

RESEARCH ARTICLE

# Opinions Toward Using Volunteers in Ecological Restoration: A Survey of Federal Land Managers

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## Abstract

Land managers use a variety of labor sources to implement ecological restoration projects. Reasons why these land managers decide to use or not use volunteer labor are not well known; yet, this decision can significantly shape ensuing social, psychological, and ecological benefits. To better understand how land managers' opinions influence their intentions toward using volunteers, we surveyed ecological restoration project decision makers ( $n = 176$ ) from three U.S. land management agencies (the Bureau of Land Management, National Park Service, and U.S. Forest Service) in Colorado, Idaho, Utah, and Wyoming using stratified random cluster sampling. Employing the Theory of Planned Behavior, we measured factors that likely influence intention to use volunteers, including land managers' attitudes, norms, and perceived behavioral control (PBC). We used multiple regression analysis to understand the

relationships among constructs, which indicated PBC was the strongest predictor of intention. Based upon intention to use volunteers, an analysis of variance (ANOVA) showed differences among land managers in terms of (1) their opinions about building community support and accomplishing more work, (2) the influence of supervisors, coworkers, and environmental groups, and (3) their perceived barriers due to a lack of trained volunteers and a lack of tasks safe for volunteers. Our results suggest environmental stewardship organizations and others that want to increase the use of ecological restoration volunteers should find ways to alleviate employees' perceived barriers, encourage supervisors to advocate for using volunteers, and when possible provide tangible information demonstrating how using volunteers can generate community support for a restoration project.

**Key words:** agency employees, attitude, belief, intention, norm, theory of planned behavior, volunteerism.

## Introduction

Ecological restoration projects are often labor intensive and may be implemented by a variety of labor sources such as contractors, in-house staff, and volunteers. Because restoration provides a unique context for people–landscape interaction, using volunteer labor can produce social and psychological benefits in concert with ecological benefits (Grese et al. 2000). For example, Ryan and Hamlin (2008) revealed that volunteer-based post-fire restoration improved community spirit and enhanced agency-community relations, while Clewell and Aronson (2006) proposed that restoration allows volunteers to reconcile their ecological dissonance.

Although much is known about the opinions, knowledge, and motivations of restoration volunteers (Schroeder 2000; Tidwell & Brunson 2008), we know little about why land management agency employees choose to use or not use volunteers when implementing restoration tasks. This lack of knowledge

is surprising considering the restoration literature has highlighted disagreements about engaging volunteers (Higgs 2003; Higgs 2006; Throop & Purdom 2006). One case study documented that restoration volunteer laborers can be inattentive to critical details, unavailable, lack technical skills, and be inefficient compared to professional contractors (Morris & Moses 1999). Conversely, Forbes et al. (2008) contended that volunteers were an acceptable substitute for contracted professionals for some restoration tasks. Lee and Hancock (2011) compared the beliefs of land management agency employees with beliefs of environmental stewardship group leaders. Their survey sampled only land managers who previously worked with volunteers; results did not reveal the opinions of agency employees who had not previously used volunteers. Furthermore, their research used non-random sampling of only a small number of agency employees ( $n = 25$ ), making it problematic to generalize their results to the larger population. Thus, an empirical gap exists in our understanding of agency decision makers' opinions about using volunteers in restoration projects.

## Conceptual Framework: The Theory of Planned Behavior

We used the Theory of Planned Behavior (TPB) framework to understand land managers' intentions toward using volunteers

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when implementing restoration projects. The TPB suggests behavioral intention is the strongest predictor of behavior (Fishbein & Ajzen 2010); before people engage in an action they cognitively create behavioral plans (Eagly & Chaiken 1993). Reviews and meta-analyses of TPB studies found that behavioral intentions predicted 20–38% of behavior (Sutton 1998; Schwenk & Möser 2009). Compared to other social science theories, behavioral intentions appear to predict behavior relatively well (Hale et al. 2003).

The TPB suggests that these behavioral intentions are based on individuals' attitudes, subjective norms, and perceived behavioral control (PBC), which in turn are based on individuals' respective behavioral, normative, and control beliefs (Fig. 1). Persuasive communication is more likely to be effective when messages target the most important determinants of a given behavioral intention (Fishbein & Cappella 2006). The TPB can help explain and predict these determinant-behavior relationships, and it provides a framework with which to craft persuasive messages.

