

## Article

# Liability and the Use of Prescribed Fire in the Southern Plains, USA: A Survey of District Court Judges

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Received: 7 August 2020; Accepted: 7 September 2020; Published: 9 September 2020



**Abstract:** Suppression of historical fire regimes has changed the composition and structure of many fire-dependent ecosystems, frequently resulting in decreased grazing productivity and biodiversity in grasslands and savannas. Land managers have attempted to reverse these trends through the application of prescribed fire, but regulations and liability concerns often deter them. District court judges play a key role in defining the legal context of prescribed burning by interpreting applicable statutes in personal injury or property damage cases resulting from escaped prescribed fire. However, information about the way judges interpret open burning statutes and regulations is difficult to obtain. We conducted a mail survey of district court judges in Texas and Oklahoma, USA to shed light on decisions judges might make presiding over an escaped fire case. The survey included questions regarding their perception of prescribed fire, their understanding of the laws affecting prescribed burning, and hypothetical questions to determine how they would apply relevant law in an escaped fire case. We found that judges cited fewer factors as evidence of gross negligence than simple negligence. This suggests that a shift toward a gross negligence liability standard for escaped prescribed fire cases might result in fewer findings of prescribed burner liability.

**Keywords:** prescribed burning; burn ban; county judges; legal statutes; simple negligence; gross negligence; wildfire

## 1. Introduction

Elevated fuel loads, or changes in fuel types, together with hotter and drier climatic conditions are projected to lead to more frequent wildfires in many parts of the world [1–3]. Recognition that changing climates, woody plant encroachment, and decades of fuel accumulation are increasing wildfire hazard [1,2,4] has led to calls for fire management reform, including the use of prescribed fire. While prescribed fire is a useful land management tool for fuel reduction and slowing or reversing woody plant expansion, the public and many landowners are wary of its use due to the possibilities of smoke hazards and escaped fires [5,6]. Liability has been frequently cited as a major concern for burners and is one of the most often cited reasons for private landowners not applying prescribed fire on their own land [5,7–11]. However, actual risks of applying prescribed fire are far lower than those commonly perceived by the public, partly because of the general lack of differentiation between prescribed fire and destructive wildfire [12–14].

While the risk of a prescribed fire escape is low, the potential cost associated with an escape can be substantial, leading landowners to avoid burning despite the low likelihood of an escape. The amount that burners can be sued for can accumulate rapidly if an escaped fire spreads across

adjacent properties, especially when the legal structure puts the burden of fuels management on those who are actually conducting burns to limit fuel loads rather than neighbors allowing fuel to accumulate [15]. In recognition of this, there has been a shift toward codifying open burning regulations through statutes to make a landowner's "right to burn" explicit in the United States [16,17]. In addition, many of the states dealing with wildfire issues have moved towards statutes that limit burner liability. Most states apply simple negligence liability standards to cases of escaped prescribed fire [18]. Simple negligence standards require the burner to practice reasonable care in applying a prescribed burn. States seeking to limit burner liability for damages from escaped prescribed fire have prescribed gross negligence liability standards which offer more protection for burners. Gross negligence liability standards provide that, if a burner follows a set of codified regulations regarding burning, a plaintiff must show reckless disregard of the duty of care owed to others by the burner. In these states, gross negligence will be applied in cases of escaped fires when burners have followed a set of codified regulations defined in the open burning statute. Adhering to these regulations qualifies them as certified prescribed burn managers. This represents an attempt to reduce burner tort liability to encourage burning while also increasing regulations, thereby increasing safety [17,19,20]. While Florida and Georgia were the first to limit liability for certified prescribed burn managers [7,21], several other states have followed suit in recent years.

Research shows that prescribed fire is applied more often and to more land in states with gross negligence standards than in neighboring states with simple negligence standards [18]. There is also evidence that limiting burner liability via gross negligence standards can increase private landowner participation in the use of prescribed fire even when the regulations for attaining this limited liability are more onerous [18]. This is the case in Florida, which enacted its right-to-burn act in 1999 and in Georgia (although it had fewer regulatory requirements attendant to the gross negligence standard than Florida); their burn managers have to adhere to more stringent regulations and preparations to take advantage of limited liability, but they face only a gross negligence liability standard if the fire escapes and causes damages [8,21]. These differences in the amount of burning under different liability standards are predicated on the court applying the two standards differently, with courts applying a lesser duty of care for burners under gross negligence standards.

