A Survey of Florida Residents Regarding Three Alternative Fuel Treatment Programs

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Abstract

The objective of this study is to determine the level of support Florida residents ascribe to three alternative fuel reduction techniques given location to recent large-scale wildfire events and differences in ethnicity and/or language. Gaps in knowledge and attitude toward prescribed fire exist between English and Spanish speaking residents. Although these disparities are present, the willingness to pay (WTP) for alternative fuel treatment programs is not statistically influenced by language, ethnicity, or location to recent large-scale wildfire events. The median and mean WTP for the prescribed fire program is $174.38 and $184.64 per household per year, respectively. The median and mean WTP for the mechanical program is $102.05 and $161.38 pre household per year, respectively. The median and mean WTP for the herbicide program is $-142.28 and $143.83per household per year, respectively.

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Executive Summary

With the past significance of wildland-urban interface events in Florida, resource managers benefit from understanding the varied public's acceptance of wildfire risk reduction strategies and how it changes spatially concerning wildfire events. This understanding gives resource managers the ability to time specific mitigation techniques in accordance with past wildfire events given the ethnicity of the communities they occur in.

The objective of the Expanded Florida Fire Management Program is to determine the support given for three alternative mitigation strategies by different ethnic groups concerning their relative location to past large scale wildfire events. It is also an objective of this study to compare knowledge and attitude responses concerning wild and prescribed fire with past surveys, across language groups, and after the introduction of educational information.

The contingent valuation method (CVM) was used in the survey design. A dichotomous choice, referendum format question elicited willingness to pay (WTP) for three alternative wildfire mitigation techniques. Logistic regressions were used to estimate WTP and identify significant variables that influence support for the three alternative methods.

A thorough review of past literature along with collection of 1998 Florida wildfire statistics led to the construction of the Expanded Florida Fire Management Program. Focus groups and pretesting were used to improve the readability and focus of the survey instrument. To obtain a representative sample of each area, random digit dialing of the population was used. Once respondents were contacted by phone, and a survey booklet was sent by mail, they were again contacted by phone to conduct an interview. Surveys were conducted in Spanish and

English. Surveying began in August 1999 and continued until March 2000. A total of 52.2 percent of respondents contacted completed all phases of the interview process.

Florida resident's knowledge and attitude exhibited few differences from past surveys. The differences that exist may be due to the exclusion of Spanish speaking respondents from past surveys. Statistically significant differences exist between knowledge and attitude of Spanish and English respondents. English respondents held greater knowledge and a lower perception of risk toward wild and prescribed fire. Even after the introduction of educational information, which increased knowledge and improved attitude for the entire sample, these gaps continued to exist.

Even though gaps in knowledge and attitude do exist between languages, WTP for the three alternative wildfire mitigation techniques does not. Race, language, and distance from past wildfires proved to be insignificant influences on support for the three alternatives. The median and mean WTP for the prescribed fire program is $174.38 and $184.64 per household per year, respectively. The median and mean WTP for the mechanical program is $102.05 and $161.38 per household per year, respectively. The median and mean WTP for the herbicide program is $-142.28 and $143.83 per household per year, respectively. The negative median indicates that for the herbicide program half of the respondents would have to be compensated $142 a year before they would support the program.

With a program cost of $115 per household per year, the average dollar amount respondents were asked to pay, and average belief in the effectiveness of a prescribed fire program occurring after the introduction of educational information contained in the survey, 81 percent of households would vote in favor. As the average cost decreases and the belief in

effectiveness of a prescribed fire program increases the more support for the program is obtained. With a cost of $1 and 100 percent belief in the effectiveness of the program by all households, 89 percent would vote in favor of the prescribed fire program.

Florida and Fire

Florida's "Pyrophilic" Ecosystem

Wildfire is an integral part of the ecosystems of Florida. Much of Florida's flora and fauna is dependent on fire for the maintenance of its biological integrity (FDOF Prescribed Fire Position Paper 1999). Plant communities require burned areas for regeneration opportunities and nutrients while wildlife uses the openings for forage and edge habitat. With the advantages made available by wildfire some species have evolved to encourage its spread (Greenlee et al. 1998). Palmetto, for example promotes fire activity through waxy leaves.

Historically, vegetation in Florida's forests burn in a fire regime of 3 to 5 years (Greenlee et al. 1998). Vessels from Europe traveling along the Florida and Georgia coast reported frequently seeing smoke, mistaking the sign as an indication of a settlement (Pyne 1982). This frequent occurrence of wildfire in Florida is not only due to vegetative characteristics but also climatic conditions. In a typical year, April and May bring relatively drier conditions along with lightning. Florida has the highest incidence of lightning in the United States (Greenlee et al. 1998). With a frequent ignition source, a period of low precipitation, and "pyrophilic" vegetation, Florida lends itself to wildfire.

El Niño/ La Niña

A climatic event possibly leading to severe wildfire seasons in Florida is the Southern Oscillation, or El Niño. El Niño is a warming of the eastern Pacific Ocean. The counterpart to El Niño is La Niña. La Niña is a cooling of the eastern Pacific Ocean. These events, through statistical analysis, have been cited as responsible for up to 40 percent of the variation in Florida's precipitation (Sun and Furbish 1997). El Niño brings above average precipitation to

Florida, while La Niña does the opposite. High amounts of precipitation encourage vegetative growth. Followed by drought conditions the stage is set for severe wildfires.

Land Management

Within the last several decades Florida has began to drastically develop the wildlands in which these wildfires occur. With the exclusion of wildfire, drainage of swamplands, and the establishment of pine plantations the vegetation is slowly changing composition (Long 1999). This transformation of vegetation along with the development of residential property intermixed among wildlands is increasing the risk of damage due to wildfire.

Florida is growing at an explosive rate. The population is expected to reach 16 million by 2000. With new Florida residents in the wildland-urban interface, the memories of past wildfires are nonexistent. People tend to deny the probability of a wildfire event or even discount potential damage (Beebe et al. 1993). Even long-term residents and developers continue to ignore the ever-present danger. The Palm Coast structures that were lost in 1985 and 1998 exhibited a similar lack of wildfire prevention methods, which led to their destruction (Greenlee et al. 1998). Unaware of the actual fire risk and prevention methods, residents expect the same structural fire protection they received in their urban residence (Greenlee et al. 1998).

Recent Events

In recent years, significant wildland-urban interface events have destroyed property and increased concern. During the summer of 1985, the Palm Coast Florida Fire destroyed 250 homes (Greenlee et al. 1998). Following this event, Florida continued to exhibit large amounts of growth with wildland-urban interface fire years until 1998. The 1998 fire season proved to

be one of the worst fire seasons in Florida history. Severe drought conditions possibly due to an El Niño event and large amounts of fuel due to early spring rain (La Niña) created catastrophic fire conditions. Close to 500,000 acres burned in Florida with 126 homes destroyed and 211 damaged. The suppression costs totaled over 130 million dollars while 100,000 plus people where evacuated from their homes (Information Sheet 40 1998).

Solution

With Florida's ever-present threat of a devastating wildfire season, solutions are needed to help reduce the risk. The factors that determine the risk or severity of a wildland-urban interface wildfire are the intensity of the fire, the material used to construct homes, and the fuel characteristics (Greenlee et al. 1998). The intensity of the fire is largely beyond a fire manager's control. This factor is foremost influenced by atmospheric conditions such as wind and/or drought. The fire manager does not determine the construction material used to build homes. This is primarily the homeowners' choice. Out of the three factors, the vegetation characteristics are the easiest**,** and possibly the only fire managers can directly manipulate.

Through the use of fuel treatment techniques, vegetation build-up in an area is significantly reduced. Prescribed fire, mechanical alteration, and herbicide application are tools that can be utilized to aid in the control and suppression of wildfires through fuel reduction. While fuel treatment methods are not a fail-safe method against the ignition and spread of wildfires they help regulate wildfire events. Prescribed fire, mechanical alteration, and herbicide application, through fuel reduction, reduces future wildfire flame lengths and rate of spread allowing fire managers to manipulate wildfire with greater ease.

Prescribed fire has proved to be an inexpensive alternative relative to other fuel reduction methods, and also perpetuates the plant and animal species that play a significant role in Florida's ecosystem (Kuypers 1999). The results of a successful prescribed fire program must be measured over large scales both temporally and spatially. "The effects of prescribed burning are best measured in broad, rather than specific terms" (Koehler 1999). The many advantages and disadvantages must be recognized on regional and ecosystem levels. Site-specific evaluations of prescribed fire effects do not fully account for the benefits of this mitigation method.

Alternatives to prescribed fire include mechanical fuel alteration and herbicide application. These methods are useful fuel reduction techniques and at times are the only options available in densely populated areas. These methods produce no smoke emissions but are more expensive to implement.

Residents of Florida do not always recognize these methods as solutions. Due to this, annoyances from fuel reduction methods are not wholly accepted. The most evident issue is smoke from prescribed fire treatment. Health problems, ash in pools, and deaths from automobile accidents are some of the most pressing issues concerning smoke from prescribed fire (Kuypers 1999). Until Florida communities recognize the benefits of prescribed fire the minor inconveniences from smoke will not be tolerated. With the ever increasing growth adding to the threat of wildland-urban interface wildfires in Florida, understanding how residents support fuel reduction techniques is important.

Problem Statement

The Florida Division of Forestry provides the citizens of the state of Florida with wildfire risk reduction services. Even though the citizens of Florida receive benefits from this service, there are no market signals from which the preferences are directly observable. This lack of observable preferences make it difficult for the Florida Division of Forestry personnel to identify specific groups within the population in which education concerning the service is needed or were support varies due to spatial and temporal distances from past wildfires. This information is essential to implement a successful wildfire risk reduction campaign.

Objectives

The objective of this study is to determine the support given for three alternative mitigation strategies by different ethnic groups concerning their spatial and temporal distance to past large scale wildfire events. This information will give resource managers the ability to target educational efforts to specific populations within the public and will help resource managers determine educational need based on spatial and temporal distance from past wildfires.

Results from the survey also allow a comparison of attitude and knowledge of the respondents with past surveys of similar content. This comparison highlights how Florida resident's knowledge and attitudes compare with past survey results in varied geographical regions. Comparisons are also made of the attitude and knowledge of respondents before and after they received the interview booklet. This will give insight on how attitude and knowledge change with the introduction of detailed fuel reduction information. Comparisons among knowledge and attitude questions can also be compared across ethnic and language groups.

Methods

Contingent Valuation Method

The contingent valuation method (CVM) uses survey techniques to elicit values for nonmarket goods or services. This elicitation process uses stated preferences by respondents based on a contingent market for the good or service in question. This process is necessary due to the lack of observable market forces for such services as wildfire risk reduction. CVM allows for the calculation of willingness to pay (WTP) for the service. This process allows for the estimation of benefits of the service.

There are three steps in producing a valid CVM survey. They are: (a) providing information about the good or service in question; (b) including a section for the elicitation of value; (c) and the collection of demographic information (Mitchell and Carson 1989). Each of these three steps can be evaluated and refined through the use of focus groups and pretesting.

The CVM is an accepted tool to obtain values for a nonmarket good. Federal guidelines such as the Water Resource Council require agencies such as the Army Corps of Engineers and the Bureau of Reclamation to use CVM (U.S. Water Resource Council 1983). The Department of Interior has recommended its use (U.S. Department of Interior 1986, 1994). The CVM has also been recommended by a NOAA panel, which included two Nobel Laureate economists (Arrow et al. 1993).

Logistic Regression

Using a dichotomous choice question format in this survey which elicits “yes and “no” answers, statistical inference is needed to determine maximum willingness to pay. This is accomplished using a logistic regression. Through the process of maximum likelihood estimation

a regression is derived with the dependent variable being the log of the odds ratio (Equation 1), which is the odds of a person giving a "yes" response.

1) $$\ln(P_i/1-P_i) = B_0 + B_1(\text{Dollar Amount}) + B_2(\text{Demographics}) + u_i$$

Through a series of equations derived by Hanneman (1984, 1989), the mean and median WTP is calculated using information from the logistic regression (Equation 2, 3).

2) $$\text{Mean WTP} = \ln\left(1 + \exp^{(B0+B2*X2)/B1)}\right)$$

3) $$\text{Median WTP} = (B_0 + B_2X_2)/B_1$$

Along with generating WTP results demographic variables are included as independent variables in the logistic regression. The expected significant demographic variables are formulated from past survey material and intuitive reasoning. The development of a model with expected significant variables helps in the design of the survey instrument.

Literature Review

Risk from wildfire in the wildland-urban interface and acceptance of fire as a management tool by society are relatively new concerns. For the greater part of the last century low population densities in the wildlands and fire suppression in full force left for little thought in addressing these issues. This has changed with the overwhelming development of wildlands increasing the risk of loss from wildland fires and a new philosophy viewing fire as a natural part of the ecosystem. The review of past literature information and questions from previous surveys provided aids in development and focus of this project.

Homeowners

Beginning in the early 1970's articles began to address the issue of fire risk in the wildland-urban interface. Hulbert (1970) surveyed the attitudes of 300 mountain homeowners and developers who held moderate concern for the wildland-urban interface fire danger. Folkman (1973) also addressed the issue of risk in the wildland-urban interface with his study, which tied a 1964 and 1970 survey together to determine the effectiveness of a fire prevention program and the change in attitude and knowledge of the residents at risk. He found little change between the two time periods. Gardner et al. (1987) captured the homeowner response to wildfire threat with a survey of homeowners who had experienced fire damage and those who had not. This study revealed that the public had misconceptions of the actual risk, held little knowledge of the probable event, and would rather have fire managers perform mitigation actions than take it on themselves.

In a survey conducted by Abt (1990), the risk perceptions of Palm Coast, Florida residents were solicited after a major wildland-urban interface fire event in 1985. Abt questioned the homeowners in the area on their perception of risk and their attitude toward mitigation. He found that the perception of risk was high and that mitigation actions were widely accepted. Cortner et al. (1990), using information from previous surveys, determined that perceptions and knowledge of wildfire risk and the mitigation strategies to reduce it have improved significantly over the past two decades.