Attitude is typically the strongest predictor of behavioral intention relative to other TPB constructs (Bamberg & Möser 2007; Rise et al. 2010). Attitude can be defined as the degree to which the expected outcome of a behavior is positively or negatively valued (Ajzen 2006). General (i.e. global) attitudes can be directly measured with questions regarding the degree of enjoyment or degree of benefit expected from a behavior (Ajzen & Fishbein 2008). To better understand the basis of these general attitudes, specific attitudes toward a behavior can also be measured (Fishbein & Ajzen 2010). The TPB represents specific attitudes as the product of behavioral beliefs and the evaluations associated with their outcomes, where behavioral beliefs are the personally perceived result of a behavior. For example, the perceived likelihood that using volunteers will increase public support, multiplied by the desirability of increasing public support, represents a specific attitude toward using volunteers to increase public support.

Other factors besides attitude appear to help explain behavioral intention. People are often influenced by their perception of what significant others think and look toward others to help guide their own behavior (Fishbein & Ajzen 2010). These subjective norms are represented as the product of normative beliefs (i.e. one's perception of how significant others

think one should behave) and one's motivation to comply with these significant others (Fishbein & Ajzen 2010). Motivation to comply most strongly predicted landowners' intentions to implement riparian restoration (Fielding et al. 2005).

The third influence on behavioral intention is PBC, which is one's perception that certain factors, such as skills or resources, make a behavior easier or more difficult to perform (Fishbein & Ajzen 2010). PBC has explained between 12 and 28% of intention, a significant contribution, albeit typically less than attitude or subjective norm (Hale et al. 2003).

Personal norms represent feelings of moral obligation to use volunteers, which generally account for how others might be impacted by a behavior (Hunecke et al. 2001). Although personal norms are typically not included in the TPB model because they are conceptually similar to attitudes, personal norms have explained an additional 6% of intention variance not captured by traditional TPB constructs (Rivis et al. 2009). Therefore, the inclusion of personal norms into this behavioral model is warranted.

The TPB has been used to explain and predict a wide variety of human behaviors across multiple sectors, including health, business, education, and natural resource management, and it has explained environmentally relevant behaviors worldwide. For example, the TPB has been used as a framework to better understand rural Australian land owners' beliefs and intentions to restore riparian ecosystems (Fielding et al. 2005), as well as to develop interpretive messages and test their effectiveness at motivating hikers to pick up litter in a Tasmanian National Park (Brown et al. 2011). Similar to our study, Wall et al. (2008) included personal norms in their model that sought to understand how staff and students commuted to a university in the United Kingdom.

## Purpose of Study

We used the TPB framework to understand federal land managers' opinions toward using volunteers when implementing restoration projects. The term 'opinion' refers to these land managers' collective attitudes, subjective norms, PBC, and personal norms. We addressed three research questions: *To what extent are attitudes, subjective norms, and perceived*

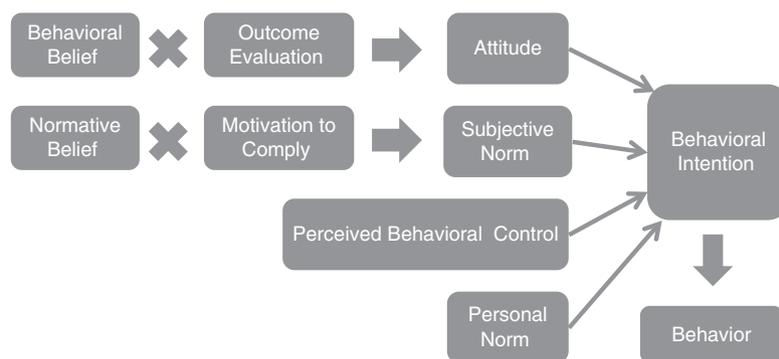


Figure 1. A representation of the theory of planned behavior adapted from Fishbein and Ajzen (2010).

*behavioral control related to intention to use volunteers in restoration projects? Do personal norms further predict intention to use volunteers? How do specific opinions differ among land managers based on their intention to use volunteers?* Environmental stewardship organizations, agency leaders, volunteer coordinators, and others that want to promote volunteerism can increase the likelihood that restoration practitioners will decide to use volunteers by crafting and employing persuasive messages based on decision makers' most prominent opinions. Our objective was to reveal these opinions with the purpose of providing empirically based recommendations on how to effectively communicate reasons to increase restoration volunteer use.

