# Effects of Liability and Regulation on Prescribed Fire Risk in the United States[1]

**Jonathan Yoder**[2]


## Abstract

In past the fifteen years, many state laws regarding prescribed fire use in the United States have been adopted and revised, and many new statutes now explicitly recognize the benefits of prescribed fire for wildfire risk mitigation. From an economic perspective, the characteristics of liability law and regulation will affect the incentives for prescribed fire use and precaution. This article examines the effect of liability law and common regulations on the incidence and risk of escaped prescribed fire. The analysis is based on annual, state-level data from 1970 to 2002 from the National Interagency Fire Management Information Database in conjunction with a categorization of statutory law. Regression results show that the incidence and severity of escaped prescribed fires tends to be lower in states with more stringent statutory liability law and regulatory restrictions. These effects are strong for private landowners burning on private land, but weak or nonexistent for public employees on federal land. The regressions control for various factors that affect baseline risk and incentives for precaution, such as land values, population demographics, the overall incidence of wildfires, and other factors. It is important to recognize that even though more lenient or less restrictive laws may lead to higher incidence and severity of escape, leniency in the context of well designed law and regulation may be useful or even optimal from a societal perspective to facilitate important vegetation management objectives.


## Introduction

Prescribed fire is the subject of increasing legislative attention and regulation in many states. For example, in the last 15 years many southeastern states have enacted legislation that explicitly recognizes careful application of prescribed fire as a public good, and simultaneously clarifies liability rules and codifies more stringent specific regulations over its use (Haines and Cleaves 1999). In contrast, the state of Washington now prohibits burning to clear grass-seed fields except under special circumstances (Washington Administrative Code 173-430-045), and in California, the Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991 prohibits burning rice straw in California except to control disease.

Liability law and regulations are designed to affect behavior. In the context of prescribed fire as a land management tool, law and regulation can affect the frequency of prescribed fire use and the care with which it is used by affecting the private expected net benefits of burning as well as the incentives for investing in precaution (Brown 1973; Yoder and others 2003). This article examines the effect of liability law and common regulations on the incidence and risk of escaped prescribed

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[2] Department of Agricultural and Resource Economics, Washington State University, yoder@wsu.edu.

fire. The analysis is based on data from 1970 to 2002 from the National Interagency Fire Management Information Database (NIFMID), in conjunction with a categorization of state statutory law. The analysis is broad in that it focuses on a broad definition of prescribed fire and uses data in aggregate form for all land cover types.

Regression results show that the incidence of escaped prescribed fires originating from private land and landowners or their agents tends to be lower in states with more stringent statutory liability law and regulatory restrictions. Public employees using prescribed fire on federal land face federal law that does not vary across states, and are not as responsive to variation in state law. The regressions analyses control for various factors that affect baseline risk and incentives for precaution, such as land values, population demographics, the overall incidence of wildfires, and other factors.

## Effects of Liability on Prescribed Fire Use and Precaution

Consider a simple representation of the expected number and overall severity of escaped prescribed fires in a state: $E[\text{damage}] = D_{ij} \cdot n_{ij}(x) \cdot p_{ij}(y)$, where $D_{ij}$ is average potential costs of an escaped prescribed fire in state $i$ and year $j$ (including, for example, damage and suppression costs), $n_{ij}$ is the number of prescribed fires started for vegetation management purposes in state $i$ and year $j$, and $p_{ij}$ is the fraction of those fires that escape. Given this definition of expected damage, the expected number of prescribed fire escapes is $n_{ij}(x) \cdot p_{ij}(y)$. The values $n_{ij}$ and $p_{ij}$ are indirect in that precautionary inputs are implicit in them, and the arguments $x$ and $y$ include exogenous factors that affect the values of $n_{ij}$ and $p_{ij}$ both directly and through their effects on the behavior of land managers who use prescribed fire. For example, one would expect that number of prescribed fires applied in a given state or year ($n_{ij}$) would decline if the benefits from prescribed fire were low for some reason, or the risks of escape were especially high for a given level of precaution. On the other hand, if the marginal costs of prescribed fire precaution were low, then more fires would be started and more precaution would be used, leading to an increase in $n_{ij}$ and a decrease in $p_{ij}$. Due to the available data, this analysis will examine the total acreage of wildfires that started as prescribed fires as a proxy for total damage, and will therefore refer to damage in these terms below.[3]

