Forest Landowner Participation in State-Administered Southern Pine Beetle Prevention Cost-Share Programs

Frederick J. Rossi, Douglas R. Carter, Janaki R.R. Alavalapati, and John T. Nowak

ABSTRACT

Healthy pine trees in low-density stands offer the best defense against the southern pine beetle (SPB), helping to ensure that timber resources and other benefits of forests are protected against infestations. Through the SPB prevention cost-share program, landowners of nonindustrial private forestland are able to receive a financial incentive for improving forest health by proactively undertaking forest management practices. In this study, two surveys were used to analyze this program: (1) a survey of enrollees in the SPB prevention cost-share program, and (2) a survey of forest landowners who have *not* participated in a cost-share program. Data are used to examine similarities and differences in the two samples (e.g., background awareness of the SPB, sources of their information about the SPB). Information obtained from cost-share program enrollees is also presented to characterize their participation and to provide an overall evaluation of the program. Data indicate that the SPB prevention cost-share program is very successful in terms of the satisfaction of its customers (i.e., the actual program participants).

Keywords: healthy forest management, financial incentive, southern pine beetle infestations, landowner survey

The physiographic and economic impacts of the southern pine beetle (SPB; *Dendroctonus frontalis*) make it the most destructive insect affecting the pine forests of the southern United States (Payne 1981). It periodically causes millions of dollars of damage in tree mortality during years when it reaches epidemic levels, leaving local landscapes blighted and scarred. From 1998 to 2002, outbreaks of the SPB intensified by severe drought killed an estimated 130 million ft^3 of pine timber in Florida (Mayfield et al. 2006). In addition, Nowak et al. (2008) indicate that estimated economic losses of $1 billion resulted from SPB infestations in several southern states during a similar period (1999–2003).

As a response, the US Forest Service (USFS) and the Southern Group of State Foresters (SGSF) developed the SPB Prevention and Restoration Program (SPRP) in 2003 (Nowak et al. 2008). This program created a SPB hazard-rating system and an awareness and education program to inform private forest landowners about the SPB, its effects, and actions to reduce the risk of outbreaks. The SPRP encompasses 13 states in the South. Other program initiatives include rehabilitating damaged forest areas and improving the health of unaffected stands (e.g., in 12 national forests) through the use of traditional forest management practices. One cornerstone of the SPRP is the formation of state-administered cost-share programs, in 12 of the 13 southern states, which enlist private owners of forestland in SPB prevention efforts by providing per-acre incentive payments for undertaking such practices. This study analyzed and assessed landowner participation in the SPB prevention cost-share programs used by selected states, and we offer some recommendations for program managers. Surveys were used to gather information and data from two groups of private owners of forestland: actual SPB prevention cost-share program enrollees and forest landowners who have not participated in this program.

Background Information

SPB populations normally exist at a very low level, usually attacking only trees that are damaged (e.g., by lightning) or otherwise environmentally stressed (e.g., from drought). Periodically, however, high concentrations of the SPB occur in epidemic phases, and the beetle is then able to overwhelm the natural defenses of individual pine trees, healthy or otherwise. Important factors known to influence formation of epidemic phases include stand conditions (e.g., tree density), temperature, and rainfall (Coulson 1981). The main defense that pine trees have against SPB attacks—the production and flow of abundant resin—is more likely realized for particular species of pine and for well-managed forests in which individual trees are healthy. In contrast, high-hazard forests, characterized by dense stocking, slow radial growth, and old age, are composed of trees more susceptible to being overcome by the SPB. Therefore, the most effective methods of preventing or mitigating SPB outbreaks are the same timber management techniques traditionally used to promote optimal forest health in managed stands. These techniques include planting or replanting with more resistant species of pine (e.g., longleaf), stand thinning operations, and prescribed burning.

Proactive application of these practices by local forest landowners is a key aspect in the SPB prevention regime. Thinning is particularly important because it "has the potential of affecting the overall population dynamics of the SPB when applied over the landscape"

