescribed the product or those distributing unapproved illicit products. The target defendants are the highly-regulated manufacturers and distributors, who are best able to pay a damage award.[88]

As with PFAS, MTBE had a lengthy history of presumed safety and efficacy long before any health, safety, or environmental concerns emerged.[89] With MTBE, beginning in the late 1970s, a push to remove lead from gasoline began, and refiners and suppliers sought practical and economical alternatives.[90] By 1979, MTBE was being used by some suppliers to replace lead, but so were other fuel oxygenates, such as ethanol, methanol, and other blends.[91] As lead was phased out of gasoline in the 1980s, the intricacies of the gasoline distribution system made it difficult to transport both gasoline capable of blending with other oxygenates and gasoline already blended with MTBE in the same distribution system.[92] MTBE was the obvious and most economically-viable choice for manufacturers. MTBE was also the least expensive because it was a byproduct of the refining process and readily available in vast quantities.[93]

Similar to PFAS, because of its utility, MTBE was a widely used chemical. The use of oxygenates, most notably MTBE, to replace lead in gasoline was widespread, and the use was exacerbated when, in 1990, the Clean Air Act (CAA)[94] aimed to reduce ozone-forming volatile organic compounds (VOCs) and emissions of toxic air pollutants.[95] Under the CAA, the EPA mandated that gasoline blended for use in certain metropolitan areas at certain times of the year must contain at least 2.0% oxygen by weight.[96] To

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87 *See In Re* MTBE Prods. Liab. Litig., 644 F. Supp. 2d 310 (S.D.N.Y. 2009).

88 *See* Barry Meier, *Hold Makers of Opioids Accountable*, N.Y. TIMES, Dec. 26, 2018, at A19.

89 *See* CAL. ENVTL. PROT. AGENCY, MTBE (METHYL TERTIARY BUTYL ETHER) BRIEFING PAPER, https://www.arb.ca.gov/fuels/gasoline/Oxy/Mtbebp.pdf (last updated Sept. 3, 1998).

90 *Methyl Tertiary Butyl Ether (MTBE): Gasoline*, U.S. ENVTL. PROT. AGENCY, https://archive.epa.gov/mtbe/web/html/gas.html (last updated Feb. 20, 2016).

91 *Id.*

92 MICHAEL A. WALSH, THE OPIOIDS DILEMMA: PAIN AND PUNISHMENT INDUSTRY-WIDE LIABILITY 18 (2018), https://c.ymcdn.com/sites/www.thefederation.org/resource/resmgr/Events/2018/Winter_Amelia/AMELIA_CLE_HANDOUTS/compressed_FDCC-The_Opioid_D.pdf.

93 Paul J. Squillace et. al., *Preliminary Assessment of the Occurrence and Possible Sources of MTBE in Groundwater in the United States, 1993-1994*, 20 ENVIRON. SCI. TECHNOL. 1721, 1721 (1995).

94 Clean Air Act § 211(k), 42 U.S.C. § 7545(k) (2018).

95 *See In re* Methyl Tertiary Butyl Ether ("MTBE") Prods. Liab. Litig., 175 F. Supp. 2d 593, 600 (S.D.N.Y. 2001).

96 *See id.*

meet this requirement, oil companies added oxygenates, such as MTBE, to their gasoline, and in 1991, the EPA approved the use of seven compounds to achieve the requirements set forth in its oxygenated fuels program: (1) MTBE, (2) ethanol, (3) methanol, (4) tertiary amyl methyl ether, (5) ethyl tertiary butyl ether, (6) tertiary butyl alcohol, and (7) diisopropyl ether.[97] The use of MTBE expanded significantly and by 2000, MTBE was added to approximately 87% of the gasoline in the United States.[98] In the MTBE litigation, refiners of gasoline argued that "like Congress, EPA understood that MTBE would be 'the most common oxygenating compound' used by refiners to comply with the CAA's new air emissions standards."[99]

Thus, throughout the 1980s and 1990s, it became increasingly difficult to use an oxygenate other than MTBE due to its availability and price. Regulators were accustomed to overseeing the clean-up of releases from underground storage tanks (USTs) when the traditional constituents of gasoline, benzene, toluene and xylene (BTEX), were released from an UST.[100] BTEX behaved predictably in the environment; it biodegrades and is susceptible to clean up.[101] What did not become generally known until the late 1990s was that, once in the subsurface, the additive MTBE had a propensity to separate from the BTEX constituents and travel with the groundwater, further and faster than the other gasoline constituents.[102]

Also beginning in the late 1990s, there was a growing consensus that MTBE either would not biodegrade or would persist far longer than the BTEX constituents.[103] Litigation advocacy groups, such as the Environmental Working Group, gleaned and extracted evidence from the tens of millions of pages of documents from early litigation, which suggested some manufacturers, industry trade associations, and other market participants may have been aware of the potential environmental concerns as early as the early 1980s. Because much of the drinking water supply is located beneath the ground and drawn from near where we live, a potential threat to drinking water emerged.[104]

A. THE BIRTH OF THE LITIGATION

On October 10, 2000, pursuant to 28 U.S.C. § 1407, the Judicial Panel on Multi-District Litigation (JPML) transferred the first MTBE cases to Judge Shira Scheindlin in the Southern District of New York, in *In re Methyl Tertiary Butyl Ether ("MTBE") Products Liability Litigation MDL-1358*.[105] The JPML found common questions concerning

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97 *See In re* MTBE Prods. Liab. Litig., 342 F. Supp. 2d 147, 151 (S.D.N.Y. 2004) (citing Proposed Guidelines for Oxygenated Gasoline Credit Programs Under Section 211(m) of the Clean Air Act as Amended, 56 Fed. Reg. 31,151, 31,154 (Jul. 9, 1991)).

98 Thomas O. McGarity, *MTBE: A Precautionary Tale*, 28 HARV. ENVTL L. REV., 281, 285 (2004) (citing 65 Fed. Reg. 16,094, 16,095 (Mar. 24, 2000)).

99 *Id.* (quoting Approval and Promulgation of Implementation Plan, 56 Fed. Reg. 5,458, 5,465 (Feb. 11, 1991)).

100 *See* U.S. ENVTL. PROT. AGENCY, EPA 815-R-08-012, REGULATORY DETERMINATIONS SUPPORT DOCUMENT FOR SELECTED CONTAMINANTS FROM THE SECOND DRINKING WATER CONTAMINANT CANDIDATE LIST (CCL 2) 13–60 (Jun. 2008).

101 *Id.* at 13.

102 *See id.*

103 *See id.*

104 *See id.* at 13–27.

105 *See In re* MTBE Prods. Liab. Litig. MDL-1358, 175 F. Supp. 2d. 593, 604 (S.D.N.Y. 2004).

whether: (1) the defendants misrepresented the nature of MTBE and conspired to market MTBE without disclosing its risk to downstream users, the government, or the public; and (2) the plaintiffs sustained drinking water contamination as a result of MTBE.[106] At this same time, in *Millett v. Atlantic Richfield*, the Superior Court of Maine denied a class certification on these issues, stating that "[t]here is no doubt that the contamination of Maine's ground water supplies by MTBE presents a major social problem that needs to be addressed" and "this court finds that the better approach to this litigation is individual trials."[107] The MDL court reached a similar conclusion denying class treatment in a case transferred to the MDL.

A few years later, in 2003, individual case filings throughout the country began in earnest. The MDL Court described MTBE as a carcinogenic "chemical compound produced from methanol and isobutylene, a byproduct of the gasoline refining process" that "lacks a 'chemical signature' that would enable identification of the refinery or company that manufactured that particular batch of gasoline."[108] MTBE is "highly soluble in water and does not readily biodegrade. Because of its high solubility, MTBE races through the underground water supply, eventually contaminating wells and underground aquifers."[109] To make matters worse, "MTBE can persist in underground aquifers for many decades, far longer than other components of gasoline" and "[e]ven in very small quantities, MTBE imparts a foul taste and odor to water and renders it unusable and unfit for human consumption."[110]

According to the MDL Court, "Defendants chose MTBE so as to profit from a gasoline refining waste byproduct."[111] Further, Defendants were aware of the risks of mixing MTBE with gasoline, including "massive groundwater contamination," and understood they were creating a "national crisis" that involved "gasoline leaking from multiple sources, such as underground storage tanks."[112] Despite the "knowledge of MTBE's ill effects, defendants conspired to mislead plaintiffs, EPA, downstream handlers, and the public about the hazards of adding MTBE to gasoline . . .to conceal the risk of MTBE contamination."[113]

Similar to the PFA litigation against DuPont, a relatively small number of cases predated the MDL, and very few went to trial. One notable pre-MDL MTBE case went to trial and on a special verdict in the first phase of the trial, the jury found for the plaintiff.[114] Thereafter, a wave of cases was filed in 2003 and removed from state court by Defendants on various grounds. Defendants moved to dismiss the plaintiffs' claims on

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106 *Id.* at 629.

107 Millett v. Atl. Richfield, No. CV-98-555, 2000 WL 359979, at *22 (Me. Super. Mar. 2, 2000), *appeal dismissed*, 760 A.2d 250 (Me. 2000).

108 *In re* Methyl Tertiary Butyl Ether Prods. Liab. Litig., 379 F. Supp. 2d 348, 364–65 (S.D.N.Y. 2005).

109 *Id.*

110 *Id.*

111 *Id.* at 365–67.

112 *Id.*

113 *Id.*

114 *See* S. Tahoe Pub. Util. Dist. v. Atl. Richfield Co., No. 99-9128, 2002 Cal. Super. LEXIS 428 (Cal. Super. Ct. Apr. 25, 2002).

numerous grounds, including federal preemption, political question, primary jurisdiction, lack of standing and lack of cognizable interest, lack of causation, and limitations.

In thousands of pages of published opinions, the MDL Court charted a course for individual cases to proceed to trial, deftly denying legal challenges that might have ended the litigation. In refusing to dismiss on preemption grounds, the Court held that "even if state tort law demands that defendants not use MTBE, federal law did not *require* the use of MTBE, . . . EPA did not intend to preempt the field of fuel content regulation for all purposes," and the EPA does not "have authority to preempt the field of fuel content for all purposes."[115]

In rejecting the defendants' political question challenge, the Court cited United States Supreme Court factors for determining whether an action is non-justiciable under the political question doctrine.[116] Issues arising "in a 'politically charged context' [do] not convert this tort suit into a non-justiciable political question."[117] There must be "evidence that Congress has decided that it would resolve the issues."[118] "[R]egulation of the national fuel supply is surely not an issue for the judicial branch," but "these suits seek abatement and damages in addition to a ban on further *contamination*."[119] As such, the Court concluded, this was not a difficult case under the political question doctrine.[120]

Primary jurisdiction is a judicially-created "prudential doctrine under which courts may, under appropriate circumstances, determine that the initial decision making responsibility should be performed by the relevant agency rather than the courts."[121] Applying the primary jurisdiction analysis, the MDL Court found that none of the relevant factors favored deference to the state agency: (1) whether the question at issue is within the conventional experience of judges or whether it involves technical or policy considerations within the agency's particular field of expertise; (2) whether the question at issue is particularly within the agency's discretion; (3) whether there exists a substantial danger of inconsistent rulings; and (4) whether a prior application to the agency has been made.[122] As court deference to agency determinations and interpretations is increasingly questioned, it is doubtful that any issue that is not presently under consideration by the agency will result in a court deferring legal proceedings until the agency decision making is complete.

The MDL Court denied Defendants' motion to dismiss claims based on the MTBE amounts found in the groundwater being below the EPA's established MCL on the grounds of lack of cognizable interest/lack of standing/lack of justiciability.[123] The MDL Court held "[t]he essence of the dispute here is the extent to which an MCL defines what constitutes a legally cognizable harm . . . . While the MCL may serve as a conve-

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115 *In re* MTBE Prods. Liab. Litig., 457 F. Supp. 2d 335–43 (S.D.N.Y. 2006).
116 *In re* MTBE Prods. Liab. Litig., 438 F. Supp. 2d 291, 304 (S.D.N.Y. 2006).
117 *Id.*
118 *Id.*
119 *Id.*
120 *Id.*
121 Syntek Semiconductor Co., Ltd. v. Microchip Tech., 307 F.3d 775, 780 (9th Cir. 2002). *See also In re* MTBE Prods. Liab. Litig., 438 F. Supp. 2d at 295.
122 *In re* MTBE Prods. Liab. Litig. MDL-1358, 175 F. Supp. 2d 593, 617 (S.D.N.Y. 2001).
123 *In re* MTBE Prods. Liab. Litig., 458 F. Supp. 2d 149, 151 (S.D.N.Y. 2006).

nient guidepost in determining that a particular level of contamination has likely caused an injury, the MCL does not define *whether* an injury has occurred."[124] The Court declined to link injury to the MCL in order to provide a bright-line rule because "it would do little else to promote standing principles."[125] Instead, the Court relied on the "essential principles underlying the standing doctrine: the parties here have adverse interests and the complained of conduct is concrete and specifically impacts plaintiffs' zone of protected interests."[126] The Court continued, stating "[w]hile it may eventually be determined that some levels of contamination below the applicable MCLs do not injure plaintiffs' protected interests, plaintiffs have presented sufficient evidence for purposes of standing to show that they may have been injured" and that question "is appropriate for judicial resolution."[127]

An interesting corollary to the Court's "cognizable interest" holding arose in the context of accrual, where the Court recognized that knowledge of the presence of MTBE alone was insufficient for the plaintiffs to have discovered their injuries.[128] Instead, a plaintiff's claims accrue when it first knows of both (1) the presence of MTBE at a level sufficient to constitute an injury, and (2) the harmful impact of MTBE on drinking water.[129] The Court stated that the mere presence of MTBE in the water does not trigger the statute of limitations, but "there does come a point where the concentration levels are so significant as to warrant discovery of a cognizable injury as a matter of law."[130] The Court then recognized the MCL as that level stating, "[o]nce the MTBE concentrations pass the levels established by the state, the statute of limitations begins to run as a matter of law. As water providers, plaintiffs knew about their duty to comply with this regulatory standard."[131] While the bright line for standing and limitations of MTBE above the MCL may seem helpful, most cases involve very low detection levels and the questions of standing and limitations are still case-specific, requiring lengthy and expensive discovery.

B. Alternative Liability

Of the numerous issues the MDL Court addressed, none is more contentious and fraught with broad reaching implications than alternative liability. These theories, while largely dormant nationwide in mass litigation, are increasingly emerging as a convenient mechanism for avoiding individual proof and aggregating damages. In crafting a novel approach to causation in the MTBE litigation, the MDL Court provided an exhaustive discussion of the history of alternative liability and concluded "MTBE-containing gasoline is a fungible product because all brands are interchangeable, and . . . [a]s such, it is inherently difficult to identify the refiner that caused plaintiffs' injuries."[132] Further, "MTBE-containing gasoline is an indiscrete liquid commodity that mixes with other

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124 *Id.* at 158.
125 *Id.*
126 *Id.*
127 *Id.*
128 *In re* MTBE Prods. Liab. Litig., 2007 WL 1601491, at *8 (S.D.N.Y. Jun. 4, 2007).
129 *Id.* at *6.
130 *Id.* at *7.
131 *In re* MTBE Prods. Liab. Litig., 591 F. Supp. 2d 259, 267–68 (S.D.N.Y. 2008).
132 *In re* MTBE Prods. Liab. Litig., 379 F. Supp. 2d 348, 376–77 (S.D.N.Y. 2005).

products during transport and might not vary in appearance from batch to batch. According to plaintiffs, when it is released into the environment, it lacks even a chemical signature that would enable identification."[133]

In diethylstilbestrol (DES) cases in which individual plaintiffs are unable to identify specific manufacturers, courts have applied alternative liability theories.[134] In the MTBE litigation, the court could have defined the "manufacturer" of the fungible product to have been the brand at the station where the gasoline was released in to the environment and required the plaintiff to focus on the case specific causation issues. But that is not what the MDL court did in the MTBE litigation. In the burgeoning PFAS litigation, it is unclear the extent to which a court will permit the litigation to focus on case-specific causation facts and identification of specific individuals allegedly harmed and the concomitant proof of exposure to specific products and manufacturers.

In fashioning an alternative liability scheme in the MTBE litigation, three of the approaches the Court recognized include: (1) concurrent wrongdoing (with joint and several liability), (2) market-share (apportioned liability, without punitive damages) and, (3) commingled product theory (apportioned liability, with punitive damages).[135] The commingled product theory is the construct of the MDL Court and is the most controversial.

Recognizing that gasoline containing MTBE is fungible, not unlike a bank account where the dollar you put in is not the same dollar you take out, the MDL Court embarked on a lengthy analysis and described its new "commingled product theory," that would be recognized in the various states. The MTBE cases, according to the Court, needed a "modification of market share liability," that could "incorporate elements of concurrent wrongdoing."[136] Commingled product theory would be beneficial for cases where "a plaintiff can prove that certain gaseous or liquid products (*e.g.*, gasoline, liquid propane, alcohol) of many suppliers were present in a completely commingled or blended state at the time and place that the risk of harm occurred, and the commingled product caused a single indivisible injury;" but the plaintiff could not identify which individual supplier caused the harm.[137]

After the plaintiff proved the first two elements, then the Court may determine "each of the products . . . to have caused the harm."[138] This modification, the Court explains, is appropriate "because the gaseous or liquid blended product is a new commodity created by commingling the products of various suppliers, the product of each supplier is known to be present."[139] Further, "[i]t is also known that the commingled product

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133 *Id.*

134 *See, e.g.*, *id.* at 375 ("The court recognized that in a 'contemporary complex industrialized society, advances in science and technology create fungible goods which may harm consumers and which cannot be traced to any specific producer.' Thus, rather than rigidly applying traditional tort principles, the court expanded alternative liability to encompass what is now known as market share liability.").

135 *Id.* at 371–72, 374–79.

136 *In re* MTBE Prods. Liab. Litig., 379 F. Supp. 2d 348, 377–79 (S.D.N.Y. 2005).

137 *Id.*

138 *Id.*

139 *Id.*

caused the harm."[140] However, the Court emphasizes, "[w]hat is not known is what percentage of each supplier's goods is present in the blended product that caused the harm."[141]

To overcome such a determination by the court, "[a] defendant must be able to exculpate itself by proving that its product was not present at the relevant time or in the relevant place, and therefore could not have been part of the commingled or blended product." Therefore, the commingled product theory would lie somewhere between the market-share and concurrent wrongdoing theories.[142]

According to the Court, the commingled product theory allows "in for a penny, in for a pound."[143] What remained unclear is who bears the burden establishing each defendant's share of the market or the geographic scope of the market (i.e. national, city or state, gas stations, or "some other market").[144]

C. Resolving a Horizontal Market

Many MDL MBTE cases were settled before trial. In approving the settlement and barring contribution claims by non-settling parties, much detail has been disclosed in the public record regarding how these cases were valued. The MDL Court recognized that, in estimating damages, plaintiffs relied on industry data to estimate high, low, and mean costs of treating wells contaminated with MTBE, using a standard linear regression analysis and considering MTBE detection levels.[145]

The settling parties used national refining capacity as a rough estimate of liability for three reasons. First, "nearly all the claims in each case are premised on defendants' decision to use MTBE in their gasoline rather than on spilling gasoline or failing to prevent leaks at their gas stations."[146] Second, discovery in other MDL cases showed "gasoline from various refiners is generally commingled for transportation, storage, and distribution."[147] As a result, "any gasoline released into the environment is generally the product of numerous defendants."[148] Third, "the national refining share is a better measure than [individual states] . . . because certain defendants that do not own refineries in a state may still participate in the gasoline market through exchange agreements or otherwise . . . [and] the means of allocating liability in these cases remains highly contested."[149]

1. *The City of New York Case*

Most of the cases involving MDL were brought by states, cities, water districts, and water purveyors and involved claims related to multiple drinking water wells and sites. In some cases, hundreds of potential wells or sites were at issue. While most defendants were able to reach a settlement in the City of New York case, a major refiner defendant

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140 *Id.*
141 *Id.*
142 *In re* MTBE Prods. Liab. Litig., 591 F. Supp. 2d 259, 267–68 (S.D.N.Y. 2008).
143 *See In re* MTBE Prods. Liab. Litig., 644 F. Supp. 2d 310 (S.D.N.Y. 2009).
144 *Id.* at 320.
145 *In re* MTBE Prods. Liab. Litig., 578 F. Supp. 2d 519, 524 (S.D.N.Y. 2008).
146 *Id.* at 527.
147 *Id.*
148 *Id.*
149 *Id.*

did not settle, and the *City of New York v. Amerada Hess* was tried in 2009.[150] In an attempt to construct a trial plan that balances the defendants' rights while permitting the Court to try less than the whole case at once, the parties were required to choose a subset of wells or sites (bellwether sites) for dispositive motion practice and trial.[151]

There is no mistaking that the judge was a major factor in the outcome and, while rulings went both ways, favoring plaintiffs in some instances and defendants in others, it was clear that the judge was determined to have the case reach a verdict, and she sided with the City on the critical issues. Notably, the *City of New York* case concerned a dilapidated water system fraught with contamination problems that was not in use for drinking water for reasons not caused by MTBE.[152] Indeed, the evidence showed that the City purchased the water system at issue in order to shut it down and not to use it for drinking water.[153]

Nonetheless, the Court allowed the trial to proceed in phases, with partial verdicts or jury interrogatories on issues as the case proceeded.[154] Trial phasing and, more specifically, determining which issues go first, is a question of paramount importance and can drive the outcome. For example, one state court MTBE case was tied to a defense verdict, but in that case, damages, not product defect, were tried first.

The *City of New York* trial resulted in a verdict in the amount of $105,000,000. In the first Phase of the trial, the jury found that the City had a "good faith intent" to both begin construction of a water treatment facility within 15 years and to use the water from the wells within 15 to 20 years as a "backup drinking water source."[155] Since the verdict in 2009, the City still has not begun construction and, realistically, may never do so. In Phase II of the trial, the question was whether and at what level MTBE would be present when those future wells were operational.[156] Plaintiff's UST expert, Marcel Moreau, co-author of the 1986 article widely recognized as focusing attention on the issue of MTBE in groundwater, testified that "[l]eaks happen at gas stations . . . on a fairly routine basis."[157] Permitting this expert to testify on assumed releases was akin to concluding from statistics that, on average, all drivers speed, and on this conclusion issuing speeding tickets to all drivers. In the *City of New York* MTBE trial, the Plaintiff's hydrogeology experts down-played the known alternative cause components and, according to one of the City's experts, MTBE presented very different concerns and

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150 *In re* MTBE Prods. Liab. Litig., 644 F. Supp. 2d 310, 311 (S.D.N.Y. 2009), *aff'd*, 725 F.3d 65 (2d Cir. 2013).

151 *See In re* MTBE Prods. Liab. Litig., No. 1:00-1898, 2007 WL 1791258, at *2 (S.D.N.Y. Jun. 15, 2007) ("The action before this Court, which is part of a larger MDL, involves 182 wells located in Suffolk County, New York. Plaintiffs have proposed a trial of a subset (approximately five percent) of their wells that have been allegedly impacted by MTBE. The parties estimate that it will take at least three months to try ten to twelve wells. In contrast, if all 182 wells were tried before a single jury, this estimate might grow to two years or more. Such a trial would be untenable because, at the very least, it would be unreasonable to expect a jury to sit for this length of time, as well as strain limited judicial resources.").

152 *In re* MTBE Prods. Liab. Litig., 725 F.3d 65, 126 (2d Cir. 2013).

153 *See id.*

154 *Id.* at 78.

155 *Id.* at 84, 91.

156 *Id.* at 80.

157 *Id.* at 116.

"changed everything" in dealing with releases from UST systems.[158] In PFA litigation, the human exposure issue is different because the plaintiffs may have greater predictability in estimating exposure without the need to extrapolate causation from volume data.

What may be among the most instructive aspect of *City of New York* came during the third Phase of the trial on causation, design defect, failure to warn, trespass, private nuisance, public nuisance, negligence, and damages. Despite almost four years of intense focus on alternative theories of liability, including the MDL Court's commingled product liability theory, the jury's verdict determined that the refiner was liable under a traditional direct spiller theory; the jury never even got to alternative liability.[159] Nonetheless, the commingled-product evidence allowed evidence to get before the jury that would not have been present in a traditional spiller liability case.

In proving that the refiner defendant's conduct as a manufacturer, refiner, supplier, or seller of gasoline was a "substantial factor" in bringing about its injury, the City used three approaches. First, the City presented expert testimony that, because gasoline from different manufacturers was commingled before distribution, refiner defendant's gasoline "ended up in each of the retail gas stations in Queens and in their underground storage tanks" between 1985 and 2003.[160]

The jury also found the following:

- Gasoline with MTBE was not reasonably safe for its intended purposes or in light of the reasonably foreseeable harms, but it did not find that there was a safer alternative design.[161]
- The refiner failed to warn the public, and determined there were "inadequate warnings."[162]
- The City succeeded on its trespass, public nuisance, and negligence claims.[163]
- A damage award in the amount of $250,500,000.[164] The jury then reduced the amount by $70,000,000, the amount the City argued it would cost to treat contaminants other than MTBE.[165] The City originally requested damages in the amount of $250,450,000.
- 42% of the liability to the settling defendants, leaving defendant refiner with 58% and a verdict in the amount of $105,000,000.[166]

It is interesting, if not incongruous, that the jury found direct spiller liability and, without evidence having been submitted regarding the settling defendants' stations, allocated liability to those defendants. Had the jury been applying the Court's commingled

158 *See id.*
159 *Id.* at 91.
160 *Id.* at 116.
161 *Id.* at 121. This was no small victory for the defense, because, for over a decade, MTBE plaintiffs had argued that ethanol was a safer alternative, bringing into evidence an avalanche of decades old documents and testimony regarding the industry's choice of oxygenate to replace lead in gasoline.
162 *Id.* at 123.
163 *Id.* at 83.
164 *Id.* at 91.
165 *Id.*
166 *Id.*

product theory, the allocation may have made more sense even though the relative percentages had no bearing on the evidence introduced by either side.

2. THE SECOND CIRCUIT AFFIRMANCE

The Second Circuit held that, where the theory of market-share liability is permitted, a defendant may be held liable absent any showing that it caused or contributed to the plaintiff's injury; instead, a defendant may be presumed liable to the extent of its share of the relevant product market.[167] The Second Circuit noted that, despite the refiner defendant's complaint that the jury improperly considered market-share evidence, the jury instruction appropriately applied the state law and did not impose market-share liability upon the refiner defendant.[168] According to the Second Circuit, it "simply permitted the jury to draw upon market-share data as one piece of circumstantial evidence that [the refiner defendant] caused the City's injury."[169]

Despite years of litigating a market-share and a commingled product theory of liability, the City did not rely on either at trial. To the contrary, it identified the "exact defendant whose product injured" it and established that the refiner defendant's gasoline found its way into every underground storage tank in Queens during the relevant period.[170] In the end, this was a case where a defendant faced liability because of evidence linking its product to the plaintiff's purported injury. In PFAS litigation, unless the manufacturers can insist that no theory of alternate liability should apply, defendants should expect a similar protracted and imbalanced outcome.

In the final analysis, the market-share data adduced by the City served as proof that the refiner defendant's gasoline was delivered to gas stations in the vicinity "making it more likely than not" that the refiner defendant's gasoline played a substantial role in bringing about the City's injury.[171] The Second Circuit perceived a difference between employing market-share data in this fashion and imposing liability based solely on a defendant's share of the market in the absence of any evidence that the defendant's own product directly caused some of the harm alleged.[172] Both the trial court and the Second Circuit found that the City did not use market-share data as a substitute for showing that the refiner defendant's contributed to the contamination. Rather, the City used the market-share data to quantify the scope of that contribution. The lesson learned for PFAS litigation is that the jury needs a construct for apportioning damages.

3. STATE OF NEW HAMPSHIRE V. EXXON MOBIL CORPORATION

In the New Hampshire MTBE trial, the refiner defendant did not fare quite as well. In 2013, a New Hampshire state court jury awarded the state $236 million against a refiner, which was upheld by the New Hampshire Supreme Court and the U.S. Supreme Court through a denied *certiorari* petition.[173] The arguments raised by the State in the

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167 *Id.* at 115.
168 *Id.* at 115–16.
169 *Id.* at 114.
170 *Cf.* Hymowitz v. Eli Lilly & Co., 73 N.Y.2d 487, 504 (1989) (allowing recovery notwithstanding plaintiffs' inability to identify the manufacturer of injurious product).
171 *Id.*
172 *Id.* at 112.
173 State v. Exxon Mobil Corp., 168 N.H. 211 (2015).

New Hampshire case were slightly different and concerned the imposition of market-share liability based on abstract statistical exercises that obscured complex evidentiary issues of causation and actual injury. In the New Hampshire case, Plaintiff relied on statistical evidence in lieu of individualized proof.[174] The use of such evidence arguably prejudiced the right of the refiner defendant to present individualized defenses to each element of liability and to refute damages.

In rejecting the refiner defendant's arguments that market-share liability is not an acceptable theory of recovery and that the trial court erred in applying market-share liability in this case, the New Hampshire Supreme Court stated, "requiring the State to allege specifically which defendant caused each injury would create an impossible burden given the allegations of commingling of MTBE and the asserted indivisible injury to the State of New Hampshire's water supplies."[175] Such a mandate "would essentially allow the defendants to seek to avoid liability" when the focus of the claim is "that all defendants placed gasoline containing MTBE into the stream of commerce, thereby causing [the State's] injury."[176] Further, it would "allow claims for tortious conduct for discrete, identifiable, and perhaps lesser tortious acts, [but would] deny claims for tortious conduct where the conduct alleged may be part of group activity which is alleged [to] have led to a common, and more deleterious, result."[177]

The New Hampshire Supreme Court further observed that "situations exist where a plaintiff may not necessarily be able to identify, specifically, which members of a group, who are engaged in the same activity, caused his or her damages" and that "courts allow plaintiffs to prove causation through alternative theories of liability, including market-share liability and . . . commingled product theory."[178] Commingled product theory was not necessary for this litigation because "that theory only relieves the Plaintiff of its burden to prove the percentage of a particular Defendant's gasoline found at a particular site, and the court has already found that a specific site-by-site approach is unfeasible and unnecessary [here]."[179] Market-share liability, therefore, was appropriate for the case.[180]

Market-share liability allows courts to "fashion remedies to meet [the] changing needs[i]n an era of mass production and complex marketing methods."[181] To do otherwise and "adhere rigidly to prior doctrine, denying recovery to those injured by" products produced "[i]n our contemporary complex industrialized society," may allow producers to escape liability because the harm "cannot be traced to any specific producer."[182] The Court observed, "[i]n an era of mass production and complex marketing methods[,] the traditional standard of negligence is insufficient to govern the obligations of manufac-

174 *See id.*
175 *Id.* at 241.
176 *Id.*
177 *Id.*
178 *Id.* at 241–42 (quoting New Hampshire v. Hess Corp., 20 A.3d 212 (N.H. Super. 2011)).
179 *Id.* (quoting *Hess Corp.*, 20 A.3d 212).
180 *Id.* (quoting *Hess Corp.*, 20 A.3d 212).
181 *Id.* at 242 (quoting *Hess Corp.*, 20 A.3d 212).
182 *Id.* (quoting *Hess Corp.*, 20 A.3d 212).

turer to consumer[. C]ourts should acknowledge that some adaptation of the rules of causation and liability may be appropriate in these recurring circumstances."[183]

In determining whether market-share liability applied, the Court relied on the *Restatement (Third) of Torts: Products Liability*, which sets forth six factors that provide a general framework for analysis:

> (1) The generic nature of the product;
>
> (2) the long latency period of the harm;
>
> (3) the inability of plaintiffs to discover which defendant's product caused plaintiff's harm;
>
> (4) the clarity of the causal connection between the defective product and the harm suffered by plaintiffs;
>
> (5) the absence of other medical or environmental factors that could have caused or materially contributed to the harm; and
>
> (6) the availability of sufficient "market share" data to support a reasonable apportionment of liability.[184]

The Court determined that in this case "these factors weigh heavily in favor of utilizing market share liability."[185]

In the New Hampshire MTBE case, the refiner defendant moved for summary judgment on the issue of causation, asserting that New Hampshire had not adopted the market-share liability theory, and that "the theory is contrary to New Hampshire law."[186] The trial court reached the opposite conclusion, however, reasoning that "New Hampshire Supreme Court has repeatedly expressed its willingness to provide plaintiffs with a less stringent burden of proof where they face a 'practically impossible burden,'" and given that willingness, New Hampshire law is not opposed to market-share liability.[187] The trial court dismissed defendant's "suggestion that market-share liability is synonymous with absolute liability" because plaintiffs proceeding under market-share liability "must prove that the defendants breached a duty to avoid an unreasonable risk of harm from their products. . . . [which] is a separate and distinct burden." Only then is the plaintiff "entitled to a relaxed standard for proving causation."

The trial court then applied the six *Restatement* factors, determining market-share liability was appropriate.[188] The court determined that: (1) MTBE is fungible or interchangeable with other brands of the same product; (2) MTBE was not latent because it travels faster and further than other chemicals; (3) the plaintiffs would be unable to identify which defendant caused the harm because the gas commingled in storage tanks at stations; (4) the causal connection between the defect and harm favored the state because the market alone does not reflect the risk; (5) the defendant had not asserted

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183 *Id.* (quoting *Hess Corp.*, 20 A.3d 212).

184 RESTATEMENT (THIRD) OF TORTS: PRODUCTS LIABILITY § 15 cmt. c (AM. LAW INST. 1998).

185 *Exxon Mobil*, 168 N.H. at 242 (quoting *Hess Corp.*, 20 A.3d 212).

186 *Id.* (quoting *Hess Corp.*, 20 A.3d 212).

187 *Id.* (quoting *Hess Corp.*, 20 A.3d 212).

188 *Id.* at 242–43 (quoting *Hess Corp.*, 20 A.3d 212)

whether other factors could have contributed to the harm; and (6) enough market data was available to proceed.[189]

Following the jury verdict, the refiner defendant moved for judgment notwithstanding the verdict (JNOV) and the Court observed that the defendant "had raised, and the court had rejected, all of these arguments before, and because [the refiner defendant] raised no new law or facts to support its motion, the court addressed [the defense] arguments 'only for the purpose of further explanation and clarification.'"[190]

The trial court also addressed the refiner defendant's argument that market-share liability did not apply "because MTBE gasoline could be traced to a supplier from the refinery."[191] The trial court reasoned, "[i]t is wholly irrelevant that gasoline might be traceable to a particular supplier from a wholesale distributor or even the refinery because, as the State alleged, once the gasoline causes harm, it cannot be traced to a supplier, distributor, or refiner." Further, the court considers, "[t]he jury heard evidence to this extent, and could thereby have found that the State met the requisites of relying on market-share liability for causation purposes."[192]

The defense argued that the jury needed to first find that the State could not prove traditional causation before it could find the State was entitled to rely upon market-share liability.[193] The trial court dismissed this argument, stating "market-share liability 'did not require the State to prove that it could not establish traditional causation."[194] Rather, the State must "show that it could not identify the tortfeasor responsible for its injury. The 'last resort' requirement focuses on the inability of the plaintiff to identify the manufacturer of a product, not the absence of alternative causes of action or theories of recovery."[195] Further, several State witnesses had "testified that MTBE gasoline is fungible and commingled at nearly every step in the distribution network."[196] Such commingling made it "impossible to trace from a spill or leak back from a contamination site to a retailer or supplier."[197] Accordingly, the court concluded, such testimony fulfilled the "State's burden of proving that it was unable to identify the specific tortfeasor responsible for its injury. The jury's verdict—finding that the State was unable to identify the specific tortfeasor responsible for its injury—was not conclusively against the weight of the evidence.[198]

The New Hampshire Supreme Court agreed that, "based upon [the Court's] willingness to construct judicial remedies for plaintiffs who would be left without recourse due to impossible burdens of proof, applying market-share liability was justified in the circumstances presented by this case." Further, the record sufficiently showed the State provided enough evidence to prove all the elements of its claims.[199] Additionally, the

189 *Id.* at 242–43 (quoting *Hess Corp.*, 20 A.3d 212).
190 *Id.* at 244 (quoting *Hess Corp.*, 20 A.3d 212).
191 *Id.*
192 *Id.* at 244–45 (quoting *Hess Corp.*, 20 A.3d 212).
193 *Id.* at 245 (quoting *Hess Corp.*, 20 A.3d 212).
194 *Id.*
195 *Id.*
196 *Id.*
197 *Id.*
198 *Id.*
199 *Id.* at 249–50.

jury found MTBE gasoline to be fungible; the State could not "trace MTBE gasoline found in groundwater and in drinking water back to the company that manufactured or supplied that MTBE gasoline;" and the State had "identified a substantial segment of the relevant market for gasoline containing MTBE."[200]

The Court also found that the jury's instructions on market-share liability were also appropriate:

> If the State has been harmed by a product that was manufactured and sold by any number of manufacturers and suppliers, and the State has no reasonable means to prove which manufacturer or supplier supplied the product that caused the injury, then the State may use market-share liability to satisfy its burden of proof. Under market-share liability, ExxonMobil is responsible for the State's harm in proportion to ExxonMobil's share of the market for the defective product during the time that the State's harm occurred.
>
> Market-share liability requires that the State . . . prove all the elements for negligence, or strict liability defect in design, or strict liability based on a failure to warn and that the State suffered harm. In addition, the State must prove the following: (1) it has identified enough MTBE gasoline manufacturers or suppliers in this case so that a substantial share of the relevant market is accounted for; and (2) MTBE gasoline is fungible, meaning that one manufacturer's or supplier's MTBE gasoline is interchangeable with another's; and (3) the State cannot identify the manufacturer or supplier of the MTBE gasoline that caused the harm.[201]

Finally, the Supreme Court found "no error with the trial court's ruling that the jury was entitled to determine that [the refiner defendant] could be held liable for its percentage of the supply market."[202] According to the trial court, the defendant "had or should have had knowledge of the characteristics of MTBE gasoline" from its refining role and "a jury could find Exxon liable for MTBE gasoline it supplied but did not refine." Additionally, "the jury was entitled to estimates of supplier and refiner market share and that both reflected [the defendant's] creation of the risk within the State[; a]ny figure within this spectrum would be an appropriate measure of the State's damages."[203]

D. Establishing Damages—Trial By Statistics

Prejudice is a recurring problem in state-initiated enforcement actions against industry. Requiring the state to offer actual evidence of specific damages merely challenges the court to ensure defendants' due process rights and the constitutionally-guaranteed opportunity to present a defense to the claims and to answer for alleged liability based on verifiable facts, not mere statistical extrapolation.[204] Cases allowing alternative liability theories threaten defendants' due process rights by permitting trial-by-formula theories of liability that deprive defendants of the right to present individualized defenses to liability. In *Wal-Mart Stores, Inc. v. Dukes*, the Supreme Court disapproved of "Trial by

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200 *Id.*
201 *Id.* at 251 (quoting New Hampshire v. Hess Corp., 20 A.3d 212 (N.H. Super. 2011)).
202 *Id.*
203 *Id.* (quoting *Hess Corp.*, 20 A.3d 212) (quotations omitted).
204 Wal-Mart Stores, Inc. v. Dukes, 131 S. Ct. 2541, 2561 (2011).

Formula," citing the Rules Enabling Act provision that procedural rules cannot abridge substantive rights.[205] Prejudice is problematic where the government is the plaintiff and the claims are brought as *parens patriae* actions, which allow the plaintiff to pursue *de facto* aggregated claims.

