

Comparison of Video and Phone Interview Survey Administration in Determining Public Support and Willingness to Pay for Prescribed Burning in California¹

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ABSTRACT

This research tests whether conveying prescribed burning information and conducting survey administration via videotape is superior to phone-interviews supplemented by an informational booklet. During the phone call, the interviewer read text and referred the respondent to drawings in the mailed booklet contrasting wildfire and prescribed fire. The video administration also started with an initial phone call and then by mailing a videotape to the respondent along with an answer booklet. The announcer on the videotape verbally presented all the text that was read to respondents in the phone interview. The phone-mail booklet-phone interview resulted in support for prescribed burning increasing from 65% in the initial phone call to 91% in the follow-up interview. Preliminary results from the video survey indicate that 71% initially supported prescribed burning, with this increasing to 84% after viewing the video. There was no statistical difference between video and phone-booklet survey models in terms of response rates or reasons for refusing to pay for the prescribed burning program. Mean willingness to pay (WTP) for the prescribed burning program using the mail booklet-phone interview was \$400 per household. The preliminary result from the video survey is \$412. The confidence intervals for these two estimates overlap indicating they are not statistically different.

Introduction

Large scale forest fires have become more common place in the last decade, resulting in greater emphasis on fuel reduction techniques such as prescribed burning. However, a program of increasing the amount of land to be prescribed burned often engenders public opposition due to the amount of smoke generated from prescribed burning. The resulting smoke reduces visibility and creates health problems for people with respiratory conditions. Prior efforts to increase prescribed burning in states such as Florida and Washington have often been limited by citizen opposition due to smoke and health effects. The prescribed burning program is also expensive

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and costs as much as \$250 per acre. Thus a policy relevant issue is whether there is sufficient public support for an active prescribed burning program to occur.

The objective of this study is to determine if differences exist in survey response rates, differences in support for prescribed burning, protest refusals to pay versus non-protest refusals to pay responses, and differences in WTP estimates for using video survey administration versus a booklet with phone interview. The phone interview combined with a previously mailed informational booklet has been used in several past WTP surveys (Hanemann and others 1990) and in a past fire survey (Loomis and others 2002). However, the approach is expensive, often in the range of \$50-\$100 per completed interview. Mailing a videotape that presents a person that talks the respondent through the program has lower variable costs, and may have the potential to convey information in a more visual and entertaining format. This could increase survey response rates and may increase support for prescribed burning. Further, the combination of audio and visual information may result in more attention by the respondent reducing the variance of the estimate of willingness to pay. More precise estimates of willingness to pay are important to reach unambiguous conclusions regarding whether benefits of prescribed burning exceed costs.

Hypotheses Regarding Response Rate and Protest Responses

Our survey modes involve an initial random digit dialing phone call with a short initial interview. We then verify their address to mail a survey booklet and schedule a time for an in-depth (20 minute) interview. The video survey proceeds in a similar fashion except a videotape is mailed and the respondent mails back the answer booklet. Thus, the first basis of comparison is whether households respond equally to the initial phone call and follow through on answering the in depth Contingent Valuation Method (CVM) questionnaire with the two survey administration modes.

Ho: $R(\text{Video}) = R(\text{Phone-booklet})$

This will be tested using separate contingency tables and χ^2 tests for both the first and second interviews.

Responses to the WTP questions elicited during the in-depth interview are the main focus of our analysis. First, phone-booklet and video survey responses are compared on reasons for refusing to pay anything for prescribed burning. Some refusals are valid expressions of zero WTP since they reflect lack of value for the good or low income (i.e., inability to pay). Other respondents that give a zero valuation or refuse to pay because they reject the scenario or rationale that citizens should have to pay for this program, are often termed protest responses (Mitchell and Carson; Halstead, Luloff and Stevens). These respondents often do not "buy into" the premise that they are responsible for paying for the solution, or are unconvinced the solution will actually work, or feel government will not spend the money collected on the specific program. Here as well, survey administration mode may result in systematically different responses.

To determine what might potentially be a protest response the following strategy was used in the voter referendum CVM question sequence. First, if a respondent indicated he or she would vote against the program at their initial bid amount, they were asked whether they would pay \$1. If they said they would not pay \$1, they were asked an open-ended question "Why did you vote this way?". The interviewer was

instructed to type in exactly what the respondent said. After all interviews were completed, the reasons were analyzed for content to classify answers by similar reasons given by the respondent. This open-ended response approach avoids having respondents fit themselves into pre-set protest categories or having the interviewer place them into pre-set categories.

