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## Public perception of wildfire risk and prescribed burning in the wildland/urban interface of the Louisiana Florida parishes

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PUBLIC PERCEPTION OF WILDFIRE RISK  
AND PRESCRIBED BURNING IN THE WILDLAND/URBAN INTERFACE  
OF THE LOUISIANA FLORIDA PARISHES

A Thesis

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Master of Science

in

The School of Renewable Natural Resources

by

Charlotte Ann Gerald  
B.S., Louisiana State University, 2001  
December 2010

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To the One who is Faithful and True - You are my Center and my Hope. *Soli Deo Gloria.*

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## **ABSTRACT**

Wildfire has been suppressed in the nation's forests for over a hundred years. The accumulation of forest fuels over time has created an urgent need to reduce fuel loads to prevent catastrophic wildfires from occurring, not only in our wildlands, but also in our Wildland/Urban Interfaces (WUI's). The residents who live within the WUI are particularly vulnerable to extreme wildfire events. As cities become more densely populated, increasing numbers of people are moving beyond the suburbs into the WUI. A complex matrix of structures and forested land, developing communities, and impinging forests exists within the WUI. This study utilized a survey instrument to elicit perceptions of wildfire risk and prescribed burning practices from residents within the WUI in the Florida parishes of southeastern Louisiana. Residents within the WUI show increasing interest in learning more about wildfire risk, acceptance for traditional forest management practices, such as prescribed burning, and willingness to interact with and receive education from the forest professionals in their region. The analysis of the data provides statistical support for the conclusion that the overall perception of wildfire risk is low and the acceptance of prescribed burning is high.

# **1 INTRODUCTION**

## **1.1 Ecological Occurrence of Wildfire**

Fires occur naturally in most of America's ecosystems, with ignition most often occurring from lightning strikes (Pyne, 2010). Indeed, many ecosystems are fire-dependent – that is, fire must occur in them periodically over time in order for propagation to continue successfully because, for fire-dependant species, propagules are released only in response to extreme heat (Wright and Bailey, 1982). Fire also creates necessary disturbances in non-fire-dependent ecosystems. It exposes bare mineral soil that allows seeds to germinate, and opens the forest canopy to allow sunlight to reach the forest floor, encouraging new growth and competition between species and creating a dynamic and healthy forest (Pyne, 1982; Platt et al., 2006b).

Fire is also a necessary component in grasslands, shrublands, and marshes. It plays a vital role in nutrient cycling in these systems. Non-native species are also kept in check by fire, which disallows them to invade and overtake indigenous species (Baeza et al., 2002; Nyman and Chabreck, 1995; Platt et al., 2006b). Fire also has another benefit – it allows fuel levels to remain low enough to disallow very large, catastrophic wildfires from occurring frequently.

## **1.2 Climate Change and Its Effect on Fuel Loading**

When evaluating fuel loads in our wildlands, climate change must be considered as a factor. As weather patterns change and global temperatures rise, nature reacts to restore equilibrium. These reactions can be vents such as hurricanes that cool sea surface temperatures altered weather patterns caused by exaggerated El Niño and La Niña events, and perhaps even

geologic events such as increased tectonic activity that results in the occurrence of earthquakes and volcanic eruptions with greater frequency and of greater magnitude than observed in recent history. While these are global events, when considering a global occurrence on a localized scale, such as an exaggerated La Niña event in the Pacific Ocean, the effect in the southeastern United States is drought, in which warm, dry winters increase forest mortality and, subsequently, increase fuel loads to dangerous levels in our wildlands and in the Wildland/Urban Interface (WUI) (Beckage et al., 2003; Gan, 2006; Malevsky-Malevich et al., 2008; Mitchener and Parker, 2005; Corringham et al., 2008; Piñol et al., 1998; Scholze et al., 2006; Schulte and Miller, 2010).

### **1.3 Population Densities and Urban Sprawl**

As we continue to develop communities and cities in these ecosystems, wildfires, whether they occur naturally or are a result of negligence or arson, have been suppressed in order to protect life and property (Donovan and Brown, 2007b). However, as fire suppression became the normal and immediate response to a wildfire, fuel levels in ecosystems have increased dramatically. These areas are now known as the “urban fringe” or the “wildland/urban interface.” As the world population continues to grow, wildlands are increasingly impinged upon, and they are either compromised, protected, or developed. Fire suppression in these areas is increasingly complex and expensive (Donovan et al., 2007b; Lynch, 2004). The increased probability of occurrence and of potentially catastrophic WUI wildfire events has elevated the hazard of wildfire damage to life, structures, wildlife, wildlife habitat, timberland, forests, and smoke. Also of concern is the increasing level of difficulty in suppression activity and forest management practices in the WUI. Traditional methods of forest fuel management, such as prescribed



burning, mechanical thinning, and chemical control of underbrush, seem to be less accepted culturally as urbanites move into forested areas.

#### **1.4 History of Wildfire Suppression**

The US Forest Service was created by Congress in 1905 “to provide quality water and timber for the Nation’s benefit” (US Forest Service homepage <http://www.fs.fed.us/aboutus/>). It has a long history of successful forest fire suppression aimed at protecting life and property. Over time, these practices have resulted in unprecedented fuel loads in the nation’s wildlands. Studies from Australia (Boer et al., 2009) and China (Chang et al., 2007) also support the observation that suppression of natural wildfires has had a deleterious effect on the health of their forests and the intensity of wildfires when they occur (Backer et al., 2004; Rieman and Clayton, 1997; Sturtevant et al., 2004; Syphard et al., 2007; Tiedemann et al., 2000; Warren, 2007).

Of the many laws enacted on behalf of the America’s forests, the Healthy Forests Initiative (Healthy Forests Restoration Act of 2003, P.L. 108-148) is of particular relevance to this study. The 2002 fire season in the United States was particularly active and destructive, and received notable media coverage and national attention. In response to the combination of public outcry and media coverage, President G.W. Bush signed the Healthy Forests Initiative into law in 2003. This law mandates that forest managers make immediate plans for forest fuel reduction, and while the idea is laudable, putting the management plans into practice has proven difficult, if not impossible. There remains a confusing, overlapping, and sometimes conflicting set of laws, court rulings, local ordinances, and wide-ranging public opinion regarding forest management practices designed to reduce fuel loads in our nation’s forests (Pyne, 2010). An easy example of conflicting agendas is the Clean Air Act and how it affects a land manager’s ability to reduce

fuel via controlled burning on any given day. Although studies have concluded that smoke from woodland fire is generally not a long term health risk to the general population because of, in part, the short duration of fire events (Beer, 2001), and more specifically to wildland firefighters (Booze et al., 2004; Schöllnberger et al., 2002), smoke from controlled burns continues to be a source of controversy for both the public and land managers. Poor visibility on roadways and poor air quality can exacerbate an already controversial problem.

Suppression activities have a significant financial impact on management budgets (Berry and Hessel, 2004) and directly affects management decisions (Borchers, 2005; Canton-Thompson et al., 2008), sometimes to the detriment of the forest's health. Also of concern are suppression activities themselves, as they can cause more damage than the wildfire event would have on its own (Backer et al., 2004).

## **1.5 History of Negative Public Perception of Land Management Practices**

Adding to the complexity of this issue is the generally negative perception of forest management practices. Large-scale logging events such as clear-cuts and deforestation tend to be viewed with skepticism, if not outright malice, by the general populace. Even poor management decisions in other countries tend to color how the American public perceives forest management in the United States. Massive deforestation practices in South America and elsewhere in developing countries have elicited global outrage and local intolerance for even the most basic and natural management techniques. The environmental movement in the United States in the 1960's and 1970's contributed to the policy of suppression; it was fueled by selective media coverage of spectacular three-dimensional wildfires in the western United States and generally negative relations with the forestry profession because of negative perceptions of logging

practices such as clear-cutting and stream degradation from soil run-off from logging roads and staging areas.

The great fire of 1988 in Yellowstone National Park is an example of an extreme wildland fire event that received extraordinary coverage, elicited outrage from the public, and reinforced the general public opinion that all fire events are “bad.” This particular fire occurred as a result of prolonged fire exclusion from that ecosystem and the resulting high levels of forest fuels on the ground. While wildfire did in fact decimate large tracts of timber and destroyed park structures, there were also many long-term benefits that many people do not know about or have not considered. Dozens of species that had been absent from that community were able to re-establish after the fire as a result of sunlight and nutrient release. Also, fire-dependent species were allowed to re-establish and replenish. As a result, succession was set back and biodiversity was increased.

In this age of instant “knowledge” via the Internet, just about anyone can believe they understand the complexities of ecosystem management and form an opinion as to what should or should not be considered “good” management practices. Additionally, as we learn more about the intricacies and fragility of watersheds, stream degradation as a result of run-off from both urban developments and logging, and the staggering fragility of some endangered species, the American public has become more aware and involved in land management practices and the policies that guide them, particularly when socially valuable forests are under consideration (Ager, 2010; Rieman and Clayton, 1997). For example, preserving old-growth trees and the structure of old-growth stands is a contentious issue that is increasingly so because the presence of WUI residents near the forest forces management decision compromises in order to protect the lives and structures of those residents (Ager et al., 2010).

## **1.6 Current Fuel Loads at Unprecedented Levels**

In spite of occasional negative public opinion of traditional land management practices such as prescribed burning, the fact remains that our forests contain unprecedented levels of fuel. This increased fuel load creates increasingly large and catastrophic wildfire events, putting more lives and structures in harm's way as the Wildland Urban Interface continues to undergo development. Managers are forced to try different approaches to controlling the fuels already on the ground; sometimes introducing fire into a system to remove or reduce fuel is no longer an option owing to the sheer amount of fuel already present. Thinning and chemical treatment options are increasingly combined with traditional prescription burns to create a safer, albeit more expensive, fuel reduction management option (Ager et al., 2007). Large three-dimensional wildfires typically gain more notoriety and attention than smaller two-dimensional fires typical of southeastern US wildfires. This media attention is not limited to the United States; it spans quite literally around the globe (Fiorucci et al., 2008; Baird et al., 1994). Fires in the western United States, in particular, have been studied extensively (Agee and Skinner, 2005; Burns and Cheng, 2007; Dickson et al., 2006; Cleve et al., 2008; Collins and Bolin, 2009; Fleeger, 2008) and even into the Midwest (Cardille and Ventura, 2010; Fried et al., 1999), but there have been fewer studies of southern wildfires (Carter and Foster, 2004; Dixon et al., 2008; Zhang et al., 2008). This study seeks to understand perceptions of wildfire risk and prescribed burning by residents in the Wildland Urban Interface (WUI) of the Louisiana Florida parishes in southeastern Louisiana.

## **1.7 Risk Mitigation Efforts**

As is true with the increased media coverage and scientific studies, the western United States is examined more extensively in other aspects of wildfire/human interaction, as well. Specifically, there are several studies about community reaction (Edwards and Bliss, 2003) and

forest managers' decision making in wildfire-prone areas (Arvai et al., 2006), subdivision design (Bhandary and Muller, 2009), and even analyses of how wildfire affects home buying and housing prices (Champ et al., 2010; Donovan et al., 2007b). Each of these studies seeks to understand how to help mitigate risk of wildfire for residents of the WUI.

Another collaborative effort to mitigate wildfire risk is a movement known as Firewise (Bright et al., 2006). This is a comprehensive online and on-the-ground program designed to educate both forest professionals and residents about wildfire risk, defensible space, and making good decisions about homeownership in the WUI. There has been an increasing crossover between the “hard” and “soft” sciences in an effort to understand human decision making and, subsequently, to create more effective land management practices and policies. An extensive review that examines these overlaps in science may be found in Martin et al. (2008).

Specific to our study area, which included the parishes known as the Florida parishes – East Baton Rouge, East Feliciana, West Feliciana, Livingston, Tangipahoa, St. Tammany, St. Helena, and Washington parishes – we postulated that public perception of wildfire risk and prescribed burning would be influenced by education, experience, and location. Specifically, we assumed that perception would be influenced by one's level of education because one's level of education increases the likelihood of being exposed to environmental issues and ecosystem function. Also, generational landowners tend to gain knowledge over time and to pass that knowledge on to new generations. Finally, one's location is likely correlated with perception: residents of fire-prone areas are exposed to wildfire indirectly via media coverage and directly via experience.

The problem we attempted to address in this study is the increased risk of wildland/urban interface wildfire and the difficulties faced by landowners and fire professionals in making wise decisions regarding not only fighting wildfires in the WUI, but also mitigating risks associated

with the increasing fuel loads in the forests in and around the WUI. The State of Louisiana expressed a desire to understand the WUI residents' perceptions of wildfire risk and prescribed fire as a risk mitigation tool. The objectives of this study were to understand public perception of wildfire risk, prescribed burning, and smoke management.

## 2 MATERIALS AND METHODS

### 2.1 Hypotheses

In considering how to address the question of public perception, we began with a few assumptions that led to the formulation of our hypotheses. Having witnessed first-hand the aftermath of Hurricanes Katrina and Rita, in particular the dramatic shifts in population, we knew that Baton Rouge, Houston, and the surrounding parishes and counties had absorbed many of the refugees. We suspected that these new residents would likely be urbanites with less knowledge of forested land and the risks associated with living in or near the urban fringe. We also assumed that these new residents would lack knowledge and understanding of traditional forest and land management practices such as prescribed burning, and that lack of knowledge would result in a lack of wildfire preparedness and acceptance of traditional land management practices. These assumptions led to the formulation of our hypotheses. At the same time, we assumed a level of willingness to learn because of current trends of environmental concern and that “going green” as a personal responsibility would result in greater acceptance and understanding of the benefits of prescribed burning, particularly for WUI residents.

Another assumption that influenced how we designed our study was that the key to acceptance by the public of wildfire risk mitigation by prescribed burning was to impart an understanding to WUI residents, not just about wildfire risk, but also about benefits gained from use of prescribed burning, such as increased biodiversity because of ecosystem succession setback, fuels reduction, improved health and access to forested lands, and smoke management associated with prescribed burning.

We approached this study with three hypotheses as our starting point: 1) perception of prescribed burning is related to length of residency, 2) perception of wildfire risk is related to

length of residency, and 3) perception of smoke caused by wildfire and prescribed burning is related to length of residency. We were particularly interested in the perceptions of the newer residents in the WUI. In order to test these hypotheses, we created a survey instrument that would allow us to gauge public perception of these assumptions.

## **2.2 Survey Instrument**

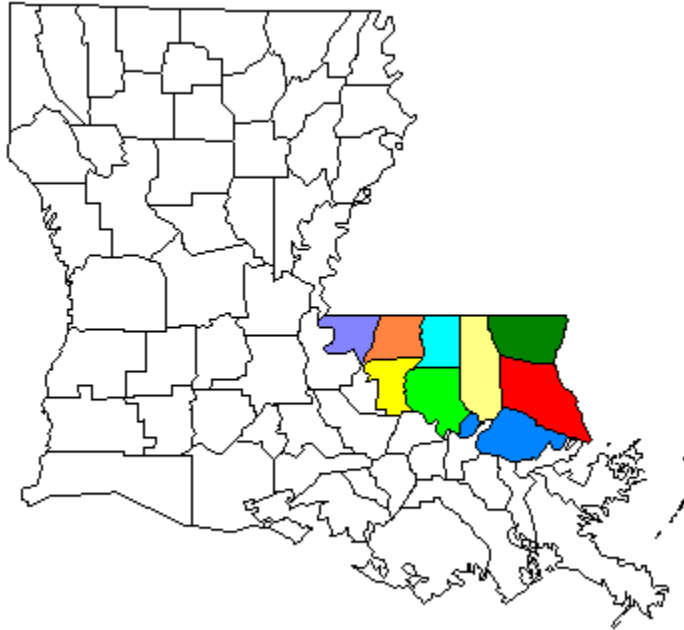
### **2.2.1 Study Area and Sample Parameters**

We decided the best way to ascertain public perception of wildfire risk and prescribed burning was to create, distribute, and analyze the results of a survey instrument. We designed a four-page written survey, along with pre- and post-mailing letters and postcards (Appendices A, B, and C), and distributed them to a sample of WUI residents in our study area. The following paragraphs describe in great detail the process we undertook to create and distribute the survey instrument.

The study area was located in southeastern Louisiana, in a region known as the Florida parishes, which includes East and West Feliciana, East Baton Rouge, Livingston, St. Helena, St. Tammany, Tangipahoa, and Washington parishes (Figure 2.1). East Baton Rouge parish is a densely populated urban area, and was excluded from the sample. The study parameters were set to include private landowners who own, manage, or lease five or more acres of land within the study area. The mailing database was created from tax rolls obtained from the Tax Assessor's Office of each parish. The database was compiled by randomly selecting 500 addresses each from East and West Feliciana, Livingston, and St. Helena parishes, and 1000 addresses each from Tangipahoa, Washington, and St. Tammany parishes, for a total of 5000 landowners selected to participate in the survey. The number of surveys sent to each parish was determined by relative population density



present in each parish. Once the database was edited for duplicate addresses, the final count yielded a sample size of 4816.



