A Baptism by Incentives: Curing Wildfire Law at the Font of Oil and Gas Regulation*

For over sixty years, wildland fires in the United States have been consuming American land to an ever-increasing extent:[1] from January 1 through March 31 of 2017 alone, over two million acres of U.S. earth were scorched by wildfires.[2] According to the U.S. Environmental Protection Agency, nine out of the ten years with the highest burned acreage counts on record in the United States have occurred within the past seventeen years.[3]

The cost of residential property destruction, both in terms of quantity and in terms of value, is one significant marker of just the human costs of wildfires. From 2002 to 2011, insured losses[4] related to wildfire totaled $7.9 billion, up 364.7% from the previous decade's total insured losses.[5] On at least one rendering, annual American property loss due to wildfire has been estimated to have increased by more than 22,000% between 1960 and the

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1. *See Total Wildland Fires and Acres (1960-2015)*, NAT'L INTERAGENCY FIRE CTR., https://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html [https://perma.cc/5WNK-9HAL] (reporting increasing rates of acreage burned by American wildfires); *see also Climate Change Indicators: Wildfires*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires [https://perma.cc/ZFS7-M8YS] ("The extent of area burned by wildfires each year appears to have increased since the 1980s.").

2. *Year-To-Date Statistics*, NAT'L INTERAGENCY FIRE CTR., https://www.nifc.gov/fireInfo/nfn.htm [https://perma.cc/85DM-75TR].

3. *Id.*

4. The term "insured losses" refers to the value of claim settlements between insurers and insureds. *See TRIA at Ten Years: The Future of the Terrorism Risk Insurance Program: Hearing Before the H. Subcomm. on Ins., Housing and Community Opportunity*, 112th Cong. 63 & n.2 (2012) (statement of Robert P. Hartwig, President & Economist, Insurance Info. Inst.) (discussing claim payouts by insurers to policyholders interchangeably with the term "insured losses").

5. LLOYD'S, WILDFIRE: A BURNING ISSUE FOR INSURERS? 20 (2013) (reporting $7.9 billion in insured losses during the period from 2002–2011 and $1.7 billion in insured losses during the preceding ten-year period).

early 2000s.[6] As global temperatures increase,[7] the costs of wildfires in terms of property damage are only likely to balloon in tandem.[8] Moreover, Americans continue to expand into the Wildland-Urban Interface (WUI),[9] an area defined as the "zone where natural areas and development meet."[10] At least with respect to certain "megafires"—enormous wildfires that consume over 100,000 acres[11]—property damage costs, stated in terms of insured

6. *See* John W. Schoen, *Cost of Western Blazes Spreads Like Wildfire*, NBC NEWS (Aug. 22, 2013), http://www.nbcnews.com/business/cost-western-blazes-spreads-wildfire-6C10974725 [https://perma.cc/W7L5-26FY] (relating that annual insurance damage due to wildfires in the 1960s totaled around $3.5 million, whereas the same figure had jumped to $800 million by the 2000s). This estimate is ostensibly based on insured losses, although the author uses the term "insured damage." *Id.* The unadjusted median U.S. home value only increased roughly 1,000% from 1960 to 2000. *See Historical Census of Housing Tables: Home Values*, U.S. CENSUS BUREAU (June 6, 2012), https://www.census.gov/hhes/www/housing/census/historic/values.html [https://perma.cc/3UGU-DM2D] (reporting the unadjusted median U.S. home value as $11,900 in 1960 and $119,600 in 2000).

7. In the past fifty years, the global combined land and surface temperature has risen at double the rate at which it rose during the preceding 100 years; "all ten of the warmest years [on record] have occurred since 1997." INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS 192–93 (Thomas F. Stocker et al. eds., 2013). Based on the best science available to date, the Earth's surface temperature is projected to rise continuously over the course of this century "under all assessed emission scenarios." INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: SYNTHESIS REPORT 10 (The Core Writing Team et al. eds., 2015).

8. Mark Fischetti, *How Much Do Wildfires Cost in Terms of Property Damage?*, SCI. AM. (May 27, 2011), https://www.scientificamerican.com/article/graphic-science-how-much-do-fires-cost-property-damage/ [https://perma.cc/P2GP-GD7C]. Three variables go into the calculus of future ballooning costs. The first variable is rising temperatures, as documented above, combined with less precipitation in drier areas that already suffer from increased wildfire risk. *See* Met Office & Duncan Clark, *How Will Climate Change Affect Rainfall?*, GUARDIAN (Dec. 15, 2011), https://www.theguardian.com/environment/2011/dec/15/climate-change-rainfall [https://perma.cc/Z8YN-FKFW] (estimating that "in a warmer climate heavy rainfall will increase and be produced by fewer more intense events" as a result of climate change, which "could lead to longer dry spells and a higher risk of floods"). A drier, hotter climate means drier wood, which will cause wildfires to burn hotter and longer. The second and third variables impacting ballooning fire-suppression costs are the lack of effective suppression strategies and the lack of effective cost-control measures relating to wildfire.

9. As of 2010, one in three homes in the lower forty-eight U.S. states was located in the WUI, and U.S. Forest Service statistics as of 2015 showed "continued expansion of housing development near forests." *As Wildfires Continue to Burn, New Maps Show* [sic] *Expansion of Wildland-Urban Interface*, U.S. DEP'T OF AGRIC. (Sept. 10, 2015), https://www.usda.gov/media/press-releases/2015/09/10/wildfires-continue-burn-new-maps-shows-expansion-wildland-urban [https://perma.cc/4FR5-F73P]. One serious issue that appears to be the source of a sizeable portion of the turmoil in the WUI is the general lack of land-use planning in the WUI by either county or municipal governments. *See* HEADWATERS ECON., SOLUTIONS TO THE RISING COSTS OF FIGHTING FIRES IN THE WILDLAND-URBAN INTERFACE 61 (2009) (listing a lack of land-use planning regarding fire at the county level as a factor which will lead to a wildfire problem of a much greater magnitude in the future, in conjunction with a warming climate and increasing pressure to develop land).

10. *Wildland Urban Interface*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/fire/living_with_fire/wildland_urban_interface.shtml [https://perma.cc/LNQ6-KL2B].

11. David A. Graham, *Just How Bad Is the 2015 Fire Season?*, ATLANTIC (Sept. 15, 2015), https://www.theatlantic.com/national/archive/2015/09/just-how-bad-is-the-2015-fire-season/405439/ [https://perma.cc/72FH-ZXT6].

losses,[12] are significantly greater than fire-suppression costs.[13] On top of property damage, wildfires destroy large swaths of habitat acreage and claim the lives of countless animals.[14]

Aside from the destruction of monumental amounts of land, property, and lives, wildland-fire-suppression efforts are exceedingly expensive. At the federal level, annual wildfire-suppression costs have topped $1 billion in thirteen out of the past sixteen years.[15] At the state level, in 2014—the most recent year for which comprehensive statistics on state fire-suppression efforts are available—state forestry agencies across the United States collectively spent $1.98 billion on wildland fire programs.[16] At the local level, municipal governments generally enact local ordinances based on the model codes adopted by their states; these ordinances are not typically written up as formal statutes.[17] To further fuel the wildfire problem, fire-suppression efforts appear to be at best tainted by inefficiency,[18] and at worst may be the product of distilled self-interest.[19]

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

13. *See* Bettina Boxall, *San Diego County's 2003 Wildfire Losses Top $2 Billion*, L.A. TIMES: GREENSPACE (July 13, 2009), http://latimesblogs.latimes.com/greenspace/2009/07/san-diego-countys-2003-wildfire-losses-top-2-billion.html [https://perma.cc/9WZP-G9KU] (stating that wildfire-suppression expenses related to the 2003 Southern California fires totaled under 2% of the $2.4 billion fire-related costs, and the "insurance industry paid an estimated $1.1 billion in property claims").

14. *See* Laura Zuckerman, *Massive Wildfires in U.S. Northwest Destroyed Habitats, Threaten Wildlife*, SCI. AM., https://www.scientificamerican.com/article/massive-wildfires-in-u-s-northwest-destroyed-habitats-threaten-wildlife/ [https://perma.cc/M3M9-4A8B] (reporting on multiple wildfires that collectively claimed hundreds of thousands of acres of forestland, killing dozens of wild horses and charring the habitats of rare birds, including the greater sage-grouse).

15. *Federal Firefighting Costs (Suppression Only)*, NAT'L INTERAGENCY FIRE CTR., https://www.nifc.gov/fireInfo/fireInfo_documents/SuppCosts.pdf [https://perma.cc/N6EV-UHTM].

16. *State Foresters by the Numbers*, NAT'L ASS'N ST. FORESTERS 10 (2015), http://stateforesters.org/sites/default/files/publication-documents/2014%20State%20Foresters%20by%20the%20Numbers%20FINAL.pdf [https://perma.cc/5AMP-CX76].

17. Terry K. Haines et al., *A Review of State and Local Regulation for Wildfire Mitigation*, *in* THE ECONOMICS OF FOREST DISTURBANCES: WILDFIRES, STORMS, AND INVASIVE SPECIES 273, 275–76, 280 (2008). As localities do not generally appear to enact robust fire regulations distinct from their respective states' regulations, this Note does not significantly address them.

18. *See* Karen M. Bradshaw, *Backfired! Distorted Incentives in Wildfire Suppression Techniques*, 31 UTAH ENVTL. L. REV. 155, 172 (2011) (discussing government action in a monopoly-power context, which is "especially susceptible to incentives that have little bearing on economic efficiency").

19. *See* Julie Cart & Bettina Boxall, *Air Tanker Drops in Wildfires Are Often Just for Show*, L.A. TIMES (July 29, 2008), http://www.latimes.com/local/la-me-wildfires29-2008jul29-story.html [https://perma.cc/S5ZQ-ETAQ] (arguing implicitly that the empirical reality of "[i]ncreased use of aircraft . . . driv[ing] up the cost of fighting wildfires" is due at least partially to political interests and the fact that "Americans have become conditioned to think officials aren't taking a fire seriously until they unleash a ferocious aerial attack").

On top of cost and human error, the fragmented ownership of firesheds gives rise to the deeper error of the collective-action problem.[20] Given the relatively small financial status of each homeowner in the WUI, homeowners gain little value from bargaining with either industrial landowners or other homeowners.[21] In short, the "heterogeneous preferences" present throughout the WUI lead to a world in which contracting for wildfire-risk reduction is limited.[22]

Published authors and academics in the realm of domestic wildfire policy mince no words. Some authors have decried widespread American fire-suppression tactics as ineffective at decreasing wildfire severity;[23] others have criticized the U.S. federal wildland firefighting complex as "rife with incentive problems."[24]

One primary flaw with modern wildfire law and policy in the United States is the fact that neither recognizes the nature of firesheds as commons.[25] Firesheds are defined as "areas of similar wildfire threat where a similar response strategy could influence the wildfire outcome," and are "conceptually analogous to watersheds"[26]—natural catchments that drain water to a common source.[27] At the time of this writing, state and federal lawmakers have done little to address wildfires in the United States as a

20. *See* Karen Bradshaw Schulz & Dean Lueck, *Contracting for Control of Landscape-Level Resources*, 100 IOWA L. REV. 2507, 2539 (2015) ("Wildfire urban interface areas are so fragmented that bargaining transaction costs and collective action problems outweigh benefits of landscape-level planning."). As a result of fragmentation, a feature of firesheds generated by homeowners' relatively weak financial positions, homeowners in the WUI rarely engage in contracting as a means of addressing the problem of wildfire and the task of protecting themselves and their property against it. *Id.*

21. *Id.*

22. *Id.*

23. *See, e.g.*, Kelsey Ray, *Is Aerial Firefighting Worth It?*, HIGH COUNTRY NEWS (Aug. 3, 2015), http://www.hcn.org/issues/47.13/after-a-record-setting-wildfire-a-washington-county-prepares-for-the-next-one/the-cost-benefit-analysis-of-aerial-firefighting [https://perma.cc/7HBJ-Z46Z] (addressing a 2011 study "that found [aerial] retardant use had no effect on wildfire size or initial attack success rates").

24. Dean Lueck & Jonathan Yoder, *The Economic Foundations of Firefighting Organizations and Institutions*, 113 J. FORESTRY 291, 292 (2015).

25. *See* Dean Lueck, *Common Property as an Egalitarian Share Contract*, 25 J. ECON. BEHAV. & ORG. 93, 93–94 (1994) (questioning the popular claim that natural resources are "common property which dissipate[] wealth" and arguing that common property can be justified based on contractual agreements); *see also* Schulz & Lueck, *supra* note 20, at 2511 & n.11 (positing that an area "of shared public–private control" can be conceptualized as a "semi-commons").

26. Bernhard Bahro et al., *Stewardship and Fireshed Assessment: A Process for Designing a Landscape Fuel Treatment Strategy*, *in* U.S. DEP'T OF AGRIC., PSW-GTR-203, RESTORING FIRE-ADAPTED ECOSYSTEMS: PROCEEDINGS OF THE 2005 NATIONAL SILVICULTURE WORKSHOP (Robert F. Powers ed., Jan. 2007).