In *Dukes*, the United States Supreme Court rejected relying on a small subset of data to extrapolate proof of liability and damages to an entire class. In *Dukes*, the Court of Appeals authorized a procedure under which "[a] sample set of . . . class members" seeking damages for alleged gender discrimination in pay and promotions "would be selected, as to whom liability for sex discrimination and the backpay ow[ed] as a result would be determined in depositions supervised by a master."[206] Once a percentage of claims were determined to be valid, the percentage was applied to the class, and presumptively valid claims were multiplied by the average backpay awards to arrive at recovery for the entire class.[207] Wal-Mart was limited to presenting individual defenses only in the "'randomly selected sample cases.'"[208]

The Supreme Court in *Dukes* rejected the Ninth Circuit approach, holding that Wal-Mart was "entitled to individualized determinations of each employee's eligibility for backpay."[209] The Supreme Court criticized the Ninth Circuit's "novel project" and "Trial by Formula."[210] The Supreme Court held that "a class cannot be certified on the premise that Wal-Mart will not be entitled to litigate its statutory defenses to individual claims."[211] The due process clause requires that a defendant be entitled to present individualized defenses to each claim of injury, stating "the Due Process Clause prohibits a State from punishing an individual without first providing that individual with an opportunity to present every available defense."[212]

Other state and federal district courts have recognized that due process protections extend to presenting individualized defenses during a litigation involving aggregated injury claims. The California Supreme Court, for instance, drew on due process principles and the decision in *Dukes* to reject the trial court's "decision to extrapolate class wide liability from a small sample."[213] In *Duran*, the trial court barred the defendant from introducing individualized evidence to challenge liability, declaring that "[t]he injustice of this result is manifest," explaining that "statistical methods," such as representative testimony and sampling "cannot so completely undermine a defendant's right to present relevant evidence."[214] Another federal district court held that "[t]ruly individual issues . . . must be adjudicated individually and not by statistical inference."[215] In *Bustillos v. Bd. of Cnty. Comm'rs of Hidalgo Cnty*, the court held that "trials by formula . . . violate[ ]

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205 *Id.*
206 *Id.*
207 *Id.*
208 *Id.* at 2550 (citation omitted).
209 *Id.* at 2560.
210 *Id.* at 2561.
211 *Id.*
212 Philip Morris USA v. Williams, 549 U.S. 346, 353 (2007). *See also* Lindsey v. Normet, 405 U.S. 56, 66 (1972).
213 Duran v. U.S. Bank Nat'l Ass'n, 325 P.3d 916, 935 (Cal. 2014).
214 *Id.* at 936.
215 Bustillos v. Bd. of Cnty. Comm'rs of Hidalgo Cnty., 310 F.R.D. 631, 660 (D.N.M. 2015).

the defendant's right to have (i) each element of (ii) each claim asserted against it by (iii) each class member specifically proven."[216]

In the MTBE litigation, prejudice from the use of statistical evidence by simply eliminating the State's burden of proof was evident and the MDL Court early on had recognized that discerning the extent of liability and damages is exceedingly complex.[217] Nonetheless, to overcome the complexity recognized by the MDL Court, the New Hampshire Supreme Court allowed the State to overcome this evidentiary showing by relying on statistical extrapolation, thus denying the defendant of an opportunity to develop evidence rebutting the State's claims of broad contamination.[218]

The State of New Hampshire's claim was an aggregation of separate claims that the refiner defendant contaminated various different wells from different UST sites.[219] An individual lawsuit over a single well would unquestionably require proof that the defendant had contaminated that well specifically. But through the aggregation of claims, the State avoided the burden of proving actual contamination in each well and adducing expert testimony concerning approximately 6,000 wells by extrapolating data from six of them. The State was provided the highly preferential privilege and prejudicial convenience of simply multiplying liability based on the evidence from six wells. As in baseball, we could simply aggregate a team's statistics from prior games, aggregate hits, errors, RBI's, and wins and losses of teams at the beginning of the season and determine who will win how many games and is entitled to be the World Series Champions before the first game is even played. Trial by statistics is no different.

The constitutional problems were significant in the New Hampshire case where the state proceeded under its *parens patriae* authority in state court.[220] Because *parens patriae* actions and jurisdictional rights of state sovereigns present obstacles to federal court removal, the federal system's statutory and judicially created procedural safeguards that govern aggregate litigation did not apply that MTBE litigation. While "the constraints of the Due Process Clause will be the only federal protection," those protections can be threatened when a state is the plaintiff.[221] *Parens patriae* actions have been questioned for just this reason and the jurisdictional issue is certain to be litigated further.

In the New Hampshire MTBE litigation, petitioners were forced to abandon the individualized defenses they could have raised in suits based on individual wells and instead to defend an extrapolation that premised liability for thousands of wells on just six of them. The Supreme Court declined to review the "Trial by Formula" produced in New Hampshire or to clarify the due process infringement that such action present.[222]

While U.S. Supreme Court decisions have curbed class action abuses by limiting the aggregation of claims, Plaintiffs' attorneys have turned to partnerships with state attorneys general to bring the same types of suits they once brought as private class actions as *parens patriae* actions—an effective end-run around the Supreme Court's class action decisions. Given the monetary incentives involved for private counsel, these proceedings

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216 *Id.* at 660, 660 n.9 (noting due-process concerns raised by "trials by statistics").
217 *See, e.g.*, *In re* MTBE Prods. Liab. Litig., 209 F.R.D. 323, 344 (S.D.N.Y. 2002).
218 State v. Exxon Mobil Corp., 168 N.H. 211, 255–56 (2015).
219 *Id.* at 251–52.
220 *Id.* at 312; *see* discussion *infra* Part III.E.
221 Phillip Morris USA v. Scott, 561 U.S. 1301, 1304.
222 Exxon Mobil Corp. v. New Hampshire, 136 S. Ct. 2009, 2010 (2016).

can abandon the pretense of prosecutorial restraint, instead using governmental muscle to strong-arm businesses to pay excessive sums of money irrespective of the merit of the underlying claims. While enriching plaintiff lawyers retained by the state and replenishing state coffers may seem harmless to some observers, the payments frustrate innovation and pass additional costs to U.S. consumers, doing little, if anything, to serve any measurable societal need.

The tendency of states to involve private contingency–fee counsel in *parens patriae* suits contributes to the confusion because contingency–fee counsel seeks to maximize the number of alleged violations and the size of the penalty for each, an approach that has led to massive verdicts in some cases that have gone to trial. It is common for state courts, such as in the New Hampshire case, to refuse to impose procedural limitations on proving aggregated claims of violations of state law, and *parens patriae* suits uniquely permit a "slash–and–burn–style of litigation" that threatens to turn courts into "an engine of an industry's unnecessary destruction."[223]

E. *Parens Patriae*

When a state is suing to protect a public interest that affects a substantial number of citizens, federal courts have recognized the *parens patriae* doctrine to support standing.[224] Under *parens patriae*, recoverable damages should be limited to those that are "public" in nature.[225] *Parens patriae* has a long history of viable use in both state and federal courts, particularly in the context of antitrust and environmental litigation. States have used the doctrine to collect monetary or equitable relief from corporations that allegedly harm a substantial number of its residents. In the MBTE litigation, the doctrine has served as a means for states to assert standing for tort and environmental claims.

A state traditionally has standing in various capacities at common law as a safeguard of the people.[226] However, the power of the State to serve as a litigant on behalf of its residents has expanded beyond these boundaries in the past century. Today, a State may seek monetary or equitable relief from private parties on the basis that the State is protecting a substantial public interest of its residents.[227] This doctrine of standing is known as *parens patriae* ("parent of the nation").[228]

In 1907, the Supreme Court decided its first environmental *parens patriae* case, where the State of Georgia sued to enjoin mining by a Tennessee company whose work was polluting the air of bordering Georgia counties.[229] Justice Holmes wrote that "[i]t is a fair and reasonable demand on the part of a sovereign that the air over its territory should not be polluted on a great scale" and that the magnitude of the pollution warranted allowing state standing in the suit.[230]

Federal law establishes certain elements for a state to properly maintain *parens patriae* standing. First, the state must articulate a sovereign or quasi-sovereign public interest

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223 *In re* Zyprexa Prods. Liab. Litig., 671 F. Supp. 2d 397, 463–64 (E.D.N.Y. 2009).
224 Hawaii v. Standard Oil Co., 405 U.S. 251, 258 (1972).
225 *See id.* at 258–59.
226 *Id.* at 157.
227 Alfred L. Snapp & Son v. Puerto Rico *ex rel.* Barez, 458 U.S. 592, 607 (1982).
228 *Id.*
229 Georgia v. Tennessee Copper Co., 206 U.S. 230 (1907).
230 *Id.* at 238–39.

that it is litigating to protect.[231] While a sovereign interest concerns the authority of the state itself, a "quasi-sovereign" interest can concern the physical or economic well-being of its residents.[232] For example, in *Puerto Rico ex rel. Quiros v. Alfred L. Snapp & Sons, Inc.*, Puerto Rico had a quasi-sovereign interest in Virginia farming because the farmers who did not adequately participate in a federal migrant-worker employment program affected the economic well-being of Puerto Rican workers.[233] Second, the state must show that the injury affects a "substantial" portion of the state's population.[234] Finally, the state, like all litigants, needs to show that the defendant's actions are "fairly traceable" to the particularized injury.[235] For example, in *Massachusetts*, the Court, over a strong dissent,[236] found that pollution to a state's coastline could be fairly traceable to the EPA inaction on climate change.[237] Overall, if the state cannot present that (1) its litigation is in protection of a quasi-sovereign public interest, (2) the alleged injury affects a substantial segment of its population, and (3) the actions of the defendant are fairly traceable to the injury, then federal standing under *parens patriae* is not appropriate.[238]

No court has yet followed the dissent in *Massachusetts v. EPA*. In that case, Massachusetts sought to challenge the EPA in court because it was not doing more to combat climate change.[239] In his dissent in *Massachusetts v. EPA*, Chief Justice Roberts reasoned that the alleged causal link between EPA inaction and the state's coastline damage was too speculative to establish standing.[240] The majority disagreed with Roberts, ruling that the state had sufficiently established an injury that was fairly traceable to the EPA.[241] Massachusetts, which sued under the *parens patriae* doctrine, still had to meet this causation element of standing.[242] However, the majority recognized that Massachusetts was a state entity working to protect a quasi-sovereign interest.[243] Because it sued through

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231 Puerto Rico *ex rel.* Quiros v. Alfred L. Snapp & Sons, Inc., 632 F.2d 365, 368 (4th Cir. 1982).

232 *Id.*

233 *Id.* at 369–70. Note that the state need not show a particularized injury *to itself* under the *parens patriae* doctrine. Instead, the injury must be to its residents.

234 *Id.* at 370.

235 Massachusetts v. EPA, 549 U.S. 497, 517 (2007).

236 Traceability and causation are difficult concepts in the context of standing and a state's pleadings must sufficiently link the defendant to the wrongdoing. In *Massachusetts*, Justice Roberts dissented in the 5-4 case: "Petitioners are never able to trace their alleged injuries back through this complex web to the fractional amount of global emissions that might have been limited with the EPA standards. In light of the bit-part domestic new motor vehicle greenhouse gas emissions have played in what petitioners describe as a 150–year global phenomenon, and the myriad additional factors bearing on petitioners' alleged injury—the loss of Massachusetts coastal land—the connection is far too speculative to establish causation." *Id.* at 544–45 (Roberts, C.J., dissenting).

237 *Id.* at 534–35 (majority opinion).

238 *Quiros*, 632 F.2d at 368, 369–70; *Massachusetts*, 549 U.S. at 517.

239 *Massachusetts*, 549 U.S. at 505.

240 *Id.* at 544–45 (Roberts, C.J., dissenting).

241 *Id.* at 534–35 (majority opinion).

242 *Id.* at 516.

243 *Id.* at 520.

parens patriae, it warranted a "special solicitude in [the] standing analysis."[244] This solicitude implies a sort of levity that will be afforded to state plaintiffs in *parens patriae* cases.[245]

The traceability analysis is fundamental to Article III standing law, serving as the second element of the *Lujan* test that all plaintiffs must satisfy in order to establish standing.[246] The Court in *Lujan* articulated this element as a "causal connection between the injury and the conduct complained of—the injury has to be 'fairly . . . trace[able] to the challenged action of the defendant, and not . . . th[e] result [of] the independent action of some third party not before the court.'"[247] States that fail to meet the *Lujan* elements may not proceed under *parens patriae* standing because federal courts lack jurisdiction to hear the suit.[248] In *Gonzales*, "myriad additional contingencies" prevented the State of Colorado from successfully arguing that the Department of Homeland Security's inaction on illegal immigration could be traceable to an increased risk of terrorist attack within the state.[249] Such contingencies were so dependent upon non-party action (in that case, potential terrorism), that standing to sue was not proper.[250]

In the context of pollution, the Second and Third Circuits have utilized a three-part test regarding the fairly-traceable element. In that test, a plaintiff must show that the defendant has (1) discharged some pollutant in concentrations greater than allowed by its permit (2) into a waterway in which the plaintiffs have an interest, and (3) that this pollutant contributes to the kinds of injuries alleged by the plaintiffs.[251] The plaintiff need only state some contribution to the larger pollution on part of the defendant.[252] The Connecticut court concluded that the exact level of contribution "is an issue best left to the rigors of evidentiary proof at a future stage of the proceedings, rather than dispensed with as a threshold question."[253] Nonetheless, for any *parens patriae* case, the threshold question is whether the state has alleged sufficient facts to support standing. Therefore, discovery needs to be tailored to determine the state's standing to bring the claims asserted.

In the MTBE MDL, defendants challenged standing of states to sue. The MDL court held that standing is a federal question, "which does not depend on the party's prior standing in state court."[254] The district court stated that to establish Article III standing,

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244 *Id.*

245 *See* Wash. Envtl. Council v. Bellon, 732 F.3d 1131, 1145 (9th Cir. 2013) ("Plaintiffs are private organizations, and therefore cannot avail themselves of the 'special solicitude.'").

246 Lujan v. Defenders of Wildlife, 504 U.S. 555, 560–61 (1992).

247 *Id.* at 560 (alteration in original) (quoting Simon v. E. Ky. Welfare Rights Org., 426 U.S. 26, 41–42 (1976)).

248 Colorado v. Gonzales, 558 F. Supp. 2d 1158, 1162–63 (D. Colo. 2007).

249 *Id.* at 1163.

250 *Id.*

251 Connecticut v. Am. Elec. Power Co., 582 F.3d 309, 346 (2d. Cir. 2009) (citing Pub. Interest Research Group of N.J., Inc. v. Powell Duffryn Terminals Inc., 913 F.2d 64, 72 (3d. Cir. 1990)), *rev'd on other grounds*, 564 U.S. 410 (2011).

252 *Id.* at 347.

253 *Id.*

254 *In re* MTBE Prods. Liab. Litig., Nos. 1:00-1898, 2005 U.S. Dist. LEXIS 12400, at *18 (S.D.N.Y. Jun. 24, 2005).

the plaintiff must show "(1) it has suffered injury-in-fact;[255] (2) the injury is fairly traceable to the challenged action; and (3) it is likely that the injury will be redressed by a favorable decision."[256]

The MTBE MDL court has not ruled against the applicability of *parens patriae* as a standing doctrine.[257] Overall, the MDL precedent views "standing" and "stating a claim" as similar concepts. For example, Puerto Rico sued oil producers in the MTBE MDL under its Environmental Public Policy Act (EPPA), which created a cause of action to collect damages for pollution cleanup, and vested the government with the power to sue to recover damages.[258] Although Puerto Rico claimed to have federal standing as the trustee of its water resources[259] under *parens patriae*, the First Circuit has previously viewed the issue as "more properly [described as] whether plaintiffs have stated a cognizable cause of action."[260] In that MTBE case, the defendant corporations failed to establish why Puerto Rico was precluded from suing under *parens patriae* and the government's valid causes of action under EPPA did not displace its common law tort claims.[261]

State courts in the MTBE litigation have articulated some of the limitations of the *parens patriae* standing doctrine. In the State of New Hampshire case, the recovery was limited.[262] While the state may have been the trustee of the groundwater under *parens patriae*, the State's Supreme Court held that "not all potential damages related to MTBE contamination in New Hampshire waters can properly be recovered by the State in its capacity as *parens patriae*."[263] Unrecoverable "private" damages included "diminution in value of private property, lost business expenditures and other business and economic losses resulting from MTBE contamination."[264] The New Hampshire Supreme Court, however, allowed the state to recover for the costs of "investigating, monitoring, treating, remediating, replacing, or otherwise restoring" groundwater wells.[265]

The New Hampshire court based its conclusions on federal cases in the Tenth Circuit, which held that plaintiffs in *parens patriae* cases cannot recover for injuries to "private interests."[266] While the *parens patriae* plaintiff can recover for damages to the

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255 In the *parens patriae* doctrine, this element would be substituted with a quasi-sovereign interest being injured. *See supra* note 231 and accompanying text.

256 *In re* MTBE Prods. Liab. Litig., 2005 U.S. Dist. LEXIS 12400, at *10.

257 *See In re* MTBE Prods. Liab. Litig., 2014 U.S. Dist. LEXIS 28287, at *3 (S.D.N.Y. Mar. 3, 2014) ("Plaintiffs purport to bring their common law claims . . . in their sovereign capacity as *parens patriae*"); *In re* MTBE Prods. Liab. Litig., 2015 U.S. Dist. LEXIS 26363, at *4 (S.D.N.Y. Mar. 2, 2015) ("In its authority as *parens patriae*, the Commonwealth asserts public nuisance, trespass, and negligence claims . . .").

258 *In re* MTBE, 2015 U.S. Dist. LEXIS 26363, at *7–8.

259 *Id.*

260 *Id.* at *24 (alteration in original) (quoting Puerto Rico v. SS Zoe Colocotroni, 628 F.2d 652, 670 (1st Cir. 1980)).

261 *Id.* at *25–26.

262 New Hampshire v. Hess Corp., 20 A.3d 212, 221 (N.H. 2011).

263 *Id.*

264 *Id.*

265 *Id.*

266 Satsky v. Paramount Commc'ns, Inc., 7 F.3d 1464, 1470 (10th Cir. 1993). The *Satsky* court further ruled that, although the state has no standing to claim purely private damages, private individuals are not barred from pursuing those private damages in a subsequent suit.

natural resources of the state, it may not recover for damages more properly pursued by private individuals, such as "business and economic damages, including lost revenue or use of the land, harm to private water rights, and response costs associated with private property."[267] Distinguishing these cases, the New Hampshire court concluded that the contamination of private wells goes "beyond harm to an individual well owner" and that the State could recover for damage to these wells.[268] While the holding of the New Hampshire Supreme Court is not determinative of federal *parens patriae* standing, the decision's reasoning sheds some light on determining the scope of damages.[269]

Despite the standing issues generally raised in the MTBE litigation, the MTBE MDL has not produced definitive authority for determining the limitations of the *parens patriae* doctrine. Nonetheless, some considerations are worth noting. First, federal law on standing is applied in the federal district court.[270] Second, the party seeking Article III standing must seek redress for any injury fairly traceable to the defendant.[271] Third, *parens patriae* standing can be challenged when a state seeks damages that are private in nature, such as loss of property value or other economic losses.[272] Overall, the standing analysis will be similar to the basic question of pleading: whether the plaintiff sufficiently stated a claim and what damages might be at issue.[273]

To establish standing, states must allege that a defendant has injured a quasi-sovereign interest of the state and that this injury affects a substantial segment of the population.[274] Basic principles of standing still apply and a defendant must allege: (1) some actual or threatened injury to himself; (2) the injury can be fairly traced to the action of the defendant; and (3) the injury is likely to be redressed by a favorable decision.[275]

1. Substantial Segment of the Population

A state may not enter litigation against an actor under the doctrine of *parens patriae* as a nominal party in protection of a private interest. Rather, it must express a quasi-sovereign interest in the litigation that must affect a substantial portion of that state's

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Id. However, private individuals may not recover damages that are public in nature or any damages already recovered by the state. *Id.*

267 Quapaw Tribe of Okla. v. Blue Tee Corp., 653 F. Supp. 2d 1166, 1183 (N.D. Ok. 2009).

268 *Hess*, 20 A.3d at 221–222.

269 The New Hampshire Supreme Court also faced the *parens patriae* issue in a 2015 MTBE case, but it "decline[d] to address it substantively." New Hampshire v. Exxon Mobil Corp., 126 A.3d 266, 306 (N.H. 2015). The case did, however, hold that the state's standing under *parens patriae* did not warrant the imposition of a trust in the state's capacity as trustee for the tort damages. *Id.* at 312.

270 *See* Hollingsworth v. Perry, 570 U.S. 693, 715 (2013) ("[S]tanding in federal court is a question of federal law, not state law."); *In re* MTBE Prods. Liab. Litig., Nos. 1:00-1898, 2005 U.S. Dist. LEXIS 12400, at *17-18 (S.D.N.Y. Jun. 24, 2005).

271 *In re* MTBE Prods. Liab. Litig., 2005 U.S. Dist. LEXIS 12400, at *10.

272 *See Hess*, 20 A.3d at 221.

273 *In re* MTBE Prods. Liab. Litig., 2015 U.S. Dist. LEXIS 26363, at *24 (S.D.N.Y. Mar. 2, 2015).

274 Alfred L. Snapp & Son v. Puerto Rico *ex rel.* Barez, 458 U.S. 592, 607 (1982).

275 Lujan v. Defenders of Wildlife, 504 U.S. 555, 560–61 (1992); Valley Forge Christian College v. Ams. United for Separation of Church & State, Inc., 454 U.S. 464, 472 (1982).

population.[276] What exactly makes a segment of the state's population "substantial," however, is less than clear. The court in *Snapp* does not provide a formulaic approach, but rather analyzes whether the injury is so substantial or so threatening that state action, such as legislation, would be justified or expected.[277] *Parens patriae* standing is available only when an action has impacted, or threatens to impact, more than a small number of private residents.[278]

Cases analyzing *Snapp* court's requirement that an injury affect a substantial portion of residents look at potential injuries as well as concrete ones.[279] In measuring whether an injury affects a substantial portion of residents, courts look to see if the injury is the type that legislation would address.[280] In *Cain*, the district court found it significant that New York had passed a law designed to protect reproductive health facilities when the state's attorney general sought to enjoin protestors from blocking entrance to a facility.[281] It was unimportant that New York could not identify particular residents impacted by the defendant's behavior.[282] Because the State could identify legislation that concerned access to reproductive services, the injury was shown to be one of "sufficient magnitude and concern" to justify *parens patriae* standing.[283]

The *parens patriae* doctrine even allows states to sue in protection of relatively small classes of residents. A district court found that the State of Maryland and the District of Columbia, in their suit against Donald Trump,[284] alleged a substantial injury to their populations, even though the suit only concerned competitors to the Trump Hotel in Washington.[285] The court concluded that the states were "more than nominal parties" because a varied number of residents, from restauranteurs to hotel owners and their employees, were affected by the alleged violations of the emoluments clause.[286] Because these competitors to Trump Hotel constituted a "large segment of their commercial residents," state standing was recognized.[287]

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276 *Barez,* 458 U.S. at 607.

277 *See id.* ("One helpful indication in determining whether an alleged injury to the health and welfare of its citizens suffices to give the State standing to sue as *parens patriae* is whether the injury is one that the State . . . would likely attempt to address through its sovereign lawmaking powers.").

278 *Id.*

279 *See, e.g.*, New York v. Cain, 418 F. Supp. 2d 457, 471 (S.D.N.Y. 2006); Quapaw Tribe of Okla. v. Blue Tee Corp., 653 F. Supp. 2d 1166, 1179 (N.D. Ok. 2009).

280 *Barez,* 458 U.S. at 607.

281 *Cain*, 418 F. Supp. 2d at 471.

282 *Id.*

283 *Id.*

284 In *District of Columbia v. Trump*, an emoluments suit that addresses profound issues of constitutional law relating to the executive, the district court found that the plaintiff states had standing to sue the President. District of Columbia v. Trump, 291 F. Supp. 3d 725, 732 (D. Md. 2018).

285 *Id.*

286 *Id.* at 747–48.

287 *Id.* at 748.

Parens patriae suits alleging concrete or potential injuries to public health are classic examples of valid quasi-sovereign interests affecting wide segments of the population.[288] Water contamination is inherently not a private injury, and water's flow through the waterways or aquifers of a state could affect any of its residents. The state's inability to specifically identify individuals harmed by the contamination is unimportant so long as it can allege a substantial potential impact on residents.[289] Because water contamination has a great potential impact on public health and is something that legislation would actively regulate, the states may have little difficulty alleging an injury to a "substantial segment" of their population.

2. Traceability in the Second, Third, and Fourth Circuits

As stated, the Supreme Court in *Lujan* has required that a plaintiff plead (1) a particularized injury, (2) that is fairly traceable to the actions of the defendant, and (3) will likely be redressed by a favorable decision.[290] While a four-vote dissent in the Supreme Court urged a newer, more stringent take on the traceability analysis, the "fairly traceable" element of standing remains lenient, particularly for *parens patriae* state plaintiffs.[291] In the Second and Third Circuits, case law has attempted to better articulate what burden the state has to link an actor to a specific instance of pollution.

In *Powell Duffryn*, the Third Circuit concluded that the fairly traceable element need not be established "with absolute scientific rigor."[292] The traceability test is "not equivalent to a requirement of tort causation."[293] The plaintiff, however, must still show a substantial likelihood that the defendant caused the complained-of harm.[294] In water pollution cases, the plaintiff must therefore show some specific harm resulting from pollutants allegedly found in the defendant's effluent.[295] Affidavits linking the pollutant to a particularized injury, such as run-off grease to an offensive aesthetic injury, may pro-

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288 Connecticut v. Am. Elec. Power Co., 582 F.3d 309, 338 (2d Cir. 2009) (quoting Alfred L. Snapp & Son, Inc. v. Puerto Rico *ex rel.* Barez, 458 U.S. 592, 607 (1982)) ("[The states'] interest in safeguarding the public health and their resources is an interest apart from any interest held by individual private entities. Their quasi-sovereign interests involving their concern for the 'health and well-being of . . . residents in general' . . . are classic examples of a state's quasi-sovereign interest."), *rev'd on other grounds*, 564 U.S. 410 (2011).

289 *See* New York v. Cain, 418 F. Supp. 2d 457, 471 (S.D.N.Y. 2006).

290 Lujan v. Defenders of Wildlife, 504 U.S. 555, 560–61 (1992).

291 *See* Massachusetts v. EPA, 549 U.S. 497, 520 (2007) ("Given that procedural right and Massachusetts' stake in protecting its quasi-sovereign interests, the Commonwealth is entitled to a special solicitude in our standing analysis."). *But see id.* at 536 (Roberts, C.J., dissenting) ("Relaxing Article III standing requirements because asserted injuries are pressed by a state, however, has no basis in our jurisprudence, and support for any such 'special solicitude' is conspicuously absent from the Court's opinion.").

292 Pub. Interest Res. Grp. of N.J., Inc. v. Powell Duffryn Terminals, Inc., 913 F.2d 64, 72 (3d Cir. 1990).

293 *Id.*

294 *Id.*

295 *Id.* at 72–73 ("[I]f a plaintiff has alleged some harm, that the waterway is unable to support aquatic life for example, but failed to show that defendant's effluent contains pollutants that harm aquatic life, then plaintiffs would lack standing.").

vide a valid trace of the defendant to the injury.[296] While the state need not exhaustively prove that the defendant *in fact* polluted, it must sufficiently explain how the pollutant causes the harm.[297]

The Second Circuit followed the lead of *Powell Duffryn* in *American Electric* when it found that eight states had standing to sue power corporations for their pollution's impact on global warming.[298] The court concluded that the requirement that the plaintiff's injury be fairly traceable to the defendant "does not mean that plaintiffs must show to a scientific certainty that defendant's effluent, and defendant's effluent alone, caused the precise harm."[299] Rather than "pinpointing the origins of particular molecules," the plaintiff must merely allege that the defendant "discharges a pollutant that causes or contributes to the kinds of injuries alleged."[300] The states were not required to identify which specific harms were caused by a particular defendant; it sufficed that they alleged that the emissions all contributed to the injury.[301]

The Second and Third Circuit cases, notably *Powell Duffryn*, did not limit the scope of *Lujan* standing. Instead, they attempted to more clearly articulate how a plaintiff should trace a pollution-related injury to a defendant's action. As the cases frequently noted, this test for standing is not a causation analysis in which the plaintiff must prove that a defendant in fact polluted a water supply.[302] Instead, the court focused on whether the pollutant allegedly spilled is of the kind that would contribute to the plaintiff's alleged injury.[303] For example, the fact that some defendant leaked a chemical into the groundwater alone would likely be insufficient to show a particularized injury that reasonably results directly from the alleged pollution.

The Fourth Circuit has also followed the *Powell Duffryn* case as the standard for determining standing to sue in the environmental context.[304] To meet the traceability requirement, "plaintiffs must merely show that a defendant discharges a pollutant that 'causes or contributes to the kinds of injuries alleged by the plaintiffs.'"[305] Plaintiffs need not allege that a particular defendant is the sole cause of their injury; a showing of contribution is sufficient.[306] If a state can demonstrate how a particular defendant's discharge has the potential to create the alleged injury, the state may not need to identify a specific harm from a specific polluter.[307]

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296 *See id.* at 73.
297 *See id.*
298 Connecticut v. Am. Elec. Power Co., 582 F.3d 309 (2d Cir. 2009), *rev'd on other grounds*, 564 U.S. 410 (2011).
299 *Id.* at 346.
300 *Id.* at 347.
301 *Id.*
302 *Powell Duffryn Terminals, Inc.*, 913 F.2d at 72.
303 *See id.*
304 Natural Resources Defense Council v. Watkins, 954 F.2d 974, 980 (4th Cir. 1992).
305 *Id.* (quoting *Powell Duffryn*, 913 F.2d at 72).
306 *Id.*
307 Friends of the Earth, Inc. v. Gaston Copper Recycling Corp., 204 F.3d 149, 161 (4th Cir. 2000).

F. Evidentiary Burdens and the 12(b)(1) Motion

For pre-discovery dismissal, jurisdictional principles of civil procedure apply to the degree of specificity that the plaintiff must "merely show" in alleging that the defendant is polluting.[308] In response to a motion for dismissal on a lack of standing, the burden is on the state to establish specific facts by affidavit or other evidence to support its allegations.[309] However, this proof is not required as a threshold matter[310] to invoke jurisdiction, as uncontested allegations are presumed true.[311]

In Pennsylvania, a district court magistrate judge vacated her previous decision in which she dismissed a complaint because the plaintiff had failed to support its allegations of pollution with evidence.[312] On rehearing, the court concluded that the plaintiffs "were not obligated to present evidence to support its allegations where, as here, [the defendant] did not submit any contrary evidence or place them at issue."[313] If allegations are uncontested, the court should presume them as true.[314] This decision adheres to the rule that a court "must permit the plaintiff to respond with evidence supporting jurisdiction" before dismissing the complaint under Rule 12(b)(1).[315] The court may then determine jurisdiction by weighing evidence, allowing the suit to proceed to trial if the trial court is satisfied that standing exists.[316] The court should only grant the motion to dismiss if the plaintiff's allegations are "wholly insubstantial and frivolous."[317] The trial court may also defer this determination.[318]

The Fourth Circuit follows other circuits in holding that the plaintiff must allege an injury that likely results from the kind of pollution allegedly committed by the defen-

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308 *Id*. *See generally* Fed. R. Civ. P. 12(b)(1) (authorizing dismissal of a complaint on jurisdictional or standing grounds).

309 EarthReports, Inc. v. U.S. Army Corps of Eng'rs, No. 8:10-cv-01834-AW, 2011 WL 4480105, at *7 (D. Md. Sept. 26, 2011).

310 Courts may allow for discovery to determine factual issues regarding standing; a motion for summary judgment for lack of standing is allowed at trial, as is a motion challenging the subject matter jurisdiction of the court. Gladstone v. Vill. of Bellwood, 441 U.S. 91, 115 (1979).

311 *Id*.

312 PennEnvironment v. RRI Energy Ne. Mgmt. Co., No. 07-475, 2010 U.S. Dist. LEXIS 102220, at *10 (W.D. Pa. Sep. 28, 2010).

313 *Id*.

314 *Id*. at *7.

315 *Id*. (quoting Gould Electronics Inc. v. United States, 220 F.3d 169, 177 (3d Cir. 2000)).

316 *Gould*, 220 F.3d at 177.

317 *Id*. at 178.

318 A 12(b)(1) motion to dismiss would, for our purposes, be a factual challenge to jurisdiction as opposed to a facial attack. *See* Holt v. United States, 46 F.3d 1000, 1003 (10th Cir. 1995) (noting that while a facial attack on the pleadings would determine if the presumed-true pleadings would merit recovery, a factual attack measures the sufficiency and credibility of the jurisdictional evidence); *Gould*, 220 F.3d at 177 (indicating that in a factual attack, the defendant may present evidence outside the pleadings); Mortensen v. First Fed. Sav. & Loan Ass'n, 549 F.2d 884, 890 (3d Cir. 1977) ("[N]o presumptive truthfulness attaches to plaintiff's allegations, and the existence of disputed material facts will not preclude the trial court from evaluating for itself the merits of jurisdictional claims.").

dant.[319] The plaintiff need not support these allegations with further evidence to establish the fairly traceable element of standing. However, evidence of a defendant's polluting activity will be required if the defendant offers a factual attack on the plaintiff's basis for standing through a 12(b)(1) motion.[320]

IV. CONCLUSION

As science develops and evolves, identifying more persistent chemicals in the environment and at lower concentrations than were imaginable decades ago when the products were in distribution, so too has the world in which cases and controversies are litigated. Prior large-scale litigation focused on large, deep pocket, upstream manufacturers and producers, and for good reason. Upstream parties have proven far easier to identify. On the other hand, downstream processors, distributors and users are not immune from enforcement and litigation and, collectively, will have massive resources. In prior litigation involving market-based allocation schemes, these downstream defendants presented a far more complicated evidentiary challenge on identifying the proper party and marshaling evidence to establish liability, causation, and damages. No prior litigation has presented the scope of exposure, risk and industry liability that PFAS presents. While much is being done industry-wide to mitigate risk, individual downstream processors, distributors, and users sitting idle in response to this looming liability does not guarantee that the coming litigation freight train will hit them, but taking a few proactive steps may nudge them off the rails.

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319 Friends of the Earth, Inc. v. Gaston Copper Recycling Corp., 204 F.3d 149, 161 (4th Cir. 2000).

320 *PennEnvironment*, 2010 U.S. Dist. LEXIS 102220 at *10.

Responsibility in Catastrophe: Are the Fiscal Requirements for Offshore Oil Leasing Sufficient to Cover the Costs of a Major Oil Spill?

By Annie Brethour

I. Introduction

On April 20, 2010, the *Deepwater Horizon* oil drilling rig suffered a catastrophic blowout that killed eleven people and released over three million barrels of oil into the Gulf of Mexico ("GOM") over the following four months. The fallout from this spill was extreme, and the costs to clean up the spill were incredibly high. As proven by the *Deepwater Horizon* blowout, clean-up costs associated with large-scale oil spills are incredibly expensive. In 2016, BP stated that it expected the pre-tax cost of the *Deepwater Horizon* blowout to total $61.6 billion.[1] And the *Refugio* spill in 2015, which was only

1 Nathan Bomey, *BP's Deepwater Horizon costs total $62B*, USA Today (Jul. 14, 2016), https://www.usatoday.com/story/money/2016/07/14/bp-deepwater-horizon-costs/87087056/ (This will total $44 billion after taxes are factored out and includes settlement costs for the over three million barrel spill. Nathan Bomey, *BP's Deepwater Horizon costs total $62B.*); Paul Davidson, *Justice files $20B BP oil spill deal with court*, USA Today (Mar. 23, 2016), https://www.usatoday.com/story/money/2016/07/14/03/23/justice-files-20b-bp-deepwater-horizon-costs/87087056/. oil-spill-deal-court/82159526/ (The largest settlement associated with this spill was a $20 billion settlement filed by the Justice Department, which includes a $5.5 billion civil penalty and $8.1 billion in damage claims.) This is the largest environ-

3,400 barrels of oil, has cost over $100 million in clean-up efforts.[2] To drill an offshore well, a company must demonstrate Oil Spill Financial Responsibility ("OSFR"),[3] but the maximum bond required is only $150 million—a drop in the bucket compared to the actual cost of a worst-case spill.[4]

This article examines the inadequacies of OSFR by comparing the actual costs of oil spill clean-up with what the regulations require for the same volume of oil spilled. Unfortunately, it is not a matter of if another oil spill will occur in the marine environment, but when. And as the Trump Administration increases offshore drilling, the likelihood of another catastrophic oil spill also increases. Despite the incredibly high costs associated with clean-up efforts for large-scale oil spills, the OSFR bond requirements associated with offshore oil drilling remains comparatively low. Therefore, the OSFR requirements should be increased to ensure that the communities directly affected by large-scale oil spills can be properly compensated for the disaster.

The beginning of the environmental protection movement has been traced to the 1969 Union Oil well blowout in Santa Barbara, California, which resulted in three million gallons of oil spilled.[5] When the blowout began, the oil company only had straw on

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mental law settlement in history. *Id*. *See also Economic and Property Damages Settlement Agreement*, DEEPWATER HORIZON COURT-SUPERVISED SETTLEMENT PROGRAM, http://www.deepwaterhorizonsettlements.com/Economic/Settlement Agreement.aspx. (last visited Apr. 9, 2019).

2 Lance Orozco, *Prosecutors Get Ready for Trial of Oil Pipeline Company for 2015 Spill in Santa Barbara County*, KCLU (Jan. 17, 2018), http://kclu.org/post/prosecutors-get-ready-trial-oil-pipeline-company-2015-spill-santa-barbara-county. For comparison, the volume of oil spilled would have only required $35 million in OSFR, which would have barely touched the actual cost of cleanup. 30 C.F.R. § 553.13(b)(1).

3 *Compare* 30 C.F.R. § 553.13(b)(1) (2011), *with* Susan Lyon & Daniel J. Weiss, *Oil Spills by the Numbers*, CENTER FOR AMERICAN PROGRESS (Apr. 30, 2010), https://www.americanprogress.org/issues/green/news/2010/04/30/7620/oil-spills-by-the-numbers/ (establishing the costs of the 1989 *Exxon-Valdez* spill in Alaska were approximately $3.8 billion in cleanup costs, fines, and compensation, in addition to the punitive damages, which were reduced to $507 million after 15 years of appeals. Under OSFR requirements, a spill with the volume of *Exxon Valdez* would have required the highest category of OSFR, but the amount of OSFR demonstrated would have fallen $3.65 billion short of the actual cleanup cost). OSFR "means the capability and means by which a responsible party for a covered offshore facility will meet removal costs and damages for which it is liable under . . . the Oil Pollution Act of 1990 . . . with respect to both oil-spill discharges and substantial threats to the discharge of oil." 30 C.F.R. § 553.3.

4 Bomey, *supra* note 1. (For further reference, the costs of the 1989 *Exxon-Valdez* spill in Alaska were approximately $3.8 billion in cleanup costs, fines, and compensation, in addition to the punitive damages, which were reduced to $507 million after 15 years of appeals.); Susan Lyon & Daniel J. Weiss, *supra* note 3. Under OSFR requirements, a spill with the volume of *Exxon Valdez* would have required the highest category of OSFR, but the amount of OSFR demonstrated would have fallen $3.65 billion short of the actual cleanup cost. 30 C.F.R. § 553.13(b)(1).

5 Ari Phillips, *How A Massive Oil Spill In 1969 Changed Everything*, THINKPROGRESS (Jun. 30, 2014), https://thinkprogress.org/how-a-massive-oil-spill-in-1969-changed-everything-c4da7ecd5038/.

hand to attempt to soak up the oil.[6] The year after the spill, President Nixon signed the National Environmental Policy Act of 1969 to ensure that branches of government consider environmental impacts of major federal actions,[7] and in 1972, the Coastal Zone Management Act was enacted to protect the coastal environment from increased recreational, residential, commercial, and industrial uses.[8] These laws were an important step to make a safer landscape for offshore oil drilling.

On April 11, 2018, in a lecture to the Rocky Mountain Mineral Law Foundation, Joseph Balash, the Assistant Secretary of Land and Minerals Management, predicted that by 2040, the U.S. will produce 21.3 million barrels of oil per day.[9] Ignoring the climate change implications, this will require a significant increase in U.S. oil production—nearly double current production.[10] To help achieve this goal, on April 28, 2017, President Trump issued Executive Order 13,795, which called for the Department of Interior to increase lease sales across all regions of the U.S. Outer Continental Shelf ("OCS").[11] Following the President's Executive Order, Interior Secretary Zinke issued a Secretarial Order to reexamine the Obama Administration's properly-promulgated five-year-lease program, which excluded lease sales in the Atlantic region and portions of Alaska.[12] This Secretarial Order also required the "development of a new 'Five-Year Outer Continental Shelf Oil and Gas Leasing Program[,'] with full consideration given to leasing the OCS offshore Alaska, Mid-Atlantic, South Atlantic, and the Gulf of Mexico[.]"[13] Response to these orders was swift—a case is pending over the associated reversal of the Obama Administration's moratorium on Alaskan leases.[14] Additionally, multiple states have protested their inclusion in the plan.[15]

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6 *Id.*

7 National Environmental Policy Act of 1969, 83 Stat. 852 (1970). *See also Summary of the National Environmental Policy Act*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/laws-regulations/summary-national-environmental-policy-act.

8 16 U.S.C. § 1451 (2018). *See also Coastal Zone Management Act*, U.S. BUREAU OF OCEAN ENERGY MGMT., https://www.boem.gov/Coastal-Zone-Management-Act/.

9 Joseph R. Balash, Assistant Sec'y for Land & Minerals Mgmt., U.S. Dep't of Interior, Keynote Address at the Rocky Mountain Mineral Law Found. Offshore Short Course: Global Energy Dominance: Policy Matters (Apr. 11, 2018).