**Figure 2.1. Map of the study area accessed from [www.sttammanygs.org](http://www.sttammanygs.org) on 04/03/08. West Feliciana is in purple, East Feliciana is in orange, East Baton Rouge is in gold, Livingston is in light green, St. Helena is in light blue, Tangipahoa is in light yellow, Washington is in dark green, and St. Tammany is in red (Lakes Maurepas and Pontchartrain in dark blue).**

Following Dillman's tailored design method (2000), a pre-mailing postcard was sent August 13, 2008, and was followed by the survey on August 19, 2008. A reminder postcard was mailed September 16, 2008, and followed by the survey on September 23, 2008 (Appendices A, B, C, D, and E). Unfortunately, Hurricanes Gustav and Ike made landfall between survey mailings and may have impacted the public's willingness and/or ability to participate in the survey. It is impossible to quantify whether the storms had an impact, either positive or negative, on survey participation or response, but it is important to note here.

### **2.2.2 Question Structure and Types**

The survey instrument was designed after “Mail and Internet Surveys: The Tailored Design Method” (Dillman, 2000) and was written for a diverse socioeconomic audience. Three basic question types were utilized: forced choice, multiple choice, and Likert scales. There were nine forced choice, 12 multiple choice, and three Likert scales, for a total of 24 questions. The questions were structured to be unbiased, non-leading, and understood and answered easily by the general population. Technical jargon, forestry terms, and industry-specific language were intentionally avoided to achieve clarity and maximize response rate.

### **2.2.3 Survey Sections and Elimination Questions**

The survey instrument was broken down into six sections: General Questions, Wildfire, Controlled Burning, Smoke, Interest in Learning More, and Additional Comments. The first two questions were designed to eliminate non-targeted recipients by ascertaining whether or not the recipient owned, managed, or leased five or more acres of land within the study area.

The General Questions section contained the two questions mentioned above, as well as questions regarding length of ownership (or management or length of time leased), primary uses and goals for the land, management techniques considered and/or utilized to achieve indicated uses and goals, percent forest cover, and primary forest cover type. This section contained both forced choice and multiple choice question types.

The Wildfire section contained questions regarding perceived personal risk of wildfire occurrence on the respondents’ land, factors that influenced their perception of risk such as fuel cover and fuel type located on the property, as well as their proximity to water, concerns regarding wildfire damage, personal experience of wildfire on that land,

and any damage sustained due to wildfire on that land. This section contained both forced choice and multiple choice question types.

The Controlled Burning section posed questions regarding familiarity with controlled burning, perceptions of the effects and manageability of controlled burning, personal experience utilizing controlled burns, outcome of previous controlled burns, and opinion regarding responsibility for conducting controlled burns. This section contained forced choice, multiple choice, and Likert scale question types.

The Smoke section contained questions regarding perception of smoke caused by both controlled burns and wildfires. This section utilized the Likert scale question type. The Interest in Learning More section utilized a forced choice question regarding the participants' interest in receiving educational material about controlled burning, wildfire danger and prevention, and smoke management.

The Additional Comments section provided three blank lines prefaced with an invitation for the participant to express any additional concerns, questions, or comments regarding the topics included within the survey instrument. The participant also was encouraged to return the completed survey promptly, thanked for their time and willingness to participate, and instructed as to how they could communicate any questions or concerns regarding the survey to us via phone, mailing address, or email address.

#### **2.2.4 Survey Creation and Digitization**

The survey was created using Microsoft Word and sent to the Louisiana State University Public Policy Research Lab (PPRL) for digitization. This process allowed the responses to be scanned digitally and stored electronically in a Microsoft Excel database

by the PPRL staff. The PPRL also coordinated with Louisiana State University Mailing Services staff to ensure timely printing and mailing of both the postcards and surveys.

We planned two rounds of mailings to maximize response rate. We sent pre-mailing and post-mailing postcards to each address with the hopes of garnering and maintaining interest among the recipients. Each mailing was staggered for a total of four mailings. We went to great lengths to ensure our respondents' privacy. We began numbering the surveys at a randomly selected number of 2501, added a barcode for scanning purposes, and printed black dots on the second round of surveys in order to differentiate the responses once both rounds of mailings had been sent out (Appendix B). The letters were separated immediately after being opened, stored separately from the surveys, and transcribed into digital format for future analysis.

Because we created our mailing database from tax records, we sent surveys to numerous family estates. This resulted in a number of deceased addressees, as well as aged respondents who stated they were too old to manage their lands in any active way. In some cases, family members of the addressee responded in their stead, and we honored their desire to respond to the survey by counting their responses as valid and included them in our analysis. In at least one instance, a family member copied the survey and sent back multiple responses for multiple addresses. Two other respondents damaged the survey instrument in such a way as to preclude analysis, and therefore both of these instances were excluded from our analysis.

### **2.2.5 Data Analysis**

Data were analyzed either by contingency or frequency tables (PROC FREQ, SAS 9.2, SAS Institute, Inc.), Log-linear models (PROC GENMOD), or multcategory

logit models (PROC GLIMMIX). Questions in which proportion of response was of interest were analyzed by contingency table. Questions with counts of surveys that responded in particular patterns given predictor variables were analyzed by log-linear models. Questions with multiple responses that could be converted to proportions were analyzed by multcategory logit models. Finally, our hypotheses were investigated by combining questions into log-linear or multcategory logit models.

### **3 RESULTS AND DISCUSSION**

#### **3.1 Sample Size, Weights, and Response Rate**

The sample size equaled 4816. We received relatively few undeliverable items (n=59). When adjusted to account for these items, our final response rate is an impressive 26.51%. We received slightly more undeliverable items from the second mailing (n=27 for the first and n=32 for the second mailing). We postulate that the cause for this increase was the high number of missing, damaged, or unreachable mailboxes caused by the wind and debris from Hurricanes Gustav and Ike.

A total of 1261 responses was received, resulting in a response rate of 26.18%. We anticipated a response rate of 10%, so it may be surmised that there may exist considerable interest in the topics of wildfire risk, prescribed burning, and smoke management that were covered in the survey instrument by the residents in the study area. This assumption is further borne out by the frequency statistics, which will be discussed in detail in Section 3.3.1. The response rate is encouraging and supports our assumptions that we would have an interested and engaged public response.

#### **3.2 Digitized Results versus Hand Coding**

Digitizing the survey was intended to streamline the response coding for statistical analysis. Unfortunately, a data integrity test was not conducted until after the initial analysis was completed and the findings reported to the State of Louisiana. Once the data integrity test was performed, a large number of invalid and inconsistent data responses were discovered, and the State report was pulled prior to publication. The surveys were then hand-coded, which was an

extremely time-consuming process and resulted in significant delay in both re-analysis and reporting.

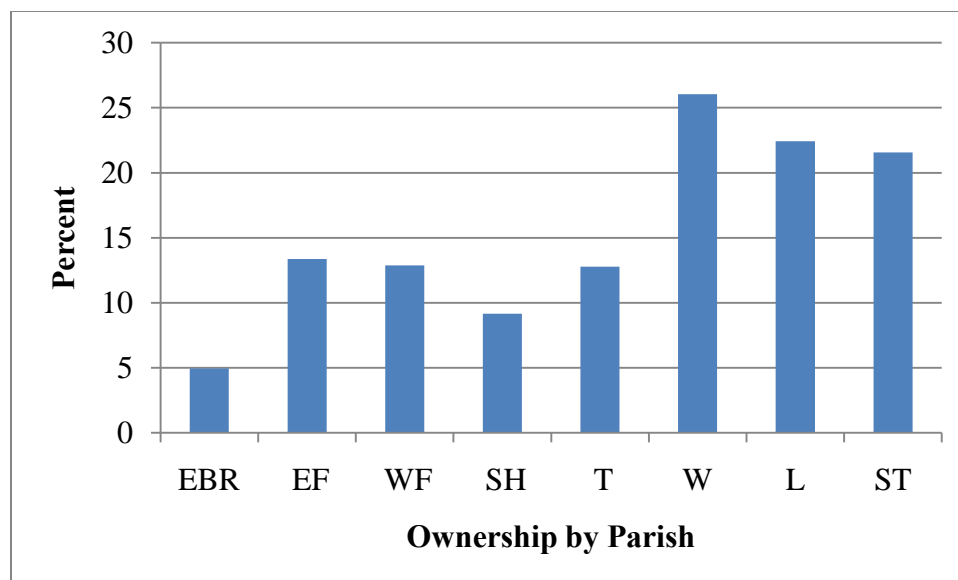
However, hand-coding the data had one unforeseen benefit: it allowed the author to become much more intimately familiar with the data, and I was able to identify trends and ask intelligent questions about the data. Failing to perform a data integrity test prior to analysis turned out to be an expensive and time-consuming mistake, but overall the benefits gained from familiarity with the data were well worth the financial cost and time delay.

### **3.3 Statistical Tests**

#### **3.3.1 Contingency Table Results**

Constructed contingency tables indicated a high level of interest among survey respondents. We also had a relatively moderate to high percentage (44%) of requests for additional information on controlled burning, wildfire risk, and smoke management. Also of note are the high numbers of survey responses with hand-written comments from the respondents, an excellent indicator of interest and involvement among survey respondents. These comments were recorded in an Excel spreadsheet for word analysis to be done in the future. When performed, that analysis should provide useful insights into thoughts and perceptions that our survey instrument could not capture.

It should be noted that for the purpose of this discussion, the term “landowner” is meant to describe landowners, managers, leasees, and lessors. Additionally, the term “participant” describes any potential participant, i.e., anyone who received a survey. The term “respondent” describes anyone who responded to the survey by completing it and returning it to us.



**Figure 3.1. Q1: Do you own, lease, and/or manage land in the Florida parishes?**

**Parishes:**

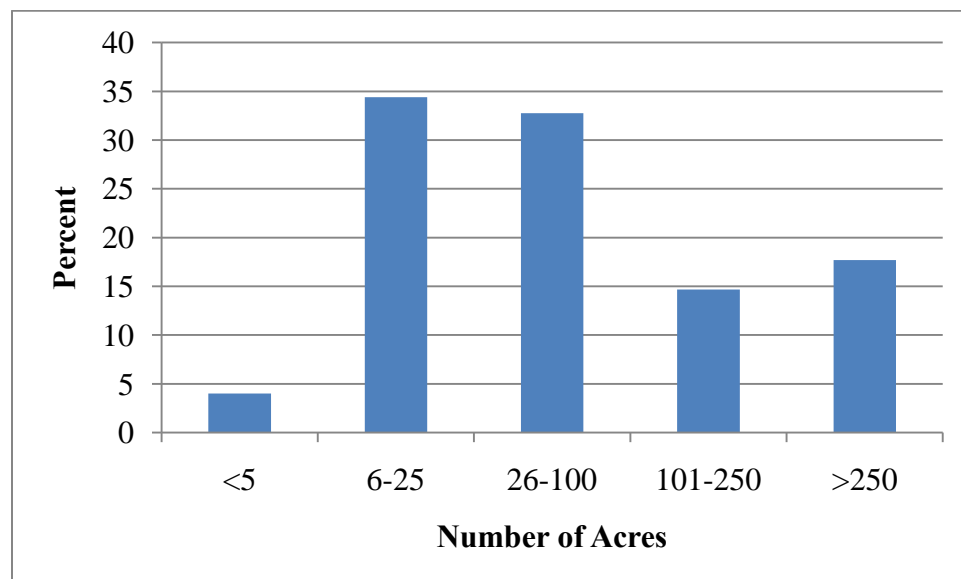
- **EBR – East Baton Rouge**
- **EF – East Feliciana**
- **WF – West Feliciana**
- **SH – St. Helena**
- **T – Tangipahoa**
- **W – Washington**
- **L – Livingston**
- **ST – St. Tammany**

Question 1 began the General Questions section. Of the survey responses received (n=1048), 95% of the respondents (n=1021) were landowners in the study area. Only 4% of the respondents (n=47) did not own land in the study area, and only 0.56% of respondents (n=6) failed to answer Question 1 (Figure 3.1). Question 1 served two purposes: it was an elimination question that allowed the respondents to indicate that they did not own land in the Florida parishes and therefore were not part of the intended sample; it also allowed the participant to indicate in which parish(es) they owned land.



Although East Baton Rouge parish was eliminated from the sample prior to survey distribution owing to the large number of urban addresses (i.e., landowners with less than five acres of land), 5% (n=52) of the respondents indicated ownership of more than five acres of land in this parish (Figure 3.1).

Slightly over 13% of respondents owned land in each of the following parishes: East Feliciana, West Feliciana, and St. Helena. Fewer than 10% of respondents indicated ownership in Livingston parish, and the highest response rates were received from St. Tammany (22%), Washington (22%), and Tangipahoa (26%) parishes, with response rates of 22%, 22%, and 26%.

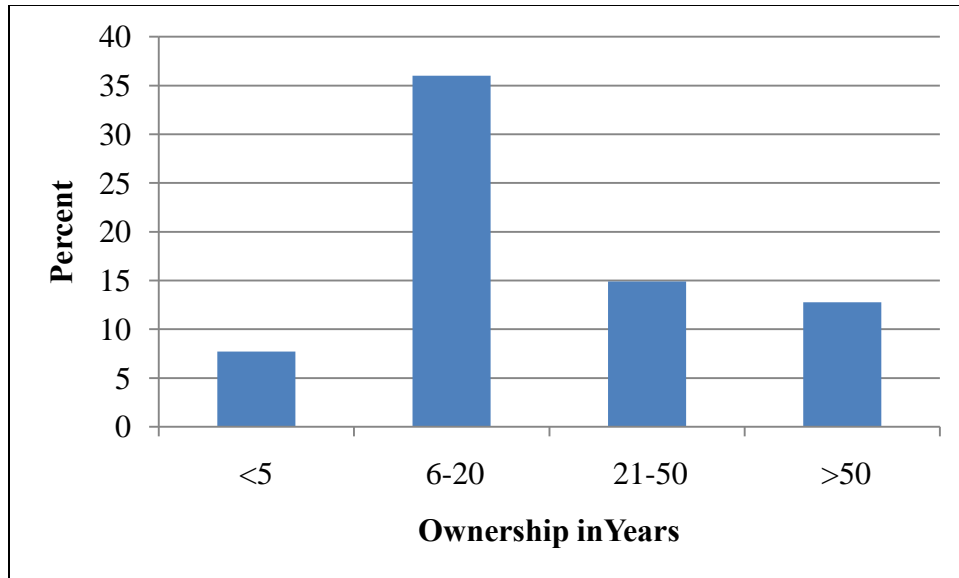


**Figure 3.2. Q2: Please indicate the approximate total number of acres you own, lease, and/or manage in the Florida parishes.**

Question 2 was also an elimination question, designed to identify recipients who did not meet the sample criterion of owning, leasing, or managing greater than five acres of land in the study area. Just over 4% of respondents were

eliminated from the sample on the basis of this question (n=46) (Figure 3.2). Of note here is a survey design flaw: an option was not given for owning, leasing, or managing exactly five acres. Only one respondent noted that she owned exactly five acres; for the purposes of this study, we added that respondent to the 6-25 acre category, as the intent of the question was to eliminate landowners of less than five acres. The majority of the respondents (67%) indicated ownership of between six and 100 acres (n=705), with just over 34% owning between six and 25 acres (n=361) and slightly more than 32% owning between 26 and 100 acres (n=344). A few more than 17% owned more than 250 acres (n=186), and slightly more than 14% owned between 101 and 250 acres (n=154).

Analysis of the contingency tables for Question 2 by parish reveals an interesting trend: the majority of the survey respondents are “small” landowners owning between six and 100 acres (n=702, 67%). This finding is consistent over all eight parishes considered in this survey. Conversely, few very large (over 250 acres) landowners responded to this survey instrument (n=186, 18%). This outcome could be due to a number of factors, including the possibility of reaching an aged recipient pool in this land size category. Also of note here is that when considering the population of people moving out of the New Orleans area after Hurricane Katrina and urbanites moving out of Slidell and Baton Rouge into the WUI, it is possible that we did not reach that population because they are less likely to have bought acreage, rather buying or renting apartments or homes in subdivisions that would not have fallen into our sample parameters. This possibility is explored further in the discussion section.