Giving a similar account to Gardner et al. (1987), Beebe et al. (1993) concluded that the risk perception of the wildland-urban interface community is skewed towards low probability, which leads to a lack of proper mitigation techniques. In another Palm Coast

survey, Kuypers (1995) determined that residents rate the risk as serious and are willing to pay for mitigation. Gardner et al. (1985b), also addressing wildland-urban interface risk, concluded that with subsidized insurance provided to these disaster prone communities there is no incentive to relocate or take mitigation actions. Homeowners hold many different perceptions of risk, some not always correct, and have taken little mitigation action to support these feelings of risk. The problem is that it is a difficult task to motivate homeowners to act without imposing stringent requirements.

Public Perception

With a change in fire management philosophies researchers have turned to investigating the shift in public perception of fire management relative to the actual change in fire managers' actions.

Hall (1972) concluded that there is no clear distinction between wildfire and prescribed fire to some of the public. The majority of the public fined fire to be "bad." Doolittle (1980) found a larger tolerance in Southern attitudes towards prescribed fire, although, this tolerance lasted only as long as structures were not threatened. Taylor et al. (1982) looked at the changes fire had on the scenic quality and recreational acceptability of Ponderosa pine stands. Overall, the more knowledge held by the public the more tolerant they were of fire, although not necessarily from a scenic standpoint. Anderson (1982) also compared scenic perceptions of the public in which effects of prescribed burning versus the effects of logging were evaluated. The long-term effects of fire proved to be more appealing to the public over the short term effects of fire or the effects of logging. Using a broader perspective, Cortner et al. (1984b) evaluated the general attitude of members of the public. These findings indicated that public

knowledge of overall fire management was high and even tolerated to a greater extent when the respondents were further educated about prescribed fire management.

Gardener et al. (1985a) examined the attitude of a national audience through different organized user groups. Their responses to new fire management policies on public lands were one of acceptance. Carpenter et al. (1986) took existing information from three different surveys and the findings held that the public had a relatively high acceptance for fire management practices, but there were different socio-demographic characteristics, which govern the extent to which the fire management practices were supported. Taylor et al. (1986) also combined three separate surveys, Zwolinski et al. (1983), Gardner et al. (1985a), and Taylor and Daniel (1984), determining that public knowledge of fire management activities is relatively high, although the publics' aesthetic perception of fire is one of undesirability. Manfredo et al. (1990) surveyed a regional and national public to gain insight on attitudes and beliefs concerning prescribed fire. The fact that there were differences in the publics and that a more informed public was more tolerant of fire management policies suggested the importance of education.

McConnell et al. (1990) took a different angle by collecting information on private land managers' perceptions of prescribed fire. The private land managers, even though all did not actively use prescribed fire, accepted it as a useful tool. Smith et al. (1994) reported the result of a survey taken of the general public concerning wild and prescribed fire finding that during active fire years awareness is high. He also found prescribed fire, when used by land managers, was acceptable. Shindler et al. (1996) determined the attitude of the public in Oregon towards Forest Service use of prescribed fire and thinning. Shindler et al. found that overall the public was very supportive of both prescribed fire and mechanical thinning. Lichtman (1998)

concluded changes in the fire policy in the future would more likely be due to public views and trust rather than ecological merit. A restoration of public and political trust and participation is important for the federal land management agencies in the future.

The amount of knowledge held by the public is an important factor in the attitude displayed toward fire and fire management practices. It has been determined that the more knowledge held by the public the greater the acceptance of fire management policies. Public knowledge has seemed to grow over time.

Public Land Visitors

Along with general public awareness, resource managers are also concerned with visitor perceptions of fire management activities. Stankey (1976) recorded the attitude and knowledge of visitors regarding a wilderness area and its fire suppression policy. Stankey found the majority of visitors leaning toward suppression. Rauw (1980) assisted National Park management in establishing contact with the local community and with park visitors regarding their outlook on fire management. Rauw found that the majority of respondents understood the beneficial aspects of prescribed fire and agreed that prescribed burning, as a management tool, was acceptable. Nielsen (1981) reviewed a field experiment, which allowed evaluation of the relative effectiveness of two interpretive methods designed to increase visitor knowledge of fire ecology and positively influence visitor attitudes toward natural resources. The findings indicated that increasing visitor knowledge increased the overall support for fire management practices.

Baas (1994) also assessed park visitor knowledge and support for prescribed burning. He found visitor support from over half of the respondents but visitors with a relatively high

knowledge of prescribed fire gave even greater support. McCool et al. (1986) revisited prescribed fire in wilderness with a survey that demonstrated public knowledge of wilderness fire management had increased and was more tolerant in 1984 compared to 1971. Quinn (1989) also surveyed visitor perceptions of fire management. A survey of 1000 visitors to Sequoia and Kings Canyon National Parks was taken to quantify the public understanding of National Park fire policy, which proved to be knowledgeable and tolerant.

A similar situation, as with the general public, seems to occur with visitors to public lands. Knowledge is specifically related to the degree of acceptance of fire management policies held by the individual. The more knowledge a visitor holds the more likely they are understanding and accepting of fire management policies.

Surveys provide valuable information when determining public attitude and knowledge. Cortner et al. (1984a) concluded that there are many options when designing a survey and there is a great deal of information that can be collected to aid land management professionals in their future decision making.

Survey Design

Data Collection

There were three paths by which data from the 1998 wildfire season was retrieved. This included the World Wide Web, in person interviews, and a multitude of interagency reports. The World Wide Web proved to be a valuable tool in the search for data. The Florida Division of Forestry's (FDOF) Forest Protection Bureau web page contained a great deal of data. Not only did the site give past fire season statistics but it also contained a

comprehensive critique of the 1998 wildfire event. This page also provided information on prescribed fire and some conclusions concerning its success in Florida.

The Environmental Protection Agency (EPA) posted a great deal of chronological data on air quality. The "AIRS" data available through the EPA listed air quality levels that resulted from the 1998 wildfires. This data provided location information of air quality levels through multiple Florida monitoring stations.

Another helpful web page posted the state situation reports. These reports gave chronological information concerning acres burned, number of fires, houses lost, and cost data on suppression and losses during the summer of 1998.

A second important source of information, not only for gathering data but also in the evolution of the survey, was in person interviews. During the initial stages of survey development, investigators met with Dale Wade and Don English from the USDA Forest Service Forest Sciences Laboratory in Athens, Georgia. During the meeting ideas about the survey direction, information concerning the Florida fires, and future contacts were established. A working relationship was maintained throughout the development of the survey in which information was exchanged.

Personnel from the FDOF were contacted to further develop the survey, included were Mike Kuypers, Jim Brenner, and Mike Long. Through conference calls and meetings in the state of Florida, the investigative team was able to collect and confirm data concerning the 1998 wildfire event. Also, following the focus group revisions, FDOF personnel reviewed the preliminary survey instrument to assure the correct representation of the unique fire environment and wildland-urban interface problems facing Florida.

Ludmilla Lelis, a reporter from the Orlando Sentinel was also interviewed. Ludmilla was stationed in Daytona Beach during the 1998 wildfire season and was able to provide numerous newspaper articles concerning the extent of the Flagler, Brevard, and Volusia County wildfire events. She also gave a detailed description of the summer of 1998 from a reporter's and a citizen's point of view.

The third information source was the multiple agency reports on the 1998 wildfire event. The reports were the most comprehensive and complete data available to the investigative team. These documents included the Federal Emergency Management Agency (FEMA) Wildfire Mitigation in the 1998 Florida Wildfires After Action Report. This document evaluated the fire history in Florida from an ecological and anthropocentric point of view, public reaction to this history, and mitigation recommendations. The FDOF Major Event Fact Sheet gave detailed information concerning the 1998 wildfires including evacuations and road closures. The National Inter Agency Fire Center's Long Range Assessment Regional Situation in Florida Final Report provided a detailed explanation of environmental conditions such as temperature, precipitation, and upper atmospheric events that led to the extreme fire conditions during the summer of 1998. The Florida Division of Emergency Management (FDOEM) provided summary information of evacuations.

Preliminary Survey Instrument

By compiling the information collected in the literature review and assembling statistics from the 1998 Florida wildfire event the investigative team developed a preliminary survey. From a comparison of the literature available to the investigators, several similar questions in previous surveys were highlighted. These questions were then incorporated in the preliminary

survey to provide temporal and spatial comparisons concerning the attitude and knowledge of specific publics.

Using information from the 1998 wildfire, and in-person interviews, the investigative team was able to develop specific topics within the preliminary survey. These included stating the problem, proposing a solution, reviewing the costs and results of the program, addressing smoke issues, and providing comparative information on the characteristics of wildfire and prescribed fire. The preliminary survey also contained two separate illustrations. One comparing wildfire and prescribed fire while the other illustration demonstrates smoke levels considered acceptable by the EPA versus smoke levels during the 1998 wildfire season. The preliminary survey also contained alternative mitigation programs from which to choose along with a demographics section.

Focus Groups

A total of four focus groups were conducted to improve the comprehensibility of the survey. Personnel from the University of Georgia Research Center and one member of the investigative team administered the focus groups. The sessions were video taped and a summary of each focus group was compiled. Two English and two Spanish focus groups took place. The English focus groups were held in different locations to gather information from severe fire areas and non-severe fire areas.

The first English focus group, consisting of 11 people, was held March 11, 1999 in Ormand Beach, Florida. This location was chosen due to its proximity to the 1998 Florida fires. This area was inundated by extreme fire activity during the 1998 summer.

The second English focus group was held on March 20, 1999 in Tampa, Florida. Eleven people also attended this focus group. The group was presented with the revised material from the previous focus group held in Ormand Beach, Florida. The Tampa area was chosen due to its separation from the extreme wildfire activity of the summer of 1998.

The first Spanish focus group took place on March 27, 1999. The first focus group results were less than desirable. The turn out was low and the translation of the survey from English to Spanish was not accurate. With some corrections concerning the translation and a more aggressive recruitment action the second focus group, which was held on April 5, 1999, turned out to be a success. The focus group was held in Orlando, Florida. This location was close to the extreme fire activity during the summer on 1998 and provided access to a large population of Spanish speaking persons. Twelve participants attended the focus group.

Results of Focus Groups and Revisions

The first English focus group provided valuable information in the revision of the preliminary survey. The first specific comment was to add definitions to explain terms within the survey. Also, the two graphics at the time illustrating wild/prescribed fire, and smoke levels were reviewed. The comments concerning the graphics led to the restructuring of the illustrations. Participants also had several comments on what needed clarification and where more information would be helpful.

The participants of the second English group reviewed the revised survey from the first focus group. The second focus group also agreed that detailed definitions explaining the terms used in the survey were necessary. The need for definitions was also apparent due to the fact that some individuals in the group could not correctly define what a controlled burn or

prescribed fire was. The illustrations provided in the survey were again discussed in the focus group. Suggestions were given to clarify the illustration comparing wildfire/prescribed fire. The second illustration providing visual information on smoke levels was dropped from the survey after continued confusion from the second focus group. The participants also provided comments on what section needed clarification and what sections needed additional information. Specifically, they wanted more information on the costs and funding of the prescribed fire and mechanical programs.

The second Spanish focus group reviewed the revised material from the two English focus groups. In this focus group the need for definitions to explain terms within the survey were requested. The respondents also gave comments directed at the clarity of the translation and added additional comments to the illustrations.

The results of the focus groups, English and Spanish, gave investigators a comprehensible survey instrument, both textually and graphically, from which pretesting could begin.

Pretest

The University of Georgia Research Center administered the pretesting**.** To begin pretesting, random individuals were contacted by phone and asked eleven knowledge and attitude questions derived from similar past surveys. From this point the respondents were recruited to participate in the main survey. If the participant agreed to continue with the survey process they were then mailed a cover letter, which explained the survey, along with a survey booklet to review. They were then contacted again by phone at a prearranged time to conduct the main survey. The response rates are given in Table 1.

Table 1: Response Rate

	Number Contacted	Agreed to Survey	Completed Survey
English 1	22	21	10
English 2	20	20	6
Spanish 1	17	17	6

Pretesting consisted of two English and one Spanish group. One English and Spanish pretest in the fire area and one English pretest outside the fire area was administered. This was accomplished to gather information about the survey from both groups of citizens, ones who were exposed to the 1998 wildfires and ones who were not, to mimic the actual study. In the first English and Spanish pretest 10 and 6 interviews respectively took place within the fire area. In the second round of pretests 6 English respondents in the non-fire area were interviewed. The first English pretest took place during the week of May 24, 1999 and the second English pretest during the week of June 21, 1999. The Spanish pretest was conducted during the week of June 16, 1999.

Results of Pretest and Revisions

Two forms of data were generated through pretesting, open-ended and binary (yes/no). The open-ended information was gathered from sections within the survey that allowed interviewers to ask for questions after important topics. This included each of the program proposals, after the program features, and after the cost information. The open-ended data informed the investigators to add more information to the specifics of the herbicide program and to rearrange the answer options of the screener.

The binary data gave insight into the coding and respondent information. By rearranging some of the coding in response to the original data layout, the final survey data will be more

conducive to analysis. The binary data also reported the dollar amounts and their respective yes/no answers for the prescribed fire program (Table 2). This information allowed for investigators to "gauge" the correct bid amounts to issue in the actual survey. This information gave indication that a pretest bid range of $10-350 was needed to capture the total willingness to pay for all the respondents.

Table 2: Number and Response to Dollar Amount

Amount	Number at Bid Amount	Yes	No
10	4	3	1
20	4	4	0
30	4	3	1
40	3	3	0
60	1	0	0
90	1	1	0
120	1	0	1
150	2	1	1
250	1	1	0
350	1	0	1
Total	22	16	5

One very beneficial aspect of the pretesting was the opportunity by an investigator to monitor both the English and the Spanish interviews. During these sessions, the investigators were able to generate ideas about the survey layout and overall timing along with the general comprehensibility of the survey itself.

Final Survey Instrument

The final survey reflected several months of data compilation and many rounds of focus groups and pretesting. At the completion of these processes the investigative team compiled a survey instrument from which data collection could begin.