District court judges, also known as county trial judges (hereafter referred to as judges), are most likely to hear a case of first impression for a tort law case, i.e., they would hear an original case (not an appeal) in which one party is suing another for damages resulting from negligence such as a civil suit to recover damages from an escaped prescribed fire. In instances where escaped fires have led to law suits, the consequences for the burner are affected by the judge's interpretation of statutes and regulations governing prescribed fire and open burning. Differences in the opinions of judges regarding the ecological role of prescribed fire, or their interpretation of the statutes and regulations affecting it make the outcome of such cases unpredictable. This uncertainty about the potential liability faced by burners can also add to their hesitation to use prescribed fire [14]. To reduce uncertainty, the way in which judges interpret these statutes and regulations needs to be understood, but this information is lacking. Information on cases of first instance is difficult to find, and escaped prescribed fire lawsuits have not often been appealed (which would make them more easily searchable in legal databases).

One means of determining judges' perceptions regarding a particular issue that might come before the court when case law is unavailable for assessment is through surveys [22]. However, surveying the judiciary is often seen as a very difficult task. Dobbin et al. [22] (p. 287) state that surveying judges is challenging because of the "high status and professional remoteness of the judiciary in American society, judicial time constraints, assumed resentment or unwillingness to be tested, concerns by judges about confidentiality of responses, and perhaps a distrust, dislike, or perceived irrelevance of social and behavioral science and scientists." They also argued that applied researchers have an obligation to study judicial decision making regardless of these constraints because of the large legal and social consequences judges' decisions could have. It is not only necessary to understand judicial decision

making to inform the public and reduce uncertainty about legal outcomes, but also for judges to better understand their own decision making [22].

Given the importance of prescribed fire to maintaining wildlife habitat, enhancing and promoting resilience in natural resource productivity, and reducing wildfire hazard through fuels management, and the constraint legal uncertainty can pose to its adoption by landowners, understanding the decision-making process of judges with regards to escaped prescribed fire cases is important to landowner decision making regarding the use of prescribed fire. The objective of the research presented here is to gain initial information on the perceptions of judges in Texas and Oklahoma about the role of prescribed fire, the statutes and regulations affecting fire as a management tool, and decisions they might make if they preside over an escaped fire case. We used a survey of judges to test several hypotheses related to the stated objective:

**Hypothesis 1:** *Judges' familiarity with and perception of prescribed fire will be an important driver of their decision-making regarding cases for damages from escaped prescribed fires.*

**Hypothesis 2:** *Judges in both states would be familiar with prescribed fire because a large portion of both states have active prescribed burning associations and both states have active statewide alliances of prescribed burners, which seek to increase the acceptability of prescribed burning to the public [23].*

**Hypothesis 3:** *Judges would alter jury instructions and have a higher bar for proving burner negligence when gross negligence was applied as the liability standard than when simple negligence was applied [18]. We also hypothesized that the magnitude of this heightened bar would be larger in Oklahoma because of the different statutory language, regulatory requirements, and differences in burning culture.*

**Hypothesis 4:** *Judges would prefer expert evidence to come from practitioners rather than academics as this has been the case for judges adjudicating other areas of law see e.g., [24,25].*

The pilot study presented here reports important preliminary information about judges' perceptions regarding prescribed fire and provides some insight on how judges might apply relevant statutes in the event of an escaped fire that leads to a lawsuit.

## 2. Study Area

The study was conducted in Texas and Oklahoma, specifically in counties that are within the Southern Plains ecoregion of the United States. The Southern Plains encompass nearly 73 million hectares of land and incorporate 208 counties in Texas and 70 counties in Oklahoma [26]. Both states are comprised of more than 95% privately owned land and have experienced significant woody plant expansion, which has contributed to catastrophic wildfires in recent years [4,27,28]. Judges from all 278 of these counties were included in the study.