## Methods

### Population and Study Area

The study population included land managers in the states of Colorado, Idaho, Utah, and Wyoming, U.S.A., who made or contributed to making ecological restoration project decisions. Specifically, we chose federal agency employees who decided which labor sources were used to help implement restoration projects. The sample included employees from the Bureau of Land Management (BLM), the National Park Service (NPS), and the U.S. Forest Service (USFS).

We clustered the population by agency offices located in each state, including all BLM field offices, USFS ranger districts, USFS supervisor offices, and NPS units. We then stratified offices by state and drew a random sample of one-third of the offices per state. Sixty-four of the 181 total offices were ultimately selected: 22 offices in Colorado, 15 in Utah, 16 in Idaho, and 11 in Wyoming (Supporting Information, Fig. S1).

In September and October 2011, we made phone calls to gather the names of employees stationed at sampled offices who made or contributed to making decisions about the labor employed at restoration projects. We then used agency directories to obtain these employees' e-mail addresses. The Idaho BLM state office declined our request to survey their employees; therefore, 23 employees from four Idaho BLM field offices were not included in our sample.

### Survey Design

**Preliminary Data Collection.** Fishbein and Ajzen (2010) suggest that formative research be based upon the prominent behavioral, normative, and control beliefs that are available to a person when faced with a decision. To draw out these prominent beliefs concerning volunteer use, we contacted and gathered information from 10 BLM employees and 12 USFS employees stationed within the study area who identified themselves as restoration practitioners. These participants completed an open-ended questionnaire in which they listed their perceived advantages and disadvantages to using volunteers, the groups or individuals who would approve or disapprove of using volunteers, and resources

or circumstances that would enabled or inhibited their use of volunteers. We made an effort to collect responses from employees who had used volunteers to implement restoration projects in the past, as well as employees who had not used volunteers previously. We categorized these preliminary data, and we incorporated the categories with the most number of responses into questions on our online survey instrument.

**Online Survey Instrument.** On the basis of these preliminary data, we designed an online survey instrument of closed-ended questions that we asked our entire sample to complete. We gathered descriptive data of the sample for five demographic variables: age, gender, years worked for agency, state of primary work, and highest level of education. Federal policies and procedures limited our ability to ask further demographic questions; thus, respondents were not individually tracked. Other survey questions were asked within the context of potentially using volunteers to help implement ecological restoration projects within the next 12 months. We defined a volunteer as 'a person who willingly performed ecological restoration tasks on a one-time or periodic basis, but did not receive any direct payment from an agency for those services.' We defined ecological restoration as 'the process of assisting the recovery of ecosystems that have been degraded, damaged, or destroyed' (Society for Ecological Restoration 2010).

We directly measured general attitudes, subjective norms, PBC, and personal norms (Supporting Information, Table S1). Following Fishbein and Ajzen (2010), we also measured specific attitude variables by multiplying outcome evaluation scores by their corresponding behavioral belief scores to derive product scores; thus, 18 questions were used to measure nine specific attitude variables. To create a product score for each group of referents, we multiplied motivation-to-comply scores by their respective normative belief scores; thus, eight questions assessed four subjective norm referents: supervisors, coworkers, professional contractors, and environmental groups. Following Fielding et al. (2005), we measured specific PBC variables by asking the likelihood that barriers would inhibit volunteer use. All questions employed a 7-point Likert-type scale, and we used the empirical criterion to determine our coding scheme (Ajzen & Fishbein 2008).

### Statistical Analyses

We first tested the influence of demographic variables on respondents' intentions to use volunteers. We used an analysis of variance (ANOVA) to determine if intention ratings differed by state, and we conducted independent samples *t*-tests to determine if intention ratings differed by gender. Analysis estimating Spearman's rho and Pearson's correlations was performed to determine if relationships existed between intention and age, years worked at agency, and education level. We used hierarchical multiple regression to determine the extent to which direct measurements of attitude, subjective norm, PBC, and personal norm were jointly related to intention to use volunteers. We then developed a new categorical variable based on responses to the 7-point intention question. This categorical

variable included three groups: 'intenders' (respondents who agreed with the statement that they planned to use volunteers), 'undecided' (respondents whose intention score equaled zero), and 'non-intenders' (respondents who disagreed with the statement that they planned to use volunteers) (Supporting Information, Fig. S3). We used one-way ANOVAs to examine differences among these three groups in specific attitude, subjective norm, and PBC variables. When the ANOVA was significant, specific differences between groups were determined using Tukey's HSD post-hoc tests. Finally, we investigated personal norm score differences between genders through an independent samples *t*-test. All errors are reported as standard errors. Results were considered statistically significant when  $\alpha = 0.05$ .

