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Factors Affecting Land Trust Agents' Preferences for Conservation Easements

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Abstract. The market for conservation easements provides a way to ensure the continued existence of open space amenities where rural communities face development pressure. The object of this research is to identify factors affecting land trust agents' preferences for conservation easements and to investigate preference heterogeneity among those potentially involved in easement acquisition. Stated choice surveys were sent to land trusts' personnel (agents) across the Intermountain West. Models were segmented by attitudinal data from land trust agents regarding their organizations' provision of ecosystem services versus their sense of place or place attachment when considering conservation easement choices. Four separate random utility models were estimated. Results indicated that preference heterogeneity for conservation easements exists across land trust agent segments. Such knowledge provides insights into factors which may affect potential demands for conservation easements in this evolving market. These outcomes might help public policy makers allocate resources towards land conservation and land use planning.

1. Introduction

The Intermountain West has witnessed rapid population growth over the past two decades. Environmental features such as scenery, recreational opportunities and varied topography are a few of the identified land attributes that people are seeking in their place of residence (McGranahan, 1999; Rasker and Hansen, 2000). Population influxes into rural areas raise land values, putting increased pressure on landowners to develop their land (Plantinga and Miller, 2001). Development of open space lands presents a threat to environmental amenities.

Land preservation programs have garnered interest at both the national and local level as land conversion increases (Goetz, 2007; America's Great Outdoors Initiative, 2011). One type of potential solution to open space conversion is the purchase or donation of development rights through conservation easements. Conservation easements are voluntary, legally binding agreements in which the landowner chooses to prevent residential development of a property and/or limit future changes in land use. Generally, the landowner retains all other rights on the land while the purchasing organization holds only the development right (the development right is extinguished unless a term arrangement is in place). The market for conservation easements has emerged as a way to ensure the continued existence of open space amenities.

Land trusts are the primary type of private organization involved in the purchase of conservation easements. "…A land trust is a non-profit organization that, as all or part of its mission, actively works to conserve land by undertaking or assisting in land or conservation easement acquisition, or by its stewardship of such land or easements…" (*2010 National Land Trust Census Report*, 2011, p. 4). Both land trusts and conservation easements are becoming

more prevalent. The 2010 National Land Trust Census indicates that the number of land trusts nationwide was 1,723. Land trusts had conserved 43 million acres by the year 2010, a 23 million acre increase from 2000. A little over 8.8 million of those acres are conserved through conservation easements, representing about a 300 percent increase from 2000 (*2010 National Land Trust Census Report*, 2011).

The buying, selling, and/or donation of conservation easements has created a market for the amenities that private open space lands offer (Hoag et al., 2005). Easements are adaptable contracts that can be changed to meet the needs of the landowner and the issuing organization. However, no organized markets exist for easements where buyers and sellers can discover price. Price and easement terms are determined during private negotiations between landowners and land trust agents (Hoag, et al., 2005). Hoag et al. (2005, p. 12) state the following: "…Another area that seems fruitful is that of understanding intermediaries' (*such as land trusts*) preferences in purchasing and providing conservation easements. Information provided about the market for easements could reduce search costs and matching risks, improving bargaining positions of sellers, and increase the overall efficiency of conservation easement markets." Understanding the factors that impact land trusts' demands for conservation easements requires knowledge of the underlying choice criteria by land trust agents.

Little is known about land trust agents' preferences for acquisition of conservation easements. Further study of land trusts is needed to understand these unique organizations. The objective of this research is to identify factors which may affect land trust agents' preferences for conservation easements and investigate the potential for preference heterogeneity among those involved in land trust organizations. Data were collected from stated choice surveys sent to land trusts' personnel across the Intermountain West. This region offers unique research opportunities as the American West is a rapidly changing and growing region.

Analysis of data collected from the land trust agent survey is intended to increase understanding of the factors affecting potential transactions in the emerging market for conservation easements. Understanding the factors which may affect demand for conservation easements provides valuable policy and planning information to growing rural communities regarding open space protection and agricultural land conservation (Knaap and Chakraborty, 2007).

2. Background and relevant literature

Individual land trusts may have specific motives and objectives for land preservation. They may seek conservation easements for various reasons with different underlying easement and land attributes. Public preferences for open space conservation vary among individuals as per their socioeconomic characteristics and environmental attitudes (Kline and Wichelns, 1998). Heterogeneity in land trust agents' preferences may also be a result of varied private and public preferences for land conservation.

Previous studies have shown that environmental attributes of agricultural lands (different from productive characteristics) were the most important factors in the public support of conservation programs (Duke and Aull-Hyde, 2002; Duke and Ilvento, 2004). Kline and Wichelns (1996) in their Rhode Island study found that environmental objectives such as preserving wildlife habitat and natural places should be important objectives of farmland preservation programs. They also found that agrarian objectives such as providing local food and preserving farming as a way of life were not the most important objectives in preserving farmland. Similarly, Rosenberger (1998) concluded that environmental amenities provided by agricultural lands were more important to the public than agrarian amenities. Results from these studies suggest that the public places a relatively high value on non-agricultural or environmental services from preserved lands.

McLeod et al. (2003) report a summary of multiple survey research efforts investigating land use planning and open space preservation preferences of residents in counties in the Intermountain West. Ecosystem services, recreation, and agriculture were identified as important issues in private open space management. The majority of respondents indicated that they would support a conservation easement program to meet land use goals. These results are consistent with previously mentioned studies that identified environmental amenities, population growth, and agricultural benefits as public preferences for land conservation. Results in this study suggest that preservation of environmental amenities is among the most important reasons to preserve land for local residents.

