

# An Evaluation of Ranch and Farm Operator Attitudes towards Emerging Ecosystem Service Markets in California and Eastern North Carolina

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By

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## Abstract

This master's project adds to the body of research on potential participation in emerging markets for ecosystem services. In particular, it addresses two questions: 1) Are ranch and farm operators interested in new payments for ecosystem service (PES) programs in California? 2) Are there differences in rancher and farm-operator attitudes between California and North Carolina? To answer these questions, a survey with 156 responses was analyzed to examine the similarities and differences in attitudes towards past, current, and future payments for ecosystem service programs in California. The survey examined the potential use of market-based incentives to encourage greater conservation efforts by private landowners. The results of this survey were then compared to the results from a similar survey in North Carolina.

The results show that ranch and farm operators *are* interested in potential payments for ecosystem service programs and that they will be more likely to participate in programs with *shorter* contract lengths and *higher* payment levels. Specifically, for every year added to the contracts, \$.81/acre should be provided in additional compensation. The conservation organization was the preferred program administrator in California, followed by a private company, a federal agency, and a state agency. In North Carolina, the preferences for contract length and payments were similar, but the preference for program administrator was the exact *opposite*, with the state agency being the preferred administrator. The best predictors of potential participation in new PES programs in both states were age and total number of programs currently enrolled in. Young ranchers and farmers who are already enrolled in conservation programs are most likely to participate in future programs.

These results highlight the importance of understanding the preferences of potential participants before implementing new PES programs. In addition, preferences for PES programs may differ by state, and preferences for administrators may differ depending on local relationships. Lastly, outreach needs to be a significant component of payments for ecosystem service programs so that potential participants know *what* programs are available and *how* to enroll in them.

## Introduction

Humans rely on a variety of services provided by the environment including water purification, water quantity regulation, flood control, storm protection, plant pollination, air quality improvements, wildlife habitat improvements, climate regulation (carbon storage), and many others (Champ, Boyle et al. 2003). But as humans have begun to have an increasing impact on the surrounding environment, it has become clear that more actions need to be taken to protect the services that nature provides. Clearly, the role of private landowners is essential since private lands make up a significant portion of the United States, but without proper incentives there is little chance that landowners will adopt conservation practices on their own. This is because many of these environmental benefits are “public goods” (i.e. they are shared by all and not bought and sold in a market), so it can be difficult for ranchers to get compensated for the benefits that they are providing to society (Heal 2000).

In recent years, however, there has been a lot of focus on the emergence of ecosystem service markets, where landowners would be compensated for changing their practices so that their lands could achieve more biodiversity and conservation goals. There have been a few federal conservation programs such as the Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP), the Conservation Stewardship Program (CSP), and other local and state programs, but participation in these programs has been limited and reactions mixed. This is mostly because conservation programs are voluntary, and their effectiveness depends on the willingness of farm operators to participate (Lambert, Sullivan et al. 2006). In order to move to the next generation of ecosystem service markets, it is essential that policymakers understand how ranch and farm operators feel about past participation in existing conservation programs, as well as their attitudes towards the creation of new markets.

## Previous Research

Although relatively little research has explored rancher's attitudes towards emerging ecosystem service markets, there has been some research carried out on proposed markets. A study by Matta et al. examined the willingness of non-industrial private forest owners of Florida to adopt a conservation program that required restrictions beyond the existing BMPs in return for financial incentives. Their results indicated that the mean willingness to accept payments for the adoption of the practices at their highest level of restrictions would be in the range of \$37 to \$151 /ha/year. These results suggest that market-based policy incentives could significantly help to further the provision of ecosystem services on private land.

Other studies have looked at the factors that contribute to participation in conservation programs. Lambert et al. (2007) tried to determine the profiles of US farm households that adopt conservation-compatible practices and found that smaller farms, particularly operators who consider themselves retired or whose primary occupation is something other than farming, were interested in programs that would save time and effort and not require major changes to their practices. Several other studies have been done on the factors leading to participation in various conservation programs. Some of these include Lichtenberg and Zimmerman (1999) Pease et al. (1997), and Zbinden and Lee (2005).

Napier et al. (1995) administered a random survey to Ohio landowners to gauge their attitudes towards a wetlands trading system, which would involve buying rights to establish permanent wetlands on the landowner's property. This survey showed that there was likely enough interest in the program, and that the landowners most willing to participate were small, part-time farmers who already owned wetlands and who were environmentally conscious

Other research on this topic includes marketing strategies for conservation programs, specifically the language and terms that best resonate with potential participants. One study on this topic was commissioned by The Nature Conservancy (TNC) and is titled “Communicating with the Public About Nature’s Benefits”(Metz and Weigel 2010). This study relied on multiple survey methods to determine which terms dealing with ecosystem services were the most understandable and most agreeable, and which sources of information would be the most trusted. The study also broke down the respondents into different socioeconomic sub-groups so that differences among the groups could be ascertained.

This master’s project adds to the body of research on potential participation in emerging markets for ecosystem services. Specifically, it will explore farm-operator attitudes in California, provides a comparison to an earlier study conducted in North Carolina, and provides guidance for those interested in the development of these programs. Policymakers, potential administrators, and landowners who are looking to develop, administer, and participate in future ecosystem service markets will find these findings useful.

## **Methods and Procedures**

### **California Survey Development**

The survey developed for this study was largely modeled after a survey carried out by Duke University researchers Randall Kramer and Aaron Jenkins titled “Ecosystem Services, Markets, and Red Wolf Habitat: Results from a Farm Operator Survey”(Kramer and Jenkins 2009). This survey was intended to examine farm operator attitudes towards current conservation programs, their interest in participating in future programs, and the potential use of

market-based incentives to encourage greater conservation effort. In particular, the North Carolina survey focused on the potential financial flows from ecosystem service benefits associated with conserved red wolf habitat in North Carolina.

The California survey was similar to the one implemented in North Carolina – the focus was on farm operator’s past participation in conservation programs and future participation in potential new conservation payment programs. For the most part, the California survey asked similar, if not identical, questions to the North Carolina Survey. Only some specific terms and wording of questions was changed. The two surveys were intended to be similar to one another to allow for a close comparison of the results from the two surveys.

An additional resource that aided in the development of the California survey was an advisory committee composed of academic researchers, ranchers, and staff from agricultural and environmental non-profit organizations. This advisory committee was formed to guide the modification of the California Survey.

### **Focus Group**

To improve and refine the survey instrument, a focus group was held on February 13, 2010 at the Yolo Land and Cattle Company ranch in Winters, CA (Yolo County). Seven ranchers participated and reviewed the survey to ensure that the questions accurately captured important features of ranching operations and current conservation practices implemented by ranchers in California. The ranchers were all white males from Alameda, Contra Costa, Yolo and Butte County in Northern California ranking. Frank Casey <sup>1</sup>and Pelayo Alvarez <sup>2</sup>served as

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the focus groups moderators.

With the information from the focus group as well as suggestions from the advisory committee, some changes were made to several questions. For instance, some questions were refined to reflect conservation programs unique to California, and a question related to the “stacking” of ecosystem service payments (allowing multiple payments for different ecosystem service enhancements on one piece of land) was added that asked respondents about their opinions on this subject. In addition, the choice questions, which were intended to estimate the rancher’s preferences towards different payment for ecosystem service (PES) program attributes, were modified to reflect the payment levels that would be realistic in California.

## Implementation

On June 1, 2010, three hundred and eighty surveys were mailed to the California Cattleman’s Association (CCA) (200 members), the California Rangeland Trust (CRT) (140 members) and the California Woolgrowers Association (CWA) (40 members). For the CCA, 1-3 ranchers from each county in the California Rangeland Coalition focus area (described below) were selected to receive surveys. The CWA only sent surveys to its members that owned ranches. Finally, the CRT only sent it to ranchers with current and pending conservation easements. Every survey included a cover letter from the respective organization (CCA, CRT, or CWA) explaining the purpose of the survey and encouraging the member to fill the survey out. The final version of the survey and the cover letter can be found in Appendix B. All of the people who received surveys were within the boundaries of the California Rangeland Coalition focus area, shown in Appendix A. This focus area was identified by the California Rangeland Coalition as the area in California containing the lowest levels of conservation management that

still maintained high biodiversity values, and which could benefit from better ranching practices.

In addition to the mail survey, an online version of the survey was created on June 16 with Surveymonkey.com, and the link was distributed through electronic newsletters by the California Rangeland Conservation Coalition (1,400 people received the newsletter – not all of them ranchers), and the CCA (1,000 people received the survey - not all of them ranchers). The online survey was also mentioned during several meetings and events where an estimated 250 producers were verbally informed about the online survey. In addition, the 20 written surveys were handed out directly to various producers at these meetings.

For the mail survey, a postcard reminder was mailed out on July 21, and at the same time a reminder was posted on the previously mentioned email newsletters. In addition, personal emails were sent from CCA to ranchers to remind ranchers to participate in the written or online survey. Such personalized targeted emails were sent to 105 ranchers. The survey was officially closed on September 13, 2010 and no more surveys were accepted after that time.

## **Data Management**

There were ten different versions of the survey because the choice question (question 24) required that a wide range of choice options (combinations of different attribute levels) be provided. To track the different versions, each survey was marked with the survey version and given an identification number. In addition, a dot on the survey indicated that the survey came from a member of the CCA. No dot indicated that it came from a member of the CRT. Since the surveys were returned to the California Rangeland Conservation Coalition (CRCC) office, they had to be scanned into PDF form and emailed to the Defenders of Wildlife DC headquarters to be processed and entered into a spreadsheet.

After being sent to the DC office, the data were entered into an Excel spreadsheet. To enter the data uniformly, a survey key was developed to specify how the survey was to be coded and input into the spreadsheet. All of the comments from both the written and online surveys were entered into a written document and the spreadsheet. Ben Parkhurst entered 142 of the surveys, and Molly Cheatum entered 14 surveys. To check for errors in the data entry process, every other written survey was re-checked for errors and the STATA and excel coding was checked multiple times to ensure the accuracy of the statistics.