Yoder and others (2003) develops a theoretical framework for understanding the effects of different liability rules on the use of prescribed fire. Although the discussion in that article focuses on relative efficiency of different legal rules, the model provides implications about the frequency of prescribed fire use and the degree of precaution taken. Implications following from the model about the effects of law to examined empirically in the present article can be interpreted in terms of their effect on $n$ and $p$ as discussed above.

First consider a comparison between a negligence rule, where a prescribed burn manager is liable for damage from an escape only if found negligent, and strict liability, where the burn manager who starts a fire may be held liable for damage

[3] Total acreage of wildfires started as prescribed fires is far from a perfect proxy for a measure of damage from escapes, but the two variables are likely to be strongly correlated.

regardless of how careful he or she was. Expected costs to the burner of an escaped prescribed fire will be higher for individuals applying prescribed fires under strict liability. Therefore, prescribed fires will be used less often under strict liability than under negligence rules, more precaution will be used under strict liability than under negligence, and prescribed fire timing will tend toward less risky environmental conditions under strict liability. The implication is that, all else constant, fewer escaped prescribed fires will tend to occur under strict liability, and the total damage of wildfires due to escaped prescribed fires will tend to be lower under strict liability than under a negligence rule.

Regulatory permit systems that restrict the number and timing of prescribed fires in order to limit risks will tend to lead to fewer escaped prescribed fires and fewer acres of wildfires originating as prescribed fires. Also, stricter criminal penalties for negligence associated with an escaped prescribed fire will tend to increase expected costs to prescribed fire users. They therefore will increase their precaution in terms of timing and effort. Stricter criminal penalties will lead to less prescribed fire use, fewer escapes, and smaller total acreage of wildfires started as prescribed fires.

Prescribed fire will tend to be used less, and precaution will be higher, when potential damage from escape is large. Therefore, fewer escapes will tend to occur when potential damage is higher. Also, per acre costs of prescribed fire use tend to be higher when the prescription area is small, and the ratio to benefits versus risk of escape will tend to be small. Therefore, to the extent that landholding size limits the geographic extent of prescriptions, prescribed fire will be used less often where landholding sizes are small.

Finally, federal employees carrying out their duties on federal land face liability under the federal Tort Claims Act; they do not directly face state liability and criminal laws. Therefore, strictly speaking, variations in state law should not lead to significant variations in the incidence and severity of escaped prescribed fires started by federal employees and originating on federal land. This result may not hold to the extent that federal employees perceive pressure to follow local laws.

Each of the hypotheses discussed above are testable in principle. The emphasis of the analysis is on the effect of law on the incidence and severity of escaped prescribed fires, but a number of control variables are included in the econometric estimation that also pertain to the non-legal hypotheses outlined above.

## Current state law and prescribed fire use

Prescribed fire laws vary across states and across years. A dataset was developed to represent the basic characteristics of state statutory code for each state and year from 1970 to 2002. A summary of 2002 law is presented in table 1.[4]

[4] For a more complete summary of state laws, see Yoder and others (2003).