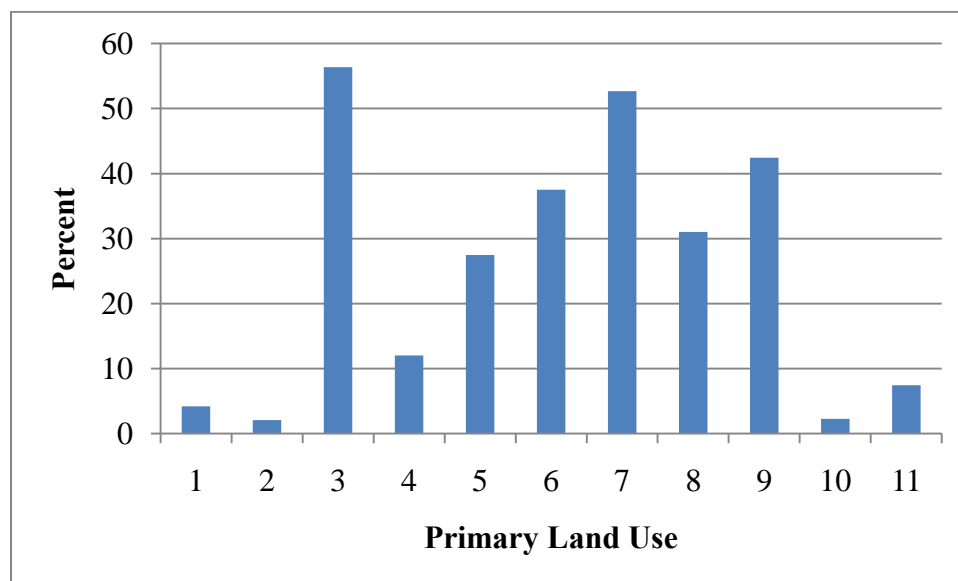
**Figure 3.3. Q3: How long have you owned, leased, and/or managed land in the Florida parishes?**

Question 3 was designed to determine length of landownership, as perception of land management tools and risk can be influenced by this factor, particularly in the WUI, where residents were assumed to be fairly new to the area. The trend of city dwellers moving to the suburbs and beyond, into the WUI, has been well-documented. In this study, the overwhelming majority of respondents (80%) indicated landownership of between 6 and 50 years (n=818); 36%, between 6 and 20 years (n=378); and almost 42%, between 21 and 50 years (n=440). An additional 13% indicated landownership longer than 50 years (n=134), and small percentage (8%) had owned land less than five years (n=81) (Figure 3.3). Interestingly, these numbers seem to correspond well with the population shift observed in New Orleans during the 1950's. A large percentage of Caucasians de-populated the urban areas and began moving into what are now considered suburbs of New Orleans. This shift in population is demographically

referred to as the “White Flight” during the decade of 1950-1960 (Martin et al., 2008).

These data seem to contradict studies that show a trend of increased population density in the WUI, which is particularly interesting when the studies of post-Katrina and post-Rita populations are considered. Hurricane Katrina hit the study area in August 2005, which was three years prior to the date of survey distribution. That same year, Hurricane Rita struck the southwest coasts of Louisiana and Texas, and another population shift was observed, again to southeast Louisiana and Texas. Coincidentally, our survey design used a five year break for the length of ownership category. In the design of the survey, the break of five acres and five years of ownership was chosen without consideration of the timing of Hurricanes Katrina and Rita.

It could be assumed that we either missed the hurricane transplants altogether or that the subset of the population containing peoples directly affected by the hurricanes was captured in the 6-25 acre and 6-20 year categories, but we cannot state either hypothesis definitively. The data support the conclusion that the majority of respondents are in these respective categories, but we cannot say with certainty whether or not these respondents are new to the study area owing to the population shifts observed after the hurricanes of 2005. Therefore, the implications of these results are unclear at this time. As noted previously, although it is impossible to quantify the affect the hurricanes had on our survey response rate or even the actual responses, it is important to note that these events happened during the study.



**Figure 3.4. Q4: What are the primary uses of and goals for this land?**

**Land Use Options:**

1. Office site
2. Industrial site
3. Primary residence
4. Secondary residence
5. Recreation
6. Hunting
7. Timber production
8. Agriculture production
9. Wildlife habitat
10. None
11. Other

Question 4 was designed to identify the primary current and intended future uses (goals) of the land held by the respondents, as use of the land can affect the respondents' perception of wildfire risk, prescribed burning, and smoke management. A small percentage (6%) of respondents reported that their land is used, or is intended for use, as office or industrial sites (n=66) (Figure 3.4). Just over 56% of respondents use, or intend to use, the land as their primary residence

(n=591), whereas slightly over 12% indicated the land is used, or is intended to be used, for a secondary residence (n=126).

Recreation and hunting comprised 65% of the responses, while timber and agriculture comprised 84% (n=877). Another 42% considered their land in use for, or intended to be used as, wildlife habitat (n=445). Additionally, 2% indicated no current use or intended goals for the land (n=24), and 7% indicated “other” as their response (n=78).

The most commonly reported “other” uses were “cattle,” “horses,” and “grazing,” which we intended to be captured under the “Agriculture” option. This delineation of use by the landowner could indicate a difference in perception of terms, again demonstrating the importance of word choice in survey design.

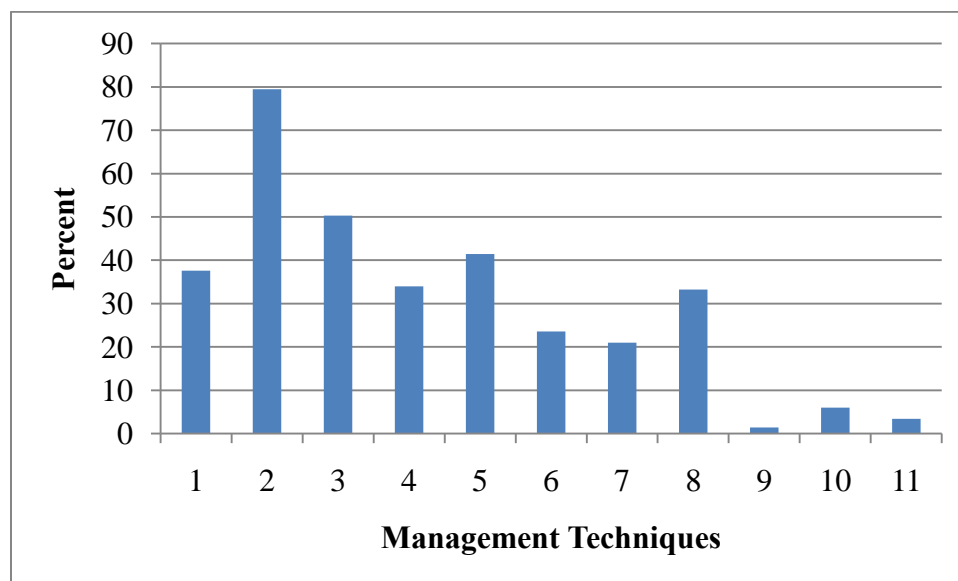
“Agriculture” may have been perceived as agricultural crops by the respondents, whereas we intended hoofstock to be included in the term. To account for this discrepancy, we reassigned any “other” comment that indicated an agricultural use to the “Agriculture” category in order to represent adequately this portion of the sample population. Also of note is that the cumulative responses are well over 100%. This anomaly is due to the instruction on the survey instrument to “check all that apply” to allow for multiple, concurrent, and intended uses for the land.

Analysis of the contingency tables reveals that very few survey respondents across all parishes use their land for office sites (n=44, 4.22%). Even fewer survey respondents across all parishes use their land for industrial sites rather than as office sites (n=22, 2.11%). Also of note is that just over half of the survey respondents across all parishes (n=588, 56%) use this land as their primary

residence compared to only 12% (n=126) who indicated that they use their land as a secondary residence.

Interestingly, just over a quarter of respondents across all parishes stated they use their lands for recreation (n=288, 28%), with St. Tammany parish having the highest percentage of respondents (n=62, 6%). Livingston parish respondents reported a much lower percentage of hunting activity than any of the other parishes (n=16, 1.53%, compared to an average of 62, ~5%, for the remaining parishes). Tangipahoa and Washington parishes have more timber producers than the other parishes (n=221, 21%), as well as agriculture producers (n=107, 13%), although by a lesser margin. Respondents owning land in St. Tammany, Washington, and Tangipahoa parishes indicated that they consider their land to be wildlife habitat (n=255, 24%, which is a higher number than for all other parishes in the survey area).

While it is not unexpected to have the most frequent responses come from the larger, more densely populated parishes, what is interesting is that the respondents from East and West Feliciana parishes did not indicate that they considered their lands as wildlife habitat. There are numerous hunting camps and hunting leases (mainly for white-tailed deer) in these parishes. We cannot speculate as to why the respondents did not indicate that their lands are considered wildlife habitat; we can note that it is possible that there may be participant prevarication or issues of mistrust surfacing in this question. Demographically speaking, these two parishes have residents who are also wealthier and more highly educated than some of the other parishes in the study area.



**Figure 3.5. Q5: What management techniques have you employed to achieve your goals?**

**Question 5 Options:**

- 1. Landscape improvement**
- 2. Bush-hogging/mowing**
- 3. Fence/Boundary Maintenance**
- 4. Timber stand improvement**
- 5. Timber harvesting/removal**
- 6. Controlled burning**
- 7. Trail improvement**
- 8. Wildlife food plot production**
- 9. Drawdown/flooding for migratory waterfowl**
- 10. None**
- 11. Other**

Question 5 was designed to determine how the respondents intend to achieve their land use goals indicated in Question 4. We chose the term “management techniques” to allow for a variety of responses while connoting a purposeful and intentional action to achieve their stated goal(s). Bush-hogging was the most frequent response, at almost 79% (n=833) (Figure 3.5), followed closely by timber harvesting at 41% (n=434). These responses are interesting



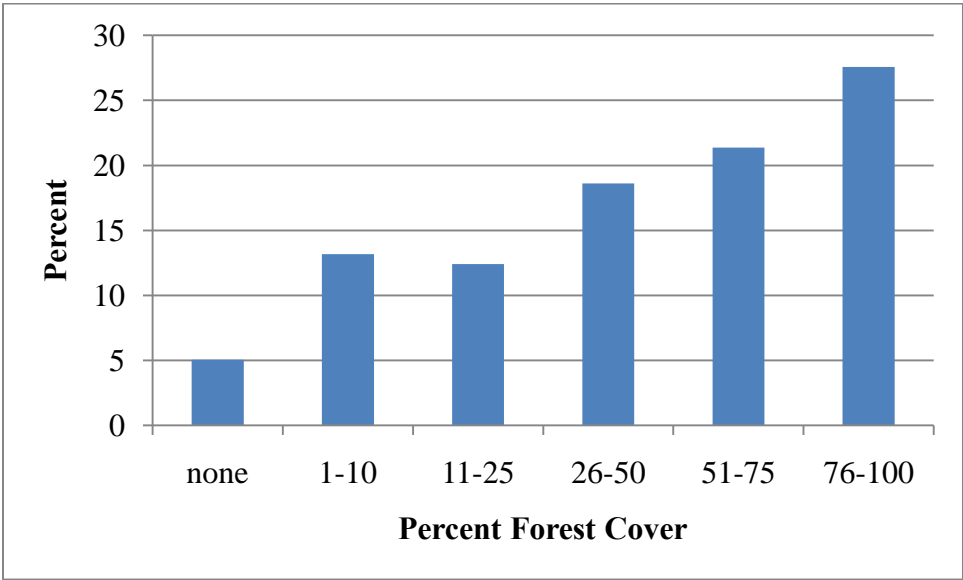
when compared with the 41% of respondents who indicated “wildlife habitat” as a current or future use of the land (Figure 3.4).

Additionally, landscape improvement and fence boundary maintenance were common techniques employed by the respondents, with almost 38% (n=394) and 50% (n=527), respectively, indicating use of these management techniques. It is interesting that the majority of respondents reported some physical manipulation/alteration of the land while stating that their land is intended for use as wildlife habitat. Respondents also indicated employing wildlife food plots (33%, n=348) and drawdown/flooding for migratory waterfowl (1.43%, n=15). These numbers seem to reflect a knowledgeable public regarding management techniques for creating and maintaining wildlife habitat, as the techniques reported by respondents can be ecologically beneficial to maintaining wildlife habitat, such as creating edges, fragmentation, and corridors.

Timber improvement was reported by almost 34% of respondents (n=356), and controlled burning was utilized by 24% (n=247), possibly indicating that controlled burning is not considered a management technique to improve timber. This result could be indicative of an educational opportunity. Trail improvement was reported by just over 20% (n=220) of respondents, a few more than 6% indicated “none” (n=63), and another 3% indicated “other” (n=36).

Analysis of the contingency table reveals that survey respondents across all parishes indicate that landscape improvement seems to be more frequently used in St. Tammany and Tangipahoa parishes than in the other parishes (n=200, 19%), while bush-hogging/mowing is used frequently in all but Livingston and St. Helena parishes (n=35, 3%, and n=73, 7%, respectively). Residents of

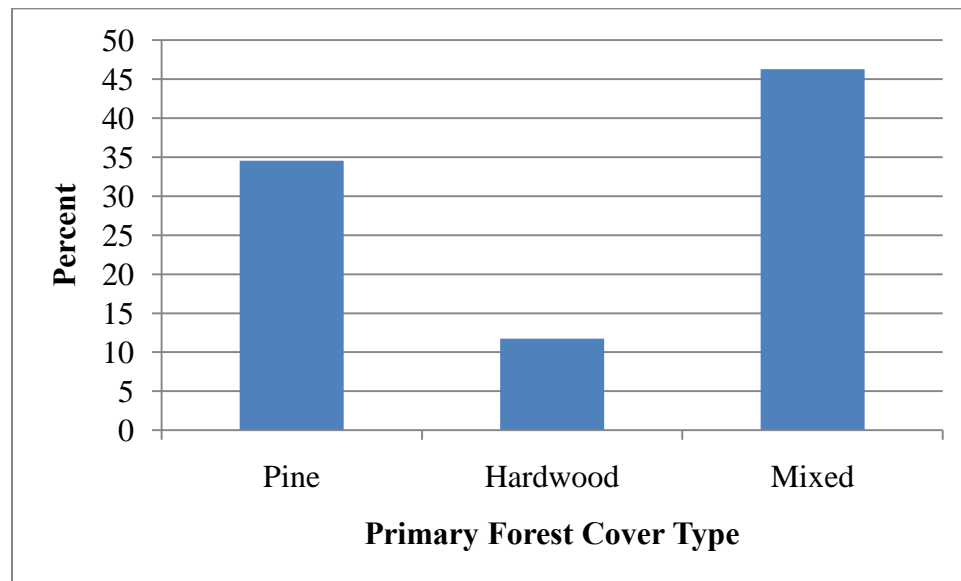
Tangipahoa parish indicated that they use controlled burning more frequently than those of any other parishes (n=60, 6%). West Feliciana respondents reported employing trail improvement as a land management technique more frequently than those in any other parish (n=46, 4%). Residents of Livingston parish said they used wildlife food plots as a management technique (n=11, 1%) much less frequently than respondents in all of the other parishes, where it was indicated that an average of 5% in each parish utilize food plots.



**Figure 3.6. Q6: In your estimation, what percentage of this land is forested? For the purposes of this survey, “forested” is defined as land where the dominant vegetation is trees.**

Question 6 sought to determine the percent of vegetative cover on the respondents’ land. Interestingly, the percentages reported by respondents generally increased with each category, starting with just over 5% reporting no trees (n=53) to more than 27% reporting 76-100% tree coverage (n=289) (Figure

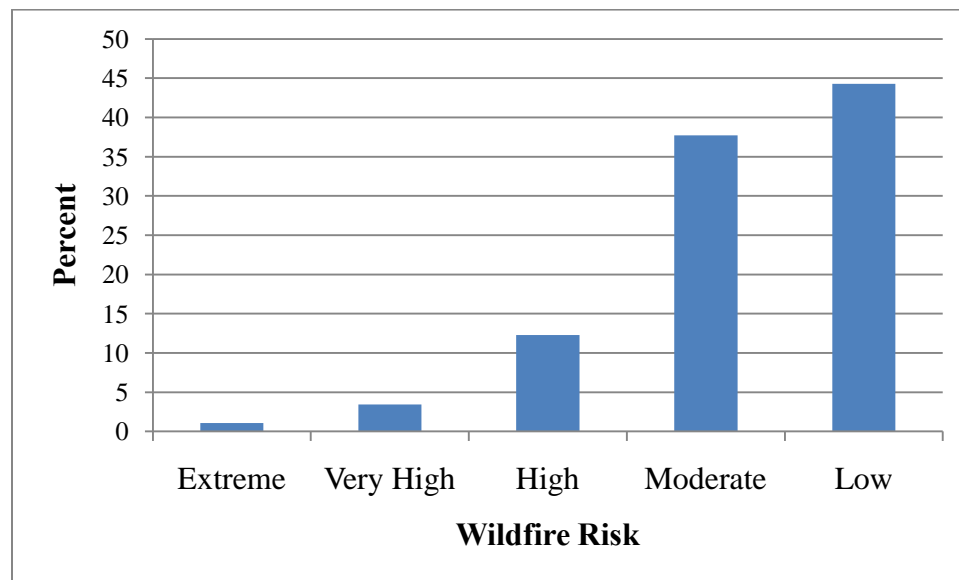
3.6). Analysis of the contingency tables reveals that survey respondents across all parishes indicated a general trend toward reporting greater forest coverage than open space.



**Figure 3.7. Q7. Regarding Question 6, what is the primary forest cover type?**

Question 7 was related to Question 6, and asked what the respondent believed to be the primary forest cover type on their land. “Primary” was defined for the participants as 80% coverage of pine, hardwood, or mixed forest cover. Almost 35% of respondents reported pine as the primary forest cover type (n=362), and hardwood was reported by just under 12% of respondents (n=123). The majority (46%) of respondents reported mixed coverage (n=485) (Figure 3.7), which is consistent with vegetation surveys of the area. Percent coverage is important to this survey because wildfire does not occur as frequently in hardwood stands as it does in pine stands. Public perception of wildfire risk could be related to the type of fuel (trees) present on their land.

Further analysis of the contingency table reveals that survey respondents across most parishes reported pine or mixed coverage as their primary forest cover type. The exception was respondents from East Feliciana and West Feliciana (n=104, 10%, and n=74, 7%, respectively), who reported a mix of hardwood as their primary forest cover.