## Error Structure

Although efforts were made to get a representative sample of the population of ranchers in California, there were certain assumptions that had to be made at several points in the survey, and there are several other possible sources of error in the survey(Rea and Parker 2005). It is important to acknowledge these potential shortcomings when considering the results of the survey. In particular the results of the survey may be impacted by non-random sampling, self selection, limitation of choices, coverage error, item non-response, response bias, online vs. written response bias, among other sources of error.

### *Non-Random Sampling*

The most important source of error in the study comes from the non-random sampling strategy used to determine who received surveys. Although members of the CCA were chosen at random, the other surveys were sent to the entire membership that owned ranchers or easements. This was done because the total number of members in the respective organizations was relatively small, so random sampling of these organizations wouldn't have generated enough responses. Ideally, a representative sample from the entire population of farm operators in

California would have been chosen to receive the survey; however, in the absence of a comprehensive list of Californian farm operators, a non-random sampling strategy had to be used. As a result, only members of the CCA, the CRT, and CWA received surveys, and farm operators not belonging to these organizations are not represented.

### *Self- Selection*

The survey was voluntary, so only respondents who were motivated to fill out and return the survey were included in the sample. Voluntary surveys tend to attract respondents that feel strongly about the topic at hand. For example, ranchers who are particularly passionate about conservation or who particularly detest government intervention may be more likely to respond. In contrast, respondents who are more moderate in their positions may be less likely to respond. This can polarize the response results, with the most extreme viewpoints more often present than in the population. In addition, there may have been people who don't speak English as a first language, or who had reading or writing deficiencies that were inadvertently excluded from the sample. As a result, we can't infer that the results from this sample are indicative of the population of Californian farm-operators as a whole (Rea and Parker 2005).

### *Limitation of Choices*

Several questions in the survey include lists of choices for the respondents to choose from. For example, when asking about how ranchers would like to see the county developed in the future, the survey gives seven options. There are an infinite number of ways that the county could be developed in the future, but in the interest of readability and space constraints only seven options were given.

### *Hypothetical Programs*

Respondents were asked to make choices on programs that don't exist. As a result, they

have no concrete basis for comparison except to existing conservation programs which may or may not be very similar. So there is inevitably some bias in how particular ranchers conceive of hypothetical programs; not everyone is envisioning the programs in the exact same way.

#### *Strategic Response Bias*

If respondents believe they may be able to influence the structure of a future program, they may respond to questions strategically. For example, a respondent may reveal that they would only participate in programs with higher payments even though they would actually participate in programs at lower payment levels.

#### *Coverage Error*

The survey responses were not uniformly distributed throughout the focus area. This leads to coverage error where some areas are better represented than others.

#### *Item Non-Response*

Some questions were skipped more than others, which leads to item non-response bias in some of the questions. This is because the respondents are free to only respond to questions that they feel comfortable with, and will avoid questions that they don't feel like responding to.

#### *Online vs. Written Response Bias*

Written surveys tend to have higher response rates for individual questions because respondents are more likely to finish a written survey once they start it than an online survey. This may be because online surveys are subject to more distractions, which can increase the chances that the survey will not be completed in its entirety.

## Comparison of North Carolina and California Surveys

The data from the North Carolina survey were obtained by contacting Aaron Jenkins at the Nicholas Institute for Environmental Policy Solutions. A detailed discussion on the development and analysis of this data can be found in the report: “Ecosystem Services, Markets, and Red Wolf Habitat: Results from a Farm Operator Survey.”

To compare the results of the two surveys, the relevant data from both surveys were combined into a single spreadsheet. This allowed for the direct comparison of related questions, in particular, the questions relating to the socioeconomic characteristics. In addition, the results from the econometric analyses (the choice questions) were compared to highlight the differences in rancher preferences for a potential PES program. All of the statistical comparisons were done using STATA and Excel.

## Choice Experiment

Choice experiments can be used to estimate the relative ranking and economic values of different attributes of a program. Such analyses inform policy makers because they not only reveal the preferences of the respondents, but they also show approximately how much more (or less) respondents would need to be compensated to accept a program with different combinations of attributes. This technique is unique in that it is primarily used to investigate tradeoffs that people must make between different goods and policies (Louviere, Hensher et al. 2000).

For example, when deciding whether to enroll in conservation programs, ranchers face a tradeoff between the payment from enrolling in the program and the forgone revenue from continuing to ranch. If the payment isn’t high enough to make up for the increased hassle of adopting the new land management practices, then ranchers will opt out of the program and

continue to ranch as they did before. Choice experiments are therefore useful because they break down the influence of the various factors regarding enrollment and then rank them by their relative influence on the decision. In the California Rangeland Survey, specifically, respondents were asked to make tradeoffs between the amount of compensation they would receive, how long the contracts last, and who would administer the program. It should be noted that not all conservation programs result in reductions in ranching productivity. In some cases the programs won't affect productivity, or can even increase productivity.

### **Format**

Following Kramer and Jenkins, the main attributes of a PES program considered in this section were: program administrator, contract length, and payment level. Question 24 was used as the stated choice question in this survey. This question asked respondents to complete a series of choice questions comparing alternative versions of a potential Payment for Ecosystem Service (PES) program. In each question, the respondents were given a choice between two sets of options and asked to choose which option they preferred (or “neither” if they didn't like either set of options). Depending on which versions of the program the respondents preferred, the values of the various attributes were determined and subsequently ranked for the total sample of ranchers that responded to the survey. A description of these attributes and an example menu can be found below:

**Table 1. PES program attribute descriptions and levels used in conjoint analysis**

Attributes	Description	Levels
<b>Contract Length</b>	Amount of time that land can be enrolled in a conservation program	5, 15, 30 years
<b>Program Administration</b>	Organization that would administer the program	Federal Agency State Agency Conservation Organization Private Company
<b>Payment Level</b>	Rental payment (per acre, per year) for enrolling land in a program	\$5, \$10, \$20, \$50

**Example menu (from survey version 1)**

Program Features	Program A	Program B	Neither
Contract length	30 years	15 years	
Program administration	Non-profit organization	State agency	
Payment level (per acre per year)	\$20	\$5	
<i>Please indicate your preferred program (circle one)</i>	I would prefer Program A	I would prefer Program B	I would not participate in either program.

There were five choice questions on each survey and ten different versions of the survey for a total of 50 different menus that had different combinations similar to the one above. As a result, there was enough variation in the attributes to get a good estimate for the preferences of the ranchers.

The results from these questions were econometrically analyzed after the responses were collected. Econometric analysis involves combining statistical tools with economic theory to help analyze economic problems. In this case, the economic problem involves the under-



allocation of public goods. The public goods in this survey are the benefits that come from ranchland - i.e. water filtration, wildlife habitat, and air pollution filtration). Public goods can cause problems because they typically benefit not only the landowner on whose property they are produced, but also others whom receive these services for free. Because landowners cannot exclude others from enjoying these benefits and charge them for these services, there is no financial incentive to make land use decisions that benefit society as a whole by maximizing the provision of environmental benefits (Kroeger and Casey, 2007). For ranchers to provide more environmental benefits, incentives must be provided. The results from this survey can therefore be used to approximate what payment levels will entice ranchers to participate in PES programs.

The statistical tool used for this type of analysis is called a conditional logit model with fixed effects. This model is intended to examine the influence that program attributes have on a respondent's choice of two hypothetical programs (A and B), and the status quo (Neither). This model basically estimates the likelihood that a rancher will participate in a program, given any combination of options. The "status quo" variable is a dummy variable indicating that the respondent selected the "Neither" response, and would *not* participate in the programs presented to them. The rancher preferences given below are therefore based on the attribute's influence on the likelihood of a rancher participating in a PES program. The following section provides the results from this analysis.