**Table 1***: State statues for selected prescribed fire laws, 2002*

| Liability or property rule | State[1] |
|---|---|
| Burner strictly liability | CT, ND, NH, OK |
| Permits or bans supported by statute | AL, AZ, CA, CO, CT, FL, GA, ID, IA, ME, MA, MN, MS, NE, NV, NH, NJ, NY, OR, RI, SD, UT, WV, VT, WA |
| Criminal penalties for unattended fire or negligent escape | AL, AK, CA, MI, NJ, NM, NV, NC, OK, OR, SC, SD, TN, UT, WI, WY |
| Prescribed Burn Manager Laws | AL, FL, GA, LA, SC, TX[2] |

[1]Citations for supporting statutes are available from the author.
[2]TX has a Certified Burner law, no one had been certified as of 2002, arguably due to a difficult-to-satisfy insurance requirement.

Most states with statutory law relating to prescribed fire explicitly specify a negligence rule. In the absence of statutory law, state-level common law forms the basis for court decisions about prescribed fire liability, and common law tends to be predicated on negligence rules (American Law Reports 1994). Four states, however, impose strict liability on prescribed burners --- Connecticut, North Dakota, New Hampshire, and Oklahoma. If a fire escapes, the burner is liable for damage regardless of his or her effort to contain the fire. There are a great many subtle differences in statutory liability law for prescribed fire across states, but we focus only on the two fundamental forms, strict liability and negligence rules. For more detailed descriptions and analysis (see Yoder and others 2003).

Permits and fire bans can be interpreted as a regulatory attempt at reducing the number of high risk prescribed fires. From an economic perspective, the potential of facing criminal penalties for negligence will tend to increase the perceived costs of negligence, and so will have the effect of reducing accidental escape by increasing incentives for investing in precautionary effort. The potential effect of Prescribed Burn Manager (PBM) laws is more complex. These laws tend to reduce the stringency of liability that prescribed burn managers face, but only if they satisfy a relatively strict set of guidelines. In two cases, Florida and Georgia, PBMs are now liable only if found grossly negligent as long as an explicit set of regulatory conditions are met. From an economic perspective, reductions in liability will tend to lead to reduced incentive for care, and therefore more escaped prescribed fires. However, the stricter regulatory conditions counteract this effect. The final effect on the number and severity of prescribed fires therefore depends on the interaction between these two components of PBM laws.

## Data and Estimation

The effect of basic liability, criminal laws and regulation on the incidence of prescribed fire is examined using data from the National Interagency Fire Management Integrated Database (NIFMID). The data for this analysis have been acquired in two related but separate and incomplete forms. First, a pre-aggregated dataset was acquired through the National Interagency Fire Center in Boise, Idaho.[5] Second, fire-specific data were downloaded from KCFAST (NIFMID 2003).[6]

[5] I thank Penny Sternberg at the National Interagency Fire Center for making these data available to me.
[6]By fire-specific, I mean that each observation represents one wildfire, some of which were started as prescribed fires.

The first (pre-aggregated) dataset is based on the complete version of the second dataset, but only part of the complete fire-level data are available through KCFAST. Ideally, a "complete" dataset would include data for every state from 1970 through 2002, and it would be broken down in terms of (1) the landowner at the origin of the fire, and (2) the category of person who started the fire (e.g. landowner, contractor, public employee, or other), if the fire originated as a prescribed fire. However, neither form of the available data provide all of this information in useable form. The pre-aggregated dataset provides a breakdown of fire information in terms of general landownership categories for each of state and year up to 1997, but it does not provide information about ownership at the fire origin, or the category of people who initiated intentional management ignitions. On the other hand, the fire-specific dataset includes approximately 360,000 observations on individual fires from 1970 through 2002, but it does not include data for Connecticut, Hawaii, Iowa, Massachusetts, Maryland, New Jersey, or Rhode Island. These are not states with substantial wildfire activity, but this set includes one of the four states that have strict liability laws --- one of the legal parameters of interest for this analysis. Due to the relative incompleteness of both datasets, each is used for different aspects of the analysis.