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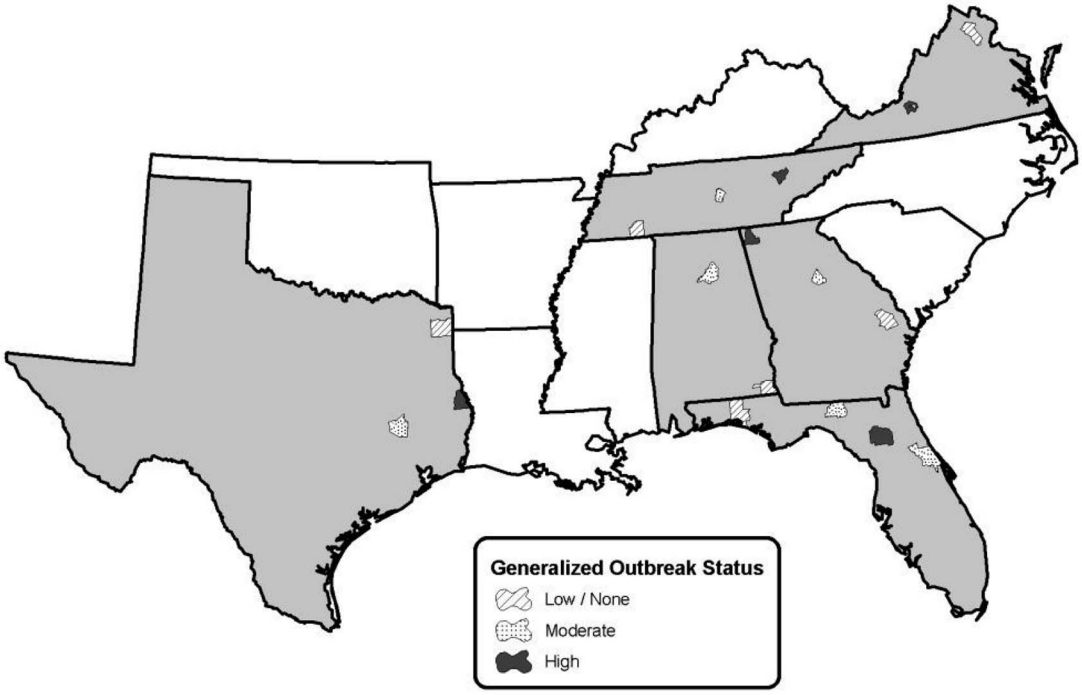

Figure 1. States and counties selected for inclusion in the surveys.

(Nebeker 2004). As federal and state lands are treated for SPB prevention on an ongoing basis through the SPRP, a significant attempt has been made by the USFS and state forestry departments to leverage these efforts by encouraging private owners of pine forests to undertake these treatments also. For example, in some states, up to 60% of selected forest management costs qualify for reimbursement under the cost-share program (USFS 2005). Activities eligible for cost-share incentives vary according to the parameters defined by each state's cost-share program; however, planting operations, thinning, and prescribed burning are the main practices represented. The USFS recommends thinning as the preferred method of SPB prevention.

Study Area and Surveys

Figure 1 illustrates the study area: Alabama, Florida, Georgia, Tennessee, Texas, and Virginia. These states were selected because of the availability and completeness of existing contact information for SPB cost-share program enrollees for the period 2003–2006. For this cost-share survey, a sample frame was compiled for each state, consisting of all program enrollees from the most recent 2 years (or 3 or 4 years, depending on state) of statewide data available and/or usable. Most potential respondents identified were enrolled in calendar years 2005 and 2006. The cost-share survey was mailed to 1,259 individual households. It was estimated that 1,249 questionnaires were actually received; 472 were completed and returned, and 463 of them were ultimately considered valid for compilation [1]. The response rate was 37.1% (463/1,249). This is generally considered to be a good figure for a mail survey (Fowler 2002) and is slightly higher than what was expected a priori.

The same states were used for the second survey, which is henceforth referred to as the landowner survey. Clustered sample selection was used because the contact data had to be acquired from county tax assessor offices: multiple counties were selected purposively (depending on available historical data) from each state to represent three levels of SPB outbreak intensity for the time period of 2007 to roughly 15–45 years in the past. These intensity levels are referred to as generalized outbreak status (GOS) and are labeled low/none, moderate, and high. Potential respondents were then selected randomly for each selected county. Figure 1 illustrates the spatial location of the selected counties with their respective GOS levels. The landowner survey was mailed to 1,998 potential respondents (1,988 estimated received). A total of 232 questionnaires were returned, with 208 considered viable for analysis (10.5% response rate). Although the low response rate observed is not unique among choice experiment studies, it was slightly more than half of the targeted rate expected [2].

Each questionnaire had three sections; the first and third sections contained largely the same questions to facilitate comparison [3]. However, the principal focus of each survey was the second section: the cost-share survey used this part to query respondents about their participation in an SPB prevention cost share program, whereas the landowner survey used this part to administer an attribute-based choice experiment [4]. The observed disparity in response rates between the two surveys is most likely due to the interest and/or motivation that the (potential) respondents within each group had in terms of completing the second section of the survey instrument. For example, cost-share survey respondents have previously been enrolled in an SPB prevention program and, as such, have already demonstrated an interest in the subject. The survey gave them an opportunity to provide feedback (in Section 2) in the form of their information and opinions; in particular, they were asked to rate their overall experience as a program participant. Therefore, their willingness to complete/return the questionnaire was expected be greater than that of the potential respondents of the landowner survey, who were recruited specifically because they did not have any previous experience with a state-sponsored SPB cost share program. Moreover, the second section of the landowner survey consisted of a

Table 1. Comparison of selected demographic and landowner characteristic variables.