The initial questionnaire, or the screener, allowed interviewers to introduce themselves and briefly explain the survey. The interviewer then asked eight questions (1,2,4,5,6,7,9,10) from previous surveys and three questions (3,8,11) specific to the survey (Appendix A). This will allow for a comparison of knowledge and attitude in relation to past surveys. The final goal of the screener is to set up a later interview date at which time the booklet would be reviewed and further questions answered.

The booklet and the survey script, read by the interviewer, were similar in many aspects but varied in a few important ways. The opening page of the booklet contained a brief introduction to the topic at hand and then delved into detailed definitions. These definitions included prescribed fire, wildfire, fire management, structural fire, and health standard (Appendix B). The first page of the booklet also provided information on the current state of fire management in Florida.

The second and third page of the booklet provided information of the wildland-urban interface problem that is facing Florida residents along with a solution in the form of prescribed fire and how it works. Two illustrations are presented on these pages providing a visual comparison of the effects between wildfire and prescribed fire (Appendix B). In addition, the issue of smoke is addressed given a prescribed fire solution.

The fourth page of the booklet describes the prescribed fire solution in greater depth. An actual program of prescribed burning is presented along with the features and specific results of the program. At this point, a question is presented in the booklet as to whether or not the respondent would support this program of prescribed fire (Appendix B).

Page five of the booklet then explains the cost of this program. A detailed explanation of the funding process is given along with the results from this program. Again, the respondent is asked whether or not they would support this program but this time at a predesignated cost to them (Appendix B).

The sixth and seventh pages provide alternatives to the prescribed fire mitigation program. The alternative mitigation proposals are a mechanical fire fuel reduction program and an herbicide fire fuel reduction program. For each of these programs the method by which fuel loading is reduced is explained along with the specific results of each program. After each of these programs is reviewed, the respondent is asked whether they would support the program at a random bid amount (Table 3). The predesignated cost for the mechanical program is $10 higher than the prescribed fire program cost while the herbicide program is $5 higher. These prices reflect the relative cost of each program in relation to the cost of a prescribed fire program (Kuypers 1999).

Table 3: Initial Florida Fire Study Bid Design

Bid Number	Prescribed Fire	Herbicide Treatment	Mechanical Treatment
1	**$10**	**$15**	**$20**
2	**$20**	**$25**	**$30**
3	**$30**	**$35**	**$40**
4	**$40**	**$45**	**$50**
5	**$60**	**$65**	**$70**
6	**$90**	**$95**	**$100**
7	**$120**	**$125**	**$130**
8	**$150**	**$155**	**$160**
9	**$250**	**$260**	**$270**
10	**$350**	**$370**	**$380**

The final page of the survey booklet is the demographics section. An introduction as to why the respondents' demographics are recorded is given along with twelve questions concerning their experience with fire and their location in Florida (Appendix B).

The survey script read by the interviewer is word for word with the survey booklet except for a few specific areas. The first page of the survey script skips the introduction and all the definitions, except for prescribed fire. This was done to shorten the length of the interview but make sure the respondent holds a correct definition of prescribed fire.

The second difference from the survey booklet and the survey script is on page three of the survey script. At this point the interviewer asks four questions not printed in the survey booklet that were previously asked in the screener (Appendix C). This provides the investigative team with a comparison of pre and post information attitude and knowledge responses.

The script also allows for interviewer skip patterns according to the respondent information. If the respondent rejects the prescribed fire program at no cost there is no reason to ask if they support the program at a cost. Rather, a willingness to accept compensation question is asked. The interviewer then provides the respondent with the alternative programs. The interviewer can also skip the specific fuel reduction techniques of the alternative programs if the respondent indicates that he or she has already read that section (Appendix C). This allows for the survey time to be reduced.

The last difference in the script is in the demographics section. The script contains more questions beyond the survey booklet demographics section (Appendix C). This allows for the

interviewer to extract more information without a defensive initial response to a large amount of personal questions located in the survey booklet.

Sample Design

To gather information a comparison of knowledge of, attitudes toward, and support for fire management policies between individuals is needed. To accomplish the desired objectives the collection of data was divided into two groups. Florida residents who experienced the recent fires represent group 1. Florida residents living in areas away from the current fire events represent group 2. They experienced no fire effects (e.g., no smoke, no road closures, and no disruptions in public services). Within each of these groups, the ethnicity of the respondents was determined to categorize the sample into Spanish and English speaking groups and into White and African American groups within the English group (Table 4).

Table 4: Overview of survey sample design by population group

Proximity to Fire	**Completed Interviews**			
Proximity to 1998 wildfire event	Group	White	Hispanic (Spanish)	African-American
Lived in Fire Area: Brevard, Flagler, Volusia	Group1:	170	194	49
Lived nearby: 25-150 miles of core counties	Group2:	158	151	54

Survey Mode

To obtain a representative sample of each area, random digit dialing of the population was used. A short set of baseline knowledge questions was asked of each person. Appointments were made with individuals for detailed follow-up interviews using a typeset, color booklet that was mailed to households. The booklet contained the key questions, scenarios about three different fire management policies as well as two figures contrasting

wildfire and prescribed fire. The individuals were asked to read the survey booklet prior to the phone interview. Phone interviews were conducted in either English or Spanish to obtain answers regarding knowledge and attitudes, support for each fire management policy outlined in the scenarios and demographic information. The use of random digit dialing assures that nearly all households are eligible to be interviewed. This is especially important due to possible rates of unlisted phone numbers. This makes contacting these households via mail surveys difficult, as they do not show up in commercially available mailing lists. However, random digit dialing allows us to contact these households and therefore obtain a more representative sample. In addition, use of random digit dialing and interviewer screening protocols should result in a sampled balanced by males and females. This is very difficult with commercial mailing lists as the majority of listed phone numbers are in the male's names.

The investigators have used this telephone-mail-telephone approach on two previous surveys and it provides very high quality data relative to a pure mail survey. In a pure telephone survey the respondent has no visual or written aids. The encouragement of the phone interviewer decreases the number of questions not answered by the respondent yielding more complete surveys for each person.

This approach is less costly than in-person interviews, but nonetheless is more costly than mail surveys. However, it would be difficult to use mail surveys in the mixed language populations of Florida because one does not know ahead of time which language version to send out. However, the telephone operators can quickly determine whether the household would desire an English or Spanish version or the choice could be offered to the household. The follow-up interview was conducted in Spanish if desired by the household.

Survey Implementation

Florida residents were surveyed beginning in the fall of 1999. The survey process was suspended during the 1999-2000 holiday season. Low response rates during the initial round of interviews prompted the addition of $5 bills to survey booklets as an incentive to response. The survey process was reinstated in February 2000 and lasted until March 2000. Although a $5 bill accompanied the remainder of survey booklets, there is no statistically significant difference between the response rate before or after their introduction. There is also no statistically significant difference between language groups. Even though the response rate did not improve through monetary incentive, the continued persistence of interview personnel increased the response rate to an average of 52.2% for completed interviews.

The interim period during the holidays gave time for investigators to reevaluate the survey process. One change made was to the bid amount given to the herbicide and mechanical program. To increase variation, increase the number of "yes" votes, the bid amount was lowered (Table 5). This variation in is an important aspect of the analysis process.

Table 5: Florida Fire Study Revised Bid Design

Bid Number	NO CHANGE Prescribed Fire	NEW LOWER Mechanical Treatment	NEW LOWER Herbicide Treatment
1	$10	$15	$12
2	$20	$25	$22
3	$30	$35	$32
4	$40	$45	$43
5	$60	$65	$63
6	$90	$95	$93
7	$120	$125	$123
8	$150	$155	$153
9	$250	$260	$255
10	$350	$360	$355

Results and Discussion

A response of 52.2 percent for a total sample of 1,492 was obtained (Table 6). Individuals who were not interviewed due to incorrect phone numbers, no established contact, or lack of appropriate respondent qualifications, such as under 18, were not included in the calculated response rate. Individuals who refused to complete the interview or rescheduled without future contact (callback) were included in the response rate as unit non-responses. Thus, any individual contacted but not interviewed was included in the response rate as a non-response. Also included in the unit nonresponse category were respondents who completed the screener but did not follow through with completion of the entire survey process**.**

The response rate was broken down into two separate categories, one English and one Spanish (Table 6). The English and Spanish response rates to unit non-response, completed screener, and completion of the entire survey process are very similar**. C**omparing information across categories shows a response rate of 53.7 percent for English and 51.5 percent for Spanish, which are similar. Note, in the English category there are 11 survey respondents who did not complete the survey in Spanish but are of Hispanic origin. This is 3 percent of the Hispanic sample.

Table 6: Response Rate

	English	*Pct.*	Spanish	*Pct.*	Total	*Pct.*
Total Contacted	**985**	---	**770**	---	**1755**	---
Non-Working/ Changed/ Wrong Number	46	---	30	---	76	---
No Answer/ Busy/ Answering Machine	58	---	49	---	107	---
No Appropriate Respondent	41	---	39	---	80	---
Net Sample	**840**	***100***	**652**	***100***	**1492**	***100***
Refusal	64	*7.6*	55	*8.4*	119	*8*
Callback	62	*7.4*	43	*6.6*	105	*7*
Completed Screener	**714**	***85***	**553**	***84.8***	**1267**	***85***
Completed Interviews	**443**	***53.7***	**336**	***51.5***	**779**	***52.2***

State demographic characteristics were retrieved to determine if the sample demographics are comparable. The age of the state sample falls within two standard errors of the sample mean. The education and income of the state average sample does not fall within two standard errors of the sample mean for Whites and African Americans (Table 7). For the Spanish sample average sate income does but education does not fall within two standard errors of the sample average (Table 7). It is not uncommon for respondents with a greater level of education and income to be more inclined to answer surveys. Given education is a significant variable in the forthcoming mechanical fuel reduction program multivariate logit model the Florida mean can be substituted to calculate WTP calculations based on state averages.

Table 7: Average Population Characteristics

	Age		Education (Years)		Income (thousands)	
	Sample	Florida*	Sample	Florida*	Sample	Florida*
White 90% CI	51.96 (50.08-53.84)	52.16	14.23 (13.96-14.50)	12.52	50.78 (46.96-54.60)	43.05
Hispanic 90% CI	46.07 (44.40-47.74)	47.28	12.78 (12.45-13.11)	11.40	34.86 (32.58-37.58)	37.53
African American 90% CI	48.30 (44.32-52.28)	45.72	13.24 (12.51-13.97)	11.12	36.85 (30.34-43.36)	26.66

*Average Florida Population Characteristics derived from 1990 U.S. Census Data for householder or persons over 25

Knowledge and Attitude

Knowledge and attitude are the two distinct question categories that are frequently addressed in wild and prescribed fire surveys (Courtner et. al., 1984b, Gardner et. al. 1985a, and Taylor and Daniel, 1982). Modeling questions from past surveys, the questions addressed to Florida residents were divided into the knowledge and attitude categories. This parallel allows for comparison of Florida residents knowledge and attitude toward wild and prescribed

fire against the respondents of past surveys. Similar questions from past surveys were grouped to determine which specific question format would allow for the greatest comparison across surveys. It is also important to recognize the sequence in which educational information was provided to respondents in each survey. Response for past surveys may not total 100 percent due to lack of documentation of complete results.

An initial knowledge question addressed to Florida residents was if they had heard of prescribed fire (Table 8). The result from this question was rather surprising. Only 50 percent of the respondents had heard of prescribed fire or controlled burning. There are two possible explanations to the disparity between Florida residents and the Tucson residents in Cortner et al.'s 1983 survey. The most important factor is that residents in Tucson received a limited amount of educational information before answering the question. Florida residents were given no information prior to the question. Also, there is a large difference between English speaking and Spanish speaking respondents, which will be addressed in the following section. Courtner et.al.'s survey did not include Spanish-speaking residents in the survey process.

Table 8: Have you heard of prescribed fire which is also called controlled burning?*

Author	Area/User	Year	Response/ Technique	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/ Neutral
*Cortner et al.	Tucson Residents	1983	Telephone	84.3^	13.9^	1.8^
*Loomis et al.	Florida Residents	1999	Telephone	**50**	49	1

*Indicates identical question used in survey as stated above

^ Educational information received before questions administered

Three additional knowledge questions were included in the Florida Fuel Treatment survey (Table 9, 10, 11). Of these, little variation exists between the residents of Florida and the other areas/groups surveyed. This is even more evident when the Florida respondents are

broken down into pre and post information categories and compared to past surveys (Table 9b, 10b).

Table 9: Forest fires usually result in the death of the majority of animals in the area.*

Author	Area/User	Year	Response/ Technique	%Strongly Agree	%Agree/Yes/ Should/True	%Disagree/No/ Should Not/False	%Strongly Disagree	%Don't Know/ Neutral
*McCool, Stankey	Selway-Bitterroot	1971	Mail	X	x	52	X	x
*McCool, Stankey	Selway-Bitterroot	1984	Mail	X	x	51	X	x
Baas	Grand Canyon Visitors	1984	Interviews/ Questionnaire	X	64	x	X	x
Cortner et al.	Tucson Residents	1983	Telephone	58.7^	28.9^	7.7^	0.1^	4.6^
*Loomis et al.	Florida Residents	1999	Telephone	X	64	27	X	9

*Indicates identical question used in survey as stated above

^ Educational information received before questions administered

Table 10a: Do you think controlled burning or prescribed fire would reduce the chance of high intensity wildfire?*

	Area/User	Year	Response/ Technique	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/ Neutral
Cortner et al.	Tucson Residents	1983	Telephone	64.6^	15.8^	19.6^
Taylor, Daniel	Tucson Residents	1982	Group Questionnaire	80-90^	10-20^	x
Quinn	Sequoia Kings Visitors	1989	Interview	77	3	22
McCool, Stankey	Selway-Bitterroot	1971	Mail	40	x	x
McCool, Stankey	Selway-Bitterroot	1984	Mail	58	x	x
Baas	Grand Canyon Visitors	1984	Interviews/ Questionnaire	58	x	x
Hulbert	Boulder CO Homeowners	1973	Interview	97.3	2.3	X
Unknown	Nevada/Rural	X	X	63	14	23
Unknown	Nevada/Urban	X	X	66	6	28
*Shindler, Reed	Oregon Residents	1996	Mail	74^	13^	x
*Loomis et al.	Florida Residents	1999	Telephone	77	9	14

*Indicates identical question used in survey as stated above

^ Educational information received before questions administered

Table 10b: Do you think controlled burning or prescribed fire would reduce the chance of high intensity wildfire?*

	Area/User	Year	Response/ Technique	Information	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/ Neutral
*Loomis et al.	Florida Residents	1999	Telephone	Pre	82**	9**	9**
*Loomis et al.	Florida Residents	1999	Telephone	Post	92**	6**	2**

** Comparison of pre/post information only for respondents completing survey

Table 11a: Do you think controlled burning or prescribed fire effectively reduces the amount of excess fuels in the forest?*

Author	Area/User	Year	Response/ Technique	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/ Neutral
Cortner et al.	Tucson Residents	1983	Telephone	86.3^	5.7^	8^
*Shindler, Reed	Oregon Residents	1996	Mail	70^	x	X
*Loomis et al.	Florida Residents	1999	Telephone	67	12	21

*Indicates identical question used in survey as stated above

^ Educational information received before questions administered

Table 11b: Do you think controlled burning or prescribed fire effectively reduces the amount of excess fuels in the forest?*

Author	Area/User	Year	Response/ Technique	Information	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/ Neutral
*Loomis et al.	Florida Residents	1999	Telephone	Pre	73**	11**	16**
*Loomis et al.	Florida Residents	1999	Telephone	Post	89**	8**	3**

** Comparison of pre/post information only for respondents completing survey

A similar comparison among surveys can be made between questions pertaining to attitude. Florida residents exhibit the most divergent results in this category when asked whether they feel that all fires regardless of origin should be put out as soon as possible (Table 12). No initial educational information, differences in user groups, and the exclusion of race are all possible reasons for this difference. In the following section it is obvious that race has played

a role in the strong attitude towards the immediate suppression of all wildfires regardless of origin.