Place attachment, or a person's personal connection to a specific geographical location or physical environment, might also be an important driver in land conservation preferences (Vorkinn and Riese, 2001). Brehm et al. (2004) survey two rural,

amenity-rich counties: Lincoln County in western Wyoming and Wayne County in Utah. The results for these counties indicate that natural landscapes, views, wildlife, and recreational opportunities all significantly influenced sense of place attachment. Zube (1987) hypothesizes that social and cultural contexts influence human responses to landscapes. Individuals support land use policies that are consistent with their own values and personal utility (Zube, 1987). Using this framework, sense of place might influence the public's preferences for land conservation (Keske et al., 2007). Vorkinn and Riese (2001) conclude that place attachment explains more of the variance in environmental attitudes than all the socio-demographic variables they employ.

There is a wide range of factors impacting public preferences for open space preservation. It is not surprising that a large amount of variation regarding land preservation goals exists among organizations transacting conservation easements. The Rocky Mountain Elk foundation works to ensure the future of elk through habitat conservation; the American Farmland Trust focuses on helping farmers preserve their land to create a healthier environment; and the American Land Conservancy desires to protect natural heritage by conserving land for the benefit of people and wildlife. This heterogeneity among land trusts may lead to market efficiencies. Rosenberger (1998) argues that efficiencies may be gained in land preservation by institutional specialization. If different parcels of land provide different levels and types of benefits, then a specialized institution with specific criteria may better be able to identify and protect lands that provide a specific benefit. This suggests heterogeneity likely exists among land trusts and the agents that work on their behalf regarding conservation easement choices.

One way to explore heterogeneity among individuals is to use attitudinal data to find different segments of individuals which may exist within a sample. May et al. (2001) use Likert-scale questions regarding attitudes about recreation experience preferences and find statistically different segments of snowmobilers. Coupal et al. (2001) find significantly different consumer surplus values for those segments. Aldrich et al. (2007) use data from Likert-scale questions measuring environmental attitudes based on the New Ecological Paradigm (NEP) scale to segment respondents into four groups. The authors find that segmentation based on the NEP attitudinal data improved the explanatory power of models and indicated significant differences in willingness to pay values for species recovery efforts. Morey et al. (2006) use angler characteristics and attitudinal data to evaluate preferences of anglers on Green Bay. They find separate groups or segments within respondents using latent class models. They conclude that "… attitudinal data are, in our opinion, data about preferences and therefore should be used in the estimation of preferences" (p. 107).

3. Theoretical considerations

Land trust agents' preferences for conservation easements may be impacted by derived demand attributes given the public's demand for open space goods and services. If it is assumed that land trusts act as producers of open space goods and services to meet the public's demand for these goods, then easements can be viewed as inputs. If the demand for conservation easements is a derived demand, land trusts and their agents should be influenced by the public's preferences.

Land trusts might also be viewed as direct consumers of conservation easements. Useful theoretical frameworks to consider easement choice could include consumer theory and utility maximization. If one assumes that land trust agents act as consumers of conservation easements, then, following constrained utility maximization, land trust agents will choose the most preferred easement choice within their organization's budget. A rational land trust agent will choose the mix of easements that maximizes their utility subject to a budget constraint.

Each land trust agent may exhibit different tastes and preferences as reflected by their socio-demographic characteristics. Land trust agents' preferences may also be impacted by organizational internal variables such as funding sources, mission, preservation goals or objectives, and staff skills. Moreover, their preferences may be impacted by external variables such as public preferences, preferences of donors, land attributes, land values, and growth (Merenlender et al., 2004). It is not the case that land trusts consist of individuals with monolithic preferences homogenous across all personnel. Respondents may act with respect to "self-regarding preferences" to enhance their personal wellbeing as well as on an agent basis or on behalf of an organization and/or community (following Sen, 1987). Given the likelihood of preference ordering for easement attributes, land trust agents likely must consider both their own and land trust organizational tradeoffs when making easement choices.

4. Stated choice and random utility

Contracts for conservation easements are most often conducted in private negotiation between two parties, making it difficult to obtain actual transaction data. One solution to overcome the lack of actual transaction data is to use stated choice questions in surveys (Louviere et al., 2000). This approach directs respondents to choose between scenarios with differing types and levels of attributes. The primary merit of this approach is that it provides information on tradeoffs between attributes (Louviere et al., 2000). This allows determination of significant variables impacting the land trust agent's choice to enter into an easement.

Using random utility theory, one can model discrete choices by assuming that individuals make choices that maximize their utility on a given choice occasion. This theory is based on the premise that individuals will choose the option that provides them with the most utility. The conceptual framework for random utility models is as follows:

$$Pr(i) = Pr(U_i = V_i+\varepsilon_i > U_j = V_j+\varepsilon_j) \quad (1)$$

The utility function for an individual then contains both a deterministic component (V) and a component that is unobservable to the researcher or is stochastic (ε). The probability of choosing choice i is the probability that the indirect utility of i plus a random, unobservable error is greater than the indirect utility of choice j with its error term.

The indirect utility functions identified in equation [1] can be estimated as:

$$V_i = \beta_k X_i \quad (2)$$

where X is a vector of k attributes associated with alternative i and β is the coefficient vector.

Statistical analyses that provide the estimated parameters reveal which factors significantly impact choice as well as the coefficient signs indicating the direction of that impact. Estimation of the resulting elasticities provides evidence of the sensitivity of choice to model variables.

5. Data collection

The Western Land Conservation Survey was administered to governing members of land trusts across the Intermountain West (CO, WY, ID, MT, NM, UT) from May through November 2007. Prior to administration of the survey, extensive focus group interviews were conducted with land trust professionals to collect insights into land trust preferences for conservation easement attributes and land amenities. Eight focus groups were conducted at Land Trust Alliance meetings in October 2005 with land trust professionals engaged in all aspects of conservation easements, including appraisers and attorneys. All focus group interviews were conducted while adhering to facilitation guidelines as outlined by Morgan (1988) and Fern (2001). Further detail of the qualitative data collection and analysis with land trust participants can be found in Keske (2008).