**Figure 3.8. Q8: In your opinion, how would you rate the level of risk from wildfire on this land? Specific to this survey, “wildfire” is defined as a fire that occurs naturally (e.g., lightning strike), fire that was set for management purposes that becomes uncontrolled, fire set with malicious intent (e.g., arson), or fire due to negligence/accident.**

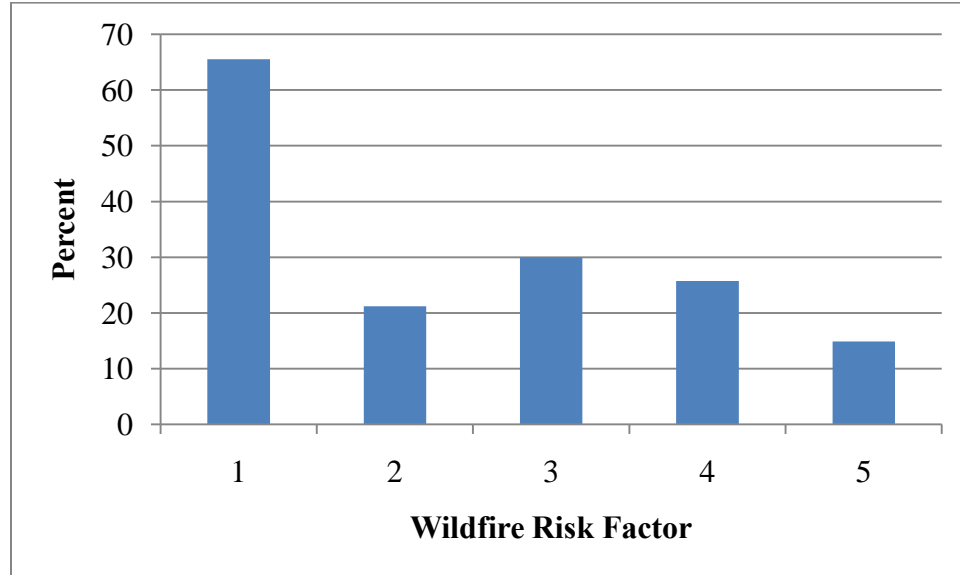
Question 8 began the “Wildfire” section of the survey. We asked the participants to rate their perceived level of risk from wildfire on their land. Interestingly, the overwhelming majority (82%, n=861) indicated a low (44%, n=465) or moderate (37%, n=396) perceived risk from wildfire. Conversely, only 4% (n=47) reported an extreme (1%, n=11) or very high (3%, n=36) perceived risk of wildfire occurring on their land. Another 12% of respondents indicated a

high level of perceived risk from wildfire (n=129) (Figure 3.8). Given the large amount of litter and blowdown after the recent hurricanes, these numbers suggest that respondents may not have considered this debris as fuel, and therefore may not perceive it as risk. This case is another opportunity for education and outreach.

Analysis of the contingency table reveals that survey respondents across all parishes seem to share an equal lack of perceived risk from wildfire. This is especially disturbing and enlightening. Southeastern Louisiana has been under drought conditions for many years, and the recent exaggerated El Niño and La Niña events in the Pacific Ocean have caused wet, cold winters in the study area, followed by warm, dry winters, neither of which presents ideal burning conditions for fuels management during the winter months.

This statistic may be the most telling of the entire study. The majority of the respondents feel that their risk of a wildfire event happening on their land is low, and this perception is not grounded in fact. This finding alone merits continued analysis of our data and will hopefully propel the State and land managers toward finding ways to engage, educate, and equip the residents in the WUI of southeastern Louisiana. This goal may be achieved in a myriad of ways, and these opportunities will be discussed in the conclusion section.

Question 9 sought to determine the factors that influenced the respondents' perception of wildfire risk on their land. Interpreting the responses to this question is difficult, as the question was written to be ambiguous, meaning that the use of the word "proximity" covered both "nearness to" and "distance from" in several of the possible responses.

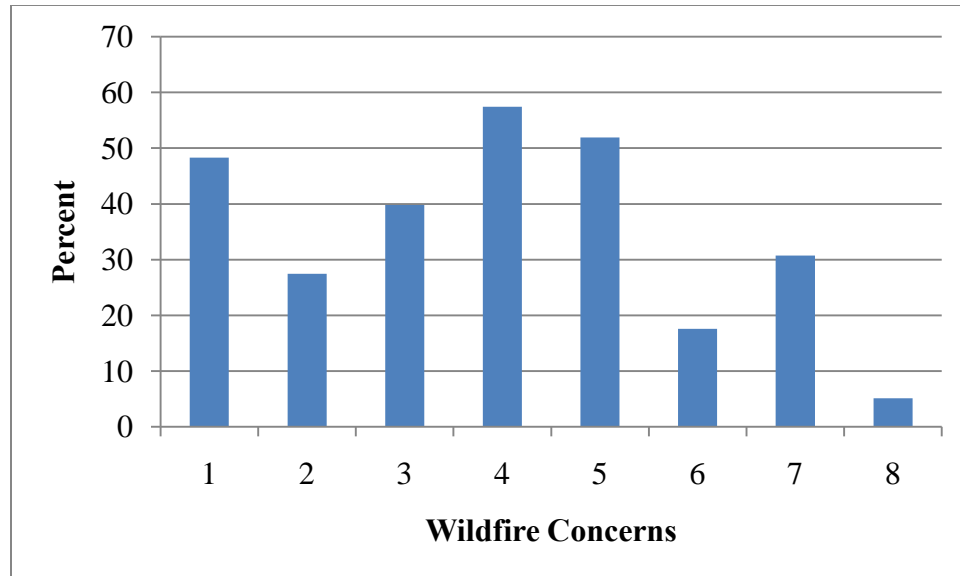


**Figure 3.9. Q9: What factors influenced how you rated your wildfire danger?**

**Wildfire risk factors:**

- 1. Amount of trees, grass, or other fuels located on property**
- 2. Proximity of trees and/or fine fuels to structures located on the property**
- 3. Proximity to local fire suppression units/fire stations**
- 4. Proximity to local bodies of water such as ponds, lakes, streams & water towers**
- 5. Other**

The majority (66%) of respondents indicated that amount of fuel influenced their risk perception (n=687) (Figure 3.9), whereas the other possible answers had much lower frequencies of occurrence: proximity of trees to structures (21%, n=222), proximity to suppression units (30%, n=314), proximity to water (26%, n=270), and other (15%, n=156). Also of note, but not quantified here, is a general observation that when “other” was marked, proximity to a road or highway was a common response.



**Figure 3.10. Q10: Regarding wildfire damage, what are your specific concerns?**

**Wildfire concerns:**

- 1. Damage to structures**
- 2. Loss of human life**
- 3. Loss of wildlife**
- 4. Loss of timber**
- 5. Loss of wildlife habitat**
- 6. Damage to soils (e.g., erosion)**
- 7. Loss of income from timber sales, hunting lease(s), and/or business**
- 8. Other**

Question 10 sought to identify specific concerns of the respondents regarding wildfire damage. As this category can be very broad, we narrowed the possible responses to eight possibilities in hopes of catching most of the concerns in broad categories. The small percentage (5%, n=54) of “other” responses could indicate that we managed to cover most of the overarching concerns. Almost 50% of respondents stated that they were concerned with damage to structures (n=506), and just over 57% of respondents indicated concern for loss of timber (n=602) (Figure 3.10). Almost a third of

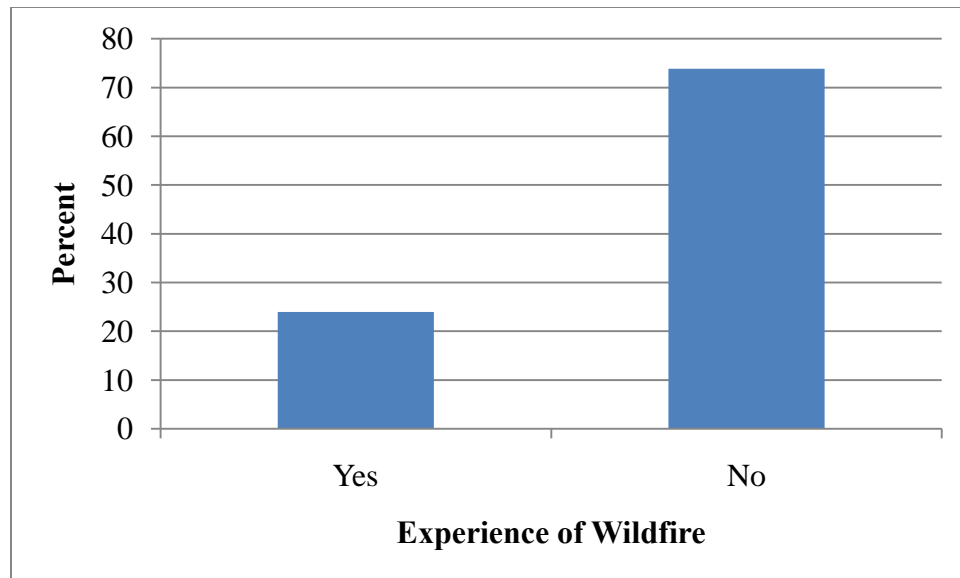
respondents (27%, n=288) reported concern for loss of human life, and almost 40% of respondents indicated concern for loss of wildlife (n=417).

These data suggest persistence of the belief among the general population that fire poses a significant threat to wildlife, whereas many studies have shown that while significant wildlife mortality occurs during wildfire events, prescribed burning events have a far lower occurrence of wildlife mortality.

A large percentage of respondents (51%) reported concern for loss of wildlife habitat to a wildfire occurrence (n=544), a fact that may also be indicative of a potential for education in this area. Wildfire has existed in these ecosystems for millennia (Pyne, 2010), and wildfire often creates or improves wildlife habitat and biodiversity instead of destroying it. Another 18% of respondents reported concern for damage to soils (erosion) (n=184), and almost a third (31%) indicated concern for loss of income from wildfire (n=322).

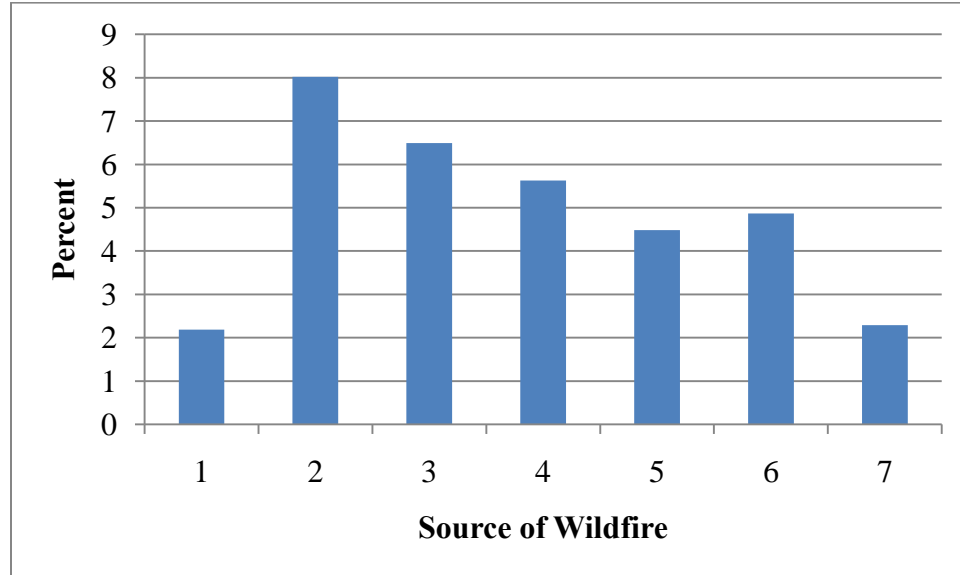
When this percentage is compared to that of respondents who reported “timber harvesting” (41%, Figure 3.5) as a management technique, it may be possible to draw correlations among landowners who actively manage for timber by using traditional land management techniques such as prescribed burning, and how they reported their perceived loss from wildfire. It may be assumed that respondents who are familiar and have used prescribed burning as a land management technique are less concerned about loss of life and more concerned about loss of income.





**Figure 3.11. Q11: Have you ever experienced wildfire on this land?**

Question 11 sought to determine what percentage of participants has ever experienced wildfire on their land (Figure 3.11). The majority (74%) of respondents had not experienced wildfire on their land ( $n=774$ ), a finding that may be correlated to their perception of risk, either positively or negatively. Almost 24% of respondents reported experiencing wildfire on their land ( $n=251$ ). These 24% were asked to report the source of the wildfire in Question 12. Of note here is that it may be surmised that if the respondent had not yet experienced wildfire on their land, the fuel loads on their land may be very high. It is also possible that length of ownership is a variable here. Although we cannot draw any firm conclusions from the results of this question, we never-the-less must consider the possibility that the longer the residents go without experiencing some fire event on their land, the higher their fuel loads will be, and therefore the higher their wildfire risk rises. The results of this question further support our initial assumptions about wildfire risk in the study area.

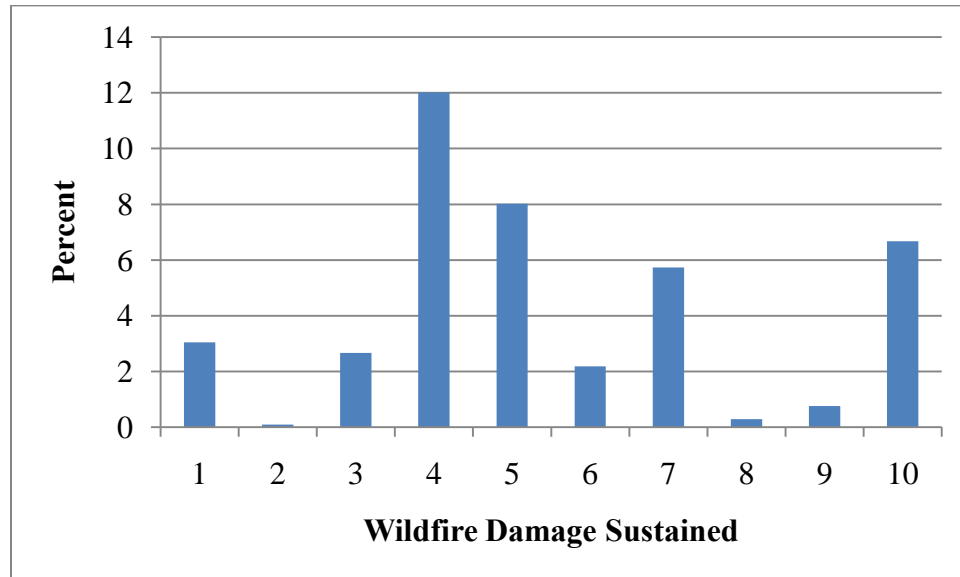


**Figure 3.12. Q12: If you answered Yes to Question 11, what was the source of the wildfire?**

**Source of wildfire:**

- 1. Lightning strike**
- 2. Brush pile or leaf burns that became uncontrolled**
- 3. Controlled burn that became uncontrolled**
- 4. Arson**
- 5. Negligence (e.g., campfire left unattended)**
- 6. Unknown**
- 7. Other**

Respondents reported lightning (2%, n=23), brush pile or leaf burn that got out of control (8%, n=84), controlled burn that became uncontrolled (6%, n=68), arson (6%, n=59), negligence (e.g., campfire left unattended) (4%, n=47), unknown (5%, n=51), and other (2%, n=24) as sources for wildfire experienced on their land (Figure 3.12). These responses may be interpreted as an inability of the survey instrument to capture the true source of wildfire; it is just as likely that the respondent just did not know the source but did not want to report that answer.



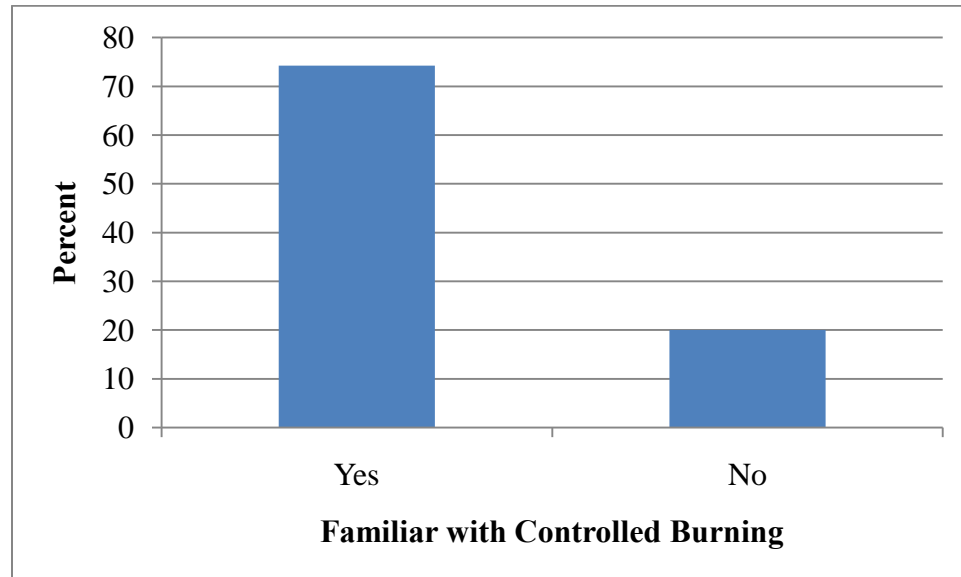
**Figure 3.13. Q13: Specific to Question 11, what types of damage did you sustain from wildfire(s)?**

**Wildfire Damage Sustained:**

- 1. Damage to structures**
- 2. Loss of human life**
- 3. Loss of wildlife**
- 4. Loss of timber**
- 5. Loss of wildlife habitat**
- 6. Damage to soils (increased risk of erosion)**
- 7. Loss of timber sale revenue**
- 8. Loss of hunting lease(s) revenue**
- 9. Loss of business-related income**
- 10. Other**

Respondents who reported having experienced wildfire on their land (22% of respondents to Question 11) were asked to indicate the types of damage they sustained from the wildfire(s). Loss of timber was the most frequent response (12%, n=126); other damages reported were damage to structures (3%, n=32), loss of human life (0.1%, n=1), loss of wildlife (3%, n=28), loss of wildlife habitat (8%, n=84), damage to soils (2%, n=23), loss of timber

revenue (5%, n=60), loss of hunting lease revenue (0.29%, n=3), loss of business income (0.76%, n=8), and other (7%, n=70) (Figure 3.13).