Texas and Oklahoma apply simple negligence liability standards to escaped prescribed fire cases. This means a plaintiff must show negligence—a breach of the duty to use ordinary care—in order for the defendant to be held liable for any damages resulting from an escaped fire. Neither Texas nor Oklahoma require the presence of a certified prescribed burn manager during a burn. However, landowners wishing to burn their land are required to file a burn plan, have a plan for mitigating smoke hazards, create proper firebreaks, and have sufficient manpower and equipment to conduct the burn [29,30]. One difference between the regulations of the two states is the notification to various parties that a burn is going to be conducted. While Oklahoma requires notification to neighbors and the local fire department, the Texas Commission on Environmental Quality requires only notification to the Texas Forest Service [31].

### 3. Methods

#### 3.1. Survey Sample, Questionnaire, and Administration

The study population for the research included all district judges in the 208 Texas counties and the 70 Oklahoma counties that fall within the Southern Plains ecoregion. The study was based on a survey of a sample of 200 randomly selected judges, including 100 from Texas and 100 from Oklahoma, representing 27% of all district judges in the study population.

The survey questionnaire consisted of approximately 20 multi-part questions covering three key areas of inquiry, including judges' knowledge of prescribed fire and prescribed fire statutes, their perspectives on differences between gross and simple negligence standards, and valuation theories relating to possible awards for damages resulting from escaped fires. The mail survey was conducted from February through June 2018 using a four-phase mailing protocol [32], which included a pre-survey notification; the survey questionnaire with a cover letter; a reminder card; and a replacement survey questionnaire with another letter.

A one-page follow-up questionnaire was also sent to all non-responding judges in November 2018 to determine the reasons they decided not to participate in the study and to ascertain if there was a non-response bias [33].

#### 3.2. Data Analysis

High rates of non-response in surveys can increase the likelihood that the respondents are different from the non-respondents in some way, creating bias in the survey results. To avoid this, researchers seek to increase the response rates for surveys. We attempted this by employing the Dillman four-phase mailing protocol [32]. Some social scientists have suggested that a minimum of 50% response is necessary to avoid bias [32,34]. However, surveys often result in 10–30% responses [35]. If the response is lower than 50%, a non-response bias test can be used to assess the bias of the responses obtained [32,36]. To test for non-response bias, the follow-up questionnaire included six questions from the initial survey questionnaire to compare response patterns. T-tests were used to test for differences among respondents and non-respondents in time spent in the legal profession and time on the bench, and chi-square tests were used for pair-wise comparisons of responses to questions asking judges whether they had heard cases involving damages from a prescribed fire, whether they were familiar with the state statute regarding agricultural burning, and their understanding of valuation theory for fire-damaged trees.

Due to the low response rate, the number of data points was insufficient to conduct robust quantitative analyses for many of the questions related to hypotheses 1 and 2. We summarized the data, calculating means and standard deviations of responses where possible and presented the data in a manner appropriate to making qualitative comparisons across states. These qualitative data provide some insight into judges' familiarity with and perception of prescribed fire and differences between judges in the two states, but do not allow us to directly assess hypotheses 1 or 2.

In order to test hypothesis 3, we developed two questions that asked judges to choose from a list of all applicable facts that would alone constitute evidence from which a jury could reasonably conclude that a defendant was negligent. Both questions provided the same list of choice options (Table 1). In an attempt to compare judges' opinions on liabilities landowners might face under simple versus gross negligence standards, the first question (see Supplementary Materials Table for the specific wording of questions 12) asked judges to select facts that would offer evidence of simple negligence—evidence that the defendant did not exercise ordinary care; the second question (see Supplementary Materials Table for the specific wording of questions 13) asked judges to select facts that would offer evidence of gross negligence—evidence that the defendant failed to exercise even slight diligence. If the judges were actually applying a higher bar to cases under a gross negligence standard, they would select fewer facts for question 13 than question 12. We modeled the difference in the number of variables selected as evidence of simple negligence versus gross negligence using

a generalized linear mixed model fit by maximum likelihood (Laplace approximation). A Poisson distribution was used since the data were count data. A unique identifier representing each respondent was included in the model as a random variable to account for within-subject error.