Five consistent themes impacting easement acceptance emerged from focus group analysis: length of conservation easement, availability of public access, protection of wildlife habitat, managerial control of land, and the financial terms of the arrangement. The importance of environmental amenities or attributes and sense of place attachment varied across respondents. The five themes, attitudinal data related to environmental attributes of land and sense of place, as well as institutional and personal respondent characteristics were queried via the ensuing survey.

The five themes from the focus groups became easement attributes which were used in the stated choice experiment design. Combinations of the five attributes' varying levels lend themselves to a large number of unique conservation easement scenarios. To reduce the total number of survey questions needed, a computer-generated design was used which maximized a D-efficiency criterion (see Kuhfeld et al., 1994). Twenty four pairs of conservation easement scenarios with varying levels of five attributes were developed. This design had a D-score of 95 (very near the orthogonal score of 100). Six versions of the survey were created using combinations of the created easement scenarios. Each version of the survey included four stated choice scenarios where respondents were asked to indicate which, if either, of two available conservation easements they would choose (while neither easement was an alternative). The sole difference in each version of the survey was the set of stated choice scenarios. Other sections of the survey were designed to elicit responses that would reveal the respondent's sense of place attachment (see Cross et al., 2011), conservation attitudes and perceptions, and demographic information such as respondent age and education level. Questions regarding their land trust's organizational characteristics covered annual

budget and size regarding number of employees and volunteers.

There were 99 conservation organizations identified at the time of the study in the region of interest. The primary qualifying criteria for survey participation was whether the organization operated in the Intermountain West and was a member of the Land Trust Alliance. There were 89 organizations meeting the qualifying criteria, of which 74 agreed to participate in the survey.

The 74 participating organizations were queried about the employees and active participants (usually working board members) involved with making decisions about land acquisitions. These were the individuals (considered here as land trust agents) who were sent the survey via their respective land trusts. The names or roles of the participants were not revealed. Analysis was not conducted on whether the answers varied by role within the organization.

The survey process followed a modified Dillman design (Dillman, 2000). Participating land trusts received a package with individual, prepared, survey packets for participants. After six weeks, a follow-up phone call was made if no surveys were received from a specific land trust; however, no additional phone calls were made when at least 50 percent of the surveys were received from the individual agents of a land trust. When the 50% threshold was not met, additional follow up mailings were administered as needed to non-respondents. A total of 417 surveys were distributed yielding 291 responses for a 69.78% response rate.

6. Methods and analysis

Given the apparent importance and variability associated with environmental amenities and sense of place attachment found in the focus groups, attitudinal data regarding these topics were the basis for exploring preference heterogeneity. Based upon the literature previously discussed, the data were segmented to investigate preference heterogeneity and potentially obtain more accurate choice predictions and insights into the potential factors impacting easement choice. Four models were estimated using subsets of the data to examine how preferences for easements differ among land trust agents. Two models were estimated by segmenting the data into land trust agents' perception that their organization had a greater or lesser focus on preserving ecosystem services. Another two models were based on segmenting respondents by a higher or lower sense of place attachment.

Data were segmented such that respondents in each segment had a nearly equal distribution of responses across versions of the survey. This was done to minimize potential biases caused by lack of adequate variation across easement attributes in the stated choice scenarios. Models were segmented and estimated in this manner to evaluate if land trust agents with different attitudes toward ecosystem services and sense of place attachment exhibited unique preferences for conservation easements.

All random utility models were estimated using LIMDEP 8.0. This software package provides several types of potential estimation procedures for random utility models. These types of models estimate indirect utility equations for each potential choice as a system of equations for a scenario on a given choice equation.

The dependent variable in each model is choice: respondents must choose conservation easement A, conservation easement B or neither. The probability of a particular choice i in a multinomial logit random utility model can be represented as follows:

$$P_{i:\,At} = \frac{e^{Vit}}{\sum_{j=1}^{J} e^{Vjt}} \tag{3}$$

where J = the number of choice alternatives; t = a given choice occasion; A = the set of available alternatives for choice occasion t; e = base of the natural logarithm; and V = is the indirect utility equation as presented earlier. Thus, each random utility model includes J (in our case three) indirect utility equations to explain P_i represented in equation 3.

The standard random utility models are estimated as a multinomial logit form. One of the critical assumptions of the multinomial logit model is that each estimated coefficient is homogenous across respondents in a given segment (Louviere et al., 2000, p. 141). Mixed or random parameters logit techniques were used to investigate potential parameter dispersion across the four estimated multinomial logit models, but no significant dispersion was found. Thus, the multinomial logit estimates are presented. Heterogeneity of preferences is therefore investigated via sample segmentation as discussed previously.[1]

[1] It should be noted that segmentation provides the opportunity to investigate the weighting of different parameters across segments, while random parameter logit techniques allows the identification of dispersion across individuals for a given parameter within the sample of interest.

Direct elasticities are estimated to evaluate the sensitivity of choice probability to a particular variable in the model. The direct elasticity is given by the following equation:

$$E_i = (1- P_i)\, X_{ki}\beta_k \quad (4)$$

The average elasticity across observations is estimated by taking the average of the elasticity estimates across the individual observations in the segment. Louviere et al. (2000) state this approach is preferred to estimation of the elasticity at the sample average for each variable. The reason is because the multinomial logit model is non-linear; "… hence, the estimated logit function need not pass through the point defined by these sample averages" (p. 60). They explain that estimation of the elasticity evaluated at the sample average can produce errors as large as 20 percent. The elasticities for each observation in the segment are estimated and then averaged.