## Results

### Response Rate and Intention

We received 176 usable responses from the 304 federal land management employees solicited, representing a 58% response rate. As responses were anonymous we were not able to check for non-response bias. On a scale ranging from  $-3$  (Strongly Disagree) to  $+3$  (Strongly Agree), the mean intention score to use restoration volunteers was positive ( $\chi^2 = 0.13 \pm 0.14$ ). Sixty-six percentage of respondents were either positive or neutral in their intention to use volunteers within the next 12 months (Fig. 2).

### Testing Demographic Influence on Intention

Aside from education, the demographic variables we collected did not appear to be related to intention to use volunteers. The number of responses by state was 50 in Colorado, 34 in Idaho, 45 in Utah, and 39 in Wyoming; eight respondents did not indicate the state in which they primarily worked. The

ANOVA revealed no significant differences in intention among employees who worked in different states ( $F_{[3,164]} = 1.0$ ,  $p = 0.40$ ). Mean intention scores by state were positive in Colorado ( $\chi^2 = 0.38 \pm 0.26$ ), Utah ( $\chi^2 = 0.36 \pm 0.25$ ), and Idaho ( $\chi^2 = 0.21 \pm 0.32$ ), while the mean intention score was negative in Wyoming ( $\chi^2 = -0.23 \pm 0.31$ ). We found no significant differences between genders regarding intention to use volunteers ( $t_{164} = 0.08$ ,  $p = 0.93$ ), where 69% of respondents were male and 31% were female. We also found no statistically significant relationships between ratings of intention to use volunteers and age ( $r = 0.07$ ,  $p = 0.36$ ) or years worked at the agency ( $r = -0.04$ ,  $p = 0.63$ ). Respondents ranged in age from 23 to 67 years old ( $\chi^2 = 45 \pm 0.75$ ) and had worked for their agency from less than 1 year to over 40 years ( $\chi^2 = 17 \pm 0.79$ ). We found a statistically significant, positive correlation between education level and intention ( $r = 0.22$ ,  $p = 0.004$ ); 28% of respondents had received a graduate degree, 20% had some graduate education, 45% had received a Bachelor's degree, and 7% had not received a Bachelor's degree.

### TPB Model Analysis

Mean scores of direct measurements of attitude, subjective norm, and PBC were positive; however, the mean score for personal norm was negative (Table 1). Hierarchical multiple regression indicated that direct measurements of all three traditional TPB constructs significantly predicted employees' intentions to use restoration volunteers in the next 12 months; when simultaneously regressed onto intention in step one, these three variables explained 34% of intention variance. Upon entering personal norm scores in step two, the total variance explained by the model as a whole increased to 40% ( $F_{[4,167]} = 29.19$ ,  $p < 0.001$ ,  $R^2$  change = 0.06,  $F$  change $_{[1,166]} = 16.84$ ,  $p < 0.001$ ; Table 2). This result fits