**Figure 3.14. Q14: Are you familiar with the concept of controlled burning, also known as “prescribed burning?”**

Question 14 began the Controlled Burning section of the survey. It asked the participants about their familiarity with the concept of controlled burning. The majority of the respondents (74%) reported that they were familiar with controlled burning (n=778) (Figure 3.14), while 20% reported that they were not (n=210). Almost 6% of respondents did not answer this question (n=60). Interestingly, more respondents answered this section than indicated that controlled burning was a land management technique that they utilized on their land. Without drawing any conclusions, it is interesting to note that familiarity with controlled burning seems to be more acceptable to report than use of the same.

**Q15: What is your opinion of the effects of controlled burning?**

**Controlled burning:**

- **is an efficient way to control undergrowth.**
- **endangers wildlife.**
- **is an efficient way to remove fuels to prevent wildfire.**
- **encourages new plant growth.**
- **easily gets out of control and becomes a wildfire.**
- **causes unsightly stand conditions.**
- **improves access to forested lands.**
- **endangers human life.**

Questions 15 and 16 incorporated the use of Likert scales into the survey instrument, and the analysis of these tables is reported and discussed in Section 3.3.2. The use of Likert scales allows the participant to quantify subjective material, here described as “opinion.” Question 15 asked the participants to rate their opinion of a specific statement regarding controlled burning on a scale of 1 to 5, with 1 being “strongly disagree” and 5 being “strongly agree.” Just over 3% of the respondents strongly disagreed or disagreed that controlled burns efficiently control undergrowth (n=36); 70% either agreed or strongly agreed with that statement (n=736). Almost 5% had no opinion (n=50).

Over a third (37%) of respondents strongly disagreed or disagreed with the statement that controlled burns endanger wildlife (n=389), while a quarter of respondents (25%) agreed or strongly agreed with that statement (n=266). Another 11% had no opinion (n=122). The margin of difference in this question suggests that the respondents are pretty evenly divided in their perception of harm or no harm to wildlife during a controlled burn, but the majority had an opinion.

Only 4% of respondents strongly disagreed or disagreed with the statement that controlled burns are an efficient way to remove fuels to prevent

wildfire (n=40), while the majority (63%) agreed or strongly agreed with this statement (n=672). Only 9% had no opinion (n=96).

Another statement that elicited strong opinions is that controlled burns encourage new plant growth. Only 3% strongly disagreed or disagreed with this statement (n=30), while a majority (67%) of respondents agreed or strongly agreed that controlled burns encourage new plant growth (n=698). Only 6% had no opinion (n=69). The strong opinions expressed by respondents to these two statements may indicate a high level of knowledge regarding the benefits of controlled burning; an opportunity may exist to educate the residents of the study area who expressed no opinion or strong opinions regarding negative statements about the use of controlled burning.

Of the respondents who expressed an opinion about the statement that controlled burns easily get out of control and become wildfires, 43% strongly disagreed or disagreed with that statement (n=452); just over half of that number (20%) of respondents agreed or strongly agreed (n=210) that controlled burns easily become wildfires. Another 11% had no opinion (n=122).

Another statement with negative connotation had an interesting split in opinion: 38% of respondents strongly disagreed or disagreed with the statement that controlled burns cause unsightly stand conditions (n=400), while 19% of respondents agreed or strongly agreed with that statement (n=199). Another 17% expressed no opinion (n=182).

Only 3% of respondents strongly disagreed or disagreed with the statement that controlled burns improve access to forested lands (n=36), while the majority (56%) agreed or strongly agreed with that statement (n=584). Another

16% expressed no opinion (n=170). Additionally, 53% of respondents strongly disagreed or disagreed with the statement that controlled burns endanger human life (n=565), and 9% of respondents agreed or strongly agreed with that statement (n=99). Another 11% expressed no opinion (n=123). The strong opinions expressed by respondents to these two statements may indicate a high level of knowledge regarding the benefits of controlled burning, and also that an opportunity may exist to educate the residents of the study area who expressed no opinion or strong opinions regarding negative statements about the use of controlled burning as a forest management tool.

**Q16: What is your perception of the manageability of controlled burning?**

**Controlled burns:**

- rarely burn at the intensity planned.
- rarely harm desirable timber when properly executed.
- rarely stay confined to the target area.
- are not really “controlled” at all, and successful burns are merely good luck.
- are fast and efficient methods for achieving a variety of land management goals.

Question 16 is the second Likert scale question incorporated into the survey instrument, and dealt with perceptions regarding the manageability of controlled burns. Respondents were fairly evenly split in their responses to the statement that controlled burns rarely burn at the intensity planned. The majority (28%) of the respondents had no opinion (n=300), and 26% strongly disagreed or disagreed with that statement (n=270); another 20% agreed or strongly agreed (n=213). This even distribution may indicate that even among the respondents who are knowledgeable about the benefits of controlled burning, there may exist

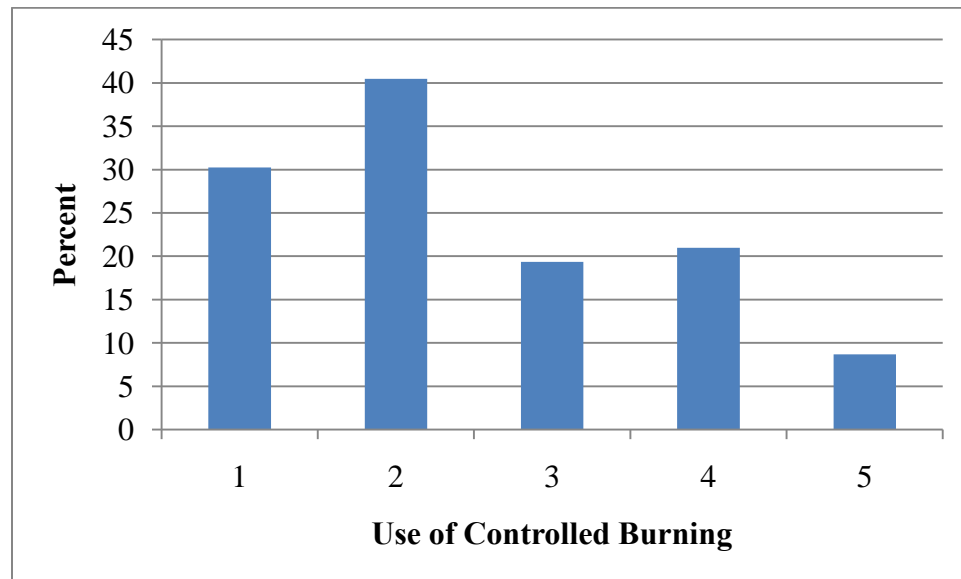
the opportunity to educate residents regarding weather patterns and fire prescriptions as risk mitigation tools for managing controlled burns.

A large majority of respondents (62%) agreed or strongly agreed with the statement that controlled burns rarely harm desirable timber when properly executed (n=653), while 5% strongly disagreed or disagreed with this statement (n=57). Another 10% had no opinion (n=102). A majority of respondents (48%) strongly disagreed or disagreed with the statement that controlled burns rarely stay confined to the target area (n=512), whereas 12% agreed or strongly agreed with this statement (n=121). Another 15% of respondents expressed no opinion (n=158). A strong majority of respondents (56%) strongly disagreed or disagreed with the statement that controlled burns are not really “controlled” at all, and successful burns are merely good luck (n=585); 6% agreed or strongly agreed with this statement (n=64). Another 14% expressed no opinion (n=145). Interestingly, in each of the previous three statements, more respondents had no opinion than those who opposed the majority. An educational opportunity may exist for those who reported either no opinion or the minority opinion, which was consistently ecologically inaccurate.

Consistent with the positive perceptions implied by the data presented in Question 16 so far, the statement that controlled burns are fast and efficient methods for achieving a variety of land management goals was either agreed or strongly agreed with by a large majority (58%) of respondents (n=609); only 5% strongly disagreed or disagreed with that statement (n=58). Another 14% expressed no opinion (n=144). The respondents’ positive perceptions of controlled burning in Question 16 seem to be supported by the data presented in



the rest of the survey. This could be indicative of an overall receptivity by the respondents to the use of controlled burning as a forest management tool.



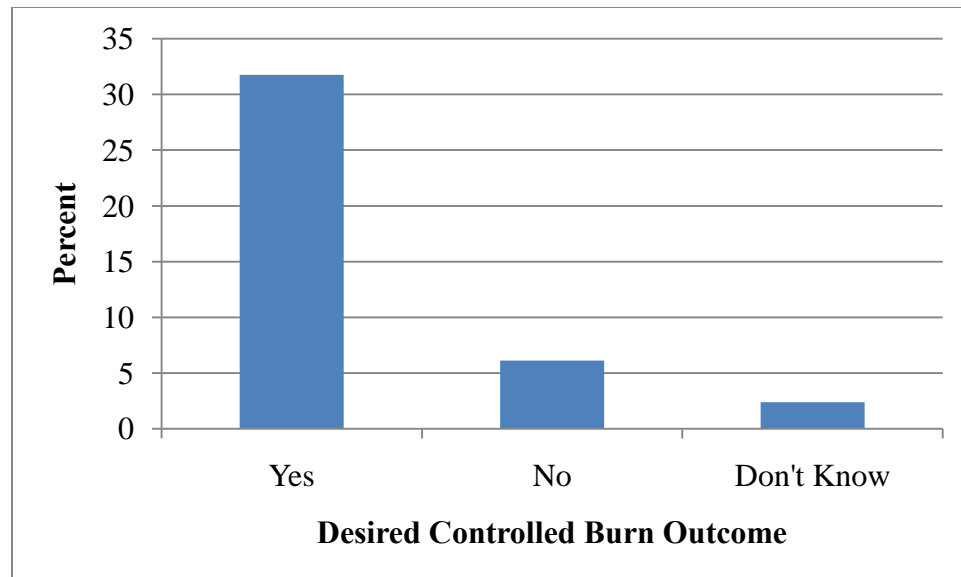
**Figure 3.15. Q17: Have you or your neighbors used controlled burning on your respective land?**

**Use of Controlled Burning:**

- 1. Yes, I have.**
- 2. No, I have not.**
- 3. Yes, my neighbors have.**
- 4. No, my neighbors have not.**
- 5. Don't know.**

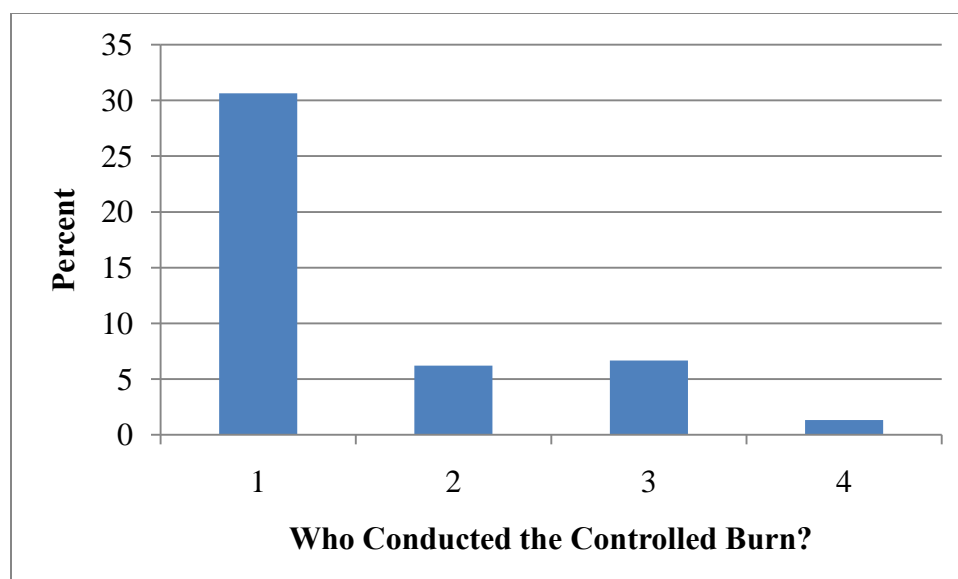
Question 17 began a series of questions intended to elicit an understanding of the respondents' actual exposure to controlled burning activity. In response to the question, "Have you or your neighbors used controlled burning on your respective lands?" (Figure 3.15), 30% had personally used controlled burning (n=317), and 40% had not (n=424). Additionally, 19% of respondents reported that their neighbors had used controlled burning (n=203); 21% of their neighbors had not (n=220). Almost 9% of respondents reported that they did not know whether

controlled burning had been used on either their land or their neighbors' land (n=91). It is important to note that the overall percentage totals over 100% because the participants were instructed to “check all that apply.”



**Figure 3.16. Q18: If you answered Yes to Question 17, did the controlled burn have the desired outcome?**

Of the combined “yes” responses to Question 17 (49%), in Question 18 31% of respondents reported that the controlled burns had the desired outcome (n=333), and 6% reported that they did not (n=64). Another 2% reported that they did not know whether the controlled burn had the desired outcome (n=25) (Figure 3.16).

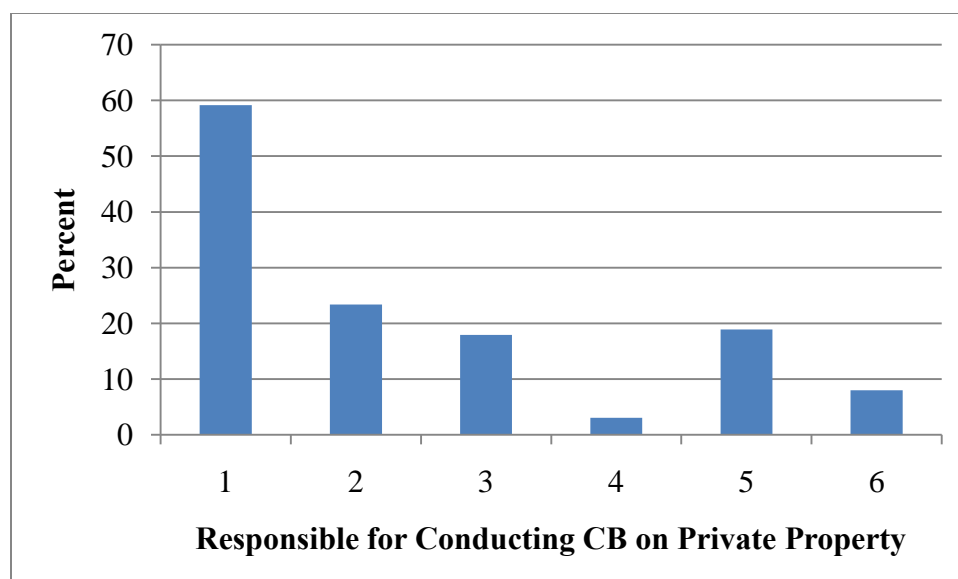


**Figure 3.17. Q19: If you answered Yes to Question 17, who conducted the controlled burn?**

**Who conducted the controlled burn?**

- 1. I, my neighbor, a family member, or an employee conducted the controlled burn.**
- 2. A private professional land manager conducted the controlled burn.**
- 3. Louisiana Department of Agriculture and Forestry conducted the burn.**
- 4. Other.**

In Question 19, of the 31% of respondents who answered “yes” to Question 18, 31% stated that they, their neighbor, a family member, or an employee conducted the controlled burn (n=321). Another 6% reported that a private professional land manager conducted the burn (n=65), and 7% related that the Louisiana Department of Agriculture and Forestry conducted the burn (n=70). Just over an additional 1% reported “other” as their response (n=14) (Figure 3.17). The implications of this question immediately suggest a source of revenue and educational outreach for the State of Louisiana.



**Figure 3.18. Q20: In your opinion, who should be responsible for conducting controlled burns on private property?**

**Responsible for Conducting Controlled Burns on Private Property:**

- 1. The landowner.**
- 2. Local government/fire district.**
- 3. The State of Louisiana.**
- 4. The federal government.**
- 5. Private land management consultants.**
- 6. Other.**

In Question 20, the majority (59%) indicated that the landowner should be responsible for conducting controlled burns on private property (n=620).