7. Model structure

Table 1 identifies and defines variables included for easement choice. Variables explaining the 'neither' choice are included in Table 2. The variables in the three indirect utility equations can generally be categorized into the following: easement attributes, attitudinal, and demographic or organizational.

Each stated choice question has varying levels of the five easement attributes which were identified as important during focus group sessions. Those easement attributes are as follows: contract length (*Length*); public access (*Access*); wildlife habitat protected under the easement (*Habitat*); control over production practices, i.e., land trust approval for changes in agricultural practices (*Approval*); and payment or easement price (*Payment*). Stated choice questions offered respondents two lengths of contract, perpetuity coded as 1 or 20-25 years coded as 0. It is expected that the parameter for contract length will be positive. In an effort to permanently preserve open space amenities, land trusts primarily seek conservation easements that prevent development in perpetuity. Landowners may not qualify for tax breaks unless the length of the easement is in perpetuity. It is unclear what direction of impact public access will have on easement choice. Land trusts seeking protection of environmental amenities may desire easements that restrict public access in order to further preserve natural landscapes.

Table 1. Model variables for easement choice.

Variable Name	Variable Category	Description (Scale of Variable)	Expected Parameter Sign	Range of Observed Values
Length	Easement attribute	Easement Length (0 =20-25 years, 1= perpetuity)	+	0 or 1
Access	Easement attribute	Access provided to the public (0 =no, 1=yes)	?	0 or 1
Habitat	Easement attribute	Wildlife habitat protected from development (0 =no, 1=yes)	+	0 or 1
Approval	Easement attribute	production practices must be approved by the land trust before implementation (0 =no, 1=yes)	+	0 or 1
Payment	Easement attribute	Payment for the easement expressed as a percent of the average land market value following framing question (0, 25, 50, 75, or 100%)	-	0 to 100 in increments of 25
Growth Pressure	Attitudinal	Amount of viewed growth pressure as captured by summated Likert scale questions (see Appendix)	?	5 to 25, continuous
Sense of Place	Attitudinal	Sense of place attachment as captured by summated Likert scale questions (see Appendix)	+	9 to 45, continuous
Economic Attachment	Attitudinal	Amount land trusts view landowners as economically attached to their lands as captured by summated Likert scale questions (see Appendix)	-	3 to 15, continuous
Ecosystem	Attitudinal	Level of ecosystem preservation focus as captured by summated Likert scale questions (see Appendix)	?	4 to 20, continuous

Some conservation agencies may desire public access to obtain public recreational opportunities. Heterogeneity in public access may exist, and the direction of impact on easement choice may depend on the land trust's objectives. Protection of wildlife habitat and control over production practices are both hypothesized to have a positive impact on easement choice. Both of these attributes give conservation agencies further ability to preserve a variety of open space amenities, and it is expected that land trust agents will seek these attributes in easements.

Payment for easements is expected to have a negative impact on easement choice given limited land trust funds for easement acquisition. The payment variable was based on a percentage of land value in the stated choice question. Each respondent was asked a framing question, prior to the stated choice questions, regarding what respondents thought lands were worth in their land trust's portfolio. This was done to reduce the potentially large number of bid values needed to represent the broad range of land values in the Intermountain West as well as reduce concerns with such things as starting point bias. It was made clear that in all scenarios with term easements tax incentives were unavailable given the tax code at the time of the survey.

Several attitudinal variables, obtained by summing Likert-scale questions from parts B and C of the survey, were also included in the models (see Appendix). A variable for growth pressure (*Growth Pressure*) was included that measures the extent to which land trust respondents view growth pressure as a threat to open space amenities in their region. It is unclear what impact this may have on easement choice.

A sense of place (*Sense of Place*) variable is included in the models as a measure of their organization's level of place attachment to the areas in which they protect lands. We expect that those individuals with a higher attachment derive more utility from easements that preserve landscapes and will seek to preserve land attributes consistent with their sense of place attachment. It is expected that sense of place will have a positive impact on easement choice.

A variable that measures respondent's perception that their easement donors are economically attached to their lands (*Economic Attachment*) is included. Previous research has shown that the higher the economic attachment of landowners the less likely they are to enter into an easement (Cross et al., 2011). It is expected that land trust agents perceiving landowners with a high economic attachment to their lands will be less likely to choose easements due to potential barriers to easement acquisition.

The last attitudinal variable included quantifies the respondent's perception of the land trust's level of focus on preserving ecosystem services (*Ecosystem*) as measured by the respondent's perception of the level of ecosystem services provided by lands within their organization's portfolio. Due to the unique nature of land trusts that focus on ecosystem service preservation, this variable was included to test for direction of impact on easement choice.

Table 2. Model variables for neither choice.

Variable Name	Variable Category	Description and Scale of Variable	Expected Parameter Sign	Range of Observed Values
ASCN	Intercept	Intercept	?	estimated
Hold Easements	Use of easements	Does your organization currently hold conservation easements? (0=no; 1=yes)	-	0 or 1
Budget	Demographic	Operating Budget@ midpoints of categories	-	$50,000 to $5,750,000
Vocational	Demographic	Indicator Variables (0,1) (a) high school = base (all zeros across education categories); (b) technical/vocational school;	-	0 or 1
College	Demographic	(c) some college or bachelor's degree;	-	0 or 1
Graduate	Demographic	(d) some graduate or graduate education	-	0 or 1
Age	Demographic	Age of respondent (23-84)	?	23-84, continuous

Variables that were included in the model to explain the neither choice are primarily demographic or organizational in nature.[2] The first variable (*Hold Easements*) is a measure of whether the land trust currently holds conservation easements. This variable is expected to have a negative sign. The respondent is expected to be less likely to choose neither or more likely to choose an easement if their organization currently holds easements. It is expected that the perceived size of the land trust budget (*Budget*) will have a negative impact on the neither choice. Land trusts with more financial resources are more likely to acquire easements and less likely to choose no easement when given the opportunity. Variables for education (*Vocational, College,* and *Graduate*) were included to ascertain the impact that different education levels of respondents have on easement choice.[3] It is expected that as the land trusts agents' education levels increase they will be less likely to choose neither and more likely to choose an easement. Preliminary correlation analyses support this expectation. The impact of the respondent's age (*AGE*) on easement choice lacks a hypothesized sign *a priori*; preliminary correlation statistics suggest that it may be negative. A constant was included in the neither equation.