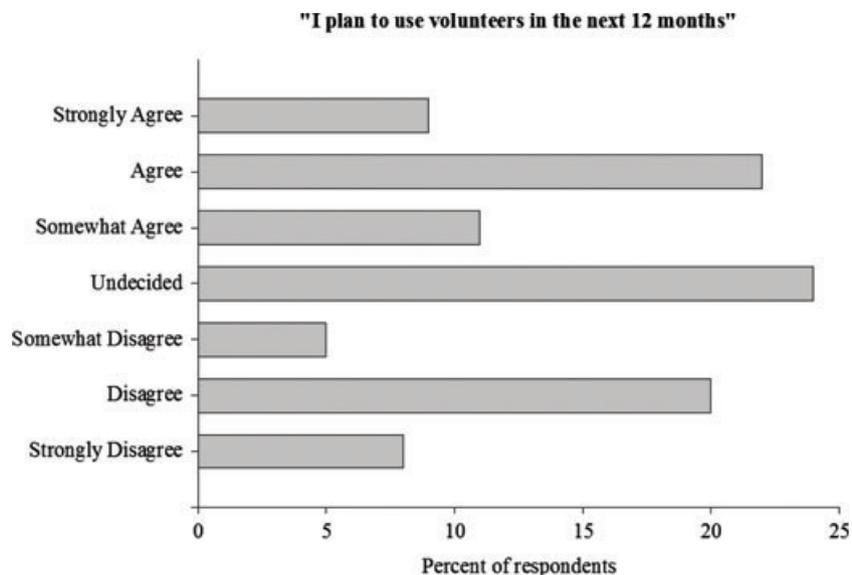


Figure 2. Respondents' level of agreement toward intending to use volunteers to help implement ecological restoration projects in the next 12 months.

**Table 1.** Means and standard errors of questions used to directly measure TPB constructs (range -3 to +3).

Variable	Mean	SE
Attitude: The extent that using volunteers would or would not be worthwhile and enjoyable	1.29	0.08
Subjective Norm: Significant others' approval or disapproval toward using volunteers	1.47	0.11
Perceived Behavioral Control: Possessing the ability, resources, and skills necessary to use volunteers	0.30	0.11
Personal Norm: Feelings of moral obligation to use volunteers	-0.59	0.12

**Table 2.** Hierarchical multiple regression analysis examining relationships between TPB constructs and intention to use volunteers to help implement ecological restoration projects within the next 12 months.

Model	Predictors	Unstandardized Coefficients		Standardized Coefficients	T
		B	SE	Beta	
Step 1	Attitude	0.36	0.11	0.22**	3.25
	Subjective Norm	0.23	0.09	0.18*	2.45
	Perceived Behavioral Control	0.36	0.09	0.29**	3.94
Step 2	Personal Norm	0.23	0.07	0.26**	4.10
	Adjusted R <sup>2</sup>			0.40	

\* $p < 0.05$ , \*\* $p < 0.01$ .

within the lower range of  $R^2$  values found within several meta-analyses (Sutton 1998). Thus, attitude, subjective norm, PBC, and personal norm all contributed unique explanation of the variance of land managers' intentions to use volunteers.

### Exploring Differences in Specific Variables Based on Categories of Intention

As described above, we combined intention responses into three categories: intenders, undecided, and non-intenders. Some respondents did not answer each survey question, so sample sizes varied slightly per specific variable. Generally, non-intenders reported the lowest mean scores for the attitude, norm, and PBC variables, and intenders reported the highest mean scores for these variables.

Specific attitudes were generally positive among all three groups; however, intenders, undecided land managers, and non-intenders all indicated negative attitudes toward using volunteers to save time, as well as toward using low-skilled workers (Table 3). Scores for attitudes toward using volunteers to increase community support were significantly higher for intenders than non-intenders. Attitudes toward using volunteers to accomplish more work were significantly higher for intenders than undecided employees and non-intenders, as were attitudes toward using volunteers to work with motivated and enthusiastic people.

Specific subjective norm means were usually positive (Table 3), more often due to strong motivation to comply

than the perceived expectations of others. However, intenders, undecided employees, and non-intenders all indicated a negative subjective norm score associated with restoration contractors. Non-intenders reported significantly lower mean scores than intenders when considering the subjective norms associated with supervisors, co-workers, and environmental groups.

Most mean scores of specific PBC variables were negative, including most scores for the intender group (Table 3), suggesting that most of these factors were perceived to inhibit rather than facilitate land managers' use of volunteers. Non-intenders reported a significantly lower mean score than intenders for lack of access to trained and knowledgeable volunteers, and undecided employees reported a lower mean score than intenders for lack of safe tasks.