10 *Weekly U.S. Field Production of Crude Oil*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx (last visited May 3, 2018) (The last week in April 2018 saw 10,619 barrels of oil extracted per day in the U.S.).

11 Implementing an America-First Offshore Energy Strategy, Exec. Order No. 13,795, 82 Fed. Reg. 20,815 (May 3, 2017).

12 Secretarial Order No. 3,350, at 1 (May 1, 2017).

13 *Id.* at 2.

14 League of Conservation Voters v. Trump, 303 F.Supp.3d 985 (D. Alaska 2018).

15 Jaron E. Ming, Reg'l Supervisor, Off. of Leasing & Plans, Bureau of Ocean Energy Mgmt., Rocky Mountain Mineral Law Foundation Offshore Short Course: Granting Offshore Federal Leases, Rights-of-Way, and Rights-of-Use and Easement (Apr. 10, 2018). According to a BOEM map of state governors' response to potential inclusion in the proposed area, of twenty-two coastal counties, only seven states *requested* inclusion in the draft proposed lease, and twelve states requested exclusion (New Hampshire and South Carolina did not respond, and Florida did not state their position) (on file with author).

Within a week of releasing the Outer Continental Shelf Leasing Draft Proposed Program, Secretary Zinke removed acreage in the Eastern GOM from the program after pressure from Florida politicians.[16] This was not the first time that this region had been proposed for drilling leases and subsequently removed; it also occurred in 2001, due to political pressure.[17] Notably, the Eastern GOM only includes acreage off the coast of Florida,[18] so no other southeastern states benefited by this decision.[19]

On January 11, 2018, Senators Whitehouse and Markey proposed a bipartisan bill to ban offshore drilling along the New England Coast due to concerns from the tourism, fishing, and recreation industries.[20] In introducing this bill, the senators emphasized concerns for the coastline and the environment in the event of an oil spill.[21]

For the first time since 1984, areas off the California coast were offered for potential lease sale in the Pacific Region of President Trump's proposed draft plan for offshore oil drilling.[22] California already has thirty-two offshore oil platforms in Southern California that date back to the 1950s "and no new ones have been constructed in more than [thirty] years" due to political and local opposition.[23] After the proposed plan for oil leasing was released, the governors of California, Oregon, and Washington all vowed to fight the plan to prevent additional oil drilling off the coasts of the western states.[24]

In Part I, this paper examines the insufficiencies of the OSFR requirements for offshore oil leasing, given the high costs and difficulty of cleanup associated with offshore oil spills. Part II examines the specifics of the Bureau of Ocean Energy Management ("BOEM") and Bureau of Safety and Environmental Enforcement's ("BSEE") OSFR requirements to determine the sufficiency of oil spill cost coverage when a company purchases a drilling lease or pipeline. Part III discusses the general costs associated with oil spills. This includes regional differences in oil spill costs, which are especially important given the different hurdles to overcome in oil spill cleanup costs, and efforts based upon the region where the spill occurs. Part IV looks specifically at the fisheries' fallout after the *Deepwater Horizon* and *Exxon Valdez* oil spills to demonstrate the effects on local fishermen post-oil spill. Finally, Part V concludes with suggestions to ensure that OSFR requirements reflect the differences in possible oil spill scenarios, and to provide fiscal protection to the individuals whose livelihoods rely on the fisheries that are dam-

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16 David Blackmon, *Florida Politics Overrule DOI's OCS 5-Year Plan; We've Seen This Story Before*, FORBES (Jan. 10, 2018).

17 *Id.*

18 U.S. DEP'T OF INTERIOR, 2019–2024 NATIONAL OUTER CONTINENTAL SHELF OIL AND GAS LEASING DRAFT PROPOSED PROGRAM, 7-40 fig. 7-20 (Jan. 2018) [hereinafter DRAFT PROPOSED PROGRAM].

19 *Id.*

20 Press Release, Sheldon Whitehouse, Senators Introduce Bipartisan New England Offshore Drilling Ban (Jan. 11, 2018), https://www.whitehouse.senate.gov/news/release/-senators-introduce-bipartisan-new-england-offshore-drilling-ban (those three industries generate more than $17.5 billion for New England annually).

21 *Id.*

22 Paul Rogers, *New Offshore Oil Drilling Proposed Off California Coast by Trump Administration*, THE MERCURY NEWS (Jan. 4, 2018), https://www.mercurynews.com/2018/01/04/new-offshore-oil-drilling-proposed-off-california-coast-by-trump-administration/.

23 *Id.*

24 *Id.*

aged by oil spills. The regime currently in place to show oil spill financial preparedness is not sufficient to cover the actual costs of a catastrophic oil spill. If the OSFR requirements are in place to cover the cost of an oil spill, those requirements must be increased to reflect the actual costs associated with a catastrophic oil spill.

II. General Provisions of Offshore Oil Drilling

Offshore oil leasing and drilling falls under the Outer Continental Shelf Lands Act of 1953.[25] The OCS is managed by the Secretary of the Interior, who has the power to grant offshore oil drilling leases.[26] Management of these leases was initially delegated to the Minerals Management Service ("MMS"), which was renamed the Bureau of Ocean Energy Management, Regulation and Enforcement ("BOEMRE") in May 2010.[27] BOEMRE was then divided into the Office of Natural Resources Revenue, BOEM, and BSEE.[28] BOEM specifically oversees the development of offshore resources, and BSEE is responsible for enforcing safety and environmental regulations.[29] BSEE is also responsible for regulating pipelines that run oil from the well back to the mainland.[30] The divisions of the BOEMRE, including the renaming and reorganization of MMS, were a result of reviews and investigations of the *Deepwater Horizon* oil spill.[31]

Even prior to *Deepwater Horizon*, the U.S. General Accounting Office ("GAO") found that the MMS had trouble managing offshore oil drilling leases.[32] Specifically, "[a]n absence of price thresholds in oil and gas leases issued by MMS in 1998 and 1999 ha[d] already cost the government about $1 billion[,]" and the agency further concluded that additional lost future royalties "would be $6.4 billion to $9.8 billion over the lives of the leases."[33] In addition to the royalties issues, President Obama indicated concerns that MMS was too close to the industry actors and not regulating the industry well.[34]

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25 Outer Continental Shelf Lands Act, 43 U.S.C. § 1332 (1953).

26 *Id*. *See also OCS Lands Act History*, U.S. Bureau of Ocean Energy Mgmt., https://www.boem.gov/OCS-Lands-Act-History/ (last visited Apr. 29, 2018).

27 *OCS Lands Act History*, *supra* note 26.

28 Reorganization of Title 30: Bureaus of Safety and Environmental Enforcement and Ocean Energy Management, 76 Fed. Reg. 64,432 (Oct. 18, 2011) (to be codified at 30 C.F.R. pt. 2 and 5). *See also The Reorganization of the Former* MMS, U.S. Bureau of Ocean Energy Mgmt., https://www.boem.gov/About-BOEM/Reorganization/Reorganization.aspx (last visited May 2, 2018).

29 *Id*.

30 Rocky Mountain Mineral Law Found., Short Course on Federal Offshore Oil & Gas Leasing and Development (Apr. 10–12, 2018).

31 *Reorganization of the Former* MMS, *supra* note 28.

32 *Royalties Collection: Ongoing Problems with Interior's Efforts to Ensure a Fair Return for Taxpayers Require Attention: Hearing on GAO Study on Minerals Management Service Before the H. Comm. on Natural Resources*, 110th Cong. (2007) (statement of Mark Gaffigan, Acting Director, Natural Resources and Environment).

33 *Id*. at 10.

34 Press Release, President Barack Obama, Remarks by the President to the Nation on the BP Oil Spill (Jun. 15, 2010), https://obamawhitehouse.archives.gov/the-press-office/remarks-president-nation-bp-oil-spill.

Other examples of MMS shortcomings include: the MMS bending to industry pressure to process permits and environmental reviews quickly, failures to enforce safety regulations, and allowing industry self-regulation.[35] These failures by MMS led not only to its restructuring, but also to the under-regulation of industry actors, which contributed to the *Deepwater Horizon* blowout.[36]

To fund spill cleanup, Congress created the Oil Spill Liability Trust Fund ("OSLTF") in 1986, which was signed into law in 1990 with the Oil Pollution Act ("OPA").[37] The OPA consolidated other oil pollution laws and funds to help fund the various costs incurred from an oil spill.[38] The fund is comprised of the Emergency Fund, which assists with rapid oil spill response and allows the President to provide $50 million per year without Congressional approval, and the Principal Fund, which pays for claims and appropriations.[39] It is important to note that while the OSLTF may provide funds to assist with oil spill cleanup, the responsible party is expected to repay that money to the fund, in addition to other penalties that may also be levied.[40]

A. Drilling Platform Requirements

To drill a well, companies must show OSFR.[41] The OSFR, which is essentially insurance in the event of varying volumes of oil spilled, is demonstrated in the Oil Spill Response Plan ("OSRP") and is required for lease application.[42] In addition to OSFR, the location of the "oil spill equipment base and staging area[,]" the organization who will provide oil spill removal, "[t]he calculated volume of [the] worst case discharge scenario[,]"and "[a] description of the worst case discharge scenario that could result from [the] proposed exploration activities" must be described.[43] Appropriate levels of OSFR are determined by the likely discharge volume of a spill.[44] The highest amount of OSFR that can be required is $150 million for over 105,000 barrels of oil spilled.[45] OSFR may

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35 Leila Monroe, *Restructure and Reform: Post-BP Deepwater Horizon Proposals to Improve Oversight of Offshore Oil and Gas Activities*, 5 GOLDEN GATE U. ENVTL. L.J. 61, 64 (2011).

36 *See id.* at 63–77.

37 U.S. COAST GUARD, REPORT ON IMPLEMENTATION OF THE OIL POLLUTION ACT OF 1990, at 5.

38 *Id.* (Specifically, funds used include money from EPA and Coast Guard clean up, state assistance, "[p]ayment to federal, state, and Indian tribe trustees to conduct natural resource damage assessments and restorations", research and development, etc.).

39 *Id.*

40 *Id.*

41 30 C.F.R. § 553.20 (2011) (describing that, to demonstrate OSFR, applicants may either show self-insurance, insurance, an indemnity, a surety bond, or an alternative method.).

42 *Id* § 550.219.

43 *Id* §§ 550.219(a)(2)(ii)-(v), 254.26 (describing that the worst-case discharge scenario information requirements include volume of discharge, a trajectory analysis of the oil spreading, the list of resources that could be impacted by the spill, and how adverse weather would affect response).

44 *Id.* § 553.13(b) (indicating that the amount ranges from $35 million to $150 million, depending on the possible volume of discharge associated with a spill).

45 *Id.*; *History of the 42-Gallon Barrel*, AM. OIL & GAS HISTORICAL SOC'Y, https://aoghs.org/transportation/history-of-the-42-gallon-oil-barrel/ (last visited Apr. 26, 2018) (describing

be demonstrated by self-insurance, insurance, an indemnity, a surety bond, or an alternative method approved by the Director of BOEM.[46]

It is not clear whether the bonding and OSFR requirements are meant to cover small, incidental spills. The American Petroleum Institute ("API") found that between 1998 and 2007, "an estimated 1,273 barrels of crude oil spilled from offshore platforms into federal and state waters of the U.S. each year."[47] Although these numbers have decreased over the decades,[48] it would still represent a requirement of $35 million in applicable OSFR if spilled from a single point source.[49] Furthermore, as seen in 2005, heavy hurricane activity often resulted in increased spills from offshore oil platforms.[50] Research has shown that climate change is causing increased hurricane activity.[51] In turn, this hurricane activity could result in more years like 2005, with increased spills from offshore oil platforms. Importantly, data shows that more spills have been caused by hurricanes in recent history.[52]

B. Offshore Oil Pipeline Requirements

Generally, to get the oil and gas from a well back to shore, a pipeline is required to transport the oil. Pipeline rights-of-way ("ROW") are granted by either the Department of Interior ("DOI") or the Department of Transportation.[53] This article will focus on the pipelines controlled by DOI through BSEE.

An initial prerequisite to obtaining a pipeline ROW is for the operator to provide and maintain a $300,000 bond and any additional security deemed necessary by the

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that there are forty-two gallons of oil per barrel, which traces back to the 1700s, and was adopted by the U.S. Geological Survey in 1872 and U.S. Bureau of Mines in 1882).

46 30 C.F.R. §§ 553.20, 553.5 (2011).

47 Am. Petroleum Inst., Analysis of U.S. Oil Spillage, 9 (2009).

48 *Id*.

49 30 C.F.R. § 553.13 (stating that between 1,000 and 35,000 barrels of oils spilled in the worst-case scenario spill discharge volume requires $35 million in OSFR).

50 Am. Petroleum Inst., *supra* note 4747, at 9, 11, 14 (noting that there were also increased spills from offshore pipelines in 2005, traced to high hurricane activity).

51 *Hurricanes and Climate Change*, Union of Concerned Scientists (Dec. 1, 2017) https://www.ucsusa.org/global-warming/science-and-impacts/impacts/hurricanes-and-climate-change.html.

52 Am. Petroleum Inst., *supra* note 47, at 24 (According to the API, between 1969-2007, there were ninety-five spills from offshore platforms caused by hurricanes, importantly, that is the same number of spills from hurricanes that occurred between 1998–2007. This means that the spills caused by hurricanes is a new problem, which will likely increase with the increased number of hurricanes resulting from climate change.). Additionally, the Taylor Oil Spill, caused by Hurricane Ivan in 2004, has spilled between 300 to 700 barrels of oil per day since 2004, which highlights the incredible danger of offshore oil drilling in the Gulf. Darryl Fears, *A 14-year-long oil spill in the Gulf of Mexico Verges On Becoming One of the Worst in U.S. History*, Washington Post https://www.washingtonpost.com/national/health-science/a-14-year-long-oil-spill-in-the-gulf-of-mexico-verges-on-becoming-one-of-the-worst-in-us-history/2018/10/20/f9a66fd0-9045-11e8-bcd5-9d911c784c38_story.html?noredirect=ON (Oct. 21, 2018).

53 30 C.F.R. § 250.1001 (2011).

BOEM Regional Director.[54] In addition, there are a few smaller costs, such as added costs for a new ROW grant or modification of an existing grant.[55]

From 1998 to 2007, the average annual spillage from offshore oil pipelines was 2,614 barrels.[56] Although this represents a 68% reduction from the previous decade, it is only a 25% reduction from the 1978-1987 decade.[57] This difference was likely due to 1988, which saw 12 pipeline spills and a total volume of 31,204 barrels of oil spilled—the highest year in the data set extending from 1969–2007.[58] Similar to spills from drilling platforms, the vast majority of spills occurred in the GOM; whereas, the Alaskan and Pacific regions would both go for years without any spillage from offshore pipelines.[59] Again, this difference is likely due to more oil production in the GOM when compared with the Alaskan or Pacific regions.

The response plans for pipelines also must include a worst-case discharge determination.[60] However, unlike the lease requirement, a monetary value is not associated with the discharge volumes for pipelines.[61] However, not setting a monetary value is inappropriate and inadequate, as demonstrated in the *Refugio* spill wherein 3,400 barrels of oil spilled from a pipeline that resulted in over $100 million in cleanup costs.[62] This spill demonstrates the corresponding OSFR requirements that the pipeline operator should have been required to provide under the lease program would still have been inadequate to provide proof that the company could afford the cleanup costs.

Notably, there is no difference in pipeline bond amount requirements based upon a worst-case spill discharge,[63] like those that exist for drill pad leases.[64] It is important to consider the volume of oil that is likely to run through each pipeline and to have a higher bond for those pipelines that transport more oil. In addition to acknowledging a worst-case spill discharge for pipelines, differences in region should also be considered. As discussed in the next section, different regions have different environments, which likely drive different cleanup costs.

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54 *Id.* § 550.1011(a)(1).
55 *Id.* § 250.125(a).
56 AM. PETROLEUM INST., *supra* note 47, at 14.
57 *Id.*
58 *Id.* at 14.
59 *Id.* at 15 (stating that between 1969–2007, the GOM region saw 175,701 barrels of oil spilled from pipelines, where there were only 2,509 barrels spilled in the Pacific and 4,145 barrels spilled in the Alaskan region).
60 49 C.F.R. § 194.105 (2005).
61 *Id.*
62 Orozco, *supra* note 2.
63 30 C.F.R. § 550.1011.
64 West Virginia Highlands Conservancy v. Norton, 238 F.Supp.2d 761, 766 (S.D.W. Va. 2003) (quoting OSM handbook for calculation of bond amounts).

III. Regional Differences in Environment and Clean Up Costs

In January 2018, BOEM proposed to open all regions of the OCS for oil and gas development leasing.[65] The U.S. Geological Survey and BOEM estimate that 69% of the U.S.'s remaining oil and 22% of remaining natural gas is in the OCS.[66] With an increase in offshore oil drilling, BSEE also proposed a rule that would roll back safety procedures and requirements on offshore oil rigs.[67] This likely increase to offshore oil and gas development coupled with weakened safety measures opens fragile habitats to heightened risk of oil spills.[68]

A. Atlantic Region

The Atlantic Region has not been explored or definitively shown to produce oil or gas to date.[69] However, oil spills have occurred within the region that demonstrate the fragility of the environment.[70] Within the proposed area, there are twenty-four threatened or endangered species and additional designated critical habitat for multiple listed species.[71] Additionally, there are many commercially valuable fisheries "including lobster; scallop . . . tunas, snapper, and grouper."[72]

In the Atlantic, the United Nations already designated areas outside of the U.S.'s exclusive economic zone ("EEZ") as regulated or closed vulnerable marine ecosystems.[73] Although drilling would not occur outside of the EEZ, or within the designated vulnerable marine ecosystems, oil slicks can spread across large geographic distances and into

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65 Draft Proposed Program, *supra* note 18, at 10 (regions include the Alaskan, Pacific, Gulf of Mexico, and Atlantic Regions).

66 *Id.* at 1-6 to 1-10.

67 Oil and Gas and Sulphur Operations on the Outer Continental Shelf-Oil and Gas Production Safety Systems-Revisions, 82 Fed. Reg. 61,703 (Dec. 29, 2017) (to be codified at 30 C.F.R. pt. 250).

68 *See* Nat'l Comm'n on the BP Deepwater Horizon Spill & Offshore Drilling, Deepwater: The Gulf Oil Disaster and the Future of Offshore Drilling (2011), https://www.govinfo.gov/content/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION-1.pdf.

69 *Deficiencies in the Permitting Process for Offshore Seismic Research, Subcomm. on Energy and Mineral Resources*, 115th Cong. 3 (2018) [hereinafter *Oversight Hearing*] (providing a statement of The Honorable Tom Davis, Senator, District 46, South Carolina Legislature).

70 *Factbox: Major Oil Spills in the United States*, Reuters (Apr. 30, 2010), https://www.reuters.com/article/us-usa-oil-spills/factbox-major-oil-spills-in-the-united-states-idUSTRE63T5HZ20100430. For instance, in Jan. 1996, a tank barge and a tug collided off Rhode Island, resulting in the death of over ten million lobsters and a several-month ban on fishing. *Id.*

71 Draft Proposed Program, *supra* note 18, at 7-28 (five bird species, seven mammal species, five sea turtle species, one fish species (plus two proposed species of fish), seven coral species, and one plant species).

72 *Id.* at 7-27.

73 *Vulnerable Marine Ecosystems Database*, Food & Agric. Org. of the U.N., http://www.fao.org/in-action/vulnerable-marine-ecosystems/vme-database/en/vme.html (last visited Feb. 1, 2019).

those vulnerable areas.[74] Given the potential for oil spread, the already vulnerable marine ecosystems are at risk from an oil spill in the Northern Atlantic.[75]

On December 15, 1976, the *Argo Merchant* ran aground twenty-nine miles southeast of Nantucket Island.[76] Over the next eight days, the vessel broke apart and spilled all of its cargo.[77] The GAO estimated that a total of 7.5 million gallons of oil was lost, which cost an estimated $2.4 million.[78] Cleanup costs for this oil spill only totaled $5.2 million,[79] because when the vessel ultimately broke apart and sank, the currents pushed the oil away from the shoreline.[80] Since the oil was pushed away from shore, "virtually no cleanup costs were incurred."[81] Regardless, surveys indicated that up to 27,000 square miles of the Atlantic Ocean, including parts of the Georges Bank fishing ground, may also have been affected by the spill.[82] Ultimately, evidence was found of oil contamination in fish, shellfish, and plankton, in addition to cod and pollack eggs.[83]

The *Argo Merchant* spill did result in important scientific research into oil spills.[84] "NOAA developed a hazardous materials team to provide and coordinate future responses, funnel necessary information to the Coast Guard, and to develop standard methods of assessing oil spills."[85] In addition, the *Argo Merchant* spill resulted in the creation of the Office of Response and Restoration, which provides twenty-four-hour, seven-day-a-week response to oil spills.[86]

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74 *Deepwater Horizon* resulted in the pollution of 1,300 miles of coastline. *Effects of the Deepwater Horizon Oil Spill on Coastal Salt Marsh Habitat*, NOAA OFF. OF RESPONSE & RESTORATION (Nov. 23, 2016), https://response.restoration.noaa.gov/about/media/effects-deepwater-horizon-oil-spill-coastal-salt-marsh-habitat.html [hereinafter *Effects on Salt Marsh Habitat*]. In addition to the surface oil slick, scientists found effects on the seafloor as far as 14 kilometers from the *Deepwater Horizon* wellhead site. Charles R. Fisher, Paul A. Montagna, & Tracey T. Sutton, *How Did the Deepwater Horizon Oil Spill Impact Deep-Sea Ecosystems?*, 29 OCEANOGRAPHY 3, 183 (Sept. 2016).

75 *Vulnerable Marine Ecosystems Database*, *supra* note 73.

76 *Argo Merchant*, NOAA INCIDENT NEWS, https://incidentnews.noaa.gov/incident/6231.

77 *Id.*

78 U.S. GOV'T ACCOUNTABILITY OFF., CED-77-71, TOTAL COSTS RESULTING FROM TWO MAJOR OIL SPILLS 1 (1977).

79 *Id.*

80 *Id.* at 2.

81 *Id.* It is important to note that just because the oil was pushed away from shore, it does not mean that the oil did no damage to the environment; it may have harmed offshore marine species.

82 *Id.* at 6.

83 Grey Hall, *Argo Merchant Grounding Off Nantucket Produced Lessons in Tracking Oil Spills*, PROFESSIONAL MARINER, Aug. 29, 2011, http://www.professionalmariner.com/September-2011/Argo-Merchant-grounding-off-Nantucket-produced-lessons-in-tracking-oil-spills/.

84 *See generally* John D. Milliman, *Argo Merchant: A Scientific Community's Response*, OCEANUS MAGAZINE (1977) (discussing scientific research that took place during the aftermath of the spill).

85 Hall, *supra* note 83. *See also* U.S. DEP'T OF COMMERCE, NAT'L OCEANIC & ATMOSPHERIC ADMIN., ARGO MERCHANT OIL SPILL: A PRELIMINARY SCIENTIFIC REPORT (1977).

86 *About*, NOAA: OFF. OF RESPONSE & RESTORATION, https://response.restoration.noaa.gov/about (last updated Apr. 17, 2019, 9:55 PM).

In another spill in the Atlantic Region, on January 19, 1996, the *Scandia* caught fire and was abandoned along with the barge it was towing, the *North Cape*, near Moonstone Beach, Rhode Island.[87] Both vessels subsequently ran aground, and eight fuel compartments on the barge were breached, spilling "about 2700 of its 12500 metric ton cargo of No. 2 (diesel) fuel oil."[88] The spill resulted in the closure of "approximately 250 square miles of fishing and shellfishing areas for as long as five months and killed more than 10 million lobsters, approximately 500 birds[,] . . . over 40 million surf clams," and many other marine species.[89]

Apart from the costs to clean up the spill, four years after the spill, a consent decree was filed, requiring that settling defendants also pay $7.8 million in natural resource damages, plus interest, beginning the month before the decree was received by the Court.[90] The payment was made to the North Cape Oil Spill Restoration Account and provided funds to NOAA, DOI, and the Rhode Island Department of Environmental Management for the cost of assessing the natural resources damages from this spill.[91] Interestingly, this settlement specifically stated that if the funds were insufficient, that completion of projects to achieve the goals of the settlement would not be required.[92] However, the 2009 Final Report on the Lobster Restoration efforts indicated that the population had significantly rebounded while the restoration program was in place.[93]

B. Gulf of Mexico Region

The original proposal for leasing the GOM included all three areas of the Gulf: the Eastern, Central, and Western GOM.[94] The "GOM supports several important fisheries, including grouper, shrimp, menhaden, mullet, snapper, lobster, blue crab and oyster, each with more than five million pounds annually harvested[,]" in addition to diverse ecosystems "including coral reefs, mangroves, barrier islands, wetlands, oyster beds, and topographic features, such as corals and deepwater seeps."[95] There are also thirty

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87 *Tank Barge North Cape*, Woods Hole Oceanographic Inst., http://www.whoi.edu/oil/north-cape (last updated Jul. 28, 2014).

88 *Id.* The 2,700 metric tons translates to approximately 828,000 gallons (20,000 barrels) of oil. Fisheries of Northeast Science Center, Mark-Recapture Analysis of American Lobster in Rhode Island Sound, Center 3 (Jan. 1, 2009).

89 *Tank Barge North Cape, supra* note 87. In 2000, lobster sold for an average of $3.61 per pound. *Average annual price of American lobster in the U.S. from 2000 to 2016 (in U.S. dollars per pound)*, Statista, https://www.statista.com/statistics/196482/average-annual-price-of-american-lobster-in-the-us-since-2000/ (last visited Apr. 15, 2018). The most popular size of Maine lobster is 1.25-1.5 pounds each. *Lobster Facts*, Maine Lobster, http://maine-lobster.com/lobster-facts (last visited May 1, 2018). Therefore, local economy likely lost around $50 million in lobster alone.

90 U.S. v. E.W. Holding Corp., No. 00-332, ¶ 14 (Jul. 06, 2000) (U.S. Dist. Ct. RI).

91 *Id.* at ¶¶ 15–17. Payments included reimbursement to NOAA, DOI, and the Rhode Island Department of Environmental Management for damage assessment, and payment for monitoring the Lobster Restoration Project. *Id.* Note that there was no mention of payment to the fishermen who were impacted by this spill. *See id.*

92 *Id.* at ¶ 19.

93 *See* Fisheries of Northeast Science Center, *supra* note 88.

94 Draft Proposed Program, *supra* note 18, at 7-20. *See also* Blackmon, *supra* note 16.

95 Draft Proposed Program, *supra* note 18, at 7-21.

threatened or endangered species in the GOM that could be affected by oil and gas related activities.[96]

Before the *Deepwater Horizon* oil spill and just one year after *Exxon-Valdez*, the *Mega Borg* tanker spilled five million gallons of oil near Galveston Bay, fifty miles off of the Texas coast.[97] Then the following month, "a collision between a tanker and three barges spilled about 645,000 gallons of oil in Galveston Bay."[98]

The *Mega Borg* spill occurred on June 8, 1990, when an explosion occurred in the pump room of the vessel.[99] The incident was in international waters, but within the U.S.'s exclusive economic zone ("EEZ").[100] Over the next seven days, an estimated 100,000 barrels of crude oil were burned or released into the water as a result of the explosion.[101] At the time of the explosion in the pump room, the *Mega Borg* was offloading oil to a tanker, the *Fraqura*, to transport the oil to Houston since the *Mega Borg* was too large to dock in Houston.[102] With the explosion and subsequent fires, only twelve to forty thousand gallons of oil ultimately remained in the water after the spill.[103] The *Mega Borg* response was the first time bioremediation—which is the use of bacteria and microbes to "eat" the spilled oil—was selected as the response action.[104] Less than one month after the incident, there were reports of tar balls from the spill washing onto Louisiana beaches.[105]A post-incident survey of bottlenose dolphins indicated that the species could orient around thick oil but did not react to thin oil sheen.[106] Certainly, bottlenose dolphins are not a fisheries species, but as a species with higher order intelligence, it may mean that fish species do not know to avoid oiled areas.[107]

The GOM Region has significantly more oil spillage from offshore platforms and pipelines than the Pacific or Alaskan Regions.[108] Between 1998 and 2007, 12,720 barrels

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96 *Id.* at 7-22 (including eight bird species, seven marine mammal species, six other mammals [such as beach mice], five sea turtles, the American crocodile, three fish species, and six coral species).

97 Craig Hlvaty, *Looking back at the Mega Borg oil spill 25 years ago this week*, HOUS. CHRONICLE, Jun. 8, 2015.

98 *Id.*

99 *M/V Mega Borg*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://incidentnews.noaa.gov/incident/6748 (last visited May 2, 2018).

100 *Id.*

101 *Id.*

102 *Mega Borg Oil Spill*, REVOLVY, https://www.revolvy.com/topic/Mega%20Borg%20Oil%20Spill (last visited Apr. 12, 2018).

103 *Id.*

104 *Id. See generally* Babajide Milton Macaulay, *Understanding the Behaviour of Oil-Degrading Micro-Organisms to Enhance the Microbial Remediation of Spilled Petroleum*, 13 APPLIED ECOLOGY & ENVTL. RES. 247 (Jan. 2015).

105 *Mega Borg Oil Spill*, *supra* note 102.

106 Mari Ann Smultea & Bernd Würsig, *Behavioral Reactions of Bottlenose Dolphins to the Mega Borg Oil Spill, Gulf of Mexico 1990*, 21.3 AQUATIC MAMMALS 171 (1995).

107 APPLIED ECOLOGY SOLUTIONS, BIODIVERSITY SURVEY OF THE MONTARA FIELD OIL LEAK 56 (2009).

108 AM. PETROLEUM INST., *supra* note 47, at 12, 15, 19. Recall that the Atlantic Region has not yet been explored or drilled, so it is not represented in the statistics. *Oversight Hearing*, *supra* note 69, at 3.

of oil were spilled in the GOM from oil platforms alone, whereas the Alaskan region only had four barrels spilled, and the Pacific region had no spills at all.[109] In addition, spills from offshore exploration and production between 1998 and 2007 in the GOM resulted in 38,963 barrels of spilled oil, where, again, the Alaskan and Pacific regions saw 4 and 10 barrels of oil spilled offshore, respectively.[110] Furthermore, of the seventeen marine well blowouts between 1964 and 2009, all but one occurred in the GOM.[111]

Any differences between the GOM and the Alaskan and Pacific Regions is likely due to increased production and hurricane activity in the GOM,[112] but it cannot be denied that increased levels of spills from platforms, regardless of the cause, results in overall harm to the environment.[113]

C. Pacific Region

One significant roadblock for the Trump Administration's plans to drill in the Pacific is the current restriction on drilling in National Marine Sanctuaries.[114] Furthermore, there is a specific prohibition on "[e]xploring for, developing, or producing oil, gas or minerals . . ." in National Marine Sanctuaries.[115] There are five marine sanctuaries in the Pacific Region, which covers over seventeen thousand square nautical miles.[116] Certainly this does not include much of the Pacific Region, but it is a large area that is off-limits to drilling.[117] Despite this, there is very little discussion of marine sanctuaries in

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109 Am. Petroleum Inst., *supra* note 477, at 21.

110 *Id.*

111 *Id.* at 25. The study with this data is dated Aug. 2009, so it does not include *Deepwater Horizon* or any other subsequent well blowouts. The only non-GOM blowout listed was the 1969 well in Santa Barbara. *See id.*

112 Oil production in the GOM alone accounts for 17% of U.S. crude oil production. U.S. Energy Info. Admin., *Gulf of Mexico Fact Sheet*, https://www.eia.gov/special/gulf_of_mexico/ (last visited May 1, 2018).

113 *Threats from Oil Spills*, U.S. Envtl. Prot. Agency, https://archive.epa.gov/emergencies/content/learning/web/html/effects.html (last visited Feb. 3, 2019).

114 *See, e.g.*, 15 C.F.R. §§ 922.61(f), 922.71(a)(3)(ii), 922.82(a)(3)(ii), 922.91(a)(1) (2018) (prohibiting drilling or coring in the seabed within the Monitor National Marine Sanctuary; prohibiting discharging or depositing from beyond the boundary of the Channel Islands National Marine Sanctuary "any material or other matter that subsequently enters the Sanctuary and injures a Sanctuary resource or quality . . . and fish, fish parts, or chumming materials (bait) used in or resulting from lawful fishing activity beyond the boundary of the Sanctuary;" prohibiting discharging or depositing from within or into the Great Farallones National Marine Sanctuary "any material or other matter that subsequently enters the Sanctuary and injures a Sanctuary resources or quality;" prohibiting "[d]redging, drilling into, or otherwise altering in any way the submerged lands of" Gray's Reef National Marine Sanctuary).

115 *Id.* § 922.122(a)(1).

116 *Ocean Explorer: The National Marine Sanctuaries*, Nat'l Oceanic & Atmospheric Admin., http://oceanexplorer.noaa.gov/explorations/02quest/background/sanctuaries/sanctuaries.html (last visited Apr. 10, 2018); *Channel Islands National Marine Sanctuary*, Nat'l Marine Sanctuaries, https://channelislands.noaa.gov/ (last visited Apr. 10, 2018).

117 *Regulations*, Nat'l Marine Sanctuaries, https://sanctuaries.noaa.gov/protect/regulations/ (last visited Feb. 3, 2019). *See, e.g.*, 15 C.F.R. § 922.61(f) (prohibiting drilling or coring the seabed within the Monitor National Marine Sanctuary).

the Draft Proposed Program, only mentioning that "National Marine Sanctuaries that were designated as of July 14, 2008" would be off limits for the Draft Proposed Program.[118]

In addition to the prohibition on drilling in National Marine Sanctuaries, California state law bans any new oil and gas drilling in state waters.[119] Furthermore, "at least 18 California coastal cities and nine of California's fifteen coastal counties . . . have local laws that ban the construction of onshore oil terminals, pipelines and other oil equipment without a public vote."[120] To further confusion over California's stance on new offshore oil drilling, the California State Lands Commission sent a letter to BOEM urging that California be exempted from the proposed program, like Florida.[121]

In addition to the marine protected habitats of the Pacific Region, there are many threatened and endangered species found in the Region.[122] Critical habitat is also designated for many of those species and for commercially viable species, such as salmon.[123] The Draft Proposed Program acknowledges the importance of those commercially viable species and states that "the abundance of these fish stocks can affect the entire ecological system, because many larger predators, such as birds and marine mammals, rely on them for food."[124]

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118 DRAFT PROPOSED PROGRAM, *supra* note 18, at 4-2 ("Pursuant to Executive Order—Implementing an America-First Offshore Energy Strategy, signed on April 28, 2017, the Department of Commerce is conducting a review of all designations and expansions of National Marine Sanctuaries and Marine National Monuments since April 28, 2007."). Review of National Marine Sanctuaries and Marine National Monuments Designated or Expanded Since April 28, 2007; Notice of Opportunity for Public Comment, 82 Fed. Reg. 28,827 (Jun. 26, 2017). Four of the sanctuaries under review are located off the California coast. *Id.* at 28,828.

119 *See* CAL. PUB. RES. CODE § 6240 (West 2015) ("[N]o state agency or state officer shall enter into any new lease for the extraction of oil or gas from the California Coastal Sanctuary, unless the President of the United States has found a severe energy supply interruption and has ordered distribution of the Strategic Petroleum Reserve . . . , the Governor finds that the energy resources of the sanctuary will contribute significantly to the alleviation of that interruption, and the Legislature subsequently acts to amend this chapter to allow that extraction.").

120 Rogers, *supra* note 22.

121 Letter from Jennifer Lucchesi, Exec. Officer Cal. State Lands Comm'n, to Kelly Hammerle, Nat'l Program Manager, Bureau of Ocean Energy Mgmt. (Mar. 9, 2018).

122 *See* DRAFT PROPOSED PROGRAM, *supra* note 18, at 7-13 to 7-14 (listing six bird species, nine marine mammal species, four sea turtle species, twelve fish or invertebrate species, one amphibian species, and one plant species as species that could be impacted by potential oil- and gas-related activities.).

123 *See id.* at 7-14 ("Critical habitat is designated in the Pacific Region for Southern Resident DPS of killer whales, eastern DPS of Steller sea lion, leatherback sea turtle, Western Snowy Plover (Pacific Coast DPS), Marled Murrelet, California red-legged frog, tidewater goby, North American green sturgeon (southern DPS), eulachon (southern DPS), black abalone, steelhead, and salmon within and adjacent to Pacific OCS waters.").

124 *Id.* at 7-12 (noting the threats to these species from "changes in the climactic regime").

To underscore the potential cost of a modern oil spill in the Pacific Region, the *Refugio* spill in Santa Barbara, California provides great insight.[125] On May 19, 2015, an oil pipeline near Refugio State Beach in California ruptured, discharging more than 100,000 gallons of crude oil onto the beach.[126] The spill resulted in the immediate closure of all fisheries and shellfisheries near the spill.[127] It also resulted in criminal indictment by a Santa Barbara County grand jury for forty-six criminal charges against the Plains All American Pipeline (the owner of the pipeline that ruptured).[128]

Two months after the *Refugio* spill, estimates of the cleanup cost for the spill were already $96 million, with the ultimate costs and consequences still unknown.[129] However, when Plains All American had their next quarterly earnings update, they projected that costs could run as high as $257 million and stated that as much as 143,000 gallons of oil may have been spilled (42,000 gallons—or 10,000 barrels—more than originally estimated).[130] Most recently, Santa Barbara County sued Plains All American for $1.3 million in lost property values post-spill.[131] At this time, how much the cleanup of the *Refugio* spill will ultimately cost is unclear as litigation is ongoing.[132]

D. Alaskan Region

Like many areas offered by the Trump Administration for increased offshore oil drilling, the Alaskan Region has areas shrouded in controversy.[133] In Section 20001 of the Oil and Gas Program of the Tax Plan, the Arctic National Wildlife Refuge ("ANWR") was offered for drilling for the first time in the Refuge's history.[134] ANWR was initially established in 1960 as the Arctic National Wildlife Range and was re-designated as a

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125 Brian Melley, *Evidence of Massive California Oil Spill Was Obvious, But Was It A Crime?*, Insurance J. (Apr. 23, 2018), https://www.insurancejournal.com/news/west/2018/04/23/487089.htm.

126 *Refugio/South Bay Incident*, CDFW OSPR Cal Spill Watch, https://calspillwatch.dfg.ca.gov/Spill-Archive/Santa-Barbara-County-Spill/lapg-2385/2 (last visited Apr 20, 2018).

127 *Refugio Beach Oil Spill Fishery Closure*, Cal. Dep't of Fish & Wildlife, https://www.wildlife.ca.gov/OSPR/Science/Laboratories/Chemistry/Special-Projects/Fishery-Closure (last updated Apr. 3, 2019).

128 Press Release, Joyce E. Dudley, Indictment of Plains All American Pipeline on Criminal Charges Resulting from the Refugio Oil Spill May 2015 (May 17, 2016), https://www.countyofsb.org/da/msm_county/documents/PlainsIndictmentPR(5_17).pdf.

129 Alex Kacik, *Refugio Oil Spill Cleanup Costs Near $100 million*, Pacific Coast Bus. Times, Jun. 27, 2015.

130 Joseph Serna, *Refugio Oil Spill May Have Been Costlier, Bigger than Projected*, Los Angeles Times, Aug. 5, 2015.

131 Nick Welsh, *Santa Barbara County Sues Plains Pipeline Over Refugio Oil Spill*, Santa Barbara Independent, Jan. 11, 2018.

132 Kacik, *supra* note 129.

133 Kristen Monsell, *Trump Administration Approves Offshore Oil Drilling Project In Arctic*, Biological Diversity (Oct. 24, 2018), https://www.biologicaldiversity.org/news/press_releases/2018/arctic-drilling-10-24-2018.php.

134 An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018, Pub. L. No. 115-97, § 20001 (2017).

Refuge in 1980 in order to protect and guide management of the entire refuge.[135] ANWR "contains the largest area of designated Wilderness within the National Wildlife Refuge System[.]"[136] Specifically, the Tax Plan has allowed for "drilling lease sales in a corner of the 19 million-acre ANWR within the next decade[.]"[137]

At this time, new leases have not yet been sold in the ANWR region. According to the Proposed Draft Leasing Schedule, these leases would be sold in 2021.[138] However, Senator Dan Sullivan said at an oil industry conference in March 2018 that sales may begin ahead of the deadline and as early as 2019.[139] Fortunately (for the "Keep it in the Ground" Movement), as long as the price of oil per barrel remains below $100, it is not commercially viable to drill in the Arctic.[140] As of April 29, 2018, the cost per barrel of oil is $68.10,[141] and has not been over $100 since August 2014.[142]

Furthermore, it is not just Arctic drilling that would be costly, the larger issue is the inability to clean up oil in the event of a spill. As recently as July, 2017, a Coast Guard Admiral noted the U.S. was not prepared to clean up an oil spill in the Arctic.[143] In 2014, the National Academies of Sciences, Engineering, and Medicine published a report that identified specific challenges to Arctic oil spill response, including "extreme weather and environmental settings, limited operations and communications infrastructure, a vast geographic area, and vulnerable species, ecosystems, and cultures."[144] These barriers to spill response must be addressed before any drilling could commence in the Arctic region.[145]

In the Draft Proposed Program, the Alaska Region was analyzed in the three BOEM ecoregions.[146] The first region is the Arctic region, which includes the Chukchi and Beaufort Seas.[147] This area has ten threatened or endangered species and includes the

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135 *About the Refuge*, U.S. FISH & WILDLIFE SERV. ARCTIC NAT'L WILDLIFE REFUGE, https://www.fws.gov/refuge/Arctic/about.html (last visited Apr. 1, 2018).

