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Willingness to pay function for two fuel treatments to reduce wildfire acreage burned: A scope test and comparison of White and Hispanic households

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ABSTRACT

This research uses the Contingent Valuation Method to test whether willingness to pay increases for larger reductions in acres of forests burned by wildfires across the states of California, Florida and Montana. This is known as a test of scope, a measure of internal validity of the contingent valuation method (CVM). The scope test is conducted separately for White households and Hispanic households to determine if cultural differences influences whether the scope test is passed. The public program to reduce acres burned involved prescribed burning and a mechanical fuel reduction program. The results of CVM logit regressions show that the acreage reduction variable is statistically significant at the 1% level for the two proposed fuel reduction programs, and the two types of households. The positive sign of this variable means that the more acreage reduction proposed in the survey the more likely people would pay for the fuel reduction program. Because of the significance of the acreage reduction variable in the willingness to pay function, this function can be used to evaluate the incremental benefits of different forest fire management plans that reduce acres burned by wildfires. These benefits would be part of the justification for prescribed burning and mechanical fire fuel reduction programs to protect forests from wildfires.

1. Introduction

Fighting the growing acreage of intense wildfires in Australia, the U.S, Greece, and many other countries is consuming a larger and larger proportion of forestry agencies budgets. The widespread residential growth in the wildland urban interface has put houses closer to these fires, increasing the monetary damages of wildfires. To address both increases in damages and budgets being consumed by firefighting, forestry agencies are putting increasing emphasis on fuel treatment programs such as prescribed burning and mechanical fuel reduction. In the U.S., one proactive effort is the Healthy Forests Initiative, to restore the health of forests and rangelands in the western United States, particularly on public lands and areas of the wild land urban interface. As part of this Initiative, natural resource agencies will increase the use of two fuel treatment methods: prescribed burning and mechanical fire fuels reduction. The prescribed burning method is defined as the controlled application of fire to existing naturally occurring fuels under specified environmental conditions following appropriate precautionary measure (Florida Division of Forestry, 2000a,b). The mechanical fire fuel reduction method consists of mechanically removing smaller trees and vegetation. This mechanical fuel reduction method is especially effective at lowering the height of vegetation, which reduces the ability of fire to climb from the ground to the top or crown of the trees.

On public lands there are no market signals that reveal the demand or value for these fuel reduction programs to society at large. Providing this type of information would allow the forestry managers and policy makers to: (a) determine the efficient level of prescribed burning and mechanical fire fuel reduction programs (hereafter RX and Mech programs) in each state; (b) provide budget justifications for these efficient levels of the two fuel reduction programs.

There are a large number of non-market valuation methods that might be applied to estimate the willingness to pay for reducing catastrophic wildfires (Braden and Kolstad, 1991). The hedonic property method (Donovan et al., 2007) has been used in the past to evaluate the effect of fire risk on wildland urban interface households, but this method does not reflect values for visitors who do not live adjacent to the forest. The demand for recreation by these visitors can be measured (Starbuck et al., 2006) but this does not reflect passive use values (e.g., existence values for the forest and its wildlife) of non visiting members of society. To estimate both use

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and passive use values, the Contingent Valuation Method or CVM (Mitchell and Carson, 1989) is often used and willingness to pay of the respondent to proposed programs is elicited.

CVM has been applied several times to quantifying the benefits of reducing wildfires and fuel treatments. CVM has been applied to valuing a reduction in wildfire in old growth forests that were habitat to threatened spotted owls by using a combination of mechanical fuel reduction and prescribed fire (Loomis and Gonzalez-Caban, 1997) and reducing risk of wildfire to property in rural Michigan (Winter and Fried, 2001). The Winter and Fried study asked households how much of an increase in property taxes they would pay for a 50% reduction in risk of wildfire. Their results averaged $57 per year per household. Recently Talberth et al. (2006) valued neighborhood and public land wildfire risk reduction.

Since the Contingent Valuation Method is a direct survey method, any biases on the part of interviewers, the design and implementation of the survey or the respondent can jeopardize the reliability and validity of the willingness to pay (WTP) estimates. One way the internal validity can be assessed is from the answer to a question: Does the willingness to pay vary with factors that would be expected to influence it under an economic theory? (Arrow et al., 1993). One of the logical checks is that the WTP should increase when more of the "good" is offered. This is usually termed a scope test or scope sensitivity. Scope sensitivity is considered a necessary condition for the internal validity of WTP derived from CVM surveys. Thus, the scope test has attracted substantial attention by critics and advocates of CVM, and it has been viewed by both as a critical test for a CVM study. The scope test could be internal to the respondent or external, i.e., split samples. The internal scope test compares differences in WTP for different levels of the good for the same respondent. The external test measures the change in WTP for separate samples of respondents given surveys with different levels of the public good.