27. *What Is a Watershed?*, U.S. GEOLOGICAL SURV., https://water.usgs.gov/edu/watershed.html [https://perma.cc/PW4P-V2X5].

general proposition,[28] much less put forth any serious effort to generate an effective policy in the fireshed: one that sophisticates current wildfire risk reduction efforts *ex ante* and evolves along with relevant science and knowledge on the subject of wildfires.

This Note argues in favor of state enactment of statutory schema that would allow private landowners to "pool"[29] and "unitize"[30] their interests in risk-reductive land management. With these statutes, states would be able to combat the predictably devastating and ubiquitous problem of wildfire, while curbing deleterious landowner impulses in the fireshed that—in terms of both current policy and practice—have imposed costs additional to the costs of suppression and property damage themselves. Under forced-pooling and compulsory-unitization statutes, landowners would be able to cut into a number of costs[31]—most notably, property-destruction and wildfire-suppression costs—by decreasing the likelihood that small fires ever gain the geophysical momentum necessary to become megafires.[32] In addition to aligning incentives for private landowners to reduce wildfire fuel sources on their property, which will be explored in Part IV of this Note, state regulations derived from forced-pooling and compulsory-unitization[33] regimes would shape the conception of wildfires as common-pool resources. States, rather than localities or the federal government, are best situated to regulate private land management with respect to wildfires, and thereby introduce the proper incentives to overcome the collective-action problem associated with fragmented ownership of firesheds.[34]

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28. *See* Karen M. Bradshaw, *A Modern Overview of Wildfire Law*, 21 FORDHAM ENVTL. L. REV. 445, 446 (2010) (stating "little legislative effort has been made to understand or stem the causes of wildfire spread and funding increases," although wildfire-cost reduction poses a challenge exceedingly amenable to a public-policy solution).

29. For the purposes of this Note, a "pool" is "[a]n association of individuals or entities who share resources and funds to promote their joint undertaking . . . ." *Pool*, BLACK'S LAW DICTIONARY (10th ed. 2014).

30. In the context of oil and gas, "unitization" refers to "[t]he collection of producing wells over a reservoir for joint operations such as enhanced-recovery techniques." *Unitization*, BLACK'S LAW DICTIONARY (10th ed. 2014).

31. Bradshaw, *supra* note 28, at 461 (describing homeowner losses additional to decreased home values, including forced evacuation, subjection to "smoke-affected air or water systems," and "economic downfall" in homeowner communities).

32. *See Hazardous Fuel Reduction*, NAT'L PARK SERV., https://www.nps.gov/fire/wildland-fire/learning-center/fire-in-depth/hazardous-fuel-reduction.cfm [https://perma.cc/SZ36-QPJL] (discussing wildfire fuel reduction, which can include "[t]hinning trees, removing underbrush, and limbing trees," as a proven means of "mitigating wildfire hazards" and decreasing the severity of wildfires generally).

33. Understandably, the terms *forced-pooling* and *compulsory unitization* may raise hairs on the back of the necks of certain state legislators, given the coercive ring they carry. However, the prevalence of these terms within the nomenclature of the statutory regimes crafted by the hydrocarbon-producing states that first developed these statutes warrants this Note's use of the statutes' common titles.

34. From a legislative standpoint, this is due to the Trump Administration's antiregulatory stance, embodied most cohesively in the policy of slashing two federal regulations for every new

To the end of arguing in favor of the enactment of land management statutory regimes descended from forced-pooling and compulsory-unitization regimes in oil and gas law—as well as a number of ancillary policy proposals aimed at smoothing out incentives in the fireshed—this Note will be divided into six Parts. First, it will canvass contemporary U.S. federal wildfire policy. Second, it will address legal scholarship on the topic of wildfire law and policy. Third, it will examine contemporary state legislative efforts to regulate private land management prior to the start of a wildfire. Fourth, this Note will demonstrate the ways in which state forced-pooling and compulsory-unitization regimes as they operate in the oil and gas industries would augment the efficiency—and thereby increase the effectiveness—of current efforts to reduce the incidence of, and costs associated with, large wildfires throughout the United States. Fifth, it will flesh out policy proposals that would work well in conjunction with oil and gas statutory derivatives to curb perverse incentives within the fireshed. Sixth, this Note will conclude by restating salient analytic points and offering closing remarks.

I. Overview of U.S. Federal Wildfire Policy

Elaborating further on the WUI, one author has described the region as inclusive of virtually all municipalities "bordering public lands."[35] Tracking the population boom in these areas, wildland fires have increased in temporal length, occurrence, and size, all in recent years.[36]

George W. Bush signed a bill into law in the early 2000s that ostensibly provided for wildfire risk reduction—the Healthy Forests Restoration Act (HFRA), based on his "Healthy Forests Initiative."[37] The Act requires at least half of funding allocated for "hazardous fuel reduction" to be spent on federal land management projects in the WUI.[38] The regulation represented a

federal regulation enacted. *See* Bourree Lam, *Trump's "Two-for-One" Regulation Executive Order*, ATLANTIC (Jan. 30, 2017), https://www.theatlantic.com/business/archive/2017/01/trumps-regulation-eo/515007/ [https://perma.cc/FDX5-6ZFV] (exploring the implications of President Trump's campaign promise of "requir[ing] federal agencies to cut two existing regulations for every new regulation they implement").

35. Jamison Colburn, *The Fire Next Time: Land Use Planning in the Wildland/Urban Interface*, 28 J. LAND RESOURCES & ENVTL. L. 223, 240 (2008). The federal government has defined the "Interface Community" as lands "directly abut[ting] wildland fuels," which usually contain "3 or more structures per acre" and offer "shared municipal services." Urban Wildland Interface Communities Within the Vicinity of Federal Lands that Are at High Risk from Wildfire, Notice, 66 Fed. Reg. 751, 753 (Jan. 4, 2001).

36. U.S. DEP'T OF AGRIC., *supra* note 9.

37. *See* WHITE HOUSE, HEALTHY FORESTS: AN INITIATIVE FOR WILDFIRE PREVENTION AND STRONGER COMMUNITIES, https://georgewbush-whitehouse.archives.gov/infocus/healthyforests/ [https://perma.cc/4K53-XXAT] (describing the purpose of the HFRA as "reduc[ing] the threat of destructive wildfires while upholding environmental standards and encouraging early public input during review and planning processes").

38. 16 U.S.C.A. § 6513(d)(1)(A) (2016).

significant step toward addressing the role of fuel sources in hiking up wildfire-suppression costs. With the HFRA, the federal government began aiming at the right target with respect to wildfire prevention.[39]

President Obama further fleshed out federal efforts to incentivize reasonable land management with the end goal of preventing more wildfire damage *ex ante*. The Four Forest Restoration Initiative (4FRI)—a 2011 project aimed at "restor[ing] wildlife to 2.5 million acres of ponderosa pine forests"—provided a model for an *ex ante* wildfire-prevention effort.[40] Perhaps the most significant aspect of the 4FRI from the perspective of *ex ante* wildfire prevention was its ability to forge public–private connections between disparate stakeholders in the WUI.[41]

While both President Bush and President Obama performed important work in terms of shifting the Forest Service's wildfire policy focus from *ex post* suppression to *ex ante* mitigation, the implementation phases of the HFRA and the 4FRI have ultimately amounted to failed efforts. With regard to the HFRA, the Forest Service under President Bush apparently disregarded the provision requiring half of the funding for fuel reduction to be spent on projects within the WUI.[42] Perhaps due to the unflattering results of the 2004 review of HFRA implementation, the Forest Service does not appear to have reprised this review in the ensuing thirteen years.[43] President Bush's efforts to reduce wildfire fuel in the United States appear to have been little more than legislative smoke and mirrors.

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39. That is, placing emphasis on *ex ante* wildfire prevention, rather than maintaining the time-honored emphasis on *ex post* wildfire suppression. *See* Charles Wilkinson & Daniel Cordalis, *Heeding the Clarion Call for Sustainable, Spiritual Western Landscapes: Will the People Be Granted a New Forest Service?*, 33 PUB. LAND & RESOURCES L. REV. 1, 11–12 (2012) (discussing the HFRA, which signaled a shift from "fighting fires to preventing them" and has "fit comfortably within . . . the new restoration emphasis of the Forest Service"). In 2009, Congress further crystallized the preventative approach by passing the Collaborative Forest Landscape Restoration Act, which offers funding for "landscape-level forest restoration projects" that pass muster according to an advisory committee. Martin Nie & Peter Metcalf, *National Forest Management: The Contested Use of Collaboration and Litigation*, 46 ENVTL. L. REP. 10,208, 10,210 (2016).

40. Schulz & Lueck, *supra* note 20, at 2538. The project proceeded at a "slow and controversial" pace. *Id.*

41. *See id.* at 2539 (discussing the option for "fragmented landowners" to negotiate agreements and thereby "reduce risk and invest in *ex ante* prevention").

42. Brett M. Paben, *The Collaborative Forest Landscape Restoration Program: A Panacea for Forest Service Gridlock or a New Name for Old Saws?*, 20 BUFF. ENVTL. L.J. 107, 125–26 (2013) (claiming critics' distrust of the HFRA was "not misplaced," and the HFRA is a bit of a handout to logging interests).

43. *See* U.S. DEP'T OF AGRIC. OFFICE OF INSPECTOR GEN. SOUTHEAST REGION, Report No. 08601-6-AT, AUDIT REPORT: IMPLEMENTATION OF THE HEALTHY FORESTS INITIATIVE 8 (Sept. 6, 2006), https://www.usda.gov/oig/webdocs/08601-6-AT.pdf [https://perma.cc/23WM-XHSV] (discussing a 2004 independent review of HFRA implementation, which described the acreage "treated adjacent to or within the WUI" as "limited" and found that "[p]riority was not given to the area where the risk to the community was greatest (the WUI)"). Incidentally, this audit effectively vindicated HFRA detractors' concerns that the Act was "an excuse to increase logging, weaken environmental protections and reduce public input." Paben, *supra* note 42, at 125–26.

There is no reason to believe federal efforts to reduce fuel sources within the WUI grew more robust during President Obama's two terms, despite the measured success of the 4FRI.[44] The federal government's actions to date have not effectively ameliorated the growing wildfire problem. Regardless of the animus behind the federal government's general lack of emphasis on *ex ante* fire prevention in terms of implementing facially robust statutes and programs,[45] the dearth of serious federal efforts to reduce wildfire risk is problematic. Given the perpetual penetration of American individuals and communities into the WUI, a trend that is only likely to increase in severity,[46] the wildfire problem will quite likely become exponentially worse in coming years.

II. Contemporary State Efforts to Regulate Private Land Management

In the style of their federal counterpart, state legislatures have done precious little to incentivize reasonable private land management in firesheds. While many states have enacted laws regulating private landowner behavior once a wildfire starts,[47] few states regulate private land management with respect to wildfire fuel reduction outside of the logging context and related landowner activities.[48] No states regulate private land management *ex ante* as the practice relates to "unmanaged natural vegetation growth."[49] Only two states, Oregon and Washington, have chosen to regulate private

44. *See* Nie & Metcalf, *supra* note 39, at 10,210 (discussing the HFRA's requirement of forming collaborative, community-based wildfire-prevention schemes and the continuation of "collaborative approaches to forest restoration" that marked the Obama years).

45. Professor Bradshaw of Arizona State University has posited that the relaxation of land management standards after the flames begin incentivizes the shift from *ex ante* to *ex post* handling of wildfires at the federal level. Bradshaw, *supra* note 28, at 454.

46. Based on statistical modeling grounded in growth trends over time, researchers estimated in 2000 that the WUI will increase from its size of 465,614 km^2 in 2000 to 513,670 km^2 by 2030. David M. Theobald & William H. Romme, *Expansion of the US Wildland–Urban Interface*, 83 LANDSCAPE & URB. PLAN. 340, 349–50 (2007).

47. Amanda Hemmerich, *From Fire Comes Life: Why Courts Assessing Forest Fire Damages Should Recognize Ecological Benefits*, 46 ENVTL. L. REP. 10,608, 10,612 (2016).

48. Massachusetts is one state that evidently does regulate land management with respect to all land uses that involve clearing and cutting brush and trees. *See* MASS. GEN. LAWS ANN. ch. 48, § 16A (West 2015) (requiring "[e]very owner, lessee, tenant or occupant of lands, . . . [to] dispose of the slash caused by [brush, wood, or timber] cutting"). By contrast, many states only require the disposal of slash that results exclusively from commercial operations. *See, e.g.*, N.H. REV. STAT. ANN. § 227-J:10 (West 2017) (setting out slash-disposal requirements for individuals who engage in timber operations on New Hampshire land); *see also* MONT. CODE ANN. § 76-13-407 (West 2017) (outlining slash-clearing requirements for anyone clearing rights-of-way for any "transmission or transportation utility").