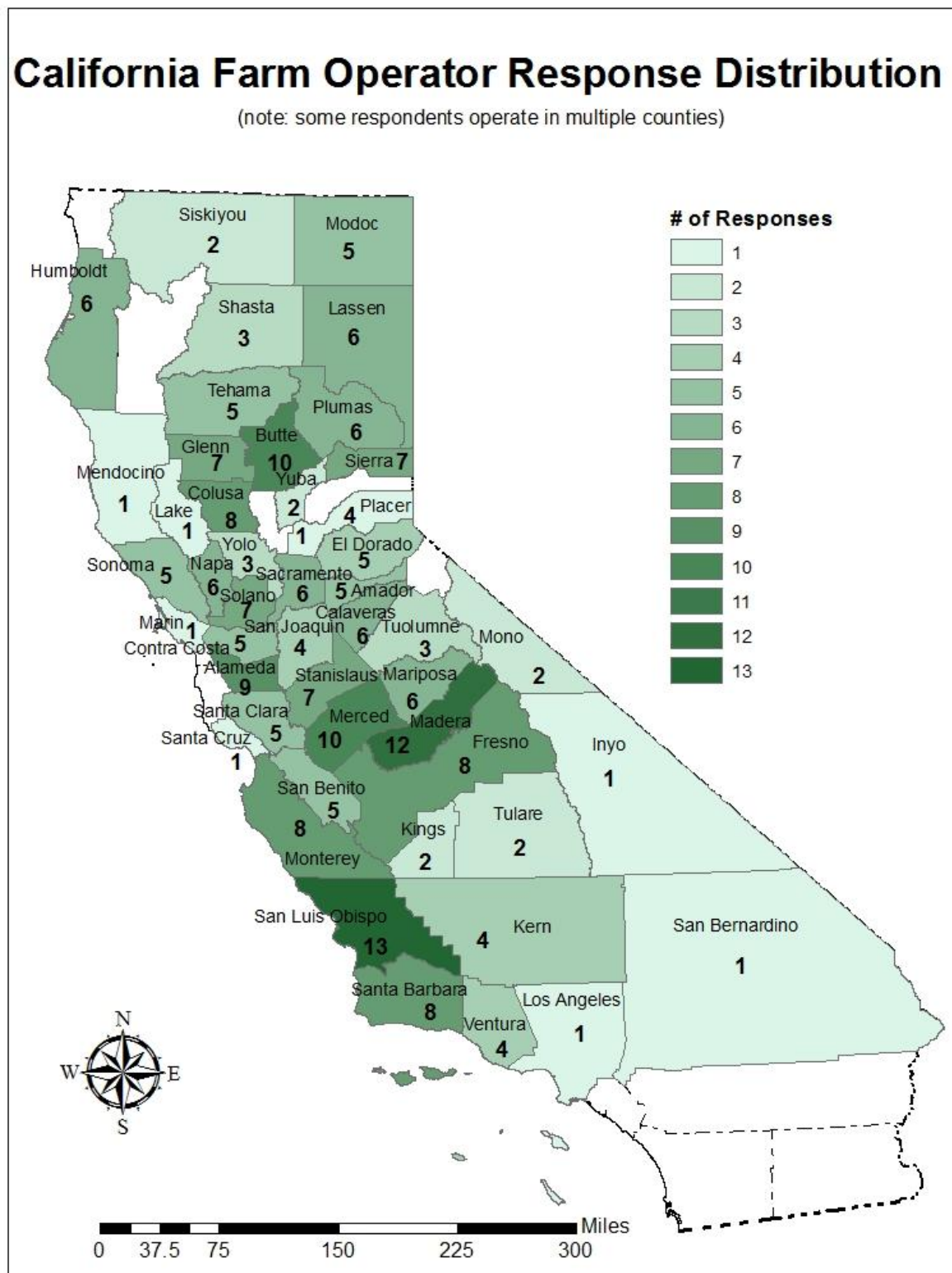
## **Results**

This section summarizes the socio-economic characteristics of Californian farm-operators as well as the data relating to potential participation in potential PES programs.

## Responses

Of the 380 written surveys mailed and directly given to producers, 94 surveys were completed and returned. This represents a 23% response rate for the written surveys. For the online surveys, 91 respondents opened the survey, 64 respondents started the survey without completing it, and 42 completed the survey in its entirety. In total, there were 158 surveys that were used in the analysis. However, there was some difficulty in differentiating between the surveys versions for 32 of the online surveys, so these were excluded from the analysis of the choice questions. The geographical distribution of respondents (the counties in which they operate) can be seen in the map on the following page.

Figure 1. Survey Response Distribution

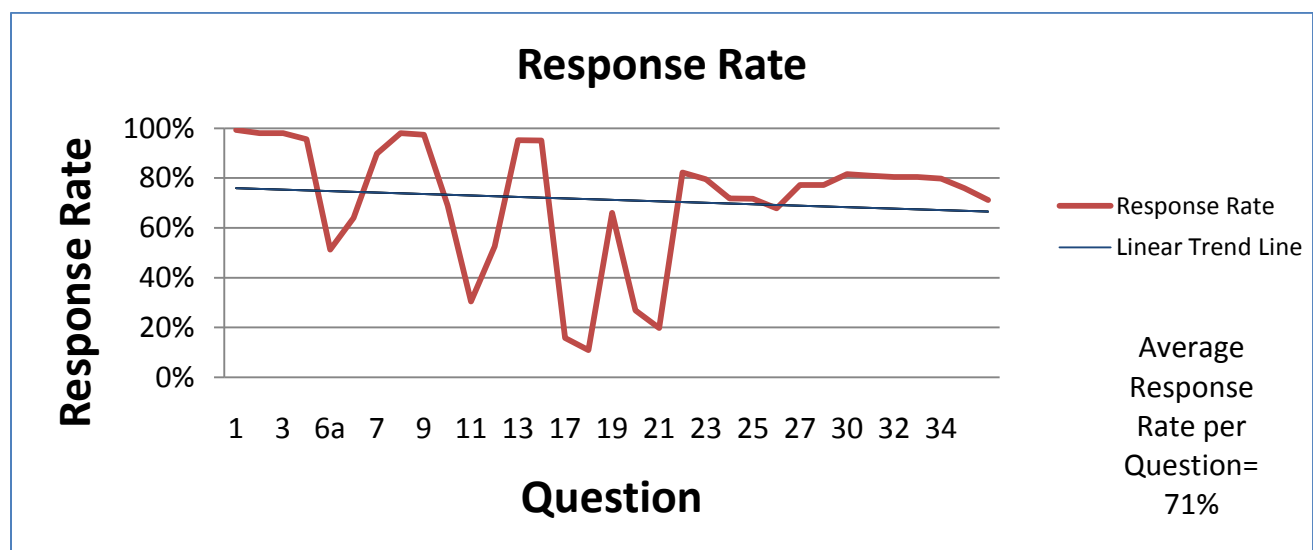


**Table 2. Responses used in the Analysis**

	Total surveys mailed and given out	Usable Hard Copies returned	Usable Online responses	Total usable surveys
General Analysis	410	94	64	158
Conjoint Analysis	410	94	32	126

On average, 71% of the questions were answered, but there was a slight downward trend in the number of questions being answered as the survey went on. This was likely caused by the online surveys, where some of the respondents seemed to quit in the middle of the survey. Nearly all of the people who responded to the written survey completed the survey, so mid-survey quitting wasn't a problem with the written surveys. The slight downward trend in the response rates can be seen in the following graph:

**Figure 2. Average Response Rate Trend**

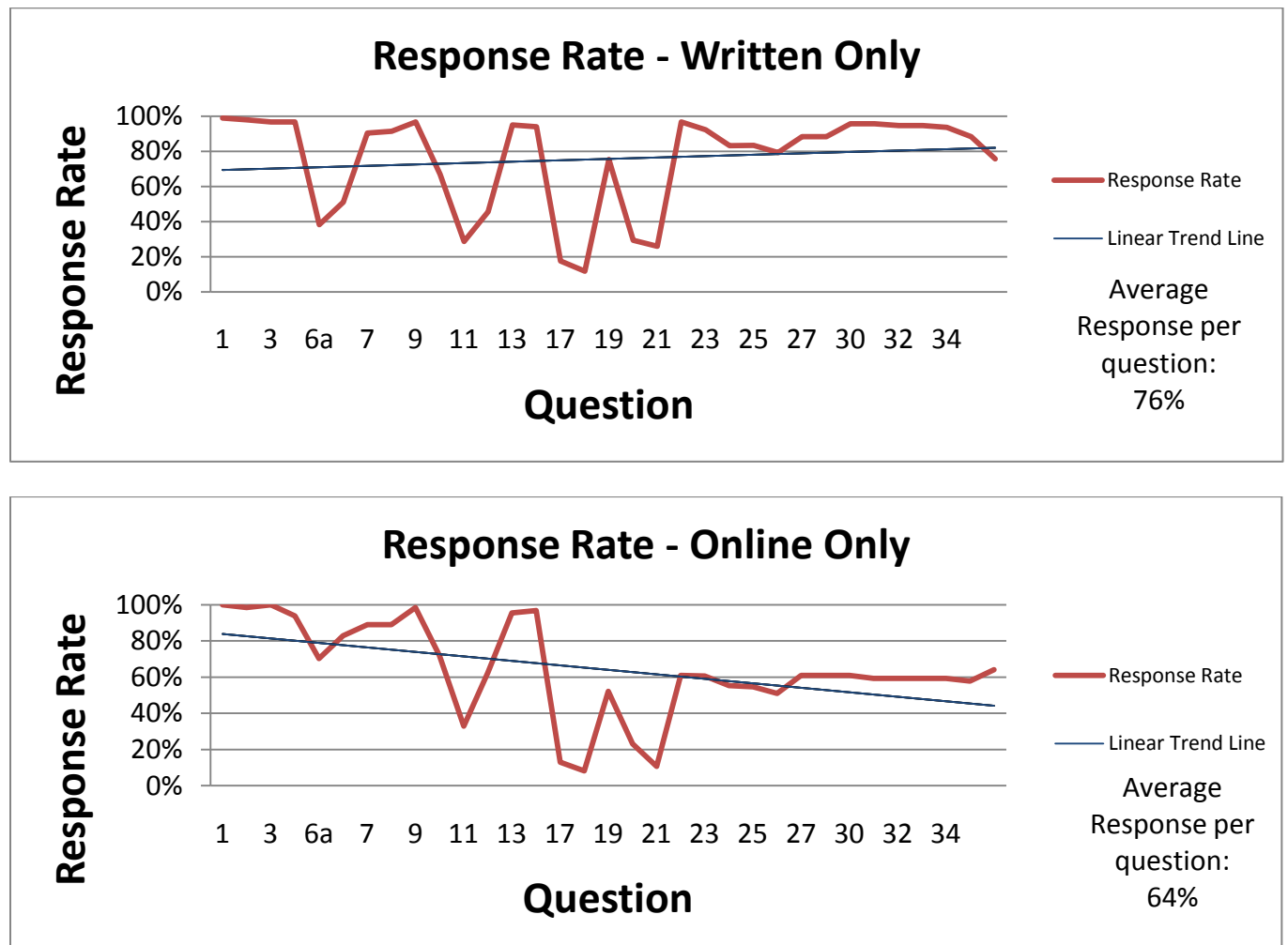


### Online vs. Written Response Trend

The following graphs demonstrate how the response rate per question differed between

the written and online surveys:

**Figure 3. Written vs. Online Response Rate per Question**



The dips in the graph are caused by questions that were skipped by a lot of respondents. The questions that were skipped the most usually contained large matrices with lots of different questions and choices. This may have been because respondents simply decided to skip through these questions instead of reading through all of the choices. Another explanation for the low-response rate questions had to do with questions that didn't pertain to a large portion of the respondents. For instance, question six asked if the respondent rents out their land, so they

would have skipped this question if they do not rent their land.

An interesting finding is that the vast majority (96%) of respondents who received the *written* survey completed it. This is shown by the proportion of respondents who answered question 31 (96%), which was on the last page of the survey. In addition, the slightly positive trend in the written response rate shows that most of the respondents who started the survey finished it.

In contrast, only 59% of respondents completed question 31 of the online survey. This shows that over 1/3 of the online respondents didn't make it to the end of the online survey. In addition, the steep decreasing trend line reveals how the response rate per question dropped over the course of the online survey. This finding is indicative of online surveys: it is much more likely that people get distracted while taking an online survey than while filling out a written survey.