The central focus of this paper is prescribed fire use risk. The NIFMID data have a number of categories for fires ignited intentionally for management purposes. A broad category, *debris fires*, is chosen for this analysis to represent the set of legitimately and intentionally set fires, because prescribed fire law tends to cover this range of fire use. This broad category includes subcategories such as field burning, land clearing, slash burning, and similar categories (USDA Forest Service 1998). For this broad based analysis, observations on escaped prescribed fires are included regardless of the land cover class at their origin. In particular, the data are not limited to forest land.

The analysis is comprised of three sets of regressions, each of which model the distribution of a state/year-level summary statistic of escaped debris fires as a dependent variable, regressed on a set of independent explanatory variables. The three dependent variables are (1) the number of escaped debris fires, (2) total acreage of escaped debris fires, and (3) the ratio of the number of escaped debris fires started on private land by private individuals divided by the number of escaped debris fires started on federal land by public employees. Explanatory variables include control variables, and variables to capture differences in the legal and regulatory environment. Brief data descriptions are presented in table 2, and summary statistics for all variables used in estimation are presented in table 3.

Because state law will affect private and federal incentives differently, three regressions are estimated for two of the three dependent variables: one is based on data for all land ownerships and all types of people using the pre-aggregated data; one is based only on observations for fires started on private land by private landowners and their agents;[7] and one only uses observations on fires started by public employees on federal land. Because of the comparative advantages of the two related datasets described above, the pre-aggregated dataset is used for regressions

[7]Because state law affects landowners and contractors differently it would be interesting to discern differences between these two groups as well, but there are not enough observations in one or the other of these categories to generate reasonably credible estimates.

that includes data for all people and land ownerships, but comparable state/year summary statistics from the KCFAST database are used for the other regressions.

***Table 2***: Descriptions of data used in estimation [for data not from NIFMID, sources are listed in brackets]

| **# esc. debris fires** | **Number of debris fires that escaped, by state, year.** |
|---|---|
| priv/fed escapes | Ratio: number of escaped debris fires started by private landowners on private land ÷ number of escaped debris fires started on federal land by public employees. |
| Total escaped debris fire acres | Sum of all wildfire acreage that started as debris fires. |
| fire ac., oth. causes | Sum of wildfire acreage for a state and year for wildfires that were not started as debris fires. |
| # other wildfires | Number of wildfires for a state/year that did not start as debris fires. |
| land value ($2000) | Average value of agricultural land ($US2000).[National Agricultural Statistics Service.] |
| avg. farm size | Average farm size [U.S. Census of Agriculture.] |
| federal land ac. | Total acreage of federal land [1000s acres] |
| state land ac. | Total acreage of the state [1000s of acres]. |
| population | Human population. [U.S. Census Bureau.] |
| # farms | Number of farms [U.S. Census of Agriculture.] |
| criminal penalties | Binary variable; equals 1 if state statutes specify criminal penalties for negligent escape; zero otherwise. |
| strict negligence | Binary variable; equals 1 if state statutes specify strict liability; zero otherwise. |
| permit required | Binary variable; equals 1 if state statutes support a permit for the application of prescribed fire; zero otherwise. |
| PBM law | Binary variable; equals 1 if state statutes support a law that conditionally limits liability for prescribed burn managers; zero otherwise. |
| PBM gross neg. | Binary variable; equals 1 if state statute specifies conditional gross negligence requirement for liability; zero otherwise. |