Table 12: All fires, regardless of origin, should be put out as soon as possible.*

Author	Area/User	Year	Response/ Technique	%Strongly Agree	%Agree/Yes/ Should/True	%Disagree/No/ Should Not/False	%Strongly Disagree	%Don't Know/ Neutral
Cortner et al.	Tucson Residents	1983	Telephone	4.9^	30^	50.5^	5.6^	9^
*Shindler, Reed	Oregon Residents	1996	Mail	X	30^	55^	X	15^
Quinn	Sequoia Kings Visitors	1989	Interview	X	11	79	X	12
McCool, Stankey	Selway-Bitterroot	1971	Mail	X	31	69	X	x
McCool, Stankey	Selway-Bitterroot	1984	Mail	X	5	95	X	x
Unknown	Nevada/Rural	X	X	X	41	45	X	14
Unknown	Nevada/Urban	X	X	X	45	34	X	x
*Loomis et al.	Florida Residents	1999	Telephone	X	**82**	17	X	1

*Indicates identical question used in survey as stated above
^ Educational information received before questions administered

The remaining results from the attitude category are very similar to past surveys (Table 13a, 14a, 15a). Again, this similarity is more apparent when comparing Florida residents, pre and post educational information, with past survey results.

Table 13a: Do you think forest managers should or should not periodically burn underbrush and debris in pine forests?*

Author	Area/User	Year	Response/ Technique	%Strongly Agree	%Agree/Yes/ Should/True	%Disagree/No/ Should Not/False	%Strongly Disagree	%Don't Know/ Neutral
*Gardner et al.	National User Groups	1985	Mail/In person Interviews	X	62^	24^	X	14^
*Cortner et al.	Tucson Residents	1983	Telephone	X	67.1^	15^	X	17.9^
*Taylor, Daniel	Tucson Residents	1982	Group Questionnaire	X	87-100^	0-13^	X	x
Baas	Grand Canyon Visitors	1984	Interviews/ Questionnaire	23.5	42	2.6	10.9	21
*Loomis et al.	Florida Residents	1999	Telephone	X	60	27	x	13

*Indicates identical question used in survey as stated above

^ Educational information received before questions administered

Table 13b: Do you think forest managers should or should not periodically burn underbrush and debris in pine forests?*

Author	Area/User	Year	Response/ Technique	Information	%Agree/Yes/ Should/True	%Disagree/No/ Should Not/False	%Don't Know/ Neutral
Loomis et al.	Florida Residents	1999	Telephone	Pre	64**	23**	13**
Loomis et al.	Florida Residents	1999	Telephone	Post	86**	12**	2**

** Comparison of pre/post information only for respondents completing survey

Table 14a: Prescribed fire should not be used because of the potential health problems from smoke.*

Author	Area/User	Year	Response/ Technique	%Strongly Agree	%Agree/Yes/ Should/True	%Disagree/No/ Should Not/False	%Strongly Disagree	%Don't Know/ Neutral
*Shindler, Reed	Oregon	1996	Mail	X	11^	70^	x	19^
Cortner et al.	Tucson	1983	Telephone	8.2^	21.9^	44.5^	14.2^	0.7^
Baas	Grand Canyon	1984	Interviews/ Questionnaire	X	72	x	x	x
*Loomis et al.	Florida	1999	Telephone	X	**38**	49	x	13

*Indicates identical question used in survey as stated above
^ Educational information received before questions administered

Table 14b: Prescribed fire should not be used because of the potential health problems from smoke.*

Author	Area/User	Year	Response/ Technique	Information	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/ Neutral
*Loomis et al.	Florida	1999	Telephone	Pre	**34****	55**	11**
*Loomis et al.	Florida	1999	Telephone	Post	**23****	70**	7**

** Comparison of pre/post information only for respondents completing survey

Table 15a: Prescribed fire is too dangerous to be used.*

Author	Area/User	Year	Response/ Technique	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/ Neutral
*Shindler, Reed	Oregon Residents	1996	Mail	14^	68^	X
*Loomis et al.	Florida Residents	1999	Telephone	**34**	57	9

*Indicates identical question used in survey as stated above

^ Educational information received before questions administered

Table 15b: Prescribed fire is too dangerous to be used.*

Author	Area/User	Year	Response/ Technique	Information	Pct. Agree/Yes/ Should/True	Pct. Disagree/No/ Should Not/False	Pct. Don't Know/Neutral
*Loomis et al.	Florida Residents	1999	Telephone	Pre	**28**	65	7
*Loomis et al.	Florida Residents	1999	Telephone	Post	**18**	80	2

** Comparison of pre/post information only for respondents completing survey

One factor that is not taken into account in past surveys is the Spanish speaking population. Many areas throughout the United States contain large numbers of Spanish speaking individuals. Without including this population group, bias is introduced into survey results. Distributing both English and Spanish survey booklets allows for full representation of the Spanish speaking population in the target area.

To determine if a difference in initial knowledge and attitude exist between groups, the screener questions were compared. Knowledge results between English and Spanish respondents were mixed. Two of the knowledge questions showed no statistical difference between groups (Table 16, 17). Both questions held insignificant Chi-square statistics.

Table 16: Do you think controlled burning or prescribed fire would reduce the chance of high intensity wildfire?

	Pct. Yes	Pct. No	Pct. Don't Know
English	78 (549)	8 (59)	14 (99)
Spanish	77 (418)	10 (54)	13 (69)
X^2=1.3319 Not Significant			

Table 17: Do you think controlled burning or prescribed fire effectively reduces the amount of excess fuels in the forest?

	Pct. Yes	Pct. No	Pct. Don't Know
English	65 (463)	12 (88)	23 (158)
Spanish	69 (372)	12 (68)	19 (104)
X^2=2.0094 Not Significant			

The other two knowledge questions are statistically different among groups (Table 18, 19). One reason there may be a disparity among knowledge questions is how respondents arrive at their conclusion. The two questions, in which no difference exists between groups, can be deduced logically. If a fire burns through the forest fuel will be removed and less fuel will be available for future wildfires. The two knowledge questions in which differences do exist are not as straight forward. If the respondent has not heard of prescribed fire or controlled burning there is only one answer and no deciphering involved. Likewise, unless information has been obtained through direct observation or a secondhand source of knowledge about the death of animals due to wildfire is difficult to come by. Much more complexities enter into the decision making process and respondents may rely more on attitude toward wildfire. As will be seen, there is a large disparity of attitude between English and Spanish speaking respondents.

Table 18: Have you heard of prescribed fire which is also called controlled burning?

	Pct. Yes	Pct. No	Pct. Don't Know
English	65 (463)	35 (244)	0 (0)
Spanish	30 (165)	68 (367)	2 (9)
X^2= 156.21**			

**Significant at the 99% level

Table 19: Forest fires usually result in the death of the majority of animals in the area.

	Pct. True	Pct. False	Pct. Don't Know
English	51 (363)	38 (271)	11 (73)

Spanish	80 (436)	12 (63)	8 (42)
X^2=124.9896**			

**Significant at the 99% level

Differences between groups exist when comparing questions concerning attitude. There is a statistically significant different attitude between the English and Spanish speaking respondents (Table 20, 21, 22, 23). These differences are important indications of the bias that can be introduced into a survey if the information is issued in only one language. This may explain some of the divergent results from past surveys and the Florida Fuel Treatment survey. Specifically the knowledge question about the term prescribed fire and the attitude question concerning putting out wildfires as soon as possible.

Table 20: Do you think forest managers should or should not periodically burn underbrush and debris in pine forests?

	Pct. Should (n)	Pct. Should Not (n)	Pct. Don't Know (n)
English	70 (493)	16 (113)	14 (101)
Spanish	48 (260)	41 (220)	1 (61)
X^2=96.2216**			

**Significant at the 99% level

Table 21: Prescribed fire should not be used because of the potential health problems from smoke.

	Pct. Agree	Pct. Disagree	Pct. Don't Know
English	25 (174)	60 (427)	15 (106)
Spanish	55 (299)	35 (188)	10 (54)
X^2=123.2092**			

**Significant at the 99% level

Table 22: Prescribed fire is too dangerous to be used.

	Pct. Agree	Pct. Disagree	Pct. Don't Know
English	18 (129)	72 (510)	10 (68)
Spanish	54 (293)	37 (202)	9 (46)
X^2=182.7794**			

**Significant at the 99% level

Table 23: All fires, regardless of origin, should be put out as soon as possible.

	Pct. Agree	Pct. Disagree	Pct. Don't Know
English	70 (497)	28 (195)	2 (5)
Spanish	95 (522)	3 (18)	1 (2)
X^2=132.4643**			

**Significant at the 99% level

Comparisons have been made of initial knowledge and attitude across surveys and across language groups within the Florida Fuel Treatment survey. This introduces the question of how knowledge and attitude change once information about prescribed fire is introduced? First it is examined how knowledge and attitude change given the total sample and then change is examined between specific language groups.

It is obvious that knowledge and attitude change after the information in the survey booklet is presented (Table 24). For each question, knowledge and attitude, there is a statistically significant change. For each question this change is toward a more supportive attitude and a higher degree of knowledge.

Table 24: Change in Knowledge/Attitude Responses.

Do you think controlled burning or prescribed fire effectively reduces the amount of excess fuel in the forest?	**X^2=208.1664****
Do you think controlled burning or prescribed fire would reduce the chance of high intensity wildfire?	**X^2=79.7799****
Prescribed fire should not be used because of the potential health problems from smoke.	**X^2=33.6977****
Prescribed fire is too dangerous to be used.	**X^2=69.6869****
Do you think forest managers should, or should not, periodically prescribed burn underbrush and debris in pine forests?	**X^2=120.1454****

**Significant at the 99% level

It is now important to determine if this change in knowledge and attitude exists across language groups. The English sample changes their knowledge and attitude after the

introduction of information to a more supportive and knowledgeable outlook on prescribed wildfire (Table 25).

The Spanish group exhibits the same results. A more supportive and knowledgeable change toward prescribed fire is observed for each question (Table 26).

Table 25: English Change in Knowledge/Attitude Responses.

Do you think controlled burning or prescribed fire effectively reduces the amount of excess fuel in the forest?	**X^2=41.5021****
Do you think controlled burning or prescribed fire would Reduce the chance of high intensity wildfire?	**X^2=260.2647****
Prescribed fire should not be used because of the potential health problems from smoke.	**X^2=439.8604****
Prescribed fire is too dangerous to be used.	**X^2=391.0024****
Do you think forest managers should, or should not, periodically prescribed burn underbrush and debris in pine forests?	**X^2=17.7544****

**Significant at the 99% level

Table 26: Spanish Change in Knowledge/Attitude Responses.

Do you think controlled burning or prescribed fire effectively reduces the amount of excess fuel in the forest?	**X^2=34.3066****
Do you think controlled burning or prescribed fire would Reduce the chance of high intensity wildfire?	**X^2=27.9317****
Prescribed fire should not be used because of the potential health problems from smoke.	**X^2=10.7586***
Prescribed fire is too dangerous to be used.	**X^2=58.8391****

*Significant at the 95% level **Significant at the 99% level

These results indicate that there is a significant change in knowledge and attitude after the introduction of information regardless of language. This change is towards a more supportive attitude and a greater degree of knowledge.

Another question is raised by these results. If there is a statistically significant difference between groups initial attitude, and each group changes their knowledge and attitude with the introduction of information, how do they compare concerning their post information knowledge

and attitude? Comparing English and Spanish samples leads to similar results as the initial comparison. Although each group changes their knowledge and attitude in the same direction with the introduction of information the same disparities exist between groups before and after the changes. As before, no statistically significant difference exists between the knowledge questions, but there still exists a significant statistical difference among the attitude questions. This observed by comparing pre and post information responses between groups (Table 16, 17, 20, 21, 22, 28).

Table 27: English vs. Spanish: Post Information Responses.

Do you think controlled burning or prescribed fire effectively reduces the amount of excess fuel in the forest?	X^2=0.4139
Do you think controlled burning or prescribed fire would Reduce the chance of high intensity wildfire?	X^2=1.4683
Prescribed fire should not be used because of the potential health problems from smoke.	**X^2=27.651****
Prescribed fire is too dangerous to be used.	**X^2=38.09667****
Do you think forest managers should, or should not, periodically prescribed burn underbrush and debris in pine forests?	**X^2=6.13243***

*Significant at the 95% level **Significant at the 99% level

Statistical Analysis of WTP Responses

To determine the WTP for the three fuel treatment methods the survey information is used in estimating a logistic regression. Calculating WTP for Florida residents using a logistic regression allows for the valuation of each fuel treatment program and also the introduction of language, income, location in Florida and other demographic factors and how they influence support. Initial development of the logistic regression begins with the determining assumed significant variables that influence support or valuation (Table 28).