Variable	Cost-share survey						Landowner survey						H_0: diff = 0		
	Obs	Med	Mean	SD	Freq	RF (%)	Obs	Med	Mean	SD	Freq	RF (%)	Chi-squared[a]	*P*	$\|z\|$[a]
Age (years)	452	61	61.7	12.5			177	62	61.7	11.8			0.330	0.566	
Total acres	452	269	875	2,816			200	90	558	3,937			54.591	0.000	
Pine acres	417	165	589	1,864			129	50	566	4,411			28.067	0.000	
Hardwoods	222	65	182	321			94	36.5	85.3	180			5.725	0.017	
Mixed P/H	261	70	194	436			125	40	161	408			5.726	0.017	
Gender (M)	455				383	84.2	193				147	76.2		0.016	2.416
Forest management	455				241	53.0	201				41	20.4		0.000	7.768
Organization member	452				217	48.0	194				55	28.4		0.000	4.639

[a] The chi-squared statistic evaluates sample medians under the null hypothesis (H_0) of no difference in median values, and the absolute value of the *z*-score evaluates the RFs under H_0 = no difference in RF. H_0 is rejected for *P* values less than 0.05 (for the $\alpha = 5\%$ level of significance).
Obs, observed; Med, median; SD, standard deviation; Freq, frequency; RF, relative frequency; P/H, pine/hardwood.

Table 2. Frequencies and comparison of survey respondents by education category.

Education	Cost-share survey			Landowner survey			H_0: diff = 0	
	Freq	RF (%)	CF (%)	Freq	RF (%)	CF (%)	$\|z\|$[a]	*P*
<High school diploma	10	2.20	2.20	5	2.59	2.59	0.302	0.763
High school diploma	44	9.67	11.87	22	11.40	13.99	0.666	0.506
AA degree	88	19.34	31.21	42	21.76	35.75	0.704	0.482
College degree	160	35.16	66.37	56	29.02	64.77	1.516	0.129
Graduate school	42	9.23	75.60	18	9.33	74.09	0.040	0.968
Graduate degree	111	24.40	100%	50	25.91	100%	0.407	0.684
Total	455	100		193	100			

[a] The *z*-score evaluates RFs under the null hypothesis (H_0) of no difference in RF. H_0 is rejected for *P* values less than 0.05 (for the $\alpha = 5\%$ level of significance).
Freq, frequency; RF, relative frequency; CF, cumulative frequency.

complex hypothetical situation that required some thoughtful judgments about preferences for forest management practices with which many potential respondents were unfamiliar. The time required to complete the choice experiment and the cognitive burden it placed on potential respondents probably had a major influence on the higher rate of nonresponses for the landowner survey compared with the cost-share survey. Note that other factors probably played a role as well (e.g., some respondents would never consider clear-cutting, even hypothetically), although the extent to which this was the case is generally unknown [5].

Finally, a comment on the basic character of the two samples is required. Since the first group of survey respondents was recruited precisely because they were enrolled in one of the state-administered SPB prevention cost-share programs, this sample was self-selected—which means it clearly is *not* statistically representative of the wider population of forest landowners in the six states examined. The nonrandom selection of counties within the landowner survey indicates that this sample is not strictly representative of that population either, although it is somewhat representative because potential respondents were selected randomly from each county chosen. Given this situation, statistical testing of certain key variables was performed primarily to examine how comparable the two samples are in relation to each other.

Results and Discussion

Demographic Information and Other Characteristics

Table 1 indicates that the means of the age variable are identical, and the medians are statistically indistinguishable ($P = 0.566$). Examination of the means and medians for total acres, pine acres, hardwood acres, and mixed pine/hardwood (P/H) acres revealed their distributions to be negatively skewed; for example, the means for total acres were inflated by 18 very large landowners possessing ≥5,000 acres [6]. Statistically testing each of these variables for differences in their median values showed them all to be extremely different ($P \leq 0.017$). Moreover, these differences indicate that cost-share survey respondents have relatively larger land holdings than landowner survey respondents. As larger landowners are more likely to implement forest management practices (Mayfield et al. 2006), the observed differences in median values may reflect self-selection of such landowners into the cost-share program.

Also contained in Table 1 are three qualitative variables: gender, use of professional forest management, and membership in forest and/or conservation organizations (e.g., Forest Landowners Association, Nature Conservancy). The *z*-scores for each indicate that the null hypothesis of no difference in relative frequency (RF) must be rejected. Note that respondents of the cost-share survey clearly have higher RFs for each of these variables. This disparity is likely caused by the effect of self-selection, at least for the management variable: as respondents of the cost-share survey were actual participants in a SPB prevention cost-share program, one would expect them to have a higher rate of employing professional foresters to manage their land.

There were no statistical differences between the two surveys in terms of the education and income of respondents. Table 2 presents data on education level; both samples are composed of well-educated individuals (>64% have college degrees or beyond) and exhibit the same bimodal distribution across the six response categories. Furthermore, the statistical test for each category implies no difference in the samples. The same is also true of the income variable shown in Table 3: *z*-scores for each of the seven response categories indicate that the null hypothesis cannot be rejected.

Table 4 reports the main reasons why respondents own their forestland; eight response categories were provided for ranking (1 = most important) the responses. This table lists each category (except for "other") along with data for the top three ranks; data values are in terms of frequency, RF, and cumulative frequency. As the top three

Table 3. Frequencies and comparison of survey respondents by income category.