Additionally, 23% indicated the local government or fire district (n=245), 18% indicated the State of Louisiana (n=188), 3% indicated the federal government (n=32), 19% indicated private land management consultants (n=198), and 8% indicated “other” (n=84) in response to this question (Figure 3.18). These data suggest that there may be an opportunity for State and local governments to engage the citizens in practicing land management techniques on their own lands.

Additionally, there are revenue and outreach opportunities suggested by those respondents who indicated that some form of local, State, or federal government or fire districts should be responsible for conducting the controlled burns.

**Q21: What is your opinion of the smoke produced by both controlled burning and wildfire?**

- Smoke from **\*controlled burns\*** is manageable.
- Smoke from **\*controlled burns\*** is just as unmanageable as smoke from wildfires.
- Smoke from **\*fire\*** reduces visibility on roadways and contributes to traffic accidents.
- Occasional smoke from **\*controlled burns\*** is acceptable.
- Smoke from **\*controlled burns\*** has an adverse effect on human health.
- Smoke from **\*wildfires\*** has an adverse effect on human health.
- Smoke from **\*any source\*** is unacceptable.
- Someone in my household is unable to tolerate any **\*smoke.\***

Question 21 was the last of the Likert scale questions, and began the Smoke section. It bears mentioning at the beginning of this discussion that Question 21 was deliberately designed to have a positive statement followed by a negative statement. This arrangement was used in hopes of avoiding confusion, since the question as a whole deals with perception of smoke from three different sources: controlled burns, fire, and wildfire. This manipulation may have been unsuccessful in that there are conflicting data from this question, possibly indicating that the attempt to avoid confusion failed. It is also possible that smoke management was an unfamiliar topic and therefore was less interesting to the respondents; or it is possible that the participants lost interest in taking the survey at that point. It is impossible to know why the respondents contradicted

themselves in answering this question, but it is important to note that contradiction occurred.

A majority of respondents (50%) agreed or strongly agreed with the statement that smoke from controlled burns is manageable (n=527), while 24% strongly disagreed or disagreed (n=248). Another 18% expressed no opinion (n=184). Of note here is that more than double the number of respondents agreed than disagreed with this statement. In response to the statement that smoke from controlled burns is just as unmanageable as smoke from wildfires, 28% agreed or strongly agreed (n=296), and 56% of respondents strongly disagreed or disagreed (n=593). Another 17% expressed no opinion (n=186).

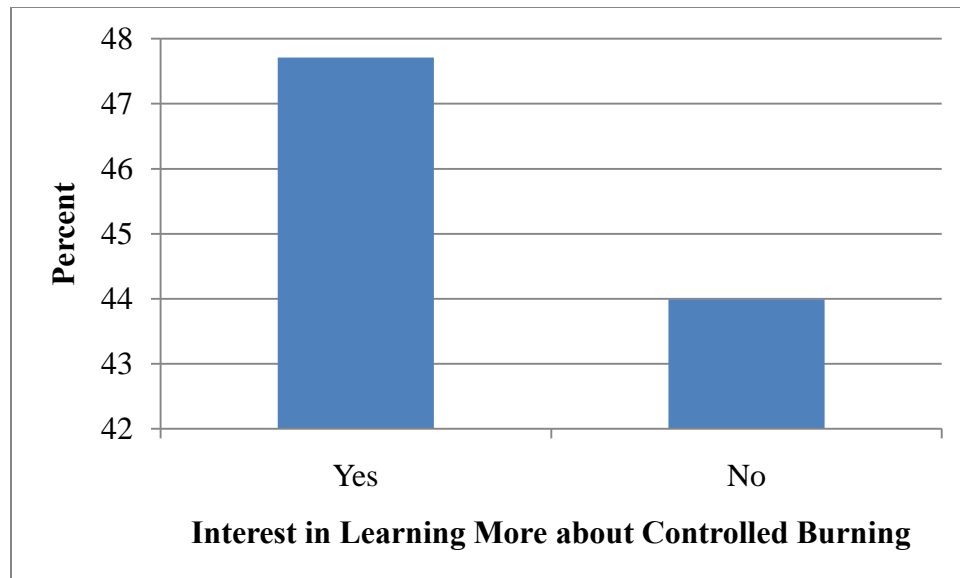
In response to the statement that smoke from fire reduces visibility on roadways and contributes to traffic accidents, a majority of respondents (50%) agreed or strongly agreed (n=520), while 20% strongly disagreed or disagreed (n=214); another 21% expressed no opinion (n=220). It is interesting that the combined responses for strongly disagree, disagree, and no opinion almost equal the combined responses for the affirmative.

A large majority of respondents (78%) agreed or strongly agreed that occasional smoke from controlled burns is acceptable (n=823), while only 6% strongly disagreed or disagreed (n=58). Another 9% expressed no opinion (n=90). The combined responses for the affirmative and no opinion far eclipse the negative. Interestingly, respondents were fairly evenly split in their opinions of the statement that smoke from controlled burns has an adverse effect on human health, with 34% indicating that they strongly disagreed or disagreed (n=343);

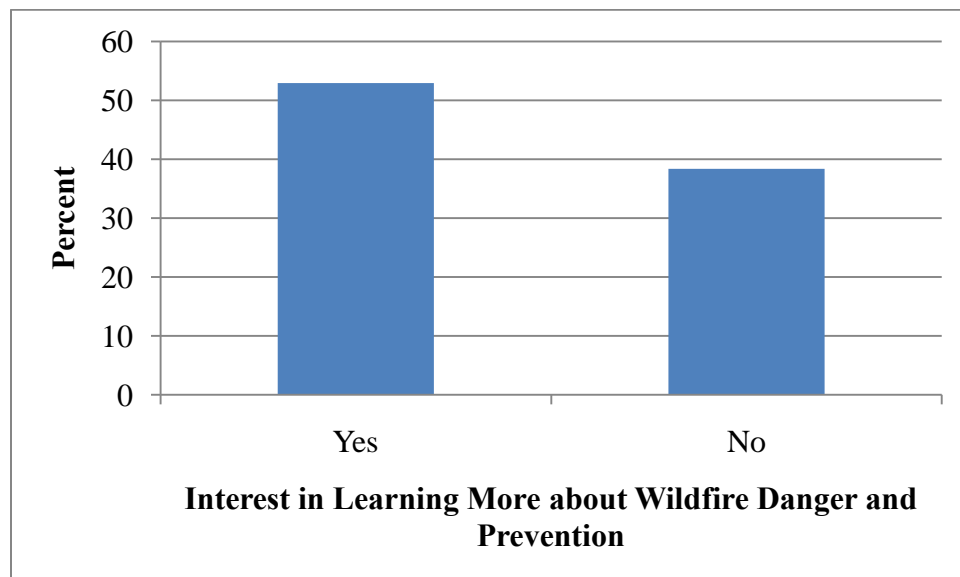
29% agreed or strongly agreed (n=305), and another 28% expressed no opinion (n=297).

A majority of respondents (45%) agreed or strongly agreed with the statement that smoke from wildfires has an adverse effect on human health (n=477), while 19% of respondents strongly disagreed or disagreed (n=204); another 25% expressed no opinion (n=266). Interestingly, the combined responses of strongly disagree, disagree, and no opinion (n=470) almost exactly equal the affirmative (n=427). Respondents (52%) strongly disagreed or disagreed with the statement that smoke from any source is unacceptable (n=549), and 15% of respondents agreed or strongly agreed (n=160); another 22% expressed no opinion (n=235).

It is interesting that more respondents lacked an opinion than those choosing the affirmative. Similar to the previous statement, a majority of respondents (52%) strongly disagreed or disagreed with the statement that someone in their household is unable to tolerate any smoke (n=545), whereas 18% of respondents agreed or strongly agreed (n=189). Another 20% expressed no opinion (n=207). Combining the neutral, disagree, and strongly disagree responses gives a strong majority (72%) of the respondents who did not agree with this statement. This is not unexpected, as the intent of the question was to ascertain how many residents are completely opposed to or intolerant of woodland smoke. We anticipate that those respondents who replied in the affirmative have health issues that preclude them from tolerance, such as asthma or chronic obstructive pulmonary disease (COPD).

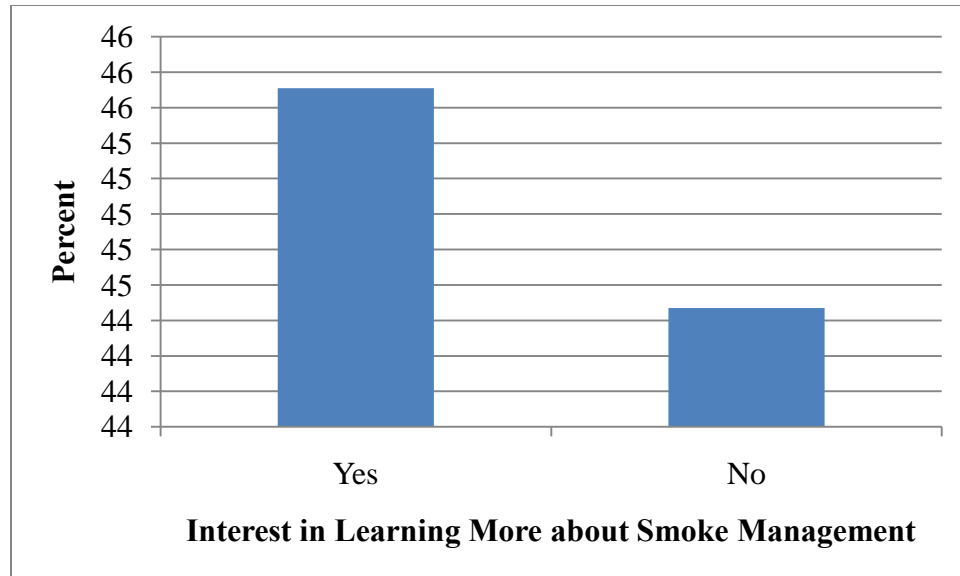


**Figure 3.19. Q22: Are you interested in learning more about controlled burning?**



**Figure 3.20. Q23: Are you interested in learning more about wildfire danger and prevention?**





**Figure 3.21. Q24: Are you interested in learning more about smoke management?**

Questions 22, 23, and 24 are in the section Interest in Learning More. The level of interest in learning more about controlled burning (47%, n=500), wildfire danger and prevention (53%, n=555), and smoke management (46%, n=479) is fairly consistent and moderate (Figures 3.19, 3.20, and 3.21). These percentages are encouraging because they indicate that our residents are interested and invested in becoming better educated about their environs. Better education is not the end-all solution to mitigating wildfire risk to WUI homeowners, wildland firefighters, and land managers, but it is a very good place to start.

As Louisiana enters into another warm, dry La Niña winter, we anticipate a corresponding increase in wildfires. Indeed, this is already proving to be true, as evidenced by reports of increased wildfire activity in our State (The Forestry Source, October 2010 and an AP article in The Daily Reveille, November 1, 2010). The public is not only deserving of better education, they desire it.

### 3.3.2 Generalized Logistic Model Results

Statistical analysis using the generalized logistic model (PROC GLIMMIX) procedure in SAS v9.2 yielded many significant results. We opted to use this model because we had several questions within the survey instrument that could not be adequately analyzed using Chi-Square or ANOVA tests. Using the PROC GLIMMIX procedure, we performed Type III Tests of Fixed Effects to compare different questions to one another. Tables 3.1 through 3.11 show the statistically significant statistics.

**Table 3.1. Multicategory logit procedure for Question 15\_a by Question 4. This table compares those who agree that controlled burning is an efficient way to control undergrowth with land use responses recreation and wildlife habitat.**

Question 15a				
	DF	F-Value	Pr>F	Direction
Question 4_5	2	3.36	0.0352	+
Question 4_9	2	4.35	0.0132	+

Analysis of responses to Question 15\_a (controlled burning is an efficient way to control undergrowth) compared to those of Question 4 (primary land use) yielded two significant results (Table 3.1). Responses to Question 4\_5 (recreation) and Question 4\_9 (wildlife habitat) show strong agreement with the statement that controlled burning is an efficient way to control undergrowth ( $F=3.36$ ,  $Pr>F=0.0352$ , and  $F=4.35$ ,  $Pr>F=0.0132$ , respectively). These results are not unexpected, as respondents who manage their lands for recreation and/or wildlife habitat would be reasonably expected to be aware of the benefits of controlled burning for keeping lands clear of underbrush and creating disturbance, which is beneficial for wildlife.

**Table 3.2. Multicategory logit procedure for Question 15\_b by Questions 1 and 4. This table compares those who disagree with the statement that controlled burning endangers wildlife with residents of West Feliciana, St. Helena, Tangipahoa, and Washington parishes, as well as hunters. Dissenting from agreement are the respondents who indicated that they use their land for industrial purposes.**

	Question 15_b			
	DF	F-Value	Pr>F	Direction
Question 1_3	2	8.35	0.0003	–
Question 1_5	2	3.48	0.0312	–
Question 1_6	2	3.68	0.0258	–
Question 1_7	2	4.05	0.0177	–
Question 4_2	2	3.10	0.0456	+
Question 4_6	2	7.04	0.0009	–

Analysis of Question 15\_b (controlled burning endangers wildlife) compared to Question 1 (parish) revealed that respondents from West Feliciana (F=8.35, Pr>F=0.0003), St. Helena (F=3.48, Pr>F=0.0312), Tangipahoa (F=3.68, Pr>F=0.0258), and Washington (F=4.05, Pr>F=0.0177) parishes strongly disagreed with the statement that controlled burning endangers wildlife (Table 3.2). Further analysis reveals that West Feliciana respondents tended to agree most strongly with this statement. Additionally, analysis of Question 4\_6 (hunters) reveals that those respondents also strongly disagreed with that statement (F=7.04, Pr>F=0.0009). Conversely, analysis of Question 4\_2 (industrial land use) responses to the same question revealed that these respondents strongly agreed with the statement that controlled burning endangers wildlife (F=3.10, Pr>F=0.0456). This is an interesting result that we can only

speculate comes from the fear of a wildfire event as a possible source of lost income.

**Table 3.3. Multicategory logit procedure for Question 15\_c by Questions 2 and 4. This table compares those who agree that controlled burning is an efficient way to remove fuels to prevent wildfire with small landowners, large landowners, secondary residents, and recreational users.**

Question 15_c				
	DF	F-Value	Pr>F	Direction
Question 2_2	2	7.04	0.0009	+
Question 2_5	2	7.04	0.0009	+
Question 4_4	2	3.59	0.0282	+
Question 4_5	2	3.09	0.0462	+

Analysis of Question 15\_c (controlled burning is an efficient way to remove fuels to prevent wildfire) compared to Questions 2\_2 (small landowners) and 2\_5 (large landowners) show overwhelming agreement that controlled burning is an efficient way to remove fuels in order to prevent wildfire ( $F=7.04$ ,  $Pr>F=0.0009$ ) (Table 3.3). There is only one statistic because during the PROC GLIMMIX we collapsed the acreage from four individual groups to two overall groups of small and large landowners. Additionally, analysis of Question 15\_c (controlled burning is an efficient way to remove fuels to prevent wildfire) compared to Questions 4\_4 (secondary residence) and 4\_5 (recreation) indicated extremely strong agreement between these two groups of respondents ( $F=3.59$ ,  $Pr>F=0.0282$ , and  $F=3.09$ ,  $Pr>F=0.0462$ , respectively). We suspect that these respondents may be some of our wealthier, older, and more knowledgeable respondents.

**Table 3.4. Multicategory logit procedure for Question 15\_e by Questions 1, 2, and 4. This table compares those who disagree that controlled burns easily get out of control and become wildfires with residents from St. Tammany, large and small land owners, and agricultural producers.**

Question 15_e				
	DF	F-Value	Pr>F	Direction
Question 1_8	2	3.27	0.0385	–
Question 2	2	3.46	0.0318	–
Question 4_8	2	4.51	0.0113	–

A comparison of Question 15\_e (controlled burns easily get out of control and become wildfires) with Questions 1\_8 (St. Tammany), 2 (large and small landowners), and 4\_8 (agriculture production) indicates disagreement with the statement that controlled burns easily get out of control and become wildfires ( $F=3.27$ ,  $Pr>F=0.0385$ ,  $F=3.46$ ,  $Pr>F=0.0318$ , and  $F=4.51$ ,  $Pr>F=0.0113$ , respectively) (Table 3.4). Additional analysis reveals that there is strong agreement among small and large landowners regarding this question.