**Table 1.** List of facts that Texas and Oklahoma judges could select from as facts they deemed to constitute evidence of simple or gross negligence in an escaped prescribed fire case.

Code	Description of Fact
A	Failing to submit a prescribed burn notification plan to the nearest rural fire department (OK only)
B	Failing to have a certified prescribed burn manager on site during the burn (TX only)
C	Failing to have an experienced burner on site during a burn
D	Failing to create a firebreak next to adjacent property or a busy roadway
E	Failing to have a burn plan
F	Failing to notify the local fire department that a burn is to be conducted
G	Failing to notify adjacent landowners that the burn is to be conducted
H	Failing to check the weather throughout the burn
I	Failing to have cell phones on hand for communication with fire authorities
J	Failing to contact fire dept. immediately upon weather changing to where it out of prescription
K	Failing to cease ignition immediately upon weather changing to where it is out of prescription
L	Burning out of prescription (i.e., relative humidity too low)
M	Burning late in the day

To assess hypothesis 4, judges were asked to rank each of the five given expert witnesses on a scale of 1–5 (least preferred to most preferred, respectively). The choices were certified prescribed burning trainer, university academic or extension personnel with expertise in prescribed fire science and application, professional wildland firefighter, agency personnel familiar with prescribed fire, and rural fire chief. The average rank for each witness was computed and compared. Again, the small sample size did not allow for a rigorous statistical assessment of hypothesis 4, but we present the data to provide some information on preferred expert witnesses in the two states.

## 4. Results

### 4.1. Response Rates and Non-Response Bias

The initial mailing to 200 judges led to an effective survey sample of 192 judges, with eight being undeliverable. We received 41 responses, of which 39 included completed questionnaires and two were from judges who declined to participate resulting in a raw response rate of 21.4% and a usable response rate of 20.3%. Of the 39 usable questionnaires, 56.5% were from Texas and 43.5% were from Oklahoma. In addition to the 39 useable questionnaires, we received 36 completed follow-up non-response questionnaires, representing a 24% response rate of the 151 initial non-respondents. Data obtained for the five questions in the non-response questionnaire were compared with the equivalent data from the original survey. Using t-tests and chi-square analyses, no statistically significant differences (*p*-values ranged from 0.180 to 0.982) were found for any of the six questions included in the non-response questionnaire. Accordingly, we found no statistical evidence for non-response bias and determined that despite the relatively low response rate, the judges' responses in the initial survey questionnaire were an unbiased representation of responses for the randomly selected 192 judges. Therefore, the findings of this study can be extrapolated more broadly to the target population of district judges in the Southern Plains counties in Texas and Oklahoma.

The primary reasons the non-response judges gave for not participating in the study included, in order of frequency: insufficient knowledge about laws and regulations regarding prescribed fire to adequately respond to the questionnaire (37%); concern that responses could jeopardize the judge's

ability to preside over a future case of this nature (29%); “other” including being out of the office and not handling these types of cases (17%), not having time to complete the questionnaire (15%), and not understanding the purpose of the study (2%).