	Cost-share survey			Landowner survey			H_0: diff = 0	
Income	Freq	RF (%)	CF (%)	Freq	RF (%)	CF (%)	$\|z\|^a$	*P*
<$30K	21	5.53	5.53	16	9.36	9.36	1.661	0.097
$30K–$45K	39	10.26	15.79	19	11.11	20.47	0.301	0.764
$45K–$60K	46	12.11	27.89	18	10.53	30.99	0.535	0.592
$60K–$75K	40	10.53	38.42	21	12.28	43.27	0.606	0.545
$75K–$100K	55	14.47	52.89	29	16.96	60.23	0.752	0.452
$100K–$125K	42	11.05	63.95	15	8.77	69.01	0.813	0.416
>$125K	137	36.05	100%	53	30.99	100%	1.156	0.248
Total	380	100%		171	100%			

[a] The *z*-score evaluates RFs under the null hypothesis (H_0) of no difference in RF. H_0 is rejected for *P* values less than 0.05 (for the $\alpha = 5\%$ level of significance).
Freq, frequency; RF, relative frequency; CF, cumulative frequency.

Table 4. Frequencies and comparison of reasons why respondents own forestland.

	Cost-share survey			Landowner survey			H_0: diff = 0	
Reason	Freq	RF (%)	CF (%)	Freq	RF (%)	CF (%)	$\|z\|^a$	*P*
Timber income								
Rank 1	155	41.44	41.44	37	33.64	33.64	1.470	0.142
Rank 2	88	23.53	64.97	30	27.27	60.91	0.780	0.435
Rank 3	47	12.57	77.54	19	17.27	78.18	0.142	0.887
Nontimber income								
Rank 1	7	6.73	6.73	5	15.15	15.15	1.491	0.136
Rank 2	22	21.15	27.88	8	24.24	39.39	1.250	0.212
Rank 3	30	28.85	56.73	5	15.15	54.55	0.220	0.826
Farm/domestic use								
Rank 1	5	11.36	11.36	2	7.41	7.41	0.542	0.588
Rank 2	2	4.55	15.91	4	14.81	22.22	0.667	0.505
Rank 3	8	18.18	34.09	6	22.22	44.44	0.872	0.383
Development potential								
Rank 1	11	16.67	16.67	9	23.08	23.08	0.808	0.419
Rank 2	9	13.64	30.30	5	12.82	35.90	0.593	0.554
Rank 3	15	22.73	53.03	11	28.21	64.10	1.108	0.268
Recreation								
Rank 1	56	20.66	20.66	32	26.02	26.02	1.184	0.237
Rank 2	80	29.52	50.18	36	29.27	55.28	0.939	0.348
Rank 3	55	20.30	70.48	21	17.07	72.36	0.381	0.703
Aesthetic/nature								
Rank 1	71	24.65	24.65	34	26.36	26.36	0.372	0.710
Rank 2	76	26.39	51.04	24	18.60	44.96	1.148	0.251
Rank 3	62	21.53	72.57	24	18.60	63.57	1.850	0.064
Part of residence								
Rank 1	68	41.46	41.46	46	46.00	46.00	0.722	0.470
Rank 2	23	14.02	55.49	13	13.00	59.00	0.559	0.577
Rank 3	19	11.59	67.07	14	14.00	73.00	1.014	0.311

[a] For rows of Rank 1, the *z*-score evaluates RFs under the null hypothesis (H_0) of no difference in RF. For rows of Rank 2 and 3, the *z*-score evaluates CF under H_0 = no difference in CF. H_0 is rejected for *P* values less than 0.05 (for the $\alpha = 5\%$ level of significance).
Freq, frequency; RF, relative frequency; CF, cumulative frequency.

rankings for most of the variables contain a majority of a given variable's responses, Table 4 has been abbreviated to just these ranks [7].

Income from timber, recreation activities, aesthetic/enjoyment of nature, and the residential variable ("land is just part of the farm or residence") are the most cited reasons for owning forestland. Nontimber income, farm/domestic uses, and development potential are definitely of lesser importance, although nontimber income has some weight in terms of secondary and tertiary ranking. Each variable had *z*-scores calculated for the top ranking (Rank 1); results show that the null hypothesis for all seven cannot be rejected. Additional *z*-scores were computed for the second and third rankings and were calculated using the cumulative frequency as the ordinal rankings allow cumulative tallies to be meaningful for each variable. These tests assess the comparability of each variable in terms of gross "popularity" of the particular preference for owning forestland. The *z*-scores for all variables of both cumulative rankings (Ranks 1 + 2, and Ranks 1 + 2 + 3) indicate that the null hypothesis cannot be rejected. Thus, much like the results observed for the key demographic variables (i.e., age, education, and income), there are only relatively small differences between the survey samples in terms of ranking the reasons that respondents own forestland.