To reduce multicolinearity some of the variables were recoded to help develop a more concise model. For example, FUELRED and FIRERED, variables indicating if the respondent feels prescribed fire reduces fuel loads and possible wildfire intensities, were

reduced into EFFECTIVENESS. This variable, EFFECTIVNESS, reflects how confident the respondent is that prescribed fire will accomplish these goals (Table 28).

Table 28: Hypothesized Significant Variables

Variable Name	Score Given To Variable	Definition of Variable	Expected Sign
Distance (proximity to fire)	0,1,…	proximity to fire, measures miles to the 1998 wildfire event	-
Inarea/Outarea (in or out of fire area)	0-Out 1-In	Determines if respondent resides in or out of 1998 wildfire event (Flagler, Brevard, Volusia)	+
Language (language)	1-English 0-Spanish	shift variable testing whether there is differential support for fire management policies between language	+
Effectiveness (perceived effectiveness of fire management policy)	0,1,2,3	determines the attitude towards the likelihood of success of prescribed fire	+
Attitude (attitude score)	0,1,2	determines perception of risks from prescribed fire	-
Seefire (witnessed wildfire)	0-No 1-Yes	determines who has witnessed a wildfire	+
Smoke (experienced smoke)	0,1,2,3	determines who has experienced smoke from either a wildfire or prescribed burn	-
Breath (respiratory problem)	0,1,2,3	level of respiratory problems the respondent might have	-
Homeburn (house damage)	0,1,…	has house has been damaged or destroyed by a wildfire	+
Neighbor (neighbor house)	0,1,…	has neighbors house has been damaged or destroyed by a wildfire	+
Evac (evacuated)	0,1,…	has respondent has been evacuated from their residents	+
Howlong (number years lived in area)	0,1,…	acts as a control for recent versus long time residents, by county	+
Samezip (same zip 1998)	0-No 1-Yes	determines if the current Florida address was occupied during the 1998 wildfire season	+
Longfla (years in Florida)	0, 1, 2, 3, …	number of years as a resident of the state	+
Age (age)	18, 19, 20, …	age in years	-
Retire (retired)	0-No 1-Yes	collects information on the employment status of the respondent	-
Yearrnd (year round resident)	0-No 1-Yes	determines the seasonal migrations of the respondent	+
Ownrent (rent or own)	0-No	determines the investment in the current	+

	1-Yes	residential property	
Home (value of residence)	0,1,…	values the property of the respondent if the respondent owns the property	+
Lotsize (lot size)	Range 1,2,3,4	determines the size of the property if the respondent owns the property	+
Educ (education)	Range 8, 12, 14, 16, 18	education ranges	+
Envorg (conservation group)	0-No 1-Yes	gathers information about the respondents affiliation with conservation and environmental groups	+
Hiking (activities)	0-No 1-Yes	determine if the respondent has hiked, camped, fished, or hunted in the past twelve months	+
Race (ethnicity)	0=Other 1=Hispanic	shift variable testing whether there is differential support for fire management policy by ethnicity	+
Race1(ethnicity)	0=Other 1=Black	shift variable testing whether there is differential support for fire management policy by ethnicity	+
Income (income/number in household)	Range 15, 25, 35, 45, 55, 70, 90, 125, 150	midpoint of per capita income ranges	+
Wave	0-Wave 1 1-Wave 2	indicates the wave in which the respondent falls (wave 2 respondents received $5 with their interview booklet)	+
Iattitude (initial attitude)	0,1,2,3,4,5	respondents initial attitude towards wild and prescribed fire	-
Iknowledge (initial knowledge)	0,1,2,3,4,5,6	respondents initial knowledge of wild and prescribed fire	+
Source (information sources)	0,1,2,3,4,5	number of information sources respondent has received prescribed fire info	+
Florida	0-No 1-Yes	determines if respondent is aware of the 1998 wildfire event	+
Bother	0,1,,2,3,4	has the respondent experienced smoke and does it bother them visually, physically, or both	-
$ dollar amount (bid amount)	10 bid amounts	each program is randomly assigned a bid amount from one of the 10 figures Example: RX $10 Mechanical $20 Herbicide $25	-

(I) Script indicates the initial script questions 1,2,3, and 4. The subsequent script questions 1,2,3, and 4 are labeled only as Script 1,2,3, and 4.

Even though these variables are expected to be important factors in the model, all are not included. There are three reasons for this. First, some variables contain small amounts of variation and their inclusion would create statistical problems. Two variables in the model, OWNRENT and FLORIDA, did not contain enough variation and were excluded. The majority of respondents owned their own home and did not rent. Also, the majority of residents were aware of the 1998 wildfire event. This leads to problems with convergence of the model.

Second, many questions are not answered by the respondent. The variables with high item non-response where taken out of the model if they significantly reduced the sample size (Table 29).

Table 29: Excluded Variables Due to Item Non-response.

Variable	Non-response
BOTHER	224
HOME	94
LOTSIZE	223
INCOME	149
IKNOWLEDGE	341
IATTITUDE	281
SOURCE	341

Two of the excluded variables include personal per capita income (INCOME) and value of the respondents home (HOME). It is not uncommon for questions of these sorts to be unanswered due to the personal nature. The variable BOTHER, if they had experienced smoke from a prescribed or wildfire and if it had adverse effects, and LOTSIZE, the respondents property size if they own a home were excluded due to high item non-response. Other variables excluded included IKNOWLEDGE, IATTITUDE, and SOURCE. These variables held high item non-response because they were derived through the combination of several variables. This transformation picks up item non-response in each variable and adds it to the final variable.

Highly correlated variables were also excluded from the initial model. INAREA and OUTAREA were excluded and are highly correlated to the variable DISTANCE. The variable HOWLONG was excluded and is highly correlated with LONGFLA. The variable LANGUAGE was excluded and is highly correlated with RACE. In both instances none of the excluded variables held a higher explanatory power than its highly correlated counterpart.

Treatment of Protest Response

Once the initial model was revised, protests votes were omitted. The recording of open-ended statements after each respondent voted "no" to a specific fuel treatment program identified protest votes (Table 30, 31). If the respondent voted "no" for reasons other than a lack of value of the program, they could not afford it, felt they were in a low risk area, etc., their response was counted as a protest vote**.** These include such reasons as opposition to government programs, stating the program will just not work, opposed to taxes, etc. It is encouraging that many reasons for the "no" votes by respondents are that the program is just not worth it or they cannot afford it. This response indicates that respondents are adhering to the contingent market. In each group, English and Spanish, "no" responses were categorized and identified as protest or not protest. (Table 30, 31) This process took place for each fuel treatment program.

Table 30: English Response to "No" Answers.

Category	**Prescribed Fire**	**Pct.**	**Mechanical**	**Pct.**	**Herbicide**	**Pct.**	**Definition**
Cannot Afford	10	1.19	12	1.42	9	1.07	Not Protest
Not Worth It/Too Expensive	35	4.16	46	5.47	24	2.86	Not Protest
Would Not Work/ Not Realistic/Use Other Ways	3	.35	27	3.21	6	.71	**Protest**
Other Programs in Booklet Superior	0	0	26	3.09	15	1.79	Not Protest
Use Existing Funds	9	1.07	8	.95	8	.95	**Protest**
Citizens Should Not Have To Pay/ Unfair	5	.59	4	.47	2	.24	**Protest**
Government Should Pay (Federal/State/County)	5	.59	4	.47	2	.24	**Protest**
Opposed To Government Programs	4	.47	3	.35	1	.12	**Protest**
Opposed To Taxes	13	1.54	14	1.6	11	1.31	**Protest**
Urban-Interface Residents Should Pay	6	.71	7	.83	5	.60	**Protest**
Little Risk For Respondent /No Problem of Mine	5	.59	2	.23	3	.36	Not Protest
General Disdain/Lack of Trust in Chemicals	----	--	-----	--	100	11.9	Not Protest
Concern For Environment	0	0	6	.71	49	5.83	Not Protest
Concern For Wildlife	3	.35	20	2.38	35	4.17	Not Protest
Against Program in General	3	.35	12	1.42	5	.60	Not Protest

Need More Information	2	.23	0	0	2	.24	Not Protest
Smoke Is A Problem	1	.11	----------	------	----------	-----	Not Protest
Other/Illegible	0	0	7	.83	0	0	Not Protest
Other	3	.35	8	.95	7	.83	**Protest**

Statistically significant differences occur when comparing protest responses across language groups. Chi-square statistics indicate significant differences at the 99% level between language groups for each program. This is an indication that it may be important to stress different aspects of the CVM surveys instrument to different language groups to obtain a reduction in protest votes. The Spanish speaking sample responded with a larger proportion of protest votes. This is an indication that more information pertaining to the implementation of government programs and the checks and balances that exist may be important in Spanish CVM surveys.

Table 31: Spanish Responses to "No" Answers.

Category	**Prescribed Fire**	**Pct.**	**Mechanical**	**Pct.**	**Herbicide**	**Pct.**	**Definition**
Cannot Afford	11	1.68	11	1.68	7	1.07	Not Protest
Not Worth It/Too Expensive	14	2.14	30	4.62	19	2.91	Not Protest
Would Not Work/ Not Realistic/Use Other Ways	3	.46	18	2.76	6	.92	**Protest**
Other Programs in Booklet Superior	0	0	6	.92	4	.61	Not Protest
Use Existing Funds	3	.46	2	.30	2	.31	**Protest**
Citizens Should Not Have To Pay/ Unfair	15	2.30	22	3.37	14	2.15	**Protest**
Government Should Pay (Federal/State/County)	18	2.76	12	1.84	11	1.69	**Protest**
Opposed To Government Programs	0	0	0	0	0	0	**Protest**
Opposed To Taxes	13	1.99	13	1.99	11	1.69	**Protest**
Urban-Interface Residents Should Pay	1	.15	1	1.53	0	0	**Protest**
Little Risk For Respondent /No Problem of Mine	2	.30	1	1.53	1	.15	Not Protest
General Disdain/Lack of Trust in Chemicals	----	--	----	--	97	14.9	Not Protest
Concern For Environment	1	.15	4	.61	24	3.68	Not Protest
Concern For Wildlife	0	0	13	1.99	9	1.38	Not Protest
Against Program in General	0	0	2	.30	1	.15	Not Protest
Need More Information	2	.30	0	0	0	0	Not Protest
Smoke Is A Problem	2	.30	----------	----	----------	---	Not Protest

Other/Illegible	0	0	0	0	0	0	Not Protest
Other	1	.15	8	1.22	4	.61	**Protest**

Logistic Regression Results: Prescribed Fire Fuel Treatment Program

Once the initial model was constructed a preliminary logistic regression took place to determine the significant variables affecting the WTP for each fuel treatment program (Appendix D). A reduced model, containing only significant variables, for each fuel treatment program was used to calculate median and mean WTP figures along with confidence intervals around them.

Using the initial model only two variables proved significant in influencing the WTP for the prescribed fire fuel treatment program reduced model (Equation 4). The effectiveness of the prescribed fire program and the dollar amount (RXBID) voted on are statistically significant.

4) RXVOTE = 0.712510(CONSTANT) - 0.004641(RXBID)
T-Stat (1.504) (4.778)

+ 0.710348(EFFECTIVENESS)
(2.993)

The effectiveness variable determines if the respondent feels prescribed fire will reduce the fuels in the forest and reduce the chance for future high intensity wildfire. The more effective the respondents feels prescribed fire is at accomplishing these two objectives the more likely they are to support the program. The variable RXBID, the dollar amount asked of each respondent to fund the program, follows economic theory. The higher the dollar amount asked of each respondent the less likely they are to vote in favor of the program. The remainder of variables proved insignificant (Table 32). Functional form transformations were attempted by changing the

continuous variables into the log of the variable. These transformations did not change the outcomes of the significance tests.

Table 32: Insignificant Variables Influencing Prescribed Fire Fuel Treatment. *

AGE	ATTITUDE	DISTANCE
EDUCATION	ENVORG	EVAC
EXSMOKE	HIKING	HOMEBURN
LONGFLA	NEIGHBOR	RACE
RACE1	BREATH	SAMEZIP
SEEFIRE	WAVE	

*See Table 28 for Definitions

From the multivariate logit model, WTP for the prescribed fire fuel treatment program was calculated. The median and mean WTP for the prescribed fire fuel treatment program is $389.08 and $411.97, respectively, per household per year. This figure takes into account 75 respondents who responded "no" to the initial vote at $0. Taking a more conservative view and adding all the item and unit nonresponses as $0 votes, the median and mean WTP total $174.38 and $184.64, respectively. With a prescribed fire program cost of $174.38 there is a probability that 50 percent of the respondents would vote in favor. The probability of votes in favor of the program at other dollar amounts was also calculated (Graph 1). The 90 percent confidence interval of mean WTP, adjusted for non-responses, is $147.86 – $256.95 (Park et al. 1991).

Graph 1: Prescribed Fire Program Logistic Curve.

Logistic Regression Results: Mechanical Fuel Treatment Program

Three variables proved significant in influencing the WTP for the mechanical fuel treatment program reduced model (Equation 5). See Appendix D for full model. The education of the respondent, if the respondent has witnessed a wildfire (SEEFIRE), and the bid amount,

or cost of program, all were statistically significant. The more education a respondent holds the less likely they are to vote in favor of the mechanical fuel treatment program.

5) MECHVOTE = 2.2028147(CONSTANT) - 0.002873(MECHBID)
T-Stat (4.403) (3.589)

- 0.084423(EDUC) - 0.35603(SEEFIRE)
(2.744) (2.029)

This may be due to the intrusive nature of the mechanical program. A higher level of education could possibly lead to a less supportive attitude of programs that does not mimic a more natural process. If the respondent has seen a wildfire they are more inclined to vote against the mechanical fuel treatment program. Media coverage of wildfire tends to capture the dramatic. Only the explosive wildfire behavior footage is often aired. If respondents have observed wildfire firsthand they are more likely to experience "average" wildfire behavior. The bid amount asked of each respondent, as with prescribed fire, follows economic theory. The higher the dollar amount asked of each respondent to fund the program the less likely they are to vote in favor of the program. The remainder of variables proved insignificant (Table 33).