49. Jonathan Yoder, *Liability, Regulation, and Endogenous Risk: The Incidence and Severity of Escaped Prescribed Fires in the United States*, 51 J.L. & ECON. 297, 307 n.15 (2008). Yoder describes existing statutory regimes for handling timber slash as illustrative of the proposition that "liability is more readily applied to cases in which discrete action rather than inaction is involved in an increase in risk." *Id.*

landowner behavior *ex post* by collecting "suppression costs" from negligent land managers once a fire begins.[50]

Out of all fifty U.S. states, only Oregon and Washington appear to have private land management statutes on the books with any real teeth. In Oregon, the Forestland-Urban Interface Fire Protection Act of 1997 provides for the ability of Oregon to "collect up to $100,000 in suppression costs from a WUI . . . landowner."[51] Three circumstances must be present before the state's ability to collect costs from a private landowner kicks in: (1) the wildfire started on the landowner's property; (2) "the fire spreads within the protection zone around a structure and driveway that does not meet the [fuel reduction] standards"; and (3) the Oregon forestry department "incurs extraordinary costs to suppress the fire."[52] Interestingly, the $100,000 limit can be exceeded if the investigation reveals the WUI landowner was negligent in starting the fire.[53] On its website, the State of Oregon describes the statute as intended to enlist "the aid of property owners to turn fire-vulnerable" areas "into less-volatile zones" in which firefighters will be able to "safely and effectively defend homes from wildfires."[54]

In Washington, section 76.04.495 of the Washington Code provides for uncapped cost recovery from persons, firms, or corporations that engage in three types of conduct: (1) negligently starting fires that spread on "forestland"; (2) creating or allowing a substantial fire hazard that perpetuates fire spread; or (3) allowing slash buildup to accumulate on their property.[55] The statute allows the state of Washington, municipalities, forest-protection associations, and all federal fire-protection agencies to recover reasonable fire-suppression expenses, investigation costs, and litigation costs—including a reasonable amount of attorneys' fees and court costs.[56] Moreover, the statute provides for a lien on all property of the entity or individual engaging in any of the three types of conduct described above, up to the amount of fire-suppression, investigation, and litigation expenses incurred in connection with the fire.[57] On two occasions, the Washington

50. *See* Bradshaw, *supra* note 28, at 462 n.80 (exploring the Oregon Forestland-Urban Interface Fire Protection Act of 1997, which allows state governments to recover suppression costs from WUI landowners if certain criteria are met); *see also* WASH. REV. CODE ANN. § 76.04.495(1) (West 2017) (allowing recovery of costs from persons or entities that negligently start or contribute to the spread of large fires).

51. Bradshaw, *supra* note 28, at 462 n.80.

52. *Id.*

53. *Id.*

54. OR. OFF. ST. FIRE MARSHAL, *Annual Report 2016*, at 7 (2016) http://www.oregon.gov/osp/SFM/docs/Comm_Ed/AnnualReport/1173289_OSFM_2016%20Annual%20Report_2017-WEB.pdf [https://perma.cc/8SEM-R58V].

55. WASH. REV. CODE ANN. § 76.04.495(1) (West 2017).

56. *Id.*

57. *Id.* § 76.04.495(2).

State Department of Natural Resources successfully pursued significant suppression costs against entities under section 76.04.495.[58]

Unlike the fairly robust penalties in the Oregon statute, the existing state statutes regulating slash disposal provide for relatively toothless penalties.[59] Given the overt dearth of civil or criminal cases involving slash statutes,[60] states do not appear to be interested in enforcing slash laws. Luckily for states, enforcement costs with regard to forced-pooling and compulsory-unitization regimes in the area of land management ought not pose an onerous burden on state coffers. Enacting these statutes—with the end goal of increasing *ex ante* wildfire prevention—would likely end up costing states less in enforcement than states spend annually on wildfire suppression. Before turning to an exposition of these statutory regimes, this Note now examines the few coherent policy proposals gleaned from academic literature on point.

III. Existing Legal Scholarship on U.S. Wildfire Law and Policy

A number of authors have weighed in on the U.S. wildfire law and policy regimes as they currently stand. While a majority of this work is theoretical and foundational in nature,[61] three authors have crafted coherent

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58. *See* Dep't of Nat. Res. of Wash. v. Littlejohn Logging, Inc., 806 P.2d 779, 780 n.1, 782 (Wash. Ct. App. 1991) (interpreting section 76.04.495 as allowing the recovery of reasonable expenses "made necessary by a person's negligence," in a case in which the Department of Natural Resources incurred $376,614.11 in firefighting expenses); *see also* State of Wash., Dep't of Nat. Res. v. Pub. Util. Dist. No. 1 of Klickitat Cty., 349 P.3d 916, 917, 924 (Wash. Ct. App. 2015) (holding the Department of Natural Resources could pursue a cost-recovery claim against a public utility district, as the latter constitutes a "person, firm or corporation" under section 76.04.495, for a fire in which the Department incurred over $1.6 million in suppression costs).

59. In Massachusetts, the failure to remove slash is punishable by a $250–$2,500 fine. MASS. GEN. LAWS ANN. ch. 48, § 20 (West 2015). In New Hampshire, the legislature has imposed a harsher penalty for failure to remove slash, in the form of one misdemeanor violation per "each 200 linear feet or fraction . . . of property boundaries, water frontage, public highway, and railroad frontage from which the slash and mill residue is not properly removed or disposed of." N.H. REV. STAT. ANN. § 227-J:10 (West 2017). In Montana, the penalty for failure to remove slash is an injunction from "further cutting, clearing and construction operations" on land until the landowner complies with the slash law. MONT. CODE ANN. § 76-13-410(1) (West 2015). A landowner's failure to comply with the slash law within thirty days "after being notified to do so by the department" may result in the department reducing the wildfire fuel sources at the landowner's expense. *Id.* § 76-13-410(3).

60. Under the Massachusetts, New Hampshire, and Montana statutes, only one case—a bankruptcy matter out of the District of Montana—has addressed a state slash-statute penalty. *See In re* Granite Lumber Co., 63 B.R. 466 (Bankr. D. Mont. 1986). The court in *Granite Lumber* briefly mentioned the Montana Department of State Lands's collection of a "slash fund" pursuant to section 76-13-410(3) of the Montana Code. *Id.* at 470. The statutory section the court referenced allows the Montana Department of Natural Resources and Conservation to "authorize . . . fire hazard reduction or management at the expense of the contractor or of the owner of the timber or other forest products cut or produced from the land" containing the fire hazard. MONT. CODE ANN. § 76-13-410(3).

61. *See* Bradshaw, *supra* note 28, at 474–78 (identifying primary wildfire-related issues that are ripe for legal analysis, including liability for fire-suppression costs and mixed incentives in firesheds).

policy proposals aimed at curbing perverse incentives in the fireshed. At the outset of this Note's exegesis of these authors' works, it is worth noting that the legal scholarship on the subject of wildfire law is scant.[62]

First, Professor Karen Bradshaw, the author who has generated the most prodigious catalog of academic literature on American wildfire law, offers a comprehensive policy proposal for compensating landowners whose property is damaged by backfire.[63] As a foundation for her argument, Professor Bradshaw submits the premise that governmental decisions to intervene or abstain from intervention in firefighting efforts by setting or failing to set backfire can influence the future necessity of setting backfire.[64] She next states that the fundamental characteristic of backfires as mechanisms employed in exigent circumstances prevents private parties from negotiating with the government or impacting backfire policy by political means.[65] She goes on to classify the chief benefit generated by backfire—namely, the protection of nearby landowners whose properties are undamaged by fire—as a windfall.[66] Not only is backfire damage prevention a windfall, according to Professor Bradshaw, but also this benefit is a windfall of the sort that is substantial enough, and occurs infrequently enough, to justify the transaction costs required for landowner compensation by the government.[67]

According to Professor Bradshaw, in the context of backfire setting, private parties are poorly situated to strike deals *ex ante*, both because different portions of property are worth differing amounts to the property owner and because governmental firefighters have absolutely no obligation to follow any private deals.[68] Bradshaw goes on to argue that backfire setting benefits a discrete group of property owners and creates an analogous situation to one in which one distinct group is harmed to benefit a separate group.[69]

Based on these arguments, Professor Bradshaw posits that the government must compensate harmed landowners for multiple quantifiable

62. *See id.* at 446–47 (describing the recent academic attention given to wildfire as of Professor Bradshaw's writing of the article in 2010 and defining the purpose of the article as overcoming the "reticence" of legal scholars to engage with wildfire).

63. *See* Bradshaw, *supra* note 18, at 164–65 (claiming that property owners are particularly deserving of compensation in cases of backfire for four reasons: (1) in setting backfires, the federal government effectively holds a monopoly on firefighting operations; (2) setting backfires generates windfalls that are not accounted for in any private market; (3) governmental transaction costs are lower than private transaction costs in the fireshed; and (4) the benefits of backfire are only realized by a small group of property owners who are subject to identification).

64. *Id.* at 167.

65. *Id.* at 168.

66. *Id.*

67. *Id.* at 169.

68. *Id.*

69. Bradshaw, *supra* note 18, at 172.

costs. The two most clear-cut costs she outlines are stumpage value—the value of the destroyed timber—and infrastructure damage—the value of roads, buildings, and equipment destroyed by backfire.[70] She proposes that the unsellable timber value be calculated based on board-feet measurements and valued under local timber sale values in nonvolatile markets.[71]

In addition to these two costs, Professor Bradshaw argues that the government must compensate harmed landowners for mitigation and regeneration costs, which include habitat remediation, future-value loss, insect and disease mitigation, value of saplings, value of seedlings, soil remediation, and invasive plant removal.[72] Professor Bradshaw posits that seedling value ought to be calculated based on market price (plus the cost of planting) and that sapling value ought to be calculated based on the net present value of the damaged vegetation.[73] Through the enactment of her detailed compensation proposal, Professor Bradshaw argues, distorted incentives regarding wildfire would be corrected, and backfire use would begin to reflect the costs it generates for the environment.[74]

Second, Benjamin Reilly offers a comprehensive policy proposal aimed at aligning incentives in the fireshed, distinct from the policy developed by Professor Bradshaw.[75] Reilly begins his argument by submitting the premise that guaranteed federal suppression efforts subsidize development in fire-prone areas.[76] He then argues that insurance providers may begin to move away from insuring property in the WUI and that Congress ought to fill the void by creating a national insurance program for wildfire loss.[77] Reilly crafts his proposal around the existing National Flood Insurance Program (NFIP), suggesting that the Federal Emergency Management Agency administer the program.[78]

In terms of the details of Reilly's proposed National Wildfire Insurance Program (NWIP), Reilly argues that the federal government should calculate premiums proportionate to fire-suppression costs in specific areas.[79] That is,

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70. *Id.* at 174–75.

71. *Id.*

72. *Id.* at 178–79.

73. *Id.* at 179.

74. *Id.*

75. *See* Benjamin Reilly, *Free Riders on the Firestorm: How Shifting the Costs of Wildfire Management to Residents of the Wildland-Urban Interface Will Benefit Our Public Forests*, 42 B.C. ENVTL. AFF. L. REV. 541, 543 (2015) (arguing that one type of moral hazard in the fireshed, created by federal spending to protect private property in wildfires and the resultant deflated homeowners' insurance premiums, can best be addressed by creating a national insurance program covering wildfire damage—a program that would generate revenues that could be used to fund wildfire-suppression activities).

76. *Id.* at 555.

77. *Id.* at 559–60.

78. *Id.* at 561.

79. *Id.*

the federal government would charge premiums under the new insurance program that are tied to both coverage level and fire risk in regions of the WUI.[80]

In order to ensure that WUI residents obtain NWIP insurance, Reilly proposes that individuals in areas of high fire risk who fail to obtain NWIP coverage be forced to pay a shared-responsibility fine crafted in the same vein as the Affordable Care Act's individual mandate.[81] He proposes that Congress stagger premium increases, rather than increasing premiums in one fell swoop, and charge significantly higher premiums for insurance on second homes in the WUI.[82] Aiming directly at landowner activity, Reilly proposes that the government reduce premiums for policyholders who engage in risk-mitigating activity on their property, such as creating "defensible spaces" in the areas around their homes.[83]

Third, Headwaters Economics[84] formulates a detailed set of ten policy proposals designed to align the incentives of many disparate groups in the fireshed. The research group first proposes mapping of high-fire-risk areas, a tactic designed to identify regions in which development would place property and lives at risk and in which costs incurred in home-protection efforts would deal taxpayers the most significant blows.[85] Headwaters Economics next suggests that federal and state land management authorities educate local governments about the astronomical financial costs associated with fighting fires.[86] In addition to mapping and education, the organization posits that the federal government incentivize land-use planning in the WUI by tapping funding already allocated to wildfire programs to both assist with land-use planning and give funding preference to communities that have attempted to discourage folks from further developing the WUI.[87]

In addition to these three policy shifts, Headwaters Economics suggests that the federal government incentivize county governments in the West to sign existing master agreements—cost-sharing mechanisms for wildfire fighting that divide fiscal responsibility between federal and nonfederal wildfire-fighting entities.[88] Next, the group proposes the federal government either purchase wildfire-prone private lands that are at significant risk of private development or secure easements that prohibit development on these

80. *Id.* at 562.