## Descriptive Statistics

The following section provides a summary of the descriptive statistics from the 158 useable surveys. Approximately 75% of the respondents were male and 86% were age 46 or greater. Over 65% of respondents earned at least a 4-year college degree. Most of the ranchers were long-time residents of their respective counties (48.16 years on average) and most of the ranches were privately owned (54%). Also, 71% of the respondents either worked outside of the farm, or had a family member who worked off of the farm for supplemental income. The median household income was \$10,000 – \$25,000 dollars, but the most frequent response was that they lost income (23% respondents). Table 3 reveals a summary of the demographics of the survey respondents.

**Table 3. Demographics**

	Gender	Age	Education	Yrs. lived in resident county	Ownership Structure	Work off farm?	Household Income
Question #	30	31	32	34	7	35	36
Stat	75% Male	86% ≥ 46 yrs.	65% ≥ 4-year degree	48.16 yrs. (mean)	54% private individual	71% of respondents	\$10,000- \$25,000 (median)

The land management summary statistics are provided in Table 4. The average respondent had been ranching in California for 28 years, and their family had been ranching in California for an average of 82 years. The most frequent response for the number of acres owned was <1,000 acres (42%), and the median number of acres owned was between 1,000 and 3,000 acres. In terms of the amount of leased land, the average respondent leased less than 5000 acres of both public and private land (82%). When considering whether the ranch would stay in the family, there seemed to be a significant amount of uncertainty; a little more than half of the respondents (55%) indicated that they either weren't sure or didn't believe that the ranch would be passed on to a future generation.

**Table 4. Land Management**

	Yrs. personally farmed	Yrs family has farmed in area	Believe next generation will farm?	Acres Owned	Public acres leased	Private acres leased
Question #	1	2	3	5	6a	6b
Stat	28 years	82 years	Yes 45% No 21% Don't Know 34%	1,000- 3,000 (median)	<5,000 (median)	<5,000 (median)

Additional summary statistics on land management are provided in Table 5. The average respondent was primarily a private land owner (54%) who used the land to raise cattle (88%). Of

the 67% of the respondents that use their land for hunting, 67% of the respondents indicated that they didn't make any money from hunting leases. However, 12% said that they made more than \$10,000 per year from hunting leases, and 33% said that they made somewhere between \$1 and \$10,000 per year (see Appendix 1 for a complete breakdown). Lastly, when responding to the influence that renters have on participation in land conservation programs, both renters and owners revealed that the renters have relatively little influence on decisions to enroll in conservation programs.

**Table 5. Land Management (cont.)**

	Ownership structure	Primary land use	Land used for hunting?	Money from hunting leases	Renter Influence (1=No Influence, 5= Complete Influence)	
Question #	7	8	9	10	11	12
Stat	54% private	88% cattle	Yes 67% No 32%	\$0 (median)	1.78 (Owner's perspective)	2.67 (Renter Perspective)

When asked about local development priorities, the respondents felt that the following issues were either important or very important: the viability of future ranching, the preservation of a rural feel, the protection of habitat for wildlife, and the relative influence of ranchers on county development. The following issues were much less important: the promotion of industrial or commercial development, eco-tourism, and the promotion of real estate.



**Figure 4: Local Development Priorities (Q13)**

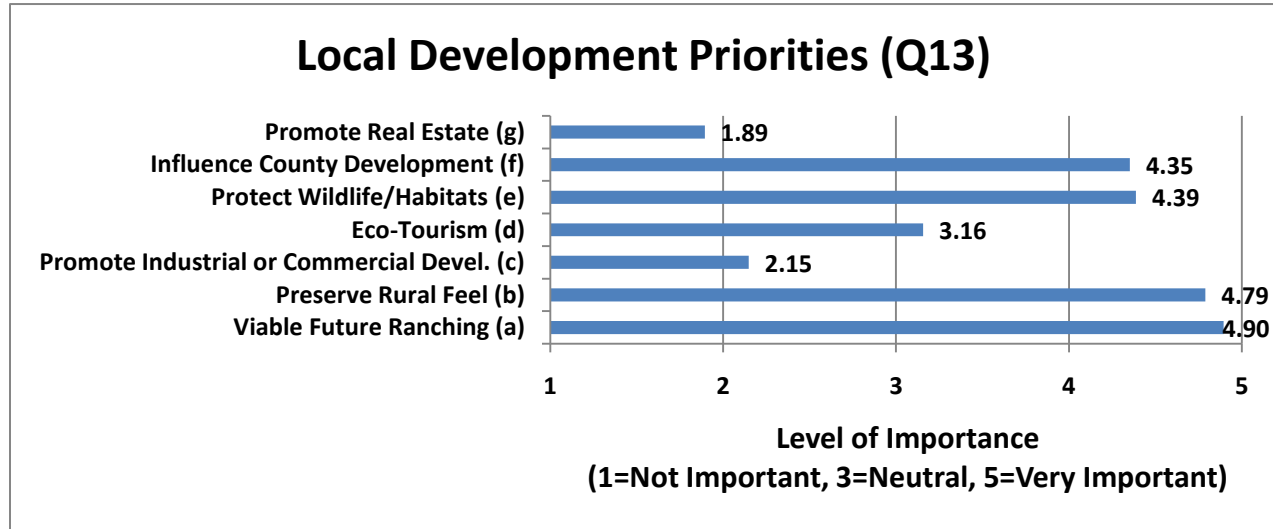


Table 6 shows the responses dealing with current, past, and future participation in conservation programs. The majority (77%) of the respondents said they would consider participating in a program in which they would receive payments to improve the quantity and/or quality of environmental benefits that their land provides to society. The reaction to the proposed creation of a program to improve habitat for wildlife was also favorable. The most important feature of a program would be the payment level, followed by the program administrator, and lastly the contract length.

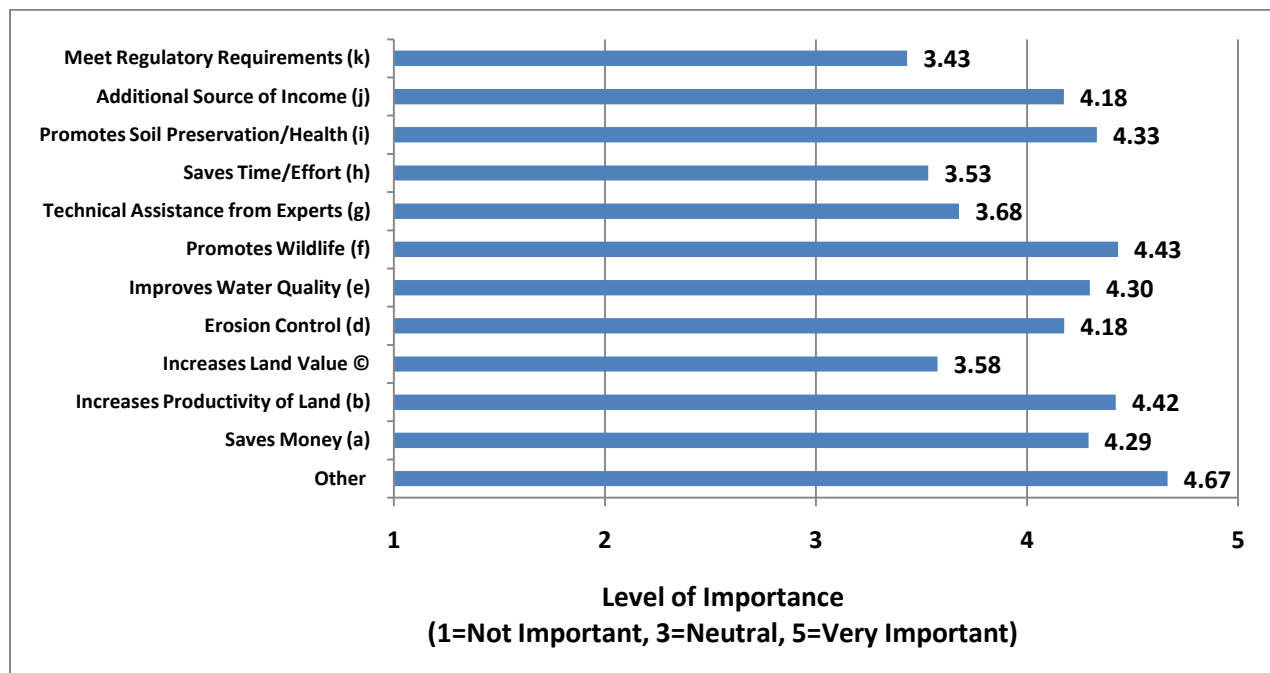
**Table 6. Conservation program participation – past, current, and potential**

	Consider participating in PES program?	Initial reaction to the creation of PES programs	Importance of program features (Q25) (1=Not Important, 5= Very Important)		
Question #	22	27	Contract Length	Program administrator	Payment level
Stat	Yes: 77% No: 8% Don't know:15%	4.01 (1=Strongly Oppose, 5=Strongly Favor)	4.13 (mean)	4.16 (mean)	4.42 (mean)

In addition, respondents were asked to indicate some of the reasons that they didn't participate in existing conservation programs. The most often cited reason for not participating was "concern about government restriction and/or access on private property" (35%) of respondents). The other most cited reasons were: "too much paperwork/general hassle" (18%), "didn't understand how to apply" (17%), "pay not high enough" (13%), and "not accepted into program" (11%). The complete results can be found in Figure 5.