Personal norm mean scores were negative for all three groups, indicating a general lack of feeling morally obligated to use volunteers. Non-intenders had a significantly lower personal norm mean score than intenders (non-intenders:  $n = 55$ ,  $\chi^2 = -1.29 \pm 0.17$ ; intenders:  $n = 74$ ,  $\chi^2 = -0.04 \pm 0.21$ ), while the 42 undecided employees reported a moderate personal norm mean score ( $-0.64 \pm 0.21$ ) ( $F_{[2,168]} = 10.66$ ,  $p < 0.001$ ,  $\eta^2 = .11$ ). We also found that the mean score for personal norm reported by female respondents ( $\chi^2 = -0.19 \pm 0.24$ ) was statistically higher than males ( $\chi^2 = -0.73 \pm 0.15$ ) ( $t_{163} = -0.20$ ,  $p = 0.045$ ,  $\eta^2 = 0.02$ ).

## Discussion

We examined how well the traditional TPB constructs, together with personal norms, predicted the intention of land managers to use volunteers when implementing ecological restoration. In general, intentions to use volunteers varied widely, while attitudes, subjective norms, and PBC all contributed unique prediction of intention. As have other studies (Rivis et al. 2009), we found that the inclusion of personal norms in our behavioral model helped explain intention to use volunteers above and beyond the traditional TPB constructs. After grouping employees as non-intenders, undecided, and intenders, we found that some specific attitudes, subjective norms, and PBC variables differed among these groups while others did not. Our model predicted 40% of variance; therefore, other factors also influenced intention. For example, we did not measure employees' plans to implement a restoration project within the year. Lacking intention to implement a project would prevent intention to use volunteers, and we note this unknown information is a limitation of our study. We aggregated employees from three different U.S. land management agencies in our sample to improve generalizability; however, differences among these agencies and their employees may also influence intentions and opinions. We did not sample employees from foreign, state, or local land management agencies, nor from states outside of the U.S. Intermountain West. Thus, further research is needed to determine if similar results would be achieved elsewhere.

**Table 3.** Mean scores and ANOVA results of specific attitudes, subjective norms, and perceived behavioral control toward using volunteers among employees who did not intend to use volunteers, who were undecided, and who intended to use volunteers within the next 12 months.\*

Attitude: Degree to which the expected outcome of a behavior is positively or negatively valued	Non-intenders (n = 57)	Undecided (n = 42)	Intenders (n = 72)	ANOVA	
	Mean (−9 to +9)			F-value	p-value
Increasing community support	2.07 <sup>a</sup> (0.50)	3.36 (0.41)	4.85 <sup>b</sup> (0.41)	10.24	< 0.001
Working with low-skilled people	−0.49 (0.33)	−0.10 (0.43)	−0.06 (0.37)	0.42	0.66
Accomplishing more work	0.23 <sup>a</sup> (0.56)	1.83 <sup>a</sup> (0.64)	4.06 <sup>b</sup> (0.43)	14.99	< 0.001
Working with motivated and enthusiastic people	3.30 <sup>a</sup> (0.46)	3.39 <sup>a</sup> (0.35)	4.96 <sup>b</sup> (0.40)	5.41	0.005
Saving time	−1.72 (0.46)	−1.17 (0.53)	−0.50 (0.40)	2.01	0.14
Training new workers	3.63 (0.48)	4.52 (0.46)	4.76 (0.40)	1.87	0.16
Saving money	1.93 (0.53)	1.93 (0.59)	3.07 (0.38)	2.06	0.13
Educating the public	3.71 (0.50)	4.57 (0.46)	5.32 (0.47)	3.01	0.05
Working with reliable and committed people	0.59 (0.56)	1.31 (0.49)	2.03 (0.51)	2.04	0.13
Subjective Norm: Degree to which one is motivated to comply with the perceived expectation of a significant other	Non-intenders (n = 55)	Undecided (n = 42)	Intenders (n = 74)	ANOVA	
	Mean (−18 to +18)			F-value	p-value
Supervisor	0.49 <sup>a</sup> (1.33)	7.31 <sup>b</sup> (0.96)	9.85 <sup>b</sup> (0.86)	21.91	< 0.001
Restoration contractors	−4.29 (0.83)	−1.71 (0.71)	−1.96 (0.73)	3.21	0.04
Coworkers	−0.25 <sup>a</sup> (0.99)	4.29 <sup>b</sup> (0.70)	7.39 <sup>c</sup> (0.71)	23.91	< 0.001
Environmental groups	2.56 <sup>a</sup> (0.74)	4.71 (0.85)	6.34 <sup>b</sup> (0.77)	6.17	0.003
Perceived Behavioral Control: Degree to which a factor is perceived to make a behavior easier or more difficult to perform	Non-intenders (n = 57)	Undecided (n = 42)	Intenders (n = 72)	ANOVA	
	Mean (−3 to +3)			F-value	p-value
Lack of time	−0.85 (0.22)	−0.74 (0.25)	−0.35 (0.20)	1.58	0.21
Lack of access to trained and knowledgeable volunteers	−0.80 <sup>a</sup> (0.23)	−0.73 (0.26)	−0.03 <sup>b</sup> (0.18)	4.26	0.02
Lack of safe tasks	−0.76 (0.27)	−1.14 <sup>a</sup> (0.27)	−0.09 <sup>b</sup> (0.23)	4.36	0.01
Lack of consistent funding	−0.93 (0.24)	−0.74 (0.25)	−0.43 (0.21)	1.29	0.28
Lack of easy to access work sites	−0.35 (0.24)	−0.17 (0.26)	0.08 (0.20)	0.99	0.37
Lack of a volunteer coordinator	−0.13 (0.25)	0.00 (0.30)	0.39 (0.22)	1.31	0.27