81. *Id.*

82. *Id.* at 563.

83. *Id.*

84. Headwaters Economics is a nonprofit research organization working to "improve community development and land management decisions in the West." *About Us*, HEADWATERS ECON., https://headwaterseconomics.org/about/ [https://perma.cc/9QBM-BMEV].

85. HEADWATERS ECON., *supra* note 9, at 20.

86. *Id.* at 23.

87. *Id.* at 25.

88. *Id.* at 31–33.

lands.[89] Headwaters Economics then sketches out a program conceptually identical to Reilly's proposed program: a national wildfire insurance program designed using the NFIP as a model.[90] Next, the organization submits the idea that insurers should adjust premiums to reflect wildfire risk in particular areas.[91]

As its eighth policy proposal, Headwaters Economics develops the idea of encouraging cities to enact zoning restrictions prohibiting homes from being built in the particularly fire-prone regions within the WUI.[92] The group further argues in favor of the abolition of federal home interest mortgage deduction with respect to new homes erected in areas of high fire risk within the WUI.[93] Finally, rounding out the policy proposals, Headwaters Economics submits a tenth maneuver: reduce federal budgets allocated to wildfire fighting in the WUI, a policy move that would be designed to force county and municipal governments to step in and make suppression decisions, ultimately driving down the permitting of new homes in the WUI.[94]

Aside from the three distinct sets of proposals offered by Professor Bradshaw, Benjamin Reilly, and Headwaters Economics, few authors have touched extensively on the maneuvers in which governments at any level may be able to engage by way of impacting private landowner incentives in the WUI. This is unusual, given the fact that many authors have identified the need to examine private landowner impacts on suppression costs.[95]

Each of the three architects of the policies explored in this section assuredly get certain things right in terms of fireshed-incentive alignment. Professor Bradshaw's proposal to effectively hold the federal government fiscally accountable for backfire-setting decisions would likely lead to a decrease in the federal government's prioritization of structures over timberlands in firefighting. This would, in turn, likely eliminate some of the subsidy from which WUI homeowners currently benefit, which would most probably lead to greater caution on the part of individuals considering development in the WUI. Benjamin Reilly's proposal of creating an NWIP modeled on the NFIP, with premiums calculated using wildfire-risk statistics, would quite likely impose the intended chilling effect on WUI home

89. *Id.* at 35.

90. *Id.* at 39. Like Reilly's proposal, the Headwaters Economics insurance proposal—published in an article that came out six years prior to Reilly's article—includes accurate pricing of policies in high fire-risk areas. *Id.* at ii, 43.

91. *Id.* at 45. This idea will be fleshed out in Part V, "Related Policy Proposals."

92. *Id.* at 50.

93. *Id.* at 55.

94. *Id.* at 58.

95. *See, e.g.*, Jingjing Liang et al., *Factors Influencing Large Wildland Fire Suppression Expenditures*, 17 INT'L J. WILDLAND FIRE 650, 651 (2008) (calling for a federal examination, in the "highly politicized environment" of private property rights, of the manners in which private owners in fire-prone areas impact suppression expenditures).

development. While the numerous policies proposed by Headwaters Economics would all likely lead to an alignment of incentives within the WUI, educating local governments on the costs of wildfire could have the greatest impact on risky development, by heralding a genesis of robust zoning laws in wildfire-prone regions of the nation.

While the policy proposals examined in this section do address key perverse incentives for various actors with starring roles in the wildfire tragedy that is currently unfolding on the American national stage, none of the policies crafted by academic authors thus far directly touch the core incentives for private landowners to disregard prudent land management considerations. Given the urgent and growing crisis of wildfires throughout the American West, the utility of a proposal aimed squarely at curbing these very incentives has never been greater. This Note now turns to an extensive overview of such a policy proposal, which comes in the form of regulatory regimes in the private land management realm, which echo forced-pooling and compulsory-unitization regimes in oil and gas law.

IV. Forced-Pooling and Compulsory-Unitization Statutory Derivatives in the Fireshed

In a majority of the primary hydrocarbon-producing states within the United States, statutes providing for both forced-pooling and compulsory-unitization shape the landscape of oil and gas law.[96] The most effective means of incentivizing reasonable land management decisions for private landowners in the WUI is for state legislatures to take a page from the oil and gas law playbook in the form of enacting forced-pooling and compulsory-unitization statutory analogues. Before providing a detailed description of the model statutory schema, it is useful to suggest what types of landowners will be impacted by the policy recommendation. Rather than including all nongovernmental owners of land in the term "private landowners," this Note proceeds on a definition of private landowners as individuals who own less than 5,000 contiguous acres in a given fireshed and who do not use their land for commercial purposes.[97]

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96. Bruce M. Kramer, *Compulsory Pooling and Unitization: State Options in Dealing with Uncooperative Owners*, 7 J. ENERGY L. & POL'Y 255, 255 n.2 (1986).

97. This definition explicitly leaves out institutional landowners, such as timber corporations; these landowners include "property owners with 5000 or more forested acres," and typically utilize their property for commercial purposes. Schulz & Lueck, *supra* note 20, at 2533. With regard to institutional landowners, the problem of distorted incentives appears to be nonexistent, or is at least much smaller in magnitude than the incentive problem in the context of small-scale, noncommercial private landowners. *See id.* (explaining that institutional landowners generally "have the resources to bear fire-related losses," claim to be self-insured, and "are well positioned to undertake *ex ante* fire prevention measures"). Given the relatively small distortion of incentives for institutional landowners, the fact that state slash law statutes typically cover activity by these landowners, and the fact that timber-laden states—such as Oregon and Washington—impose further deterrence of negligent land management by institutional landowners in the form of cost-recovery statutes,

This Part will be organized into three subparts: (1) Overview of Oil and Gas Statutory Derivatives for Fireshed-Land Management; (2) Detailed Features of Echoic Statutory Regimes; and (3) Recommended Modifications to Existing Statutory Regimes.

A. Overview of Oil and Gas Statutory Derivatives for Fireshed-Land Management

Based on a lame enforcement arm and limp statutory schema with respect to private land management, negligent private land managers in the WUI have little incentive to reduce wildfire risk by clearing slash on their property.[98] Moreover, individuals who own homes in the WUI can count on federal funding for firefighting once a wildfire commences its destructive journey. Whether or not WUI land becomes discounted by fire risk in the future—which could attract developers[99]—one can expect further development in this fire-prone terrain.[100] States are best positioned to step in and regulate private landowner behavior in order to prevent wildfires *ex ante*. This is so because federal regulation addressing wildfires may become even less robust than now, given President Trump's altered priorities.[101] In light of landowner and developer expansion into the WUI, as well as rising

wildfire law as it now stands appears to adequately address institutional landowners. This is the precise reason for the exclusion of institutional landowners from the policy prescriptions for which this Note advocates.

98. *See* Bradshaw, *supra* note 28, at 454–55 (explaining that a lack of accountability "for land manager fire suppression efforts" creates perverse incentives that are not offset in the current wildfire-fighting system).

99. The pattern of developers buying land saddled with risk at discount rates in order to ultimately profit off of its development is a form of moral hazard—a concept that boils down to the idea that insulating actors from the impacts of their deleterious actions generates a greater quantity of deleterious actions. Tom Baker, *On the Genealogy of Moral Hazard*, 75 TEXAS L. REV. 237, 238 (1996).

100. *See* Ray Rasker, *Resolving the Increasing Risk from Wildfires in the American West*, 6 SOLUTIONS J. 55, 56 (2015) (discussing the fact that WUI homeowners have "little incentive to build on safer lands" because "a significant portion of the costs associated with building in hazardous areas are [sic] not borne by the local governments or homeowners").

101. *See* Nick Stockton, *Trump's Trying to Chainsaw Nearly Every Environmental Program*, WIRED (Mar. 16, 2017), https://www.wired.com/2017/03/trumps-trying-chainsaw-nearly-every-environmental-program/ [https://perma.cc/C6DU-H4EF] (examining President Trump's proposed federal budget); *see also* Lam, *supra* note 34 (quoting one of President Trump's most prominent campaign promises, encapsulated in his statement that "[i]f there's a new regulation, they have to knock out two").

temperatures due to climate change,[102] the prospect of continuing to allow unregulated management of land within firesheds is fraught.[103]

Enter the statutory regimes conjugate to forced-pooling and compulsory-unitization regimes from oil and gas law as means to cure the incentive structures that have led to landowners shirking wildfire risk reduction responsibilities throughout the WUI. Forced-pooling and compulsory-unitization statutes delegate state regulatory commissions the police power to compel nonconsenting mineral rights holders to allow drilling underneath their property.[104]

Compulsory unitization, unlike its regulatory cousin, forced pooling,[105] conceptually covers development of the entire reservoir itself, rather than the regulatory requirements necessary to legally exploit the hydrocarbons within portions of it by drilling specific wells.[106] Compulsory-unitization regimes deal exclusively with consolidating "all, or a sufficiently high percentage of the royalty and participating interests in a pool as will permit reservoir engineers to plan operation of the pool as the natural energy mechanism unit which it is."[107] In other words, the primary distinction between forced-pooling and compulsory-unitization regimes is that forced-pooling statutes handle the process of combining mineral interests to reach the threshold level for well-spacing and drilling units, whereas compulsory-unitization statutes address development of entire common-source hydrocarbon reservoirs. Compulsory-unitization statutes allow for fieldwide development, implicating all land and mineral interests related to an entire hydrocarbon reservoir.[108] Forced-pooling statutes merely permit interest consolidation in a single well-spacing unit, which covers a small portion of the entire field.[109]

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102. Rising temperatures increase the likelihood of hotter wildfires that burn for longer periods of time. *Is Global Warming Fueling Increased Wildfire Risks?*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/global_warming/science_and_impacts/impacts/global-warming-and-wildfire.html#.WOkgv1dKHVo [https://perma.cc/LBP3-EMD5].

103. *See id.* (arguing that the "devastating" costs of wildfires to the federal government and state governments will likely increase "unless we better address the risks of wildfires and reduce our activities that lead to further climate change").

104. Jared B. Fish, Note, *The Rise of Hydraulic Fracturing: A Behavioral Analysis of Landowner Decision-Making*, 19 BUFF. ENVTL. L.J. 219, 263 (2012).

105. *See* Kramer, *supra* note 96, at 255 n.1 (explaining that "[p]ooling and unitization are analogous but not identical concepts" and that pooling typically involves "the joining together of tracts in order to receive a drilling permit under the applicable well spacing rule for the area").

106. *See id.* (defining unitization as "the joining together of tracts in order to cooperatively develop all or part of a reservoir containing hydrocarbons").

107. ANDREW DERMAN & KYLE VOLLUS, UNITIZATION 5, https://www.tklaw.com/files/Publication/7450c785-022d-4a36-a9cb-da5897ca678b/Presentation/PublicationAttachment/562dbe71-7a60-4867-ab0b-98205656af8f/Unitization%20(Derman%2C%20A.).pdf [https://perma.cc/BQ5Z-AMXG].

108. John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 843–44 (1986).

109. *See* Brad Secrist, *Not All "Units" Are Created Equal: How* Hebble v. Shell Western E & P, Inc. *Missed an Opportunity to Curb the Expansion of Fiduciary Obligations in Oklahoma*

1. On the Combination of Forced-Pooling and Compulsory-Unitization Statutes.—From a descriptive standpoint, adding both forced-pooling and compulsory-unitization statutes governing private land management to a state's regulatory regime would be quite simple. Rather than delegating authority to approve pooling agreements to the hydrocarbon regulatory commission of a given state, the forced-pooling statutory echoes would delegate authority to approve land management agreements to the state forest service or its equivalent. Relatedly, rather than allowing contiguous owners of land and/or the minerals thereunder to combine their interests in property to maximize efficiencies regarding an entire reservoir, the compulsory-unitization statutory echoes would allow contiguous landowners spanning an entire fireshed to combine their interests in risk reduction.

Boiled down to the essential elements of the regulatory regime, the statutory analogues for which this Note advocates will borrow two distinct features from oil and gas forced-pooling and compulsory-unitization statutes, and will be governed by one distinct feature unique to these echoic regimes. In terms of borrowed features, first, the agreements—when approved by the state agency responsible for their review—will be enforceable as against nonconsenting landowners in the fireshed, pursuant to a pooling or unitization order in which the agency has made findings of fairness and equity as to all landowners in the shed.[110] Second, landowners in the shed will be required to be presented with a fair opportunity to consent to the agreement before the state will be able to bind them to it. In terms of a feature distinct from the qualities of the oil and gas statutes from which the land management statutes are derived, the latter agreements will involve solely matters of cost—they will not address any sharing of benefits. The shared benefits that will likely fall out of the regulatory regimes are largely speculative; as crafted, the broader goal of the statutory echoes is to reduce the incidence of wildfires across the WUI.