136 *Id.*

137 Devin Henry, *Final GOP tax bill would allow arctic refuge drilling*, THE HILL (Dec. 13, 2017), http://thehill.com/policy/energy-environment/364754-senator-arctic-drilling-provision-remains-in-gop-tax-cut-bill.

138 DRAFT PROPOSED PROGRAM, *supra* note 1847, at 8.

139 Lorraine Chow, *Interior Moves to Sell Oil Leases in Arctic National Wildlife Refuge*, ECOWATCH (Mar. 9, 2018, 08:49 AM EST), https://www.ecowatch.com/arctic-national-wildlife-refuge-oil-2544903824.html.

140 Chris Mooney, *The real reason arctic drilling is faltering right now—low oil prices*, WASH. POST, Oct. 19, 2015 (according to Heather Conley, senior vice president for Europe, Eurasia, and the Arctic with the Center for Strategic and International Studies).

141 OIL-PRICE.NET, http://www.oil-price.net/ (last visited May 3, 2018).

142 *Crude Oil Prices—70 Year Historical Chart*, MACROTRENDS, http://www.macrotrends.net/1369/crude-oil-price-history-chart (last visited May 3, 2018).

143 Kelsey Lindsey, *Coast Guard tests new oil spill technology as Arctic waters open up*, ANCHORAGE DAILY NEWS, Sept. 3, 2017.

144 *Oil Spill Clean Up in U.S. Arctic Waters Requires Increased Infrastructure to Use Full Range of Response Methods*, NAT'L ACADS. OF SCIS., ENG'G, MED. (Apr. 23, 2014), http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=18625.

145 *Id.*

146 DRAFT PROPOSED PROGRAM, *supra* note 18, at 7-2.

147 *Id.* at 7-3.

ANWR.[148] The second region is the Bering Sea, which has thirty-four threatened and endangered species and a significant amount of critical habitat for the polar bear.[149] The third region is the Gulf of Alaska, with thirty-one threatened or endangered species and critical habitat for various marine mammals and the Steller's eider.[150]

At 12:04 a.m., on March 24, 1989, the *Exxon Valdez* ran aground on Bligh Reef off the coast of Alaska in Prince William Sound.[151] Approximately eleven million gallons of crude oil, of the fifty-three million gallons carried by the tanker, were spilled.[152] Exxon reportedly spent $2.1 billion in the cleanup effort, which, at its peak, "included 10,000 workers, about 1,000 boats and roughly 100 airplanes and helicopters, known as Exxon's army, navy, and air force."[153] To illustrate how harmful this spill was, it is unclear how many animals died from the spill, but "[t]he best estimates are: 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, up to 22 killer whales, and billions of salmon and herring eggs."[154]

Due to the fragile habitat impacted by the spill, the NOAA Office of Response and Restoration conducted a ten year "ecological study to monitor the intertidal shorelines of Prince William Sound, Alaska."[155] Long-term monitoring of the region has demonstrated that the oil persisted for many years after the spill, and "the remaining oil deposits may have become a chronic source of low-level oil pollution within the spill-affected area."[156] The oil now persists subsurface on the beaches and can be reintroduced into the environment after storms.[157] As recently as 2001 (when the last field study was conducted), approximately twenty acres of Prince William Sound were still contaminated with oil.[158] In addition to the continued beach contamination, twenty-one years after

148 *Id.* at 7-5 (listing two bird species and eight marine mammal species). The ANWR was not discussed in the Proposed Program, though the area at issue abuts the Beaufort Sea. *Facts and Features*, U.S. Fish & Wildlife Serv. Arctic Nat'l Wildlife Refuge, https://www.fws.gov/refuge/arctic/facts_and_features.html (last visited Apr. 1, 2018).

149 Draft Proposed Program, *supra* note 18, at 7-8 (listing three bird species, twelve marine mammal species, four sea turtle species, and fifteen fish subspecies).

150 *Id.* at 7-10 (listing two bird species, ten marine mammal species, four sea turtle species, and fifteen fish subspecies).

151 *Questions and Answers About the Spill*, *Exxon Valdez* Oil Spill Trustee Council, http://www.evostc.state.ak.us/index.cfm?FA=facts.QA (last visited Apr. 30, 2018).

152 *Id.*

153 *Id.*

154 *Id.* (the carcasses of more than 35,000 birds and 1,000 sea birds were found, although those numbers are likely not representative of the actual death toll because most carcasses sink).

155 *Exxon Valdez Oil Spill*, Off. of Response & Restoration, https://response.restoration.noaa.gov/oil-and-chemical-spills/significant-incidents/exxon-valdez-oil-spill (last visited May 1, 2018).

156 Jeff Short et al., *The Exxon Valdez Oil Spill: How Much Oil Remains?*, Nat'l Oceanic & Atmospheric Admin., https://www.afsc.noaa.gov/Quarterly/jas2001/feature_jas01.htm (last visited May 1, 2018).

157 *Id.*

158 *Id.*

the spill, the fisheries in Cordova, Alaska still had not fully recovered;[159] "only ten of twenty-six resources and species had recovered from the oil spill."[160]

IV. FISHERIES DAMAGE FROM *DEEPWATER HORIZON* AND *EXXON-VALDEZ*

Undoubtedly, the *Deepwater Horizon* oil spill caused significant damage to the Gulf of Mexico.[161] Unfortunately, in addition to the damage to the GOM environment, the people who live in the area were also deeply affected.[162] One study identified individuals, like the fishermen of the GOM, as living in a Renewable Resource Community ("RRC"). This means that their "primary cultural, social, and economic existences are based on the harvest and use of renewable natural resources."[163] Those living in an RRC tend to be especially susceptible to disasters, like oil spills.[164]

A. EFFECTS ON INDIVIDUALS

Similar to the GOM, many people in Alaska rely on fisheries as primary means of income, in addition to the population who rely on subsistence hunting and fishing.[165] As a result, cultural impacts stemming from the *Exxon Valdez* oil spill related to the damage to the fisheries.[166] In addition to the greater cultural impacts, individuals also experienced increased levels of stress, which resulted in "increased drug and alcohol use and domestic violence . . . elevated levels of depression, anxiety, and posttraumatic stress

159 Duane A. Gill et al., *The Exxon Valdez and BP Oil Spills: A Comparison of Initial Social and Psychological Impacts*, 56 AM. BEHAVIORAL SCI. 4 (Jan. 12, 2012) (stating that prior to the *Exxon Valdez* oil spill, Cordova was "in the top 10 of the nation's most profitable seafood ports; 21 years later, it is not even in the top 25.")

160 *Id.* at 5.

161 *See Effects of the Deepwater Horizon oil spill on protected marine species*, ENDANGERED SPECIES RES. VOL. 33 (Nick Pilcher et al. eds. 2017).

162 Deborah W. Gould et al., *Behavioral Health in the Gulf Coast Region Following the Deepwater Horizon Oil Spill: Findings from Two Federal Surveys*, 42 J. BEHAV. HEALTH SERV. RES. 6 (Jan. 2015).

163 Symposium, *The Exxon Valdez Oil Spill and Chronic Psychological Stress*, 18 AM. FISHERIES SOC'Y, 879, 881 (1996).

164 Gill, *supra* note 159, at 8.

165 In rural Alaskan communities, of the estimated 36.9 million pounds of food harvested for subsistence purposes, "subsistence fisheries contribute about 32% from salmon, 21% from other finfish and 3% from shellfish[.]" *See generally* ALASKA DEP'T OF FISH & GAME, ALASKA SUBSISTENCE AND PERSONAL USE SALMON FISHERIES 2012 ANNUAL REPORT 7 (Sept. 2014).

166 Gill, *supra* note 159, at 6–7. Specific impacts "included social disruption and strained community relations, prolonged uncertainty, and disruption to subsistence lifestyles." *Id.* This was also compounded by the extended litigation after the spill, which was not fully resolved until nineteen years after the spill. *Id.*

disorder . . . and adoption of avoidance coping strategies."[167] Many of the same issues have also been observed in communities affected by *Deepwater Horizon*.[168]

Results from the study of psychological stress among people in Mobile County, Alabama, post-*Deepwater Horizon* showed that the mean level of stress of individuals sampled "was similar to that of victims of rape [two] years after the assault."[169] Further stress study results showed comparable results to levels in Cordova, Alaska five months after *Exxon Valdez*.[170] Furthermore, 62% of those surveyed indicated that they were experiencing very or somewhat negative economic impacts on their household, compounded by 56% of respondents expressing that they were concerned or very concerned with their economic future.[171]

From the post-*Deepwater Horizon* and *Exxon Valdez* studies, it is clear that individuals directly affected by the spills experience increased levels of stress.[172] Since it took nineteen years after the *Exxon Valdez* spill for all of the litigation to be resolved, these people were also likely exposed to chronic stress.[173] Additionally, chronic psychological stress was more pronounced among those people with closer ties to damaged resources, which included Alaska Natives and commercial fishermen.[174] Community members of Cordova, Alaska indicated high levels of stress and depression for eleven years after the spill.[175] High levels of stress for such a long time may be considered chronic stress, which has been tied to headaches, migraines, chronic muscle tension, increased risk of hypertension, diabetes, heart attack, and stroke.[176]

One specific group of fishermen especially affected by the *Deepwater Horizon* spill were Vietnamese-American fishers from Louisiana.[177] This community is "almost all economically dependent on fishing and crabbing" and comprises thirty to fifty percent of fishers in the GOM.[178] In addition to economic dependence, local culture is also directly tied to the catch.[179] Because of this deep, cultural tie to the fishing industry, the value of the fish when claims were paid out from BP's original compensation fund was difficult to determine because the fishers wanted greater compensation than the normal monetary

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167 *Id.* at 7.

168 *Id.* (including an increase in suicides and an increased need for mental health services in the region).

169 *Id.* at 10–11. The sample size of the study was 412 residents who responded to a randomized telephone survey, which was modeled in the same way as previous studies of Alaskan communities after the *Exxon Valdez* spill. *Id.* at 9.

170 *Id.* at 10.

171 *Id.* at 12.

172 *Id.* at 10–12, 15–16.

173 *Id.* at 16.

174 *Id.*

175 *Id.*

176 *Stress Effects on the Body*, AM. PSYCHOL. ASS'N., http://www.apa.org/helpcenter/stress-body.aspx (last visited Feb. 8, 2019).

177 Robert R.M. Verchick, *Disaster Justice: The Geography of Human Capability*, 23 DUKE ENVTL. L. & POL'Y. F. 23, 58 (Fall 2012).

178 *Id.*

179 *Id.* at 59 (stating that fish and crabs are bartered for other goods and are donated to local churches or given as gifts at weddings).

value of the fish.[180] Ultimately in 2012, subsistence fishers' claims were settled wherein the fishers could be eligible for "2.25 time the market-based loss, in acknowledgement of 'damage to subsistence family and community customs and culture.'"[181] While this value may not have fully compensated the Vietnamese-American fishers for their lost catch, it was a step towards justice for a subsistence community.[182]

B. EFFECTS ON FISHERIES

In the GOM, many people rely on fishing as a primary source of income.[183] For instance, in Louisiana, one of every seventy jobs is linked to the seafood industry.[184] Modeling after the *Deepwater Horizon* oil spill proved that the spill significantly damaged the GOM fisheries, both fish stocks and the earning potential of the local fishermen.[185] Louisiana, Mississippi, and Alabama were the states hit the hardest, but Texas and West Florida saw some species affected as well.[186]

Within two weeks of the *Deepwater Horizon* blowout, NOAA began restricting fishing activities in federal waters along the Gulf Coast. The areas were not reopened until after the well was capped and sealed.[187] "As of July 22, 2010, over 10% of the total surface area of the Gulf of Mexico [large marine ecosystem] and approximately 24% of the U.S. Gulf EEZ and territorial state waters were closed to commercial fishing operations."[188] In this closed area, normally "22% of the annual U.S. commercial catch in the Gulf and 24% of the corresponding annual landed value were derived from the area closed to fishing, representing a potential minimum annual loss of $247 million."[189] In addition to the initial restrictions by NOAA, in late November after the spill, "NOAA banned deepwater trawling for shrimp for a 4,313-square-mile-area of the Gulf, suggesting continuing risks for seafood safety."[190]

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180 *Id.* ("To them a sack of crab was worth more than the personal nourishment or satisfaction that it brought (both of which are presumably reflected in the market price).").

181 *Id.* at 59–60 (quoting Settlement Agreement as Amended on May 2, 2012 Ex. 9 at 2, In re Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, on April 20, 2010, MDL. No. 2179 (2015)).

182 *See id.* at 60.

183 The Sea Grant Programs of the Gulf of Mexico estimate that fishing in the GOM creates nearly 160,000 jobs and $22 million in sales. CHRISTINE HALE ET AL., FISHERIES LANDINGS AND DISASTERS IN THE GULF OF MEXICO 2 (2015).

184 *Industry*, LOUISIANA SEAFOOD, http://www.louisianaseafood.com/industry (last visited Feb. 7, 2019).

185 "Overall, the [Deepwater Horizon] oil spill was calculated to have reduced 'total sales' between $51.7 and $952.9 million. This reduction, in turn, reduced 'value added' by $21.4 to $392.7 million, reduced 'income' by $21.6 to $309.8 million, and reduced 'jobs' by 740 to 9,315 jobs." U.S. DEP'T OF THE INTERIOR, AN ANALYSIS OF THE IMPACTS OF THE DEEPWATER HORIZON OIL SPILL ON THE GULF OF MEXICO SEAFOOD INDUSTRY 3 (2016).

186 *Id.* at 4.

187 *Id.* at 5–8.

188 A. McCrea-Strub et al., *Potential Impact of the Deepwater Horizon Oil Spill on Commercial Fisheries in the Gulf of Mexico*, 36 FISHERIES 332, 334 (2011).

189 *Id.*

190 Gill, *supra* note 159, at 4.

Although the long-term consequences of the *Deepwater Horizon* oil spill will be difficult and take time to fully assess, in 2012, 1.7 billion pounds of finfish and shellfish were landed, which earned $763 million in landings revenue.[191] The 1.7 billion pounds of finfish and shellfish represented a 3.5% increase from 2003, and a 6.5% decrease from 2011.[192] Despite the seemingly promising landings revenue, even with a 15% increase from 2003,[193] local restaurants still struggled to source enough seafood to fill their menus and faced difficulty selling seafood to worried consumers.[194]

Another factor that has made it difficult for the Gulf coast to fully recover, especially Louisiana, is the damage sustained to the coastal salt marshes.[195] Coastal salt marshes are vital habitat for many fish, bird, and invertebrate species who use these marshes for refuge and feeding.[196] In addition, this habitat provides flood protection, erosion control, and carbon sequestration.[197] "More than 687 miles of coastal wetland shoreline were polluted with oil throughout the Gulf during the 87-day [*Deepwater Horizon*] spill."[198] This extreme shoreline pollution resulted in increased erosion "over at least 108 miles of shoreline throughout the Gulf."[199]

Even prior to the *Deepwater Horizon* spill, wetland habitat loss was already significant; a study of wetland acreage loss conducted from 2004 to 2009 showed a loss of 257,150 acres in the GOM.[200] A project called "Losing Ground" by ProPublica unearthed that in Louisiana, the total amount of lost coastal land since the mid-1930s is about 2000 square miles.[201] Currently, Louisiana loses about 16 square miles per year, translating to a football field of land every 48 minutes.[202] This coastal habitat loss may prove detrimental to coastal fish species, which, in turn, could cost the area fishermen and their livelihoods.[203]

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191 NAT'L, OCEANIC & ATMOSPHERIC ADMIN., FISHERIES ECONOMICS OF THE UNITED STATES 2012: ECONOMICS AND SOCIOCULTURAL STATUS AND TRENDS SERIES 117 (2014).

192 *Id.* at 118.

193 *Id.* at 117.

194 Laine Kaplan-Levenson, *Five Years After BP Spill, It's Safe to Eat Gulf Seafood. . . If You Can Find It*, 89.9 WWNO (Apr. 13, 2015), http://wwno.org/post/five-years-after-bp-spill-its-safe-eat-gulf-seafood-if-you-can-find-it.

195 *Effects on Salt Marsh Habitat*, *supra* note 74.

196 *Id.*

197 *About Coastal Wetlands*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/wetlands/coastal-wetlands (last visited May 2, 2018).

198 *Effects on Salt Marsh Habitat*, *supra* note 74.

199 *Id.*

200 U.S. DEP'T OF INTERIOR ET AL., STATUS AND TRENDS OF WETLANDS IN THE COASTAL WATERSHEDS OF THE CONTERMINOUS UNITED STATES 2004 TO 2009 2 (2013).

201 Adam Wernick, *Louisiana's coastline is disappearing at the rate of a football field an hour*, LIVING ON EARTH (Sept. 23, 2014), https://www.pri.org/stories/2014-09-23/louisianas-coastline-disappearing-rate-football-field-hour.

202 *Id.*

203 *Wetland Loss in Louisiana*, LACOAST.GOV, https://lacoast.gov/reports/rtc/1997/5.htm (last visited Apr. 12, 2019).

V. CONCLUSION

The current requirements for the OSFR of offshore oil platforms and oil pipelines are grossly inadequate. Further, significant regional differences are not currently addressed by regulations.[204] Since the Trump Administration has called for an increase in offshore oil exploration in all regions, those environmental differences should be addressed if drilling operations are to be increased in unexplored or not-recently-explored areas. Additionally, the Alaskan region would need to prepare itself for a catastrophic oil spill, for which it is currently ill-prepared.[205] Moreover, although less oil was spilled in the 1998–2007 decade than any decade before it, oil was still spilled.[206] Additionally, when data from the 2008–2017 decade is released, it will include the *Deepwater Horizon* spill, which was a stark reminder that offshore oil drilling is a dangerous proposition that can do incredible damage to an already declining ecosystem.

After the *Deepwater Horizon* spill, Secretary of the Interior, Ken Salazar, ordered a six-month moratorium on deepwater drilling to reexamine drilling operations to ensure that that operations were safe and that another catastrophic spill would not occur.[207] Following that decision to suspend drilling operations, a trend of bankruptcy began, compounded by the low price of oil.[208] In an early case that discussed this issue, the Supreme Court held:

Bankruptcy Court does not have the power to authorize an abandonment without formulating conditions that will adequately protect the public's health and safety . . . a trustee may not abandon property in contravention of a state statute or regulation that is reasonably designed to protect the public health or safety from identified hazards.[209]

This has raised questions of who is financially responsible to decommission a drilling rig or pipeline if the owner declares bankruptcy. The decommissioning obligations are incurred and accrued by drilling a well, installing a well or pipeline, obtaining the rights to a well or pipeline, or by reentering a previously plugged well.[210] BSEE and BOEM are currently working to ensure that the bonding requirement in lease purchases will cover the cost to decommission the rig.[211] With respect to these upcoming changes to the

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204 *See* Bomey, *supra* note 1. *See also* Serna, *supra* note 130.

205 Lindsey, *supra* note 143.

206 AM. PETROLEUM INST., *supra* note 47.

207 Press Release, U.S. Dep't of Interior, Salazar Calls for New Safety Measures for Offshore Oil and Gas Operations; Orders six Month Moratorium on Deepwater Drilling (Apr. 5, 2010), https://www.doi.gov/news/pressreleases/Salazar-Calls-for-New-Safety-Measures-for-Offshore-Oil-and-Gas-Operations-Orders-Six-Month-Moratorium-on-Deepwater-Drilling.

208 Michael A. Celata, Reg'l Director, U.S. BUREAU OF OCEAN ENERGY MGMT., Rocky Mountain Mineral Law Foundation Offshore Short Course: Bonding/Financial Assurance (Apr. 10, 2018).

209 Midlantic Nat'l Bank v. N.J. Dep't of Envtl. Prot., 474 U.S. 494, 507 (1986). This was a case where a debtor filed for liquidation under Chapter 7 of the Bankruptcy Code before their waste oil sites were cleaned up, and those sites were subsequently abandoned in contravention of environmental laws.

210 30 C.F.R. § 250.1702 (2011).

211 Currently, there is joint and several liability for the decommissioning obligations of leases, and those obligations are not alleviated by the sale of the lease. 30 C.F.R. § 250.1701 (2011). Further guidance was offered in NTL No. 2016-N01 (effective Sept. 12, 2016).

bonding requirements, the Regional Director of the GOM Region of BOEM, Michael Celata, said that discussions of the financial assurance changes are being discussed with industry to determine "what is workable."[212] This may have troubling implications if the changes cater to industry interests, rather than actual costs that could be passed to the taxpayer.[213]

Certainly, many of the spills discussed herein were from oil tankers that are subject to different regulations than pipelines or drilling platforms. Those spills were included to showcase the actual costs of large-scale oil spills that are possible for pipelines and platforms. Further, these cases highlight the inadequacies of the current OSFR standard because the actual cleanup costs of an oil spill tend to cost more than the OSFR would imply.[214]

It should also be noted that the OSFR inadequacies also apply to onshore oil spills, as illustrated in the 2010 Enbridge Spill in Michigan.[215] Funding for onshore oil response is provided by the OSLTF, which initially had a $25,000 ceiling.[216] During the Enbringe Spill, this ceiling was quickly exhausted, and regularly increased; "[b]y the end of the second week of the response, the [ ] ceiling was at $11 million."[217] Since the ceiling was over $250,000, an OPA 90 Project Plan ("OPA 90 PP") was also required, which first estimated expenditures of $27,000,000;[218] whereas, the final OPA 90 PP requested a ceiling of $69,250,000.[219] Enbridge had the responsibility to reimburse the OSLTF for all costs associated with the cleanup.[220] According to the consent decree filed against Enbridge for this spill in 2017, a $62 million civil penalty was imposed, and Enbridge had to repay $5,438,222 to the OSLTF for removal costs.[221] The civil penalties were filed under the Clean Water Act, in addition to an agreement to spend at least $100 million in measures for future spill prevention.[222]

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212 Celata, *supra* note 208. It should be noted that this lecture was to predominantly industry and government actors, so there may also be discussions with other interested parties who simply were not at the lecture.

213 *Id.*

214 Cleanup of *Refugio* has cost 3 times more than the OSFR requirement would have implied; *Exxon-Valdez* cost 25 times more than the OSFR requirement would have required; and *Deepwater Horizon* cost 400 times more than the OSFR requirement.

215 U.S. Envtl. Prot. Agency, FOSC Desk Report for the Enbridge Line 6b Oil Spill Marshall, Michigan (2016) (On July 26, 2010, an Enbridge pipeline ruptured and released an estimated 843,000 gallons of heavy crude oil and tar sands bitumen into a nearby creek that flowed into the Kalamazoo River, which ultimately carried the oil at least 35 miles downstream. The pipeline rupture went unreported for 17 hours, so response efforts were delayed until the following day).

216 *Id.* (Normally, the ceiling would have been $50,000, but the fund was already strained by the response efforts from the *Deepwater Horizon* spill.).

217 *Id.*

218 *Id.*

219 *Id.*

220 *Id.* at 234.

221 Consent Decree, U.S. v. Enbridge, No. 1:16-cv-914, 21–22 (W.D. Mich. 2017).

222 At the time of the settlement, Enbridge had already reimbursed the government $57.8 million in cleanup costs. *Id.*

Another concern stems from how long it takes for the large settlements to be reached. Consent decrees for the Enbridge and *Deepwater Horizon* spills both took six years.[223] Compared with both of these settlements, facially, *Exxon-Valdez* was settled quickly, occurring only two years after the spill.[224] However, in 2006, seventeen years after the spill, a claim under the reopener provision was filed by the U.S. Department of Justice and State of Alaska Department of Law "with a detailed project plan for the cleanup of lingering oil at an estimated cost of $92 million."[225] Furthermore, the issue of the $2.5 billion award from *Exxon Shipping Co. v. Baker* finally reached the U.S. Supreme Court in 2008, with the Court deciding whether the award was greater than permitted under Maritime Law.[226] The point is not actually whether the award was too great, it is that the people who were injured in the aftermath of the spill are the ones who suffer from this long process and cannot be duly compensated.

Significant regional differences should be accounted for in OSFR and bonding requirements—cleaning up a spill in Alaska has different challenges than clean up in the GOM. The different regions rely on different industries, support different ecosystems, and have different opinions on offshore oil drilling. The Trump Administration's decision to review 90% of the OCS in the Draft Proposed Plan despite multiple states' request for exclusion also may have Environmental Justice implications.[227] Although the people of these regions did have the opportunity to comment on the Draft Proposed Plan, it appears the Department of Interior does not currently care about the will of the people with respect to the location of available offshore oil and gas leases. In the revised Draft Plan (incorporating the comments from the first draft), a significant area of the OCS may not be leased after all, but the initial plan, combined with Trump's Executive Order and Secretary Zinke's Secretarial Order imply that the maximum area possible for offshore leasing will be made available, regardless of the associated high risks.[228]

In addition to revisions in Financial Assurance, the Department of Interior should acknowledge differences between the regions and treat those regions differently in the bond requirements for lease purchases. Furthermore, the OSFR requirements should be increased to reflect actual cleanup costs of oil spills, and to acknowledge the risk to

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223 *See* Consent Decree, In re Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, on April 20, 2010, MDL. No. 2179 (2015); Julia P. Valentine, *Reference News Release: U.S., Enbridge Reach $177 Million Settlement After 2010 Oil Spills in Michigan and Illinois*, ENVT'L PROT. AGENCY (Jul. 20, 2016), https://www.epa.gov/enforcement/reference-news-release-us-enbridge-reach-177-million-settlement-after-2010-oil-spills.

224 *Settlement*, EXXON-VALDEZ Oil Spill Trustee Council, http://www.evostc.state.ak.us/index.cfm?FA=facts.settlement (last visited Feb. 7, 2019). This consisted of a $150 million criminal fine, but $125 million of that was forgiven for Exxon's cooperation in cleanup efforts. *Id.*

225 *Id. See also* Letter from Sue Ellen Wooldridge, Assistant Attorney General, RE: Demand for Cost of Restoration Under Reopener for Unknown Injury in *United States v. Exxon Corporation, et al.*, Nos. 3:91-0082 & 3:91-0083 (D. Alaska) (Aug. 31, 2006).

226 Exxon Shipping Co. v. Baker, 554 U.S. 471, 475 (2008).

227 DRAFT PROPOSED PROGRAM, *supra* note 18, at 1-15. The meaningful involvement of those states was to request exclusion from the Draft Proposed Program, but those requests were ignored, implying that the opinions of those states did not matter to the regulatory bodies. *Id.*

228 *Id.*

fisheries, which may harm local fishermen. The risks from offshore oil spills are extreme, and the regulations in place to mitigate the costs must be amended to reflect the actual cleanup costs to ensure that costs are never passed down to the taxpayers and to ensure that the individuals injured and lose work from the spill are repaid.

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Protecting Captive Endangered Animals: The Importance of Interpreting the Endangered Species Act Broadly

By Greer Gaddie

I. Introduction

In March 2018, the world lost its last male northern white rhinoceros, Sudan.[1] Although Sudan was an elderly animal whose health had been deteriorating for weeks, his death was particularly tragic because it marked the beginning of the end of his species.[2] Only two northern white rhinos remain, housed in the same conservancy where Sudan lived and where he was eventually euthanized.[3] Before the 20th century, rhinos roamed Africa in abundance.[4] Indeed, they were so numerous that local governments considered them agricultural pests.[5] In 1960, there were approximately 2,000 northern white rhinos

1 Rachel Nuwer, *Sudan, the Last Male Northern White Rhino, Dies in Kenya*, N.Y. Times, Mar. 20, 2018.
2 *Id.*
3 *Id.*
4 Janine Van Norman, *Protecting Africa's Last Rhino Populations from Poaching*, Endangered Species Bulletin, U.S. Fish & Wildlife Serv. Endangered Species (Nov. 30, 2013), https://www.fws.gov/endangered/news/episodes/bu-Fall2013/story5.
5 *Id.*

in east and central Africa.[6] Over the next several decades, however, human conflict, habitat destruction, and poaching destroyed the population.[7] By 2008, northern white rhinos could no longer be located in the wild.[8] The northern white rhino is only one of thousands of threatened or endangered species around the world.[9] Current extinction rates are accelerating rapidly, and research suggests that half of the planet's species could be eradicated by the end of the century.[10]

In the United States, the Endangered Species Act of 1973 (ESA)[11] provides the most critical and far-reaching source of legal protection for threatened and endangered animal populations.[12] The ESA was enacted primarily to conserve animal species threatened with extinction and the habitats they depend on to survive.[13] Despite the law's ambition, critics have questioned its effectiveness.[14] To illustrate, in 2013, the

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6 Eyder Peralta, *Sudan, World's Last Male Northern White Rhino, Dies*, NPR (Mar. 20, 2018), https://www.npr.org/sections/parallels/2018/03/20/591075801/sudan-worlds-last-male-northern-white-rhino-dies.

7 Nuwer, *supra* note 1.

8 *Id.*

9 Matthew Taylor & Hannah Ellis-Peterson, *Last male northern white rhino's death highlights "huge extinction crisis*," THE GUARDIAN, Mar. 20, 2018 (quoting World Wildlife Fund's Colin Butfield, who explained that "there is undoubtedly a huge extinction crisis going on of which [Sudan's] death is just a small part").

10 Kennedy Elliott et. al., *Does the Endangered Species Act Protect Too Many Species?*, NAT'L GEOGRAPHIC, https://www.nationalgeographic.com/magazine/2017/05/does-the-endangered-species-act-protect-too-many-species- (last visited Feb. 2, 2019).

11 Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2018).

12 *See* Federico Cheever, *An Introduction to the Prohibition Against Takings in Section 9 of the Endangered Species Act of 1973: Learning to Live with a Powerful Species Preservation Law*, 62 U. COLO. L. REV. 109, 125 (1991) (describing the ESA's enactment as a "watershed in federal wildlife law"); William M. Flevares, *Ecosystems, Economics, and Ethics: Protecting Biological Diversity at Home and Abroad*, 65 S. CAL. L. REV. 2039, 2040 (1992) (characterizing the ESA as "the most sophisticated species preservation law in the world"); Blaine I. Green, *The Endangered Species Act and Fifth Amendment Takings: Constitutional Limits of Species Protection*, 15 YALE J. ON REG. 329, 335 (1998) (suggesting that the ESA's introduction, which outlines the law's purposes and policies, foreshadows "the breadth of the Act").

13 David R. Schmahmann & Lori J. Polacheck, *The Case Against Rights for Animals*, 22 B.C. ENVTL. AFF. L. REV. 747, 769 (1995).

14 *See, e.g.*, Kristoffer Whitney, *Critics of the Endangered Species Act Are Right About What It Does. But They Miss the Point.*, WASH. POST, Aug. 2, 2018 (discussing lobbyists' critiques); Damien M. Schiff, *The Endangered Species Act at 40: A Tale of Radicalization, Politicization, Bureaucratization, and Senescence*, 37 ENVIRONS: ENVTL. L. & POL'Y J. 105, 120 (2014) (criticizing "the Act's approach to the recovery of listed species [as] no longer (assuming it ever was) particularly successful, cost-effective, or relevant"); Matt Kettman, *Why the Endangered Species Act is Broken, and How to Fix It*, SMITHSONIAN.COM (May 15, 2013), https://www.smithsonianmag.com/innovation/why-the-endangered-species-act-is-broken-and-how-to-fix-it- ("There are a lot of pundits out there who will tell you that it has . . . been a disaster . . ."); Natalie Pawelski, *Is the Endangered Species Act Effective?*, CNN (Dec. 22, 1998), http://www.cnn.com/TECH/science/9812/22/endangered.anniversary (describing disagreement among experts about whether the ESA can "take credit" for saving several endangered species).

United States Fish and Wildlife Service (FWS)—the agency responsible for administering and enforcing the ESA with respect to terrestrial animals—published a bulletin outlining its efforts to protect African rhinos.[15] The FWS explained that a wide array of conservation resources was necessary to ensure the long-term survival of the species, and it promised that "[t]he Endangered Species Act [was] helping to [ensure] just that."[16] But Sudan died just five years later, leaving only two surviving northern white rhinos in the world and casting doubt on the ESA's ability to save threatened animal species from extinction.

By some accounts, Sudan survived the extinction of his kind in the wild thanks only to his captivity.[17] Over the next century, climate change, habitat destruction, overhunting, and competition among animal populations will continue to exacerbate the extinction crisis,[18] and captivity programs are expected to play a critical role in mitigating the devastating effects.[19] In 2011, researchers estimated that zoos held approximately 15% of threatened species of terrestrial vertebrates.[20] More recently, scholars have theorized that captive breeding programs, and zoos in particular, will become increasingly important in combatting the extinction of endangered species.[21] As a result, greater numbers of endangered animals will likely live exclusively in captivity.

Protective measures should focus on ensuring the safety and humane treatment of these captive animals, meaning that administrative agencies and courts must enforce the ESA stringently against captivity programs. Some courts, however, are reluctant to interpret provisions of the ESA in such a way as to protect captive animals from mistreatment. For example, in January 2018, the United States Court of Appeals for the Eleventh Circuit decided an ESA case involving Lolita, a captive orca living at the Miami Seaquarium.[22] Lolita is a southern resident killer whale, which is considered an endangered species under the law.[23] People for the Ethical Treatment of Animals (PETA) sued the Seaquarium over Lolita's captivity conditions, alleging that the Seaquarium had committed an unlawful taking of Lolita prohibited by the ESA.[24]

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15 Norman, *supra* note 4.

16 *Id.*

17 Nuwer, *supra* note 1 (quoting Jan Stejskal, the director of international projects at the Dyur Kralove Zoo, where Sudan spent most of his life).

18 Dalia A. Conde et al., *Zoos Can Lead the Way with Ex Situ Conservation*, 12 WAZA MAG. 26, 26 (2011).

19 *See, e.g.*, Dave Hone, *Why the World Needs Zoos*, THE GUARDIAN, Mar. 8, 2017 (explaining that many endangered species are only surviving today because they are kept in captivity); Conde et al., *supra* note 18, at 26 ("[C]aptive breeding programmes may be the only short term solution to avoid the extinction of those species whose populations are highly threatened.").

20 Jozef Keulartz, *Captivity for Conservation? Zoos at a Crossroads*, 28 J. AGRIC. & ENVTL. ETHICS 335, 341 (2015).

21 Conde et al., *supra* note 18, at 26.

22 People for the Ethical Treatment of Animals, Inc. v. Miami Seaquarium, 879 F.3d 1142, 1144 (11th Cir. 2018).

23 *Id.* at 1144–45. *See also* 50 C.F.R. § 224.101 (2018).

24 *Miami Seaquarium*, 879 F.3d at 1145. For an explanation of the ESA's take prohibition, see *infra* Part II.A.

The outcome of *Miami Seaquarium* ultimately turned on the Eleventh Circuit's interpretation of the ESA—specifically, the court's refusal to read the relevant provision broadly.[25] The court was concerned, in part, that a broad construction of the provision at issue would put the ESA into direct conflict with the United States Department of Agriculture's (USDA) regulatory scheme under the Animal Welfare Act (AWA), another federal law that regulates animal captivity.[26] In light of this concern, the court held that Lolita's captivity conditions did not amount to an unlawful taking under the ESA,[27] a decision PETA lamented as condemning Lolita—a "highly intelligent, deeply lonely, and distressed orca"—"to a lifetime of physical and psychological harm."[28] *Miami Seaquarium* raised an important question: how should courts interpret the ESA in the context of captive wildlife considering the law's inevitable overlap with the AWA?

This Note explores the answer through a discussion of judicial interpretation of the ESA in the context of an increasing reliance on zoos to combat the extinction crisis. The ESA's purpose is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved."[29] Congress likely contemplated the conservation of natural ecosystems: oceans and forests, prairies and tundra. But what if the ecosystems those species depend on become contrived, controlled environments? What if protecting endangered species can only be achieved by more rigorous scrutiny of the people and organizations housing endangered animals in captivity?

Courts have taken various approaches to the ESA's Section 9 take prohibition—the provision at issue in *Miami Seaquarium*—particularly in light of its perceived conflict with the AWA. In this Note, I argue that the correct interpretation of Section 9 must be broad to serve the ESA's purposes under increasingly dire circumstances for vulnerable animal populations. In Part II, I describe the ESA, including its core components and purpose as well as its role in protecting captive members of endangered species. In Part III, I explore the current legal framework by surveying recent cases that offer conflicting interpretations of the ESA as well as competing theories on the ESA's relationship with the AWA. Finally, in Part IV, I propose a broad interpretation of the ESA's Section 9 take prohibition in furtherance of the law's ultimate goals, and I highlight examples of courts implementing my recommended approach.

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25 *Miami Seaquarium*, 879 F.3d at 1145.

26 *Id.* at 1149.

27 *Id.*

28 *PETA Files Petition for Rehearing of Lolita Lawsuit Against Miami Seaquarium*, PETA: ANIMALS ARE NOT OURS BLOG, https://www.peta.org/blog/peta-files-petition-rehearing-lolita-lawsuit-miami-seaquarium (last updated Mar. 30, 2018).

29 16 U.S.C. § 1531 (2018).

II. The Endangered Species Act in Its Modern Context

The ESA is considered the "catalyst of [a] movement"[30] and has been credited with saving over 200 species from extinction.[31] The law was originally intended to promote the conservation of the ecosystems that threatened and endangered species depend on to survive.[32] However, its purpose and impact are evolving as environmental and manmade threats to wildlife worsen. Today, conservationists must be increasingly innovative, and a growing number of threatened or endangered animals are being removed from their natural habitats and placed in captivity to ensure their survival.

A. The ESA's Mechanics and Purpose

The ESA is the final product of intense and prolonged congressional action meant to protect threatened and endangered species from risks of extinction.[33] Congress first passed the Endangered Species Preservation Act in 1966 as a result of increasing concerns about the conservation of endangered wildlife.[34] The law required certain federal agencies to maintain a list of designated endangered species and provided listed species with limited protections.[35] Just three years later, Congress expanded the law to increase federal involvement in the initiative.[36] The resulting legislation "represented the most comprehensive of its type to be enacted by any nation."[37] Yet Congress vowed to do more. In 1973, to address continuing anxiety among environmental groups, Congress passed the Endangered Species Act.[38] The modern version of the ESA provides the country's most comprehensive approach to species conservation to date.[39] Signing the bill into law, President Nixon concluded, "Nothing is more priceless and more worthy of preservation than the rich array of animal life with which our country has been blessed."[40]

The ESA has several main components. Section 4 authorizes the Secretary of the Interior to designate species as threatened or endangered based on a delineated process.[41]

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30 Davina Kari Kaile, *Evolution of Wildlife Legislation in the United States: An Analysis of the Legal Efforts to Protect Endangered Species and the Prospects for the Future*, 5 Geo. Int'l Envtl. L. Rev. 441, 441 (1993).

31 Christopher Ketcham, *Inside the Effort to Kill Protections for Endangered Animals*, Nat'l Geographic, May 19, 2017.

32 16 U.S.C. § 1531.

33 *See* Tenn. Valley Authority v. Hill, 437 U.S. 153, 174 (1978) ("When Congress passed the Act in 1973, it was not legislating on a clean slate.").

34 *Endangered Species Act: A History of the Endangered Species Act of 1973*, U.S. Fish & Wildlife Serv., https://www.fws.gov/endangered/laws-policies/esa-history.html (last updated Dec. 11, 2018).

35 *Id.*

36 *Tenn. Valley Auth.*, 437 U.S. at 175.

37 *Id.* at 180 (internal quotations omitted).

38 Kaile, *supra* note 30, at 456.

39 *Tenn. Valley Auth.*, 437 U.S. at 180.

40 President Nixon's Statement on Signing the Endangered Species Act of 1973, 374 Pub. Papers 1027, 1027–28 (Dec. 28, 1973).

41 16 U.S.C. § 1533 (2018). *See also* Sonia S. Waisman, Pamela D. Frasch & Bruce A. Wagman, Animal Law 605 (5th ed. 2014).