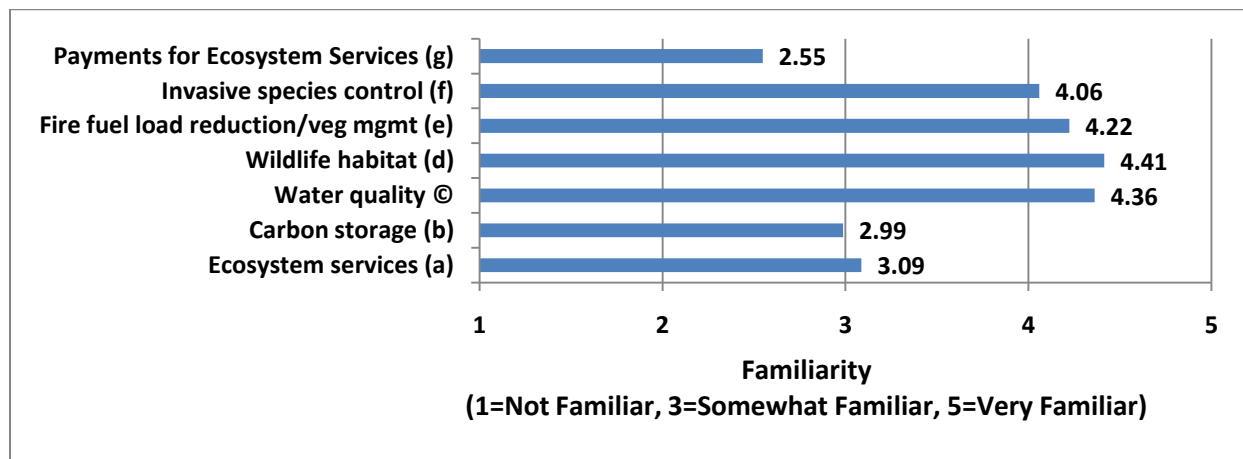
When given a chance to rate the importance of various aspects of conservation programs, the respondents showed that the following were most important to them: the promotion of wildlife, increased land productivity, water quality improvements, soil preservation/health, erosion control, and additional sources of income. The respondents cared less about increasing land values, getting technical assistance from experts, saving time/effort, and meeting regulatory requirements.

**Figure 5. Important Aspects of Conservation Programs (Q19)**



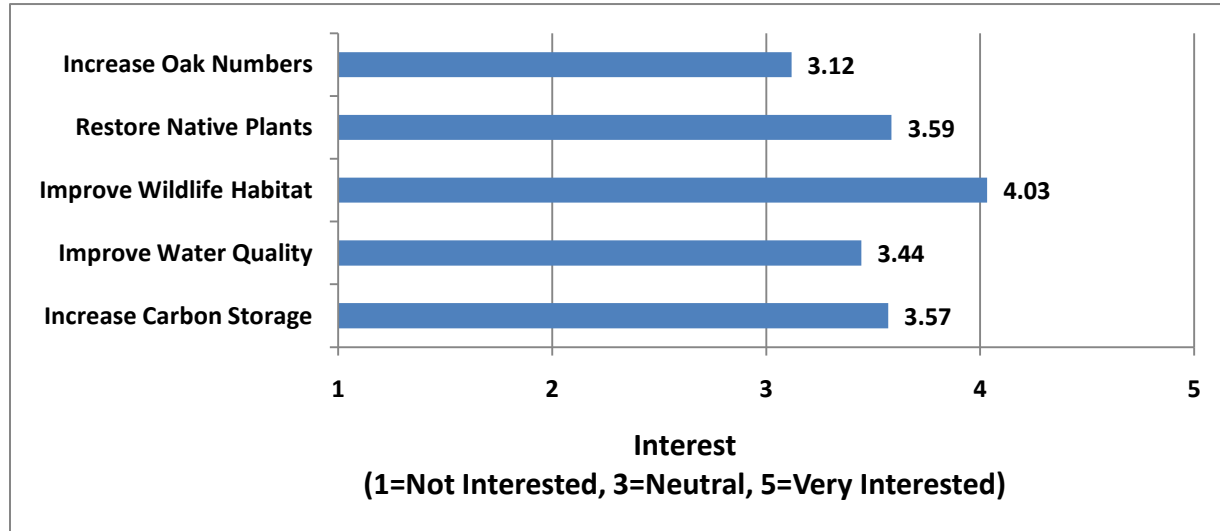
Questions 15 and 23 were intended to gauge the respondent's familiarity with terms regarding ecosystem services as well as their interest in adopting practices to enhance ecosystem services. The ranchers weren't too familiar with the terms "ecosystem services" (mean=3.09), or "payments for ecosystem services" (mean=2.55), but were more familiar with "wildlife habitat," "water quality," "fire fuel load reduction/vegetation management" and "invasive species control." The respondents were also unfamiliar with "carbon storage (mean=2.99)."

**Figure 6. Ecosystem Service Term Familiarity (Q15)**



Lastly, the respondents showed that they were somewhat interested in practices to enhance ecosystem services. Improving wildlife habitat generated the most interest (mean=4.03), and there was at least some interest in increasing oak numbers, restoring native plants, improving water quality, and increasing carbon storage; all had average interest levels between 3 and 4.

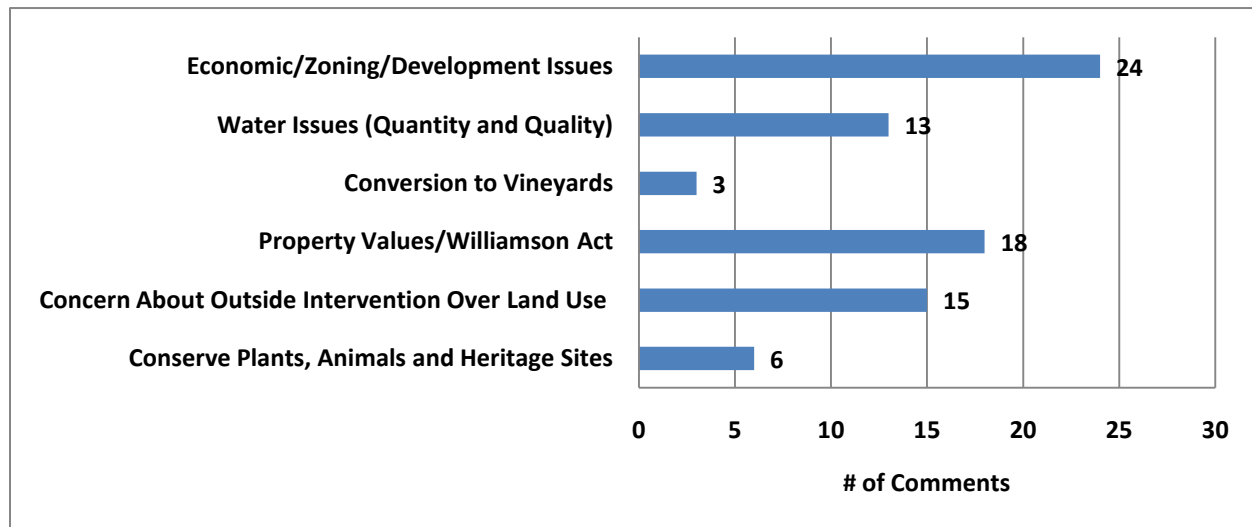
**Figure 7. Ecosystem Service Interest (Q23)**



### Written Comments

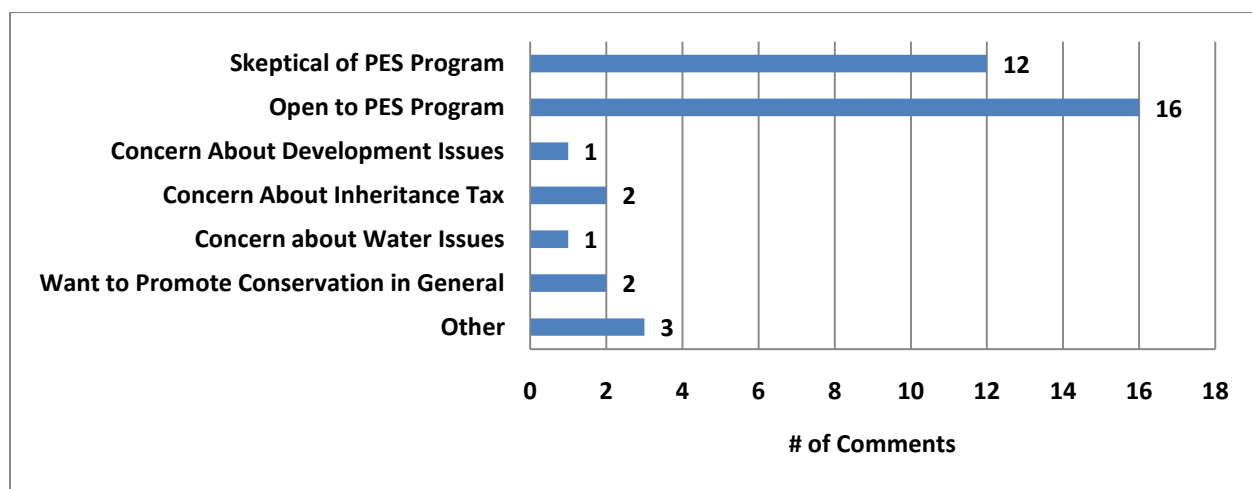
In question 14 the survey respondents were given the opportunity to voice any local issues that were particularly important to them. Of the 158 total respondents, 73 (58%) respondents left comments, which were grouped into 6 common categories. Some respondents left more than one comment, so the total number of comments came to 79. The distribution of these responses can be found in Figure 8.

**Figure 8. Categorization of Local Development Comments (Q14)**



Further comments were given in question 29, where respondents were given the opportunity to provide any information, opinions, or comments on efforts to promote wildlife conservation on California Rangelands. Thirty-eight people (30%) chose to leave a comment for this question, and these responses were grouped into the seven different categories. The most common comments dealt with reasons why respondents were either in skeptical or open to participation in payments for ecosystem services (PES) program.

**Figure 9. Additional Comments (Q29)**



## Statistical Analysis

To start with, the correlations of variables thought of as candidates for explaining potential participation in a PES program (Q22) were compared. A reduced table (with the most interesting correlations) is shown below. The strongest correlations in the table were the following:

1. The positive correlation between number of conservation programs *currently* enrolled in and *potential* enrollment in future PES programs
2. The positive correlation between expecting the youngest generation to ranch, and number of programs currently enrolled in

It's interesting to note that there were not many significant correlations with the socioeconomic variables (age, education, income). However, correlation doesn't imply causation, and the following section on the regression analysis helps to tease out the influence of the individual variables.