Awareness, Concern, and Sources of Information

The initial question of each survey asked respondents what was their awareness of the threat the SPB posed to pine forests, prior to: (1) enrolling in the SPB cost-share program, if answering the cost-share survey; or (2) being a participant in the landowner survey. Figure 2 shows that the level of background awareness was roughly the same for the two samples. Nevertheless, there was a slightly higher overall background awareness of the SPB for cost-share enrollees, especially in the "very aware" category. Figure 3 reveals a sharp distinction between the samples for respondents' concern for the threat of the SPB attacking their forestland. An overwhelming

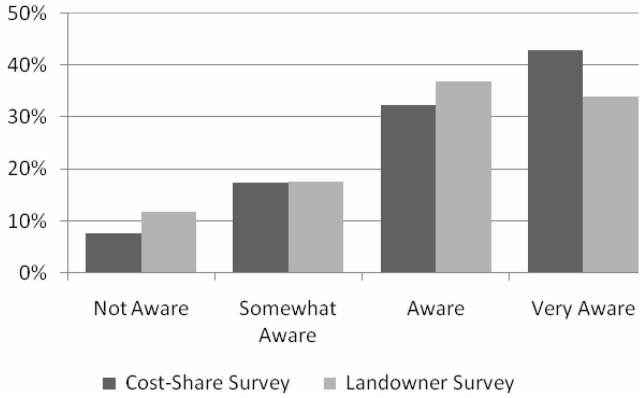

Figure 2. Respondents' awareness of the southern pine beetle prior to enrollment in the surveys.

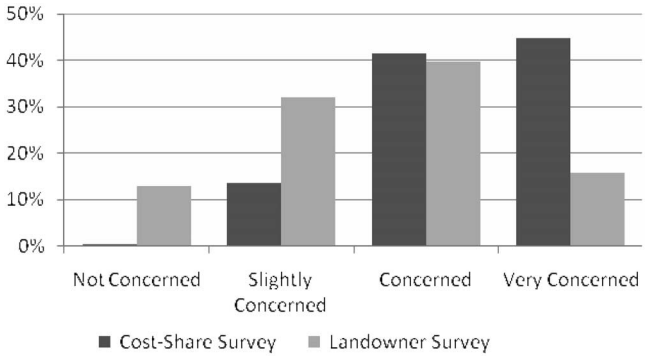

Figure 3. Respondents' concern for the southern pine beetle attacking their forestland.

86% of cost-share survey respondents were either "concerned" or "very concerned" about the SPB; only one respondent (0.22%) reported being "not concerned." In contrast, 13% of landowner survey respondents indicated that they were "not concerned," whereas the remaining respondents showed much less concern overall than the cost-share respondents. The observed disparity across the surveys is quite likely due to self-selection of cost-share enrollees; people participating in a cost-share program presumably took such action because they had higher levels of concern for the SPB than other forest landowners [8].

Each survey asked respondents to indicate the source(s) of information from which they first heard about the SPB. Figure 4 displays the data tallied; note that many respondents chose more than one response. The data here are strikingly dissimilar, which, again, most likely reflects the self-selected nature of the cost-share sample. For example, printed information and social networks (relatives and neighbors) were the most frequent sources of initial information about the SPB for landowner survey respondents, whereas forestry officials and professional managers and/or consultants were most frequently cited by respondents of the cost-share survey. By virtue of the fact that the latter participated in the cost-share program, it is highly probable that (as a class) they have always been more involved in proactive management of their forestland. Thus, they would be expected to have had a closer relationship with forest officials and/or professional managers/consultants and therefore would most likely have obtained their initial information about the SPB from these sources.

More than 50% of landowner survey respondents received their initial information about the SPB from printed information and/or from relatives or neighbors. The importance of printed information to forest landowners is clearly evident and must be emphasized. Results from similar surveys conducted by Molnar et al. (2003) and Mayfield et al. (2006) indicate that landowners of nonindustrial private forestland (NIPF) overwhelmingly prefer to receive forest management information from printed materials rather than other sources (e.g., workshops). An earlier survey by Jacobson (1998) also noted this preference and specifies that small landowners in particular should be targeted with publications. Likewise, Mayfield et al. (2006) speculate that direct mailings would be an effective way of reaching forest landowners with small holdings because such owners appear unlikely to attend forestry workshops.

Results Specific to the Cost-Share Survey

Figure 5 displays the sources of information from which cost-share enrollees learned of the program [9]. A wide majority of respondents indicated that they learned of the program through direct contact with either forestry officials (274) or forestry consultants (147). This is similar to the data shown in Figure 4, where forestry officials/consultants also dominate as the source of SPB information for cost-share enrollees. This reinforces the notion that such sources are more knowledgeable than casual sources (relatives or neighbors) about specific SPB information, such as the cost-share program.

Motivation for participating in the SPB prevention cost-share program is presented in Figure 6. As the first category (reducing risk of pine tree mortality) represents the broad overarching reason for action, it is more instructive to focus on other categories. Reducing economic damages (50 responses) and the financial incentive (53 responses) have approximately equal tallies in terms of primary importance (i.e., Rank 1); both are slightly less than "trees needed thinning" in Rank 1 frequency (66 responses). In *combined* importance levels (i.e., Rank 1 + Rank 2), "reduced economic damages" ranks slightly higher than the other two (thinning and financial incentive). For Ranks 1 and 2, reducing fire risk and reducing SPB risk in the respondent's county are of much lesser importance than the previously mentioned reasons. Only as ranks of tertiary and greater importance are added does the overall weight of "reduce SPB risk in my county" become apparent.