Table 33: Insignificant Variables Influencing Mechanical Fuel Treatment.*

AGE	ATTITUDE	DISTANCE
EFFECTIVENESS	ENVORG	EVAC
EXSMOKE	HIKING	HOMEBURN
LONGFLA	NEIGHBOR	RACE
RACE1	BREATH	SAMEZIP
WAVE		

*See Table 28 for Definitions

The median and mean WTP for the mechanical fuel treatment program is $242.22 and $383.03, respectively, per household per year. Taking a more conservative view and adding all

the item and unit non-responses as $0, the median and mean WTP total $102.05 and $161.38 respectively. Using state averages for education the median and mean estimates rise to $125.87 and $177.69, respectively. With a mechanical fuel treatment program cost of $102.05 there is a probability of 50 percent of the respondents would vote in favor. The probability of votes in favor of the program at other dollar amounts, adjusted for non-response, was also calculated (Graph 2). The bounds on the confidence interval of mean WTP, adjusted for non-response, are $120.80 to $266.63 (Park et al. 1991).

Graph 2: Mechanical Fuel Treatment Program Logistic Curve.

Logistic Regression Results: Herbicide Fuel Treatment Program

Five variables proved significant in influencing the WTP for the herbicide fuel treatment program reduced model (Equation 6). For the full model see Appendix D. The age of the respondent, the attitude of the respondent towards prescribed fire, if the

6) HERBVOTE = 0.070376(CONSTANT) - 0.001393(HERBID) - 0.016948(AGE)
T-Stat (0.227) (1.671) (2.463)

+ 0.256532(ATTITUDE) + 0.458110(RETIRE) + 0.703705(ENVORG)
(2.053) (1.871) (1.702)

respondent is retired, if the respondent belongs to an environmental organization, and the bid amount all were statistically significant. The older the respondent the less supportive they were of the herbicide program. As respondents rise in age the more concern there might be for health. The less supportive the respondent was of prescribed fire the more supportive they were of the herbicide fuel treatment program. If the respondent is retired, the more supportive they are of the herbicide fuel treatment program. Individuals who have retired in Florida for the

climate may be less tolerant of smoke or mechanical commotion and prefer the herbicide program. Belonging to an environmental organization reduces support for the herbicide program from respondents. The bid amount asked of each respondent, as with prescribed fire and mechanical program, follows economic theory. The higher the dollar amount asked of each respondent to fund the program the less likely they are to vote in favor of the program. The remainder of variables proved insignificant (Table 34).

Table 34: Insignificant Variables Influencing Herbicide Fuel Treatment.

DISTANCE	EFFECTIVENESS	EVAC
EXSMOKE	HIKING	HOMEBURN
LONGFLA	NEIGHBOR	RACE
RACE1	BREATH	SAMEZIP
WAVE		

*See Table 28 for Definitions

The mean WTP for the herbicide fuel treatment program is $346.49 per person per year. Taking a more conservative view and adding all the item and unit non-responses as $0 the mean WTP total is $143.83. The median value is negative. Households would have to be paid $142.28 for a probability that 50% of the respondents would vote in favor. The probability of votes in favor of the program at other dollar amounts, adjusted for non-response, was also calculated (Graph 3). The bounds on the confidence interval of mean WTP, adjusted for non-response, are $77.39 to $844.23 (Park et al. 1991).

The herbicide results should be viewed with caution. The model is not robust when reduced. When touching on a topic with such public sentiment, attitudes develop which may prove difficult to capture in a survey limited in questions and time. The bid amount (HERBID) comes in just significant at the 10% level with the support of four explanatory variables. Alone

the bid variable is insignificant at the 10% level. This is an indication that to some degree support for the herbicide program is partially independent of cost and other factors are more important in the respondents decision making process.

Graph 3: Herbicide Fuel Treatment Program Logistic Curve.

Race Variable in the Fuel Treatment Programs

Given that the t-statistics for the RACE (Hispanic) and RACE1 (African American) variables are not significant, race and language do not make a difference in the support for the alternative fuel treatment programs. The RACE variable covers the influence Hispanic ethnicity and Spanish language has on the alternative programs. Given the focus of the study, an additional test, the likelihood ratio test, was performed on the three alternative programs to determine if systematic differences in all coefficients exist between language groups. Breaking the sample into language and race groups this comparison was made (Table 37). With the prescribed fire program there is no significant difference in the logit model coefficients using a likelihood ratio test when the sample is broken down by language or race. The mechanical fuel treatment program does exhibit a statistically significant difference between language and race when using the likelihood ratio test. There is no significant difference in the herbicide program when broken down by language. When divided by race the African American logit model does not converge when running the herbicide model.

Table 35: Log Likelihood Ratio Test.

Comparison	Prescribed Fire	Mechanical	Herbicide
English vs. Spanish	X2=3.75778	X2=8.2328**	X2=5.0382
White vs. Spanish vs.	X2=10.8399	X2=19.07**	_____

African American vs. Other races			

*Significant at the 95% level

To determine if there is a difference in WTP among groups separate logistic regressions were run for English and Spanish groups for the mechanical fuel treatment program. When the sample is broken down into groups by race, problems with logit model convergence and significance arise. The English median and mean WTP for mechanical fuel treatment is $72.43 and $127.67 respectively. The Spanish median and mean WTP is $133.97 and $179.97 respectively. Developing confidence intervals around the mean WTP figures for each language group is the next step. The 90 percent confidence intervals of the different language groups overlap (Graph 4).

Graph 4: Mechanical Fuel Reduction WTP and Confidence Intervals.

The confidence interval for the English WTP ranges from $90.52 to $262.60 while the confidence interval for the Spanish WTP ranges from $109.59 to $821.47 (Park et al. 1991). This is an indication that there is no statistical difference between language groups WTP.

Forecasting Model

Successful implementation of a wildfire mitigation policy is partially dependent on support from the public. Understanding how different levels of support vary with different levels of information held by the public is important. Further analysis of the data was used to forecast support for prescribed fire based on information held by the public, how effective they feel

prescribed fire is at reducing the wildfire risk, and cost of the program. The results indicate support increases with the expected success of a prescribed fire program and decrease in program costs (Table 36).

Table 36: Forecasting Support For Prescribed Fire.

Information (Expected Effectiveness of Prescribed Fire)	Program Cost $1	Program Cost $10	Program Cost $155.67 (Average Bid)
	Pct.	Pct.	Pct.
Before Survey (Average Information)	86	85	78
After Survey (Average Information)	88	88	81
Perfect Information (Expected Effectiveness)	89	89	83

With an average cost, bid amount, given to respondents in the Florida Fuel Treatment survey, and an average level of support, or attitude towards effectiveness of prescribed fire, after the introduction of information, 81percent voted in support of the prescribed fire program. Under prefect information, complete belief in effectiveness, and literally no cost, $1, 89 percent of Florida residents would vote in favor of a prescribed fire program. It is also evident from the forecast results that at higher levels of information, the cost of the prescribed fire program is less instrumental in dictating support. The more Florida residents believe in the effectiveness of prescribed fire accomplishing its goal of reducing wildfire risk, the less concerned they are with program cost.

Conclusion

In this study, support for wildfire mitigation policies is not statistically significantly influenced by distance from past major wildfires, time elapsed, or ethnicity/language of the respondent. Although respondent's attitude and knowledge differ by language, there is no

indication this creates differences in support for wildfire mitigation policies. Variables that influence support for wildfire mitigation, besides the cost, are how confident the respondent is in the ability of the program to accomplished its objectives, how comfortable they are with the risks of the program, and how they perceive the effects of the program. Respondents are more supportive of programs they understand. It is also evident that the more a respondent believes in the merits of a program the less influence cost has on support.

The continuation of data analysis will take place. It will be determined if sampled county demographics compare closer to sample demographics than state demographics do. Characteristics of the current model and steps taken to generate the final output will also be examined. For instance, the influence of the removal of protest votes and the complex interaction among expected significant variables will be examined at a greater level of detail.

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Appendix A
Interview Screener

Interview Screener

Hello, my name is _____, at the University of Georgia. I am calling concerning a survey we are conducting about forest fires in Florida. We are obtaining public opinion to help aid the future direction of Florida forest fire management. This survey will take a few moments of your time now, to answer some general questions, and then we will send you a booklet in the mail. After you receive the booklet and have had a chance to read it, we will call back to review the booklet with you and ask a few more questions, which will take about 15 minutes.

Would you agree to answer a few short questions now?

<u>There are no right or wrong answers, we just want your honest opinions.</u>

1. Have you heard about the forest fires in Florida last summer?
   ____ Yes ____ No

   I would like to ask you whether you agree or disagree with the following statement:

2. All fires, regardless of their origin, should be put out as soon as possible.
   ____ Agree ____ Disagree ____ Don't know

   Do you think the following statement is true or false:

3. Forest fires usually result in the death of the majority of animals in the area.
   ____ True ____ False ____ Don't know

4. Have you read or heard about the use of prescribed burns or prescribed fires?
   ____ Yes ____ No

   4a. If yes - What does a prescribed burn or prescribed fire mean to you?
   (Do not read list, check closest definition)
   ____ A fire set by fire officials to remove fuels in the forest to reduce the risk of wildfire and provide habitat for wild animals.
   ____ A fire set by fire officials to slow or stop the spread of wildfire by removing fuel in its path.

____ Other

4b. If yes- From what sources did you hear about prescribed burns or prescribed fire:
__ Newspaper; __ Radio; __ TV; __ Neighbors; __ School;
__ Other (Please Specify_____); __ Don't know
(Check all that apply)

5. Do you think forest managers should, or should not, periodically prescribed burn underbrush and debris in pine forest? ____ Should ____ Should not____ Don't know

6. Do you think prescribed burning or prescribed fire effectively reduces the amount of excess fuels in the forest? ____Yes ____No ___Don't Know

7. Do you think prescribed burning or prescribed fire would reduce the chance of high intensity wildfire? ____Yes ____No ___Don't Know

8. If a wildfire occurred in an area that had previously been prescribed burned or treated with prescribed fire do you think the damage to houses and mature trees would be reduced?
___Yes, it would reduce the damage
___No, it would have no effect
___ Don't Know

Do you agree or disagree with the following statement:

9. Prescribed fire should not be used because of the potential health problems from smoke.
_____ Agree ____Disagree ___Don't know

Do you agree or disagree with the following statement:

10. Prescribed fire is too dangerous to be used.
____Agree ____Disagree ___Don't know

11. Do you think the periodic use of prescribed burning would make the area more or less attractive for recreation? ___More attractive ___Less attractive
___Don't know

Thank you for your time in answering these questions. I would now like to arrange a time for our next telephone interview. What would be a good time for you about a week from now?

To send the booklet to you we need your name and mailing address. May I ask for your name

(repeat name) , street address , city, and zip code.

Look for the booklet in the mail in the next few days and I am looking forward to talking to you again. As a reminder, our next telephone appointment is for _____.

Have a nice day.

Appendix B
Interview Booklet

Interview Booklet

EXPANDED FLORIDA FIRE MANAGEMENT PROGRAM

What do you think?

Expanded Florida Fire Management Program

Definitions

Fire in Florida is an ever-present and natural part of the landscape. Your views on this topic are very important to Florida fire managers as they decide how to protect houses and preserve Florida's forests and wildlife in the future. Your participation in this survey is greatly appreciated. Please read the booklet over prior to you scheduled phone interview. This will speed up your interview. Thanks.

Before you answer this survey we want to familiarize you with the following fire management terms:

Prescribed fire or prescribed burn: A fire purposely set in a designated area to accomplish one or more specific objectives such as removal of underbrush and dead wood to reduce available fire fuel and increase the ability to control future wildfires.

Wildfire: A fire started by human activities or a lightning strike. A wildfire, occurring under unfavorable weather conditions, can be difficult to control due to high intensity and/or rapid rate of spread.

Fire management: Consists of the following four activities: fire prevention, prescribed burning, fire detection and fire suppression.

Structural fire: A building or house that is on fire.

Health standard: The minimum level of air quality which the Environmental Protection Agency considers to be healthy.

Before beginning let me tell you that currently the Florida Division of Forestry has in place a fire management program that both controls wildfires and authorizes prescribed fire on federal, state and private forest and rangelands in Florida. In a typical year the Florida Division of Forestry authorizes 1.4 million acres of federal, state and private forest and rangelands to be prescribed burned in Florida. However, the state of Florida and federal agencies are considering an expanded fire management program.

EXPANDED FLORIDA FIRE MANAGEMENT PROGRAM

DESCRIPTION

What Is The Current Problem?

An attempt to keep fires from burning forest and rangelands over the past several decades has helped lead to an unnatural build up of wildfire fuel in the form of brush, dead branches, logs and pine needles on the forest floor. Generally, resulting wildfires burn very hot. As shown in Figure 1, the flames from these wildfires burn all the way to the top of tall trees and houses and spread very fast making these wildfires difficult to put out. Under very dry conditions, these high intensity wildfires burn nearly everything, frequently causing the high levels of air pollution shown in Figure 1.

What Is A Solution?

One long term solution to the problems caused by unnatural build-up of wildfire fuel is to restore a fire cycle similar to that which existed historically in Florida. This means having fire professionals periodically set prescribed fires to clear the forest floor of the excess brush, dead branches, and pine needles.

How Does It Work?

These prescribed fires are easier to manage than wildfires since, as shown in Figure 2, prescribed fires do not burn as intensely and they can be directed away from structures. While prescribed fires do result in an increase in air pollution, they generally produce far less air pollution than would a wildfire on the same acreage.

Most importantly, fire professionals reviewing the 1998 Florida wildfires suggested that areas that had been previously prescribed burned, tended to have lower flame lengths and slower rates of spread. This slower rate of spread and lower flame length often made it possible to contain wildfires and protect structures which would have otherwise been lost.