The explicit indirect utility equations for each of the segment models were specified as follows:

$$U_{CE\ A,B} = \beta_{Length}*Length + \beta_{Access}*Access + \beta_{Habitat}*Habitat + \beta_{Approval}*Approval + \beta_{Payment}*Payment + \beta_{Growth\ Pressure}*Growth\ Pressure + \beta_{Sense\ of\ Place}*Sense\ of\ Place + \beta_{Economic\ Attachment}*Economic\ Attachment + \beta_{Ecosystem}*Ecosystem \quad (5)$$

$$U_{NO\ CE} = Constant + \beta_{Hold\ Easements}*Hold\ Easements + \beta_{Budget}*Budget + \beta_{College}*College + \beta_{Vocational}*Vocational + \beta_{Graduate}*Graduate + \beta_{Age}*Age \quad (6)$$

Descriptive statistics are calculated for the four subsets of the data set. They reveal a great deal of uniformity across subsamples in attribute levels given the distribution of easement scenarios across each of the segments. Notable differences can be found in the Sense of Place and Ecosystem variables which in turn were used to create the subsets of land trust CE preferences. The organizational variable, *Budget*, demonstrates large differences in mean values across the subsamples. The measures of respondent education also differ between subsamples. This suggests that differences in weighting across attributes for choice occasions should reflect varying preferences by respondents.

Table 3. Descriptive statistics: mean and standard deviation of variables by segment.[a]

Variable Name	Low Ecosystem	High Ecosystem	Low Sense of Place	High Sense of Place
Length	0.5496 (0.4978)	0.5467 (0.4980)	0.5538 (0.4973)	0.5528 (0.4975)
Access	0.4855 (0.5000)	0.4839 (0.4999)	0.4772 (0.4997)	0.4838 (0.5000)
Habitat	0.4969 (0.5000)	0.4960 (0.5001)	0.4945 (0.5001)	0.4978 (0.5003)
Approval	0.5331 (0.4992)	0.5419 (0.4984)	0.5164 (0.4999)	0.5442 (0.4983)
Payment	50.0516 (35.8635)	49.6371 (35.6377)	50.1825 (35.8678)	50.2155 (35.7152)
Growth Pressure	18.0833 (2.5582)	18.5208 (3.2024)	17.8855 (2.7182)	18.9074 (3.2058)
Sense of Place	36.9806 (5.5183)	39.5070 (3.4950)	35.4453 (4.4159)	41.8448 (1.6066)
Economic Attachment	9.7027 (2.2693)	9.7450 (2.4506)	9.4104 (2.1455)	10.2342 (2.4795)
Ecosystem	13.2727 (2.0335)	17.4839 (1.3365)	15.1061 (2.8673)	16.4159 (2.2496)
Hold Easements	0.9483 (0.2215)	0.8889 (0.3144)	0.9398 (0.2378)	0.8956 (0.3058)
Budget	513426 (884424)	1160448 (1736433)	897269 (1492746)	874755 (1426556)
Vocational	8.475^{E-03} (9.169^{E-02})	1.299^{E-02} (0.1132)	0.0000 (0.000)	2.632^{E-02} (0.1601)
College	0.2373 (0.4256)	0.3377 (0.4730)	0.2519 (0.4342)	0.3509 (0.4774)
Graduate	0.7373 (0.4403)	0.6429 (0.4793)	0.7407 (0.4384)	0.6053 (0.4889)
Age	53.8783 (12.7811)	50.8446 (13.5494)	52.1955 (13.0087)	50.6036 (13.2206)

[a]Standard deviation reported in parentheses directly below mean.

[2] Louviere et al. (2000) point out that "a characteristic of an individual, or any other variable that is not an attribute of an alternative in a choice set, cannot be included as a separate variable in all utility expressions since it does not vary across alternatives (p. 63)." Thus, easement attributes are only observed in the easement choices and therefore only represented in the easement equations. Socio-demographic characteristics and perceptions of land trust characteristics known to the respondent are only used in the neither equation. Morey et al. (1993) take a similar approach and use demographic characteristics to explain the choice not to participate in recreational fishing.

[3] Due to high correlation between College and Graduate education, College was not included in the final models.

8. Ecosystem model and results[4]

Two models were estimated for subsets of the data that were segmented based on responses to the summed ecosystem (*Ecosystem*) variable. Responses to Ecosystem questions with a summed score less than 16 were classified as respondents' perception that their land trust organization was less focused on preservation of ecosystem services, while respondents with a summed score greater than or equal to 16 were perceived to be ecosystem-oriented land trusts by respondents. Of the 1075 choice observations, 41 were dropped because they could not be classified due to non-response to one or more of the segmenting questions. The low ecosystem segment was comprised of 457 potential choice observations while the ecosystem segment included 577 observations. Each model was estimated separately to investigate the difference in importance of specific variables on easement choice across the segments.[5]

Indirect utility equations (5), one each for easement A and easement B, and (6), a neither choice, were estimated as a multinomial logit model for each of the two (high and low) ecosystem segments. Model performance statistics suggest that both models explain a significant amount of the variability in easement choice. The high ecosystem segment model yields a lower pseudo R^2 than the low ecosystem segment model (0.461 versus 0.533).