There have been scope tests conducted in CVM using in-person interviews (Carson et al., 1994), and a few mail surveys (Loomis and Ekstrand, 1997), and recently Internet surveys (Banzhaf et al., 2006). Carson (1997) indicates that while some CVM surveys do not pass a scope test, many do. Interestingly, the WTP question format may affect a CVM instrument's ability to pass the split sample scope test. Past research indicates the open-ended WTP question format is less likely to pass a scope test. For example, open-ended WTP questions by Kahneman and Ritov (1994) as well as Bateman and Brouwer (2006) did not pass a scope test, while the dichotomous choice WTP question format did pass a scope test (Bateman and Brouwer, 2006; Berrens et al., 2000). To our knowledge there have not been external scope tests for forest/forest fire management, nor for Spanish speaking respondents.

2. Study objectives

The purpose of this study is to conduct a scope test to determine whether the willingness to pay per household for prescribed burning and mechanical fire fuel reduction programs increases with the number of acres of forest protected among White and Hispanic households. To our knowledge this is one of the first scope tests of Hispanic respondents taking a survey in Spanish. In addition, we provide WTP functions relating to WTP for reducing the number of acres of forests burned by wildfires. Such WTP functions would be useful to managers and policy makers who must decide how much money to spend on fuel reduction programs.

3. Statistical methods

As detailed below, our CVM survey asked a dichotomous choice WTP question, whether households would pay a specific amount of money (which varied across the sample) for the fuel reduction program. Given that the dependent variable is binary (Yes = 1 if they vote in favor of the program at cost $X and No = 0 if they vote against) we analyze the responses using a logistic regression model. Besides a variable for the dollar amount they are asked to pay, we include the acreage reduction in wildfire from implementation of the fuel reduction program in their state. We conduct the scope test by testing whether the coefficient in the logistic regression on reduction in acreage of forest fires is statistically significant and positive. Specifically, whether the larger the reduction in acreage of forest burned the higher probability of paying a given dollar amount. We are able to conduct an external scope test because the amount of acreage reduction varies across the three states of California (CA), Florida (FL) and Montana (MT), and we control for differences in demographics and attitudes across states.

In terms of specifying the logit model, first we define the odds of voting for the prescribed burning program as $A = P_i/(1-P_i)$ as a function of several independent variables:

$$\text{Ln}\,(A) = \beta_0 + \beta_1 \text{Acre Reduction} + \beta_2 \text{RXBid} + \beta_3 X_3 + \ldots\ldots + \beta_n X_n + u_i \quad (1)$$

Similarly for the mechanical fire fuel reduction program:

$$Ln\,(A) = \beta_0 + \beta_1\ \text{Acre Reduction} + \beta_2\ \text{MechBid} + \beta_3 X_3 + \ldots\ldots + \beta_n X_n + u_i \quad (2)$$

The scope test involves testing whether the sign of the acreage reduction variable is positive and statistically significant. Therefore the null and alternative hypotheses are:

$$H_0\colon \beta_1 = 0 \text{ and } H_a : \beta_1 > 0. \quad (3)$$

A one tailed t-statistic test will be conducted.

To control for any differences across the states, we include respondent demographic and attitudes variables shown in Table 1.

4. Survey methods

A survey booklet was developed in conjunction with forestry professionals, first in Florida, then in California and Montana. The text and figures were developed in two focus groups in Florida. The survey booklet and associated phone script were pretested by the Survey Research Center at University of Georgia (who also administered the full survey using the random digit dialing initial phone contact, mailing booklet to respondents, and conducting phone interviews with the respondents using the booklet). The survey booklet was tailored to Montana with a focus group and pretested there as well. The California survey booklet was pretested in California as the survey would be conducted (phone, mail booklet, and phone interview) using the California State University-Chico Survey Research Center, who also administered the full survey in California and Montana. The survey booklet provided the respondent with the basic information of

Table 1
Independent variables in logit model.