**Table 3***: Summary statistics for variables used in estimation*

| Variable | N | Mean | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| # esc. debris fires | 1274 | 14.627 | 18.227 | 0.00 | 117.00 |
| priv/fed escapes | 1274 | 0.097 | 0.116 | 0.00 | 1.00 |
| fire ac., oth. causes | 1089 | 931.689 | 5361.360 | 0.10 | 103254.00 |
| # other wildfires | 1274 | 300.799 | 515.300 | 1.00 | 3890.00 |
| land value ($2000) | 1242 | 762.868 | 436.768 | 103.35 | 2559.23 |
| avg. farm size | 1273 | 0.855 | 1.203 | 0.10 | 6.65 |
| federal land ac. | 1273 | 17443.7 | 39071.5 | 130.20 | 244626 |
| state land ac. | 1273 | 53732.8 | 56776.6 | 5740.20 | 365039 |
| population | 1273 | 4941514 | 5292405 | 302583 | 34600463 |
| # farms | 1273 | 23912.2 | 23248.9 | 420.00 | 142800 |
| criminal penalties | 1273 | 0.494 | 0.500 | 0.00 | 1.00 |
| strict liability | 1273 | 0.071 | 0.258 | 0.00 | 1.00 |
| permit required | 1273 | 0.605 | 0.489 | 0.00 | 1.00 |
| PBM law | 1273 | 0.042 | 0.200 | 0.00 | 1.00 |
| PBM gross neg. | 1273 | 0.005 | 0.069 | 0.00 | 1.00 |

The state/year summary statistics used in all regressions (regardless of data source) are based on the number of wildfires occurring in that state/year; the more wildfires, the larger the number of observations are used to calculate the summary statistic. This characteristic of aggregation leads to inherent heteroscedasticity if the number of wildfires varies across states and years (and it does). To increase asymptotic efficiency, weighted least squares was therefore used for estimation. Each variable in the regression was multiplied by $\sqrt{n_{ij}}$, where $n_{ij}$ is the number of wildfires in state $i$ and year $j$. These weights are designed such that the disturbances associated with weighted least squares are homoscedastic.

Finally, based on examination of residuals from preliminary regressions, each of the continuous variables in the analysis is transformed to natural log form (also to relieve heteroskedasticity problems). Because of the log transformation, parameter estimates associated with the continuous variables are elasticity estimates. Dummy variables are used in the regressions to represent legal characteristics of a state. For these dummy variables, the percent difference in the dependent variable between one legal regime and another (i.e. legal dummy variable=1 versus legal dummy variable=0) is 100*(exp[$c$]-1), where *exp* is the exponential function and $c$ is the parameter estimate associated with the dummy variable (Halvorsen and Palmquist, 1980). The results are presented (in table 4) as (exp[$c$]-1), so the percent difference is 100 times the value presented in the table.

## Results

Regression results are presented in table 4. The table contains three regressions on the number of escaped debris fires, three regressions on the total acreage of wildfires started as debris fires, and one regression on the ratio of escaped private fires over

escaped public (federal) fires. For each regression, the first nine rows of independent variables (excluding the intercept) are variables that attempt to capture non-legal characteristics of states for a given year. Not all of these variables are used in each regression because of the different definitions of the dependent variables. The discussion below begins with a focus on regression groups 1 and 2, after which is a discussion of the group 3 regression.

In group 1 regressions (dep. Var: number of debris fires), *# other wildfires* is included to capture the general propensity for wildfires in a given state/year, and therefore the risk associated with performing prescribed fires. For group 2 regressions (dep. Var.: total escaped debris fire acreage), *other escaped fire acres* is included as a control for general severity of wildfires for a given year and state. As might be expected, there is a statistically strong relationship between these two variables and their respective dependent variables (in all cases, $p<0.0001$). The elasticity estimates for these two variables range between 0.59 and 0.81; all less than one. This means that the incidence and severity (as measured by total acreage) of escaped prescribed fires increases less than one percent for every one percent increase in overall wildfire incidence and severity. This is consistent with a hypothesis that people performing prescribed fires tend to invest in additional precaution when wildfire risk is high, postpone prescribed burning until it is less risky to do, or forego prescribed fire altogether.