**Table 3.5. Multicategory logit procedure for Question 15\_f by Questions 2, 3, and 4. This table compares those who disagree that controlled burning causes unsightly stand conditions with landowners, secondary residents, timber producers, and wildlife habitat providers. Long-time residents agree.**

Question 15_f				
	DF	F-Value	Pr>F	Direction
Question 2	2	9.55	<0.0001	–
Question 3	8	2.58	0.0089	+
Question 4_4	2	6.03	0.0025	–
Question 4_7	2	3.71	0.0248	–
Question 4_9	2	4.84	0.0081	–

Analysis of Question 15\_f (controlled burning causes unsightly stand conditions) compared to Question 2 (acreage) reveals that both small and large landowners disagreed that controlled burning causes unsightly stand conditions ( $F=9.55$ ,  $Pr>F<0.0001$ ). Large landowners are much more likely to disagree than small landowners (Table 3.5). Analysis of Question 3 (length of ownership) also shows that long-time landowners tend to disagree with this statement ( $F=2.58$ ,  $Pr>F=0.0089$ ). Further analysis reveals that as length of ownership increases, the tendency to disagree also increases. Analysis of Question 4\_4 (secondary residents) indicates that respondents are ambivalent across the spectrum of strongly agree, no opinion, to strongly disagree ( $F=6.03$ ,  $Pr>F=0.0025$ ). Analysis of Questions 4\_7 (timber production) and 4\_9 (wildlife habitat) suggests a tendency to disagree that controlled burning causes unsightly stand conditions ( $F=3.71$ ,  $Pr>F=0.0248$ , and  $F=4.84$ ,  $Pr>F=0.0081$ , respectively).

**Table 3.6. Multicategory logit procedure for Question 15\_g by Questions 1 and 4. This table compares those who agree that controlled burning improves access to forested land to residents of St. Tammany and timber producers.**

	Question 15_g			
	DF	F-Value	Pr>F	Direction
Question 1_6	2	5.02	0.0068	+
Question 4_7	2	3.83	0.0221	+

Analysis of Question 15\_g (controlled burning improves access to forested lands) compared to Questions 1\_6 (St. Tammany) and 4\_7 (timber production) reveals that overwhelming agreement exists among respondents from St. Tammany parish and respondents who produce timber on their land with the

statement that controlled burns improve access to forested lands ( $F=5.02$ ,  $Pr>F=0.0068$ ,  $F=3.83$ ,  $Pr>F=0.0221$ , respectively) (Table 3.6).

**Table 3.7. Multicategory logit procedure for Question 15\_h by Questions 2 and 4. This table compares those who disagree that controlled burning endangers human life to landowners and timber producers.**

Question 15_h				
	DF	F-Value	Pr>F	Direction
Question 2	2	5.37	0.0048	–
Question 4_7	2	4.46	0.0118	–

Analysis of Question 15\_h (controlled burning endangers human life) compared to Question 2 (acreage) and 4\_7 (timber production) indicates that there is strong disagreement among landowners and timber producers that controlled burning endangers human life ( $F=5.37$ ,  $Pr>F=0.0048$ , and  $F=4.46$ ,  $Pr>F=0.0118$ , respectively) (Table 3.7). Further analysis reveals that large landowners are much more likely to disagree than small landowners.

**Table 3.8. Multicategory logit procedure for Question 20\_1 by Questions 2, 3, and 4. This table compares respondents who believe that landowners should be responsible for conducting controlled burns on private property with landowners, length of residency, agriculture producers, and wildlife habitat providers.**

Question 20_1			
	DF	F-Value	Pr>F
Question 2	1	7.88	0.0051
Question 3	4	3.95	0.0034
Question 4_8	1	20.38	<0.0001
Question 4_9	1	9.17	0.0025

Analysis of Question 20\_1 (landowners should be responsible for conducting controlled burning on private property) compared to Question 2 (acreage) showed that 56.19% of small landowners (6-100 acres) versus 65.29% of large landowners (over 101 acres) answered that the landowner should be responsible for conducting controlled burns on private property (Table 3.8). Comparing Question 20\_1 to Question 3 (length of ownership) revealed that 54.80% of short term (up to 20 years) landowners and 62.83% of long term (over 20 years) landowners answered that landowners should be responsible for conducting controlled burns on private property. Analysis of Question 20\_1 compared to Question 4\_8 (agriculture production) showed that 70.15% of agriculture producers answered that the landowners should be responsible for conducting controlled burns on private property. Analysis of Question 20\_1 compared to Question 4\_9 (wildlife habitat) indicated that 67.87% answered that the landowner should be responsible for controlled burning on private property ( $F=7.88$ ,  $Pr>F=0.0051$ ,  $F=3.95$ ,  $Pr>F=0.0034$ ,  $F=20.38$ ,  $Pr>F=<0.0001$ , and  $F=9.17$ ,  $Pr<F=0.0025$ , respectively).

Further analysis reveals that small landowners are more likely to agree with that statement than large landowners. Also, newer residents are less likely to agree with the statement that landowners should be responsible for conducting controlled burns on private property than longer term residents. This is not an unexpected result, as newer residents are less likely to have the knowledge or the experience to conduct a safe and successful controlled burn on their property. They may also feel this way because of their proximity (either near or far) to their



neighbors or proximity (either near or far) to large tracts of timber. Access to roads was a common comment written on this section of the survey.

**Table 3.9. Multicategory logit procedure for Question 20\_2 by Questions 2, 3, and 4. This table compares those who believe that the local government or fire district should be responsible for conducting controlled burning on private property with acreage, secondary residents, hunters, and agricultural producers.**

Question 20_2			
	DF	F-Value	Pr>F
Question 2	1	8.37	0.0039
Question 4_4	1	8.93	0.0029
Question 4_6	1	6.61	0.0103
Question 4_8	1	4.82	0.0284

Analysis of Question 20\_2 (local governments/fire districts should be responsible for conducting controlled burning on private property) compared to Question 2 (acreage) showed 26.03% of small landowners and 17.35% of large landowners answered that the local governments/fire districts should be responsible for conducting controlled burning on private property ( $F=8.37$ ,  $Pr>F=0.0039$ ) (Table 3.9). Analysis of Question 20\_2 compared to Question 4\_4 (secondary residence) indicated 35.71% of secondary residents answered that local governments/fire districts should be responsible for conducting controlled burning on private property ( $F=8.93$ ,  $Pr>F=0.0029$ ). Analysis of Question 20\_2 compared to Question 4\_6 (hunting) showed 18.83% of hunters answered that local governments/fire districts should be responsible for conducting controlled burning on private property ( $F=6.61$ ,  $Pr>F=0.0103$ ). Analysis of Question 20\_2 compared to Question 4\_8 (agriculture production) indicated that 18.15% of

agriculture producers answered that local governments/fire districts should be responsible for conducting controlled burning on private property ( $F=6.61$ ,  $Pr>F=0.0103$ ). Further analysis reveals that small landowners are more likely than large landowners to agree.

**Table 3.10. Multicategory logit procedure for Question 20\_3 by Questions 1, 2, and 4. This table compares those who believe that the State of Louisiana should be responsible for conducting controlled burns on private property with residents of St. Helena, acreage, secondary residents, timber producers, and wildlife habitat providers.**

Question 20_3			
	DF	F-Value	Pr>F
Question 1_5	1	5.98	0.0147
Question 2	1	16.62	<.00001
Question 4_4	1	4.51	0.0339
Question 4_7	1	10.70	0.0011
Question 4_9	1	11.50	0.0007

Analysis of Question 20\_3 (State of Louisiana is responsible for conducting controlled burns on private property) compared to Question 1\_5 (St. Helena): 25.37% of respondents answered that the State of Louisiana is responsible for conducting controlled burns on private property ( $F=5.98$ ,  $Pr>F=0.0147$ ) (Table 3.10). Analysis of Question 20\_3 (State of Louisiana is responsible for conducting controlled burns on private property) compared to Question 2 (acreage): 14.51% of small landowners and 25% of large landowners answered that the State of Louisiana is responsible for conducting controlled burns on private property ( $F=16.62$ ,  $Pr>F=<0.0001$ ).

Analysis of Question 20\_3 (State of Louisiana is responsible for conducting controlled burns on private property) compared to Question 4\_4 (secondary residence): 11.11% of respondents answered that the State of Louisiana is responsible for conducting controlled burns on private property ( $F=4.51$ ,  $Pr>F=0.0339$ ). Analysis of Question 20\_3 (State of Louisiana is responsible for conducting controlled burns on private property) compared to Question 4\_7 (timber production): 23.23% of timber producers answered that the State of Louisiana is responsible for conducting controlled burns on private property ( $F=10.70$ ,  $Pr>F=0.0011$ ). Analysis of Question 20\_3 (State of Louisiana is responsible for conducting controlled burns on private property) compared to Question 4\_9 (wildlife habitat): 24.49% of respondents answered that the State of Louisiana is responsible for conducting controlled burns on private property ( $F=11.50$ ,  $Pr>F=0.0007$ ).

**Table 3.11. Multicategory logit procedure for Question 20\_5 by Questions 1, 2, and 4. This table compares those who believe that private land management consultants should be responsible for conducting controlled burns on private property with residents of East Feliciana, West Feliciana, St. Helena, St. Tammany, hunters, and timber producers.**

Question 20_5			
	DF	F- Value	Pr>F
Question 1_2	1	16.89	<0.0001
Question 1_3	1	18.74	<0.0001
Question 1_5	1	15.61	<0.0001
Question 1_8	1	10.33	0.0014
Question 4_6	1	4.78	0.0291
Question 4_7	1	5.99	0.0146

Analysis of Question 20\_5 (private land management consultants should be responsible for conducting controlled burns on private property) compared to Question 1\_2 (East Feliciana): 28.57% of respondents answered that private land management consultants are responsible for conducting controlled burns on private property ( $F=16.89$ ,  $Pr>F=<0.0001$ ) (Table 3.11). Analysis of Question 20\_5 (private land management consultants should be responsible for conducting controlled burns on private property) compared to Question 1\_3 (West Feliciana): 28.15% of respondents answered that private land management consultants are responsible for conducting controlled burns on private property ( $F=18.74$ ,  $Pr>F=<0.0001$ ). Analysis of Question 20\_5 (private land management consultants should be responsible for conducting controlled burns on private property) compared to Question 1\_5 (St. Helena): 29.10% of respondents answered that private land management consultants are responsible for conducting controlled burns on private property ( $F=15.61$ ,  $Pr>F=<0.0001$ ).

Analysis of Question 20\_5 (private land management consultants should be responsible for conducting controlled burns on private property) compared to Question 1\_8 (St. Tammany): 21.33% of respondents answered that private land management consultants are responsible for conducting controlled burns on private property ( $F=10.33$ ,  $Pr>F=0.0014$ ). Analysis of Question 20\_5 (private land management consultants should be responsible for conducting controlled burns on private property) compared to Question 4\_6 (hunting): 26.46% of respondents answered that private land management consultants should be responsible for conducting controlled burns on private property ( $F=4.78$ ,  $Pr>F=0.0291$ ). Analysis of Question 20\_5 (private land management consultants

should be responsible for conducting controlled burns on private property) compared to Question 4\_7 (timber production): 24.50% of respondents answered that private land management consultants should be responsible for conducting controlled burns on private property ( $F=5.99$ ,  $Pr>F=0.0146$ ).

### 3.3.3 Log-Linear Model Results

Statistical analysis using log-linear modeling (PROC GENMOD) yielded several significant results. With log-linear models, we used Chi-Square Tests of Significance to compare different questions to one another in order to identify significant relationships within the dataset. We compared Question 8 (respondents' perception of wildfire risk) to Questions 1, 3, 4, and 7. Table 3.1 shows a summary of the significant GENMOD results for comparisons to Question 8.

**Table 3.12. Log-linear results for Question 8. This table compares perception of wildfire risk to residents of West Feliciana and St. Tammany, long-time residents, office sites, timber producers, and forest cover type pine.**

	DF	Chi-Square	Pr>Chi-Square
Question 1_3	1	5.9	0.0151
Question 1_8	1	6.18	0.0129
Question 3	4	10.5	0.0328
Question 4_1	1	5.14	0.0233
Question 4_7	1	11.08	0.0009
Question 7	2	19.95	<0.0001

Question 1\_3 indicates that the respondents own land in West Feliciana parish, while Question 1\_8 respondents own land in St. Tammany parish. These two parishes show a significantly low perception of wildfire risk ( $Pr>Chi-Square$  0.0151 and 0.0129, respectively) (Table 3.12). Although a low perception of risk

in West Feliciana is expected because of the predominantly hardwood forest cover, the same cannot hold true for St. Tammany parish. That parish has predominately pine forest cover, as there are vast tracks of industrial timberland located in that parish. This parish is one that we postulated would have a misconception regarding their risk of wildfire danger, and the statistical analysis bears out that assumption.

Question 3 elicited from the respondents the length of time that the respondents have owned, managed, or leased land in the Florida parishes and compared that amount of time to their perception of wildfire risk. Interestingly, the respondents who have been around the longest (over 50 years) have the greatest perception of risk than those in any of the other time categories. This finding may suggest that the long-time landowners are more aware of factors involving wildfire risk. When comparing Question 8 (wildfire risk) to Question 4\_1 (primary land use is office site) and Question 4\_7 (primary land use is timber production), analysis found strong significance for both of these land use options. This result may indicate that respondents who have a vested interest in the land may be more aware of the risks involving their investments.

Finally, when comparing Question 7 (primary forest cover type) to Question 8 (wildfire risk), there is a strong significant relationship between the two questions. As expected, respondents who reported pine as their primary forest cover type had a higher perception of wildfire risk on their land, whereas respondents who reported hardwood or mixed hardwood and pine forest cover types had less perception of risk than other respondents. These respondents may possess a general knowledge of which forest fuels carry fire more readily than

other types, as pine stands will carry fire much more easily and quickly than hardwood stands. Leaves from deciduous hardwoods do not burn well, whereas pine needles ignite and carry fire efficiently.

### **3.4 Participant Prevarication and Implications of Mistrust**

Throughout the data validation process, it was noted that there were inconsistencies in the way the respondents answered certain questions that may point to prevarication or reticence on the part of some of the respondents to answer truthfully. This observation was not found to be significant during statistical analysis, but it should be mentioned here nonetheless. Reasons for prevarication may include a general mistrust of institutions, unfamiliarity with laws regarding controlled burning, or a general unwillingness to be truthful about potentially contentious topics such as wildfire and land management.

Also of note, but not found to be statistically significant, is the general observation during data validation that respondents who wrote comments were elicited (and sometimes not) that strong negative and positive feelings exist regarding the topics covered in this survey instrument. Specifically, Question 20 (who should be responsible for controlled burning on private property) elicited some rather heated and strong opinions from survey respondents. Many of these comments were undeniably anti-establishment, anti-government, very pro-private ownership and control. These strong reactions indicate strong feelings of ties to the land and mistrust of policy makers and government in general. This observation is meant to encourage future researchers and policy makers to find a common thread of mutual protection of shared value (healthy forested land and protected homes) as a way to navigate through these very strong feelings to common ground.

## **4 CONCLUSION**

### **4.1 Implications**

This study shows clearly that the residents of the Florida parishes of southeastern Louisiana are interested in the topics of wildfire risk and controlled burning, as evidenced by a very good response rate of over 26%. Overall, their perception of wildfire risk is low and their perception of controlled burning is positive. There are many opportunities for education and engagement between forestry professionals and the public.

Further, there is strong statistical support for these conclusions. Our hypotheses were that perceptions of prescribed burning and wildfire risk are related to length of residency and size of acreage owned, leased, or managed. We were unable to form a conclusion regarding the final hypothesis, which states that there exists a relationship between perception of smoke hazard and length of residency and size of acreage owned, leased, or managed because of the poor wording choices made during the survey instrument creation.

### **4.2 Recommendations**

Opportunities for education are abundant and encouraging. The public seems eager to learn and interested in the topics. This interest creates a unique opportunity for forestry professionals to engage with the public in a cohesive and positive way, mitigating the tension that has traditionally existed between land managers and homeowners.



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## APPENDIX A: SURVEY INSTRUMENT

### General Questions

1. Do you own, lease and/or manage land in the Florida parishes?  
(Please check all that apply)
  - ☐ Yes
    - ☐ East Baton Rouge
    - ☐ East Feliciana
    - ☐ West Feliciana
    - ☐ Livingston
    - ☐ St. Helena
    - ☐ Tangipahoa
    - ☐ Washington
    - ☐ St. Tammany
  - ☐ No
    - If your answer is **No**, please stop here and return this survey in the postage-paid envelope provided. Thank you for your time!
2. Please indicate the approximate **total number of acres** you own, lease and/or manage in the Florida Parishes:
  - ☐ **Less than 5 acres**
  - ☐ 6 – 25
  - ☐ 26 – 100
  - ☐ 101 – 250
  - ☐ More than 250
  - ☐ If you indicated **less than 5 acres**, please stop here and return this survey in the postage-paid envelope provided. Thank you for your time!
3. How long have you owned, leased and/or managed this land in the Florida Parishes?
  - ☐ Less than 5 years
  - ☐ 6 – 20 years
  - ☐ 21 – 50 years
  - ☐ More than 50 years
4. What are the primary **uses of** and **goals for** this land?  
(Please check all that apply)
  - ☐ Office site
  - ☐ Industrial site
  - ☐ Primary residence
  - ☐ Secondary residence
  - ☐ Recreation
  - ☐ Other – Please indicate: \_\_\_\_\_
  - ☐ Hunting
  - ☐ Timber production
  - ☐ Agriculture production
  - ☐ Wildlife habitat
  - ☐ Not currently in use
5. What management techniques have you employed to achieve your goals?