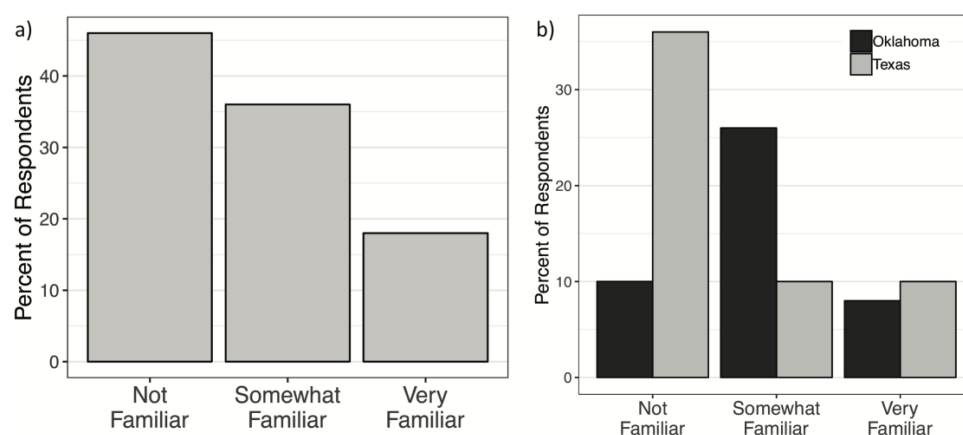
#### 4.2. Legal Experience

The average amount of time that the judges had been in the legal profession was 30.4 years (std. dev. = 9.07, min = 10; max = 50), while the average amount of time they spent as a judge was 12.1 years (std. dev. = 7.76, min = 0.5; max = 28). These average values did not differ statistically between the two states ( $t = -0.675$ ,  $p = 0.252$ ;  $t = 0.208$ ,  $p = 0.418$ , respectively).

Of the 39 responding judges, only four (10%) had heard a case involving prescribed fire and each of them had heard only one case. Two of the cases were reported as being bench trials (a judge-determined case), one was a jury trial, and the nature of the fourth was not reported. Of these cases, one resulted in dismissal (bench trial), two resulted in adjudicated dispositions (one jury trial, one bench trial), and in the fourth case, the respondent did not report the disposition of the case.

#### 4.3. Familiarity with and Perceptions about Prescribed Fire

When asked about their familiarity with prescribed fire, only 17.9% of judges reported being very familiar, 35.9% reported being somewhat familiar, and 46.2% reported being not at all familiar with this land management tool (Figure 1). At least some level of familiarity with prescribed fire was significantly greater in Oklahoma than in Texas ( $X^2 = 7.748$ ;  $p = 0.005$ ; Figure 1).



**Figure 1.** Results of (a) the judges’ self-reported familiarity with prescribed fire overall, and (b) grouped by state (N Texas = 22, N Oklahoma = 17). At least some level of familiarity with prescribed fire was significantly greater in Oklahoma than in Texas ( $X^2 = 7.748$ ;  $p = 0.005$ ).

Despite nearly half of the respondents indicating they were unfamiliar with prescribed fire, 74.3% identified potential benefits and negative aspects that they associated with its use. In both states, the most commonly identified benefit of using prescribed fire was wildfire control through the reduction of fuel loads, followed by land management advantages including herbaceous plant regrowth (regeneration) and brush and other invasive species control. Texas judges saw more potential benefit in the reduction of wildfire while the category with the highest number of respondents from Oklahoma was the control of invasive species with 50% of those respondents specifically naming eastern redcedar (*Juniperus virginiana*).

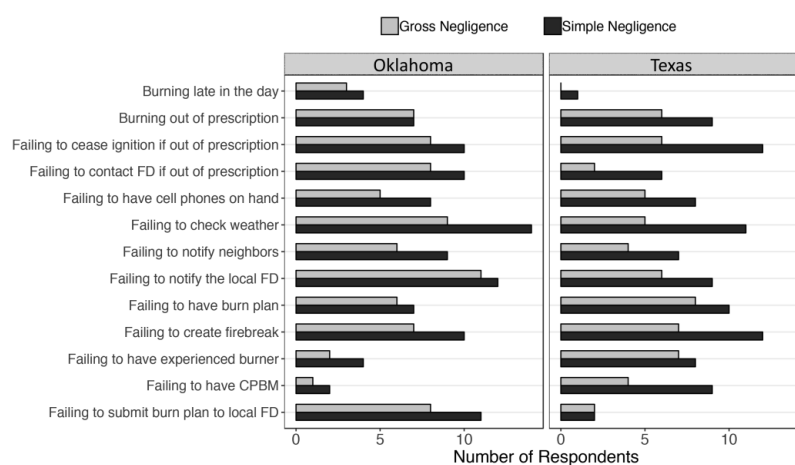
#### 4.4. Adjudication over an Escaped Fire Case