Studies by the Florida Division of Forestry and the USDA Forest Service indicate that under normal weather conditions prescribed burning reduces the number of acres that would burn each year from wildfires.

What About Air Quality?

By timing prescribed fires with favorable weather and wind conditions, smoke can be directed away from the majority of the population. As seen in Figure 1, wildfires generally produce more smoke than prescribed fires, and wildfire smoke can exceed health standards.

What Is The Proposed Program?

Foresters and fire professionals have developed an expanded program of prescribed burning on Florida's 28 million acres of federal, state and private forest and rangelands to reduce the extent and damages of wildfires. Under the current program, about 1.4 million acres are prescribed burned each year.

To reduce the size and damage from wildfires, and to improve the safety of both the public and firefighters, it is recommended that 1.9 million acres be prescribed burned each year.

Features Of The Program

This expanded Florida prescribed burning program is believed by foresters and fire professionals to be the minimum sufficient to:

· restore a fire cycle similar to that which existed historically in Florida by increasing the frequency of low intensity fires over time, and reduce the threat of high intensity wildfires that would completely burn the forests to the ground and spread to any nearby houses or structures.

· benefit many of Florida's native plant and wildlife species. For example, prescribed burning allows sunlight to reach the forest floor which stimulates the growth of many types of flowers and shrubs thereby providing food sources for wildlife.

· reduce the chances of wildfire smoke exceeding air quality health standards.

· control forest diseases.

· protect wildlife due to the slow moving nature of prescribed burns which allows wild animals to find refuge in damp areas or migrate out of the area.

Results Of The Program

If the Prescribed Burning Program is expanded in Florida, it is expected to reduce the number of acres of high intensity wildfires and houses lost to wildfires. Currently, in a typical year approximately 5,300 wildfires burn approximately 200,000 acres and destroy about 43 houses in Florida. If the Expanded Florida Prescribed Burning program were implemented it is expected to reduce the number of acres burned by wildfires from approximately 200,000 acres burned in a typical year to about 150,000 acres for a total reduction of 50,000 acres. This represents a 25% decrease in acres burned by wildfire. The number of houses destroyed by future wildfires is expected to be reduced from an average of 43 a year to about 25.

Given the discussion above, do you think forest managers should or should not undertake this program of prescribed burning underbrush and debris in pine forests?

___Should ____Should not ___ Don't know

Costs of The Expanded Florida Prescribed Burning Program

While prescribed burning programs such as described above have proven effective at reducing the extent and severity of wildfire, there is not sufficient funding currently available to carry out such programs on all of the 28 million acres of federal, state and private forest and rangelands in Florida.

Who Would Fund This Program?

The State of Florida is considering using some of the state revenue as matching funds to help counties finance fire prevention programs. If a majority of residents vote to pay the county share of this program, the Expanded Florida Prescribed Burning Program would be implemented in your county and other counties in Florida on state forest and rangelands and lands of willing private land owners.

Funding of the Expanded Florida Prescribed Burning Program would require that all users of Florida's forest and rangelands, such as timber companies, recreation visitors, and Florida households pay the additional cost of this program. If this expanded program were to be implemented, by law, the money would be deposited in a separate Florida Prescribed Burning Fund, which could only be used to carry out the prescribed burning program described above. A citizen advisory board would review the expenditures from the fund annually.

Results Of The Program

If the Expanded Prescribed Burning program was undertaken it is expected to reduce the number of acres of wildfires shown in Figure 1 from the current average of approximately 200,000 acres each year to about 150,000 acres, for a 25% reduction. The number of houses destroyed by wildfires is expected to be reduced from an average of 43 a year to about 25.

Your Chance To Vote

Your share of the Expanded Prescribed Burning Program would cost your household $_____ a year. If the Expanded Florida Prescribed Burning Program were on the next ballot would you vote

__In favor ___ Against

Alternative Method In The Expanded Florida Fire Management Program

Mechanical Fire Fuel Reduction Program

Another approach to reducing the build up of fuels in the forest is to "mow" or mechanically chop the low and medium height palms and bushes into mulch. This is especially effective at lowering the height of the vegetation, which reduces the ability of fire to climb from the ground to the top or crown of the trees. In addition, mechanical "mowing" slows the new vegetation growth with the layer of mulch acting as a barrier.

Mowing or mulching 1.9 million acres of forest and rangelands is more expensive than prescribed burning, due to increased labor and equipment needs. It would also decrease the number of ground cover plant species reducing food for wildlife. However, unlike prescribed burning, mulching does not produce any fire smoke.

Results Of The Program

If the Mechanical Fire Fuel Reduction Program was undertaken instead of the expanded prescribed burning program, it is expected to reduce the number of acres of wildfires shown in Figure 1 from the current average of approximately 200,000 acres each year to about 150,000 acres, for a 25% reduction. The number of houses destroyed by wildfires is expected to be reduced from 43 a year to about 25.

Your Chance To Vote

Your share of this Mechanical Fire Fuel Reduction program would cost your household $___ a year. If the Mechanical Fire Fuel Reduction program was the **only** program on the next ballot would you vote

__In favor ___ Against

A Second Alternative Method In The Expanded Florida Fire Management Program

Herbicide Fire Fuel Reduction Program

Instead of prescribed burning or mowing, a third approach to reduce the build up of fuels in forest and rangelands is to treat vegetation with Government approved herbicides which are nontoxic to wildlife and humans. The application of herbicides, such as weed killer, with a tractor mounted sprayer would eliminate the growth of unwanted vegetation reducing the available fire fuel. This is a common practice in commercial forests in Florida.

While spraying 1.9 million acres of forest and rangelands with herbicides would be less expensive than mechanically mowing, it would be more expensive than prescribed fire.

Similar to the mechanical treatment, applying herbicides would decrease the number of ground cover plant species reducing food for wildlife. However, it would not produce any fire smoke either.

Results Of The Herbicide Fire Fuel Reduction Program

If the Herbicide Fire Fuel Reduction Program was undertaken it is expected to reduce the number of acres of wildfires shown in figure 1 from the current average of approximately 200,000 acres each year to 150,000 acres, for a 25% reduction. The number of houses destroyed by wildfires is expected to be reduced from an average of 43 a year to about 25.

Your Chance To Vote

Your share of the Herbicide Fire Fuel Reduction Program would cost your household $ ____ a year. If The Herbicide Fire Fuel Reduction Program was the **only** program on the next ballot would you vote

__ In favor ___ Against

DEMOGRAPHICS

These last few questions will help us understand how well our sample represents the State of Florida. You answers are strictly confidential and will be used only for statistical purposes. You will not be identified in any way and your name or address will not be distributed or sold to any mailing list.

1. Have you ever been in or personally witnessed what you would consider a wildfire?

   Yes_____ No_____

2. Have you ever experienced smoke from a wildfire or prescribed burn?

   Yes____ No_____

   If Yes, did it bother you?

   Yes____ No_____ If Yes, did it bother you

   ____ visually ____ physically or ____ both?

3. Do you suffer from respiratory or breathing problems?

   ___ Yes ___ No.

   If Yes, is it a ___ Serious, ___ Moderate, or ___ Minor problem?

4. Has your home ever burned or sustained structural damage from a wildfire?

   Yes (# of times) _____ No _____

5. Has one or more of your neighbors' homes ever burned due to wildfires?

   Yes (# of times) _____ No_____

6. Have you had to evacuate your home one or more times due to wildfire?

   Yes (# of times) _____ No_____

7. What county do you live in?_____ Name of County

8. How long have you lived in this county? ____ # Years

9. What is your zip code here in Florida _____

10. Was your zip the same in June 1998? ___ Yes ___ No

    If No, what was you zip in June 1998? _____

11. Have you lived in other counties in Florida?

    Yes (List Counties) _____ No _____

12. How long have you lived in Florida? ____ # Years

Thank you for completing this survey. If you have any comments for us concerning this topic please feel free to express them with your interviewer.
BACK COVER

Appendix C
Interview Script

Interview Script

Hello, May I please speak with _____?

Hello, my name is _____, at the University of Georgia. I am calling to conduct the interview which we arranged with you last _____. Have you received the booklet we mailed you? It has the map of Florida on the cover.

Do you have the booklet with you there by the phone? (If not I will wait while you get it as we will need the booklet and the fire diagrams for our interview)

I'd like to begin by reviewing the definition of a prescribed fire or prescribed burn on page one of the booklet.

As stated in the definition, a prescribed fire or prescribed burn is a fire purposely set in a designated area to accomplish one or more specific objectives such as removal of underbrush and dead wood to reduce available fire fuel and increase the ability to control future wildfires.

Before beginning let me tell you that currently the Florida Division of Forestry has in place a fire management program that both controls wildfires and authorizes prescribed fire on about 28 million acres of federal, state and private forest and rangelands in Florida. In a typical year the Florida Division of Forestry authorizes 1.4 million acres of federal, state and private forest and rangelands to be prescribed burned in Florida. However, the state of Florida and federal agencies are considering an expanded fire management program.

Now, I would like to discuss the Expanded Florida Prescribed Burning Program with you starting on page 2.

What Is The Current Problem?

An attempt to keep fires from burning forest and rangelands over the past several decades has helped lead to an unnatural build up of wildfire fuel in the form of brush, dead branches, logs and pine needles on the forest floor. Generally, resulting wildfires burn very hot. As shown in Figure 1, the flames from these wildfires burn all the way to the top of tall trees and houses and spread very fast making these wildfires difficult to put out. Under very dry conditions, these high intensity wildfires burn nearly everything, frequently causing the high levels of air pollution shown in Figure 1.

What Is A Solution?

One long term solution to the problems caused by unnatural build-up of wildfire fuel is to restore a fire cycle similar to that which existed historically in Florida. This means having fire professionals periodically set prescribed fires to clear the forest floor of the excess brush, dead branches, and pine needles.

How Does It Work?

These prescribed fires are easier to manage than wildfires since, as shown in Figure 2, prescribed fires do not burn as intensely and they can be directed away from structures. While the prescribed fires do result in an increase in air pollution, they generally produce far less air pollution than would a wildfire on the same acreage.

Most importantly, fire professionals reviewing the 1998 Florida wildfires suggested that areas that had been previously prescribed burned, tended to have lower flame lengths and slower rates of spread. This slower rate of spread and lower flame length often made it possible to contain wildfires and protect structures which would have otherwise been lost.

Studies by the Florida Division of Forestry and the USDA Forest Service indicate that under normal weather conditions prescribed burning reduces the number of acres that would burn each year from wildfires.

What About Air Quality?

By timing prescribed burns with favorable weather and wind conditions, smoke can be directed away from the majority of the population. As seen in Figure 1, wildfires generally produce more smoke than prescribed fires, and wildfire smoke can exceed health standards.

What Is The Proposed Program?

Foresters and fire professionals have developed an expanded program of prescribed burning on Florida's 28 million acres of federal, state and private forest and rangelands to reduce the extent and damages of wildfires. Under the current program, about 1.4 million acres are prescribed burned each year.

To reduce the size and damage from wildfires, and to improve the safety of both the public and firefighters, it is recommended that 1.9 million acres be prescribed burned each year.

Features Of The Program

This expanded Florida prescribed burning program is believed by foresters and fire professionals to be the minimum sufficient to:

1. restore a fire cycle similar to that which existed historically in Florida by increasing the frequency of low intensity fires over time, and reduce the threat of high intensity wildfires that would completely burn the forests to the ground and spread to any nearby houses or structures.

2. benefit many of Florida's native plant and wildlife species. For example, prescribed burning allows sunlight to reach the forest floor which stimulates the growth of many types of flowers and shrubs thereby providing food sources for wildlife

3. reduce the chances of wildfire smoke exceeding air quality health standards.

4. control forest diseases.

5. protect wildlife due to the slow moving nature of prescribed burns which allows wild animals to find refuge in damp areas or migrate out of the area.

I would now like to ask you a few questions not contained in the booklet. There are no right or wrong answers. We just want your honest opinion.

1. Do you think prescribed burning or prescribed fire effectively reduces the amount of excess fuels in the forest?

____Yes ____No ___Don't Know

2. Do you think prescribed burning or prescribed fire would reduce the chance of high intensity wildfire?

____Yes ____No ___Don't Know

Do you agree or disagree with the following statement:

3. Prescribed fire should not be used because of the potential health problems from smoke.

_____ Agree ____Disagree ___Don't know

Do you agree or disagree with the following statement:

4. Prescribed fire is too dangerous to be used.

____Agree ____Disagree ___Don't know

Next, I would like to discuss the results of the program.

If the Prescribed Burning Program is expanded in Florida, it is expected to reduce the number of acres of high intensity wildfires and houses lost to wildfires. Currently, in a typical year approximately 5,300 wildfires burn approximately 200,000 acres and destroy about 43 houses in Florida. If the Expanded Florida Prescribed Burning program were implemented it is expected to reduce the number of acres burned by wildfires from the approximately 200,000 acres burned in a typical year to about 150,000 acres for a total reduction of 50,000 acres. This represents a 25% decrease in acres burned by wildfire. The number of houses destroyed by future wildfires is expected to be reduced from an average of 43 a year to about 25.

5. Given the discussion above, do you think forest managers should or should not undertake this expanded program of prescribed burning underbrush and debris in pine forests?

___Should ____Should not ___ Don't know

Read Framed Text Only To Should Not Votes

Because of the importance of using prescribed burning to reduce the threat and dangers from wildfire, there may be times when the state must do the prescribed burns. However, the state could pay affected citizens for any adverse effects of prescribed burning such as smoke, soot, road closures and other inconveniences; if the state paid your household $____ per year would you vote in favor of the expanded prescribed burning program?
($__ would be varied 10, 20, 30, 40, 60, 90, 120, 150, 250, 350)

_____Yes _____No
(Skip the next 5 paragraphs and question 6 for these people only)

Now, I would like to talk about the cost of the program starting on page 5.

While prescribed burning programs such as described above have been proven effective at reducing the extent and severity of wildfire, there is not sufficient funding currently available to carry out such programs on all of the 28 million acres of federal, state, and private forest and rangelands in Florida.

Who Would Fund This Program?