**Table 4***: Regression results*

| **Dependent variable →** | **GROUP 1: # escaped debris fires** | | | **GROUP 2: Total escaped debris fire acreage** | | | **GROUP 3: priv÷fed escapes** |
|---|---|---|---|---|---|---|---|
| Independent variables ↓ | All[1] | Private | Federal | All[1] | Private | Federal | All |
| Intercept | 4.952** | -3.329** | 0.777 | 4.848** | -4.546 | -6.504 | -5.246** |
| # other wildfires | 0.811** | 0.708** | | | | | |
| fire ac., oth. cause | | | 0.712** | 0.734** | 0.928** | 0.588** | |
| land value | -0.404** | 0.225** | -0.004 | -0.394** | -0.295 | 1.240** | 0.236** |
| population density | -0.162** | -0.102* | -0.280 ** | -0.316** | -0.022 | -0.796** | -0.113* |
| avg. farm size | -0.932** | -0.004 | -0.282 ** | -1.176** | -0.990 ** | -0.214 | -0.241** |
| federal land ac. | -0.044 * | -0.120* | 0.148** | -0.107** | 0.264 | 1.017** | -0.624** |
| state land ac. | -0.121 | 0.409** | -0.372 ** | -0.139 | -0.804 | -1.637 * | 0.867** |
| total farm acreage | 0.505** | -0.114 | 0.263** | 0.779** | 1.083** | 0.942 * | -0.223** |
| criminal penalties | -0.254** | -0.159** | -0.119 ** | -0.292** | -0.514 ** | -0.455** | -0.160** |
| strict liability | -0.241** | -0.200* | 0.483** | -0.235 * | -0.725 * | 1.532 | -0.213 |
| permit required | 0.043 | -0.107* | 0.255** | -0.054 | -0.375 ** | 0.250 | -0.224** |
| PBM law | 0.946 | 0.368* | 0.275 | 1.354 ** | 0.501 | 0.747 | -0.088 |
| PBM gross neg. | ---[2] | 0.049 | -0.204 | ---[2] | 1.094 | -0.835 | -0.130 |
| R-sq. | 0.770 | 0.723 | 0.710 | 0.770 | 0.381 | 0.364 | 0.527 |
| N[3] | 1327 | 760 | 442 | 1327 | 760 | 442 | 1060 |

[1]NIFC pre-aggregated data used. For all other regressions, fire-level NIFMID data from the KCFAST database were aggregated as needed to the state/year level. A single asterisk denotes significance at the 10 pct level and a double asterisk denotes significance at the 5 pct level.

[2]No states had adopted gross negligence for PBMs until after 1997, so the effect is not estimable using the pre-aggregated data.

[3]N is the number of observations used in the regression. If states did not have any recorded wildfires that year for that category, the observation was dropped. The pre-aggregated data includes all states and therefore the regressions listed under "All" have more observations.

The variables *land value* and *population* are proxy variables that attempt to capture the potential costs associated with escaped fire. High land values and large population densities are likely to be positively correlated with higher values-at-risk, because land values reflect the current and future value of resources on the land, and high population densities are associated with a high density of homes, businesses, and other valuable capital.[8] For regressions in groups 1 and 2, the parameters associated with these variables are expected to be negative for each regression, and they are negative for 10 of 12 estimates, significantly so for 7 of these. The distribution of population, land value, and land use matters, however, and so additional control variables *state land acreage, federal land acreage, and total farm acreage* were included as proxies for both the total land area of a state as well as broad land use categories. These variables likely pick up a number of factors affecting incentives and fire behavior, so it is not clear what signs to expect on their associated parameters.

The effects of the legal variables *criminal penalties*, *strict liability*, and *permit required* are all expected to be negative for private land, but are *a priori* indeterminate for public employees on federal land. The *criminal penalties* variable is negative and significant for every regression, suggesting that statute-based criminal penalties may be a strong deterrent to negligence not only on private land and for private landowners and their agents, but also perhaps for federal employees. Consider the effect of criminal penalty statutes on the number of escaped prescribed fires for all sources (the first regression in group 1). The results suggest that a statute specifying criminal penalties for negligent escape are associated with 25.4 percent lower number of escaped prescribed fires (all else constant). *Permits required* (which also accounts for statutory support for burn bans) also tends to reduce the incidence and severity of escaped prescribed fires, with negative and significant signs for private land in regression groups 1 and 2. Counter-intuitively, however, the number of escaped prescribed fires from public employees on federal land appears to significantly increase when permits and burn bans are written into state law.