When asked what instructions they would give a jury regarding a future case of this nature, the respondents provided a range of answers. The responses were compiled into categories: unknown, will not give an opinion, standard negligence instructions, and Oklahoma Uniform Jury Instructions

(OUJI). Of the 39 judges, 7 (17.9%) did not provide a response to this question. Two of the judges (5.1%) responded that they did not know what instructions they would give. The judges in the second category ( $N = 6$ , 15.4%) responded they had never heard a case such as the one described, and they were unwilling to express an opinion lest their response be used in future proceedings. Many of the respondents ( $N = 18$ , 46.2%) fell into the third category, stating they would use the language in the law to provide instructions to the jury about the legal liability statute for their state. The fourth category refers to the OUJI, which are a set of court rules established in the Oklahoma court system that are provided to a jury ( $N = 6$ , 15.4%). Similarly, judges were asked to explain how their instructions to the jury would change if the liability standard in their state were amended to require a finding of gross negligence. Responses were again compiled into common groupings. Judges provided responses such as unknown/unsure ( $N = 6$ , 15.4%), OUJI or Pattern Jury Charge ( $N = 6$ , 15.4%), and different definition ( $N = 20$ , 51.3%). There were several respondents who did not answer the question ( $N = 7$ , 17.9%). For these data, OUJI refers to the same uniform instructions in Oklahoma and Pattern Jury Charge Instructions are a similar set of instructions provided by the Texas court system. The category listing different definitions refers to judges who responded that they would provide the jury with the legal definition of the new liability standard (i.e., gross negligence instead of simple negligence).

#### 4.5. Comparisons of Simple and Gross Negligence

The factors listed as choices for judges to indicate what facts would alone constitute evidence from which a jury could reasonably conclude that a burner failed to exercise adequate care in the case of simple negligence or gross negligence are presented in Table 1. The frequencies of selection for each factor are presented by state in Figure 2. On average, respondents suggested that more of the undisputed facts would alone constitute evidence of a failure to exercise ordinary care, suggesting the burner was negligent in conducting a prescribed fire, than would constitute evidence that the defendant failed to exercise even slight diligence and was grossly negligent in conducting a prescribed fire. The expected number of variables checked for factors that would constitute evidence of simple negligence is  $6.95 \pm 1.12$ , and for gross negligence is  $4.60 \pm 1.11$  ( $z = -3.67$ ,  $p < 0.001$ ), indicating that about 1.5 times more factors constituted evidence of simple than gross negligence. Oklahoma judges indicated only three criteria that would qualify as evidence of simple negligence, but not evidence of gross negligence (i.e., there were three criteria for which there was a substantial decrease in the number of judges who viewed it as evidence of simple negligence but not gross negligence), whereas Texas judges indicated six criteria that would qualify as evidence of simple negligence, but not evidence of gross negligence.



**Figure 2.** District judges' selection of factors that constitute evidence from which a jury could reasonably conclude that a burner failed to exercise adequate care in the case of simple negligence or gross negligence in Texas and Oklahoma, USA.

With respect to the simple negligence standard, Texas judges most frequently chose (D) failure to create a firebreak (N = 12) and (K) failure to cease ignition upon weather changing (N = 12), while Oklahoma judges most frequently chose (H) failure to check the weather throughout the burn (N = 14) or (F) failure to notify a local fire department about the burn (N = 12). When the question changed to include a gross negligence standard, overall judges in both states chose fewer facts to constitute negligence; Texas judges most frequently chose (E) failure to have a burn plan (N = 7), while Oklahoma judges still picked the same two facts as before but at a lower rate (fact F, N = 11; fact H, N = 9).

#### 4.6. Evidence and Assessment

Overall, respondents ranked certified burner trainers and professional wildland firefighters highest for expert witnesses they would prefer to provide evidence in a prescribed fire case. The only major interstate difference in rankings occurred with respect to rural fire chiefs; in Oklahoma they ranked highly as expert witnesses in the case of an escaped fire trial, but in Texas they ranked lowest among the five categories of potential expert witnesses.