Variables	Variable explanation
VoteRXPr	Dependent variable: 1 if respondent votes for RX program, 0 otherwise
VoteMechPr	Dependent variable: 1 if respondent votes for Mech program, 0 otherwise
Acre	Acreage of burned forest reduction
Age	Age of the respondent
Educ	Education level of the respondent
Exp5moke	Dummy variable: 1 if the respondent experienced smoke from a wildfire or RX, 0 otherwise
Income	Household income of the respondent
OwnHome	Dummy variable: 1 if respondent owns a home, 0 if respondent rents
Respprob	Dummy variable: 1 if respondent suffers from respiratory or breathing problems, 0 otherwise
RXBid	Bid amount for RX program
MechBid	Bid amount for Mech program
WitnessFire	Dummy variable: 1 if respondent witnesses a wild fire, 0 otherwise

Table 2
Comparison of response rates in California, Florida and Montana.

	California		Florida		Montana
	Whites	Hispanics in Spanish	Whites	Hispanics in Spanish	Whites
First wave—screener					
Total initial sample contacted	794	620	840	652	602
Completed initial	328	468	714	553	406
1st wave response rate	41.3%	75.5%	85%	85%	67%
Second wave—CVM WTP interview					
Net sample for 2nd wave	257	420	714	553	381
Total surveys completed	187	139	443	336	272
2nd Wave Response Rate	72.8%	33.1%	62%	61%	71%

proposed programs prior to eliciting the WTP. The booklet began by discussing large wildfires in the respondent's state in previous years. The booklet then conveyed information on the extent of the problem (e.g., acres currently burned) and two possible programs to reduce the problem (i.e., prescribed burning and mechanical fuels reduction).

The effect of wildfire on forests, houses and air quality was illustrated with a color drawing showing the flame height and rate of fire spread with a wildfire. Then a program increasing the use of prescribed fire or controlled burning in California, Florida or Montana was described. Respondents were told that the prescribed burning fuels reduction program would reduce potential wildfire fuels through periodic controlled burning. It was acknowledged that prescribed burning does create some smoke, although far less than a wildfire. Then the survey booklet provided additional information and another color drawing contrasting wildfire and prescribed fire, showing prescribed fire to have much lower flame height and slower fire spread.

The cost of financing this prescribed burning program was described as a cost-share program between their state government and the county the individual lived in.

The WTP elicitation wording for California was:

> "California is considering using some 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 California Prescribed Burning program would be implemented in your county on federal, state, and private forest and rangelands. Funding the Program would require that all users of California's forest and rangelands pay the additional costs of this program....If the Program was undertaken it is expected to reduce the number of acres of wildfires from the current average of 362,000 acres each year to about 272,500 acres...".

Of course the acreages burned were different in each of the three states: In California, respondents were told that the fuel reduction program would reduce wildfires from the current annual average of 362,000 acres burned each year to about 272,500 acres, for a net reduction of 89,500 acres burned each year. In Florida, currently 200,000 acres burn in an average year. With the proposed program this would be reduced to 150,000 acres, for a net reduction of 50,000 acres. In Montana currently 140,000 acres burn in a typical year. With the program, this would be reduced to 105,000 acres, for a net reduction of 35,000 acres each year. Thus, the range of the acreage reductions was from 35,000 acres (for both the RX and Mechanical) to 89,500 acres, in order to perform a scope test of the two fuel reduction programs.

The wording of the WTP question itself was:

> *Your Chance to Vote:* Your share of the Expanded Prescribed Burning Program would cost your household $X a year. If the Expanded Prescribed Burning Program were on the next ballot would you vote: In favor ____ Against ___

A similar question was also used for the mechanical fire fuel reduction program.

The bid amounts for prescribed burning were $10, $20, $30, $40, $69, $90, $120, $150, $250, and $350. The dollar bid amounts for the mechanical fire fuel reduction are on average $10 higher that those of the prescribed burning program.