The Secretary is also required to establish conservation programs to protect listed species.[42] Section 7 requires all federal agencies to "utilize their authorities in furtherance of the purposes of [the ESA]" and to "insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of" threatened or endangered species.[43] The ESA also includes a citizen-suit provision, which allows interested persons to bring civil actions in federal court to mandate compliance with the law.[44]

Most importantly, for the purposes of this Note, Section 9—which scholars have argued is "perhaps the most powerful regulatory provision in all of environmental law"[45]—prohibits "any person" from "tak[ing]" a member of an endangered species.[46] The statute defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[47] While the provision is direct and the definition of "take" clear, the statute itself does not define any of the actions listed in the definition, and the FWS regulations that define some of these terms have led to significant controversy.[48] The ESA's Section 9 take prohibition may be the most "powerful protection[ ] for animals . . . in danger of extinction."[49] However, it is also the subject of much litigation involving captive wildlife.[50]

The law's legislative history makes clear that the ESA was intended to signal Congress's stalwart commitment to protecting endangered species. At its core, the ESA is designed to curb the extinction of vulnerable animal populations. During consideration of the House version of the bill, one congressman described it as "declar[ing] a national policy that endangered species should be protected" and "extend[ing] maximum protection to the animals of this Nation which are endangered."[51] In the same vein, deliberating senators described the bill as "designed to provide the protection needed to save species of wildlife threatened with extinction."[52] The ESA's intentionally broad purpose had bipartisan support: "The dominant theme pervading all Congressional discussion of the proposed [law] was the overriding need to devote whatever effort and resources were necessary to avoid further diminution of national and worldwide wildlife resources."[53] This broad, powerful mandate should be the cornerstone of the law's enforcement.

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42 16 U.S.C. § 1534.
43 *Id.* § 1536.
44 *Id.* § 1540(g).
45 WAISMAN ET AL., *supra* note 41, at 609.
46 16 U.S.C. § 1538.
47 *Id.* § 1532(19).
48 *See* Paul Boudreaux, *Understanding "Take" in the Endangered Species Act*, 34 ARIZ. ST. L.J. 733, 736 (2002).
49 *Id.* at 733.
50 *See infra* Part III.B.
51 H.R. 37, 93rd Cong. (1973) (statements of Representative John Dingell of Michigan and Representative Frank Annunzio of Illinois, respectively).
52 S. 1983, 93rd Cong. (1973) (statement of Senator Harrison Williams, Jr., of New Jersey).
53 Tenn. Valley Authority v. Hill, 437 U.S. 153, 177 (1978) (quoting George Cameron Coggins, *Conserving Wildlife Resources: An Overview of the Endangered Species Act of 1973*, 51 N.D. L. REV. 315, 321 (1974)). *See also* Mark W. Schwartz, *The Performance of the Endangered Species Act*, 29 ANN. REV. ECOLOGY, EVOLUTION, & SYSTEMATICS 279, 280 (2008) (noting that support for the ESA was originally bipartisan).

B. Endangered Species Living in Captivity

Climate change and human encroachment will continue to threaten the existence of endangered species.[54] Undoubtedly, efforts to combat extinction will increasingly rely on captivity programs.[55] For example, in 2012, the non-governmental organization Polar Bears International facilitated collaboration between researchers and zoos to spearhead a conservation program to save endangered polar bears.[56] The project enabled researchers to study captive polar bears at the St. Louis Zoo.[57] As a result of their research, scientists developed tools to anticipate future issues the species may face—tools that will eventually be used to maintain genetic diversity among wild polar bear populations.[58] Similarly, the San Diego Zoo has partnered with the FWS and other organizations to recover the critically endangered alala population.[59] The zoo has been breeding the alala, otherwise known as the Hawaiian crow, since 1996.[60] In 2019, a pair of alala released back into the wild were observed making a nest—the first nest built in the wild in decades.[61] In an effort to contribute to conservation efforts, the Association of Zoos and Aquariums promotes the use of zoos to implement survival plans for endangered species.[62] The organi-

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54 J. Michael Scott et al., *Conservation-Reliant Species and the Future of Conservation*, 3 Conservation Letters 91, 95 (2010).

55 *See* John Alroy, *Limits to Captive Breeding of Mammals in Zoos*, 29 Conservation Biology 926, 926 (2015) (arguing that "[c]aptive breeding of mammals in zoos is the last hope for many of the best-known endangered species"). *See also* Robin Ganzert, *Zoos Are Not Prisons. They Improve the Lives of Animals*, TIME, June 13, 2016 (discussing the existence of zoos that "facilitate the promote and conservation of animals" and arguing that zoos "are uniquely positioned to combat [the] evolving threats" of human activity); Jordan Carlton Schaul, *St. Louis Zoo & Polar Bear International are Spearheading an Effort to Bring Arctic Polar Bears to US Facilities*, Nat'l Geographic: Changing Planet Blog (Mar. 3, 2012), https://blog.nationalgeographic.org/2012/03/03/st-louis-zoo-polar-bears-international-are-spearheading-an-effort-to-bring-arctic-polar-bears-to-us-facilities/ (reporting on a meeting between the St. Louis Zoo and conservationists meant to raise awareness about the "potential for zoological facilities to help in conservation efforts").

56 Randi Meyerson et al., *Welfare of Captive Polar Bears and Their Value to In Situ Conservation Efforts*, *in* Marine Mammal Welfare: Human Induced Change in the Marine Environment and its Impacts on Marine Mammal Welfare 489, 491–92 (Andy Butterworth ed., 2017).

57 *Id.* at 492.

58 *Id.*

59 *Alala*, U.S. Fish & Wildlife Serv., Pacific Islands Fish & Wildlife Office, https://www.fws.gov/pacificislands/articles.cfm?id=%20149489562.

60 *How We're Helping to Save the 'Alala*, San Diego Zoo: Institute for Conservation Research, hhtp://www.institute.sandiegozoo.org/species/alala.

61 Bradley J. Fikes, *Critically Endangered Hawaiian Crow Builds First Nest in the Wild in Decades*, Spokesman-Review (May 15, 2019), https://www.spokesman.com/stories/2019/may/15/critically-endangered-hawaiian-crows-build-first-n/.

62 *See* Meyerson et al., *supra* note 56, at 492. *See also* Justin Worland, *The Future of Zoos: Challenges Force Zoos to Change in Big Ways*, TIME, Feb. 16, 2017; *About Us*, Ass'n of Zoos & Aquariums, https://www.aza.org/about-us, (last visited April 4, 2019) (The Association of Zoos and Aquariums (AZA) is a nonprofit organization "dedicated to the advancement of zoos and aquariums in the areas of conservation, education, science, and recreation." The AZA represents over 230 institutions around the world.).

zation is credited with saving, among others, the red wolf and the California condor, both of which were reintroduced into the wild after nearly becoming extinct.[63]

Zoos will unavoidably become a more permanent fixture in the fight against extinction. In fact, many endangered species are already extinct in the wild and depend exclusively on zoos and captivity programs for survival.[64] As animal populations disappear at an alarming rate, conservationists are looking for more ambitious and inventive strategies.[65] More researchers are recognizing and embracing the valuable role zoos and captivity programs can play in both managing threatened species and saving those that are already endangered.[66]

This newfound acceptance of zoos as conservationists serves not only scientists, environmentalists, and endangered species, but also the zoos themselves. Media focus on the deaths of captive animals has subjected zoos to heightened scrutiny; the most notable example is the 2016 death of Harambe, an endangered silverback gorilla, at the Cincinnati Zoo.[67] After a child visiting the zoo fell into Harambe's *enclosure*, a staff member shot and killed the gorilla, sparking outrage across social media.[68] Keen to avoid similar public relations nightmares and overburdened by the demands of animal-rights advocates, zoos have looked to rebrand themselves as part of the solution.[69] Although Harambe's death reflected poorly on zoos, they have undoubtedly played a critical part in preserving gorillas via species survival programs.[70] And experts believe that, in the future, zoos will serve as major contributors to conservation and preservation efforts in an increasingly influential way.[71] While the drafters of the ESA did not necessarily contemplate the law's impact on captive wildlife, environmental and animal-rights organizations have begun using the law—particularly Section 9—to protect those species that have gone extinct in the wild.

III. THE CURRENT LEGAL FRAMEWORK

Although the ESA's protections apply to members of threatened and endangered species that have been taken out of their natural habitats, the Animal Welfare Act is the

63 Worland, *supra* note 62.

64 Hone, *supra* note 19.

65 Ian James & Sammy Roth, *The Extinction Crisis in a Warming World*, DESERT SUN (Apr. 18, 2016), https://www.desertsun.com/story/news/environment/2016/04/18/extinction-crisis-warming-world/.

66 Conde et al., *supra* note 18, at 26, 29.

67 Ben Guarino, *Gorilla Death at Cincinnati Zoo Puts Debate Over Captive Creatures in Stark Relief*, WASH. POST, May 31, 2016.

68 *Id*. *See also* Ben Shapiro, *The Gorilla Megillah*, NAT'L REV. (June 1, 2016), https://www.nationalreview.com/2016/06/gorilla-harambe-killing-justified/.

69 Worland, *supra* note 62.

70 Guarino, *supra* note 67.

71 *See* Conde et al., *supra* note 18, at 28 ("Zoos' contribution to conservation is not limited to captive breeding, but as well is growing towards research, *in situ* conservation projects.").

law primarily responsible for regulating the care and treatment of captive animals.[72] Only in the last decade have courts begun to analyze how the AWA intersects with Section 9 of the ESA. The issue remains unsettled, and the current legal landscape is conflicted.

A. The Animal Welfare Act's Failure to Protect Captive Wildlife

The AWA is the predominant law governing zoos.[73] The AWA authorizes the Secretary of Agriculture to set minimum standards for the handling, care, and treatment of animals used for research or exhibition purposes.[74] While the ESA protects a subset of captive animals—those on the threatened or endangered species list—the AWA has a wider reach. Its purpose is to "insure that animals intended for use in research facilities or for exhibition purposes . . . are provided humane care and treatment,"[75] and the law's provisions apply to all captive wildlife used for those purposes. The USDA sets the minimum standards; and the Animal and Plant Health Inspection Service (APHIS) enforces them.[76]

However, current enforcement of the AWA is ineffective at protecting members of endangered species living in captivity. Unlike the ESA, the AWA does not include a citizen-suit provision:[77] only public enforcement of the law is available, meaning the USDA must use its limited resources to sue those research facilities and exhibitors who fail to comply with the law.[78] In practice, the USDA rarely attempts enforcement.[79] Additionally, when private actors sue the USDA for decisions made under the AWA—for example, to challenge an agency's renewal of a permit for a zoo with a record of AWA violations—courts' deference to APHIS decisions under the *Chevron* doctrine[80] makes it nearly impossible to successfully combat failed enforcement.

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72 Animal Welfare Act, 7 U.S.C. § 2131 (2018) ("Congress finds that . . . regulation of animals and activities as provided in this chapter is necessary to prevent and eliminate burdens upon such commerce and to effectively regulate such commerce, in order . . . to insure that animals intended for use in research facilities or for exhibition purposes or for use as pets are provided humane care and treatment . . . to assure the humane treatment of animals during transportation in commerce; and . . . to protect the owners of animals from the theft of their animals by preventing the sale or use of animals which have been stolen.").

73 *Id.* §§ 2131–2159.

74 Schmahmann & Polacheck, *supra* note 13, at 765.

75 Animal Welfare Act, 7 U.S.C. § 2131.

76 Kaitlin Vigars, *Bigger Than Blackfish: Lessons from Captive Orcas Demonstrate a Larger Problem with Animal Welfare Laws*, 44 B.C. Envtl. Aff. L. Rev. 491, 504 (2017).

77 Lisa Marie Morrish, *The Elephant in the Room: Detrimental Effects of Animals' Property Status on Standing in Animal Protection Cases*, 53 Santa Clara L. Rev. 1127, 1135 (2013).

78 *Id.* at 1134.

79 Vigars, *supra* note 76, at 505.

80 Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837 (1984) (articulating the legal standard for determining when courts should grant deference to an administrative agency's interpretation of a statute); Vigars, *supra* note 76, at 514–15.

APHIS's failures are well documented. In 2010, the Office of Inspector General (OIG) conducted an audit of the APHIS unit responsible for enforcing the AWA.[81] The audit was precipitated by significant media coverage surrounding "puppy mills," large-scale dog breeders notorious for treating their animals inhumanely.[82] A previous audit had revealed that the agency was not enforcing the AWA aggressively enough.[83] Yet, despite past poor performance and prior warnings, the OIG again concluded in its 2010 audit that APHIS's efforts to enforce the AWA were failing: over 80% of dog breeders were not being monitored for compliance.[84]

Most recently, in 2017, the OIG conducted an audit of APHIS's AWA enforcement programs for captive marine mammals.[85] The OIG concluded that APHIS's attempts to enforce the AWA were unsuccessful.[86] Inadequate AWA enforcement—both the direct failures of executive agencies and judicial deference to those agencies—has effectively made the law a dead letter.[87] Accordingly, steadfast administration and judicial enforcement of the ESA with respect to captive animals is increasingly imperative.

B. UNDERSTANDING THE RELATIONSHIP BETWEEN THE ESA AND THE AWA

Despite their different stated purposes, the underlying concerns of the ESA and the AWA demonstrate the extent of their similarities. The first version of the AWA was designed to regulate the use of certain animals for research.[88] Over time, the AWA's goals have broadened, with the modern formulation intended to protect animals used for

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81 U.S. DEP'T OF AGRIC., OFFICE OF INSPECTOR GEN., AUDIT REPORT 33002-4-SF, ANIMAL AND PLANT HEALTH INSPECTION SERV. ANIMAL CARE PROGRAM: INSPECTIONS OF PROBLEMATIC DEALERS 1 (2010).

82 *Id.* at 1.

83 *Id.* at 1–2.

84 Tanya Espinosa & Suzanne Boyd, *USDA Restores Important Check and Balance on Retail Pet Sales to Ensure Health, Humane Treatment*, USDA: ANIMAL & PLANT HEALTH INSPECTION SERV., https://www.aphis.usda.gov/aphis/newsroom/news/SA_By_Date/SA_2013/SA_09/CT_retail_pet_final_rule (last updated Aug. 29, 2016).

85 U.S. DEP'T OF AGRIC., OFFICE OF INSPECTOR GEN., AUDIT REPORT 33601-0001-31, APHIS: ANIMAL WELFARE ACT—MARINE MAMMALS (CETACEANS) 1–3 (2017).

86 *Id.* at 4, 9, 14, 16 (concluding that APHIS failed to enforce regulations, incorrectly performed and documented inspections, and promulgated vague rules that could potentially harm those animals the law regulates).

87 *See* Carole Lynn Nowicki, *The Animal Welfare Act: All Bark and No Bite*, 23 SETON HALL LEGIS. J. 443, 467 (1999) ("The USDA and the federal courts are empowered to enforce the AWA, yet both have failed . . . ."); Katharine M. Swanson, *Carte Blanche for Cruelty: The Non-Enforcement of the Animal Welfare Act*, 35 U. MICH. J.L. REFORM 937, 950, 955 (2002) (arguing that the USDA fails to promulgate adequately protective regulations and that APHIS fails to adequately police compliance with the law); Melanie L. Vanderau, *Science at Any Cost: The Ineffectiveness and Underenforcement of the Animal Welfare Act*, 14 PENN. ST. ENVTL. L. REV. 721, 728 (2008) (chronicling enforcement issues "render[ing] the AWA powerless to protect animal welfare in many situations"). *See also* Vigars, *supra* note 76, at 505 (noting that "the AWA, in practice, is seldom enforced").

88 Henry Cohen, *The Animal Welfare Act*, 2 J. ANIMAL L. 13, 13 (2006).

exhibition or research purposes, as well as those transported in interstate commerce.[89] Despite its broadening goals, the AWA's scope remains fairly narrow. The ESA, by contrast, provides sweeping protection for all members of any threatened or endangered species.[90]

Courts across jurisdictions have offered various interpretations of the relationship between the ESA and the AWA. A typical case involving their overlap may present issues related to an animal that is held in captivity for exhibition or research purposes and that is also a member of a threatened or endangered species. The first federal court to analyze both laws interpreted them as a pair, ultimately determining that, collectively, they did not preempt state law.[91] It was not until 2016 that a court analyzed the statutes' relationship more directly—weighing evidence of a defendant's AWA compliance to assess its potential liability under the ESA.[92]

Since then, several courts have discussed the laws' interplay, and almost all of the pertinent cases have involved the ESA's Section 9 take prohibition. As explained herein, Section 9 makes it unlawful to take "any endangered species of fish or wildlife listed pursuant to [Section 4]."[93] "Take" means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[94] The United States Supreme Court offered a thorough examination of the take prohibition in *Babbitt v. Sweet Home Chapter of Communities for a Greater Oregon*.[95] In *Babbitt*, the Court upheld as reasonable the Secretary of the Interior's definition of "harm," the controversial portion of which included habitat modification.[96] For guidance, the Court looked to the ESA's policy goals and concluded that "the broad purpose of the ESA supports the Secretary's decision to extend protection."[97] Although the Supreme Court has provided a comprehensive interpretation and analysis of the law, "the parameters of the take prohibition remain unsettled."[98]

None of the actions that constitute a "take" are defined in the statute, but the FWS and the National Marine Fisheries Service (NMFS)—which administer the ESA for terrestrial and marine mammals, respectively—have promulgated regulations defining the terms "harm" and "harass."[99] Both agencies define "harm" in the context of a taking as "an act which actually kills or injures wildlife."[100] Only the FWS has defined "harass."

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89 *Id.*

90 *See* 16 U.S.C. § 1531(b) (2018) (outlining the purposes of the ESA, including "provid[ing] a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved" and "provid[ing] a program for the conservation of such endangered species and threatened species . . .").

91 *See* Pinto v. Conn. Dep't of Envtl. Prot., No. 87–523, 1988 WL 47899, at *9–11 (D. Conn. Mar. 24, 1988) (concluding that the relevant Connecticut permitting statute is not preempted by either the AWA or the ESA).

92 Kuehl v. Sellner, 161 F. Supp. 3d 678 (N.D. Iowa 2016).

93 16 U.S.C. § 1538.

94 *Id.* § 1532(19).

95 Babbitt v. Sweet Home Chapter of Cmtys. for a Greater Or., 515 U.S. 687 (1995).

96 *Id.* at 708.

97 *Id.* at 698.

98 Boudreaux, *supra* note 48, at 771.

99 50 C.F.R. § 22.102 (2016); 50 C.F.R. § 17.3 (2006).

100 50 C.F.R. § 22.102 (2016); 50 C.F.R. § 17.3 (2006).

Under Section 9, the FWS defines "harass[ment]" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering."[101] Despite this guidance, courts have struggled to determine when an animal exhibitor's conduct amounts to an unlawful taking.[102] Courts have also grappled with how the AWA and its regulations regarding captive animals fit into the takings analysis. As described below, these courts have come to various conclusions.

1. *PETA v. Miami Seaquarium: Crafting a Narrow Approach*

The Eleventh Circuit has refused to interpret the scope of actions that constitute a "taking," as applied to captive wildlife, broadly. In 2015, PETA sued the Miami Seaquarium, alleging that the Seaquarium's treatment of the captive orca Lolita amounted to an unlawful taking under Section 9 of the ESA.[103] PETA alleged that Lolita's conditions "harmed" and "harassed" the whale in violation of the ESA.[104] To support its allegations, PETA cited an inadequate tank size and configuration, prolonged sun exposure, and the inappropriateness of Lolita's forced cohabitation with dolphins.[105]

On appeal, the *Miami Seaquarium* decision turned on statutory construction and the Eleventh Circuit's analysis of the words "harm" and "harass."[106] The court relied on the canon of construction *noscitur a sociis* ("a word is known by the company it keeps").[107] According to the court's interpretation of the statute, the other words listed in the ESA's definition of "take"—such as "hunt" and "kill"—refer to actions that "pose a serious threat of harm to an endangered animal."[108] The court reasoned that "harm" and "harass" must, therefore, also imply a serious threat.[109] PETA criticized this interpretation, arguing that the court was effectively adding an unnecessary modifier to the words "harm" and "harass."[110] PETA further argued that the court's conclusion was inconsistent with the Supreme Court's broad interpretation of the ESA's purpose in *Sweet Home*.[111] However, the Eleventh Circuit disagreed.[112]

The court was motivated by a desire to avoid conflict between the ESA and the AWA. Lolita's captivity conditions are regulated primarily by APHIS, as the relevant enforcer of the AWA.[113] The court's concern was that an expansive reading of "harm"

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101 50 C.F.R. § 17.3 (2006).
102 Boudreaux, *supra* note 48, at 739.
103 People for the Ethical Treatment of Animals, Inc. v. Miami Seaquarium, 879 F.3d 1142, 1144 (11th Cir. 2018).
104 *Id.* at 1145.
105 *Id.*
106 *See id.* at 1146.
107 *Id.* at 1147.
108 *Id.*
109 *Id.*
110 *Id.* at 1148.
111 *Id.*
112 *Id.* at 1148–49.
113 *See id.* at 1150 ("[T]he regulations promulgated under the AWA address many of the aspects of Lolita's activity PETA puts forward in this case as 'harm[ing]' or 'harass[ing]' Lolita in violation of the ESA . . .").

and "harass" would undermine AWA compliance—or, worse, render it worthless: "If given their dictionary definitions, 'harm' and 'harass' would sweep so broadly as to deprive AWA compliance of practical significance."[114] To illustrate, a zoo might meet all AWA regulatory requirements and have a perfect compliance record but nonetheless be liable under the ESA for its treatment of an animal based simply on a loose judicial interpretation of the word "take." The Eleventh Circuit believed a higher standard was necessary to prevent *de minimis* injuries from creating liability.[115] By adding a "seriously threatening" qualifier to "harm" and "harass," the court purported to strike a balance between protecting endangered species and avoiding complete abrogation of the "complex regulatory scheme" implemented by the USDA under the AWA.[116]

2. Rejecting a Qualification of "Harm" and "Harass"

Most courts that have addressed the issue have taken a less restrictive approach. In *Graham v. San Antonio Zoological Society*,[117] the Western District of Texas rejected a "seriously threatening" qualifier, noting that no other court had adopted the standard or added similar modifiers to the definitions of "harm" and "harass."[118] The *Graham* court conceded that the language of the FWS regulations suggests that the "the nature of an act that violates the ESA must be more than any minor injury or harm" and "must have some notion of significance," but the court drew a line: "[T]he language comes far short of requiring a 'grave[ ] threat.'"[119]

In *Graham*, the plaintiffs were San Antonio residents and frequent visitors of the San Antonio Zoo, which houses the endangered Asian elephant Lucky. The plaintiffs accused the zoo of violating the ESA's Section 9 by harming and harassing Lucky in such a way that constituted an unlawful taking.[120] In response, the zoo argued that the AWA, not the ESA, was the law governing the treatment of captive animals and, furthermore, that the zoo's compliance with the AWA exempted it from ESA liability.[121] The zoo relied on the FWS regulation defining "harass," 50 C.F.R. section 17.3, which includes several exemptions.[122] The exemption that the zoo depended on provides that the definition of "harass," "when applied to captive wildlife, does not include generally accepted . . . [a]nimal husbandry practices that meet or exceed the minimum standards for facili-

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114 *Id.*
115 *Id.*
116 *Id.*
117 Graham v. San Antonio Zoological Soc'y, 261 F. Supp. 3d 711 (W.D. Tex. 2017).
118 *Id.* at 743.
119 *Id.* *Graham* was decided before the Eleventh Circuit's decision in *Seaquarium*. The *Graham* court rejected a "gravely threatening" requirement adopted by the Southern District of Florida in *Seaquarium* before the case was appealed to the Eleventh Circuit. *See Miami Seaquarium*, 189 F. Supp. at 1327. On appeal, the Eleventh Circuit rejected the district court's conclusion that "harm" and "harass[ment]" include only deadly or potentially deadly harm, although it determined that actionable harm and harassment are nonetheless restricted to conduct that poses a threat of serious harm. *Id.* at 1144, 1150 (11th Cir. 2018).
120 *Graham*, 261 F. Supp. 3d 711, 716.
121 *Id.*
122 50 C.F.R. § 17.3 (2018).

ties and care under the [AWA]."[123] The zoo argued that this exemption shielded AWA-compliant facilities from liability under Section 9 of the ESA.[124]

The court rejected the zoo's argument.[125] Acknowledging that APHIS's determinations of AWA compliance could serve as evidence against a finding of liability, the *Graham* court nonetheless held that APHIS's determinations alone would not suffice to protect a zoo from ESA liability under Section 9.[126] Rather, the court would need to "independently assess the zoo's animal husbandry practices."[127] The court disagreed with the zoo's contention that an exhibitor's record of AWA compliance prohibits a finding of take liability altogether.[128] Instead, the court interpreted the AWA as providing the substantive standards for determining liability under an analysis of whether an exhibitor has "harassed" an animal in violation of the ESA.[129] Amending the definition of "harass," the FWS had previously noted that "captive animals can be subjected to improper husbandry."[130] The court read the agency's statement to support its conclusion, not only that Section 9 protects captive wildlife, but also that APHIS's determinations of AWA compliance are not conclusive on the issue of ESA liability.[131] Under *Graham*, courts must independently assess an exhibitor's practices when undertaking a "harass"-based analysis.[132]

The Fourth Circuit has interpreted the relationship between the ESA and the AWA similarly. In *Hill v. Coggins*,[133] the Cherokee Bear Zoo and its owners were alleged to have committed an unlawful taking under the ESA's Section 9.[134] At issue was the zoo's confinement of four grizzly bears.[135] The district court had previously held that the zoo did not harm or harass the bears in a way that was sufficient to find an unlawful taking.[136] It based its conclusion on the zoo's record of compliance with the AWA but did not independently analyze the zoo's husbandry practices.[137]

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123 *Graham*, 261 F. Supp. 3d at 737 (citing 50 C.F.R. § 17.3 (2006)).
124 *Id.* at 739.
125 *Id.* at 716.
126 *See id.* at 737, 743–44 (rejecting the zoo's argument that the AWA supersedes the ESA and concluding, instead, that "APHIS determinations of AWA compliance are evidence of AWA compliance for purposes of ESA take liability").
127 *Id.*
128 *Id.* at 739.
129 *Id.* at 745.
130 Captive-Bred Wildlife Regulation, 63 Fed. Reg. 48,634, 48,636 (Sept. 11, 1998) (codified at 50 C.F.R. Pt. 17)
131 *Graham*, 261 F. Supp. 3d at 745, 748.
132 Additionally, the *Graham* court noted that the animal husbandry exemption only applies to the FWS definition of "harass"—not "harm" or any of the other actions enumerated in the statutory definition of "take." *Id.* at 743. Therefore, even if the zoo's compliance with the AWA and an independent judicial determination of the zoo's husbandry practices led to the conclusion that there was no "harass[ment]," such a determination would not preclude possible liability under the ESA for "harm[ing]" Lucky. *Id.* at 743–44.
133 Hill v. Coggins, 867 F.3d 499 (4th Cir. 2017).
134 *Id.* at 502.
135 *Id.*
136 *Id.* at 504.
137 *Id.*

Like the *Graham* court, the Fourth Circuit focused on the FWS definition of "harass" under 50 C.F.R. section 17.3 and its accompanying exemptions.[138] As part of its analysis, the court dissected the structure of section 17.3.[139] The sentence defining "harass" is immediately followed by an introduction to the exemptions:

> "This definition, when applied to captive wildlife, does not include generally accepted:
> (1) Animal husbandry practices that meet or exceed the minimum standards for facilities and care under the [AWA],
> (2) Breeding procedures, or
> (3) Provisions of veterinary care for confining, tranquilizing, or anesthetizing, when such practices, procedures, or provisions are not likely to result in injury to the wildlife."[140]

Because the introductory clause is set apart from the list of exemptions, the court argued that the phrase "generally accepted"—which is part of the introductory clause—is a separate requirement.[141] The exemption is, therefore, two-pronged: (1) the exhibitor's animal husbandry practices must meet or exceed the minimum AWA standards, and (2) the practices must be generally accepted. APHIS determinations of AWA compliance can serve as evidence for the first prong, but the Fourth Circuit held that courts must conduct their own assessments about whether an exhibitor's practices are generally accepted under the second prong.[142]

Consequently, the Fourth Circuit held that the district court's interpretation and analysis of Section 17.3 was incorrect.[143] Once the lower court had determined the zoo to be AWA-compliant, it refused to independently assess whether the zoo's practices were generally accepted.[144] The Fourth Circuit explained that, in doing so, the district court had effectively read the phrase "generally accepted" out of the definition of "harass," which erroneously narrowed the scope of conduct constituting harassment and contradicted Congress's intent.[145]

Miami Seaquarium was decided before *Hill*, so the Fourth Circuit did not discuss the Eleventh Circuit's interpretation of Section 9.[146] Regardless, the Fourth Circuit relied, in part, on what it believed to be broad congressional intent underlying the ESA; it criticized the district court's "protection-narrowing" approach as conflicting with the ESA's "broad purpose," which was intended "to be advanced in large part through . . . broad

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138 *Id.* at 509–10.
139 *Id.*
140 50 C.F.R. § 17.3 (2018) (emphasis added).
141 *Hill*, 867 F.3d at 509 ("The first enumerated exclusion specifically requires AWA compliance, and it is preceded by a 'generally accepted' requirement that applies to the disjunctive list of enumerated exclusions.").
142 *Id.* at 510.
143 *See id.* at 509 ("The district court's . . . interpretation . . . conflicts with basic principles of legal interpretation.").
144 *Id.* at 504.
145 *Id.* at 509–10.
146 People for the Ethical Treatment of Animals, Inc. v. Miami Seaquarium, 879 F.3d 1142, 1149 (11th Cir. 2018).

power."[147] As a result, lower courts bound by the *Hill* decision have interpreted the opinion to stand for the proposition that the ESA provides heightened protection for captive animals.[148]

In all three of the foregoing cases, the courts agreed that some level of deference to the agencies charged with administering and enforcing the ESA was appropriate; however, the courts disagreed about the degree of deference warranted.[149] Concluding that the lay definitions of "harm" and "harass" needed to be qualified, the Eleventh Circuit sought to protect federal agencies from judicial encroachment.[150] The court worried that a relaxed standard might "invite a federal court to substitute its judgment for APHIS's."[151] By contrast, the Fourth Circuit reasoned that the district court's proposed interpretation of the FWS regulations—which would exclude animal husbandry practices that are AWA compliant from "harass" liability with no regard for whether those practices are "generally accepted"—ran contrary to the agency's intent.[152] The Fourth Circuit believed that treating "generally accepted" as meaningless would lead to absurd results.[153] Additionally, although the Western District of Texas acknowledged that APHIS was a group of "animal experts," the court read the relevant regulatory and statutory language to "compel" an independent judicial assessment of the evidence regarding an exhibitor's animal husbandry practices.[154] Each court believed that it was giving effect to the intent of both Congress and the executive agencies, albeit with different results.

C. SIDESTEPPING THE ISSUE

Other courts have avoided an in-depth analysis of possible tension between the ESA and the AWA, although accused exhibitors often argue that the AWA preempts or nullifies the ESA altogether.[155] In *Kuehl v. Sellner*,[156] for example, the Northern District of

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147 *Hill*, 867 F.3d at 510 (citing Babbitt v. Sweet Home Chapter of Cmtys. for a Greater Or., 515 U.S. 687, 700, 708 (1995)).

148 *See, e.g.*, People for the Ethical Treatment of Animals, Inc. v. Tri-State Zoological Park of W. Md. Inc., No. 17-2148, 2018 WL 434229, at *6 (D. Md. Jan. 16, 2018) (applying *Hill* and holding that "the ESA provides for separate and heightened protections for the subset of captive animals that are threatened or endangered").

149 *Miami Seaquarium*, 879 F.3d at 1150; *See Hill*, 867 F.3d at 510; Graham v. San Antonio Zoological Soc'y, 261 F. Supp. 3d 711, 744 (W.D. Tex. 2017).

150 *See Miami Seaquarium*, 879 F.3d at 1150 ("But the interpretation PETA presses could nullify the AWA's regime of administrative enforcement. Even after APHIS had approved a particular aspect of an endangered animal's conditions of captivity, plaintiffs could expose the exhibitor to ESA liability by framing that condition as an impermissible 'take,' no matter how *de minimis* the harm it caused.").

151 *Id.*

152 *Hill*, 867 F.3d at 510.

153 *Id.* at 509.

154 *Graham*, 261 F. Supp. 3d at 744.

155 *See, e.g.*, Mo. Primate Found. v. People for the Ethical Treatment of Animals, Inc., No. 16-2163, 2018 WL 1420239, at *3 (E.D. Mo. March 22, 2018) (summarizing the defendant's argument that "claims for violations of the ESA cannot be brought as to captive animals housed in facilities that are otherwise regulated by the [AWA]"); People for the Ethical Treatment of Animals, Inc. v. Tri-State Zoological Park of W. Md. Inc., No. 17-2148, 2018 WL 434229, at *3 (D. Md. Jan. 16, 2018) ("[D]efendants argue the [AWA] preempts, super-

Iowa individually assessed whether or not animals' captivity conditions amounted to a taking under the ESA without addressing possible conflict between the ESA and the AWA.[157] The Animal Legal Defense Fund (ALDF) alleged that the defendant, Cricket Hollow Zoo, had committed an unlawful taking of several of its captive animals.[158] The *Kuehl* court looked to 50 C.F.R. Section 17.3 and its exemption for generally-accepted animal husbandry practices that meet minimum AWA standards.[159] Based on an extensive review of the animals' conditions and expert testimony—and without any discussion of possible encroachment on the USDA's regulatory scheme under the AWA—the court held that the zoo had not met minimum AWA and generally-accepted standards and had violated the ESA.[160]

Arguably, the facts of *Kuehl* precluded any worry about impinging on USDA decision-making. The zoo had a record replete with AWA violations, so the court's holding did not conflict with previous APHIS decisions.[161] Nonetheless, the court set a precedent permitting it to later make similar assessments, even when the results might be more contentious. Indeed, analyzing the decision in 2017, the Western District of Texas noted in *Graham* that "the [*Kuehl*] court found that the zoo violated the ESA by harassing its lemurs through social isolation," even though, with respect to the particular conduct at issue, "APHIS had previously found no corresponding violations of the AWA."[162] The *Graham* court interpreted *Kuehl* as permitting courts to "conduct [their] own, independent analysis of the evidence presented," regardless of prior APHIS determinations, and conducted its own independent assessment accordingly.[163]

Other courts have been silent on the laws' interplay. In *PETA v. Wildlife in Need and Wildlife in Deed*,[164] the Southern District of Indiana granted PETA's request for a preliminary injunction against the defendants, who were the owners and exhibitors of several endangered big cats. The injunction prohibited the defendants from declawing the cats while the action was pending.[165] Although PETA relied on evidence demonstrating that the defendants had been cited by the USDA for AWA violations multiple times, the court did not discuss how the AWA interacted with the ESA or whether the AWA violations should be considered as part of an ESA Section 9 takings analysis.[166] Instead,

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sedes, or nullifies an action brought under the ESA."). *See also* Justin Marceau, *How the Animal Welfare Act Harms Animals*, 69 HASTINGS L.J. 925, 954 (2018) (describing the defendants-appellants' brief in an Eighth Circuit ESA case as "go[ing] so far as to argue that an AWA license provides a 'safe harbor' against all other liability").

156 Kuehl v. Sellner, 161 F. Supp. 3d 678 (N.D. Iowa Feb. 11, 2016).

157 *Id.*

158 *Id.* at 709.

159 *Id.*

160 *Id.* at 713, 717, 718.

161 *See id.* at 695, 718 (observing that the defendants admitted they had "'locked horns' with the USDA inspectors on many occasions" and ultimately concluding that "[d]efendants' violations are pervasive, long-standing and ongoing").

162 Graham v. San Antonio Zoological Soc'y, 261 F. Supp. 3d 711, 740 (W.D. Tex. 2017).

163 *Id.* at 740.

164 People for the Ethical Treatment of Animals, Inc. v. Wildlife in Need & Wildlife in Deed, Inc., No. 17-186, 2018 WL 828461, at *1, 8 (S.D. Ind. Feb. 12, 2018).

165 *Id.* at *8.

166 *Id.* at *2, 8.

the court undertook its own assessment of whether PETA could prove the defendants had harmed or harassed its cats by declawing them.[167]

At least two courts have recently addressed the issue by affirmatively rejecting the argument that the AWA and the ESA conflict, in turn allowing them to analyze the legal issues without discussing the relationship between the two laws. In a 2018 case, the Eastern District of Missouri was not persuaded by the defendants' argument that the ESA was preempted by the AWA.[168] Instead, the court determined that "the ESA and AWA are complementary" and that "the ESA protects captive endangered animals from an unauthorized take whether or not the alleged violator is an AWA licensed entity."[169] Because the defendants in that case argued that the ESA was altogether inapplicable, the court did not need to address the weight or significance of AWA compliance.

The District of Maryland conducted a more in-depth survey of the ESA and the AWA in a case decided the same year, but it also ultimately concluded that the two statutes "do not pursue conflicting objectives."[170] Bound by the Fourth Circuit's opinion in *Hill*, the court held that "compliance with the AWA would not be sufficient to avoid 'take' liability."[171] However, it did not explain when AWA compliance is nonetheless instructive (for example, whether a history of compliance would put a thumb on the scale in favor of an accused exhibitor). These varying and sometimes conflicting approaches result in a confusing jurisprudence about what constitutes an unlawful taking of a captive animal under the ESA.

IV. A PROPOSED BROAD INTERPRETATION OF SECTION 9

Some advocates of zoo captivity programs believe that "animals in zoos and aquariums today can live longer, healthier, and richer lives than their forbearers ever did in the wild."[172] Whether that is true, and whether captivity programs are ethically sound, are questions beyond the scope of this Note. Regardless, in the future, zoos are expected to serve as strong participants in animal conservation efforts.[173] Consequently, how zoos treat their animals will likely be subject to increasing scrutiny. And this scrutiny is, in turn, likely to generate a growing number of cases in which courts must analyze the ESA's Section 9 take prohibition while also confronting the provision's possible tension with the AWA.

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167 *Id.* at *7–8.

168 Mo. Primate Found. v. People for the Ethical Treatment of Animals, Inc., No. 16-2163, 2018 WL 1420239, at *4 (E.D. Mo. March 22, 2018).

169 *Id.*

170 *See* People for the Ethical Treatment of Animals, Inc. v. Tri-State Zoological Park of W. Md. Inc., No. 17-2148, 2018 WL 434229, at *3–4, 6 (D. Md. Jan. 16, 2018) (summarizing the ESA and the AWA, reviewing analogous case law, and rejecting the Eleventh Circuit's approach in *Miami Seaquarium*).

171 *Id.* at *6.

172 Ganzert, *supra* note 55.

173 *See* Hone, *supra* note 19 and accompanying text.

Current enforcement of the AWA is woefully inadequate,[174] and the AWA's inability to protect members of endangered species held in captivity urges a reexamination of courts' reluctance to encroach on the USDA's power when interpreting Section 9 of the ESA. If the AWA, as written and enforced, fails to protect captive animals, there is no longer any reason to allow zoos and other exhibitors to shield themselves from ESA liability based on a record of AWA compliance, as that compliance has so far been rendered meaningless by the USDA's inability to enforce the AWA. Any potential conflict between the two statutes must yield to a broad interpretation of the take prohibition in furtherance of the ESA's goals.

A. The Statutory Meaning of "Harm" and "Harass" is Unclear

Section 9 has generated a significant amount of debate about how it should be interpreted.[175] The word "take" is explicitly defined in the statute, but courts have struggled to define the contours of "harm" and "harass"—both commonly invoked forms of an unlawful taking.[176] The Eleventh Circuit has held that, under the ESA, "harm" and "harass" must be read to encompass only conduct that poses a "serious threat."[177] The Fourth Circuit, by contrast, has not read a qualifier into the definition of either action, and other lower courts have constructed their own, different interpretations.[178]

The Eleventh Circuit's interpretation has some merit. After examining the plain meanings of "harm" and "harass," the court looked to canons of statutory construction for guidance as to what *degree* of harm or harassment is necessary to constitute an unlawful taking.[179] The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct."[180] Applying the interpretive maxim *noscitur a sociis* to the definition of "take," one could argue that "harm" and "harass" should be interpreted as comprising conduct that is seriously threatening: the other verbs listed alongside "harm" and "harass"—such as "hunt," "shoot," and "kill"—describe actions that either inflict harm on or pose a serious threat of harm to an endangered animal.

However, the Eleventh Circuit's conclusion is not so obvious based on an analysis of the remaining listed actions. For example, the court cited Webster's dictionary definition of "wound" as "to inflict a wound upon."[181] It then looked to the definition of the noun form of "wound," which means "an injury to the body consisting of a laceration or breaking of the skin . . . [usually] by a hard or sharp instrument forcefully driven or applied."[182] Although this definition suggests that "wound" entails some form of harm, it is silent on the requisite severity of such harm. The logical conclusion is that any harm suffices.