### 5. Discussion

To realize the diverse values of prescribed fire, see e.g., [37–39] at large scales in privately owned landscapes, the increased adoption of prescribed fire by private landowners is imperative, but many landowners are reluctant to use the land management tool due to legal liability concerns [10,13,14]. These liability concerns have been recognized as important barriers to prescribed fire use across the USA [5,7–11,40,41] and in other countries [15]. The aim of this study was to provide clarity on how the laws and regulations pertaining to prescribed fire will be applied by judges in order to reduce uncertainty regarding potential liability, eliminating one potential barrier to prescribed burning on private lands. We recognize that more work has to be done to fully understand how courts will decide prescribed fire cases in Texas, Oklahoma, and more broadly. However, our preliminary study does provide insight into potential policy shifts for lowering the likelihood that judges will decide against burners in escaped prescribed fire cases. In addition, our methodology offers an example for obtaining information on how judges might adjudicate a prescribed fire case in other regions of the USA and in other countries.

Our survey found that judges cited fewer factors as evidence of gross negligence than simple negligence. This suggests that a shift toward a gross negligence liability for burners might result in fewer findings of prescribed burner liability, especially in Texas where the discrepancy between the number of factors checked as evidence of gross versus simple negligence was greatest; fewer factors that could be considered evidence of negligence means that there is a higher bar to establish burner negligence. Given that fear of liability is a commonly cited deterrent to the use of prescribed fire by private landowners, limiting the types of evidence that support a finding of liability could help increase the number of private landowners willing to conduct prescribed burns. Gross negligence liability standards have been shown to increase the amount of private land prescribed burning relative to states with simple negligence liability standards, even when there are stricter regulatory requirements to offset the less stringent liability standard [18]. Therefore, the stricter regulatory environment attendant to a lower liability standard, which is typical of right-to-burn acts, is not expected to be a deterrent to burning. Responses to questions regarding how judges would instruct a jury under simple versus gross negligence statutes did not yield a lot of additional insight as to whether the lower liability standard would be emphasized if the statutorily prescribed standard were to change; most judges stated they would follow pattern instructions and did not write in the specific language they would use. A few, however, did indicate that they would instruct the jury to apply a gross negligence standard in determining negligence if the statute changed.

A strong culture of burning could be important in determining how judges will interpret burner negligence and evidence of negligence in an escaped prescribed fire case. In Oklahoma, where the regulatory requirements are less intensive than in Texas, judges were more inclined to choose fewer

of the options as evidence of either simple or gross negligence. The Texas respondents, especially those familiar with the simple negligence standard, appeared to be more likely to choose more criteria for simple negligence but then drop those criteria in reference to gross negligence. This suggests that in effect, despite both states having simple negligence standards, Oklahoma judges apply a less stringent standard, seeing far fewer errors as evidence that would alone constitute simple negligence, while Texas judges see more mistakes as constituting evidence of simple negligence. A stronger fire culture might prove beneficial in changing social constructs and breaking down the barriers to prescribed fire use that are highlighted in this research. The Oklahoma judge who responded “yes” to having heard a case involving damages from an escaped burn did not respond to related questions but, instead, stated, “because it [prescribed fire] is a widely accepted practice in our area, unless a structure was damaged, no one ever seeks damages” (OKJ013). This provides some evidence that Oklahoma has developed a pro-fire culture. In addition, Oklahoma judges reported being “somewhat familiar” with prescribed fire more often and “not at all familiar” with prescribed fire far less often than Texas judges (Figure 1)—further evidence that fire culture can influence the judiciary.

The different notification rules for burners in the two states might play a role in this difference in fire culture between Texas and Oklahoma. Under the Oklahoma statute, burners must notify neighbors and the fire department when they are conducting a prescribed fire. Such notification is a courtesy that can potentially foster a better burn culture. It allows neighbors the opportunity to reduce the risk of fire spreading onto their land. It also allows fire departments to be aware of the burn should concerned residents contact them and it might encourage more landowners and fire departments to seek information about prescribed fire.