5. Data collection and survey mode

To obtain a representative sample, random digit dialing of the respective state populations were used. The use of random dialing assures that nearly all households with phones are eligible to be interviewed, and at the time of our surveys (1999–2001), cell phones had not yet become so ubiquitous. While landlines are quite common among households, Hispanics may have a lower percentage and this could result in slight underrepresentation of Hispanics in our sample compared to the population. This uncertainty about how representative our sample is of the Hispanic population should be noted when generalizing our results of scope tests for Hispanics. The surveys were conducted using phone–mail–phone approach. The initial phone interview lasted about five minutes with questions focusing on introduction of the survey purposes, and obtaining the address to send the in-depth survey booklet. The individuals were asked to read the booklet prior to the scheduled date of the phone CVM WTP interview. The phone interviews were conducted in English with the White households and Spanish for Hispanic households in California (CA) and Florida (FL), and only in English in Montana (MT).

Table 2 presents the survey response percentages in three states CA, FL and MT. For the initial short interviews with White households in CA, FL and MT, these response rates were 41%, 85% and 67%, respectively (a Chi-Square test using the proportions contacted versus completed, indicates these are significantly different at the 1% level). Hispanic households interviewed by a Spanish speaking interviewer, had response rates of 75% in CA and 85% in Florida (a Chi-Square tests indicates these are not significantly different). The response rates for the in-depth CVM WTP interviews used in the logistic WTP regression analysis were similar for White households across states at 73%, 62%

Table 3
Selected descriptive statistics of the samples by fuel reduction program.

Whites	California	Florida	Montana
Income	$71,797	$53,078	$45,905
Years of education	15	14.74	14.32
% Yes prescribed burning	75%	73%	60%
% Yes mechanical	50%	45%	34%
Hispanics	**California**	**Florida**	
Income	$32,947	$37,982	
Years of education	12.2	14.38	
% Yes prescribed burning	84%	64%	
% Yes mechanical	68%	50%	

Table 4
Logit regression results of scope test for White households.

Variables	Prescribed burning program		Mechanical program	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	1.457	(1.83)	−0.1705	(−0.42)
Acre Reduction	1.18E−05	(2.41)***	5.00E−06	(2.11)*
RXBid	−0.00449	(−6.36)***		
MechBid			−0.00195	(−5.18)***
Age	−0.0032	(−0.51)	−0.00029	(−0.09)
Educ	−0.0472	(−0.99)	0.01489	(0.65)
ExpSmoke	0.0250	(0.08)	−0.15471	(−1.04)
Income	2.81E−06	(0.92)		
OwnHome	0.0230	(0.087)	−0.07919	(−0.64)
RerspProb	0.2680	(1.14)	0.07005	(0.60)
WitnessFire	−0.0696	(−0.30)	−0.10963	(−0.96)
Mc Fadden R-squared	0.0735		0.0391	
Total observations	583		673	

*Significance at 10% **significance at 5% ***significance at 1%.

and 71%, respectively, in CA, FL and MT (a Chi-Square test using the proportions in the net sample for second wave versus surveys completed, indicates these are not significantly different at the 1% level; $\chi^2 = 2.95$). However, there were substantial and statistically significant differences in the second wave response rate between Hispanic households in California and Florida ($\chi^2 = 26.03$).

Table 3 provides several descriptive statistics of the sample by ethnicity and by state. While incomes are quite different among White households, some of this difference is due to the much higher cost of living in California, and may not represent differences in real income. Years of education are similar across states for White households and Hispanic households in Florida. Only Hispanics in California have substantially fewer years of education. Table 3 also presents the percentage of households in each state and ethnicity within state, that voted for the two fuel reduction programs. Without exception the prescribed burning program was preferred to the mechanical fuel reduction program, although the difference in support between the two programs was less for Hispanic households. Note also the higher percent Yes responses for Hispanic households than White households. This will play a role in the higher WTP of Hispanic households.

6. Results

We estimate separate pooled logit models across the three states for the RX and Mech programs controlling for any demographic or attitude differences among residents of the three states. Thus a total of four logistic regressions were estimated (separate RX fuel reduction program regressions for Whites and Hispanics, and a separate Mech fuel reduction program regressions for Whites and Hispanics).