Significant variables impacting easement choice positively in the low ecosystem model (see Table 4) include contract length of easement (*Length*), protection of wildlife habitat (*Habitat*), and control over production practices (*Approval*). The importance of ecosystem-driven decision making (*Ecosystem*) is negative as expected for the low ecosystem subsample. Signs for each significant variable were consistent with previous expectations. Respondents in this segment also indicated they were less likely to choose neither if their organization currently holds conservation easements. *Budget* was negative and significant at the 10 percent level for the neither option, indicating that as budgets increase CEs appear more attractive to land trust agents.

Non-significant variables of note include public access (*Access*), payment (*Payment*), growth pressure (*Growth Pressure*), sense of place attachment (*Sense of Place*), and perceived economic attachment of landowners (*Economic Attachment*). The above is sensible for individuals unconcerned with threats to ecosystem preservation as the potential impacts of growth pressure and access as well as the importance of sense of place are irrelevant.

Results for the high ecosystem model identify nine significant parameter estimates in explaining easement choice (Table 4). Two of the variables (*Growth Pressure* and *Age*) that had no prior expectations for sign were significant in this model. Growth pressure reduced land trusts' likelihood of choosing an easement. A negative sign on the growth pressure variable may indicate that land trusts in this segment facing high growth pressure are less able to obtain easements that may provide desirable ecosystem services because desirable development rights may come at higher costs to purchase. This is further supported by the negative and significant parameter associated with payment for the easement (*Payment*). It may also suggest that land trusts that focus on ecosystem preservation concentrate more on preserving lands with less growth pressure as they may be looking for larger or contiguous blocks of land (at a lower per acre price) that provide ecosystem services away from population centers. Age (*Age)* also was estimated to have a significant negative effect on easement choice (likely to choose neither) in the ecosystem model. Younger land trust agents were more likely to choose an easement.

Additional significant variables that negatively influenced easement choice include public access (*Access*). It is interesting that agents for high ecosystem land trusts are more likely to choose easements without public access included. This suggests that ecosystem-oriented land trusts may view public access as a threat to ecosystem service preservation. Ecosystem service-oriented land trusts may be specifically representing the environmentally minded individuals from the public who have been shown to prefer preservation policies that restrict public access (Kline and Wichelns, 1998).

[4] It should be noted that these results are from surveys conducted in 2007. A limitation of these results is that they may not reflect potential changes in conservation easement choices and preferences due to changes in the current economic climate relative to the time the survey was conducted. However, conservation easement policies and funding programs remain largely unchanged in the states included in the study area. Federal policies and funding mechanism have also not shown substantial change.

[5] This approach has similarities to a latent class model approach in that attitudinal data may be used to assign individuals to a class, and separate parameter estimates for each class are estimated (see Aldrich et al. 2007; Morey et al. 2006). In the latent class approach, however, it is assumed that an individual's class is unknown to the researcher, and therefore an individual is assigned as part of the estimation procedure. However, assignment of the number of potential classes is assigned by the researcher. Given the small number of observations in our data, respondents were only assigned to one of two segments given the need for representation across the stated choice scenarios so sufficient variation in attributes existed for parameter estimation rather than use the latent class approach.

Table 4. Ecosystem models results.

	Variable	Low Ecosystem		High Ecosystem	
		Parameter Estimate (β)	**Direct Elasticity**	**Parameter Estimate (β)**	**Direct Elasticity**
Easement Choice	Length	1.9092***	0.3095[a]	2.1377***	0.3196
	Access	-0.7693E-01	-0.0125	-0.3080*	-0.0461
	Habitat	0.9484***	0.1538	1.7883***	0.2509
	Approval	0.7447***	0.1208	0.5184***	0.0775
	Payment	-0.4345E-02	-0.0007	-0.5089E-02**	-0.0008
	Growth Pressure	0.4517E-01	0.0073	-0.1406***	-0.0210
	Sense of Place	-0.1347E-01	-0.0022	0.6222E-01	0.0093
	Economic Attachment	-0.9615E-01	-0.0159	-0.1290E-01	-0.0259
	Ecosystem	-0.1797**	-0.0291	0.1225	0.0183
Neither	Constant	0.5661		-0.2925	
	Hold Easements	-2.8218***	-0.5041	0.8014*	0.1232
	Budget	-0.5272E-06*	0.0000	-0.1559E-07	0.0000
	Vocational	-0.1170	-0.0209	0.3687	0.0567
	Graduate[b]	-0.6075*	-0.1085	-0.5471**	-0.0841
	Age	-0.6119E-02	-0.0011	0.2466E-01**	0.0038
Model Statistics					
N		276/457[c]		441/577	
Unrestricted LL		-234.626		-341.546	
Restricted LL		-502.066		-633.899	
χ^2		534.88		584.706	
Degrees of Freedom		14		14	
Critical χ^2(α=.01)		29.14		29.14	
Pseudo R^2		0.533		0.461	

*Significant at α=.10;**Significant at α=.05;***Significant at α=.01

[a] Total direct effect elasticity is estimated as average over observations.

[b] Correlation coefficient between College and Graduate education variables was 0.999989 and 0.999931 for the low and high ecosystem segments, respectively. Only Graduate education was included to address collinearity between these two variables.

[c] This number represents the number of observations out of the total sample (numerator over denominator) with which the model was estimated due to item non-response across variables used in the model.

Several variables were positively significant in this model including contract length of easement (*Length*), wildlife habitat protection (*Habitat*), and control over production practices (*Approval*). Those respondents with some type of graduate education (*Graduate*) were less likely to choose neither. *Age* was significant and positive in determining a neither choice. Most significant parameters were consistent with *a priori* expectations. One notable exception is that of an organization that already holds easements (*Holds Easements*). This was positive and significant at the 10 percent level, suggesting land trust agents in this segment whose organization used easements was more likely to choose neither. This could reflect that respondents felt their organization had a large number of easements and there was diminished marginal utility for adding an additional easement. The elasticity estimates suggest that high ecosystem respondents' choice of an easement were more

sensitive to habitat being provided, which is consistent with expectations.