In addition to reducing the potential for liability, a well-developed fire culture that is enhanced by a more fire-positive judiciary can promote the establishment of Prescribed Burn Associations (PBAs) [27]. These associations are beneficial networks of landowners that are useful for natural resource agencies because they can extend the reach of agencies by disseminating knowledge through personal interactions among PBA members. They also providing a vehicle through which members can share resources, such as equipment and qualified personnel, helping to mitigate constraints caused by the scarcity of agency personnel relative to demand [42].

In the survey responses, none of the judges chose agency personnel as their most preferred expert witness for a case involving damages due to an escaped prescribed fire, and they broadly ranked university academics and extension agents as their least preferred expert witnesses. By contrast, judges seem to value the testimony of prescribed burner trainers more highly. Therefore, facilitating interactions between prescribed burn managers and county judges could help increase their familiarity with prescribed fire, its importance to land management, and the safety of prescribed burning. This could reduce the likelihood of findings against burners even in a law suit brought under a simple negligence liability standard.

Since risks of using prescribed fire are generally not well differentiated from wildfire losses, the application of this management tool is often limited by social constraints [9,43]. Over 99% of prescribed burns are conducted without incident and within planned parameters, yet the few that escape and result in property damage are sensationalized by the media [14,44,45]. This has fueled public perceptions that prescribed fire is uncontrollable and harmful, which makes it difficult for burn managers, burn associations, and landowners who want to burn their land to argue for less stringent liability standards. Keeping a safety record to present to legislators could facilitate the adoption of a right-to-burn act with less stringent liability standards. Right-to-burn acts also typically present judges with a record of legislative intent and they can interpret escaped prescribed fire cases in light of this intent. For instance, both Florida’s and Georgia’s statutes include language regarding the importance of prescribed fire for the ecosystems, economies, and safety of residents, and judges have included this intent in their decisions.

The response rate in our study was relatively low and, therefore, despite the lack of detectable non-response bias, we were not able to conduct rigorous statistical analyses to test all of our four

hypotheses. One factor that negatively influenced the response rate was the unwillingness of judges to provide their opinions on hypothetical legal matters pertaining to prescribed fire. In future research aimed at understanding judges' perceptions and application of prescribed fire laws and regulation, use of a larger survey sample and adoption of a mixed-methods approach that combines a mail survey with personal or telephone interviews could increase response rates. This approach will likely help build greater rapport with judges, reduce their concerns over confidentiality, and increase their willingness to provide input for such research [22].

## 6. Conclusions

The findings of this study provide useful preliminary information to better understand how district court judges might adjudicate a case for damages from escaped prescribed fire. Our research found high variability in answers pertaining to the application of simple negligence laws among the judiciary in Texas and Oklahoma for cases concerning an escaped prescribed fire. Our data suggest that prescribed burn culture plays a role in how laws are interpreted and applied by judges. Some states have recently overcome this variability in the interpretation of burner negligence by creating right-to-burn laws for prescribed fire that provide more easily interpretable statutes with clear regulatory requirements tied to specific levels of liability. This allows judges to apply less stringent liability when burners have adhered to burning regulations. Our findings show that a right-to-burn act that prescribed lower liability for certified prescribed burn managers would likely reduce the types of evidence that judges in both Texas and Oklahoma perceive as constituting evidence of negligence, thereby limiting burner liability in these states. Our methodology could be followed by those in other regions interested in understanding how judges will interpret and apply relevant prescribed fire law.

**Supplementary Materials:** The following are available online at <http://www.mdpi.com/2073-445X/9/9/318/s1>: Table S1: A Survey of District Court and Associate District Court Judges in Texas and Oklahoma.

**Author Contributions:** Conceptualization, C.L.W. and U.P.K.; methodology, C.L.W. and U.P.K.; formal analysis, A.H. and C.L.W.; data curation, A.H.; writing—original draft preparation, A.H.; writing—review and editing, C.L.W. and U.P.K.; visualization, C.L.W.; project administration, U.P.K.; funding acquisition, C.L.W. and U.P.K. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Joint Fire Sciences Program, grant number 16-1-02-10.

**Conflicts of Interest:** The authors declare no conflict of interest.

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