6.1. Results for White households

The initial regression is specified with all the demographic and attitude variables in Table 1 to control for any differences across states. The number of observations is slightly different between the prescribed program and the mechanical program due to more individuals answering the mechanical program WTP question. As shown in Table 4, the coefficient on RX bid price and the Mech bid price are negative and statistically significant. The negative sign demonstrates the higher the dollar amount households were asked to pay, the lower the probability they would pay. In terms of our scope test, the *Acre Reduction* variable is statistically significant at 0.01 and 0.05 level for both RX and Mech program respectively (Table 4). The positive sign of this variable tells us that White households in these states are more likely to pay as the reductions in acres burned by wildfires goes up. Dividing the logit coefficient on the *Acre Reduction* variable by the absolute value of the bid coefficient yields an estimate of the amount WTP rises for each additional acre of wildfire reduction. For the RX program this is 26 cents per household per year for each 100 acre reduction in wildfires. For the Mech Program this is 27 cents per household per year for each 100 acre reduction in wildfires. The null hypothesis of no effect of acreage reduction on WTP is rejected, rather WTP is sensitive to reduction of burned forest acreage. The main focus of our research is on the significance of the Acre Reduction variable, thus the other variables were included to control for any differences in demographics and experience with wildfires across respondents and states. The insignificance of these variables reflects in part the limited variation in these variables across states, as well as indicating that the individual variables by themselves do not influence the decision to vote for the program. The upside of the insignificance of these variables is that we are able to estimate a reduced form model that requires less information for benefit transfer to other states. Nonetheless, the likelihood ratio statistics does indicate that as a group the coefficients in the respective models are statistically different from zero. In particular for the prescribed burning program the likelihood ratio statistic is 53.1, significant at the 1% level. Likewise the likelihood ratio statistic for the mechanical program is 39.45, also significant at the 1% level.

6.2. Results for Hispanic households

For Hispanics, there is also a positive sign on the *Acre Reduction* coefficient and it has a statistically significant t-statistic in Table 5. Thus the larger the acreage reduction in wildfires proposed in the prescribed burning and mechanical fuel reduction programs, the more likely the Hispanics are to say Yes to the bid amounts. The *Acre Reduction* variable is statistically significant at 0.01 level for both fuel reduction programs. Thus, we accept the alternative hypothesis that $\beta_1 > 0$, and therefore both these programs also pass the scope test. As with the two logit equations for White households for these fuel reduction programs, most of the socioeconomic variables are not statistically significant. The values per acre for a reduction of 100 acres burned in wildfires are 83 cents using prescribed burning and $1.27 for mechanical fuel reduction program. These are three to four times higher than White households. This difference appears to be due to Hispanics greater sensitivity to a reduction in acres burned and a more price inelastic response to the bid amount than White households. It is not obvious why there are these systematic differences. One possibility on the more inelastic bid response among Hispanic households may be that since Hispanic household's know their income is much lower than White households, Hispanic households may believe they would not likely be paying the full amount of what they believe is the average tax increase stated in the survey; rather they would pay some fraction of this amount. Because (Loomis et al.,

Table 5
Logit regression results of scope test for Hispanic households.

Variables	Prescribed burning program		Mechanical program	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	1.493	(1.32)	1.7872	(1.83)
Acre Reduction	2.27e−05	(3.4)***	1.47E−05	(2.63)***
RXBid	−0.002716	(−3.26)***		
MechBid			−0.001152	(−1.65)*
Age	−0.0069	(−0.89)	−0.000218	(−0.03)
Educ	−0.088	(−1.49)	−0.1766	(−3.47)***
ExpSmoke	0.2527	(0.96)	0.08188	(0.37)
Income	−4.28E−06	(−0.92)	1.11E−06	(0.28)
OwnHome	−0.2388	(−0.93)	−0.0989	(−0.46)
RerspProb	−0.095	(−0.33)	−0.2344	(−0.94)
WitnessFire	0.166	(0.61)	0.1355	(0.59)
Mc Fadden R-squared	0.0779		0.06042	
Total observations	478		601	

*Significance at 10% **significance at 5% ***significance at 1%.

2002) also found a similar pattern of higher Hispanic overall annual WTP for both the prescribed burning and mechanical fuel reduction programs in Florida, better understanding of this pattern is an important avenue for future research, possibly via targeted debriefing questions.

7. Converting a reduced form logit model into a WTP equation

To estimate a minimum variance policy relevant WTP function for acreage reduction, we eliminated variables that were not consistently significant: Age, Educ, ExpSmoke, Income, OwnHome, RespProb and WitnessFire. This allowed us to focus on significant variables that influence the probability of voting positively at their bid amount. Thus the reduced WTP model will avoid including unnecessary variables that will inflate the variance, reducing the precision in the estimates of marginal values of acreage reduction.