Just 21 respondents indicated that "my neighbor had also participated" was a reason for enrolling. This suggests the likelihood that program participants are scattered spatially, implying that low amounts of contiguous private forest tracts are being treated to prevent the SPB. It may also indicate a lack of information being disseminated effectively and/or uniformly. Because >200 respondents indicated that a desire to reduce SPB risk in their county was a reason for enrolling, a decent level of social or community concern appears to be present among these individuals. This means the low response for the "neighbor participated" category does not necessarily indicate a lack of social concern or altruism.

Table 5 presents the treatment practices listed in the questionnaire, along with descriptive statistics for each and a measure of the average percentage of total pine acres treated (pines + mixed pine/hardwood) [10]. Clearly, most program participants enrolled for pulpwood thinning: 138 of 307 respondents (45%) provide acreage data for this practice. Precommercial thinning (30%), prescribed burning (26%), and replanting (25%) were selected with about equal frequency. The last column in Table 5 shows that enrollees surveyed by this study treated, on average, between 45 and

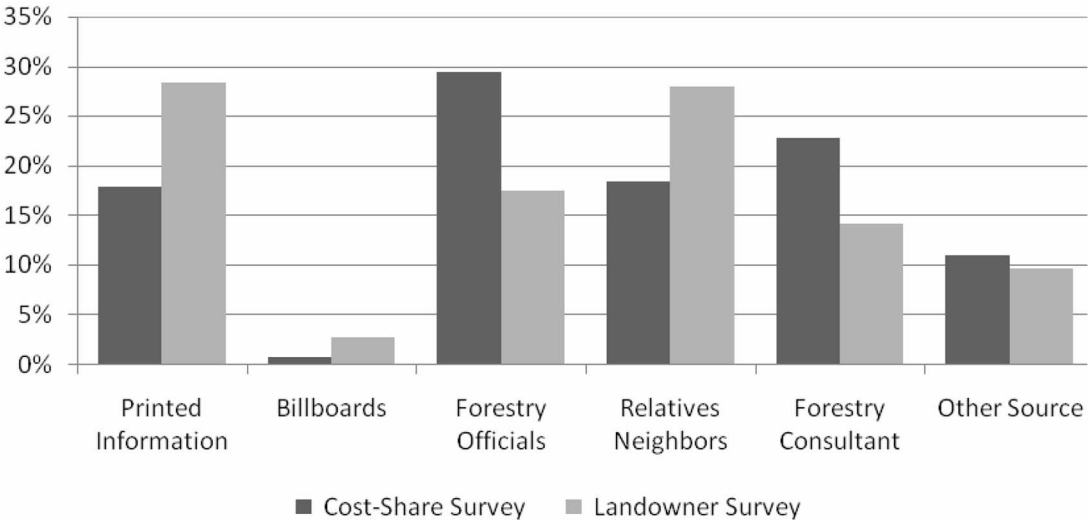

Figure 4. Sources of information about the southern pine beetle (SPB). *n* = 694 (prior to enrollment in the cost-share survey); *n* = 304 (prior to enrollment in the landowner survey).

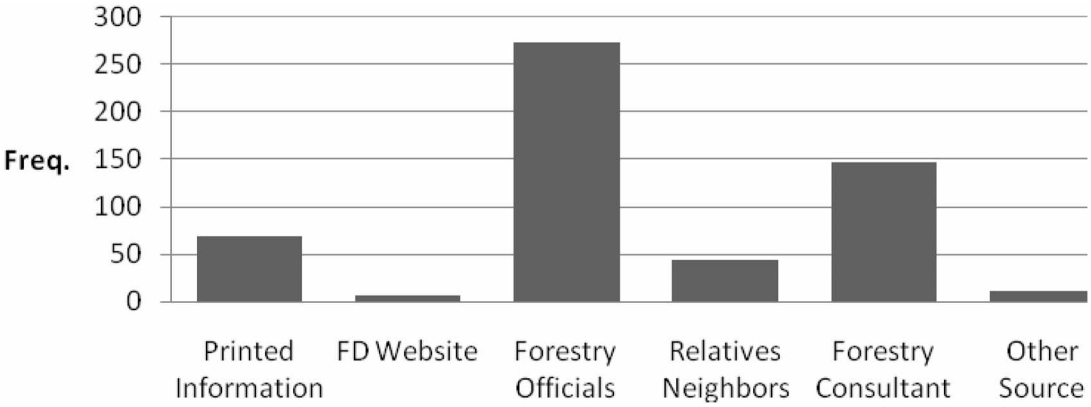

Figure 5. Source(s) of respondent awareness of the SPB cost-share program; *n* = 550.