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174 *See supra* Part III.A.

175 *See* Waisman et al., *supra* note 41, at 623 ("Since the ESA's enactment, difficult questions have arisen regarding the definition of 'take' . . . ."). *See also supra* Part III.B.

176 *See supra* Part III.B. *See also* People for the Ethical Treatment of Animals, Inc. v. Miami Seaquarium, 879 F.3d 1142, 1148 (11th Cir. 2018).

177 *See Miami Seaquarium*, 879 F.3d at 1147.

178 *See supra* Part III.B. *See also* Hill v. Coggins, 867 F.3d 499 (4th Cir. 2017).

179 *Miami Seaquarium*, 879 F.3d at 1146–47.

180 16 U.S.C. § 1532(19) (2018).

181 *Miami Seaquarium*, 879 F.3d at 1147.

182 *Id.*

Without providing any instructive rationale to the contrary, the Eleventh Circuit nonetheless concluded that "wound" concerned "seriously threatening conduct."[183] And while "pursue," "trap," "capture," and "collect" are less relevant to captive wildlife,[184] their meanings only suggest a serious threat of harm if we read into them additional circumstances or some motivation on the part of the person pursuing, trapping, capturing, or collecting an animal.

Congress enacted the ESA to correct what it perceived as inadequacies in the law's former versions. The take prohibition was included to add "additional protection for those species most at risk by forbidding private activity that harms any member of an endangered species."[185] The purpose of Section 9 was, therefore, to further the law's overarching goal of combatting the extinction crisis with no mention of a "seriously threatening" qualifier to "take" actions in any of the debates surrounding the provision.[186] Additionally, unlike the Eleventh Circuit, scholars analyzing the ESA's text and legislative history have not read an added requirement into the definition of "take."[187] Rather, the provision has been described broadly, for example, as penalizing "*any* private activity that has an adverse effect on *any* member of [an endangered] species."[188] The implementing regulations have been characterized similarly, as "flexible enough to include *any* conceivable activity that may injure an endangered species in *any* way."[189] Finally, both the FWS and the NMFS have promulgated definitions of the word "harm," and neither agency's definition requires a severity modifier.[190] As demonstrated by the ESA's legislative history and regulations, the Eleventh Circuit's interpretation runs contrary to Congress's intent to provide a far-reaching law generously protective of threatened and endangered species. Although the Eleventh Circuit limited its restrictive

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183 *Id.*

184 *Id.*

185 Jonathan Wood, *Take it to the Limit: The Illegal Regulation Prohibiting the Take of Any Threatened Species Under the Endangered Species Act*, 33 PACE ENVTL. L. REV. 23, 23 (2015).

186 *Id.* at 35.

187 *See, e.g.*, Jud Mathews, *Turning the Endangered Species Act Inside Out*, 113 YALE L.J. 947, 953 (2004) ("The ESA is not a regulation of commercial development qua commercial development: It is a regulation of anything and everything that would take an endangered species."); J.B. Ruhl, *Keeping the Endangered Species Act Relevant*, 18 DUKE ENVTL. L. & POL'Y F. 275, 282 (2009) (describing the prohibition as "broad" because it applies to "all federal, state, and local governments and all private organizations and individuals, anywhere 'within the United States,' on public and private lands alike"); Laura Spitzberg, *The Reauthorization of the Endangered Species Act*, 13 TEMP. ENVTL. L. & TECH. J. 193, 220 (1994) (emphasizing that Section 9 "has an extremely broad scope"); Robert D. Thornton, *Takings Under Endangered Species Act Section 9*, 4 NAT. RESOURCES & ENV'T 7, 8 (1990) (describing the history of Section 9 regulations as "mak[ing] it clear that the taking prohibition applies to actions that harm individual members and not simply actions that harm the entire species"); Cheever, *supra* note 12, at 111 (explaining that the provision "makes it a federal offense for anyone to harm or injure or attempt to harm or injure any members of endangered animal species" and describing it as "perhaps the most powerful piece of wildlife legislation in the world").

188 Wood, *supra* note 185, at 27 (emphasis added).

189 Cheever, *supra* note 12, at 120 (emphasis added).

190 *See supra* Part III.B.

interpretation of "harm" and "harass" to situations involving captive animals,[191] the reality is that greater numbers of threatened and endangered animals are likely to live out their lives in captivity, meaning the Eleventh Circuit's interpretation is likely to be applied with increasing frequency.[192]

B. Courts Should Reject Interpretations that Erode the ESA's Purpose

The Eleventh Circuit's interpretation of Section 9 is not the only plausible one, and it is certainly not the only potentially correct one. Without any further guidance from Congress or the executive agencies responsible for administering the ESA, courts should reject those interpretations that undermine the law's stated purpose. The ESA is meant to protect endangered animals, including those held in captivity. If courts follow the Eleventh Circuit's approach and decline to interpret the take prohibition broadly in fear of impinging on the USDA's authority under the AWA, they risk compromising the ESA's purpose. In theory, the AWA should provide captive animals that also fall under the purview of the ESA adequate protection. But the AWA is under-enforced. Thus, in practice, the AWA often fails, and protecting these animals requires more stringent enforcement of the ESA's Section 9.

The story of Lucky—the Asian elephant at issue in *Graham*—illustrates the importance of this strict enforcement. Lucky was born in Thailand in 1960[193] but has spent almost her entire life at the San Antonio Zoo.[194] For years, her conditions at the zoo have been the subject of outrage and protest.[195] Visitors and media criticized Lucky's living conditions as "grossly inadequate"[196] and a form of "cruel confinement."[197] In 2015, the ALDF sued the San Antonio Zoo over the allegedly inadequate conditions.[198] The organization accused the zoo of harming and harassing Lucky by depriving her of social interaction with other elephants, housing her in an undersized enclosure, failing to provide her adequate shelter from the sun, and lining her enclosure with a "hard" and "unnatural" substrate.[199] Describing Lucky's meager conditions, one lay observer noted

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191 People for the Ethical Treatment of Animals, Inc. v. Miami Seaquarium, 879 F.3d 1142, 1144 n.1 (11th Cir. 2018).

192 *See* 16 U.S.C. § 1531(b) (2018).

193 Brian Chasnoff, *Lucky in Limbo at San Antonio Zoo*, San Antonio Express-News, May 6, 2013.

194 *See* Graham v. San Antonio Zoological Soc'y, 261 F. Supp. 3d 711, 716 (W.D. Tex. 2017) (noting that Lucky was brought to the zoo in 1962).

195 Vincent T. Davis, *Federal Judge Allows Lawsuit Over Lucky to Go to Trial*, San Antonio Express-News, Jun. 18, 2017 ("Over the years, animal rights activists have sponsored petitions and held protests for Lucky to be moved to a sanctuary.").

196 Express News Editorial Board, *Lawsuit Made Lucky's Life Better*, San Antonio Express-News, Dec. 6, 2017.

197 Stephen Wells, *Elephants in Captivity: Demanding an End to Cruel Confinement*, Animal Legal Def. Fund: Winning the Case Against Cruelty (March 15, 2016), http://aldf.org/blog/elephants-in-captivity-demanding-an-end-to-cruel-confinement/.

198 *Graham*, 261 F. Supp. 3d at 716.

199 *Id.*

that "her exhibit is about a half-acre of compacted granite with dirt and piles of sand, two umbrella-shaped structures and a small pool of knee-deep water."[200]

Lucky's captivity conditions constitute an unlawful taking under the ESA. Her life and environment at the zoo are drastically different from what they would be if she lived in her natural habitat. For example, although elephants are extremely social creatures with high cognitive faculties, Lucky was living alone when the ALDF filed its lawsuit.[201] Additionally, while wild elephants traverse several miles each day and spend most of their waking lives in motion, Lucky's enclosure was too small to allow any significant movement.[202] In *Graham*, one of the ALDF's experts reported that Lucky had "multiple chronic medical problems, some of which are life-threatening, as a direct result of her past and current standard of care and living conditions at the San Antonio Zoo."[203] These medical problems undoubtedly rose to the level of harm necessary to constitute an unlawful taking as required by FWS regulations, which define "harm" to include an "act which actually kills or injures wildlife."[204] Not only has Lucky experienced distinct physical injuries—including abscesses on her feet that the ALDF's expert characterized as life-threatening—but her captivity conditions cause her pervasive, ongoing suffering.[205]

In *Graham*, the zoo attempted to use the AWA as a shield against ESA liability. It first argued that the AWA governed Lucky's captivity exclusively.[206] Second, the zoo also argued that, if the court decided that the ESA applied, the zoo's compliance with AWA standards nonetheless precluded ESA liability.[207] In its complaint, the ALDF contended that Lucky's conditions violated AWA standards.[208] The zoo, however, pointed to its past three years' worth of APHIS inspections.[209] According to the record, none of those inspections had resulted in any sanctions for AWA violations.[210] Indeed, the zoo asserted that it had a perfect record of compliance.[211] This record, the zoo contended, barred any finding of take liability under the ESA because the FWS definition of "harass" exempts "generally accepted [a]nimal husbandry practices that meet or exceed the minimum standards for facilities and care under the [AWA]."[212] The zoo urged the court to hold that it could only have committed an unlawful taking if it had violated AWA standards—which, according to its record with APHIS, it had not.[213]

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200 Chasnoff, *supra* note 193.
201 Complaint at 8–10, *Graham*, 261 F. Supp. 3d 711 (No. 5:15-cv-01054).
202 *Id.*
203 *Graham*, 261 F. Supp. 3d at 720.
204 50 C.F.R. § 17.3 (2018).
205 *Graham*, 261 F. Supp. 3d at 719.
206 *Id.* at 716.
207 *Id.* at 738.
208 Complaint at 20, *Graham*, 261 F. Supp. 3d 711 (No. 5:15-cv-01054).
209 *Graham*, 261 F. Supp. 3d at 726.
210 *Id.*
211 *Id.* When asked if he had any knowledge of an AWA violation, one of the ALDF's experts responded, "I'm not aware that they've had focused inspections. It doesn't surprise me that there's no violations because the standards are grossly minimal." *Id.*
212 *Id.* at 738.
213 *Id.*

Despite the zoo's urgings, the court held that the ESA protected captive wildlife.[214] Furthermore, the court refused to let the zoo's record of AWA compliance end the ESA liability inquiry.[215] Instead, the court held that a record of AWA compliance serves only as evidence for a court to consider when deciding whether an exhibitor has committed an unlawful taking.[216] It also ruled that the ALDF could succeed on either "harass" or "harm" grounds; the FWS regulation defining "harm" does not include an analogous AWA-compliant exemption.[217] Thus, the zoo's compliance with the AWA could theoretically be irrelevant to a determination of whether the zoo was harming Lucky.

If, after determining the zoo had never been cited for AWA violations, the court had ended its analysis, Lucky's inhospitable conditions would likely have remained the same. Instead, the ALDF's lawsuit and the court's willingness to interpret Section 9 broadly spurred the San Antonio Zoo to action. In response to *Graham*, the zoo introduced two elephant companions into Lucky's enclosure and expanded and updated her habitat.[218]

C. Courts Should Instead Prefer Interpretations that Facilitate the ESA's Goals

The FWS has explicitly acknowledged the importance of Section 9 to protecting those members of endangered species held in captivity. When the agency amended the definition of "harass" to include the exemption for generally accepted animal husbandry practices, it addressed criticism from commentators who believed Section 9 should not apply to captive wildlife at all: "Since captive animals can be subjected to improper husbandry as well as to harm and other taking activities, [FWS] considers it prudent to maintain such protections, consistent with Congressional intent."[219] In construing Section 9 generally, courts should adopt interpretations that best serve the ESA's purpose, which is to protect all members of endangered species.

Of course, not all of the actions listed in the "take" definition apply to captive wildlife. For example, because captive animals have already been taken out of their natural habitat, it is unlikely that exhibitors could be exposed to liability for hunting, capturing, or collecting their animals. However, there is a growing body of cases in which environmental groups are accusing exhibitors of harming and harassing those animals in their care. Construing the words "harm" and "harass," and Section 9 generally, courts should adopt interpretations that best serve the ESA's purposes. In doing so, courts must interpret "harm" and "harass" broadly. This approach is supported by the statute's legislative

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214 *Id.* at 745.

215 *Id.* at 746 ("If APHIS has previously found that these acts do (or do not) comply with the AWA, these findings are merely evidence of AWA compliance, and such findings do not automatically result in the defeat (or success) of Plaintiffs' claims.").

216 *Id.* at 744.

217 *Id.* at 746.

218 Anthony M. Doss, *The Profit and Loss Report on Animal Rights: How Profit Maximization Has Driven the Stagnation of the Legal Identification of Animals as Property*, 13 U. Mass. L. Rev. 140, 167 (2018); *Plaintiffs File to Dismiss Claim of Elephant Lawsuit Involving San Antonio Zoo*, KSAT (Nov. 22, 2017), https://www.ksat.com/news/plaintiffs-file-to-dismiss-claim-of-elephant-lawsuit-involving-san-antonio-zoo.

219 Captive-bred Wildlife Regulation, 63 Fed. Reg. 48,634, 48,636 (Sept. 11, 1998) (codified at 50 C.F.R. pt. 17).

history and agency regulations. Section 9 was passed as a tool to address what Congress believed was a "deeply concern[ing]" extinction crisis.[220] The first iteration of the ESA—the Endangered Species Protection Act of 1966—included a take prohibition, but it was narrow.[221] The provision applied only to animals on national wildlife refuge land and did not consider "harm" or "harass[ment]" to be forms of an unlawful taking.[222] In 1973, Congress passed the modern ESA and expanded the definition of "take."[223] Congress's legislative intent is clear: "Take was defined in the 'broadest possible manner to include every conceivable way in which a person can 'take' or attempt to 'take' any fish or wildlife.'"[224] While other federal wildlife statutes include a take prohibition, the ESA's provision is the most expansive.[225] Indeed, the Supreme Court has decided ESA cases based on what it considers to be a broad legislative purpose.[226] According to the Supreme Court, Congress believed that "the value of endangered species was 'incalculable,' and thus, these species should be afforded the highest priority in order to halt and reverse extinction."[227]

FWS and NMFS regulations and comments likewise support a generous reading of Section 9. Criticizing a version of the *Miami Seaquarium* approach, and in reference to the district court's addition of a "gravely threatening" qualifier to the definitions of "harm" and "harass," the *Graham* court observed, "[T]he FWS has promulgated clear, straightforward definitions of these terms, obviating the need for such inquiries."[228] Both the FWS and the NMFS define "harm" as "an act which actually kills or injures" animals.[229] While this definition protects exhibitors from liability against merely potential harm, it balances the strictness of the "actually" requirement by permitting liability for *any* injury, regardless of its severity. The regulations do not require that these injuries be serious.[230] In fact, the NMFS has suggested that "actually" is a loose standard, explaining, "An action which contributes to injury can be a 'take' even if it is not the only cause of

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220 Cheever, *supra* note 12, at 122.

221 *Id.* at 125 (citing George Cameron Coggins, *Legal Protection for Marine Mammals: An Overview of Innovative Resource Conservation Legislation*, 6 ENVTL. L. 1, 2–10 (1975)).

222 *Id.* at 123–24.

223 *Id.* at 129.

224 *Id.* (citing H.R. Rep. No. 93-412, at 10 (1973)).

225 *Id.* at 121 n.66.

226 *See generally* Babbitt v. Sweet Home Chapter of Cmtys. for a Greater Or., 515 U.S. 687 (1995).

227 Antionette Duck, *Welcome to Primates' Paradise, Human Rights Not Allowed: Unraveling the Great Ape Project*, 7 REGENT J. INT'L L. 165, 173 (2009).

228 Graham v. San Antonio Zoological Soc'y, 261 F. Supp. 3d 711, 743 (W.D. Tex. 2017).

229 50 C.F.R. § 222.102 (2018); 50 C.F.R. § 17.3 (2018).

230 *See Graham*, 261 F. Supp. 3d at 743 (internal quotations and brackets omitted) ("This language . . . shows that the nature of an act that violates the ESA must be more than any minor injury or harm in the literal sense, but must have some notion of significance, though the language comes far short of requiring a grave threat."). The Supreme Court has held that the FWS's definition of harm comports with the ESA's broad purpose. Babbitt v. Sweet Home Chapter of Cmtys. for a Greater Or., 515 U.S. 687, 697 (1995). *See also* Lawrence R. Liebesman & Steven A.G. Davison, *Takings of Wildlife Under the Endangered Species Act After* Babbitt v. Sweet Home Chapter of Communities for a Greater Oregon, 5 U. BALT. J. ENVTL. L. 137, 145 (1995) ("[T]he Court held that the 'harm' regulation naturally fits

the injury. This concept includes *actions reasonably certain to contribute to the death or injury of listed species* by significantly impairing [their] essential behavioral patterns."[231]

And although the FWS is the only agency of the two that has defined the word "harass," its definition is also broad. The definition covers both intentional and negligent acts or omissions and does not require any actual injury.[232] "Harass" can thus fairly be interpreted as a lower standard than "harm."[233] The fact that a lower standard exists as a form of a taking—and did not exist before 1973, when the ESA was enacted—supports a permissively liberal interpretation of "harm" and "harass" to effectuate the ESA's powerful purpose.

By interpreting those actions that constitute a taking broadly, courts can both allow for greater scrutiny of captive animals' conditions and create an additional check on exhibitors' compliance with the law. Ironically, when the Eleventh Circuit interpreted "harm" and "harass" narrowly, it purported to guarantee captive endangered animals "an additional layer of protection from harmful conditions."[234] The court argued that this guarantee adequately shields animals from maltreatment without interfering with the USDA's enforcement of the AWA.[235] But this poses the question: what is so undesirable about possible interference with the AWA? If the court was concerned about potential tension between the AWA and the ESA because it believes in deference to executive agencies, its claim of protection is hollow. If, rather, the court meant that the tension is undesirable because it inhibits the USDA from protecting animals by enforcing the AWA without interference, the court erred by overlooking the AWA's current ineffectiveness.

The motivations behind the ALDF's 2014 lawsuit against Cricket Hollow Zoo highlight the problem. In *Kuehl*, the ALDF brought suit pursuant to the ESA to protect the zoo's animals.[236] In an "Ask Me Anything" thread (what is, essentially, a virtual Q&A session) on the website Reddit, users asked ALDF lawyers about the case.[237] One lawyer explained that, in bringing the lawsuit, the ALDF was urging Iowa to "take the [ESA] to the next level" by applying it "to captive wildlife for the first time ever."[238] The lawyer

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within the ESA's broad purposes to protect habitat and ecosystems of endangered and threatened species.").

231 50 C.F.R. § 222.102.(emphasis added).

232 *Id*. § 17.3.

233 *See* Reclassification of the American Alligator and Other Amendments, 40 Fed. Reg. 44,412, 44,413 (Sept. 26, 1975) (to be codified at C.F.R. pt. 17) (discussing the definition of "harass" and noting, by contrast, that "'[h]arm' covers actions or omissions which actually, (as opposed to potentially), cause injury").

234 People for the Ethical Treatment of Animals, Inc. v. Miami Seaquarium, 879 F.3d 1142, 1150 (11th Cir. 2018).

235 *Id*.

236 Kuehl v. Sellner, 161 F. Supp. 3d 678, 680–81 (N.D. Iowa 2016).

237 JessicaALDF, *We are animal rights lawyers from the American Legal Defense Fund who just obtained a court order freeing Lucy the lemur along with other endangered lemurs and tigers from their grim lives at a roadside zoo. Ask us anything!*, REDDIT: ASK ME ANYTHING (Feb. 16, 2016), https://www.reddit.com/r/IAmA/comments/463qn6/we_are_animal_rights_lawyers_from_the_animal/#bottom-comments.

238 JessicaALDF, Comment to *We are animal rights lawyers from the American Legal Defense Fund who just obtained a court order freeing Lucy the lemur along with other endangered lemurs and*

added that the organization was simultaneously pushing for heightened standards for zoos but that "the USDA is notoriously captured by the industry."[239] She cited the 2010 OIG audit of the USDA's enforcement of the AWA: "The law that governs the humane standards for these facilities—is completely ineffective at ensuring animal welfare because the USDA simply does not enforce it."[240] If the AWA is unsuccessful at protecting captive wildlife, using compliance as a shield against ESA liability is nonsensical. When the standards are not enforced properly or effectively, a court cannot deduce that an exhibitor with a record of AWA compliance is entitled to protection against ESA liability.

The *Graham* decision offers a more compelling exemplar. Interpreting the FWS "harass" exemption for generally accepted animal husbandry practices, the court held that APHIS determinations of AWA compliance are merely evidence for purposes of assessing ESA take liability.[241] According to the *Graham* court, courts must make their own independent assessments of the adequacy of the exhibitor's challenged practices.[242] In sum, the court construed the AWA as providing standards for ESA determinations. It also created an additional check on the USDA's enforcement of the AWA. As the court explained, the definition of "harass" "substitutes the compliance standards of the AWA as the substantive standard for whether an ESA violation has occurred, and requires such a determination to be made through the typical adversarial process."[243] While former APHIS findings of compliance may serve as evidence with respect to the inquiry, the court should be the ultimate determiner of whether an unlawful taking has occurred. *Graham*'s safeguard is important: for the AWA to act as an effective standard for determining ESA liability, the AWA must work. And when it does not, the court cannot rely on the AWA and its enforcement bodies to determine whether an exhibitor should be held liable under the ESA.

The Fourth Circuit's decision in *Hill* also provides helpful guidance. The opinion offers a slightly different approach to the generally accepted animal husbandry practices exemption than *Graham*. However, both courts have decided that some judicial fact-finding beyond pure agency deference is necessary when determining whether a defendant has harmed or harassed an animal under Section 9. The *Hill* court interpreted the exemption in 50 C.F.R. section 17.3 to set out a two-part analysis: "The first enumerated exclusion specifically requires AWA compliance, and it is preceded by a 'generally accepted' requirement that applies to the disjunctive list of enumerated exclusions. It is

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tigers from their grim lives at a roadside zoo. Ask us anything!, REDDIT: ASK ME ANYTHING (Feb. 16, 2016, 12:34 PM), https://www.reddit.com/r/IAmA/comments/463qn6/we_are_a_animal_rights_lawyers_from_the_animal/d026405/.

239 JessicaALDF, Comment to *We are animal rights lawyers from the American Legal Defense Fund who just obtained a court order freeing Lucy the lemur along with other endangered lemurs and tigers from their grim lives at a roadside zoo. Ask us anything!*, REDDIT: ASK ME ANYTHING (Feb. 16, 2016, 9:25 PM), www.reddit.com/r/IAmA/comments/463qn6/we_are_animal_rights_lawyers_from_the_animal/d02s3x0/.

240 *Id.*

241 Graham v. San Antonio Zoological Soc'y, 261 F. Supp. 3d 711, 744 (W.D. Tex. 2017).

242 *Id.*

243 *Id.* at 745.

therefore clear that the first enumerated exclusion is comprised of both a 'generally accepted' requirement and an AWA compliance requirement."[244]

Because section 17.3 includes criminal aspects, the dissenting judge in *Hill* would have applied the rule of lenity to reject the majority's interpretation. The dissent criticized the majority's approach as vague and unworkable; under the majority's framework, the dissenting judge believed that "whether an action or inaction on the part of a zookeeper was legal would depend on the current opinion, not codified in any form, of non-government members of certain associations or the general public."[245] But courts frequently make judgments that require fact-specific inquiries into gray areas of the law. For example, courts use a reasonableness standard to determine the validity of searches of private property.[246] They also look to industry custom and usage to construe ambiguous contractual language.[247] Requiring a court to determine whether an exhibitor's animal husbandry practices are generally accepted is not only practical, but the majority's approach is grounded in a proper reading of the regulation and facilitates furtherance of the ESA's goals.

V. Conclusion

As zoos play an increasingly significant role in protecting threatened and endangered species, courts' interpretation of the ESA—specifically Section 9—must reflect the law's broad purpose. Heavier reliance on captivity programs to implement conservation efforts will require greater scrutiny of exhibitors housing members of endangered species in captivity. Ultimately, while animals like Sudan, Lolita, and Lucky offer entertainment and educational value, they are critical components of our ecosystem. The ESA exists "to halt and reverse the trend toward species extinction, whatever the cost,"[248] and the law's significance for protecting captive animals is amplified by the government's failure to properly enforce the AWA. Until APHIS provides improved standards under the AWA and commits to enforcing those standards sternly, the ESA may serve as the only adequate protection for captive members of endangered species. The survival of many of those species thus relies on courts adopting a broad interpretation of the ESA's Section 9 and respecting Congress's far-reaching grant of power to protect critically endangered wildlife.

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244 Hill v. Coggins, 867 F.3d 499, 509 (4th Cir. 2017).

245 *Id.* at 515 (Bailey, J., dissenting).

246 *See, e.g.*, O'Connor v. Ortega, 480 U.S. 709, 719 (1987) ("A determination of the standard of reasonableness applicable to a particular class of searches requires balanc[ing] the nature and quality of the intrusion on the individual's Fourth Amendment interests against the importance of the governmental interests alleged to justify the intrusion.") (internal quotation marks omitted).

247 *See, e.g.*, Stolt-Nielsen S.A. v. AnimalFeeds Int'l Corp., 559 U.S. 662, 674 n.6 (2010) ("Under both New York law and general maritime law, evidence of 'custom and usage' is relevant to determining the parties' intent when an express agreement is ambiguous.").

248 Tenn. Valley Authority v. Hill, 437 U.S. 153, 184 (1978).

Land Use Management: A Governmental Obligation to Ensure Adequate Flood Prevention

By Katelyn A. Hammes

I. Introduction

The damage caused by Hurricanes Harvey, Irma, and Maria contributed to making 2017 one of the costliest years the U.S. has seen to date.[1] The aftereffects from the flooding that came with those hurricanes inflicted over $125 billion in damages and caused 251 deaths.[2] While natural disasters do not discriminate in where they occur to inflict their damage, and while they do affect a variety of people, certain neighborhoods invariably tend to bear the burden more often than others.[3] As a result, the effects of natural disasters fall more heavily onto vulnerable populations.

Although surprising to some, individuals in the middle class are often members of those vulnerable populations and are quite susceptible to the harms natural disasters wreak on cities. Natural disasters are quite capable of stripping individuals of the middle class of all their protections and imposing incredible costs on them.[4] Home values often factor into such risks, with some even arguing that flood insurance subsidizes the risk and encourages homebuilding in floodplains, so homes in these moderate- to high-risk locations actually are less expensive.[5] Accordingly, aspiring middle class individuals seize the opportunity to purchase their own home, but ultimately end up owning a home bur-

1 Chris Mooney, *Hurricane Harvey was year's costliest U.S. disaster at $125 billion in damages*, Tex. Tribune, Jan. 8, 2018, 11:00 AM.

2 *Id.*

3 David Hunn et al., *Build, flood, rebuild: flood insurance's expensive cycle*, Houston Chronicle. Dec. 9, 2018.

4 *See infra* text, Part I

5 Michael Kimmelman, *Lessons from Hurricane Harvey: Houston's Struggle is America's Tale*, N.Y. Times, Nov. 11, 2017.

dened by risks. But what if these risks could have been mitigated? I cannot propose a machine that could prevent hurricane damage before it occurs. Rather, I propose that effective land use management would reduce future damage on cities and the middle-class.

This Note proceeds in three parts. In Part II, I analyze how weak land use regulations regarding floodplains affect city residents and inflict particularly special harm on the middle class. In Part III, I provide a case study of The City of Houston ("City"), evaluating its land use management plan and how it has affected flooding and its residents. Houston is of particular interest because it does not practice extensive land use regulation.[6] As a result, sprawling land development effectively hamstrung the City's ability to protect its residents, providing a warning for cities to heed. Finally, in Part IV, I propose two land use management solutions that would enable cities to protect their residents from excessive, foreseeable, and mitigatable harm.

Land use management in floodplains is within the scope of municipal control.[7] In fact, cities and municipalities are often charged with the duty to "promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions."[8] To do otherwise is in direct conflict with these entities' responsibility to residents. Effective land use management regulations could help keep those striving to enter or remain in the middle class from sliding back into poverty.

II. POOR LAND USE REGULATIONS IMPACT THE MIDDLE CLASS' ECONOMIC SECURITY

Lax land use regulations governing floodplains result in additional harm to those trying to enter the middle class, as well as those trying to remain in the middle class. First, the average homebuyer is often ignorant that their home may be in an area subject to moderate- to high-risk of flooding.[9] Often, they do not realize their position until after a savvy land developer wishes to purchase their land, the floodplain regulations change, or their property has already been damaged.[10] Second, costs of repair often dip into middle class families' ability to save. Without that safety net, individuals may easily fall

6 CITY OF HOUSTON PLANNING AND DEVELOPMENT, 2019 NO ZONING LETTER (Jan. 1, 2019).

7 *See generally* HOUSTON, TEX., ORDINANCES ch. 19 (2006).

8 *See, e.g.*, *id.*

9 *See* Michael Keller et al., *Outdated and Unreliable: FEMA's Faulty Flood Maps Put Homeowners at Risk*, BLOOMBERG, Oct. 6, 2017.

10 *See* Press Release, Natural Resources Defense Council, Buyer Beware: In 21 States, Buyers Don't Have to Be Informed About Past Flood Damages (Aug. 16, 2018), https://www.nrdc.org/media/2018/180816-0.

out of the middle class.[11] Finally, home insecurity has a direct effect on job retention.[12] Those with jobs requiring a security clearance are specifically in danger.[13]

Residents who purchase homes in floodplains and floodways often do not realize that their homes are in such danger.[14] This failure to recognize the risk could be for many reasons, such as a general ignorance of the local land surveys, purchasing a home that was built before relevant floodplain regulations were in place, or reliance on unknowledgeable insurance and real estate agents.[15] Regardless of the reason, cities and counties have an affirmative obligation to protect residents by ensuring that existing and new homes do not increase the harm of flood damage on others.[16] Active floodplain management ordinances help protect residents by putting them on notice of the risks associated with purchasing homes in areas of moderate- to high-flood risk and may even prevent the danger by eliminating altogether the option to purchase homes in such areas.

The costs of repairing flooded homes are crippling for those who are not in the upper class because, for those residents who do not have flood insurance or who have inadequate coverage, the costs of repairing their damaged homes come out of their own pockets. According to a 2014 study for the Federal Emergency Management Agency (FEMA), over forty percent of Texas homes that are required by federal law to have flood insurance do not have it.[17] Even worse, many homes with moderate- to high-risk for flooding are located outside FEMA flood zones and do not require flood insurance.[18] As a result, it is likely that a majority of homes that could use flood insurance, go without.[19] Even those who receive flood insurance payments or aid from the state or federal government often must supplement it with loans and money from their savings.[20] Accordingly, if a storm does ravage a city and the damage is extensive and too costly to

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11 FEDERAL EMERGENCY MGMT. AGENCY, ESTIMATED FLOOD LOSS POTENTIAL (2017).

12 *See generally* Mike Kappel, *For Employee Retention, There's No Place Like Home*, FORBES, Jul. 27, 2016, 4:17 PM.

13 *See Eligibility Guidelines for Gaining Security Clearance*, military.com, https://www.military.com/veteran-jobs/security-clearance-jobs/security-clearance-eligibility.html (last visited Sept. 9, 2019).

14 Mark Collette & Matt Dempsey, *What's in Houston's worst flood zones? Development worth $13.5 Billion*, HOUSTON CHRONICLE, Dec. 13, 2017; Neena Satija, *Houston officials let developers build homes inside reservoirs. But no one warned buyers*, TEX. TRIBUNE, Oct. 12, 2017; Kim Jackson, *City's 2006 floodway rule irks property owners*, HOUSTON CHRONICLE, May 20, 2008, 5:30 AM.

15 Collette & Dempsey, *supra* note 14; Satija, *supra* note 14; Jackson, *supra* note 14.

16 *See, e.g.*, HOUSTON, TEX., ORDINANCES ch. 19, art. I, § 19-1 (2006).

17 *See* David Hunn et al., *supra* note 3.

18 *See* Cat Cardenas & Brandon Formby, *Houston council approves changes to floodplain regulations in effort to reduce flood damage*, TEX. TRIBUNE, Apr. 4, 2018.

19 *Policies in Force By Month*, FEDERAL EMERGENCY MANAGEMENT AGENCY, https://www.fema.gov/policies-force-month (last updated Mar. 20, 2019); *QuickFacts, United States*, U.S. CENSUS BUREAU, https://www.census.gov/quickfacts/fact/table/US/PST045217 (last updated July 1, 2018).

20 *See* Cat Cardenas, *Six figures for six feet: Some Harvey victims in Houston spend huge sums to elevate their homes*, TEX. TRIBUNE, Mar. 14, 2018, 12:00 AM.

repair, residents must choose between demolishing their home and leaving, or remaining in the damaged home.[21]

However, insurance payments are helpful in rebuilding damaged homes if the funds are actually used for that purpose.[22] After Hurricane Katrina destroyed many homes in New Orleans, a study found a "sharp and immediate drop in personal debt" for New Orleans residents.[23] The study noted that, rather than using the insurance money to rebuild or repair their homes, residents were using the money to repay other debts.[24] This decision can lower property values neighborhood-wide, since individuals who used their insurance payment for purposes other than rebuilding or repairing their homes may neighbor someone else who did use their insurance funds to rebuild or repair. Middle class individuals who rely on their home as a life investment then see their efforts undercut in yet another way.

Finally, home stability is a factor in job retention. If one's career requires that his or her finances are in order so that he or she may remain employed, flood-related home damage can be especially devastating. For example, if someone works for the military or federal government, then he or she often must retain a security clearance.[25] Financial considerations are one of the primary concerns for the security clearance investigation.[26] Specifically, investigators are concerned that individuals who are "financially overextended" are at an increased risk of engaging in illegal activities to generate funds and thereby cannot be trusted with access to sensitive information.[27] This danger exists outside of the investigation period as well; a security clearance may be revoked upon receipt of new information about an individual's finances.[28] Without this security clearance, the individual would be unable to fulfill his or her duties and would be removed from that position. If the property damage from flooding is so extensive that it imposes a financial burden that he or she is unable to meet, then the flooding may result in loss of employment.

When cities enact ineffective land use regulations for floodplains, they are shirking their responsibility to their residents. Unfortunately, a city's failure often has a disparate impact upon vulnerable populations, such as those in the middle class.[29] Since cities have an affirmative obligation to protect citizens, it follows that they have an obligation to implement land use regulations for floodplains and floodways that would reduce risk for their residents, rather than allowing an environment of excessive risk to develop.

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21 *See id.*

22 Case Western Reserve University, *Study: After Hurricane Katrina, Personal Debt Fell for Those Worst Hit – But at a Cost*, PHYS.ORG (Aug. 28, 2017), https://phys.org/news/2017-08-hurricane-katrina-personal-debt-fell.html.

23 *Id.*

24 *Id.*

25 *See Eligibility Guidelines for Gaining Security Clearance*, MILITARY.COM, https://www.military.com/veteran-jobs/security-clearance-jobs/security-clearance-eligibility.html (last visited Sept. 9, 2019).

26 *See id.*

27 *Id.*

28 *See id.*

29 *See* Jenny Deam, *Harvey takes an uncounted toll on Houston's middle class*, HOUSTON CHRONICLE, Sep. 22, 2017 (observing that "[l]ower-to moderate-income renters are the most vulnerable as many recovery resources are geared to homeowners.")

III. A Case Study: Houston

The City of Houston, the fourth most populous city in the United States,[30] is often hailed as the success story for anti-zoning enthusiasts for balancing economic growth with affordable housing.[31] Lately, Houston has come under heavy scrutiny for its land use regulations because of its repeated failure to protect its residents from flooding.[32] Unlike other major metropolitan areas that establish a planning committee to design the general scheme of how the city will look *before* the city becomes too expansive, Houston took a very *laissez faire* approach to land development.[33] The results are three-fold: (1) sprawling land development that has filled natural wetlands and extended into floodplains and floodways; (2) new home owners who unknowingly buy high-risk properties; and (3) residents and landowners who are so hostile to land use regulation that they would rather perpetuate the current problems than fix them.[34]

Many cities use single-use zoning as a tool to accomplish their plans. Zoning allows a city to place, for example, industrial or commercial facilities in one area of the city, while placing residential areas in another location.[35] For many cities, this zoning can be reduced to such specificity that it would require single-family residential homes to be built in a separate area from multi-family residential homes.[36] These requirements have historically been used to segregate city residents by race, working class, and income and may contribute to gentrification.[37]

Houston, however, does not engage in zoning, nor does it restrict building density.[38] None of this should be taken to say that Houston is the wild west where *anything* can go and the only limit is one's imagination—though it is close. Houston has established land use regulations other than zoning, but most are quite minimal. For example, Houston imposes a minimum lot size. Most single-family residential lots must be at least 5,000 ft^2; however, a subdivision plat can be as small as 1,400 ft^2.[39] Houston also adopted an off-street parking ordinance, which determines the number of parking spaces required on

30 *About Houston*, City of Houston, Texas, https://www.houstontx.gov/abouthouston/houstonfacts.html (last visited Apr. 8, 2019).

31 Aaron Terrazas, *Housing Affordability in Houston: Oasis or Mirage?*, Zillow (Sep. 14, 2015), https://www.zillow.com/research/houston-housing-affordability-10548/.

32 Josh Stephens, *What If Houston Fell in Love with Planning*, Next City (May 9, 2016), https://nextcity.org/features/view/houston-flood-development-gentrification.

33 City of Houston Planning and Development, 2018 No Zoning Letter (Jan. 1, 2018).

34 Stephens, *supra* note 32.

35 John Jacob, *Zoning—don't throw out the baby with the floodwater!*, Watershed Texas (Sept. 11, 2017), https://watershedtexas.org/2017/09/11/zoning-dont-throw-out-the-baby-with-the-floodwater.

36 Gerrit Knaap et. al, *Zoning as a Barrier to Multifamily Housing Development*, American Planning Association 1–3 (2007).

37 *Inheriting Inequality*, Austin Statesman, http://projects.statesman.com/news/economic-mobility/ (last visited May 3, 2018).