Table 6 presents the reduced form logit models for White households. Scope is even more evident for the mechanical program as the statistical significance of the acreage reduction variable is now significant at the 1% level. These logit equations can be reparameterized into a WTP function for reductions in acreage burned by dividing the constant and the Acre Reduction variable by the absolute value of the bid coefficient. For the RX program this calculation obtains WTP per White household as a function of acres burned:

$$\text{WTP per White household} = \$174.06 + .002578(\text{Acres}) \quad (4)$$

Due to the non-rival public good nature of wildfire reduction, the marginal willingness to pay per acre reduction (.002578) can be scaled up by the number of households in the areas affected by wildfire (e.g., 1 million household equals $2578 per acre). Table 7 presents the reduced form logit models for Hispanic households.

Given the statistical significance of acres burned, scope continues to be evident for both the RX and Mechanical programs for Hispanic households. For the mechanical program, although the bid amount is negative, it is not statistically significant. Thus the full logit model for the mechanical program given in Table 5 may be preferable for estimating a Hispanic household's WTP function for a reduction in acreage of wildfires prevented by using the mechanical program.

8. Discussion

While the values per household, per acre discussed in this paper and identified in Eq. (4) may seem quite small, the non-rival or public good nature of wildfire reduction programs requires that these per household values per acre be added up over all the benefiting households. Thus the aggregate benefits are obtained by multiplying the value per household, per acre by the number of households in the areas that would benefit from the wildfire reduction. For the high population states of California and Florida, it may not be unreasonable to have upwards of 1 million people benefiting from a reduction in wildfire acres, in terms of reduction in risk (and potential evacuations), reduction in smoke pollution, and reduction in inconveniences from road closures. Aggregating up the marginal benefits per acre from Eq. (4) to an area with 1 million White households would yield a marginal benefit for prescribed burning fuel reduction program of $2578 per acre. For an area with 1 million Hispanic households, the WTP per household for prescribed burning is even higher. These benefit estimates per acre can be compared to the per acre cost of prescribed burning and mechanical fuel reduction programs to determine if these fuel reduction programs are economically efficient, i.e., have net benefits. If so, this information may be quite useful for forest managers and policy makers for budget justification purposes.

Table 6
Reduced logit regression results for White households.

Variables	Prescribed burning program		Mechanical program	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	0.7899	(3.04)***	−0.4819	(−2.16)**
Acre Reduction	1.17E−05	(2.7)***	1.05E−05	(2.9)***
RXBid	−0.004538	(−6.91)***		
MechBid			−0.00311	(−4.96)***

Table 7
Reduced logit regression results for Hispanic households.

Variables	Prescribed burning program		Mechanical program	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	−0.2229	(−0.6249)	−0.9574	(−3.09)***
Acre Reduction	2.50E−05	(4.69)***	2.03E−05	(4.69)***
RXBid	−0.00247	(−3.19)***		
MechBid			−0.000649	(−1.02)

9. Conclusion

The scope test conducted in this paper shows that willingness to pay for prescribed burning and mechanical fire fuel reduction programs among the White and Hispanic households is sensitive to the amount of reduction in acreage burned. The more wildfire acreage reduction proposed, the more people would likely pay. This finding is true for both White households taking the survey in English and Hispanics taking the survey in Spanish. In nearly all the estimated logit equations, the coefficient on the bid amount was negative and statistically significant, indicating internal validity to the WTP estimates. Combining these findings on the sensitivity of respondents to the monetary cost and the scope of the fuel reduction program, suggests that the Contingent Valuation Method can be used to obtain internally valid estimates of WTP for fuel reduction programs in other states. Our results also make a more general contribution by expanding the stock of knowledge regarding the scope test for evaluating the validity of the Contingent Valuation Method, especially for Hispanic households for which a test of scope has not been previously performed.

The results also provide forest managers and policy makers a willingness to pay function for reducing acres of wildfire using prescribed burning and mechanical fuel reduction in California, Florida and Montana. This willingness to pay function may also be useful to estimate the benefits of reducing wildfire acreages in other states, via benefit transfer approach. Specifically fire managers in other states can evaluate the marginal benefits of reducing wildfire acreages burned by applying our WTP function within the range of acres we studied (35,000 acres to 89,500 acres). The benefit estimates calculated from these WTP functions can be compared to the cost of prescribed burning and mechanical fuel reduction to: (a) ascertain if these fuel reduction program are economically justified; (b) if so, to provide budget justification for these fuel reduction programs.

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