\*Letters represent statistically significant differences between means within a variable when  $p < 0.05$ . Standard error is reported in parentheses.

### Recommendations

Environmental stewardship organizations and others often advocate for using volunteers in ecological restoration. Our results empirically support our recommendations on how to effectively communicate messages that may increase restoration project decision makers' use of volunteers.

**Focus on Opinions that Differ Most.** Communication about using volunteers should focus on specific opinions that demonstrated the greatest difference among the three intention-based groups (Fishbein & Cappella 2006). For example, we found a large difference between intenders and non-intenders in their subjective norms toward coworkers and supervisors. Thus, land managers' perceptions of what their supervisors or coworkers want them to do appear to influence land managers' intentions of using volunteers. Our results concur with Fielding et al. (2005) who found that the greatest differences between weak and strong intenders were normative evaluations. Fielding et al. (2005) highlighted the 'importance of promoting a supportive normative climate' and we similarly

suggest stewardship organizations should encourage supervisors and coworkers to demonstrate support for using volunteers.

Concerns about the lack of access to trained and knowledgeable volunteers did significantly differ between intenders and non-intenders, and akin to Fielding et al. (2005), we suggest organizations develop strategies to help land managers overcome this perceived barrier. Unfortunately, we cannot be sure whether this concern was due to a lack of access to volunteers or due to a lack of trained and knowledgeable volunteers. We therefore are limited to suggesting that an organization consider its own situation and take actions to reduce the influence of either or both of these inhibitors by increasing volunteer training programs or by creating and maintaining conduits for land managers to access volunteers when desired.

Communication efforts may be less effective when targeting opinions that did not significantly differ among any of the three intention-based groups (Fishbein & Cappella 2006). For example, attitudes toward using volunteers to save money and save time were not statistically different among intenders,

undecided employees, and non-intenders. Indeed, all these groups indicated negative attitudes toward using volunteers to save time, including the one-third of employees that nevertheless intended to use volunteers. Saving time was also not a particularly strong influence on intention compared to other variables. Therefore, we believe that messages aimed at convincing land managers that using volunteers will save time or money will be less effective at persuading behavior.

**Target Behavioral Beliefs Rather Than Outcome Evaluations.** Those desiring to increase use of volunteers in federal restoration projects should target changing project decision makers' behavioral beliefs and normative beliefs, rather than their outcome evaluations and motivation to comply; the latter were both strongly positive compared to their associated beliefs, regardless of intention. For example, 89% of respondents indicated that the outcome evaluation of 'increasing community support for restoration projects' was either moderately or highly desirable. Messages aimed at changing this outcome evaluation would likely have little impact on employees' decisions because even the non-intenders already strongly desired increasing community support (Ham et al. 2009). Instead, messages should focus on changing behavioral beliefs (i.e. perceptions of the advantages or disadvantages of using volunteers) and subjective norm beliefs (i.e. perceptions of how other people or groups think one should behave). For example, we recommend environmental stewardship organizations help strengthen the behavioral belief that using volunteers can tangibly increase community support.