(Please check all that apply)

- |  |   |
|--|---|
| <input type="radio"/> Landscape improvement          | <input type="radio"/> Trail improvement                         |
| <input type="radio"/> Bush-hogging/mowing            | <input type="radio"/> Wildlife food plot production             |
| <input type="radio"/> Fence/Boundary maintenance     | <input type="radio"/> Drawdown/flooding for migratory waterfowl |
| <input type="radio"/> Timber stand improvement       | <input type="radio"/> None                                      |
| <input type="radio"/> Timber harvesting/removal      |   |
| <input type="radio"/> Controlled burning             |   |
| <input type="radio"/> Other – Please indicate: _____ |   |

6. In your estimation, what percentage of this land is forested? For the purposes of this survey, “forested” is defined as land where the dominant vegetation is trees.

- |  |                                 |
|--|---------------------------------|
| <input type="radio"/> 0% (e.g. grassland or pasture) | <input type="radio"/> 26 – 50%  |
| <input type="radio"/> 1 – 10%                        | <input type="radio"/> 51 – 75%  |
| <input type="radio"/> 11 – 25%                       | <input type="radio"/> 76 – 100% |

7. Regarding Question 6, what is the primary forest cover type?

- |                            |                                |                             |
|----------------------------|--------------------------------|-----------------------------|
| <input type="radio"/> Pine | <input type="radio"/> Hardwood | <input type="radio"/> Mixed |
|----------------------------|--------------------------------|-----------------------------|

## Wildfire

8. In your opinion, how would you rate the **level of risk from wildfire** on this land? Specific to this survey, “wildfire” is defined as a fire that occurs naturally (e.g., lightning strike), fire that was set for management purposes that becomes uncontrolled, fire set with malicious intent (e.g., arson) or fire due to negligence/accident.

(Please check only one)

- |                                 |                               |                                |
|---------------------------------|-------------------------------|--------------------------------|
| <input type="radio"/> Very high | <input type="radio"/> Average | <input type="radio"/> Very low |
| <input type="radio"/> High      | <input type="radio"/> Low     |                                |

9. What factors influenced how you rated your wildfire danger?

(Please check all that apply)

- ☐ Amount of trees, grass or other fuels located on the property
- ☐ Proximity of trees and/or fine fuels to structures located on the property
- ☐ Proximity to local fire suppression units/fire stations
- ☐ Proximity to local bodies of water such as ponds, lakes, streams & water towers
- ☐ Other – please explain in the space provided here: \_\_\_\_\_

10. Regarding **wildfire** damage, what are your specific concerns?

(Please check all that apply)

- ☐ Loss of human life
- ☐ Damage to structures
- ☐ Loss of wildlife
- ☐ Loss of land-related income from timber sales, hunting lease(s), and/or business
- ☐ Other – Please Indicate: \_\_\_\_\_
- ☐ Loss of timber
- ☐ Loss of wildlife habitat
- ☐ Damage to soils (e.g. erosion)

11. Have you ever experienced **wildfire** on this land?

- ☐ Yes
- ☐ No
- ☐ If your answer is **No**, please skip the remainder of this section and proceed to the Section titled “Controlled Burning”.

12. If you answered **Yes** to Question 11, what was the source of the wildfire(s)?

(Please check all that apply)

- ☐ Lightning strike
- ☐ Brush pile or leaf burns that became uncontrolled
- ☐ Controlled burn that became uncontrolled
- ☐ Other – Please indicate: \_\_\_\_\_
- ☐ Arson
- ☐ Negligence (e.g. campfire left unattended)
- ☐ Unknown

13. Specific to **Question 11**, what types of damage did you sustain from wildfire(s)?

(Please check all that apply)

- ☐ Loss of human life
- ☐ Damage to structures
- ☐ Loss of wildlife
- ☐ Loss of timber
- ☐ Loss of wildlife habitat
- ☐ Other – Please Indicate: \_\_\_\_\_
- ☐ Damage to soils (increased risk of erosion)
- ☐ Loss of timber sale revenue
- ☐ Loss of hunting lease(s) revenue
- ☐ Loss of business-related income

## Controlled Burning

14. Are you familiar with the concept of controlled burning, also known as “prescribed burning”?

- ☐ Yes
- ☐ No
- ☐ If your answer is **No**, please skip the remainder of this section and proceed to the Section titled “Smoke”.



15. What is your opinion of the effects of controlled burning?

Controlled burning:	Disagree ----- Agree				
is an efficient way to control undergrowth.	1	2	3	4	5
endangers wildlife.	1	2	3	4	5
is an efficient way to remove fuels to prevent wildfire.	1	2	3	4	5
encourages new plant growth.	1	2	3	4	5
easily gets out of control and becomes a wildfire.	1	2	3	4	5
causes unsightly stand conditions.	1	2	3	4	5
improves access to forested lands.	1	2	3	4	5
endangers human life.	1	2	3	4	5

16. What is your perception of the manageability of controlled burning?

Controlled burns:	Disagree ----- Agree				
rarely burn at the intensity planned.	1	2	3	4	5
rarely harm desirable timber when properly executed.	1	2	3	4	5
rarely stay confined to the targeted area.	1	2	3	4	5
are not really "controlled" at all, and successful burns are merely good luck.	1	2	3	4	5
are fast and efficient methods for achieving a variety of land management goals.	1	2	3	4	5

17. Have you or your neighbors used controlled burning on your respective land?

**(Please check all that apply)**

- ☐ Yes, I have.
- ☐ No, I have not.
- ☐ Yes, my neighbors have.
- ☐ No, my neighbors have not.
- ☐ Don't know

18. If you answered **Yes** to Question 17, did the controlled burn have the desired management outcome?

- ☐ Yes, the controlled burn(s) went as planned.
- ☐ No, at least one controlled burn produced undesirable results.  
➤ Please explain briefly: \_\_\_\_\_
- ☐ Don't know

19. If you answered **Yes** to Question 17, who conducted the controlled burn?

- ☐ I, my neighbor, a family member or an employee conducted the controlled burn.
- ☐ A private professional land manager conducted the controlled burn.
- ☐ Louisiana Department of Agriculture and Forestry conducted the burn.
- ☐ Other – Please indicate: \_\_\_\_\_

20. In your opinion, who should be responsible for conducting controlled burns on private property?

(Please check all that apply)

- ☐ The landowner
- ☐ Local government/fire district
- ☐ The State of Louisiana
- ☐ Other – Please indicate: \_\_\_\_\_
- ☐ The Federal government
- ☐ Private land management consultants

## Smoke

21. What is your opinion of the smoke produced by both **controlled burning** and **wildfire**?

	Disagree ----- Agree				
Smoke from <b>controlled burns</b> is manageable.	1	2	3	4	5
Smoke from <b>controlled burns</b> is just as unmanageable as smoke from wildfires.	1	2	3	4	5
Smoke from <b>fire</b> reduces visibility on roadways and contributes to traffic accidents.	1	2	3	4	5
Occasional smoke from <b>controlled burns</b> is acceptable.	1	2	3	4	5
Smoke from <b>controlled burns</b> has an adverse affect on human health.	1	2	3	4	5
Smoke from <b>wildfires</b> has an adverse affect on human health.	1	2	3	4	5
Smoke from <b>any source</b> is unacceptable.	1	2	3	4	5
Someone in my household is unable to tolerate any smoke.	1	2	3	4	5

## Interest in Learning More

22. Are you interested in learning more about controlled burning?

- ☐ Yes
- ☐ No

23. Are you interested in learning more about wildfire danger and prevention?

- ☐ Yes
- ☐ No

24. Are you interested in learning more about smoke management?

- ☐ Yes
- ☐ No

*Thank you for your time! Your input is invaluable and will help direct the future of our research focus and policy recommendations.*

***Please return this survey in the enclosed postage-paid envelope today!***

You may address questions or concerns regarding this survey to the following address:

Cornelis de Hoop  
Louisiana State University AgCenter  
Renewable Natural Resources Building  
Baton Rouge, LA 70803-6202  
[cdehoop@agcenter.lsu.edu](mailto:cdehoop@agcenter.lsu.edu)

## APPENDIX B: SURVEY PRE- AND POST-MAILING POSTCARD

### Notice of Survey Invitation

LOUISIANA STATE UNIVERSITY AGCENTER

*Louisiana Forest Products  
Development Center*

In one week, you will be receiving a survey in the mail. You are invited to participate in a very important research project regarding land-owner attitudes and perceptions of **wildfire** and **controlled burning** in the Florida Parishes of Louisiana.

Your participation is vital to the success of this survey and to the future direction of our State's natural resource policies.

Please rest assured that all information you provide is **anonymous** and **confidential**.



C. A. Gerald  
Dr. C. F. de Hoop  
Renewable Natural Resources Bldg.  
LSU  
Baton Rouge, LA 70803

Phone: 225.578.4242  
Fax: 225.578.4251  
E-mail: cdehoop@agcenter.lsu.edu

### Notice of Survey Invitation

LOUISIANA STATE UNIVERSITY AGCENTER

*Louisiana Forest Products  
Development Center*

Recently, you should have received a survey in the mail. If you have completed and returned the survey to us, thank you! If you have not returned it yet, we urge you to consider participating. For your convenience, we are mailing another round of surveys in about a week.

Your participation is vital to the success of this survey and to the future direction of our State's natural resource policies. **THANK YOU!**

Please rest assured that all information you provide is **anonymous** and **confidential**.



C. A. Gerald  
Dr. C. F. de Hoop  
Renewable Natural Resources Bldg.  
LSU  
Baton Rouge, LA 70803

Phone: 225.578.4242  
Fax: 225.578.4251  
E-mail: cdehoop@agcenter.lsu.edu

## APPENDIX C: SURVEY FIRST AND SECOND MAILING LETTERS



### SCHOOL OF RENEWABLE NATURAL RESOURCES

227 Renewable Natural Resources Bldg. – LSU

Baton Rouge, LA 70803-6202

(225) 578-4255

Fax (225) 578-4251

Websites: [www.lsuagcenter.com](http://www.lsuagcenter.com) ; [www.lfpdc.lsu.edu](http://www.lfpdc.lsu.edu)

August 18, 2008

**JOHN ARCENEUX  
PO BOX 1555  
ST FRANCISVILLE, LA 70775**

Dear Sir/Madam,

Recently, you received a postcard from us, inviting you to participate in a unique research opportunity in progress here at the LSU AgCenter's School of Renewable Natural Resources. We are excited about this study and are looking forward to learning about your thoughts and feelings regarding controlled burning and wildfire risk in Louisiana's Florida Parishes.

The enclosed survey is an important part of this research. Your participation is vital, not only to the success of this study, but to our research focus as we move forward in our goal to reshape the natural resource policies within our state.

**You have the option of filling out the information sheet on the back side of this letter, if you would like more information on any of the topics covered on this survey. Please be aware that all answers you provide on the survey are anonymous and we cannot contact you if you do not return the information sheet!**

Thank you in advance for your time and participation. We know you have opinions, and we want to know them! Here is your chance for your voice to be heard on these very important issues.

Sincerely,

A handwritten signature in black ink, appearing to read "C. de Hoop".

Cornelis de Hoop, Ph.D.

Associate Professor

Louisiana Forest Products Development Center

Louisiana State University AgCenter

Baton Rouge, LA 70803-6202

[cdehoop@agcenter.lsu.edu](mailto:cdehoop@agcenter.lsu.edu)

Enclosure

The LSU Agricultural Center is a statewide campus of the LSU System and provides equal opportunities in program and employment. Louisiana State University and A. & M. College, Louisiana parish governing bodies, Southern University, and the United States Department of Agriculture cooperating.

## Contact Information Sheet

If you would like us to send you information on ways you can learn more about any of the section topics, please fill out the following:

Name: \_\_\_\_\_

Corrected Mailing Address: \_\_\_\_\_

Property Location(s) or Parish(es): \_\_\_\_\_

What are you interested in learning more about?

- ☐ Controlled burning
- ☐ Wildfire risk and prevention
- ☐ Protecting my property from wildfire
- ☐ Smoke management
- ☐ Other: \_\_\_\_\_

Which method(s) of learning appeal(s) to you?

- |  |                                  |
|--|----------------------------------|
| <input type="radio"/> Letters                        | <input type="radio"/> Websites   |
| <input type="radio"/> Brochures                      | <input type="radio"/> Videos     |
| <input type="radio"/> Local Workshops                | <input type="radio"/> DVD's      |
| <input type="radio"/> Demonstration Burns            | <input type="radio"/> Web-stream |
| <input type="radio"/> Other – Please indicate: _____ |                                  |

What is the best way to contact you?

- ☐ Email – please provide your email address: \_\_\_\_\_
- ☐ Mail – please provide your corrected mailing address above.
- ☐ Other – Please indicate: \_\_\_\_\_

Thank you for your interest!

We are thrilled to have the opportunity to continue to correspond with you, and look forward to the possibility of meeting you. **Please return the survey and this information sheet in the postage-paid envelope today!** If you have lost the envelope, the return address is included at the bottom of this page.

Please return to:

Renewable Natural Resources Building, LSU AgCenter, Baton Rouge, LA 70803  
Attn: C. F. de Hoop

Thanks again! Your input is invaluable and greatly appreciated.

6201



**SCHOOL OF RENEWABLE NATURAL RESOURCES**

227 Renewable Natural Resources Bldg. – LSU

Baton Rouge, LA 70803-6202

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Websites: [www.lsuagcenter.com](http://www.lsuagcenter.com) ; [www.lfpdc.lsu.edu](http://www.lfpdc.lsu.edu)

September 22, 2008

Dear Sir/Madam,

About a week ago, you received a postcard from us, inviting you to participate in a unique research opportunity in progress here at LSU's School of Renewable Natural Resources. **IF YOU HAVE ALREADY COMPLETED AND RETURNED THIS SURVEY, THANK YOU SO MUCH! PLEASE DISREGARD THIS SECOND MAILING.** We are excited about this study and are looking forward to learning about your thoughts and feelings about controlled burning and wildfire risk in Louisiana's Florida Parishes.

The enclosed survey is an important part of this research. Your participation is vital, not only to the success of this study, but to our research focus as we move forward in our goal to reshape the natural resource policies within our state.

**You have the option of filling out the information sheet on the back side of this letter, if you would like more information on any of the topics covered on this survey. Please be aware that all answers you provide on the survey are anonymous and we cannot contact you if you do not return the information sheet!**

Thank you in advance for your time and participation. We know you have opinions, and we want to know them! Here is your chance for your voice to be heard on these very important issues.

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Cornelis de Hoop, Ph.D.

Associate Professor

Louisiana Forest Products Development Center

Louisiana State University AgCenter

Baton Rouge, LA 70803-6202

[cdehoop@agcenter.lsu.edu](mailto:cdehoop@agcenter.lsu.edu)

Enclosure

The LSU Agricultural Center is a statewide campus of the LSU System and provides equal opportunities in program and employment. Louisiana State University and A. & M. College, Louisiana parish governing bodies, Southern University, and the United States Department of Agriculture cooperating.

## Contact Information Sheet

If you would like us to send you information on ways you can learn more about any of the section topics, please fill out the following:

Name: \_\_\_\_\_

Corrected Mailing Address: \_\_\_\_\_

Property Location(s) or Parish(es): \_\_\_\_\_

What are you interested in learning more about?

- ☐ Controlled burning
- ☐ Wildfire risk and prevention
- ☐ Protecting my property from wildfire
- ☐ Smoke management
- ☐ Other: \_\_\_\_\_

Which method(s) of learning appeal(s) to you?

- |  |                                  |
|--|----------------------------------|
| <input type="radio"/> Letters                        | <input type="radio"/> Websites   |
| <input type="radio"/> Brochures                      | <input type="radio"/> Videos     |
| <input type="radio"/> Local Workshops                | <input type="radio"/> DVD's      |
| <input type="radio"/> Demonstration Burns            | <input type="radio"/> Web-stream |
| <input type="radio"/> Other – Please indicate: _____ |                                  |

What is the best way to contact you?

- ☐ Email – please provide your email address: \_\_\_\_\_
- ☐ Mail – please provide your corrected mailing address above.
- ☐ Other – Please indicate: \_\_\_\_\_

Thank you for your interest!

We are thrilled to have the opportunity to continue to correspond with you, and look forward to the possibility of meeting you. **Please return the survey and this information sheet in the postage-paid envelope today!** If you have lost the envelope, the return address is included at the bottom of this page.

Please return to:

Renewable Natural Resources Building, LSU AgCenter, Baton Rouge, LA 70803  
Attn: C. F. de Hoop

Thanks again! Your input is invaluable and greatly appreciated.



## VITA

Ms. Gerald was born in Baton Rouge, Louisiana, and has lived there most of her life, with the exception of some brief stints away while she lived in Wyoming and Texas. She attended Northwestern State University on scholarship until a four-wheeler accident at the beginning of her third semester landed her in the hospital. Facing reconstructive surgery and an extensive recovery time, she withdrew from Northwestern State University for the semester and enrolled in Southeastern Louisiana University the following semester. After one semester she enrolled at Louisiana State University and earned her Bachelor of Science in forestry in December 2001. After several years she returned to Louisiana State University to continue her education by pursuing a Master of Science in forestry.

In addition to her academic pursuits, Ms. Gerald cares passionately about the global Church and the natural world. Although her degrees label her as a forester, she is much more an ecologist and an avid believer in ecological protection and restoration. She travels extensively, pursuing adventure wherever she can find it – usually in the most unlikely places! She loves to hike, climb, swim, and kayak, and on any given day you will find her kayak in the back of her truck, ready at a moment's notice to hit the water.