Similar in function to the interest-holder agreements required by numerous forced-pooling and compulsory-unitization statutes in the oil and gas realm as precursors to pooling or unitization, both types of statutory echoes would require land management plans to be drawn up and submitted to the state forest service for approval. In addition to the requirement of voluntary consent of a certain percentage of landowners and interest holders as a precursor to the state regulatory commission's authority to compel unitization or pooling with regard to the remainder of interest holders in the

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Oil and Gas Law, 65 OKLA. L. REV. 157, 161–62 (2012) (defining forced-pooling as a statutory provision for the combination of interests regarding development of a drilling and spacing unit and defining unitization as a process encompassing the entirety of a hydrocarbon reservoir).

110. Further details of the review process and the required findings will be outlined in the following subpart, "Institutional Design."

unit or pool,[111] oil and gas forced-pooling and compulsory-unitization statutes generally require findings of fairness and equity by the regulatory commission.[112] The recommended derivative regimes would similarly require voluntary consent of a specified percentage of fireshed landowners[113] as a prerequisite to the state forest service obtaining the authority to order the unitization or pooling of disparate property in the fireshed. Further details of the statutory analogues will be elucidated in subpart (4), "Detailed Features of Echoic Statutory Regimes."

From a prescriptive standpoint, the necessity for both a compulsory-unitization statute and a forced-pooling statute within each state's regulatory regime is evident based on two features of the WUI. As the principal point, firesheds cover exceedingly large areas of land.[114] Therefore, many private landowners are contained within a fireshed, and transaction costs between them can be extraordinarily high.[115] By allowing landowners to combine their interests in risk reduction, these statutes lessen transaction costs. As an ancillary—and related—point, one can conceive of a number of efficiencies flowing from statutes that incentivize private landowners to engage in both large- and small-scale joint land management efforts. With regard to the compulsory-unitization statutory analogue, owners of a specified percentage of land in a fireshed would be able to bind all other landowners in the same fireshed to high-level land management contracts and surveying procedures to ensure compliance with the provisions in the contracts. The forced-pooling statutory analogue, on the other hand, would allow for owners of smaller, adjacent tracts within particularized zones of the fireshed to enter into detailed, more specialized contracts to handle landscape features unique to the relatively small portions of the fireshed comprising their land.

Further, the resources covered by the statutes bear many similarities to one another. Like oil and gas reservoirs, which "typically underlie multiple

111. *See, e.g.*, LaMaster, *supra* note 108, at 847–48 (detailing the contours of compulsory-unitization statutes, one of which is the requirement of either a unitization plan or contract, to which a specified percentage—typically 60%–80%—of working-interest owners and royalty-interest holders have agreed).

112. *Id.* at 848.

113. This Note leaves the calibration of the precise percentage of minimum consent to the states, although something in the neighborhood of 70%–80% likely best balances the interests of states in administrable regimes and the interests of a wide swath of private fireshed landowners in retaining the effective ability to have a say in the form and function of the agreements.

114. This feature of firesheds may be more pronounced in certain western states than in others; for example, "firesheds in California often encompass 50,000 to 100,000 ac[res] or more." Malcolm North et al., *Using Fire to Increase the Scale, Benefits, and Future Maintenance of Fuels Treatments*, 110 J. FORESTRY 392, 397 (2012).

115. *See* Bradshaw, *supra* note 18, at 170 (addressing contracting for private parties impacted by federal firefighting strategies, and claiming that "transaction costs for reaching a bargain are extraordinarily high," as a result of "the endless combination of scenarios that could arise").

parcels of land,"[116] firesheds are often owned in contiguity by numerous unaffiliated private landowners.[117] Additionally, both firesheds and hydrocarbon reservoirs are fleeting in nature,[118] which increases the difficulty of predicting *ex ante* the efforts required to mitigate risk[119] or maximize production.[120] The ephemeral natures of the resources also undoubtedly drive up the transaction costs associated with their management in both fireshed risk reduction and hydrocarbon exploration and development. The analogy runs deeper than the array of similarities between the two resources themselves, however. The requirement of a substantial front-end investment of funds prior to commencement of any actual land-altering actions is present in both fire risk management[121] as well as oil and gas drilling.[122]

2. Institutional Design.—Part of the beauty of the recommended state forced-pooling and compulsory-unitization regimes is that they allow for private contract to govern a vast array of primary matters taken up by the parties with regard to land management procedures, as long as the agreements

116. D. Theodore Rave, *Governing the Anticommons in Aggregate Litigation*, 66 VAND. L. REV. 1183, 1226 (2013).

117. *See* Tania Schoennagel et al., *Implementation of National Fire Plan Treatments Near the Wildland–Urban Interface in the Western United States*, 106 PROC. NAT'L ACAD. SCI. U.S. 10706, 10707 (2009) (stating that private land accounts for 71% of the WUI); *see also* Dean Lueck, *Economics and the Organization of Wildfire Suppression*, *in* WILDFIRE POLICY: LAW AND ECONOMICS PERSPECTIVES 71, 77 (Karen M. Bradshaw & Dean Lueck eds., 2012) (noting that the "first important consideration" regarding wildfires "is that the large scale of a wildfire, or fireshed, might be well beyond the acreage of a single landowner," and that the "Great 1910 Burn" covered millions of acres of private land—including "large tracts of forest land as well as small rural plots and town lots"); Schulz & Lueck, *supra* note 20, at 2529 ("As with most landscape-level resources, the wildfire resource exceeds the size of individually sized land parcels.").

118. With regard to fires, "[f]irescapes are ephemeral and uncertain in their nature." Schulz & Lueck, *supra* note 20, at 2529. In the context of oil and gas drilling, "hydrocarbons migrate," as "[o]il and natural gas deposits are under great pressure." Bryan Leonard & Gary D. Libecap, *Endogenous First-Possession Property Rights in Open-Access Resources*, 100 IOWA L. REV. 2457, 2468 (2015).

119. Schulz & Lueck, *supra* note 20, at 2529.

120. It is worth noting that gas trapped in shale formations does not exhibit the same "migratory" principles exhibited by hydrocarbons stored in traditional reservoirs. Lindsey Trachtenberg, Note, *Reconsidering the Use of Forced Pooling for Shale Gas Development*, 19 BUFF. ENVTL. L.J. 179, 212 (2012).

121. Granted, in the context of land management aimed at reducing wildfire risk *ex ante*, private insurers will likely bear a majority—if not all—of the costs associated with collaborative land management efforts. *See* Schulz & Lueck, *supra* note 20, at 2536–37 (positing the idea that third-party regulation by insurers is efficient in terms of reducing fire risks, since these insurers are able to engage in cost spreading in the form of increased premiums for homeowners' insurance in fire-prone regions). A further discussion of insurers in the WUI, their current perverse incentives to distort wildfire risk with regard to policy rates, and what can be done to ameliorate these deleterious incentives will be taken up in the following Part, "Related Policy Proposals."

122. *See* Chiawen C. Kiew, Comment, *Contracts, Combinations, Conspiracies, and Conservation: Antitrust in Oil Unitization and the Intertemporal Problem*, 99 NW. U. L. REV. 931, 962 (2005) ("Producing oil is an endeavor requiring high, upfront costs in exploration and capital equipment.").

are deemed fair and equitable[123] by the state forest service. As a more fine-grained point, the recommended forced-pooling and compulsory-unitization statutes in the land management area would contain language to the effect that the state forest service's role in reviewing and approving pooling and unitization agreements is to conserve natural resources and to promote fairness and equity.[124] This language would ensure that private landowners are able to challenge approval or nonapproval of specific macro- and micro-level land management plans on three separate grounds.[125]

Certain forced-pooling and compulsory-unitization statutes in the oil and gas realm indeed already require state regulatory commissions to find fairness and equity regarding a number of circumstances in orders unitizing or pooling interests. For instance, Wyoming's compulsory-unitization statute requires that the regulatory commission make five findings. First, after any "interested person" files an application for unitization with the regulatory commission, the commission must find a proposed operating plan adjusts front-end investment costs fairly and equitably among unit owners.[126] Second, the commission must find the plan provides for a "fair and equitable determination of the cost of unit operations."[127] Third, the commission must find the plan, if necessary, provides for fair, reasonable, and equitable terms and conditions regarding interest or financing for an individual "unable to promptly meet his financial obligations" attached to the unit.[128] Fourth, the commission must find the plan grants each owner "a vote in the supervision and conduct of unit operations," proportionate to the costs chargeable to the owner.[129] Fifth, the commission must find the plan provides for fair

123. This language is distinct from typical forced-pooling and compulsory-unitization statutes, which are premised on the protection of correlative rights. *See, e.g.*, OKLA. STAT. ANN. tit. 52, § 287.1–287.4 (West 2017) (reporting the legislative finding that the circumstances warrant authorization of and provision for "unitized management, operation and further development" of oil and gas properties, "to the end that a greater ultimate recovery of oil and gas may be had therefrom, waste prevented, and the correlative rights of the owners in a fuller and more beneficial enjoyment of the oil and gas rights, protected"). The doctrine of correlative rights in oil and gas law refers to the "reciprocal rights and duties that exist" between disparate owners of a common reservoir, given the "migratory nature of oil and gas reserves" and the consequential fact that "every extractive operation necessarily affects the economic welfare of adjacent or nearby owners of land overlying the common source of supply." Gregory F. Pilcher, Note, *Oil and Gas: H.B. 1221: Protection of Correlative Rights in the Absence of Waste*, 40 OKLA. L. REV. 127, 130–31 (1987).

124. By statute, the term "equitable" will be defined by its legal meaning: "[j]ust; consistent with principles of justice and right." *Equitable*, BLACK'S LAW DICTIONARY (10th ed. 2014).

125. Although administrative litigation against forest-service agencies is beyond the scope of this Note, plaintiffs in such litigation subpart V(d), "Standing Issues for Tort Victims in the WUI."

126. WYO. STAT. ANN. §§ 30-5-110(c), (e)(vi)(A) (West 2017).

127. *Id.* § 30-5-110(e)(vi)(B).

128. *Id.* § 30-5-110(e)(vi)(C).

129. *Id.* § 30-5-110(e)(vi)(D).

and equitable operator-removal and successor-appointment terms and conditions.[130]

The recommended forced-pooling and compulsory-unitization statutes will define the duties of the forest service similarly to the manner in which the Wyoming statute defines the duties of the regulatory commission. Specifically, the forest service will be required to review and approve any land management contracts that lack the consent of any landowners within a given fireshed, even if the agreements are supported by a landowner percentage equal to or exceeding the statutory minimum. Mandatory review of nonunanimous plans would likely require more administrative might than certain states' forest service agencies currently possess, but would be the best way to protect against the tyranny of the majority within the fireshed.[131]

When landowners in a particular shed apply for state forest-service approval of a land management plan—either a macro-level plan, drawn up under the unitization statute, or a micro-level plan akin to a Joint Operating Agreement (JOA),[132] drawn up under the pooling statute—the state agency will be statutorily required to make several additional findings. First, the forest service will be required to make a finding that the plan is fair, reasonable, and equitable with respect to all landowners in the shed.[133] All applying landowners will be statutorily required to provide documentation to the forest service showing that they offered a fair opportunity for each landowner in the shed to consent, prior to filing the administrative application. If certain landowners do not speak English,[134] the applying

130. *Id.* § 30-5-110(e)(vi)(E). Drawing on the Wyoming statute, in highly contested cases, state oversight agencies would have statutory authority—codified in both the compulsory-unitization and forced-pooling echoes—to conduct hearings regarding land management agreements. *See id.* § 30-5-105 (providing the regulatory commission the authority to appoint examiners to conduct hearings regarding any matter before the commission).

131. When any majority has access to a great deal of power, individuals within this group have the incentive to exploit individuals within the powerless minority, thereby—in the context of politics—abusing the legislative process at the "expense of a 'discrete and insular' minority." Eric A. Posner & E. Glen Weyl, *Voting Squared: Quadratic Voting in Democratic Politics*, 68 VAND. L. REV. 441, 444 (2015). In the context of land management, if a state merely enacts a compulsory-unitization statutory analogue—and thus presumably allows a majority of landowners in a fireshed to dictate the fireshed land management plan—the landowners in the majority will take advantage of small groups of landowners in particularized regions within the fireshed.

132. *See* Muhammad Waqas, *Joint Operating Agreements*, OIL & GAS FIN. J. (2014) http://www.ogfj.com/articles/print/volume-11/issue-10/features/joint-operating-agreements.html [https://perma.cc/R4SX-XNDK] (defining the JOA as a "contract where two or more parties agree to undertake a common task to explore and exploit an area for hydrocarbons" and providing a history and analysis of the agreements).

133. Tracking the requirements of the model Wyoming unitization statute, the statutory echoes will require the state oversight agency to make findings of fairness, reasonableness, and equity regarding cost determinations, front-end cost allocation, financing terms, vote allocation, and land-manager removal and successor terms.

134. This situation is likely to present itself, given the fact that over 350 languages are currently spoken in the United States. Press Release, U.S. Census Bureau, Census Bureau Reports at Least

landowners must provide documentation evidencing the fact that they translated the land management agreement into a language the landowner is able to understand and offered him or her a fair opportunity to consent to the agreement.