Variations between these models identify the unique nature of land trusts that are more focused on ecosystem service preservation. Variables that are significant in the ecosystem models but not in the non-ecosystem approach are public access (*Access*), payment (*Payment*), growth pressure (*Growth Pressure*), sense of place attachment (*Sense of Place*), graduate education (*Graduate*), and age (*Age*). Conversely, *Budget* was significant only for respondents in the low ecosystem segment. This supports the idea that ecosystem oriented land trusts are unique organizations with employees or agents that are influenced by different factors when considering an easement.

9. Sense of place models and results

Two additional models were estimated using subsets of the data that were segmented by sense of place attachment. Responses were categorized into either low or high sense of place attachment based on their summed responses (see Appendix) used to form the variable Sense of Place. Observations with summed responses to Sense of Place with a value less than 40 were categorized as low sense of place attachment (low Sense of Place) and observations with a summed value greater than or equal to 40 were categorized as high sense of place attachment (high Sense of Place). In this segmentation 122 of the 1075 choice observations were dropped due to non-response to one or more of the segmenting questions. The low Sense of Place segment was comprised of 524 potential choice observations while the high Sense of Place segment included 429 potential observations. Each segment was run as a separate model. Model performance statistics χ^2 and pseudo-R^2 indicate that both models explain a significant amount of the variability in easement choice (see Table 5).

Results for the low Sense of Place model reveal three significant parameter estimates (see Table 5). Contract length of easement (*Length*), protection of wildlife habitat (*Habitat*), and control over production practices (*Approval*) increased the likelihood of a land trust choosing an easement in this segment. The importance of Sense of Place attachment (*Sense of Place* or SOP) is positive when considering an easement for the low Sense of Place subsample. This suggests that those with higher sense of place attachment in this segment were more likely to choose an easement. Signs for each significant parameter were consistent with expectations.

Model results for land trusts with a high Sense of Place (SOP) attachment identified five different parameters as significant in explaining easement choice. A higher payment price (*Payment*) reduced the likelihood of land trust agents choosing an easement. Contract length of easement (*Length*), protection of wildlife habitat (*Habitat*), and control over production practices (*Approval*) positively impacted easement choice.

Segmentation based on SOP attachment presents some interesting differences between these groups. Particularly, high SOP attachment land trusts generally indicated more sensitivity to price than respondents in the low SOP segment. This possibly reflects a desire by land trusts to work with like-minded landowners who equally value SOP and require less compensation for an easement. The probability of choosing an easement was more sensitive to the provision of habitat (*Habitat*) and approval of production practices (*Approval*) for respondents in the high SOP segment. This may suggest that respondents in this segment feel that provision of habitat and changes in existing production on lands impact the nature of where they live more than those in the low SOP segment.

10. Conclusions and implications

Increased easement contract length (*Length*) was found to be positively significant on easement choice in all models. This indicates that land trust agents have homogenous preferences for conservation easements with contract length in perpetuity. This might be because easements in perpetuity permit permanent protection of open space amenities on the land. Easements must be in perpetuity for landowners to receive tax breaks, which may lead to less transactions and compensation costs between land trust and landowner. Conservation organizations or agencies may have to pursue additional preservation options like fee simple purchase or leasing as well as zoning or taxing strategies, respectively, for lands with owners that are unwilling to enter into easements in perpetuity.

Public access (*Access*) was negatively significant on easement choice in the model for ecosystem-oriented land trusts. The land trust agents that focus on ecosystem service preservation may feel that easements without public access better preserve ecosystems and associated benefits. Landowners in general should be more willing to work with

Table 5. Sense of place models results.

	Variable	Low Sense Of Place		High Sense Of Place	
		Parameter Estimate (β)	Direct Elasticity	Parameter Estimate (β)	Direct Elasticity
Easement Choice	Length	1.8833***	0.3151[a]	2.0532***	0.3062
	Access	-0.2121	-0.0355	-0.2261	-0.0337
	Habitat	1.2016***	0.2010	1.6698***	0.2425
	Approval	0.4654***	0.0779	0.6610***	0.0986
	Payment	-0.3046^{E-02}	-0.0005	-0.6961^{E-02}**	-0.0010
	Growth Pressure	-0.7443^{E-01}	-0.0125	-0.6635^{E-01}	-0.0099
	Sense of Place	0.6694^{E-01}*	0.0112	0.1052	0.0157
	Economic Attachment	-0.2395^{E-01}	-0.0040	-0.8543^{E-01}	-0.0127
	Ecosystem	-0.4521^{E-01}	-0.0076	0.9176^{E-01}	0.0144
Neither	Constant	0.2049		2.1628	
	Hold Easements	-0.7008	-0.1240	0.8964	0.1452
	Budget	-0.7348^{E-07}	0.0000	-0.7855^{E-07}	0.0000
	Vocational	--------[b]	-------	0.1592	0.0258
	Graduate	-0.4541	-0.8032	-0.4880[c]	-0.0791
	Age	0.1133^{E-01}	0.0020	0.1730^{E-01}	0.0028
Model Statistics					
N		395/524[d]		322/429	
Unrestricted LL		-341.902		-253.021	
Restricted LL		-446.037		-471.305	
χ^2		208.270		436.568	
Degrees of Freedom		13		14	
Critical $\chi^2(\alpha=.01)$		27.69		29.14	
Pseudo R^2		0.233		0.463	

*Significant at α=.10;**Significant at α=.05;***Significant at α=.01

[a] Total direct effect elasticity is estimated as average over observations.