Comparing the overall protest reasons given, we will test the null hypothesis of no difference between the two survey administration modes in terms of acceptance of the premise and credibility of the CVM survey. The null hypothesis is that the distribution of refusals to pay and protest responses to the CVM survey are independent of survey administration mode:

Ho: $\text{ProtestVideo} = \text{ProtestPhone-Booklet}$

This will be tested using a contingency table. The significance test will be performed using a χ^2 statistic.

WTP Model and Related Hypothesis Tests

As suggested by the NOAA panel on contingent valuation, a voter referendum willingness to pay question format was used (Arrow, et al., 1993). Hanemann (1984) and Cameron (1988) both provide motivations for how a respondent may answer a dichotomous choice CVM question. Hanemann views the respondent as evaluating the difference in utility associated with the status quo versus paying some amount (\$X) to have the program. If the difference in utility is positive for the program, the individual would respond "Yes". If the difference in utility is distributed logistically, a logit model can be used to estimate the parameters and allow for calculation of WTP.

Comparisons of mean WTP estimates across survey administration mode will be used to establish if differences exist in the benefits of the public program. The null hypothesis tests whether the WTP estimate by survey administration mode are equal:

Ho: $\text{WTP}(\text{Video}) = \text{WTP}(\text{Phone-booklet})$

The results are determined by whether the confidence intervals overlap or not. We will also use the confidences to compare whether the presentation of the fire and CVM scenario information in the two different modes influences of the variance of WTP. We suspect that the more visual presentation of the fire information and CVM scenario information in the video along with the more entertaining video presentation might reduce the variance as compared to the audio only with the booklet approach.

Survey Design

The survey booklet was developed in conjunction with forestry professionals in California. It described the acreage that is burned by wildfires in an average year as well as the typical number of houses lost to wildfire each year. Next, a program increasing the use of prescribed fire or controlled burning in California was described. Specifically, respondents were told that the prescribed burning fuel 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 drawings contrasting wildfire and prescribed fire. The cost of

financing this program of prescribed burning was described as a cost-share program between the State of California and the county the individual lived in.

The WTP elicitation wording 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, for a 25% reduction. The number of houses destroyed by wildfires is expected to be reduced from an average of 30 a year to about 12. Your share of the Expanded California Prescribed Burning program would cost your household \$__ a year. If the Expanded Prescribed Burning Program were on the next ballot would you vote __In favor __Against? "

The basic format of the survey booklet and script had previously been through several focus groups in two different states. The survey was conducted through a phone-mail-phone process. To obtain a representative sample of households, random digit dialing of the households living in a sample of California counties was performed. The counties were selected so there was a mix of counties that frequently experience wildfires, counties that occasionally experience wildfires, and counties that almost never experience wildfires. Once initial contact was established, we elicited initial attitude and knowledge of wild and prescribed fire, followed by the scheduling of appointments with individuals for detailed follow-up interviews. During the interim time period, a color survey booklet was mailed to the household.

The 15-minute video was designed to closely follow the layout of the booklet and question order of the telephone interview. First, a script was created by adhering to the exact wording of the survey booklet and interviewer script used in the first phone interview. The video is simple and includes only a headshot of the narrator, the same two graphics in the booklet, and occasional written text on the screen. In order to focus solely on the survey mode effects, the video does not deviate from the booklet or telephone script in any way. The video, like the booklet, begins by defining important fire management terms like "prescribed fire" and "wildfire." Then, the narrator continues to describe the current problem and suggested solution in detail. Ultimately, respondents were asked questions about whether or not they agree with the proposed solution and whether or not they would be willing to pay a certain dollar amount for the solution to be implemented. The script was edited and revised several times and the video was evaluated by two focus groups in two different states before the videotape was finalized.

The initial contact of potential households for the video was much like the phone-interview process. To obtain a representative sample, random digit dialing of the households was used in the same counties that were used in the telephone survey. At initial contact and after determining that the potential respondent was willing to participate in the survey, the interviewer probed the respondent about his knowledge of forest fire and forest fire management. This allowed not only the comparison of post-video questionnaires to questionnaires of the phone interviews but also provided an opportunity to analyze whether or not any changes occurred in the respondent's fire management knowledge after he watched the video. A videotape, questionnaire,

and postage-paid self-addressed envelope were mailed to those households whose residents had previously verbally agreed to participate in the survey.