38 City of Houston Planning and Development, 2018 No Zoning Letter (Jan. 1, 2018).

39 Houston, Tex., Ordinances § 42-181 (2013).

the site of a business or residence.[40] Finally, Houston tends to enforce the restrictive covenants of private properties, rather than leaving it as a purely private affair to be resolved by courts in the court.[41]

As expected, Houston's general hands-off approach to land use regulation also extends to floodplain regulations, which means some landowners jealously protect their property values at the risk of others. Since World War II, Houston voters have rejected the imposition of land use restrictions three times.[42] Additionally, although the city has prohibited construction in floodway zones since 1968, many landowners have obtained exemptions. If the builder could prove that new construction would not further contribute to flooding, the City would grant a building permit.[43] With the permits in hand, developers built in and alongside these floodway zones.[44]

Paving and building over floodplains and floodways produce two effects, both of which raise the water levels: (1) less available land that is capable of absorbing excess rainfall; and (2) water displacement.[45] Over the last twenty-five years, uncontrolled urban sprawl has decreased the amount of wetlands in the city by almost 50 percent.[46] Wetlands are indispensable to urban areas prone to flooding because they trap floodwater and slowly release it over time, thus reducing the risk of flooding homes.[47] To make matters worse, building alongside and inside floodways and floodplains changes how the area ultimately floods.[48] With so few wetlands, Houston's flood plan is forced to rely on a combination of reservoirs, bayous, and even roads, to hold and drain flood water.[49] The thought presumably is that flooding is better in the streets than in the home, but if any extensive flooding occurs, evacuations must occur by boat.[50] Rainwater runoff from homes and streets siphon runoff into the reservoirs.[51] Meanwhile, buildings displace the water and disrupt the flow of floodwaters, which reportedly raises the overall flood height and increases the flow speed by as much as forty-five percent.[52]

The results of the lax restrictions are that the citizens of Houston regularly experience flooding, sometimes multiple times a year.[53] On average, Harris County sees four to

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40 *Id*.
41 Nolan Gray, *How Houston Regulates Land Use*, MARKET URBANISM (Sept. 19, 2016), http://marketurbanism.com/2016/09/19/how-houston-regulates-land-use/.
42 Mike Morris & Rebecca Elliott, *Fight over Houston floodplain rules taps into city's resistance to regulation*, HOUSTON CHRONICLE, Apr. 3, 2018.
43 Jackson, *supra* note 14.
44 *Id*.
45 *Id*.
46 *Why is Houston so prone to major flooding?*, CBS NEWS (Aug. 28, 2017, 7:39 AM), https://www.cbsnews.com/news/harvey-why-is-houston-so-prone-to-major-flooding/.
47 *Why Are Wetlands Important?*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/wetlands/why-are-wetlands-important (last visited May 3, 2018).
48 Collette & Dempsey, *supra* note 14.
49 Shawn Boburg & Beth Reinhard, *Houston's 'Wild West' Growth*, WASH. POST, Aug. 29, 2017.
50 *Id*.
51 Satija, *supra* note 14.
52 Collette & Dempsey, *supra* note 14.
53 Jon Erdman, *Is Houston America's Flood Capital?*, THE WEATHER CHANNEL (Aug. 24, 2017), https://weather.com/storms/severe/news/houston-flood-history-april2016.

five days of flooding annually; but Harris County has also experienced four to five "500 year" floods in the last five years.[54]

While most floods are small, sometimes they are larger and inflict devastating damage. In 2001, Tropical Storm Allison rushed through Houston, where it dropped 35 inches of rain, caused approximately $8.5 billion (2001 USD) in damage, and killed 23 people.[55] In 2015, Houston experienced its Memorial Day Flood that, while "only" producing 12 inches of rain, caused $459.8 million dollars in damage and killed 7 people.[56] Then, in 2016, Houston experienced its "Tax Day" flood, which resulted in 17 inches of rain and the death of 8 people.[57] Hurricane Harvey, in 2017, dropped 51 inches of rain, resulted in more than 75 deaths,[58] and inflicted $125 billion dollars in damage.[59] And finally, in 2019, Tropical Depression Imelda, referred to as Harvey 2.0, resulted in anywhere from 24 to 42 inches of rain across the city, at least 5 deaths, and currently uncalculated costs.[60] The slow-moving tropical depression flooded some of the very same homes that had just completed reconstruction after Harvey, and flooded others that escaped that fate during Harvey.[61] The unchecked growth Houston experienced, especially in areas with a high risk of flooding, effectively reduced the land's natural ability to absorb water. Further, the city's drainage system was not designed to handle storms of this magnitude.[62]

To make matters worse, despite city officials' awareness, many homeowners do not realize the home they purchased was at such high risk for flooding.[63] For example, in the aftermath of Hurricane Harvey, many residents who purchased and rented homes in the Addicks and Barker Reservoirs were shocked to discover their homes were within the original basins built by the U.S. Army Corps of Engineers designed specifically to reduce

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54 Amal Ahmed, *Tropical Storm Imelda Will Likely Be Southeast Texas' Fifth 500-Year Flood in Five Years*, TEX. OBSERVER, Sep. 20, 2019, 10:06 AM; Christopher Ingraham, *Houston is experiencing its third '500-year' flood in 3 Years. How is that possible?*, WASH. POST, Aug. 29, 2017; Jon Erdman, *Is Houston America's Flood Capital?*, THE WEATHER CHANNEL (Aug. 24, 2017), https://weather.com/storms/severe/news/houston-flood-history-april2016.

55 *Tropical Storm Allison blew through Houston on this day 17 years ago*, ABC 13 (Jun. 9, 2017), http://abc13.com/weather/tropical-storm-allison-disaster-began-16-years-ago-today/2075243/.

56 Fernando Ramirez, *Remembering Houston's Memorial Day Flood, one of America's costliest floods*, HOUSTON CHRONICLE, last updated May 26, 2017, 3:20 PM.

57 John-Henry Perera, *Revisiting Houston's Tax Day Floods one year later*, HOUSTON CHRONICLE, last updated Apr. 17,2017, 11:26 PM.

58 Cindy George et al., *Storm deaths: Harvey claims lives of more than 75 in Texas*, HOUSTON CHRONICLE, last updated Oct. 9, 2017, 5:07 PM.

59 Mooney, *supra* note 1.

60 Manny Fernandez and Sarah Mervosh, *For Some in Texas, Imelda's Heavy Rain Feels Like Harvey 2.0*, N.Y. TIMES, Sept. 19, 2019; Assoc. Press, *Death in Texas is fifth attributed to Tropical Storm Imelda*, L.A. TIMES, Sep. 22, 2019, 8:31 AM.

61 *Id.*

62 Boburg & Reinhard, *supra* note 49.

63 Neena Satija, *Everyone Knew Houston's Reservoirs Would Flood—Except for the People Who Bought Homes Inside Them*, PROPUBLICA (Oct. 12, 2017), https://projects.propublica.org/graphics/harvey-reservoirs.

downstream flooding.[64] While some city officials claim they have repeatedly warned residents of the risks, homeowners, renters, real estate agents, and even some insurance agents, were all surprised to discover that those neighborhoods were at such risk.[65] Now, instead of prairieland that could absorb the water, the streets are paved and lined with homes—at least 4,000 of them built after Tropical Storm Allison, when officials noted the sheer luck that the rain hadn't been over these reservoirs, else the damage from that storm would have been worse.[66] During Hurricane Harvey's onslaught of rain, the rainfall was so excessive that it caused too much stress on the dams and the U.S. Army Corps of Engineers was forced to release some of that water downstream, which caused thousands of more homes to flood.[67]

Houston is not blind to these issues. After the damage Hurricane Katrina inflicted on New Orleans in 2006, the city closed the loophole that allowed landowners to build on vacant lands in the floodways and it further limited any renovation and reconstruction work.[68] Land developers and homeowners joined forces to reverse the ordinance when they saw property values of the land within the floodways plummet.[69] Homeowners were furious that their retirement and life investments were suddenly worthless and many were unaware they were even within a floodway.[70] Developers, alike, were furious to discover the property they had bought could not be used according to plan.[71] Together, landowners, homeowners, and developers claimed that the ordinance was a taking of their private property without just compensation and demanded reparations.[72] Expectedly, that fierce backlash forced the city to adjust the ordinance to allow construction in floodplains and floodways by variance, so long as the homes were built on piers.[73]

After Hurricane Harvey, however, injured homeowners have demanded more from the City to prevent such horrific flooding from happening again. In April 2018, Houston approved a new ordinance to replace its current floodplain requirements.[74] The new ordinance extended its requirements for those in the 100-year floodplain and those within the 500-year flood plain.[75] Houston based its action on a concern that these recent 500-year floods indicate that the 500-year floods will likely be considered 100-year floods in the near future.[76] The ordinance applies to any new construction and any

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64 Satija, *supra* note 14; Kimmelman, *supra* note 5.
65 Satija, *supra* note 14.
66 *Id.*
67 *Id.*
68 Jackson, *supra* note 14.
69 *Id.*
70 *Id.*
71 *Id.*
72 *Id.*
73 *Developer Wants to Build New Housing Project in Houston Flood Plain*, INSURANCE JOURNAL, Dec. 18, 2017.
74 Cardenas & Formby, *supra* note 18.
75 *Id.*
76 Cardenas, *Six Figures for Six Feet*, *supra* note 20.

existing home that will be expanded by 33% or more.[77] Further, it increases the required height of new build's stilts to two feet above the floodplain.[78]

As anticipated and true to history, this ordinance met with severe criticism. Opponents state that the regulations would undermine growth, "hamstring Houston's competitive edge as an affordable big city[,] and destroy the property values of thousands of homeowners, including many who did not flood in Harvey."[79] Unfortunately, this argument flies in the face of increasing flood insurance costs for homeowners, who must decide between a several-thousand-dollar hike in insurance costs or rebuilding their home.[80] Further, companies are also at risk for flight from Houston, as seen with HP leaving their Houston campus for another after "unprecedented flooding two years in a row."[81]

Houston's attempt to protect its citizens is definitely a step in the correct direction. Unfortunately, it still needs to win over its residents. To prevent additional cost to itself, Houston must proactively protect itself and its residents from excessive risk.

IV. Two Proposed Solutions

Since most cities engage in more extensive land use management, they will not be faced with as many problems as Houston has in implementing regulations on land use. With both the regulation-adverse Houston and the average large city in mind, I recommend two solutions. First, I recommend that building new structures and any substantial improvements to existing structures within the 100-year floodplain must conform with additional building standards. My solution may be easily amended to expand to the 500-year floodplain in lieu of the 100-year plain. Further, the city's ordinances should include an outright prohibition of new construction and substantial improvements to existing structures within floodways. Second, I recommend that cities implement a watershed restoration program. Both recommendations would impose additional costs on the city to perform, but by pledging to accomplish these solutions, the city would be performing its obligation to protect its residents from excessive, foreseeable, and mitigatable harm.

A. Strict Ordinance Controls for Building New or Substantially-Modified Structures

Structures in 100-year floodplains should be required to be built at higher elevations to decrease unreasonable additional risk for residents and their neighbors. Further, private structures should no longer be allowed to be built or substantially modified within or alongside floodways. Accordingly, I propose incorporation of the following four amendments to city ordinances: addition of definitions for "flood hazard area," "flood-

77 Cardenas & Formby, *supra* note 18.
78 *Id*.
79 Morris, *supra* note 42.
80 Cardenas, *Six Figures for Six Feet*, *supra* note 20.
81 Olivia Pulsinelli, *Hewlett Packard Enterprise to move out of Houston campus due to flooding*, Houston Bus. J., https://www.bizjournals.com/houston/news/2017/11/01/hewlett-packard-enterprise-to-move-out-of-houston.html (last visited May 3, 2018).

way," "start of construction," and "substantial improvement" (Figure 1);[82] three refined restrictions on granting variances (Figure 2);[83] base flood elevation requirements in flood hazard areas (Figure 3);[84] and floodway-specific prohibitions (Figure 4).

FIGURE 1

Sec. [ ] – Definitions

FLOOD HAZARD AREA. The greater of the following two areas:

1. an area within a flood plain subject to a 1-percent or greater chance of flooding in any year (100-year flood); or
2. an area with a flood plain subject to a 1-percent or greater chance of flooding in any year (100-year flood) based on projected full development.

FLOODWAY. The channel of the river, creek, other watercourse, or an area with a flood plain subject to a four percent or greater chance of flooding in any year (25-year flood) and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

START OF CONSTRUCTION. The date a permit is issued for new construction or substantial improvements to existing structures if construction, repair, reconstruction, rehabilitation, addition, placement or other improvement starts within 180 days from the date the permit is issued. Construction starts when permanent construction of a building (including a manufactured home) is first placed and includes pouring a slab or footing, installing pilings, or constructing columns. Permanent construction does not include preparing land (clearing, excavating, grading, or filing); installing streets or walkways; excavating for a basement, footing, pier, or foundation; or erecting temporary forms or installing accessory buildings not occupied as dwelling units or not part of the main building. For a substantial improvement, construction starts when a wall, ceiling, floor, or other structural part of a building is altered even if the alteration does not affect the external dimensions of the building.

SUBSTANTIAL IMPROVEMENT. For the purpose of determining compliance with the flood hazard management provisions of this Code, a substantial improvement is any combination of repair, reconstruction, rehabilitation, alteration, addition or other improvement of a building or structure during the immediate 10-year period, the cost of which cumulatively equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started, or if the structure has been damaged and is being restored, before the damage occurred. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed.

Figure 1 adopts four definitions to draw clear lines for determining which regulations apply. For example, flood hazard areas are those areas designated as 100-year floodplains. Likewise, floodways are those areas designated as a 25-year floodplain. Finally, clear lines on what constitutes "substantial improvements" and "start of construction" are likewise important to interpret when the ordinance would apply.

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82 Adapted from AUSTIN, TEX., CODE OF ORDINANCES § 25-12-3 (2018).

83 Adapted from HOUSTON, TEX., ORDINANCES § 19-20 (2006).

84 Adapted from HOUSTON, TEX., ORDINANCES § 19-33 (2006).

Figure 2

Sec. [ ] – Variance.

In granting a variance, the board must find that the variance, if allowed, will not have the effect of:

(a) Increasing flood level height due to impedance of the stream of channel flow;

(b) Introducing or increasing any threat to public safety; and

(c) Unduly interfering with effective water retention in watersheds.

Figure 2 proposes variance considerations to re-emphasize floodway-structure prohibitions and to discourage floodplain variances.

Figure 3

Sec. [ ] – Base flood elevation requirements in flood hazard areas.

(a) All additions to, and new construction and substantial improvement of, any residential or nonresidential structures within flood hazard areas subject to a 1 percent or greater chance of flooding in any given year shall have the lowest floor and all utilities elevated to at least 12 inches above the elevation that is subject to a 1 percent or greater chance of flooding.

(b) Fully enclosed areas below the lowest floor that are used solely for parking, building access or storage in an area other than a basement and that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either:

(1) be certified by a registered architect or professional engineer licensed in the State of Texas or

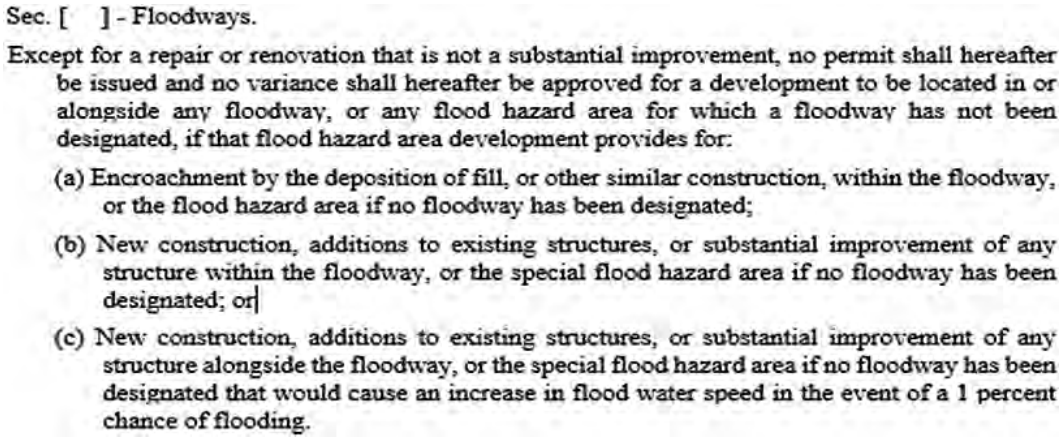
(2) have a minimum of two openings with a total net area of not less than one square inch for every square foot of enclosed area subject to flooding, with the top of all such openings no higher than 12 inches above the elevation that is subject to a 1 percent or greater chance of flooding. Openings may be equipped with screens, louvers, valves, or other coverings or devices, provided that they permit the automatic entry and exit of floodwaters.

(c) All structures to be constructed in whole or in part within flood hazard areas shall be designed with adequate drainage paths around structures on slopes to guide floodwaters around and away from those structures.

(d) For critical facilities located in an area that is subject to a 0.2 percent or greater chance of flooding in any given year, all additions, new construction, and substantial improvements shall have the lowest floor elevated or floodproofed to at least 12 inches above the elevation that is subject to a 0.2 percent or greater chance of flooding.

Figure 3 proposes amendments to the base flood elevation requirements in 100-year floodplains to require all structures to be elevated at least 12 inches above the elevation that is subject to flooding in a 100-year flood. It also imposes a requirement that critical facilities located in 500-year floodplains also construct all structures to be elevated at least 12 inches above the elevation that is subject to flooding.

FIGURE 4



Sec. [ ] - Floodways.

Except for a repair or renovation that is not a substantial improvement, no permit shall hereafter be issued and no variance shall hereafter be approved for a development to be located in or alongside any floodway, or any flood hazard area for which a floodway has not been designated, if that flood hazard area development provides for:

(a) Encroachment by the deposition of fill, or other similar construction, within the floodway, or the flood hazard area if no floodway has been designated;

(b) New construction, additions to existing structures, or substantial improvement of any structure within the floodway, or the special flood hazard area if no floodway has been designated; or

(c) New construction, additions to existing structures, or substantial improvement of any structure alongside the floodway, or the special flood hazard area if no floodway has been designated that would cause an increase in flood water speed in the event of a 1 percent chance of flooding.

Finally, Figure 4 proposes new regulations for construction in and alongside floodways. This proposal would prohibit all new construction or substantial improvements to existing structures in and alongside floodways. This amendment would work to ensure that 100-year or greater floods would not be as prone to rising flood levels due to structure displacement or faster water speeds from the pseudo-levies created by buildings.

While this ordinance would grandfather existing structures, the city may be subject to regulatory taking claims for those properties situated in and alongside the floodway.[85] The ordinance's requirements for properties situated within the floodway substantially limits the property owner's ability to develop his or her property. Further, those individuals with existing homes and structures within the floodway may see their home values plummet because the property would have become encumbered by regulations. Each of these parties may have a possible claim against the city to recover damages.

The soundest argument against this ordinance is the incredible cost the city would incur to enforce this ordinance.[86] However, cities suffering from such flood devastation have already routinely turned to federal taxpayers for help to rebuild its infrastructure and rarely pay for all the damages themselves.[87] Harris County alone has received approximately $3 billion from the Federal Emergency Management Agency (FEMA) in the last four decades and ranks third in the amount paid by the National Flood Insurance Program.[88] For a city like Houston, however, which has incurred over $126 billion in

85 *See* Pa. Coal Co. v. Mahon, 260 U.S. 393, 415 (1922) ("The general rule at least is that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a takin.").

86 *See* Benjamin Lesser & Ryan McNeill, *Special Reuters Report: The High Cost of Building in High Flood Risk* Areas, INS. J., Dec. 12, 2017. While this is an argument with merit, an in-depth analysis on property tax-related expenses the city would incur as a result of property value declination is outside the scope of this note.

87 Boburg & Reinhard, *supra* note 49.

88 *Id.*

damages from floods in the past three years,[89] the $3 billion is dwarfed and such a proactive regulation would decrease the overall damage done to its infrastructure and residents' properties. Further, coastal cities will likely experience more storms of this caliber because of climate change, so they should prepare to prevent as much damage as possible.[90] It is simply not reasonable for a city prone to flooding to continue at the current status quo. It must act proactively to protect its citizens from reasonably foreseeable harm.

B. Implementing Watershed-Restoration Programs

My second recommendation is that cities should work to protect and restore the watersheds by establishing programs that focus on managing and rehabilitating the city's creeks and streams. The goal of these programs is to monitor stream quality and flow to develop and implement programs to stabilize stream systems, which will ultimately decrease property loss.[91]

By developing programs that protect or repair the local watersheds, cities will be able to adapt more readily in heavy rainfall and flooding.[92] When these natural landscapes are available, they minimize the area and impacts of floods by absorbing some or all of the excess rainfall.[93] This, in turn, reduces the stress on public drainage infrastructure and results in less flooding, and hence less damage to property and infrastructure.[94] Further, there are federal, regional, and state funds that incentivize the creation of these sorts of programs geared towards improving the watersheds.[95] Accordingly, this forward-looking approach decreases the likelihood and severity of floods and protects its citizens from the costs and dangers of flooding.

Cities may start this process on lands they already own. This development need not be banished to city parks or preserves. As seen in Austin, Texas, watershed protection and rehabilitation projects come in a variety of shapes and forms.[96] For example, while

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89 *See* Mooney, *supra* note 1; *see also* NOAA National Centers for Environmental Information, U.S. Billion-Dollar Weather & Climate Disasters 1980–2019, https://www.ncdc.noaa.gov/billions/events.pdf (last accessed Apr. 8, 2019).

90 *Why Are Wetlands Important?*, *supra* note 47. The Intergovernmental Panel on Climate Change projected with medium confidence that as global temperatures increase, heavy precipitation associated with tropical cyclones and heavy precipitation aggregated at a global scale will be higher, and because of the heavier precipitation, the "the fraction of the global land area affected by flood hazards is [also] projected to be larger." Intergovernmental Panel on Climate Change, Global Warming of 1.5°C: Summary for Policymakers 9 (2018).

91 *Watershed Protection Department*, *Programs*, austintexas.gov, http://www.austintexas.gov/department/watershed-protection/programs (last visited May 3, 2018).

92 *Benefits of Healthy Watersheds*, U.S. Envtl. Prot. Agency, https://www.epa.gov/hwp/benefits-healthy-watersheds (last visited May 3, 2018).

93 *Id*.

94 *Id*.

95 *Initiatives to Create and Protect Healthy Watersheds*, U.S. Envtl. Prot. Agency, https://www.epa.gov/hwp/initiatives-create-and-protect-healthy-watersheds (last visited May 3, 2018).

96 *Watershed Protection Department*, *Projects*, austintexas.gov, http://www.austintexas.gov/department/watershed-protection/projects (last visited May 3, 2018).

Austin has programs in traditional parks, such as the Shoal and Walnut Creek Parks,[97] it also has a program that meshes an urban mall with stream protection: Austin Central Park Shopping Center hosts both a shopping center, apartments, and the Central Park Wet Pond.[98] This joint public and private enterprise's primary goal is water quality protection, but it also assists against flooding by providing 173 acres of pond watershed.[99] Integrating these projects into urban environments is possible for the city individually or as a joint project between the city and land developers, and should be more encouraged.

Another useful tactic to reduce the amount of rainfall that would enter the streets, streams, and watersheds is the installation of "green vegetative roofs" on new city and commercial buildings.[100] The Lady Bird Johnson Wildflower Center researched, among other things, how effective commercial green roofs are on reducing rainfall run-off.[101] Results indicated that similar to how wetland soils can absorb excess rain, the green rooftop's vegetation, soil, and other layers effectively "retain and filter storm water," which ultimately reduces the amount of rain that leaves the roof.[102] An installation of a green roof at Dell Children's Medical Center of Central Texas' further showed that increased soil depth lead to greater moisture-holding capacity.[103] These green roofs may be a more viable option for cities that may lack the land necessary to create or re-establish its natural watersheds as they can be incorporated onto new and existing commercial and city buildings.[104] Green roofs could also be an effective tool in a city's water-

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97 *Id.*; *Watershed Protection Department*, *Frequently Asked Questions*, AUSTINTEXAS.GOV, http://www.austintexas.gov/department/watershed-protection/faq (last visited May 3, 2018).

98 *Watershed Protection Department*, *Completed Project—Central Park Wet Pond*, AUSTINTEXAS.GOV, https://austintexas.gov/faq/completed-project-central-park-wet-pond (last visited May 3, 2018).

99 *Id.*

100 Center Staff, *Wildflower Center Launches New Study on Green Roof Building,* LADY BIRD JOHNSON WILDFLOWER CENTER, Mar. 31, 2005, https://www.wildflower.org/pressroom/wildflower-center-launches-new-study-green-roof-building; Center Staff, *New Green Roof Study*, LADY BIRD JOHNSON WILDFLOWER CENTER, Jan. 27, 2011, https://www.wildflower.org/pressroom/new-green-roof-study.

101 Center Staff, *Wildflower Center Launches New Study on Green Roof Building,* LADY BIRD JOHNSON WILDFLOWER CENTER, Mar. 31, 2005, https://www.wildflower.org/pressroom/wildflower-center-launches-new-study-green-roof-building; Center Staff, *New Green Roof Study*, LADY BIRD JOHNSON WILDFLOWER CENTER, Jan. 27, 2011, https://www.wildflower.org/pressroom/new-green-roof-study.

102 Center Staff, *Wildflower Center Launches New Study on Green Roof Building,* LADY BIRD JOHNSON WILDFLOWER CENTER, Mar. 31, 2005, https://www.wildflower.org/pressroom/wildflower-center-launches-new-study-green-roof-building; Center Staff, *New Green Roof Study*, LADY BIRD JOHNSON WILDFLOWER CENTER, Jan. 27, 2011, https://www.wildflower.org/pressroom/new-green-roof-study.

103 WATERSHED PROTECTION DEPARTMENT, DELL CHILDREN'S MEDICAL CENTER OF CENTRAL TEXAS (2010), http://www.austintexas.gov/sites/default/files/files/Sustainability/Green_Roof/Dell_Childrens_Hospital_Case_Study.pdf.

104 Incorporating a green roof onto existing structures should be done with care, however. New structures are preferred for green roofs because the building plans can account for the sheer immense weight of a green roof. *See Technical Preservation Services: Green Roofs*, NAT'L PARK SERVICE, https://www.nps.gov/tps/sustainability/new-technology/green-roofs/physical-impacts.htm (last visited Sep. 23, 2019) (The weight of the "plants, growing medium, wa-

shed restoration program because they also work to reduce the amount of rainfall available to flood cities and homes.

Critics' strongest argument against proactive land management to reduce flooding is that in events of monumental storms such as Hurricane Harvey and Tropical Depression Imelda, no city is able to withstand or prepare for such a storm.[105] The amount of rainfall that occurs in these particularly horrific storms are such that no one can prepare for it.[106] While some argue that the floodplains in Houston would have been sufficient to hold all the rainfall from Harvey,[107] some critics quip that the idea that "these magic sponges out in the prairie would have absorbed all that water is absurd."[108]

The reality is likely somewhere in between. The arguments that the natural watersheds would have been able to hold the water but for the residential developments may have some merit. Studies have shown that the very wetlands that critics mock actually can receive and store much larger amounts of rainfall than previously thought.[109] Further, intact wetlands are directly related to increased resilience in the face of extreme weather patterns and changes in precipitation.[110] Jim Blackburn, co-director of Rice University's research center on severe storm prediction and disaster evacuation, concedes that there would have been widespread damage with hurricanes like Harvey no matter what preventative measures were taken—but "it could have been substantially reduced" if Houston had been proactive.[111] Areas that have not experienced much land development would have more flexibility in protecting the watersheds and floodplains, but even in areas where cities already exist, they have the flexibility in watershed plans to more effectively protect residents.

V. Conclusion

Insufficient land management ordinances pose a threat to those in the middle class. Houston, in particular, is illustrative of the harms that *laissez faire* land management in floodplains and floodways have on flooding and the damages residents incur. However, flooding is not unique to Houston. Accordingly, I proposed two solutions for cities to consider. The first is that structures within the 100-year flood plain require additional restrictions and that building in the floodways be prohibited. The second recommendation is that cities proactively rehabilitate and protect their watersheds. While both proposed solutions impose different additional costs for a city, these proposed land use

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terproofing and support layers, paving material and, most importantly, water load, can drastically increase the amount of weight being supported by a roof.").

105 Jacob, *Zoning—don't throw out the baby with the floodwater!*, *supra* note 35.

106 John S. Jacob, *Does Houston need a stronger floodplain ordinance?*, Houston Chronicle, Sept. 25, 2017.

107 Jacob, *Zoning—don't throw out the baby with the floodwater!*, *supra* note 35.

108 Scott Beyer, *Did Houston Flood Because Of A Lack Of Zoning?*, Forbes, Aug. 30, 2017, 1:46 AM.

109 Jim Blackburn, *Twelve steps Houston can take to address our flooding problem*, Houston Chronicle, Aug. 31, 2017.

110 *Benefits of Healthy Watersheds*, *supra* note 92.

111 Boburg & Reinhard, *supra* note 49.

management solutions give a city two different styles of options to consider in their own ordinances and plans. By implementing such policies, a city would be performing its obligation to protect its residents from excessive, foreseeable, and mitigatable harm.

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TCEQ REDESIGNATION REQUEST AND MAINTENANCE PLAN FOR THE HGB AREA'S ONE-HOUR AND 1997 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS

INTRODUCTION

The Texas Commission on Environmental Quality (TCEQ) has proposed to the Environmental Protection Agency (EPA) redesignation of the Houston-Galveston-Brazoria (HGB) area from non-attainment to attainment for the one-hour and 1997 eight-hour ozone standards under the Federal Clean Air Act (CAA).[1] The proposal includes a state implementation plan (SIP) revision for maintaining attainment of the standards and requests approval by EPA.[2] The area remains in moderate nonattainment for the superseded 2008 standard and in marginal nonattainment for the current standard promulgated in 2015, with an attainment deadline of August, 2021.

BACKGROUND

CAA History

Beginning with the 1970 amendments to the CAA, the EPA Administrator was tasked with issuing National Ambient Air Quality Standards (NAAQS) to be met by the states through the promulgation of state implementation plans (SIPs).[3] SIPs require emission reductions to attain the prescribed standards.[4] Standards were issued for six criteria of air pollutants, including ozone, which was previously regulated as a photochemical oxidant and set at 0.08 ppm (80ppb) for a one hour period.[5] Attainment of the standards was to be demonstrated for each Air Quality Control Region (AQCR) established in the state, including the eight-county HGB region.[6] SIPs were approved in

1 TEX. COMM'N ON ENVTL. QUALITY, PROJ. NO. 2018-026-SIP-NR, HOUSTON-GALVESTON-BRAZORIA REDESIGNATION REQUEST AND MAINTENANCE PLAN STATE IMPLEMENTATION PLAN REVISION FOR THE ONE-HOUR AND 1997 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS 1-1 (2018), [hereinafter REDESIGNATION REQUEST].

2 *Id.* at ES-2.

3 Arnold W. Reitze, Jr., *The National Ambient Air Quality Standards for Ozone*, 6 ARIZ. J. ENVTL. L. & POL'Y 420, 422–23 (2015).

4 42 U.S.C. § 7409 (2018); Reitze, *supra* note 3, at 423.

5 Reitze, *supra* note 3, at 423, 430.

6 *See id.* at 424–25 ("Under the program, EPA divided the nation into quality control regions in coordination with the states, and states of the area are designated as either (1) 'attainment,' if the atmospheric concentration is below the NAAQS, [or] (2) 'nonattainment' . . ."); REDESIGNATION REQUEST, *supra* note 1, at 1-1 ("In 1990, the eight-county HGB one-hour ozone nonattainment area . . . was classified as severe-17 according to the [Federal CAA].").

1972, and the struggle for ozone attainment in the nation's large urban areas—including the HGB area—has continued ever since.[7]

Evolution of the Ozone Standard

After updating the one-hour ozone standard in 1979, the EPA, in 1997, began phasing out the one-hour standard and fully revoked it in 2005.[8] Post-revocation, the former one-hour ozone nonattainment areas remained subject to anti-backsliding requirements.[9] In lieu of the one-hour standard, the EPA established a new, eight-hour standard for ozone.[10] The 1997 eight-hour standard was 0.08 ppm (80 ppb), based on the three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentrations measured at each monitor within an area.[11] In 2008, the standard was lowered to 0.075 ppm (75 ppb) and in 2015 was lowered again to 0.070ppm (70 ppb), with anti-backsliding requirements retained for areas that remain nonattainment.[12] Ozone nonattainment areas are designated as marginal, moderate, serious, severe, or extreme depending on the severity of the nonattainment.[13]

HGB One-Hour Ozone NAAQS History

In 1990, the HGB area was classified by the state and EPA as severe-17 pursuant to the CAA and given a deadline of November 15, 2007 to achieve attainment of the one-hour ozone standard.[14] After the TCEQ submitted numerous Attainment Demonstrations and SIP Revisions to the EPA in 2000, 2001, 2002, 2004, and 2006, the HGB area failed to attain that standard by the November 15, 2007 deadline.[15] Even though the one-hour ozone NAAQS was fully revoked by 2005, the EPA published a failure-to-attain determination in 2012 that made the HGB subject to certain anti-backsliding requirements.[16]

In 2014, based on 2011 through 2013 monitoring data, the HGB area demonstrated attainment of the one-hour ozone NAAQS and the anti-backsliding requirements for contingency measures were achieved.[17] This final determination did not trigger addi-

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7 *SIP Processing Manual*, U.S. ENVTL. PROT. AGENCY, https://cfpub.epa.gov/oarwebadmin/sipman/sipman/mContent.cfm?chap=1&filePos=2 (last visited Mar. 11, 2019).

8 *See generally* Reitze, *supra* note 3, at 431–38 (describing the history of EPA's reviews of NAAQS standards).

9 *Id*. at 433.

10 John B. Turney & Kelly Ozuna, *Recent Implications for the Houston-Galveston-Brazoria Eight-Hour Ozone Nonattainment Area*, 39 TEX. ENVTL. L.J. 69, 70 (2008) (citing 40 C.F.R. § 50.15 (2008)).

11 John B. Turney & Stephanie Trinh, *Update on Texas State Implementation Plan*, 44 TEX. ENVTL. L.J. 145, 145 (2014).

12 *Id*. at 146, Reitze, *supra* note 3, at 433 ("The 1997 ozone NAAQS was revoked on February 13, 2015 by a new rule that includes anti-backsliding requirements for areas that remain nonattainment for the 0.08 ppm standard . . .").

13 42 U.S.C. § 7511a (2018).

14 REDESIGNATION REQUEST, *supra* note 1, at 1-1.

15 *Id*. at 1-2.

16 *Id.*

17 *Id.* at 1-2, 1-3.

tional emissions reductions.[18] Based on this achievement, the TCEQ submitted a redesignation substitute report for the HGB one-hour ozone standard nonattainment area in place of a redesignation request and maintenance plan.[19] In 2015, that plan was approved by the EPA, and the TCEQ continues to monitor attainment with no expected exceedances based on 2015 through 2017 data.

HGB 1997 Eight-Hour Ozone NAAQS History

Effective in 2004, the HGB area was designated as moderate nonattainment in the first phase of the EPA's implementation rule for the 1997 eight-hour ozone NAAQS.[20] The attainment deadline to meet the eight-hour standard was June 15, 2010.[21] In 2007, the TCEQ adopted SIP revisions, which the EPA approved in 2009, to demonstrate a 15% reduction in ozone precursor emissions for the period of 2001 through 2008.[22] A month after the TCEQ adopted the SIP revisions, the TCEQ requested that the HGB area be reclassified as a severe nonattainment area.[23] The EPA approved this request and set a new attainment deadline of June 15, 2019.[24]

In response to the reclassification, the TCEQ adopted two revisions to the SIP in 2010, which the EPA approved throughout 2014 and 2015. In 2015, the EPA published a final determination of attainment for the 1997 eight-hour ozone NAAQS for the HGB area.[25] In the same year, the TCEQ submitted a Redesignation Substitute Report which ensured that specific requirements would be met under the 2008 eight-hour ozone standard of .075 ppb, which was revoked in 2015 in favor of a reduced standard of .070 ppb.[26] The redesignation substitute fulfilled the EPA's requirements to lift anti-backsliding obligations and was approved in 2016.[27] The area continues to remain in attainment of the 1997 standard based on data from 2015 through 2017.

Purpose of Redesignation Request and Maintenance Plan

In 2018, a case was brought to the United States Court of Appeals for the District of Columbia that challenged the EPA's final 2008 ozone standard SIP requirements rule that revoked the 1997 eight-hour ozone NAAQS.[28] The court rendered a decision, which vacated parts of the EPA's final 2008 ozone standard SIP requirements rule and included the redesignation substitute.[29] The decision also removed anti-backsliding requirements for areas designated nonattainment under the 1997 NAAQS.[30] Among other concerns, this ruling resulted in uncertainty for transportation projects seeking air qual-

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18 *Id.* at 1-2, 1-3.
19 *Id.* at 1-3.
20 *Id.* at 1-4.
21 Turney & Ozuna, *supra* note 10, at 70.
22 Redesignation Request, *supra* note 1, at 1-4.
23 *Id.*
24 *Id.*
25 *Id.* at 1-5.
26 *Id.*
27 *Id.*
28 South Coast Air Quality Management District v. EPA, 882 F.3d 1138, 1145 (D.C. Cir. 2018).
29 Redesignation Request, *supra* note 1, at 1-5, 1-6.
30 *Id.*

ity permits in the HGB area.[31] The EPA filed a request for rehearing on April 23, 2018, but the court denied the rehearing and granted a stay of its decision through February 16, 2019, with respect to transportation conformity requirements in "orphan areas."[32]

To address the uncertainty created by the court's ruling, the TCEQ developed a "formal redesignation request and maintenance plan SIP revision for the HGB area for the one-hour and 1997 eight-hour ozone NAAQS for submittal to the EPA."[33] The SIP revision, adopted by the Commission after public hearings and comment, includes a request that the HGB area be redesignated to attainment for the revoked one-hour and 1997 eight-hour ozone NAAQS and a maintenance plan to ensure the area remains in attainment through 2032.[34] Today, the area remains in moderate nonattainment for the 2008 standard and in marginal nonattainment for the 2015 standard, with an attainment deadline of August 2021, some fifty years after the quest for ozone attainment began.[35]

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PUBLICATIONS

REVIEW OF SARAH FOX, *ENVIRONMENTAL GENTRIFICATION*, 90 U. COLO. L. REV. 803 (2019)

INTRODUCTION AND BACKGROUND

In her article, "*Environmental Gentrification*," Sarah Fox examines the problem of "environmental gentrification" and possible solutions through environmental law.[1] As

31 *Id.* at 1-6.

32 *South Coast Air Quality Management District*, 882 F.3d at 1148, 1154–55 (explaining further that orphan *nonattainment* areas are areas that were designated attainment for the 2008 ozone NAAQS while remaining nonattainment for the 1997 NAAQS due to EPA's refusal to redesignate areas after revocation of a NAAQS. Orphan *maintenance* areas are areas that were initially designated nonattainment for the 1997 ozone NAAQS, but were formally redesignated for that NAAQS prior to its revocation, and were designated attainment for the 2008 ozone NAAQS).

33 Interoffice Memorandum from Steve Hagle, Deputy Director, Tex. Comm'n on Envtl. Quality to Commissioners, Tex. Comm'n on Envtl. Quality (Aug. 17, 2018) at 2.

34 *Id.* at 2, 3, 4.

35 *Houston-Galveston-Brazoria: Current Attainment Status*, TEX. COMM'N ON ENVTL. QUALITY, www.tceq.texas.gov/airquality/sip/hgb/hgb-status (last visited Mar. 11, 2019).

1 Sarah Fox, *Environmental Gentrification*, 90 U. COLO. L. REV. 803 (2019).

Fox notes, the concept of gentrification has existed for nearly sixty years.[2] Broad cycles of disinvestment and later rehabilitation of certain urban areas leads to the displacement of poorer—and often minority—residents.[3] This process leads to demographic changes whereby higher-income groups move into lower-income areas, which can change the area's cultural and financial character.[4] This, in turn, can exacerbate this nation's affordable housing crisis and growing wealth gap.[5]

Fox's article focuses on a specific type of gentrification caused by environmental improvements.[6] Environmental gentrification occurs when affluent residents move into new areas that are suddenly more attractive after an environmental solution such as a hazardous waste clean-up, or the recapture of polluted green space.[7] Although these environmentally-friendly actions are lauded by the public for good reason, they often spur new development and force out the residents who have been living alongside the hazard, pollution, or detritus for years.[8] In this way, environmental improvement can itself become a problem, especially when the negative effects of such improvement are rarely, if at all, considered during the planning process.[9]

Environmental Gentrification and Displacement

Fox first describes the different types of environmental gentrification and their impacts.[10] She explores four basic types of urban environmental improvements: (1) cleaning up contaminated or heavily polluted land; (2) improving bodies of water; (3) enhancing green space; and (4) sustainability planning.[11] Each of these improvements is beneficial on its own. But when viewed within a social context, they create unique displacement problems.[12] As an example, Fox points out that cleaning up polluted land for "brownfield" development disproportionately affects low-income communities and communities of color, as these are the people most likely to be living next to contaminated sites.[13] Programs designed to clean bodies of water or "daylighting"—uncovering urban water bodies that were previously buried—have the same effect, as housing prices

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2 *Id.* at 805 n.1 (citing Diane K. Levy, Jennifer Comey, & Sandra Padilla, *In the Face of Gentrification: Case Studies of Local Efforts to Mitigate Displacement*, 16 J. Affordable Housing & Community Dev. L. 238, 239 (2007) (noting that the concept of gentrification was first used to describe areas of London in the 1960s)).

3 *Id.* at 806. *See also* Neil Smith, The New Urban Frontier: Gentrification and the Revanchist City 22–23 (1996).

4 Fox, *supra* note 1, at 805 (quoting U.S. Dep't of Hous. & Urban Dev., Ensuring Equitable Neighborhood Change: Gentrification Pressures on Housing Affordability 1 (2016)).

5 *Id.* at 806.

6 *Id.*

7 *Id.*

8 *Id.*

9 *Id.* at 806–07.

10 *Id.* at 810.

11 *See generally id.* at 813–20.

12 *Id.* at 840.