[b] All respondents in the low SOP segment had some college or graduate education. To avoid singularity issues only the indicator variable for graduate education was included in the model.

[c] Correlation coefficient between College and Graduate education variables was 0.99997 for the High SOP segment. Only Graduate education was included to address collinearity between these two variables.

[d] This number represents the number of observations out of the total sample (numerator over denominator) with which the model was estimated due to item non-response across variables used in the model.

ecosystem-oriented land trusts that typically prefer easements without public access. Miller et al. (2011) found public access to be a deal breaker for agricultural landowners considering easements. This variable was insignificant in all other models. This suggests that some land trust agents may desire this attribute while others may not.

Protection of wildlife habitat (*Habitat*) was a significantly desired easement attribute in all models. Land trust agents chose easements that facilitated the protection of wildlife habitat on the parcel. Landowners with significant wildlife habitat on their property should be preferentially chosen by land trusts seeking easements. Lands lacking significant wildlife habitat may require other preservation techniques to preserve their open space amenities.

Land trusts' control over production practices implemented on the land (*Approval*) increased the

likelihood of land trust agents choosing an easement in every model. Land trusts desire this easement attribute because it conveys the right to deter production practices that might damage the open space amenities that they desire to protect. This attribute may become a point of difficulty during negotiations with landowners. It may require one side or the other to modify this easement attribute in order for a transaction to take place. Timing of certain practices, crop choices and/or rotations, and grazing practices may need to be negotiated.

It is interesting to note that both the high Ecosystem and high Sense of Place segment models indicated that price significantly impacted easement choice. Possible competition across site selection and substitution between sites may be affecting these land trust agents' preferences. Table 3 indicates that the high Ecosystem segment scored slightly higher on place attachment while the high Sense of Place segment did as well for the preservation of ecosystem services. This may suggest that preservation of ecosystem services is important to place attachment.

Growth pressure was found to be a significant factor in the high ecosystem model. The higher the perceived level of growth pressure, the less likely land trust agents focusing on ecosystem preservation were to choose an easement. The agents of such land trusts may seek lands away from population centers that are contiguous with other open space areas. They may view growth pressure on adjacent lands as either a threat to their preservation efforts or evidence that the desired ecosystem attributes have already been compromised. These lands may be poised for development and as such are expensive to protect.

Preference heterogeneity is revealed by differences in factors affecting easement choice across the investigated segments. This represents a key finding with implications in the market for conservation easements. Results from the ecosystem model indicate that ecosystem service and sense of place attachment oriented land trusts agents' decisions to accept conservation easements are influenced by variables that differ from other land trusts.

Public policy makers may be able to use these results to integrate land trust efforts into local planning to better meet public conservation and land use objectives. Conservation outcomes could be changed by the variables identified in this study. Should public policy makers decide that public access is an important feature of easements, they may consider providing more tax incentives for easements that include this feature as the results here indicate that many land trusts have no significant preference for easements with public access. If public policy makers identify the need to conserve lands lacking significant wildlife habitat, they may pursue other conservation methods given that land trusts here seek lands with wildlife habitat.

Land trusts are playing an increasingly influential role in conservation efforts in the U.S. West and elsewhere. Research presented here provides an understanding of what factors may be impacting land trusts' easement acquisitions. Understanding the demand for conservation easements provides valuable information regarding this emerging market as protecting open space lands is garnering interest in many communities. It could help policy makers as they allocate scarce resources toward endeavors such as land conservation and land use planning.

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Appendix. Construction of selected variables.

Growth Pressure Summated Likert scale questions A, B, C, D, and E from Part B of Survey (each 1-5; total ranging from 5-25 scores)

A. Our organization believes that there is too much development on rural and agricultural lands.

B. The land our organization wants to protect is being purchased by people who have little interest in agriculture.

C. Our organization believes that people moving into the community are changing the customs, cultures, and conservation values of the land.

D. Our organization believes that population growth is a common cause of community conflicts.

E. Our organization believes that population growth has led to more rules that threaten the livelihood of the people who own large tracts of land.

Sense of Place - Summated Likert scale questions F, G, H , I, L, M, N, O, and R from Part B of Survey (each 1-5; total ranging from 9-45 scores)

F. Our organization believes that the conservation values that we preserve should be protected for future generations.

G. Lands that our organization protects reflect the personal history and identity of those communities.

H. Land and the conservation of the values we protect are part of the historical character of those communities.

I. Our organization has a responsibility to conserve natural amenities (wildlife, open space).

L. The people in our organization have a personal attachment or "feeling of belonging" to the lands that our organization protects.

M. The people in our organization seem to feel more themselves in the geographic area of the protected lands than anywhere else.

N. The people in our organization seem to have a spiritual connection to the conservation values of the lands that we protect.

O. Our organization believes that the conservation values of the lands that we protect reflect the values of the community.

R. Lands in our community offer the amenities that people in our organization seek when looking for in a place to live.

Economic Attachment-Summated Likert scale questions S, T, and U from Part B of Survey (each 1-5; total ranging from 3-15 scores)

S. The livelihood of our conservation donors depends on economic productivity from their lands, which may prevent the landowner from entering into a conservation contract.

T. The future livelihood of our conservation donors depends on the flexibility to use their land in ways to gain economic returns.

U. The financial well-being of people considering conservation easements frequently conflicts with conservation processes.

Ecosystem - Summated Likert scale questions C, D, H, and I from Part C5 (each 1-5; total ranging from 4-20 scores)

C. Our preserved lands provide wildlife habitat, which may include migratory birds or other predators.

D. Our preserved lands provide habitat for threatened/endangered plant or animal species.

H. Our preserved lands are selected in an ecosystem planning process.

I. Our preserved lands are contiguous with other preserved areas.