Results

Comparison of Survey Response Rates

Because the survey was conducted in two waves, we compare the response rates from the initial random digit dial phone survey and the follow-up in-depth interviews separately in Table 1. We obtained 51.6% in the pre-video mailing contact and 41.3% with the pre-mail booklet contact, a response rate not statistically different at the 5% level using a chi-square test (calculated χ^2 of 2.4 versus critical of 3.84 with one degree of freedom). However, response rates to the follow-up were higher for the mail booklet at nearly 73% as compared to the 53.2% for the video. The direction of the difference is surprising as one would have expected the more novel video survey would have yielded a higher response rate for the video, although the difference is not statistically significant at the 5% level (calculated χ^2 is 2.41). Perhaps, having the phone interviewer calling back and recording responses, with nothing for the respondent to have to initiate or mail back is an advantage to the phone-survey booklet approach over the video. The video mail back rate is similar to most other CVM mail back survey response rates.

Table 1 Response Rates and Chi-Square Tests

	<u>Video</u>	<u>Phone</u>	<u>Total</u>
First Wave-Screener			
Total Initial Sample Contacted	178	794	1,283
Completed Initial	92	328	420
1st Wave Response Rate	51.6%	41.3%	
Chi-Square			2.40
Second Wave-In-Depth Interview			
	<u>Video</u>	<u>Phone</u>	<u>Total</u>
Refusal	86	4	90
Phone disc, moved, not avail	100	16	116
Not called by end	211	51	262
Net Sample for 2nd	92	257	435
Completed	49	187	236
2nd Wave Response Rate	53.2%	72.8%	
Chi-Square			2.41

Comparison of Support for Prescribed Burning

The phone-mail booklet-phone interview resulted in support for prescribed burning increasing from 65% in the initial phone call to 91% in the follow-up interview after the booklet had been read and interviewer read the script. Preliminary results from the video survey indicate that 71% initially supported prescribed burning, with this increasing to 84% after viewing the video.

Reasons Why Households Would Not Pay for the Program

Table 2 presents the analysis of refusals to pay, i.e., individuals that indicated they were in favor of the prescribed burning program at no cost, but then would neither pay their initial bid amount nor pay \$1 in the follow-up willingness to pay question. These individuals appear to favor the program but essentially have a zero WTP. Table 2 lists the reasons why a person would not pay the \$1. The first four reasons listed in Table 2 are not considered protest responses because having no value for the program or receiving no benefits from the program, as well as not being able to afford to pay, are valid reasons for zero WTP. However, the other three categories of responses (*italicized in Table 2*) are considered protests because they were frequently prefaced with, "I am in favor of program" or "I'm all for it, but I think the program should be paid for by those living in the forests or with existing taxes."

Because of the frequency of zero cell entries for specific protest responses, only an overall chi-square of protest refusals to pay versus non-protest refusals to pay can be computed. The calculated chi-square of .289 indicates no statistically significant difference in the pattern of protest and non-protest reasons for refusing to pay for video and phone surveys.

Table 2 Why Respondents Would Not Pay \$1

Reason	Video	Phone	Total
<u>Non-Protest Refusals to Pay</u>			
No Value/No Benefits	0	1	1
Cannot Afford	5	3	8
Taxes Already too High	3	2	5
Other	3	0	3
Sub Total	11	6	17
<u>Protest Responses</u>			
<i>Should be Paid for with Existing Taxes</i>	2	4	6
<i>Those that Live in Forest Should Pay</i>	2	0	2
<i>Other</i>	2	1	3
<i>Sub Total Protest Refusals</i>	6	5	11
Total	17	11	28

*Italicized considered protest responses for purposes of the chi-square analysis

Results of Logit Regressions

Due to the small sample size for the video survey (n=42), we conserved degrees of freedom and only estimated a simple logit model with the bid amount as the sole explanatory variable. This will not affect the calculation of WTP between the two models, since the non-bid variable coefficients are multiplied by their respective means prior to calculating WTP. This can be seen in the formula for calculating mean WTP:

$$\text{Mean WTP} = (\ln(1+\exp B_0))/B_1$$

Where B_0 is either the constant term (as in the videotape survey logit model) or the other non bid variable multiplied by their mean and added to the constant term. In either case, this is subsumed into the B_0 term, for purposes of calculating mean WTP.

As can be seen in Table 3, the bid slope coefficients are statistically different from zero at conventional levels (0.01) for both types of survey administration.