13 *Id.* at 814. *See also* Lindsey Dillon, *Cleaning Up Toxic Sites Isn't Always as Good for the Community as You Might Think*, Grist (July 15, 2017), http://grist.org/article/cleaning-up-toxic-sites-isnt-always-as-good-for-the-community-as-you-might-think/.

increase upon their completion.[14] The author does not uniformly criticize environmental clean-up programs; rather, she weighs the benefits and drawbacks of such urban renewal.[15]

THE IMPACT OF CURRENT ENVIRONMENTAL LAWS

Next, Fox writes about the existing environmental laws that facilitate the kind of improvements described above.[16] Environmental statutes like CERCLA and the Clean Water Act do not consider displacement because the drafters were not focused on social equity when writing the laws.[17] Fox notes that "the major federal environmental laws are aimed at addressing harm to the physical environment, not social harm."[18] The article discusses two ways in which the traditional statutory framework fails to prevent social injustice.[19] First, the traditional enforcement mechanisms found in federal statutory schemes like the Clean Air Act and Clean Water Act are often underused in communities of color.[20] Indeed, low-income communities likely often feel like the existing laws are inaccessible without money or legal advice. These communities are disconnected from the enforcement mechanisms, and when the mechanisms *are* used to improve the urban landscape, the locals are rarely the ones to benefit in the long run.[21] Instead, they are simply priced out of the neighborhood.[22]

After covering the inadequacy of current laws, Fox explores possible reasons why the laws have not changed to address social concerns like gentrification.[23] One of the most important reasons she identifies is "the history of government policies combined with discrimination [and] choices by wealthy urban residents."[24] Because middle and upper-class home ownership has historically been one of the most important factors affecting individuals, Fox argues, the same communities being displaced from their homes find themselves caught between the Scylla of environmental pollution and the Charybdis of rising property values.[25] Even worse, opponents of affordable housing have actively used the tools of environmental law to stop or slow sustainable housing planning.[26]

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14 Fox, *supra* note 1, at 816.
15 *Id.* at 820–26.
16 *Id.* at 826.
17 *Id.* at 827.
18 *Id. See also* J.B. Ruhl, *The Co-Evolution of Sustainable Development and Environmental Justice: Cooperation, then Competition, then Conflict*, 9 DUKE ENVTL. L. & POL'Y F. 161, 177–78 (1999).
19 Fox, *supra* note 1, at 828–29.
20 *Id.* at 829.
21 *Id.*
22 *Id.* at 830.
23 *Id.* at 841.
24 *Id.* at 842.
25 *Id.* at 843–44.
26 *Id.* at 844 n.214 (citing Ngai Pindell, *Environmental Planning and Review of Affordable Housing Development*, *in* THE LEGAL GUIDE TO AFFORDABLE HOUSING DEVELOPMENT § 2.IV (Tim Iglesias & Rochelle E. Lento eds., 2d ed. 2011) ("[O]pponents of affordable housing motivated by non-environmental concerns can use these laws to block, delay, change, and increase the costs of affordable housing developments by claiming such proposals will cause

Addressing the Problem of Environmental Gentrification

The final section of the article explores how environmental law could better address the problem of environmental gentrification.[27] Because this form of gentrification "cannot be expected to abate on its own" due to market forces, Fox argues that the law must change to properly address it.[28] Modern environmentalism is primarily focused on pollution control and protection of natural resources, and Fox argues that it needs to widen its existing views of environmental justice and sustainability.[29] Fox discusses the problem of "frontier mentality" in U.S. environmentalism.[30] Frontier mentality means imagining environmentally damaged areas as uncharted frontier, meant to be cleaned up and developed the "proper" way.[31] Fox reminds the reader that the most environmentally damaged areas of the U.S. are already home to communities that are more likely to be low-income or minority.[32] Any future plans for sustainable development should take this fact into account without giving up the basic mission of protecting the natural environment.[33] Although Fox does not go into detail about what constitutes socially conscious "smart growth," she provides some sources that investigate the issue in a more concrete way.[34]

Conclusion

Fox's article continues an important conversation about balancing environmental protection with social justice considerations. The reader may wish for a more nuanced discussion of environmental clean-up and market forces; Fox seems to take a monolithic view of the American housing market. Although she cites several case studies of gentrification in real cities, some more explanation of economic trends would give some useful context.[35] Even so, the article is a welcome addition at a time when community displacement is more important than ever. In the end, Fox is an optimist, writing that "better investments of time, planning resources, community development, and strategic thinking" can bridge the gap between current environmental protection and the needs of the most underprivileged communities.

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environmental harms. Established communities sometimes raise environmental issues to oppose affordable housing as infill development.").

27 *Id.* at 851.

28 *Id.*

29 *Id.* at 852.

30 *Id.* at 853.

31 *Id.*

32 *Id.* at 853–54.

33 *Id.* at 854–56.

34 *Id* at 855. *See, e.g.,* John Nolon, *The Law of Sustainable Development: Keeping Pace*, 30 Pace L. Rev. 1246 (2010); Heather O'Connell, *Connecting Job Proximity and Gentrification: What's Going On in Houston?*, Kinder Inst. (Mar. 24, 2015), https://kinder.rice.edu/2015/03/24/27.

35 *See* Heather O'Connell, *Connecting Job Proximity and Gentrification: What's Going On in Houston?*, Kinder Inst. (Mar. 24, 2015), https://kinder.rice.edu/2015/03/24/27 and Diane K. Levy, Jennifer Comey, & Sandra Padilla, *In the Face of Gentrification: Case Studies of Local Efforts to Mitigate Displacement*, 16 J. Affordable Housing & Community Dev. L. 238, 239 (2007).

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SOLID WASTE

EPA RULE: MANAGEMENT STANDARDS FOR HAZARDOUS WASTE PHARMACEUTICALS AND AMENDMENT TO THE P075 LISTING FOR NICOTINE

INTRODUCTION AND BACKGROUND

Pharmaceutical waste is an inevitable byproduct of the healthcare sector. This waste and its impact on water quality came to the forefront of the public's mind in 2008, when an Associated Press series discovered pharmaceuticals in the drinking water of over forty-one million Americans.[1] At that time, the Environmental Protection Agency (EPA) proposed to add pharmaceuticals to the list of hazardous wastes that could be regulated under the Resource Conservation and Recovery Act's (RCRA) hazardous waste regulations.[2] However, this rule was never finalized due to concerns regarding its lack of notification requirements for healthcare facilities and lack of shipping requirements for pharmaceutical wastes.[3]

In 2015, an EPA study estimated that healthcare facilities flush thousands of tons of pharmaceutical drugs down the drain each year.[4] This finding spurred efforts to finalize rules to limit the pharmaceutical waste from healthcare facilities and address concerns raised during the previously proposed rule's comment period.[5] The EPA declined to proceed with the rule as revised, and instead re-engaged with states and other stakeholders

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1 Jeff Donn, Martha Mendoza & Justin Pritchard, *AP Probe Finds Drugs in Drinking Water*, ASSOCIATED PRESS, (Mar. 2008), http://nipomowater.com/pdf/2008_pdf/2008_News/08_0310_SMT_AP_Probe_Finds_Drugs_%20in_Drinking_Water.pdf.

2 Amendment to the Universal Waste Rule: Addition of Pharmaceuticals, 73 Fed. Reg. 73,520 (proposed Dec. 2, 2008).

3 *Final Rule: Management Standards for Hazardous Waste Pharmaceuticals and Amendment to the P075 Listing for Nicotine*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/hwgenerators/final-rule-management-standards-hazardous-waste-pharmaceuticals-and-amendment-p075 (last visited Mar. 9, 2019) [hereinafter *EPA Final Pharmaceutical Rule*].

4 Rich Thompson, *Much ado about pharma residue: EPA rule aims to end waste flushing*, WASTE DIVE (Jan. 7, 2019), https://www.wastedive.com/news/much-ado-about-pharma-residue-epa-rule-aims-to-end-waste-flushing/545159/.

5 Management Standards for Hazardous Waste Pharmaceuticals, 80 Fed. Reg. 58,014 (proposed Sept. 25, 2015).

on the relevant issues, considered public comments, and proposed further revisions to include additional flexibility.[6]

Years after the initial proposed rule, the EPA issued a final rule in March 2019, titled *Management Standards for Hazardous Waste Pharmaceuticals and Amendment to the P075 Listing for Nicotine*. This final rule seeks to streamline the pharmaceutical waste management process for healthcare facilities and address many of the problems associated with pharmaceutical waste disposal.[7]

Regulating this industry has been notoriously difficult. For example, in just one facility, pharmaceutical waste is generated throughout a large number of points in small quantities.[8] Furthermore, pharmaceutical waste comes in hundreds of different forms, while industrial waste creates only a few predictable forms from much fewer generation points.[9] Current RCRA requirements for disposing of pharmaceuticals are also incredibly difficult for healthcare facility employees to interpret.[10] This results in the disposal of hazardous pharmaceuticals as municipal waste or medical waste, which can easily end up in waterways and cause the public health crises that arose almost a decade ago.[11]

Final Rule and its Effects

General Description of Rule

According to the EPA, the goal of the final rule is to "[establish] cost-saving, streamlined standards for handling hazardous waste pharmaceuticals to better fit the operations of the healthcare sector while maintaining protection of human health and the environment."[12] The final rule became effective on August 21, 2019.[13] With this new rule, states are now required to modify their own RCRA programs to incorporate the new, more stringent requirements.[14]

> The final rule will affect healthcare facilities and reverse distributors that generate hazardous pharmaceutical waste but will not impact pharmaceutical manufacturers unless they act as reverse distributors, production facilities, or other generators of hazardous pharmaceutical waste.[15]According to the final rule, a "healthcare facility" is defined as any person that is lawfully authorized to:

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6 *EPA Final Pharmaceutical Rule*, *supra* note 3.

7 *Frequent Questions about the Management Standards for Hazardous Waste Pharmaceuticals and Amendment to the P075 Listing for Nicotine Final Rule*, U.S. Envtl. Prot. Agency, https://www.epa.gov/hwgenerators/frequent-questions-about-management-standards-hazardous-waste-pharmaceuticals-and#q6 (last visited Mar. 9, 2019) [hereinafter *EPA Final Rule FAQ*].

8 *Id.*

9 *Id.*

10 *Id.*

11 *Id.*

12 *EPA Final Pharmaceutical Rule*, *supra* note 3.

13 Management Standards for Hazardous Waste Pharmaceuticals and Amendment to the P075 Listing for Nicotine, 84 Fed. Reg. 5,816 (Feb. 22, 2019) (codified at 40 C.F.R. pts. 261, 262, 264, 265, 266, 268, 270, 273).

14 *Id.*

15 *Id.* at 5,835.

> (1) provide preventative, diagnostic, therapeutic, rehabilitative, maintenance or palliative care, and counseling, service, assessment or procedure with respect to the physical or mental condition, or functional status, of a human or animal or that affects the structure or function of the human or animal body; or
>
> (2) distribute, sell, or dispense pharmaceuticals, including [over-the-counter] pharmaceuticals, dietary supplements, homeopathic drugs, or prescription pharmaceuticals.[16]

This definition includes hospitals, long-term care pharmacies, health clinics, and more.[17] A "reverse distributor" is defined as any person that "receives and accumulates prescription pharmaceuticals that are potentially creditable hazardous waste pharmaceuticals for the purpose of facilitating or verifying manufacturer credit."[18]

Currently, of the thousands of prescription and over-the-counter drugs on the market, it is unknown how many of these contain hazardous waste.[19] RCRA outlines and identifies a list of hazardous wastes in addition to any waste that exhibits one or more of the following features: ignitability, corrosivity, reactivity, and toxicity.[20] Common examples of such drugs include human and veterinary drugs used for chemotherapy, x-ray contrast media medical agents, and antibiotics.[21]

THE EFFECTS OF THE RULE

The EPA's goal for this rule is to "establish[h] cost-saving, streamlined standards for handling hazardous waste pharmaceuticals to better fit the operations of the healthcare sector while maintaining protection of human health and the environment."[22] First, the rule addresses public health concerns raised by both the EPA's findings and the issues raised in the 2008 Associated Press investigation.[23] The rule seeks to make drinking and surface water safer and healthier, with a proposed reduction of between 1,644 to 2,300 tons of hazardous pharmaceutical waste entering our sewer systems.[24] Previously, RCRA allowed for the drain disposal of hazardous waste pharmaceuticals.[25] But, by prohibiting healthcare facilities from flushing these products into sewers that lead to our surface water and groundwater, this rule should create a healthier ecosystem for humans, fish, and animal populations.[26]

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16 *Id.* at 5,851.
17 *Id.*
18 *Id.* at 5,844.
19 *EPA Final Rule FAQ*, *supra* note 7.
20 40 C.F.R. §§ 261.1–261.9.
21 MAE WU ET AL., DOSED WITHOUT PRESCRIPTION: PREVENTING PHARMACEUTICAL CONTAMINATION OF OUR NATION'S DRINKING WATER 3 (2009).
22 *EPA Final Pharmaceutical Rule*, *supra* note 3.
23 *Id.*
24 *Id.*
25 Management Standards for Hazardous Waste Pharmaceuticals and Amendment to the P075 Listing for Nicotine, 84 Fed. Reg. 5,816, 5,820 (Feb. 22, 2019) (to be codified at 40 C.F.R. pts. 261, 262, 264, 265, 266, 268, 270, 273).
26 *EPA Final Rule FAQ*, *supra* note 7.

Second, the rule will remove FDA-approved, over-the-counter nicotine replacement therapies such as nicotine patches or gum from the RCRA list of hazardous waste.[27] Both RCRA and Drug Enforcement Administration regulations for controlled substances monitor and govern the use of these products, leading to expensive disposal restrictions that need to comply with both sets of regulations.[28] Eliminating nicotine replacement therapy products from the RCRA list will reduce the regulatory impacts on this product and significantly decrease costs and burdens for healthcare facilities.[29]

Third, the rule clarifies regulations regarding the reverse logistics of non-pharmaceutical unsold retail items that, if discarded, would otherwise be categorized as hazardous waste.[30] The rule codifies a standing EPA interpretation that "nonprescription pharmaceuticals that are sent through reverse logistics are not solid wastes at the retail store if they have a reasonable expectation of being legitimately used/reused (*e.g.*, lawfully redistributed for their intended purpose) or reclaimed."[31] This adjustment to the rule is made in response to various states, such as California, which have taken enforcement actions against retailers like Kmart and Walmart that have been raising awareness about the reverse distribution of pharmaceuticals.[32]

Conclusion

Recently, healthcare facilities have continued to flush unused medications down the toilet or drain, not only generating public health concerns regarding drinking water, but also affecting riparian and aquatic life.[33] The new rule helps clarify requirements regarding the management of this waste, streamline disposal processes, and will hopefully decrease the negative effects of pharmaceutical waste on our ecosystem.

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27 84 Fed. Reg. at 5820.
28 *Id.*
29 *Id.*
30 *Id.* at 5,827 n.42.
31 *Id.* at 5,827.
32 *Id.* at 5,820.
33 Thompson, *supra* note 4.

STATE CASENOTE

LANDRY'S, INC. V. ANIMAL LEGAL DEFENSE FUND, 566 S.W.3D 41 (TEX. APP.—HOUSTON 2018 [14TH DIST.], PET. DENIED)

INTRODUCTION

On October 18, 2018, the Fourteenth Court of Appeals, Houston, Texas, affirmed a district court decision dismissing claims that the Texas Citizens Participation Act (TCPA) is unconstitutional.[1] The decision also affirmed an award of fees and sanctions to parties, including the Animal Legal Defense Fund (ALDF).[2] In its opinion, *Landry's, Inc. v. Animal Legal Defense Fund*, the Court of Appeals held that the TCPA did not violate Landry's right to a jury trial on its defamation-related claims with its requirement that a court to grant a motion to dismiss if the movant establishes a valid defense by a mere preponderance of the evidence.[3] In addition, the Court held that the TCPA did not violate the Texas Constitution's open-courts provision.[4] With regard to the sanctions awarded by the trial court, the Court of Appeals determined the district court's award to ALDF of sanctions in an amount 2.4 times greater than its attorneys' fees and Conley 2.8 times her attorneys' fees was arbitrary and recommended a remittitur on sanctions and also on fees.[5]

BACKGROUND

Landry's, a "leading dining, entertainment, gaming, and hospitality group," owns and operates Houston Aquarium Inc., which includes Houston's Downtown Aquarium. The Downtown Aquarium houses four white tigers as a part of their "Maharaja Temple" exhibit.[6] Cheryl Conley, a radio station owner, asked Landry's for back-stage access to the tigers' housing.[7] The Animal Legal Defense Fund and its attorney Nasser served an intent to sue to Landry's, alleging mistreatment and violation of the Endangered Species Act (ESA) on behalf of Conley, Nasser, and the ALDF ("the Conley Parties").[8] The Conley Parties also issued a press release and social media post regarding the intent to sue letter. Following the publication of news articles in such magazines as *The Houston Chronicle*, the ALDF sent a copy of their suit to a Denver news station, who published an additional article about the suit.

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1 Landry's, Inc. v. Animal Legal Def. Fund, 566 S.W.3d 41, 49–50 (Tex. App.—Houston 2018 [14th Dist.], pet. denied).

2 *Id.*

3 *Id.* at 50.

4 *Id.* at 50, 68 ("All courts shall be open, and every person for an injury done him, in his lands, goods, person or reputation, shall have remedy by due course of law.") (citing TEX. CONST. art. V, § 13).

5 *Id.* at 73.

6 *Id.* at 50.

7 *Id.* at 51.

8 16 U.S.C. § 1540(g) (2018).

In response to the publicized reports, Landry's sued the Conley Parties for defamation, business disparagement, tortious interference with prospective business relations, and abuse of process.[9] Landry's also sued Conley for trespass, seeking actual damages of between $100,000–$200,000, exemplary damages, declaratory relief, an order that the Conley Parties retract previous statements, and an injunction barring the parties from defaming Landry's in the future.[10] The Conley Parties moved to dismiss the claims against them under the TCPA, arguing that Landry's asserted claims related to their exercise of the rights of free speech, petition, and association.[11] The 334th District Court, Harris County, granted the TCPA motion and awarded sanctions.[12]

Issues on Appeal

Constitutionality

The TCPA, an anti-Strategic Lawsuit Against Public Participation (anti-SLAPP) statute, has the purpose of preventing meritless lawsuits that discourage the exercise of certain constitutional rights.[13] Dismissal under the TCPA is determined not by the action as a whole, but on a claim-by-claim basis.[14] The TCPA requires the court to grant a motion to dismiss if the movant establishes a valid defense by a preponderance of the evidence.[15] In determining whether the defendant has met their burden under the TCPA, courts must recognize that the statute casts a wide net.[16]

Landry's and the Houston Aquarium claimed on appeal that the TCPA violated the Texas Constitution for two reasons: (1) denying their right to a jury trial and (2) violating the Texas Constitution's open-courts provision.[17]

Fees and Sanctions

The TCPA stipulates that the plaintiff pays the defendant's attorney's fees and expenses if even one of the plaintiff's claims is dismissed under the TCPA.[18] Further, Landry's and the Houston Aquarium argued that the court should eliminate the conditional award of appellate attorneys' fees to the law firm that withdrew from the case.[19] The appellants also argued that the award of sanctions in the amount of $450,000 was excessive.[20]

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9 *Landry's*, 566 S.W.3d at 51.
10 *Id.*
11 *Id.*
12 *Id.* at 50.
13 Tex. Civ. Prac. & Rem. Code § 27.002.
14 *Id.* § 27.001 *et seq.*
15 *Id.* § 27.005(d).
16 *See id.* § 27.006 (describing what a court should consider in determining whether a legal action should be dismissed).
17 *Landry's*, 566 S.W.3d at 67–68.
18 Tex. Const. art. V, § 13; Tex. Civ. Prac. & Rem. Code § 27.001 *et seq.*
19 *Landry's,* 566 S.W.3d at 50.
20 *Id.*

THE COURT'S ANALYSIS

CONSTITUTIONALITY

The Court addressed each constitutional issue on appeal. The Court began with the presumption that the statute is constitutional.[21] With regard to the argument that the TCPA denies it a right to a jury trial, Landry's contended that it was entitled to have the jury resolve a factual dispute regarding its defamation claim and the application of the judicial proceedings privilege and the related doctrine of attorney immunity.[22] The Court avoided the constitutional question by determining that the factual inquiry regarding whether ALDF and Nasser represented Conley was immaterial and could not alter the outcome of the case.[23] The Court noted that the judicial-proceeding privilege applies to ALDF whether or not the role was as Conley's counsel or Conley's co-plaintiff in the planned suit under the Endangered Species Act.[24] For the same reason, the judicial-proceedings privilege applied to Nasser as an attorney, regardless of whether or not her attorney was Conley or ALDF.[25]

The Court further addressed Landry's argument that the TCPA violates the Texas Constitution's open-courts provision. The open-courts provision of the Texas Constitution states, "[a]ll courts shall be open, and every person for an injury done him, in his lands, goods, person or reputation, shall have remedy by due course of law."[26] The Court determined that the open-courts provision guarantees access to the courts for a plaintiff bringing a well-established common-law cause of action.[27] However, Landry's did not have a well-established cause of action, so the Court rejected this argument.[28] The Court reiterated that the only fact issues Landry's presented were immaterial, and the Texas Constitution did "not guarantee the right to an evidentiary hearing on disputed immaterial facts."[29]

Additionally, Landry's claimed that the TCPA violates the Texas Constitution's provision because the statute lacks guidance on issuing sanctions.[30] But, the Court explained other statutes similarly grant sanctions without including guidelines.[31] Chapter 10 of the Texas Civil Practice and Remedies Code authorizes trial courts to impose sanctions for frivolous pleadings and motions, but the statute itself does not state how this amount is determined.[32] Addressing Landry's final dispute that the trial court did not explain its reasoning behind the sanctions, the court concluded that the statute does

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21 *Id.* at 67 (citing Nootsie Ltd. v. Williamson Cty. Appraisal Dist., 925 S.W.2d 659, 662 (Tex. 1996)).
22 *Id.*
23 *Id.*
24 *Id.* at 67.
25 *Id.* at 68.
26 TEX. CONST. art. V, § 13.
27 *Landry's*, 566 S.W.3d at 68.
28 *Id.*
29 *Id.*
30 *Id.*
31 *See id.*
32 *Id.*

not violate the open-courts provision because "sanctions are imposed and litigation costs are shifted only after claims are resolved."[33]

Fees and Sanctions

Although they lost on the merits, the appellants won with regards to the excessive fees and sanctions argument. The Court agreed with Landry's and the Houston Aquarium that the award of $450,000 was excessive and suggested a remittitur of $146,814.74 from the $250,000 awarded to ALDF and $128,705.00 from the $200,000.00 awarded to Conley.[34] Ultimately, the awards totaled $103,191.26 and $71,295.00, respectively.[35]

The Court reduced the amount of sanctions to an amount equal to that of the trial attorneys' fees awarded,[36] explaining that a trial court abuses its discretion if the sanctions awarded are greater than necessary to promote compliance.[37] The TCPA mandates an award of sanctions in addition to the award of attorney's fees because the purpose of the TCPA is to prevent meritless lawsuits.[38] The Court interpreted the purpose of the TCPA to "deter" in conjunction with the language of the Texas Civil Practice and Remedies Code, which allows for sanctions in an amount "limited to what is sufficient to deter repetition of the conduct or comparable conduct by others similarly situated."[39]

Furthermore, the Court set forth a non-exclusive twelve-factor test the trial court was to consider to the extent each factor was relevant, including factors such as:

> the good or bad faith of the offender; . . . the risk of chilling the specific type of litigation involved; . . . the relative magnitude of sanction necessary to achieve the goal or goals of the sanction; . . . [and] burdens on the court system attributable to the misconduct, including consumption of judicial time . . .[40]

Based on an evaluation of the twelve factors, the court concluded that the award of sanctions by the trial court was arbitrary and reduced it to the above listed amount.[41]

Conclusion

The Court upheld the constitutionality of the TCPA in *Landry's, Inc. v. Animal Legal Defense Fund*. The TCPA serves to protect citizens from frivolous lawsuits that infringe on their right to protected speech. The Court of Appeals determined that in a meritless claim, when no factual issues remain, a trial court may constitutionally deny a jury trial and a right to court under the TCPA. But the court also concluded that fees and sanctions in an amount significantly greater than the cost of attorney's fees were arbitrary under the TCPA.

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33 *Id.* at 69 (citing Mem'l Hermann Health Sys. v. Khalil, No. 01-16-00512-CV, 2017 WL 3389645, at *16 (Tex. App. Aug, 8, 2017)).
34 *Id.* at 74.
35 *Id.*
36 *Id.* at 50.
37 *Id.* at 70.
38 *Id.* (citing Low v. Henry, 221 S.W.3d 609, 614 (Tex. 2007)).
39 Tex. Civ. Prac. & Rem. Code § 27.002.
40 *Landry's,* 566 S.W.3d at 70–71 (citing *Low*, 221 S.W.3d at 620 n.5) (not all factors listed).
41 *Id.* at 34.

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WATER QUALITY

CIRCUITS SPLIT ON THE SCOPE OF POINT SOURCE DISCHARGE UNDER THE CLEAN WATER ACT

INTRODUCTION

A circuit split between the Sixth Circuit and the Fourth and Ninth Circuits on the scope of the Clean Water Act's regulation of point source discharges appears poised for consideration by the U.S. Supreme Court, unless the various parties settle their disputes. This article discusses the circuit split on the scope of the point source discharge prohibition under section 301(a) of the Clean Water Act (CWA).[1] It first introduces the background of relevant federal laws regulating point source discharge and then examines courts' holdings and analyses in statutory text, statutory structure, and policy considerations.

BACKGROUND: FEDERAL LAWS REGULATING POINT SOURCE DISCHARGE

With the stated purpose to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters," the CWA, which was passed by Congress in 1972, forbids discharge of any pollutant without a permit from the statute's National Pollutant Discharge Elimination System (NPDES).[2] "Discharge of a pollutant" is defined by statute as "any addition of any pollutant to navigable waters from any point source . . ."[3] A "point source" is also statutorily defined and means "any discernible, confined and discrete conveyance . . . ."[4] The CWA prohibits "any addition of any pollutant to navigable waters from any point source" without a permit.[5]

The CWA embodies the cooperative federalism principle by adopting measures to "recognize, preserve, and protect the primary responsibilities and right of States to prevent, reduce, and eliminate pollution, to plan the development and use . . . of land and water resources . . . ."[6] In particular, the CWA draws a line between point source pollu-

1 33 U.S.C. § 1311(a) (2018).
2 *See* 33 U.S.C § 1251(a) (2018) (declaring the goals and policies of the CWA); *Id.* § 1311(a) (stating discharge of any pollutant is illegal unless in compliance with law); *Id.* § 1342(a) (describing the permitting system for discharge of pollutants).
3 *Id.* § 1362(12)(A).
4 *Id.* § 1362(14).
5 *Id.* §§ 1311(a), 1342(a), 1362(12)(A).
6 *Id.* § 1251(b).

tion, which is subject to federal regulation, and nonpoint source pollution, which is within the regulatory ambit of the states.[7] Additionally, the CWA only extends to pollutants discharged into "navigable waters," which are defined as "the waters of the United States," leaving the state to regulate the discharge of pollutants into non-navigable waters, such as groundwater.[8] The scope of the section 301(a) point source discharge prohibition is the main focus and subject of the circuit split.[9]

Kentucky Waterways Alliance v. Kentucky Utilities Co.

On September 24, 2018, the Sixth Circuit held that the Kentucky Utilities Company (KU) was not liable under the CWA, because the CWA "does not extend liability to pollution that reaches surface waters via groundwater."[10] KU produced coal ash as a byproduct of energy production and stored the resulting coal ash in man-made onsite ponds.[11] Environmental interest groups brought a citizen suit enforcement action against KU under the CWA, alleging that the hazardous chemicals in the coal ash were percolating into the surrounding groundwater, which then contaminated a nearby lake.[12] The Plaintiffs alleged this was a point source discharge of pollution under the CWA.

Plaintiffs offered two theories to support their claim that KU's conduct constituted a point source discharge under the CWA.[13] Under the "point source" theory, plaintiffs argued that groundwater itself was a point source that deposited pollutants into navigable waters.[14] Alternatively, under the "hydrological connection" theory, plaintiffs argued that the coal ash ponds themselves were point sources, whereas groundwater was the medium transmitting pollutants to navigable waters.[15]

However, the Sixth Circuit rejected both theories.[16] First, the Sixth Circuit looked to the statutory text and held that neither groundwater nor the subterranean karst structure was a point source as defined in 33 U.S.C. § 1362(14) that conveyed pollutants to

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7 *See id.* § 1314(f) ("The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall issue to . . . the states . . . guidelines for identifying and evaluating the nature and extent of nonpoint sources of pollutants . . ."); *Id.* § 1362(12) (defining "discharge of a pollutant"), 1362(14) (defining "point source"); Ky. Waterways All. v. Ky. Util. Co., 905 F.3d 925, 929 (6th Cir. 2018). ("[T]he CWA draws a line between point-source pollution . . . and nonpoint-source pollution.") (citations omitted).

8 33 U.S.C §§ 1311(a), 1362(12), 1362(7).

9 *See* Upstate Forever v. Kinder Morgan Energy Pars., L.P., 887 F.3d 637, 652 (4th Cir. 2018), cert. pending, Docket No.18-268 ("An alleged discharge of pollutants . . . falls within the scope of the CWA."); Haw. Wildlife Fund v. County of Maui, 886 F.3d 737, 749 (9th Cir. 2018) ("[T]he pollutants are fairly traceable from the point source to a navigable water such that the discharge is the functional equivalent of a discharge into the navigable water . . .").

10 *Ky. Waterways All.*, 905 F.3d at 928.

11 *Id.* at 928–29.

12 *Id.* at 928.

13 *Id.* at 932.

14 *Id.* at 932–33.

15 *Id.*

16 *Id.* at 933.

the lake.[17] Second, in response to the plaintiffs' "hydrological connection theory," the Sixth Circuit again looked to the statutory text and held that the CWA's text does not address a situation where pollutants "travel from a point source through nonpoint sources en route to navigable waters."[18] The Sixth Circuit also looked to the statutory context and the interplay between the CWA and the Resource Conservation and Recovery Act (RCRA) to buttress its holding.[19]

The Sixth Circuit's position to confine the CWA to the situation where a point source discharges directly into the navigable waters directly conflicts with the Fourth Circuit's position in *Upstate Forever v. Kinder Morgan Energy Partners, L.P.*, 887 F.3d 637 (4th Cir. 2018), and the Ninth Circuit's position in *Hawai'i Wildlife Fund v. County of Maui*, 886 F.3d 737 (9th Cir. 2018). *Upstate Forever* involved an indirect discharge, where a large quantity of gasoline spilled from a pipeline rupture, seeped through groundwater, and contaminated nearby surface waterways.[20] Similarly, *Hawai'i Wildlife Fund* also involved an indirect discharge, where effluent disposal was discharged from wells, traveled through groundwater, and ultimately entered the Pacific Ocean.[21] Both circuits decided that the CWA extended to these indirect discharges, as long as the connection between a point source and navigable waters was clear.[22]

The fact pattern in *Kentucky Waterways Alliance* shares some similarities with another Fourth Circuit case, *Sierra Club v. Virginia Electric & Power Co.*[23] Virginia Electric & Power Co. also dealt with pollution from coal ash ponds of a coal-fired power plant operator: arsenic was released from coal ash ponds, polluting the surrounding groundwater and ultimately the nearby surface waterways, and defendant Dominion Energy Virginia (Dominion) was sued for violating 33 U.S.C. § 1311(a).[24] The Fourth Circuit refused to extend CWA liability to Dominion, but unlike the Sixth Circuit in *Kentucky Waterways Alliance*, it held so on different grounds.[25] The Fourth Circuit did not controvert the viability of the hydrological connection theory; instead, it concluded that the coal ash ponds themselves were not point sources as defined in 33 U.S.C. § 1362(14), and therefore, the case fell outside the CWA because of the inability to identify any point source throughout the pollutants migration process.[26]

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17 *Id.*
18 *Id.* at 934.
19 *Id.* at 936–38.
20 Upstate Forever v. Kinder Morgan Energy Pars., L.P., 887 F.3d 637, 641–42 (4th Cir. 2018).
21 Haw. Wildlife Fund v. County of Maui, 886 F.3d 737, 742–43 (9th Cir. 2018), *cert. granted*, 139 S.Ct. 1164 (Feb. 2019).
22 *Haw. Wildlife Fund*, 886 F.3d at 745, 749; *Upstate Forever*, 887 F.3d at 646, 660.
23 Sierra Club v. Virginia Electric & Power Co., 903 F.3d 403 (4th Cir. 2018).
24 *Id.* at 405–06.
25 *Id.* at 409.
26 *Id.* at 409, 412.

Circuits Split on What Constitutes a Point Source Discharge

Courts generally agree that a CWA claim must present the following elements: (1) a pollutant must be (2) added (3) to navigable waters (4) from a point source.[27] However, courts disagree on the interpretation of the last element—"from a point source."

The Sixth Circuit in *Kentucky Waterways Alliance* interpreted the phrase "from a point source" to mean a discharge of pollutants directly into those navigable waters.[28] If there is a conveyance—such as groundwater—in between, then the pollutants are not coming from a point source, but from a nonpoint source, and therefore, the CWA does not extend to such scenarios and state law governs.[29]

In reaching this conclusion, the Sixth Circuit first looked to the statutory definition of "effluent limitations" under 33 U.S.C. § 1362(11), which means "restrictions on the amount of pollutants that may be discharged from point sources *into* navigable waters."[30] The Sixth Circuit reasoned the word "into" "indicates directness" and that the term "leaves no room for intermediary mediums to carry the pollutants."[31] The Sixth Circuit then looked to the statutory definition of "discharge of a pollutant" under § 1362(12), which confines the CWA to address "only pollutants that are added '*to* navigable waters *from* any point source.'"[32] The words "to" and "from" were interpreted to require the pollutant to reach navigable water by virtue of point source conveyance only to qualify as a "discharge of a pollutant" under § 1362(12).[33]

Additionally, the Sixth Circuit reasoned that its holding was not inconsistent with Justice Scalia's concurring opinion in *Rapanos v. United States*, 547 U.S. 715 (2006).[34] In *Rapanos*, Justice Scalia noted the absence of the word "directly" from § 1362(12), and concluded that "the CWA does not forbid the addition of any pollutant *directly* to navigable waters from any point source, but rather the addition of any pollutant *to* navigable waters."[35] The Sixth Circuit pointed out the special fact pattern in *Rapanos* which involved multiple connected point sources, but no nonpoint sources, before pollutants reached navigable waters, and explained that Justice Scalia only meant to clarify that "intermediary point sources does not break the chain of CWA liability."[36]

Beyond textual analysis, the Sixth Circuit also analyzed the CWA's statutory context to buttress its holding that pollutants traveling from a point source through nonpoint sources en route to navigable waters fell outside the ambit of the CWA.[37] First, aside from protecting navigable waters, the CWA also has the stated purpose of fostering cooperative federalism by engaging state involvement in environmental regulation, and

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27 *Haw. Wildlife Fund*, 886 F.3d at 744; Ky. Waterways All. v. Ky. Utils. Co., 905 F.3d 925, 932 (6th Cir. 2018).
28 *Ky. Waterways All.*, 905 F.3d at 934.
29 *Id.*
30 *Id.* (emphasis in original).
31 *Id.*
32 *Id.* (emphasis in original).
33 *Id.* at 934.
34 *Id.* at 935–36.
35 *Id.* at 936 (citing Rapanos v. United States, 547 U.S. 715, 743 (2006)).
36 *Id.*
37 *Id.* at 934.

the Sixth Circuit found its holding to be in line with the latter.[38] Second, the Sixth Circuit examined the interplay between the CWA and the RCRA, and concluded that a more inclusive reading of the CWA would effectively nullify large portions of the RCRA.[39]

In contrast to the Sixth Circuit, the Ninth Circuit and the Fourth Circuit adopted the position that the CWA extends to the situation where pollutants are added into navigable waters via groundwater and there is a sufficient connection between the point source and the navigable water.[40] The Ninth Circuit in *Hawai'i Wildlife Fund* explained that the phrase "from a point source" only required the existence of a point source from which the pollutants were discharged, and that point source needed not itself directly feed into the navigable water.[41] The Ninth Circuit cited a number of cases to support its position, including in particular, the Second Circuit's decision in *Concerned Area Residents for Environment v. Southview Farm*, 34 F.3d 114, 119 (2d Cir. 1994).[42] The Second Circuit held in *Concerned Area Residents for Environment* that the discharge of manure from a tanker onto fields and eventually into navigable waters constituted a point source discharge under the CWA.[43] The field itself was arguably not a point source, but this did not negate the finding of a point source discharge under the CWA because "(1) the pollutant itself was released from the tanker, a point source, and (2) there was a direct connection between the field and the navigable water."[44]

The Ninth Circuit, like the Sixth Circuit, also cited Justice Scalia's concurring opinion in *Rapanos* rejecting the requirement of direct discharge to find a point source discharge; however, it also emphasized that Justice Scalia favorably cited *Concerned Area Residents for Environment*, where the Second Circuit upheld a point source discharge even though arguably nonpoint sources were involved in between a point source and navigable waters.[45] In fact, the dissent in *Kentucky Waterways Alliance* criticized the majority's attempt to distinguish *Rapanos* as pointless because of the Supreme Court plurality's endorsement of the Second Circuit's approach.[46]

The Fourth Circuit in *Upstate Forever* added a policy argument to support its position. If the presence of nonpoint source were to categorically preclude a finding of point source discharge, then the CWA would leave a serious loophole—polluters could easily

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38 *Id.* at 936–37.

39 *Id.* 937–38.

40 *Compare Ky. Waterways All.*, 905 F.3d at 933 ("[W]e disagree with the decisions from our sister circuits in [the Ninth and Fourth Circuits]."), *with* Haw. Wildlife Fund v. County of Maui, 886 F.3d 737, 749 (9th Cir. 2018) ("[T]he pollutants are fairly traceable from the point source to a navigable water such that the discharge is the functional equivalent of a discharge into the navigable water . . ."), *and* Upstate Forever v. Kinder Morgan Energy Pars., L.P., 887 F.3d 637, 652 (4th Cir. 2018) ("[A]n alleged discharge of pollutants, reaching navigable waters located 1000 feet or less from the point source by means of ground water with a direct hydrological connection to such navigable waters, falls within the scope of the CWA.").

41 *Haw. Wildlife Fund*, 886 F.3d at 746–47.

42 *Id.* at 747.

43 *Id.*

44 *Id.* (quotations omitted).

45 *Id.* at 748.

46 Ky. Waterways All. v. Ky. Utils. Co., 905 F.3d 925, 944 (6th Cir. 2018).

avoid liability under the CWA by ensuring all discharges pass through soil and groundwater at a short distance before reaching navigable waters.[47] The Fourth Circuit held such outcome would greatly undermine the purpose of the CWA to restore the chemical, physical, and biological integrity of the Nation's waters.[48] This policy argument was also echoed by the dissent in *Kentucky Waterways Alliance*.[49] The dissent in *Kentucky Waterways Alliance* further criticized the majority's textual arguments which largely hinged on the word "into" in the definition of "effluent limitations," and maintained that Congress would not "hide a massive regulatory loophole in its use of the word 'into.'"[50]

The dissent in *Kentucky Waterways Alliance* also explained that the interplay between the CWA and the RCRA had been clarified by EPA years ago and the majority's concern was unwarranted.[51] Under EPA's interpretation, which was later ratified by Congress when it enacted amendments to the RCRA, a polluter's discharge of pollutants to navigable waters under the CWA does not exempt that polluter's storage of coal ash from regulation under the RCRA.[52] Therefore, the RCRA would not be rendered virtually useless by a more inclusive interpretation of the CWA, and a polluter can be liable under both statutes if the polluter both improperly stores coal ash and discharges it to a navigable waterway.[53]

Conclusion

The Sixth Circuit's holding in *Kentucky Waterways Alliance v. Kentucky Utilities Co.* to require the point sources discharge pollutants directly into navigable waters for a CWA liability to attach seems to be inconsistent with the other circuits' reading of the statute. The Supreme Court of the United States has granted certiorari to *Hawai'i Wildlife Fund*, with oral arguments scheduled for November 6, 2019; however, the case may settle before being heard.[54] This may prompt the Court to instead grant certiorari for *Upstate Forever*, which is still pending. The practical impact of these decisions is unclear. In April 2019, the EPA released an Interpretative Statement regarding the CWA's treatment of releases of pollutants from a point source to groundwater, concluding that such releases are categorically excluded from permitted requirements under the CWA because Congress explicitly left regulation of such discharges to the states and to the EPA under other statutory authorities.[55] How and whether the Court will consider the EPA's current interpretation of the CWA in its resolution of any circuit court split remains to be seen.

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47 Upstate Forever v. Kinder Morgan Energy Pars., L.P., 887 F.3d 637, 652 (4th Cir. 2018).
48 *Id.*
49 *Ky. Waterways All.*, 905 F.3d at 941.
50 *Id.* at 943.
51 *Id.* at 945.
52 *Id.*
53 *Id.*
54 Juan Carlos Rodriguez, *Maui Council Chair Wants Hunton Cut Off In Water Case*, Law 360 (Sept. 27, 2019); https://www.law360.com/articles/1203554/print?section=appellate.
55 Envtl. Prot. Agency, *Interpretive Statement: Application of the Clean Water Act National Pollutant Discharge Elimination System Program to Releases of Pollutants from a Point Source to Groundwater* (April 12, 2019), available at https://www.epa.gov/sites/production/files/2019-04/documents/interpretive_statement_application_of_cwa_npdes_memo_-_signed.pdf (last visited Oct. 9, 2019); *see also* 84 Fed. Reg. 16,810 (April 23, 2019).

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