The State of Florida is considering using some of the state revenue as matching funds to help counties finance fire prevention programs. If a majority of residents vote to pay the county share of this program, the Expanded Florida Prescribed Burning Program would be implemented in your county and other counties in Florida on state forest and rangelands and lands of willing private land owners.
Funding of the Expanded Florida Prescribed Burning Program would require that all users of Florida's forest and rangelands, such as timber companies, recreation visitors, and Florida households pay the additional cost of this program. If this expanded prescribed burning program were to be implemented, by law, the money would be deposited in a separate Florida Prescribed Burning Fund, which could only be used to carry out the prescribed burning program described above. A citizen advisory board would review the expenditures from the fund annually.

If the expanded prescribed burning program was undertaken it is expected to reduce the number of acres of wildfires shown in Figure 1 from the current average of approximately 200,000 acres each year to about 150,000 acres, for a 25% reduction. The number of houses destroyed by wildfires is expected to be reduced from an average of 43 a year to about 25.

6. Your share of the Expanded Florida Prescribed Burning program would cost your household $__ a year. If the Expanded Florida Prescribed Burning Program were on the next ballot would you vote

__In favor ___Against
($__ would be varied 10, 20, 30, 40, 60, 90, 120, 150, 250, 350)

If Against - Why did you vote this way?_____

Now I would like to discuss an alternative program on page 6. Have you read this section on the Mechanical Fire Fuel Reduction program?

Yes - Skip Framed Text

No - Read Framed Text

Another approach to reducing the build up of fuels in the forest is to "mow" or mechanically chop the low and medium height palms and bushes into mulch. This is especially effective at lowering the height of the vegetation, which reduces the ability of fire to climb from the ground to the top or crown of the trees. In addition, mechanical "mowing" slows the new vegetation growth with the layer of mulch acting as a barrier.

Mowing or mulching 1.9 million acres of forest and rangelands is more expensive than prescribed burning, due to increased labor and equipment needs. It would also decrease the number of ground cover plant species reducing food for wildlife. However, unlike prescribed burning, mulching does not produce any fire smoke.

If the Mechanical Fire Fuel Reduction Program was undertaken instead of the prescribed fire program, it is expected to reduce the number of acres of intense wildfires shown in Figure 1 from the current average of approximately 200,000 acres each year to about 150,000 acres, for a 25% reduction. The number of houses destroyed by wildfires is expected to be reduced from an average of 43 a year to about 25.

Framed Text (Cost information) should be read if skipped above. DO NOT READ IF DONE SO ABOVE.

The State of Florida could use some of the state revenue as matching funds to help counties finance the Mechanical Fire Fuel Reduction program. If a majority of residents vote to pay the county share of this program, the mowing program would be implemented in your county and other counties in Florida on state forest and rangelands and willing private owner's land.

Funding of the Mechanical Fire Fuel Reduction Program would require that all users of Florida's forests, such as timber companies, recreation visitors, and Florida households pay the additional cost of this program. If this expanded program were to be implemented, by law, the money would be deposited in a separate Florida Fire Mechanical Fire Fuel Reduction Fund which could only be used to carry out the mowing program described above. A citizen advisory board would review the expenditures from the fund annually.

7. Your share of this Mechanical Fire Fuel Reduction program would cost your household $__ a year. If the Mechanical Fire Fuel Reduction program was the only program on the next ballot would you vote

__In favor ___ Against
($___ would be varied 20, 30, 40, 50, 70, 100, 130, 160, 270, 380)
(Generally, $10 more than prescribed burning amount)

If Against - Why did you vote this way?_____

Now I would like to discuss a second alternative method in the Expanded Florida Fire Management program on page 7. Have you read this section on the Herbicide Fire Fuel Reduction program?

Yes - Skip Framed Text

No - Read Framed Text

Instead of prescribed burning or mowing, a third approach to reduce the build up of fuels in forest and rangelands is to treat vegetation with Government approved herbicides which are nontoxic to wildlife and humans. The application of herbicides, such as weed killer, with a tractor mounted sprayer would eliminate the growth of unwanted vegetation reducing the available fire fuel. This is a common practice in commercial forests in Florida.

While spraying 1.9 million acres of forest and rangelands with herbicides would be less expensive than mechanically mowing, it would be more expensive than prescribed fire.

Similar to the mechanical treatment, applying herbicides would decrease the number of ground cover plant species reducing food for wildlife. However, it would not produce any fire smoke either.

Results Of The Herbicide Fire Fuel Reduction Program

If the Herbicide Fire Fuel Reduction Program was undertaken it is expected to reduce the number of acres of intense wildfires shown in figure 1 from the current average of approximately 200,000 acres each year to 150,000 acres, for a 25% reduction. The number of houses destroyed by wildfires is expected to be reduced from an average of 43 a year to about 25.

Your Chance To Vote

8. Your share of the Herbicide Fire Fuel Reduction program would cost your household $ ____ a year. If the Herbicide Fire Fuel Reduction program was the <u>only</u> program on the next ballot would you vote

__In favor ___ Against
($__ Would Be Varied 15, 25, 35, 45, 65, 95, 125, 155, 260, 370)
(Generally, $5 more than prescribed burning amount)

If Against - Why did you vote this way?_____

These last few questions will help us understand how well our sample represents the state of Florida. Your answers are strictly confidential and will be used only for statistical purposes. You will not be identified in any way and your name or address will not be distributed or sold to any mailing list.

1. Have you ever been in or personally witnessed what you would consider a wildfire?

   Yes_____ No_____

2. Have you ever experienced smoke from a wildfire or prescribed burn?

   Yes____ No_____

   If Yes, did it bother you?

   Yes____ No_____ If Yes, did it bother you

   ____ visually ____ physically or _____ both?

3. Do you suffer from respiratory or breathing problems?

   Yes ___ No ___

   If Yes, is it a ___ Serious, ___ Moderate, or ___ Minor problem?

4. Has your home ever burned or sustained structural damage from a wildfire?

   Yes (# of times) _____ No_____

5. Has one or more of your neighbors' homes ever burned due to wildfires?

   Yes (# of times) _____ No_____

6. Have you had to evacuate your home for one or more times due to wildfire?

   Yes (# of times) _____ No_____

7. What county do you live in?_____ Name of County

8. How long have you lived in this county? ____ # Years

9. What is your zip code here in Florida _____

10. Was your zip the same in June 1998? ___ Yes ___ No

If No, what was you zip in June 1998? _____

11. Have you lived in other counties in Florida?

Yes (List Counties) _____ No _____

If Yes, how long have you lived in Florida? ____ # Years

12. What is your age? ____ # Years
13. Are you retired? ___ Yes ___ No

14. Do you live year round in Florida? ___ Yes ___ No

15. Do you own or rent your current residence? __ Own __ Rent

15a. If you own, what is the approximate current value of your residence? $_____

15.b If you own, about how large is your lot?

___ Standard subdivision lot
___ Large subdivision lot (1/2 to 2 acres)
___ Small acreage/ranchette (3-10 acres)
___ Large acreage ranch/farm (11+ acres)
___ No lot (Condominium, etc.)

16. What is the highest number of years of education you have completed, where 12 years is usually considered high school graduate; 16 years college graduate, etc.

Less than 12__ 12 __ Between 12-16 __ 16__ More than 16__

17. Are you a member of a conservation or environmental organization?

___Yes ___ No

18. In the past 12 months have you gone hiking, camping, fishing or hunting?

___ Yes ___ No

19. Which of the following best describes your ethnic background? (Circle One)

(1) a. Hispanic or Mexican-American; 1b. Cuban 1c. Puerto Rican 1d. Central American 1e. Haitian
(2) White, Anglo or European
(3) Black or African-American
(4) Asian/Pacific Islander
(5) Native American
(6) Some other? (Please specify) _____

20. Including yourself, how many people are there in your household?

# of persons _____

21. Finally, what is an approximate total amount of annual income in your household.

(1) Less than $20,000
(2) $ 20,000 to $ 29,999
(3) $ 30,000 to $ 39,999
(4) $ 40,000 to $ 49,999
(5) $ 50,000 to $ 59,999
(6) $ 60,000 to $ 79,999
(7) $ 80,000 to $ 99,999
(8) $100,000 to $150,000
(9) More than $150,000

Thank you for completing the survey. Do you have any comments for us?

Appendix D
Regression Output

Dependent Variable: Prescribed Fire Prescribed Fire Vote
Method: ML - Binary Logit

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.354546	1.403651	0.965016	0.3345
RXBID	**-0.005052**	**0.001097**	**-4.604413**	**0.0000**
AGE	0.017634	0.010606	1.662523	0.0964
ATTITUDE	-0.276632	0.199936	-1.383604	0.1665
DISTANCE	-0.001898	0.003215	-0.590422	0.5549
EDUC	-0.062333	0.048026	-1.297896	0.1943
EFFECTIVNESS	**0.656065**	**0.290741**	**2.256524**	**0.0240**
ENVORG	0.522763	0.598997	0.872731	0.3828
EVAC	-0.227784	0.495306	-0.459885	0.6456
EXSMOKE	0.230663	0.304297	0.758019	0.4484
HIKING	0.342596	0.272914	1.255329	0.2094
HOMEBURN	0.477568	1.174002	0.406786	0.6842
LONGFLA	-0.009668	0.009143	-1.057481	0.2903
NEIGHBOR	-0.074964	0.629826	-0.119024	0.9053
RACE	0.204064	0.332046	0.614567	0.5388
RACE1	0.577611	0.496842	1.162565	0.2450
REATH	0.090061	0.104001	0.865965	0.3865
RETIRE	-0.527606	0.354931	-1.486502	0.1371
SAMEZIP	-0.134759	0.407705	-0.330532	0.7410

SEEFIRE	0.162985	0.304794	0.534741	0.5928
WAVE	-0.222871	0.289853	-0.768909	0.4419
YEARRND	-0.014479	0.680523	-0.021277	0.9830

Mean dependent var 0.822938 S.D. dependent var 0.382106
S.E. of regression 0.372197 Log likelihood -210.3438
Restr. log likelihoo-232.0541 Avg. log likelihoo-0.423227
LR statistic (21 df) 43.42064 McFadden R-squared 0.093557
Probability(LR stat) 0.002777

Obs with Dep=0 88 Total obs 497
Obs with Dep=1 409

Dependent Variable: Mechanical Vote
Method: ML - Binary Logit

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.960348	1.020807	0.940774	0.3468
MECHBID	**-0.003126**	**0.000857**	**-3.646236**	**0.000**3
AGE	-0.003881	0.007712	-0.503282	0.6148
ATTITUDE	0.173630	0.154926	1.120726	0.2624
DISTANCE	0.000293	0.002364	0.123760	0.9015
EDUC	**-0.050760**	**0.034853**	**-1.456415**	**0.1453**
EFFECTIVNESS	0.090388	0.227036	0.398121	0.6905
ENVORG	-0.381329	0.379753	-1.004149	0.3153
EVAC	-0.393228	0.329624	-1.192961	0.2329
EXSMOKE	0.171449	0.237919	0.720622	0.4711
HIKING	-0.014939	0.200767	-0.074412	0.9407
HOMEBURN	0.777897	0.651867	1.193338	0.2327
LONGFLA	-0.001107	0.006960	-0.158985	0.8737
NEIGHBOR	0.216257	0.433769	0.498554	0.6181
RACE	0.299506	0.244508	1.224933	0.2206
RACE1	0.368920	0.382651	0.964117	0.3350
REATH	-0.019371	0.074280	-0.260779	0.7943

RETIRE	0.043429	0.260646	0.166621	0.8677
SAMEZIP	0.304556	0.283384	1.074709	0.2825
SEEFIRE	**-0.255814**	**0.218259**	**-1.172064**	**0.2412**
WAVE	-0.073548	0.217100	-0.338775	0.7348
YEARRND	0.169876	0.504441	0.336761	0.7363

Mean dependent var	0.584466	S.D. dependent var	0.493293
S.E. of regression	0.489206	Akaike info criteri	1.384619
Log likelihood	-334.5393	Avg. log likelihoo	-0.649591
LR statistic (21 df)	30.09519	McFadden R-squared	0.043044
Probability(LR stat)	0.090092		

Obs with Dep=0	214	Total obs	515
Obs with Dep=1	301		

Dependent Variable: Herbicide Vote
Method: ML - Binary Logit

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.637582	0.963281	1.700005	0.0891
HERBID	**-0.001644**	**0.000874**	**-1.881112**	**0.0600**
AGE	**-0.018744**	**0.007688**	**-2.438287**	**0.0148**
ATTITUDE	**0.171558**	**0.143455**	**1.195901**	**0.2317**
DISTANCE	-0.002627	0.002445	-1.074446	0.2826
EDUC	-0.038512	0.033165	-1.161219	0.2456
EFFECTIVNESS	-0.144050	0.213263	-0.675459	0.4994
ENVORG	**-0.655482**	**0.429395**	**-1.526523**	**0.1269**
EVAC	0.323771	0.327284	0.989267	0.3225
EXSMOKE	-0.271589	0.233916	-1.161053	0.2456
HIKING	-0.262851	0.198371	-1.325046	0.1852
HOMEBURN	0.600326	0.597241	1.005165	0.3148
LONGFLA	0.001209	0.007121	0.169722	0.8652
NEIGHBOR	-0.445401	0.432613	-1.029559	0.3032
RACE	-0.086096	0.242845	-0.354532	0.7229
RACE1	0.077395	0.360672	0.214586	0.8301

REATH	0.012676	0.072804	0.174106	0.8618
RETIRE	**0.531013**	**0.252462**	**2.103341**	**0.0354**
SAMEZIP	-0.258018	0.282979	-0.911794	0.3619
SEEFIRE	0.145192	0.219354	0.661908	0.5080
WAVE	-0.182166	0.221706	-0.821656	0.4113
YEARRND	0.088553	0.496660	0.178298	0.8585

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Mean dependent var	0.335088	S.D. dependent var	0.472436
S.E. of regression	0.469801	Sum squared resid	120.9509
Log likelihood	-349.6396	Avg. log likelihoo	-0.613403
LR statistic (21 df)	27.72530	McFadden R-squared	0.038136
Probability(LR stat)	0.148115		

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Obs with Dep=0	379	Total obs	570
Obs with Dep=1	191		