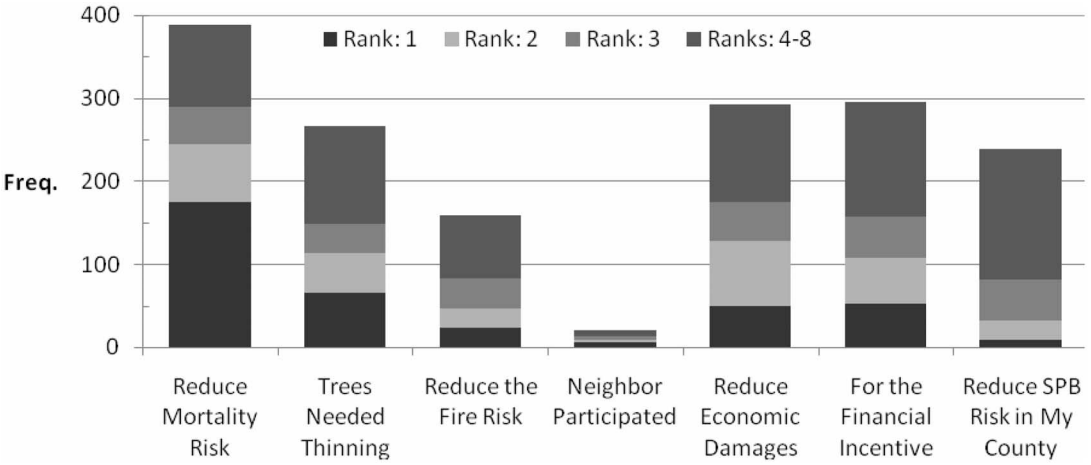

Figure 6. Reason(s) for participating in the SPB cost-share program.

61% of their pine acres (pine + mixed P/H) with the forest management practices listed. This suggests that program authorities can expect the coverage of SPB prevention, in terms of percentage of private pine acres treated, to be quite high for a given enrollee. In other words, once a landowner decides to enroll in the program, a good portion of his or her pine acres are treated.

Respondent Evaluation of the Program

The survey relied on two questions to evaluate the program. The first qualitatively rates the respondent's experience (e.g., very negative, somewhat negative, okay, somewhat positive, very positive), and the other asks enrollees whether they would participate again. Figure 7 illustrates that the cost-share program is an unqualified

Table 5. Descriptive statistics of forest treatments for single enrollment (in acres).

Treatment type	No. observed	Median	Mean	SD	Min	90th percentile	APTP (%)[a]
Precommercial thinning	91	50	67.5	61.5	5	154	45
Pulpwood thinning	138	50	87.2	136	1	200	45
Chemical application	61	58	112	202	7	200	57
Prescribed burning	79	100	144	226	10	300	59
Planting/replanting	78	50	87.1	92.3	5	199	51
Other treatments	5	35	85	109	10	274	61
Total treated acres	307	75	142	260	1	300	

[a] Average percentage of total pine acres treated by respondents, for a given treatment, where total pine acres equal pine acres + mixed pine/hardwood acres.

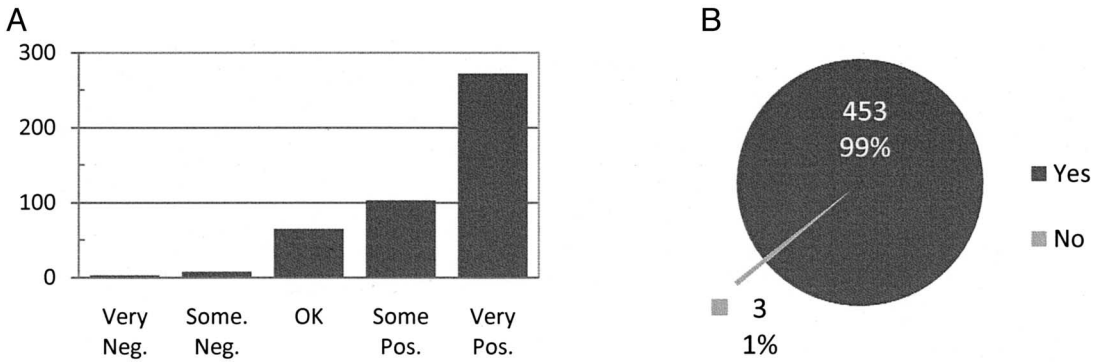

Figure 7. A, Program rating data; *n* = 451. B, Future participation; *n* = 456.

success, as evinced by the very people it was designed for: private owners of forestland. The histogram clearly shows that a large majority of respondents (60.3%) stated that their overall experience as a participant in the program was "very positive" (272 responses), and another 23% indicated a "somewhat positive" experience (103 responses). Only 1.8% reported any type of negative experience (11 responses).

Multiple enrollments in the program are possible because of the limit to how much money can be paid out to a given enrollee per year. This fact provides an opportunity to assess respondent satisfaction by asking whether or not they would participate again at some point. Figure 7B shows that less than 1% (3 respondents) would not enroll again. One can infer this result to be near-unanimous approval of the program and an endorsement of its value to the segment of the population that owns pine forestland in the southeastern United States.

Selected Recommendations

As indicated above, the SPB prevention cost-share program is very successful: 83% of cost-share survey respondents report their program experience to be either "very positive" or "positive." Nevertheless, the program will only be as good as the county foresters responsible for interacting with enrollees. One respondent noted "The key to success with this program is the competency and capability of the area forester. The lady I worked with was fantastic."