In addition to the requirement of submitting documentation evidencing the fair opportunity for all landowners to join in the agreement, the statutes will explicitly require the forest service or equivalent oversight agency to consider economic resources of nonconsenting landowners. That is, agency professionals will be required to examine the finances of all landowners in determining the equity of the proposed plan.[135] If the plan fails to account for the inevitable variance in landowner financing capabilities, the oversight agency will be explicitly disallowed from finding that the plan is equitable and will therefore be unable to order a unitization or pooling plan enforceable as against nonconsenting landowners.

When the reviewing agency approves an agreement, all landowners subject to the agreement will take on fiduciary duties to one another, specified in the statute. Codifying fiduciary duties into the statutory echoes will increase the likelihood that all landowners in the shed comply with the requirement to either chip in a specified sum—pegged to both owned acreage and economic ability to front costs—or personally engage in land management activities. Would-be noncomplying landowners will be more likely to comply, given the threat of litigation brought against them by their neighboring landowners in the fireshed.[136]

As part of the review process for proposed land management plans, individuals in charge of land management oversight at the state forest service or equivalent agency will necessarily be required to determine the reasonableness of matters of cost. One potentially effective means by which the forest service could determine the reasonableness of particular costs is to hire a land management expert familiar with the going rate for brush clearing and other relevant activities in the area in which the fireshed is situated, who would provide cost-review services. This individual would be statutorily prohibited from maintaining any affiliation with any of the landowners in the particular shed—bearing in mind issues of self-dealing and cost unfairness. Alternatively, the agency could obtain per-acre quotes from multiple land

350 Languages Spoken in U.S. Homes (Nov. 3, 2015), https://www.census.gov/newsroom/press-releases/2015/cb15-185.html [https://perma.cc/EB6M-B4AD].

135. Therefore, a fair amount of cost spreading will occur between economically powerful and economically weak landowners in the fireshed; this cost spreading is justified on the grounds that it will ultimately produce net gains for all landowners in the form of marked—and even—reductions in wildfire risk to private property across the fireshed.

136. This litigation would be premised on the idea that the noncomplying landowners breached their fiduciary duty to the complying landowners.

management companies that work in or near the fireshed.[137] The oversight agency could then average these quotes for each category of land management activity to create a table of reasonable per-acre costs, by category, that could be used to check against the costs listed in submitted land management agreements.

One major benefit of the former cost-review process is that it avoids the potential for price fixing. If the expert charged with approval of costs is familiar with the typical fees for brush hauling and the like, it would be difficult for companies in particular firesheds to collude with one another and submit artificially high cost figures. One major benefit of the latter cost-review process is that it builds in the potential to closely track the costs for particular land management services as the service providers adjust these costs. With the provision that a cost-approval process must be spelled out in the statutes, the particularities of the process are best left to the states, as laboratories,[138] to work out.

The costs likely to come up in land management agreements, that forest services or their equivalents ought to consider reasonable, include costs related to multiple activities in the process of fireshed land management. First, the costs of tree cutting, brush clearing, and disposal of brush should categorically be treated as reasonable if they match the going rate for brush-clearing services in the area—checked against the respective average table—or the land management expert deems them reasonable. Second, costs relating to transportation, both to and from the land, should also be treated as reasonable so long as they receive proper approval by way of either average-cost comparison or expert review. Transportation of the brush to a disposal site or mulching/compost facility should also be treated as reasonable, unless the ownership or location of the site or facility raises self-dealing concerns.[139] Third, monitoring costs relating to fireshed tracts will undoubtedly be featured among the greatest hits of submitted land management costs. These costs should likewise be considered reasonable, subject to approval by cost comparison or expert review.

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137. The particular land management activities for which prudent oversight agencies would obtain quotes include tree cutting, brush clearing, brush hauling, and brush disposal, to name a few.

138. *See* New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting) ("It is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country.").

139. If the disposal site or mulching/composting facility is owned by one of the landowners in the subject shed, self-dealing concerns would be present. If the site or facility is not the nearest facility to the land that would be cleared pursuant to the agreement, more nuanced self-dealing concerns would be present. The latter situation would require prudent land management officials with the forest service to inquire as to the selection of the particular site or facility, probing for potential benefits to the operating landowner. This situation could of course be avoided if the landowners simply allow the company clearing the land to select the site or facility at which its workers will deposit the brush.

With regard to monitoring schema, states could utilize agency employees to review satellite data as a means of ensuring compliance with the agreements.[140] If a particular state's forest service budget is tight, the state could hire programmers to code an application that would monitor available satellite imagery and use some sort of algorithm to identify whether particular landowners are complying with the provisions of their governing land management agreements. An administrative monitoring process would generate the positive externality of leveraging economies of scale[141] to eliminate the need for landowners to fund monitoring efforts on an individualized basis.

As one potential maneuver to financially prop up state forest service entities and allow them to provide the sort of expert review vital to the proposed regulatory regimes, states could engage in aggressive *parens patriae* litigation against negligent land managers.[142] To ensure that states are able to maintain *parens patriae* suits based on public nuisance, states could include provisions in the conjugate statutes referencing public nuisance and expanding the tort's scope with regard to large wildfires.[143] As a matter of logic, the states would have incentive to sue only those negligent land managers who are flush with capital—the individuals representing the greatest potential for the states' investment in the litigation paying off. By way of financing *parens patriae* suits, states could solicit investment in litigation by private litigation-funding entities; no principled rationale exists to prohibit states from borrowing money from litigation funders in the same manner as they regularly borrow from other lending institutions.[144]

States could deposit any money recovered from the *parens patriae* actions into a fund that would be used as a boon for state forest-service agencies in their oversight of the land management plans generated pursuant

140. Data generated by the Landsat satellite program is in fact commonly used to events bearing on land use such as crop yields. *See* Kenneth J. Markowitz, *Legal Challenges and Market Rewards to the Use and Acceptance of Remote Sensing and Digital Information as Evidence*, 12 DUKE ENVTL. L. & POL'Y F. 219, 225 (2002) (listing the land-monitoring applications of the Landsat 7 satellite, which include observing "forestry, crop monitoring, land cover, land use, and watersheds"). The Landsat program is currently producing data from Landsat 8, which was launched on February 11, 2013. *Landsat 8*, U.S. GEOLOGICAL SURV., https://landsat.usgs.gov/landsat-8 [https://perma.cc/XGS5-5GYK].

141. The reference to "economies of scale" is intended to reflect the increase in cost savings that results from an increase in efficiency when moving from small-scale to large-scale efforts, as a general proposition. *See Economy of Scale*, BLACK'S LAW DICTIONARY (10th ed. 2014) (providing, as one definition for the term, "savings resulting from the greater efficiency of large-scale processes").

142. *Parens patriae* actions are public lawsuits brought by the state in its quasi-sovereign capacity on behalf of its citizens, premised on the idea that the state possesses an interest distinct from the interests of its citizens. Anthony J. Sebok, *Private Dollars for Public Litigation: An Introduction*, 12 N.Y.U. J.L. & BUS. 813, 820 (2016).

143. These particular provisions are fleshed out in section (4) of this subpart, "Detailed Features of Echoic Statutory Regimes."

144. Sebok, *supra* note 142, at 827–28.

to the statutory derivatives. In addition to its utility in bankrolling oversight efforts, this fund could be exceedingly significant in the effort to raise landowner awareness of the dangers of negligent land management, by financing landowner information campaigns. The collective increase in awareness that would likely be effected through such campaigns would generate astronomical positive gains in terms of curbing deleterious landowner behavior that is partially to blame for spiraling suppression costs.[145]

In addition to *parens patriae* funding, states and the federal government would do well to develop other means of funding the stringent agency review that would be required to minimize self-dealing and the tyranny of the majority in fireshed land management contracting. State regulation of negligent land management falls squarely within the ambit of state police power, like legislative efforts aimed at addressing issues of health, safety, and welfare of a state's citizens.[146] Based on this proposition, funding of oversight efforts ought to fall on the states themselves, perhaps with the assistance of the federal government if necessary.[147]

3. Relevant Hypotheticals.—Hypotheticals demonstrating the effectiveness of compulsory-unitization and forced-pooling statutes working in tandem with regard to both macro- and micro-level land management in the fireshed abound. Suppose a small portion of a fireshed contains a grove of a certain type of highly flammable tree—mountain cedar, for instance[148]—which spans the tracts of multiple landowners. In order to address, with

145. State and federally funded information efforts would likely generate the landowner literacy, regarding wildfires and land management, necessary to solve the vexing problem posed by negligent private land managers, in conjunction with statutory echoes. States have every incentive to fund these campaigns. Given the vastness of the federal budget, the U.S. government is impacted by markedly less powerful incentives to fund landowner information campaigns. Therefore, the responsibility for informing WUI residents of the power they possess to tamp out the wildfire problem appears to fall on the states.

146. *See* Santiago Legarre, *The Historical Background of the Police Power*, 9 U. PA. J. CONST. L. 745, 745 (2007) (quoting Barnes v. Glen Theatre, Inc., 501 U.S. 560, 569 (1991)) (quoting the Supreme Court's definition of the "traditional police power of the States" as "the authority to provide for the public health, safety, and morals").

147. At the state level, one simple means of increasing available funding for oversight and monitoring efforts would be a very slight increase in property taxes.

148. The tree referred to, both in this Note and conventionally, as "mountain cedar," is in fact a species of juniper—*Juniperus ashei*, to be precise. Patricia Sharpe, *Texas Primer: Cedar Fever*, TEX. MONTHLY (Mar. 1986), http://www.texasmonthly.com/the-culture/texas-primer-cedar-fever/ [https://perma.cc/V3YM-MZXX]. The resin within mountain cedar renders the trunks and branches exceedingly flammable in times of drought, creating a dangerous situation in "developed portions" of the Texas Hill Country "where sparks can ride high winds, igniting fires that race up steep slopes." Marty Toohey, *Why Can't We Just (Sniff) Wipe Out Austin's (Achoo!) Cedar Trees?*, AUSTIN AM.-STATESMAN (Jan. 12, 2017), http://www.mystatesman.com/weather/why-can-just-sniff-wipe-out-austin-achoo-cedar-trees/gqm7oTA22fMH9DFRgqfoYI/ [https://perma.cc/7ZVG-2YWR].

specificity, the land management procedures necessary to effectively reduce wildfire risk in the region of the fireshed in which the grove of cedar trees stubbornly lies, the landowners must—logically—contract for particularized services. These small-scale agreements should also be subject to the review of the state forest service, as they will in some cases be more important from an efficiency standpoint than the high-level contracts entered into pursuant to the compulsory-unitization statutes.

Suppose, further, that one of the unfortunate landowners in the blighted region within the fireshed containing the flammable trees happens to be highly skilled in the esoteric practices necessary to effectively clear out the pesky mountain cedar.[149] This additional wrinkle in the hypothetical is not a far-off prospect. Individuals who have had to engage in some level of private land management over the years in which they have owned property in the WUI likely have more expertise handling the particular features of their land than do individuals whose land does not contain those features. The skilled landowner would be the best choice for a land manager, in terms of the specific project of clearing the mountain cedar, but not in terms of all land management projects in the fireshed generally. A forced-pooling statutory analogue on top of the compulsory-unitization statutory analogue would allow for the attention to detail necessary for this landowner to get the contract for the micro-level job, as it were, pending approval of the oversight agency.[150]

In the possible event that more than one landowner possesses the ability to remove the cedar, and all of the able landowners are equally skilled, the state agency charged with review of the land management agreements must necessarily choose between these individuals. In light of the equity considerations enshrined in the recommended statutory derivatives, this hypothetical choice between equals is a simple one: the oversight agency must select the landowner with the greatest economic need as the land manager for the particular JOA related to the task of cedar removal. One positive externality associated with rewarding the economically disadvantaged landowner with the job is that he or she will be more equipped to front costs associated with further macro- or micro-level agreements, drawn up under the conjugate statutory regimes, in the future. Notably, this result would only occur in a narrow set of circumstances. First, the state

149. *See* Joe Nick Patoski, *The War on Cedar*, TEX. MONTHLY (Dec. 1997), http://www.texasmonthly.com/articles/the-war-on-cedar/ [https://perma.cc/A94T-QCWJ] (quoting a rancher describing the elaborate process of cutting cedar: stacking "the dead wood in windrows on a slope to catch soil and runoff," keeping "dead branches around the trunk trimmed back," and cutting "any new growth").

150. As explored above, the reviewing agency would be statutorily permitted to approve the agreements only after a thorough review of their implications, including a detailed examination of the likely impacts of self-dealing on other landowners and a finding that any self-dealing would have no negative effects on other landowners in the shed.

oversight agency would have to find that multiple landowners are equally capable of a land management task. Second, the agency would have to find that the self-dealing effected by appointing any of these capable landowners to the position of land manager for the specific task outlined in the agreement would be fair and equitable to all other landowners.