**Table 7: Correlation Matrix**

	Potentially Participate in PES Program?	Expect Youngest to Ranch	Enrollment in Conservation Programs (#)	Age	Education	Income
Participate in PES Program?	r=1					
Expect Youngest to Ranch	r=.13 P=.16	r=1				
Conservation Programs (#)	r=.18 P=.03	r=.27 P=.001	r=1			
Age	r=.03 P=.74	r=.06 P=.53	r=.16 P=.07	r=1		
Education	r=.02 P=.83	r=-.05 P=.55	r=-.01 P=.84	r=-.04 P=.58	r=1	
Income	r=.12 P=.18	r=.01 P=.92	r=.13 P=.15	r=.05 P=.54	r=.13 P=.12	r=1

(Note: r = correlation coefficient, P = p-value, red = significant at  $\alpha = .1$ )

## Econometric Evaluation of the Choice Experiments

This section presents the relative preferences of the ranchers regarding the different program attributes. This information will be valuable to those responsible for implementing PES programs. First, the methods are discussed; second, we analyze the results of the rancher's preferences; and lastly, we provide recommendations on policy implications and the feasibility of a payment for ecosystem services program.

### Analysis of Farm-Operator Preferences

Several attributes were found to have statistically significant effects (at the 5% significance level) on the respondent's selection of a potential PES programs. A statistically significant coefficient shows that the presence of a particular attribute (such as payment level, program administrator, etc) made it either more or less likely that the rancher would participate in the program presented to them. In contrast, attributes that were found to be non-statistically significant *don't* have an influence on the rancher's decision to participate. The following attributes were found to have a *significant* influence on the rancher's decision to participate:

- Status Quo
- Contract length
- Payment level
- Program administration by a state government
- (But *not* program administration by a private company)

For the contract length and payment level attributes, ranchers showed a preference for shorter contract lengths and higher payment levels. Specifically, for every year added to the contract, the amount paid to the rancher would have to be increased by \$.81/acre (Table 4.2). For example, enrollment in a 30 year program would require \$24.30/acre in additional compensation. Also, the positive coefficient on the payment level variable (.040) shows that as payment level increases, the likelihood of enrolling in a program increases. Both of these results

are to be expected based on common sense: ranchers are more likely to enroll in programs if they have short contracts and are paid larger amounts of money.

### Socioeconomic Variables

Age, education, income, and number of conservation programs currently enrolled in were used to assess the influence of socioeconomic factors on respondents' choice decisions. To determine their influence, the socioeconomic variables had to be interacted with the status quo (SQ) variable because they could not enter into the model on their own since they do not change over choice occasions (Louviere, Hensher et al. 2000).

The variables that were shown to make respondents *more* likely to choose neither program were age and education. As age increased, the likelihood of circling neither increased, and increasing amounts of education also increased the likelihood of circling neither. The variable that made respondents *less* likely to circle neither was the number of conservation programs currently enrolled in. As the number of programs enrolled in increased, the likelihood of circling neither decreased. The income variable was insignificant, which shows that income is not a good predictor of future enrollment in conservation programs.

Lastly, the status quo variable was significant and negative. The status quo variable indicates that the ranchers circled the "neither" response. By circling "neither," the respondents indicated that they have a preference for their current ranching practices relative to the proposed program alternatives. In this survey, since the status quo coefficient variable was significant but *negative*, this indicates that respondents preferred one of the program alternatives to maintaining the status quo, as long as the program attributes were adequate. This is backed up by the proportion of landowners who said they preferred one of the programs to the status quo (circled



Program A *or* Program B). Specifically, of the respondents who answered the question (~72% filled out the choice questions) 74% said they would participate in one of the programs (circled Program A or B), and 26% circled “neither.” Specifically, 38% chose Program A and 36% chose Program B. This last result is important because it shows that there wasn’t any bias in how people selected the programs (approximately equal preference for Program A and Program B).

### **Program Administrator**

The respondents revealed the following preferences (in order of most preferable to least preferable) for program administration:

1. Conservation Organization
2. Private Company
3. Federal Agency
4. State Agency

The conservation organization was shown to be the most preferred administrator, and was therefore used as the baseline to compare the other administrators. The preference for a conservation organization implies that ranchers would require higher payment levels if a private company, federal agency, or state agency were the administrator. However, given that the federal agency and private company variables were not statistically significant, respondents were relatively indifferent between administration by a private company or a federal agency. The state agency, in contrast, *was* statistically significant, indicating that ranchers *would* prefer a private company or a federal agency over a state agency, given a choice between the three.

### **Price of Attributes**

To calculate the approximate amount of additional compensation that would be required (per acre of land enrolled in the program) for administration by the different agencies, the

marginal values (or implicit prices) were calculated by dividing the negative of the coefficient on each attribute by the coefficient on the payment variable. This gives the additional amount of money rancher's required to be indifferent towards administering agencies. The additional compensation required for each administrator (beyond that of the conservation organization) is as follows: administration by a private organization would require \$2.28/acre in additional compensation, administration by a federal agency would require \$11.50/acre of additional compensation, and administration by a state agency would require \$25.22/acre in additional compensation. The complete results from the econometric evaluation of the conjoint analysis can be found in Table 8.

**Table 8. Conditional logit model of responses to choice questions**

Variable	Coefficient	Z-Value	<sup>1</sup> P-Value	Marginal Value
<b>Dependent Variable: Respondent Choice</b>				
Status Quo	-5.03***	-3.9	0.000	
Contract Length	-.033***	-4.03	0.000	\$0.81
Federal Agency	-.465**	-1.90	0.058	\$11.50
Private Company	-.092	-0.43	0.668	\$2.28
State Agency	-1.02***	-4.50	0.000	\$25.22
Payment Level	.040***	8.17	0.000	
SQ * Age	.70***	2.83	0.005	
SQ * Education	.296***	2.31	0.021	
SQ * Currently Enrolled in Programs	-.478***	-5.31	0.000	
SQ * Net Income	-.05	-1.02	0.306	

\*\*\* Significant at the 1% level; \*\* Sig. at 5% level; \* Sig. at 1% level

The P-value indicates the probability that the coefficient from the population of Californian ranchers has a significant impact (the coefficient  $\neq 0$ ) on a rancher's choice to enroll in a program. For example, if you did 100 more mailings to 100 more random samples of ranchers, the status quo variable would be significant (different from zero) for about 99 of the samples, contract length would be significant for all 100 samples, federal agency would be different for about 75 of the surveys, private company would be different for about 50 of the samples, state agency would be significant for all 100 of the samples, and payment level would be significant for all 100 of the samples.

The above table can also be used to calculate the increased compensation required for any combination of the above attributes. Increased compensation is defined as the compensation

beyond that of a program with a contract length of 0 years and administered by a conservation organization. For example, a program administered by a federal agency that required a 10 year contract would need  $(\$11.50 + [10 * \$0.81]) = \$19.60/\text{acre}$  in additional compensation compared to a program administered by a conservation organization that did not have a time contract. For another example, a program administered by a state agency that lasted 20 years would require  $(\$25.22 + [20 * \$0.81]) = \$41.42/\text{acre}$  in additional compensation when compared to a program administered by a conservation organization that didn't have a time contract. Such calculations can be done for any combination of attributes to determine how much additional compensation would be required for ranchers to enroll in a program.

### **Comparison of Farm-Operators in North Carolina and California**

In this section, we compare some of the main statistics from the survey carried out by Duke University researchers Randall Kramer and Aaron Jenkins titled “Ecosystem Services, Markets, and Red Wolf Habitat: Results from a Farm Operator Survey”(Kramer and Jenkins 2009). As previously noted, this survey examined farm operator attitudes towards current conservation programs, their interest in participating in future programs, and the potential use of market-based incentives to encourage greater conservation effort. In particular, some of the key descriptive statistics are compared, including demographics, land management, conservation program participation, and finally the potential participation in future payment programs. It should be noted that some of the questions were slightly modified for the California survey, so not all of the statistics are in the exact same format.

**Table 9. Demographics**

	Gender	Age	Education	Yrs. lived in resident county	Ownership Structure	Members of family work off farm?
California	75% Male	46-60 (Median)	4 -Year Degree (mode)	48.16 yrs. (mean)	54% private individual	71% of respondents
North Carolina	94% male	60 yrs (mean)	High School (mode)	51 yrs (mean)	78% private individual	36 % of respondents

Farm operators in North Carolina were overwhelmingly male, whereas about  $\frac{3}{4}$  were male in California. Californian farm-operators were, on average, better educated, and there was more private ownership of land in North Carolina than California. Finally, about twice as many farm operators in California had a member of their family that worked off of the farm.

**Table 10. Land Management**

	Yrs. personally farmed/ranched	Yrs family has farmed/ranched in area	Believe next generation will farm/ranch?	Primary use of land	% w/ acres in permanent easement
California	28 years (mean)	82 years (mean)	Yes 45% No 21% Don't Know 34%	88% cattle	23%
North Carolina	30 years (mean)	75 years (mean)	Yes 38% No 29% Don't know 33%	84% agriculture	7%

Farm operators had personally farmed/ranched for approximately the same amount of time in both states, and their families had farmed/ranched about the same amount of time. Slightly more respondents in California believed that the youngest generation in their family

would continue to ranch (45% vs. 38%), and three times as many respondents in California had acres in permanent conservation easements than in North Carolina. The single largest difference between the two surveys was the primary use of land in the two states: in California the primary use of land was cattle (88%), and in North Carolina the primary use of land was agriculture (84%).

**Table 11. Conservation program participation –current and potential**

	Current Participation in conservation program	Consider participating in PES program?	Importance of program features (Q25) (1=Not Important, 5= Very Important)		
			Contract Length	Program administrator	Payment level
California	69% Yes 31% No	77% Yes 8% No 15% Don't know	4.13 (mean)	4.16 (mean)	4.42 (mean)
North Carolina	33% Yes 64% No	63% Yes 7% No 30% Don't Know	4.14 (mean)	3.81 (mean)	4.33 (mean)

There was higher participation in current conservation programs by Californians when compared to North Carolinian farm operators. Most of this difference can be accounted for by the Williamson Act in California. This program allows landowners to receive property tax assessments which are much lower than normal because they are based upon farming and open space uses as opposed to full market value(California 2007). This program is very popular among farm operators in California. There was slightly higher interest in potential PES programs in California (77% vs. 63%), and Californian farm operators placed slightly higher importance on program administrators (4.16 vs. 3.81) than in North Carolina. The importance of contract length and payment level was similar for both states.