Strict liability laws also appear to reduce the incidence of escaped prescribed fires for private land and landowners. When all landowners and types of prescribed burn managers are considered (the dataset with all states is used), strict liability law is associated with 24.1 percent fewer escaped fires and 23.5 percent fewer acres of escaped prescribed fires. Both of these estimates are significantly different from zero at the 5 or 10 percent level (group 1 and group 2 regressions labeled "All"). For private landowners only, the results also show a statistically significant negative relationship, again, supporting the hypothesis that strict liability provides incentives to reduce the risk and severity of escape. In contrast, both parameters for the effect of strict liability for public employees on federal land are positive, and one of them is statistically significant. Although a significantly positive effect of state-level strict liability is unexpected, these results are all consistent with the theory developed above in that public employees on private land are not influenced by state law in the same way that private landowners are.

The expected signs of parameters associated with the PBM laws are unclear even for private land, because of the offsetting effects of relaxed liability and more

[8] Interestingly, if prescribed fire were mainly used to reduce wildfire risk, then higher land values may increase the use of prescribed fire as a (risky) wildfire risk mitigation tool. (see Yoder in press).

stringent conditions. However, for regression groups 1 and 2, the number and size of escaped prescribed fires tend to be higher for states under these laws although the evidence is mixed and relatively weak.

The dependent viable for the group 3 regression is the ratio of the number escaped prescribed fire started by private individuals on private land over the number of escaped prescribed fires started by public employees on federal land. To the extent that state law affects private incentives and actions of private individuals more than those of federal employees, the signs of the legal parameters should all be negative. Indeed, the parameter estimates are all negative, and significantly so for both *criminal penalties* and *permit required*. Again, these results are consistent with the idea that that state law has a stronger effect on the incentives and actions of private individuals than on federal employees.

## Conclusion

Attitudes and some laws relating to prescribed fire have changed substantially over the last couple of decades. The empirical analysis in this paper finds evidence to suggest that different liability and regulatory rules affect the number and size of escaped prescribed fires. All else constant, states with strict liability rules tend to have fewer escaped prescribed fires than states with a negligence rule. Further, permit systems and criminal penalties for negligence reduce the incidence and extent of escape as well.

This article provides a broad perspective on the incentive effects of prescribed fire law and regulation. There are a number of weaknesses associated with the data relied on in this article as well. Little information is available about the extent of damage associated with prescribed fire in the aggregate, or even the fraction of prescribed fires that do become out of control. Nowhere in this analysis is the number of prescribed fires actually relied upon. Because the data are collected in a decentralized manner, many different individuals provide the data by filling out forms, and the definitions of the data requested are often not defined very clearly. Furthermore, the requested data are often omitted for any given fire. To the extent that these data omissions or survey misinterpretation are not systematically related to the scale or incidence of escaped prescribed fire, these omissions will result only in a higher variance in parameter estimates. To the extent that data omissions or misinterpretations are correlated with those variables, bias might be introduced into the estimation process. To the extent allowed by the data, related future work will focus more closely on specific categories of land cover types, forest land in particular, as well as more specific categories of prescribed fires as wildfire sources and other factors.

It is crucial to recognize that these results, which suggest that higher incidence and severity of escaped prescribed fires occur under less stringent laws, is in no way an indication that more stringent laws are better. As recognized by a number of state statutes in the southern states, prescribed fires can provide public goods in the form of wildfire risk mitigation and other vegetation management goals. It is entirely plausible that the additional costs of increased prescribed fire use are more than compensated by the benefits of increased prescribed fire use. Unfortunately, the datasets used in this analysis do not allow an analysis of these net benefits. A great deal of research and data are needed to better understand the tradeoffs associated with prescribed fire use.

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