4. Detailed Features of Echoic Statutory Regimes.—In reference to the earlier mention of explicit statutory encoding of nuisance law, states could include a number of relevant statutory provisions in this vein. Public and private nuisance are two disparate—but related—sorts of tort liability.[151] One primary distinction between the two classes of liability is the essential right on which plaintiffs base suits. Public nuisance claims are premised on violations of rights shared by all members of the public, whereas private nuisance claims are based on violations of an individual's right to the private use and enjoyment of her land.[152] Another significant distinction between public and private nuisance is the entity possessing the authority to sue. Illustrative of the typical public nuisance regime, in North Dakota, public nuisance actions may only be maintained by a private individual "if the public nuisance is 'specially injurious to himself or his property.'"[153] Similarly, in Texas, a county "or a person affected or to be affected" by public nuisance violations—including property owners, neighborhood residents, or an "organization of property owners or residents of a neighborhood"—may sue for abatement of public nuisances.[154] Remedies available to victims of public nuisance are civil actions or abatements.[155] A majority of states have enacted statutes that courts have interpreted to encompass common law public nuisance.[156]

With regard to private nuisance suits, plaintiffs' injuries must be specific to the plaintiffs as a result of a nuisance condition's proximity to the plaintiffs' homes.[157] Private nuisance actions typically involve "a single individual or a small group of individuals" harmed by a defendant's conduct.[158] Like public nuisance actions, private nuisance claims are premised on the idea that the defendant harmed the beneficial use and

151. David R. Bliss, *Tilting at Wind Turbines: Noise Nuisance in the Neighborhood After* Rassier v. Houim, 69 N.D. L. REV. 535, 538 (1993).

152. *Id.*

153. *Id.* at 539 (quoting N.D. CENT. CODE § 42-01-08 (1983)).

154. TEX. HEALTH & SAFETY CODE ANN. § 343.013(a)–(b) (West 2010).

155. Bliss, *supra* note 151, at 539.

156. *Id.* An exemplary statute in this vein is the North Dakota public nuisance statute, which defines "a public nuisance as one which affects an entire community, neighborhood, or any considerable number of persons." *Id.*

157. Bliss, *supra* note 151, at 540.

158. LaVonda N. Reed-Huff, *Dirty Dishes, Dirty Laundry, and Windy Mills: A Framework for Regulation of Clean Energy Devices*, 40 ENVTL. L. 859, 891–92 (2010).

enjoyment of the plaintiffs' private property.[159] In some states, plaintiffs may avail themselves of strict liability theories in nuisance claims if the defendants engaged in "abnormally dangerous" conduct or conduct that involves an abnormally "dangerous substance" creating a "'high degree of risk' of serious injury."[160]

In order to encourage public and private nuisance litigation, first, states would do well to include provisions defining private nuisance in the conjugate statutory regimes. Legislators could word these provisions so as to deliberately expand the common law understanding of the tort. More precisely, legislators could draft provisions in the statutory derivatives that explicitly include unreasonable caretaking of slash, failure to reasonably clear brush, and unreasonable management of live vegetation—all on private property—within the definition of private nuisance. The third category could include omissions such as failure to reasonably trim trees as a means of mitigating the potential for canopy fires.[161]

On top of expanding the definition of private nuisance by statute, legislators could draft the forced-pooling and compulsory-unitization analogues with explicit provisions extending the tort of public nuisance to situations involving specific landowner conduct. The recommended provisions would state that conduct committed with gross negligence or recklessness and involving the destruction of large acreage would give rise to public nuisance actions against the grossly negligent or reckless landowners. Primarily, the provisions would be designed to further curb negligent fireshed land management. Addressing one positive externality generated by the provisions, extending public nuisance to negligent and reckless private landowner conduct would increase the potential for *parens patriae* actions based on public nuisance claims. As explored in the preceding subpart, these actions could prove vital to states as part of a mechanism to bankroll the stringent agency-review processes required for the statutory derivatives to operate equitably as to private fireshed landowners both large and small.

With regard to the forced-pooling derivatives in particular, states lacking the resources for both macro- and micro-level land management monitoring could potentially leave small-scale monitoring to the parties to the agreements. Perhaps one or more private landowners entering into a JOA with respect to wildfire fuel reduction in a fireshed could engage in the land

159. *Id.* at 892.

160. *See* Crosstex N. Tex. Pipeline, L.P. v. Gardiner, 505 S.W.3d 580, 609 (Tex. 2016) (discussing Turner v. Big Lake Oil Co., 96 S.W.2d 221, 222 (Tex. 1936)).

161. The National Park Service defines canopy fires as the fires that scorch the highest foliage layer on trees and are the most intense—and often most challenging to contain—of all types of wildfire. *Fire Spread*, NAT'L PARK SERV., https://www.nps.gov/fire/wildland-fire/learning-center/fire-in-depth/fire-spread.cfm [https://perma.cc/G8MF-R5VW].

management monitoring activities themselves by way of drone[162] or a thorough review of Landsat imagery by third-party land management experts. Although glaring economies of scale attend agency-level monitoring, small-scale efforts would be more amenable to private monitoring than large-scale efforts. This is due to the compressed time frame and small geographic scope of the JOAs, relative to the broad, long-term agreements contemplated by the unitization statutory echoes.

Conceivably, a JOA could even appoint an individual who owns part of the fireshed to serve as the satellite data reviewer, if the person has relevant experience sufficient to qualify her for the task of ensuring compliance with the various agreements between the landowners of contiguous private tracts. As crafted, the statutes would protect against damage to other landowners by this sort of self-dealing. Orders approving JOAs placing landowners in monitoring capacities—placements amounting to self-dealing on the part of the monitoring landowners—would have to contain reasonableness, fairness, and equity findings.

B. Recommended Modifications to Existing Statutory Regimes

Typical forced-pooling statutes in the area of oil and gas law merely allow pooling, rather than providing some independent incentive to pool.[163] The same proposition is true with regard to compulsory-unitization statutes across the board.[164] A vast majority of states require a minimum percentage of consenting working interest and royalty interest holders prior to ordering unitization.[165]

In terms of encouraging the use of the statutory echoes, the recommended fireshed land management statutes would be written to include

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162. Indeed, modern drone technology is increasingly employed by land surveyors, as drones are now capable of collecting "geo-referenced digital aerial images, with resolutions as sharp as 1.5 cm (0.6 in) per pixel." *Drones for Surveying*, SENSEFLY, https://www.sensefly.com/applications/surveying.html [https://perma.cc/3L9R-2UM4].

163. *See, e.g.*, TEX. NAT. RES. CODE ANN. § 102.011 (2017) (providing that the Texas Railroad Commission, on a landowner's application "and for the purpose of avoiding the drilling of unnecessary wells, protecting correlative rights, or preventing waste, shall establish a unit and pool all of the interests in the unit" within an area of specified acreage).

164. *See* 52 OKLA. STAT. ANN. § 287.3 (2017) (setting out "the filing of a petition," as well as "notice and hearing," as prerequisites to the Corporation Commission ordering unitization of property interests).

165. *See* BRUCE M. KRAMER & PATRICK H. MARTIN, THE LAW OF POOLING AND UNITIZATION § 18.02(4)(b) (3d ed. 2016) (relating that all states with compulsory-unitization statutes on the books, other than Alaska, have codified a minimum-consent requirement). In the single case that addressed the constitutionality of minimum-consent requirements, the Supreme Court of Oklahoma held that these requirements are not mandatory under either the Oklahoma Constitution or the U.S. Constitution. *See* Palmer Oil Corp. v. Phillips Petroleum Co., 231 P.2d 997, 1004 (Okla. 1951) (holding that the legislature possesses the power to withhold the right to protest unitization from royalty interest holders, deriving from the legislature's "police power to enact the law without the consent of either lessees or royalty owners," and stating that statutorily allowing either group of interest holders to consent was optional).

positive incentives. One simple means of introducing a positive incentive would be to provide tax breaks to landowners who consent to agreements under the statutes. Again, as long as state legislatures include some form of powerful positive incentive in the statutory derivatives, the specific incentives—from the array of candidates—are best determined by the states in their capacities as laboratories of democracy.

Broadly, the primary benefit of hydrocarbon-development statutory derivatives is the deterrence of negligent land management, augmented by state and federally sponsored private landowner information campaigns. Additionally, these statutes would overcome the significant transaction costs involved in joining together disparate, contiguous private landowners in the fireshed for joint land management efforts.[166] With the detailed features of the forced-pooling and compulsory-unitization statutory echoes laid out, this Note now turns to an exploration of existing features of wildfire suppression and *ex ante* land management which would work more efficiently, in conjunction with the statutory derivatives, if modified from their current forms.

V. Related Policy Proposals

To be sure, the inefficiencies relating to ex ante wildfire risk reduction in the WUI cannot be solved exclusively by enacting forced-pooling and compulsory-unitization statutes to govern the actions of private landowners. This Part outlines other culpable actors generating inefficient results in firefighting and land management in firesheds across the United States, alongside policy proposals to better align relevant incentives.

A. Moral Hazard: A Reality in the Fireshed?

The age-old worry of moral hazard with regard to insurance[167] appears to be vindicated to some degree in the context of homeowner-insurance policies in fire-prone areas of the country. Homeowners in the WUI nearly all carry home-insurance policies that cover wildfire loss,[168] and the availability of federal disaster assistance disincentivizes insurers from

166. *See* Schulz & Lueck, *supra* note 20, at 2536 (stating that individual landowners in the fireshed desire "to protect against wildfire risk and engage in *ex ante* management of the wildfire resource," despite the fact that these landowners are heterogeneous and the fact that "high transaction costs provid[e] a bar to bargaining").

167. That is, the worry that insurance at large has the effect of increasing careless behavior respecting insured property, which ultimately leads to higher insurance payouts. *See, e.g.*, Alston v. Pheonix Ins. Co., 27 S.E. 981, 982 (Ga. 1897) (characterizing the "delivering of a mortgage upon insured property" as a "moral hazard," since it "tends to lessen the interest of the mortgagor in the safety and preservation of the property").

168. *See* Schulz & Lueck, *supra* note 20, at 2536 (asserting that "[h]ome insurance among homeowners in wildland urban interface areas is ubiquitous" and "[s]tandard homeowner insurance provides private compensation for losses caused by fire").

adjusting premiums based on wildfire risk.[169] Thus, homeowners in the fireshed have the ability to obtain insurance at rates disproportionate to the risk they assume by living in wildfire-prone areas.[170]

To curb the moral hazard generated by current wildfire policies in the United States—a conundrum perpetuated by both governmental and private actors—insurers would do well to peg homeowner-insurance policies to actual fire risk in the WUI. By charging "actuarially sound premiums for wildfire insurance,"[171] home insurers in the WUI could do their part to reduce development in areas with exceedingly high rates of wildfire damage, which they could identify using fire-suppression cost figures. Since the home-protection component of wildfire-suppression costs likely makes up the bulk of fire-suppression costs across the board,[172] reducing development in the WUI is one of the most vital maneuvers in the effort to drive down annual wildfire-fighting costs.

B. State Options in Addition to Oil and Gas Statutory Derivatives

In terms of measures that would incentivize efficient land management with respect to wildfire risk, states and the federal government have a myriad of options at their disposal on top of statutes derived from oil and gas law.

1. Amending Slash Laws to Invite Tort Suits.—First, states would be wise to amend slash laws to cover all land management activities that impact the presence of wildfire fuel sources on private property. Massachusetts hits closer to this mark with its slash statute than any other state. However, the issue with Massachusetts's slash statute is that it regulates only landowner behavior as it relates to slash buildup caused by various wood-cutting activities.[173] The recommended slash statutes would not only cover both commercial and noncommercial activities but would also include regulation of landowner inactivity—that is, landowner failure to clear private property of slash. The target of the latter category of regulated behavior would be slash

169. Bradshaw, *supra* note 28, at 464 (quoting Richenda Connell et al., *Evaluating the Private Sector Perspective on the Financial Risks of Climate Change*, 15 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 133, 138–39 (2009)).

170. Bradshaw, *supra* note 28, at 462.

171. As detailed in Part III, at least one academic has proposed that the federal government create a national wildfire insurance program similar to the National Flood Insurance Program, with premiums based on "wildfire suppression costs" in particular areas within the WUI. Reilly, *supra* note 75, at 542, 544, 561.

172. HEADWATERS ECON., *supra* note 9, at 10 (reporting a finding by the U.S. Department of Agriculture's Office of Inspector General that land managers attributed 50% to 95% of wildfire-fighting costs "to the defense of private property").

173. *See* MASS. GEN. LAWS ch. 48, § 16A (2017) (requiring disposal of slash left over from brush, wood, and timber cutting).

that accumulates as a result of the natural process of decay, resulting in tree litter and brush that serves as wildfire fuel.

In addition to broadening the scope of slash laws, states could include tort-liability provisions within the penalty sections of slash laws. Legislators could include two features in these provisions that would likely increase deterrence of negligent private land management. First, drafters could include statutory damage provisions for civil tort suits alleging violations of the modified slash laws. Second, legislatures could statutorily lower the burden of proof for these tort suits to substantial evidence,[174] a burden the Supreme Court has defined as "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion."[175] Although suits in tort are not commonly tried under this burden,[176] compelling reasons exist for legislators to codify this burden in modified slash statutes.