## Comparison of Responses to Choice Questions

The following tables allow for a comparison of the North Carolina and California choice question results. Please note that conservation organization is the baseline administrator in the California model, and that state agency is the baseline administrator for the North Carolina model. This makes it easier to compare the *additional* amount that would need to be paid over the *preferred* administrator.

**Table 12. California conditional logit model of responses to choice questions**

Variable	Coefficient	Z-Value	<sup>1</sup> P-Value	Marginal Value
<b>Dependent Variable: Respondent Choice</b>				
Status Quo	<b>-5.03***</b>	-3.9	0.000	
Contract Length	<b>-.033***</b>	-4.03	0.000	\$0.81
Federal Agency	<b>-.465*</b>	-1.90	0.058	\$11.50
Private Company	-.092	-0.43	0.668	\$2.28
State Agency	<b>-1.02***</b>	-4.50	0.000	\$25.22
Payment Level	<b>.040***</b>	8.17	0.000	
SQ * Age	<b>.70***</b>	2.83	0.005	
SQ * Education	<b>.296**</b>	2.31	0.021	
SQ * # Programs Currently Enrolled	<b>-.478***</b>	-5.31	0.000	
SQ * Net Income	-.05	-1.02	0.306	

\*\*\* Significant at the 1% level; \*\* Sig. at 5% level; \* Sig. at 1% level

**Table 13. North Carolina conditional logit model of responses to choice questions**

Variable	Coefficient	Z-Value	<sup>1</sup> P-Value	Marginal Value
<b>Dependent Variable: Respondent Choice</b>				
Status Quo	-.468	-.77	0.444	
Contract Length	<b>-.080***</b>	-12.83	0.000	\$7.41
Federal Agency	-.108	-.67	0.503	\$10.06
Conservation Organization	<b>-.339**</b>	-.216	.031	\$31.55
Private Company	<b>-.262*</b>	-1.65	0.000	\$24.44
Payment Level	<b>.011***</b>	13.00	0.000	
SQ * Age	<b>.019**</b>	2.32	0.020	
SQ * Education	<b>-.259***</b>	-3.87	0.000	
SQ * Currently enrolled in program	<b>-1.281***</b>	-6.36	0.000	
SQ * % Income from land	.0036	1.39	0.165	
SQ * Income (\$1,000's)	<b>.0021*</b>	1.89	0.059	

\*\*\* Significant at the 1% level; \*\* Sig. at 5% level; \* Sig. at 1% level

The preferred administrators were the exact *opposite* in the two states. In California, the respondents revealed the following preferences (in order of most preferable to least preferable) for program administration:

1. Conservation Organization
2. Private Company
3. Federal Agency
4. State Agency

In contrast, North Carolina farm operators revealed the following administrator preferences:

1. State Agency
2. Federal Agency
3. Private Company
4. Conservation Organization

The other big difference was in the influence of socioeconomic factors on respondents' choice decisions. In California, more education made respondents *more* likely to opt for the status quo, whereas increased education in North Carolina made respondents *less* likely to opt for the status quo. In addition, increased income in California made it *less* likely that they would opt for the status quo, whereas increased income in North Carolina made it *more* like that farm operators would opt for the status quo.

Besides those differences, the signs on the other coefficients were the same, the coefficients similar. Farm-operators in both states preferred *shorter* contract lengths and *higher* payment levels. As age increased, this increased the likelihood of opting *for* the status quo, and being currently enrolled in conservation programs made it *more* likely that respondents would opt choose one of the program alternatives over the status quo.

## Discussion

The results of this survey shed some light on how farm operators in California feel about past participation in existing conservation programs, as well as their attitudes towards the creation of new markets. These findings have implications for anyone considering how a new PES program should be structured to provide compensation to farm operators in California.

Some of the main findings are presented below:

### *(1) Conversion of California rangelands to other uses is a real threat*

More than half of the respondents indicated that they were unsure whether the youngest generation would continue to ranch/farm, despite the fact that the average time that the ranch/farm had been in the family was 82 years. In addition, many of the written comments had to do with the pressure coming from residential and commercial developments. Not only does development encroach on the natural landscape of ranches and farms, but it also drives up the property values, creating a greater incentive to sell the land to developers. This is a particularly important threat given that 36% of respondents either broke even or lost money on their ranches in 2009. Many ranchers are land rich but cash poor, so even though they don't want to sell the land, they may be forced to if ranching becomes unviable.

### *(2) Farm operators in California are interested in potential PES programs*

Of the 82% of respondents who answered the question about potential participation in a program that offered farm operator's payments for improving the quantity and/or quality of environmental benefits produced from the land, 77% indicated that they *would* be potentially interested in such programs. This is backed up by the choice questions, which showed that of the respondents who answered the questions (~72% filled them out) 74% said they *would* participate



in one of the programs (circled Program A or B), and 26% circled “neither.”

*(3) Payment levels are an important factor in decisions to enroll, but enrollment will depend on other factors such as the program administrator and the contract length*

Farm-operators are more likely to participate in programs with *shorter* contract lengths and *higher* payment levels. Any increase in the contract length should be accompanied by approximately \$.81/acre in additional compensation. Also, higher payments will increase the likelihood that a rancher will participate in any given program.

For the program administrator, the conservation organization was the preferred administrator and administration by a federal or state agency would require additional compensation. The state agency was by far the least preferred administrator, and respondents were indifferent between whether a conservation organization or a private company was the administrator.

However, it should be noted that the additional compensation listed above is the *additional* amount of money that would be needed for ranchers to participate. In addition, each type of ecosystem service would likely have a different baseline payment, therefore the findings can only be used to roughly approximate the *additional* amount of money required over and beyond the baseline payment for each type of service. The baseline payment for each type of service should be based on a variety of factors, most importantly the increased costs associated with implementing the new land management practice. Ultimately, ranchers will usually only participate in programs when the payment *exceeds* the cost of implementing the new practice.

*(4) The best predictors of participation in future programs are age and number of programs currently enrolled in*

The significant socioeconomic variables were age, education, and number of conservation programs currently enrolled in. Although precise guidance for a targeted marketing approach would require further analysis (and a larger sample size), it appears that targeting *younger* farm operators who are already enrolled in conservation programs is the best strategy. Education is a less reliable predictor, as evidenced by the contradictory findings in California and North Carolina. In addition, income was shown to be a poor predictor of future participation. However, further research is necessary to focus future marketing efforts so that those who are most likely to enroll will be reached.

*(5) Preferences for PES programs may differ by state, and preferences for administrators may differ depending on local relationships*

A conservation organization was the preferred administrator in California, whereas a state agency was the preferred organization in North Carolina. This highlights the need to understand local relationships with potential administrators before implementing a PES program. For instance, farm-operators in California may think of organizations like the California Cattleman's Association, the California Rangeland Trust, the California Woolgrowers Association, or the California Conservation Association when thinking of a conservation organization as an administrator. In this case, the farm operators have a positive association with the conservation organization, and put the *most* trust in them.

In contrast, farm operators in North Carolina may have the best relationships with state agencies like the Natural Resource Conservation Service (NRCS), game and fish, or the forest

service. They might not trust conservation organizations because they may think of them as environmental groups that oppose their land management practices, and therefore trust them the *least*. This highlights the importance of understanding the relationships between farm-operators and potential administrators before implementing PES programs. For such programs to get substantial buy-in, the administrator must be trusted by participant

## Conclusion

Ranchers and farmers help provide many ecosystem services to society, but without compensation there is little incentive for them to increase the provision of environmental services. To create a mechanism through which ranch and farm-operators would get compensated for increasing the provision of environmental benefits, various payments for ecosystem service (PES) programs have been proposed. But before creating the next generation of ecosystem service markets, it is essential that policymakers understand how ranch and farm-operators feel about past participation in existing conservation programs, as well as their attitudes towards the creation of new markets.