**Focus on Changing Weak and Moderate Opinions.** Weak and moderate opinions generally represent an opportunity for opinions to shift in a more positive direction compared to strongly positive opinions that have less opportunity for positive change (Wiles & Hall 2009). Groups or individuals keen on persuading behavior may find it advantageous to target weak or moderate variables (Brown et al. 2011). In our study, all three intention-based groups generally indicated that a lack of access to trained and knowledgeable volunteers would inhibit intentions to use volunteers. Given the opportunity for shifting these opinions in a positive direction, we suggest environmental stewardship organizations focus on training volunteers and connecting them to agency employees. Conversely, all three groups held relatively strong and positive attitudes that using volunteers would lead to working with motivated and enthusiastic people; with less room for attitudes associated with this belief to shift, changing these attitudes would be less effective at influencing decisions.

**Avoid Attempting to Change Strong Opinions.** Finally, attitudinal theory and empirical evidence have generally found that strong attitudes are enduring and more resistant to change than weak ones (Petty & Cacioppo 1986). Indeed, persuasive messages designed to change attitude direction about wolf reintroduction actually strengthened previously

held beliefs of strongly opinionated people (Meadow et al. 2005). Our study found that employees who were either non-intenders or undecided indicated relatively strong attitudes that potentially dangerous restoration tasks would inhibit their use of volunteers. Given possible difficulties in changing strong opinions, it may be ineffectual to target changing the personal beliefs of restoration practitioners about the safety and risk involved when using volunteers; such communication efforts may reinforce existing negative opinions (Bright & Manfredi 1997). Land stewardship organizations should acknowledge the inherent and complex challenge of changing opinions and recognize that attempts to sway behavioral intentions will likely take a concerted and multi-pronged approach.

### Implications for Practice

- Restoration project decision makers may be more likely to use volunteers to implement restoration projects if their supervisors or co-workers demonstrate support for using volunteers.
- Messages aimed at positively changing restoration project decision makers' attitudes toward using volunteers should demonstrate how using volunteers can accomplish more work or increase community support.
- Messages should not claim that using volunteers saves time or saves money; these claims are less likely to shift intention and may reinforce negative attitudes of strongly opinionated employees.
- Increasing the number of volunteers trained and knowledgeable in ecological restoration, and providing project decision makers with access to these volunteers, may help overcome the perceived barriers of using volunteers.
- It is likely easiest to influence the opinions of project decision makers who are unsure of their plans to use volunteers.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article:

**Figure S1.** Study area map. Each symbol represents the office locations sampled in the states of Colorado, Idaho, Utah, and Wyoming, U.S.A. Some symbols represent multiple offices.

**Figure S2.** Prior use of volunteers to help implement ecological restoration projects.

**Figure S3.** Respondents were categorized into one of three groups based on their level of agreement with the statement that they planned on using restoration volunteers in the next 12 months. These groups included “intenders” (respondents who agreed with the statement that they planned to use volunteers), “undecided” (respondents whose neither agreed nor disagreed with the statement), and “non-intenders” (respondents who disagreed with the statement that they planned to use volunteers).

**Figure S4.** Attitude means towards using volunteers among employees who did not intend to use volunteers, who were undecided, and who intended to use volunteers. Range of possible scores was  $-9$  to  $+9$ . Different labels (a/b) represent statistically significant differences between two means within a variable. Error bars represent standard errors.

**Figure S5.** Subjective norm means associated with using volunteers among employees who did not intend to use volunteers, employees who were undecided, and employees who intended to use volunteers. Range of possible scores was  $-18$  to  $+18$ . Different labels (a/b/c) represent statistically significant differences between or among means within a variable. Error bars represent standard errors.

**Figure S6.** Perceived behavioral control means towards using volunteers among employees who did not intend to use volunteers, employees who were undecided, and employees who intended to use volunteers. Range of possible scores was  $-3$  to  $+3$ . Different labels (a/b) represent statistically significant differences between two means within a variable. Error bars represent standard errors.

**Table S1.** Survey questions to directly measure Theory of Planned Behavior constructs. All questions refer to using volunteers to help implement ecological restoration projects within the next 12 months. When constructs were measured with more than one question, scores were averaged.

**Table S2.** Survey questions to measure specific attitudes ( $Att = ei \times bi$ ).

**Table S3.** Survey questions to measure specific subjective norms ( $SN = mi \times ni$ ).

**Table S4.** Survey questions to measure specific perceived behavioral control variables.

**Appendix S1.** Previous behavior.