Despite the apparent strength of the program, there is room for improvement in its administration, as comments accompanying the returned questionnaires attest. Although most complaints are minor, a few are important to note: cost-share payments were wrong, delayed, or never received; the quality of contractors hired to complete the work was poor; deadlines were unrealistic. The program is still fairly new, so it is expected that some kinks exist and need to be worked out to maximize program efficiency. At the very least, however, the payments should be managed correctly and without incident—this is an information and quality control issue that must be dealt with by the county forester and the state bureaucracy. In addition, forestry commissions should compile a list of acceptable contractors that enrollees can review before making decisions to hire a specific firm. A list of recommended contractors based on informal feedback would probably suffice in terms of benefiting landowners in this task.

Many technical requirements (e.g., deadlines) of the program were developed at the state level. It is recommended that, at 5 years into the program, each state review its technical requirements and program procedures so that any necessary revisions, deletions, and/or updates can be made in a timely and consistent manner. This should be done to ensure better coverage and optimal efficacy/efficiency of the program. It is crucial that county foresters lead the process by providing feedback from the field that can identify any constraints to the program; they are also the best source for identifying and relating other opportunities for improvement.

This study clearly indicates that forestry officials and/or forestry consultants are the key conduits of information for cost-share survey respondents; they are by far the main source of respondent awareness of the cost-share program (Figure 5). If the USFS and SGSF wish to increase program participation, then the main challenge in terms of recruitment of forest landowners is to impart to them the benefits of managing their stands and the opportunity to receive financial assistance. Data from the landowner survey indicate that 25% of respondents are passive in terms of the management of their forestland, and many never interact with county foresters or forestry consultants. For such individuals, information on forest management and/or the SPB is largely gained from casual sources (e.g., relatives). Therefore, if increasing program participation is indeed an explicit objective, then state forestry commissions must begin to create and disseminate various printed information, because they cannot rely on information being passed from person to person.

Previous studies (Jacobson 1998, Molnar et al. 2003, Mayfield et al. 2006) have shown that NIPF owners prefer printed materials in terms of receiving forest management information and suggest that this modality be used to target smaller landowners in particular. Articles in local newspapers and other key publications (e.g., farm reports) that discuss the SPB, its impacts, and the cost-share program offer a good way in which to reach many potential enrollees in a cost-effective manner (Johnson 2008). Direct mailings of brochures to forest landowners in moderate- to high-hazard counties would also be a relatively cost-effective way to disseminate information about the SPB and boost program participation. Regardless of the mode of delivery, the information should explicitly emphasize that forest management for SPB prevention is effective specifically because it is good for the general health of pine forests. As many people own forestland for aesthetic and recreational reasons, it should also specifically note that forest management is beneficial for wildlife (e.g., red-cockaded woodpecker) and can help improve biodiversity in the forest.

Endnotes

[1] Eight presurvey postcards and two questionnaires were returned to sender as invalid address or undelivered. Therefore, it is estimated that 1,249 questionnaires were actually received by potential respondents.

[2] See, for example, studies by Loureiro and Umberger (2007) and van Helvoort-Postulart et al. (2009), which report response rates of 13% and 10%, respectively.

[3] The focus of the first section of each questionnaire concerns the respondent's awareness and attitude regarding the SPB and the respondent's source(s) of knowledge or information about the SPB. The objective of the third section is to elicit demographic information about the respondent, as well as information regarding the size, composition, and ownership structure of his or her forestland.

[4] Choice experiments evaluate the preferences that respondents have for a good (or service) based on the attributes of the item in question. Respondents are asked to choose from alternative competing profiles that are paired together and that differ in the levels or amounts of the various attributes listed. Most choice experiments contain between 4 and 16 pairs (called choice sets) per questionnaire, which are evaluated independently of each other. Logistic regressions are then used to analyze the data.

[5] Because the landowner survey was stratified by GOS level, this particular variable could be tested for nonresponse bias. No statistical difference from the overall response rate was found for the response rates corresponding to each of the GOS categories.

[6] This figure includes 16 from the cost-share survey and 2 from the landowner survey.

[7] Space considerations also preclude a full listing of data for all eight ranks.

[8] Other factors explaining the observed disparity in respondent concern for the SPB attacking forestland are probably involved, as well. For instance, participation in the program itself could have led to an a posteriori increase in concern for the SPB. Note also that in addition to concern about the SPB, other reasons certainly exist as to why an individual might choose to enroll in the cost-share program (see Figure 6). One example is to receive government money despite already planning to conduct a forest treatment for reasons unrelated to the SPB, such as prescribed burning for wildlife habitat (A. Mayfield, Florida Division of Forestry, personal communication, July 13, 2009).

[9] The question used was very similar to the "source of SPB information" question that appears at the beginning of both questionnaires (i.e., Figure 4), with the exception that the second response refers to a website instead of a billboard.

[10] These data are for respondents who enrolled in the program only once. However, some respondents applied more than one treatment; thus, the last row reports descriptive statistics for such aggregated treated acres.

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