Substantial evidence is preferable to preponderance, since these cases would likely be difficult to prove, even with state-implemented land-monitoring programs that would produce some of the necessary evidence. Lowering the burden from preponderance would provide a toothier threat against negligent land managers, which would further incentivize them to manage their land to a reasonable degree.

2. Enacting Cost-Recovery Statutes.—In addition to amending slash statutes, states would do well to enact statutes explicitly providing the forest service the capacity to recover costs from landowners, using the Oregon Wildland-Urban Interface Fire Protection Act as a model.[177] These sorts of statutes would be particularly useful in dealing with groups of landowners in firesheds that come up with reasonable land management agreements, gain the necessary stamp of approval from the state forest service agencies, and then simply return to business as usual. One can conceive of a fireshed full of private landowners who resent the idea of the tyrannical state government

174. Substantial evidence is a lower burden than the applicable burden in typical tort cases, preponderance of the evidence. Sarah T. Zaffina, *For Whom the Bell Tolls: The New Human Resources Management System at the Department of Homeland Security Sounds the Death Knell for a Uniform Civil Service*, 14 FED. CIR. B.J. 705, 728 n.143 (2005).

175. Consol. Edison Co. of N.Y. v. Nat'l Labor Relations Bd., 305 U.S. 197, 217 (1938).

176. However, in certain states, specific torts do indeed require proof by substantial evidence rather than preponderance of the evidence. As an example, in claims for tortious interference with contract in at least two states, plaintiffs must produce substantial evidence establishing a lack of justification or absence of privilege to show unlawful interference and means. 86 C.J.S. TORTS § 101 & nn.17–18 (2017); *see also* Nazeri v. Mo. Valley Coll., 860 S.W.2d 303, 316–17 (Mo. 1993) ("A plaintiff has the burden of producing substantial evidence to establish a lack of justification.").

177. This Act, plumbed in Part II, allows for cost recovery of suppression costs, up to $100,000, from WUI landowners when a fire started on their property; the fire spread "within the protection zone" surrounding a building and driveway which were not up to the fuel-reduction standards specified in the statute; and the costs expended to suppress the fire were "extraordinary." Bradshaw, *supra* note 28, at 462 n.80. The $100,000 cap is eliminated in cases of negligence. *Id.*

effectively compelling them to manage their land in particular ways, and who therefore sign off on what they see as red-tape paperwork without the intent to ever follow through. Cost-recovery statutes would allow states to address the vexing problem posed by this type of landowner.

As an incidental note, cost-recovery statutes would help offset the "implicit subsidy" that incentivizes private landowners to continue to plunge deeper into the WUI under the U.S. wildfire law and policy regimes as they now stand.[178] This is so because, as explored briefly above, the wildfire-related costs that WUI homeowners bear are disproportionate to the risk these homeowners incur by virtue of building in high-fire areas.[179] States could deposit the revenues collected pursuant to the cost-recovery provisions into the oversight and monitoring fund discussed in the previous Part.[180] As a positive-feedback loop, increased oversight would likely generate extensively greater revenues by way of increasing detection of negligent land managers after large fires, which would in turn allow for the development of more robust detection capabilities, which would in turn compound penalty revenues, and so forth.

C. Role of Nuisance Litigation in Aligning Fireshed Incentives

An examination of the role of public and private nuisance litigation in deterring negligent land management will prove an ideal bookend to this Note's primary analysis, prior to addressing ancillary standing issues in the following subpart. As explored in section IV(a)(ii), "Institutional Design," the recommended statutory echoes would contain provisions expanding the definition of private nuisance and extending public nuisance to encompass grossly negligent and reckless land management.

In order to further deter negligent land management in the WUI, municipalities, the private plaintiffs' bar, and states—in cases of large-acreage damage at the hands of grossly negligent or reckless landowners—ought to be vigorously pursuing public and private nuisance claims against negligent land managers. Such suits could be ideal tools in the fight to decrease fire-suppression costs by incentivizing efficient land management

178. LUECK, *supra* note 117, at 83.

179. This is largely due to the ubiquity of homeowners' insurance in the WUI, and the fact the premiums for same "do not reflect the actual risk of living in the WUI." Reilly, *supra* note 75, at 555.

180. Some states—like Texas—would likely use some of the money generated from land management tax revenues for other purposes when the states' budgets are tight. *See* Ross Ramsey, *Analysis: Lawmakers Can Turn to a Bag of Tricks to Balance State Budget*, TEX. TRIB. (Feb. 15, 2017), https://www.texastribune.org/2017/02/15/analysis-lawmakers-can-turn-bag-tricks-balance-state-budget/ [https://perma.cc/YXX6-BLJA] (describing the many means by which the Texas legislature regularly constructs the façade of a balanced budget, including "taking money set aside for other uses"). Certainly, this practice is reprehensible.

efforts *ex ante*. Standing may inhibit these uncommon suits.[181] Specifically, private plaintiffs and municipalities may face challenges proving that the injury of damaged land and property can be traced to the action of negligent land management. Standing issues with regard to all tort suits discussed in this Note are taken up in the following subpart.

D. Standing Issues for Tort Victims in the WUI

Standing under Article III of the U.S. Constitution is a prerequisite to a plaintiff's ability to maintain a federal lawsuit and requires plaintiffs to show three elements: (1) a particularized injury; (2) traceability of the injury to the challenged action; and (3) the ability for a favorable ruling to redress the injury.[182] The first element is known as "injury in fact," and requires that the plaintiff "personally suffered some harm."[183]

Although this three-pronged conception of standing requirements applies in suits brought in federal court, state standing doctrine typically tracks Article III standing doctrine, though the requirements may depart from the federal conception in certain respects and may derive from particular statutory regimes.[184] If they vary from federal requirements, state standing requirements are generally less onerous than Article III standing requirements.[185] Standing requirements in certain states' courts can be met by proof that the plaintiff "is within the class of persons intended to be protected by a statutory damages scheme," irrespective of any actual harm to the plaintiff.[186] Other states, however, more closely hew to the Article III standard with regard to standing requirements and therefore require plaintiffs to prove actual injury in order to maintain tort suits.[187]

The injury-in-fact prong will not be difficult to prove for plaintiffs whose homes are burned to crisps. The more onerous requirement will be proving traceability of the injury to the action of negligent land management—causation, by another name.[188] Courts have elaborated on the

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181. Indeed, nuisance claims for negligent land management are rare. *See* Yoder, *supra* note 49, at 306–07 n.15 ("Although nuisance claims for smoke from prescribed fires are commonplace, nuisance claims for the wildfire risk due to poor vegetation management in fire-prone areas is [sic] uncommon.").

182. Lujan v. Defs. of Wildlife, 504 U.S. 555, 560–61 (1992); *see also* Edward Sherman, *"No Injury" Plaintiffs and Standing*, 82 GEO. WASH. L. REV. 834, 836 (2014).

183. Sherman, *supra* note 182, at 836.

184. *Id.* at 836–37.

185. Paul Karlsgodt, *Statutory Penalties and Class Actions: Social Justice or Legalized Extortion?*, 90 DENV. U. L. REV. ONLINE 43, 46 (2013).

186. *Id.*

187. *See* Brief of the Chamber of Commerce of the United States of America et al. as Amici Curiae Supporting Petitioner at 4–7, Spokeo, Inc. v. Robins, 136 S. Ct. 1540 (2016) (No. 13-1339) (providing a list of states requiring proof of injury in fact as a standing prerequisite).

188. *See* Rothstein v. UBS AG, 708 F.3d 82, 91 (2d Cir. 2013) ("The traceability requirement for Article III standing means that the plaintiff must 'demonstrate a causal nexus between the

traceability-of-injury requirement as a "lesser burden" than the requirement of showing proximate cause in a complaint.[189] Thus, in order to ensure that plaintiffs whose homes are burned in a given fireshed as a result of negligent management of adjacent tracts have standing to sue in all states, plaintiffs should endeavor to show proximate cause. In terms of widespread damages in a given fireshed, organizations of landowners may be able to maintain suits as entities in and of themselves, as long as they can show that their members have standing.[190] With respect to trial strategy, a fire-origin expert would likely be necessary to prove proximate cause, as is the case in the run-of-the-mill personal injury suit based on fire damage.[191]

Tort suits for slash law violations would only be viable with regard to certain types of wildfires, due to the difficulty of effective monitoring of large segments of private land. The most viable type of wildfire damage on which civil plaintiffs would be able to sue would be damage from fires resulting from negligent land management—slash buildup, for instance—around the edges of private tracts. The paradigmatic case of this type of tract-edge wildfire is the Bastrop Complex Fire of 2011.[192] Although plaintiffs would still be able to go after public entities, in some cases, for failures to maintain terrain explicitly under their charge,[193] statutory damage provisions for suits against private landowners would provide an incentive for land managers to remove the hazardous fuel sources on their property.

In the same vein as the state-implemented Landsat data review programs, it may be possible for states to fund the coding of programs that sift through Landsat data after a large fire and algorithmically determine the probable origin of the fire. These programs could then cross-reference that

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defendant's conduct and the injury.'" (quoting Heldman v. Sobol, 962 F.2d 148, 156 (2d Cir. 1992))).

189. *Id.* at 92 (quoting Lerner v. Fleet Bank, N.A., 318 F.3d 113, 122 n.8 (2d Cir. 2003)).

190. *See* Friends of the Earth, Inc. v. Crown Cent. Petroleum Corp., 95 F.3d 358, 360 (1996) (noting that associations have standing to bring suits on behalf of their members when the members "would otherwise have standing to sue in their own right," the interests the organizations seek to protect are "germane" to the purposes of the organizations, and "neither the claim asserted nor the relief requested" in any suit brought by an organization "requires the participation of individual members").

191. *See, e.g.*, Fireman's Fund Ins. Co. v. Canon U.S.A., Inc., 394 F.3d 1054, 1056–58, 1060 (8th Cir. 2005) (holding the district court properly excluded expert opinions on fire origin as unreliable in a strict products liability case).

192. *See Bastrop Victims Sue Utility, Claim Negligence*, AUSTIN-AM. STATESMAN, Sept. 27, 2011, at A8 (outlining Texas Forest Service findings that "trees that crashed into overhead power lines probably caused the Bastrop fire," as a result of heavy winds that "apparently knocked down trees that tumbled into the electrical lines at two locations, causing sparks that fell into the dry grass and tree litter below").

193. After the Bastrop Complex Fire of 2011, Bluebonnet Electric Cooperative, Inc. ended up settling with the plaintiffs in the Bastrop Complex Fire lawsuit in 2014; the fire was the most expensive wildfire in Texas history. Jess Krochtengel, *Texas Utility Settles Dozens of Suits over 2011 Fires*, LAW360 (Mar. 31, 2014), https://www.law360.com/articles/523690/texas-utility-settles-dozens-of-suits-over-2011-fires [https://perma.cc/D3UX-ZJPN].

data with more detailed, publicly available satellite images of the land on which the fire started. Creating a database of this cross-referenced information would likely drive down expert fees in litigation, as experts would have access to a majority of the data they would need to determine the origin of the fire. Consequently, more private plaintiffs would sue in tort, and land managers would be further deterred from negligently allowing slash and other wildfire fuel to accumulate on their property.

Conclusion

In sum, the most efficient means of aligning incentives with respect to land management as it relates to wildfire risk are delivered primarily in the form of state legislative action. In order to reduce the risk of wildfires by shaping wildfire law around the conception of the fireshed as a commons, state legislatures would do well to enact three measures. First, state legislatures would do well to enact forced-pooling and compulsory-unitization statutes in the area of private land management in firesheds. Second, state legislatures would do well to either enact slash laws or amend existing laws to provide for statutory damages in tort suits alleging violations of the slash laws' land management provisions. Third, state legislatures would do well to enact cost-recovery statutes.

In addition to states, insurers; private plaintiffs' attorneys; and municipalities have distinct roles to play in improving private land management efforts in the WUI. Insurers can disincentivize negligent land management in the WUI by pegging premiums to wildfire risk. Private plaintiffs' attorneys, municipalities, and states would be wise to aggressively engage in litigation based on nuisance law of both the public and private varieties following wildfires caused by negligent land management. States can foster this litigation by statutorily expanding public and private nuisance law in the forced-pooling and compulsory-unitization derivatives. Additionally, states would do well to ameliorate specific standing issues regarding these and other tort suits for negligent fireshed land management by coding programs to monitor Landsat data and other detailed satellite images of fireshed land following large wildfires.

Taken holistically, the benefits flowing from this bundle of reforms would, this author surmises, outweigh the elevated transaction costs associated with private landowner bargaining for *ex ante* fire risk reduction in the WUI. Moreover, these reforms would form the bedrock of a coherent wildfire law regime in the United States with the concept of wildfires as common-pool resources at its core. These policy measures would likely be

able to reduce the amount of money spent annually on fighting wildfires in the WUI, and would save countless human and nonhuman lives and homes from obliteration as humanity blazes its haphazard path into the future and global temperatures climb ever higher.

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