Table 3 Logit Regressions Used to Calculate WTP

Variable	Phone			Video Survey		
	Coef.	T-stats	Prob.	Coef.	T-Stats	Prob.
Constant	1.9659	1.585	0.112	1.8547	3.211	.0013
Bid	-0.0055	-3.667	0.000	-.00485	-2.031	.0423
RX Health Problem	-0.7147	-0.813	0.416			
Income	.000006	1.354	0.175			
Gender	-0.844	-1.899	0.057			
Age	.00889	.6249	0.532			
# in Household	-.05845	-.3460	0.729			
Education	-.02990	-.3526	0.724			
Mean Dependent	0.7482			0.738		
Log likelihood	-70.91			-21.98		
Restr. Log likelihood	-80.68			-24.15		
LR statistic	19.55			4.34		
Probability (LR stat)	0.006			.037		
McFadden R ²	0.1211			.0898		
Sample Size	143			42		

Comparison of Mean WTP

Mean WTP in reported in Table 4, is computed using the coefficients in Table 3. The confidence intervals were calculated using the approach of Park et al. (1991) that involves an adaptation of the Krinsky-Robb method to dichotomous choice CVM. Since the 90% confidence interval of overlap there is no statistical difference between the mean WTP of \$400 per year using the phone-booklet approach and \$412 per year using the videotape. Note the confidence intervals do not suggest much difference in precision in WTP, although this comparison is hampered by the sample size for the video survey being one-third that of the phone-booklet approach. It appears that with larger sample sizes for the video, its variance might fall to below that of the phone-booklet survey.

Table 4 Mean WTP and 90% Confidence Intervals for Prescribed Burning Program in California

	Mean	90% Confidence Interval
Phone-booklet	\$399	\$312-\$608
Video	\$412	\$272-\$1229

Conclusions

Using a univariate test (chi-square), we did not find a statistical difference in survey response rates between the two survey administration modes for both the initial random digit dialed interviews and the scheduled follow-up CVM phone interviews. Reasons for not being willing to pay for the prescribed burning program were similar as well for the survey administered via videotape and via phone-booklet approaches. There was also no statistical difference in mean WTP between the two approaches, with both annual WTP estimates being nearly identical (\$400 for the phone-booklet approach and \$412 for the video survey approach).

Thus the results of this comparison were not what might be expected. The good news is that the innovative survey administration mode via videotape yielded results comparable to the more conventional mixed mode phone-booklet approach. However, we had hoped that the novelty of the videotape would increase the response rate in the follow-up phase. This did not happen, perhaps because the video survey format still relies upon respondent initiative as compared to being called back by an interviewer and led through the booklet. We had hoped that respondents would have paid more attention to the video survey presentation of the information than perhaps they would have with the phone interview with the booklet. This would have translated into a reduced variance on mean WTP, and perhaps a higher mean WTP. There is no statistical difference in mean WTP. The comparison of the variance in WTP is confounded by the much smaller sample size in the video survey (n=42) which tends to increase the variance, relative to the large sample size 143 in the phone-booklet survey. Nonetheless, the equivalency of results between the two methods is encouraging. The video survey costs more for the initial production, but is less expensive than the follow-up phone interviews. The videotape technology also offers the potential to present actual fire footage and more dynamic images, something we did not undertake in this study to maintain consistency with the booklet. However, the phone-booklet approach offers a live interviewer, which may result in a more engaged respondent even if the interaction is only audio. Further

research sorting out the advantages and disadvantages of these two methods versus mail and in-person interviews is clearly warranted.

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References

- Arrow, K., R. Solow, P. Portney, E. Leamer, R. Radner and H. Schuman. Report of the NOAA Panel on Contingent Valuation. U.S. Department of Commerce, Federal Register
- Cameron, T. "A New Paradigm for Valuing Non-Market Goods Using Referendum Data." *Journal of Environmental Economics and Management* 15(4), 1988, 355-79
- Halstead, J., Luloff, A., and Stevens, T. "Protest Bidders in Contingent Valuation." *Northeastern Journal of Agricultural and Resource Economics* 21, 1992, 160-169.
- Hanemann, M. Welfare Evaluations in Contingent Valuation Experiments with Discrete Responses." *American Journal of Agricultural Economics* 67(3), 1984, 332-341
- Hanemann, M., J. Loomis and B. Kanninen. Statistical Efficiency of Double-Bounded Dichotomous Choice Contingent Valuation. *American Journal of Agricultural Economics* 73(1): 1225-1263. 1991.
- Loomis, John, Lucas Bair and Armando Gonzalez-Caban. Language Related Differences in a Contingent Valuation Study: English Versus Spanish. *American Journal of Agricultural Economics*. 84(4), 2002, 1091-1102.
- Mitchell, R., and Carson, R. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Ed. Washington D.C.: Resources for the Future. 1989.
- Park, T., Loomis, J., and Creel, M. Confidence Intervals for Evaluating Benefit Estimates from Dichotomous Choice Contingent Valuation Studies." *Land Economics* 67(1), 1991,64-73.