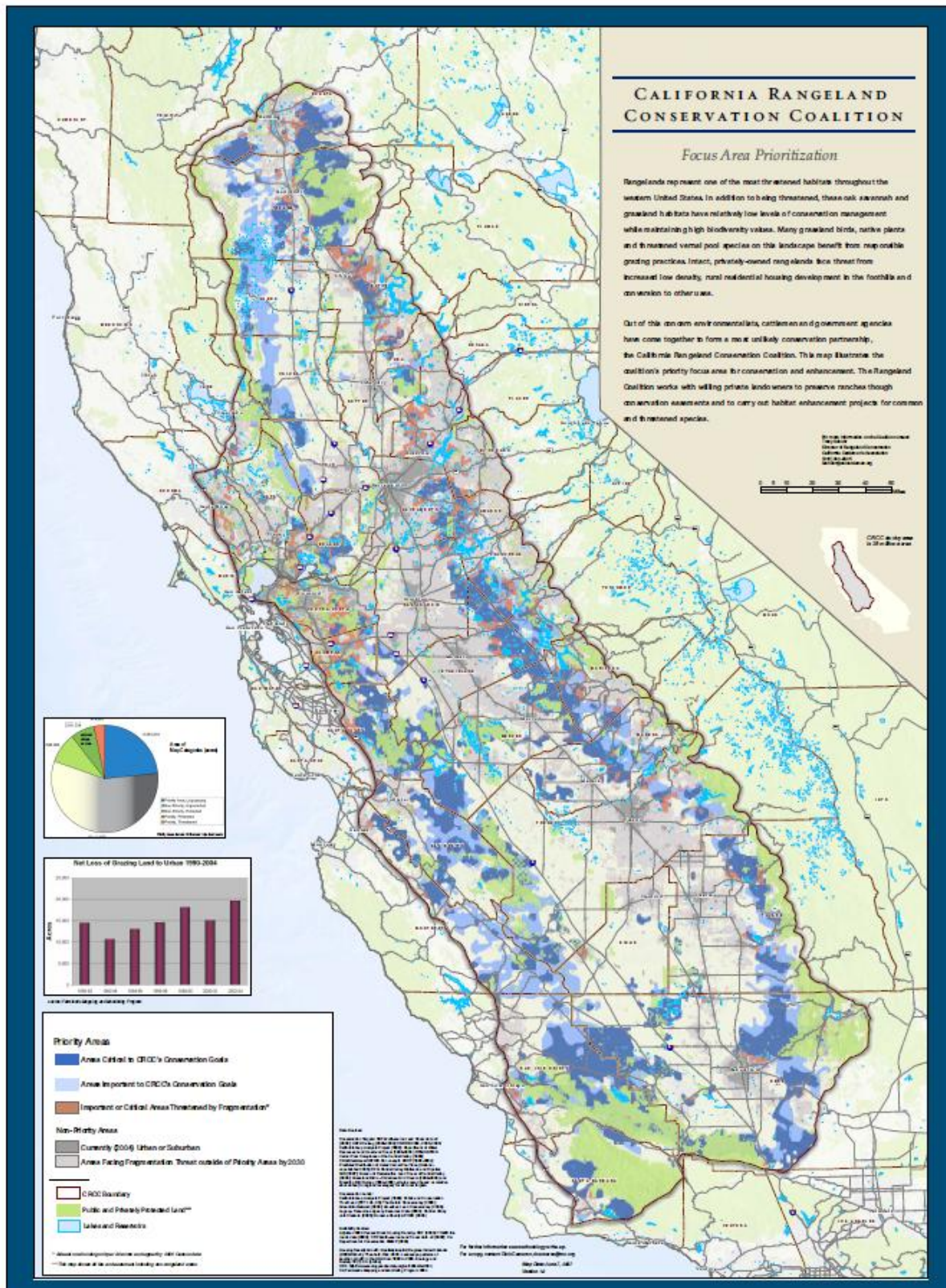
The results from this survey indicate that ranch and farm-operators are interested in potential PES programs, especially those that enhance the productivity of the land and increase wildlife habitat while providing additional sources of revenue. Understanding the financial situation of many ranchers and farmers is of particular importance since they are so often land-rich and cash-poor, meaning their land is valuable, but it's difficult to generate adequate revenue from ranching and farming alone. Since conversion of Californian rangelands to other uses is a real threat, any programs that made ranching/farming more profitable would likely have high participation rates.

The only way that new ecosystem service market will successfully increase the provision of environmental services will be if a large number of ranch and farm operators participate. To get ranchers and farmers to participate in new programs, they need to know *what* programs are available and *how* to enroll in them. The type of ranchers/farmers that would be most likely to participate in new programs are young ranchers/farmers who are already enrolled in conservation programs. However, ranchers and farmers won't necessarily participate in new programs unless the structure of the programs satisfies their preferences. As a result, the preferences of potential participants *must* be taken into consideration before new PES programs are implemented.

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## Appendix A: California Rangeland Coalition Focus Area





## Appendix B: Survey Instrument and Data Coding

# A Survey on Conservation Payments on California Rangelands



**A Survey from the California Rangeland Conservation Coalition**

## A Survey from the California Rangeland Conservation Coalition

**This survey should only be filled out by the person to whom it was addressed. If this person is not available, please check here and return the survey in the enclosed postage-paid envelope ☐**

# Introduction

**Dear Respondent,**

**Your input is extremely important for understanding what the potential is for developing payments for the ecosystem services (i.e. environmental benefits such as carbon sequestration, water quality improvements, wildlife habitat, etc.) that ranchers provide. These results will allow us to structure markets that are designed with rancher's preferences in mind and that are simple, transparent and easily accessible to ranchers. These ecosystem services markets have the potential to provide additional sources of income for ranchers while achieving conservation goals.**

**This survey is for the owners or renters of rangelands used for producing livestock. All individual information collected and analyzed as part of this survey will be held as strictly confidential and will not be shared outside of the research team. Responses will not be attributable to individual ranchers. Data analysis and reporting will be limited to aggregation across all respondents.**

**In addition to some optional demographic information, the sections of this survey cover two major topics. The first is to learn about rancher involvement in conservation programs. The second is to determine the potential for using ecosystem service payments and/or markets as an incentive mechanism to keep land in ranching, and the wildlife habitat benefits those ranches provide.**

**In advance, thank you very much for your cooperation and your help. Once our data analysis is complete, the final results will be available to you and the public.**

**If you need assistance or have any questions about the survey please e-mail Pelayo Alvarez [palvarez@defenders.org](mailto:palvarez@defenders.org).**

**If you prefer to respond to the questions over the phone or online please send an e-mail to Pelayo Alvarez at [palvarez@defenders.org](mailto:palvarez@defenders.org)**



*- This project is a collaboration between Defenders of Wildlife, Duke University, California Rangeland Trust, and the California Cattlemen Association and it is funded by a Conservation Innovation Grant from the California office of the USDA Natural Resources Conservation Service.*

*Do you use rangelands and/or pasture for producing livestock? (circle ONE)*

*YES—please continue to fill out the survey.*

*NO---please return this survey in the enclosed postage paid envelope so that we do not send further mailings*

## **Section 1: Land use**

1. How many years have you personally managed ranchland in California? (please fill in NUMBER OF YEARS)

\_\_\_\_\_ years (If no answer leave blank)

2. How many years has your family managed ranchland in California? (please fill in NUMBER OF YEARS)

\_\_\_\_\_ years (If no answer leave blank)

3. Do you expect that the youngest generation in your family will stay in ranching? (Please check ONE)

y Yes n No dk \_\_\_\_\_ Don't know (If no answer leave blank)

4. In what County or Counties do you operate your ranch?

Write out the county names and use 4b, 4c, and 4d if there are additional counties.  
Put a 0 in 4b, 4c, and 4d if there are no additional counties.

5. How many acres do you own?

1 Less than 1,000 (If no answer leave blank)  
2 1,000 to 3,000

- 3 3,000 to 5,000  
4 5,000 to 10,000  
5 More than 10,000

6. How many acres of public and private land do you currently *rent*?

6	Public land		6	Private land
<u>1</u>	Less than 5,000		<u>1</u>	Less than 5,000
<u>2</u>	5,000 to 10,000		<u>2</u>	5,000 to 10,000
<u>3</u>	10,000 to 50,000		<u>3</u>	10,000 to 50,000
<u>4</u>	50,000 to 100,000		<u>4</u>	50,000 to 100,000
<u>5</u>	More than 100,000		<u>5</u>	More than 100,000

(If they don't answer either or both questions, leave the appropriate columns blank)

7. If you own land, what is the ownership structure of that land? (Check ONE)

<u>1</u>	Private individual	(If no answer leave blank)
<u>2</u>	Corporation	
<u>3</u>	Partnership (e.g., LLC)	
<u>4</u>	Other. Please specify	

7a

8. What is the primary use of your owned/rented land? (Check ONE)

<u>1</u>	Cattle Grazing	(If no answer leave blank)
<u>2</u>	Sheep Grazing	
<u>3</u>	Horse Grazing	
<u>4</u>	Timber	
<u>5</u>	Recreation	
<u>6</u>	Other. Please specify	

8a

9. Is your owned/rented land used for hunting by you, your family, and/or people outside your family? (check ONE)

y Yes   n No   dk Don't know (If no answer leave blank)

10. If you use your land for hunting, approximately how much money do you earn from hunting leases each year? (Check ONE)

- 1  
2  
3  
4

_____	\$0		_____	\$2,500-\$4,999
_____	\$1 - \$500	<b>5</b>	_____	\$5,000-\$9,999
_____	\$500-\$999	<b>6</b>	_____	More than \$10,000
_____	\$1,000-\$2,499	<b>7</b>		

**(If Q9=no and Q10=1 leave blank. If Q9=yes and Q10=1 put a 1)**

**11. If you are a landowner who rents or leases out land, how much influence do your renters have on which land conservation programs you participate in? (Please circle one number that most closely matches the level of renter influence)**

<i>No influence</i>		<i>Neutral</i>		<i>Complete influence</i>	<i>Don't know</i>	<i>Not applicable</i>
1	2	3	4	5	DK	NA

**(If no answer leave blank)**

**dk**

**na**

**12. If you rent land, how much influence or control do you have over whether the land that you rent can be placed into a conservation program? (Please circle one number that most closely matches *your* level of control)**

<i>No influence</i>		<i>Neutral</i>		<i>Complete influence</i>	<i>Don't know</i>	<i>Not applicable</i>
1	2	3	4	5	DK	NA

**(If no answer leave blank))**

**dk**

**na**

**13. We would like to get your opinion on how you would like to see your county in the future. For each statement listed below, please indicate how important each one is to you personally by circling one number for each statement.**

		<i>Not important</i>		<i>Neutral</i>		<i>Very important</i>	<i>Don't know</i>
13a	Keeping the ranching industry viable	1	2	3	4	5	DK
13b	Preserving the rural, countryside feel of the area	1	2	3	4	5	DK
13c	Promoting industrial or commercial development	1	2	3	4	5	DK

13d	Encouraging nature-based tourism	1	2	3	4	5	DK
13e	Protecting habitat for wildlife	1	2	3	4	5	DK
13f	Influencing county development plans	1	2	3	4	5	DK
13g	Promoting real estate development	1	2	3	4	5	DK

(If no answer leave blank)

dk

14. Are there any other local issues, not listed above, that are important to you?

Write out in the Q14 (Comments) Tab

15. We would like to find out what you know about the following terms. Please indicate your degree of familiarity by circling the number that most closely matches your level of experience.

		<i>Not familiar</i>		<i>Somewhat familiar</i>		<i>Very familiar</i>	<i>Don't know</i>
15a	Ecosystem services	1	2	3	4	5	DK
15b	Carbon storage	1	2	3	4	5	DK
15c	Water quality	1	2	3	4	5	DK
15d	Wildlife habitat	1	2	3	4	5	DK
15e	Fire fuel load reduction / vegetation management	1	2	3	4	5	DK
15f	Invasive species control	1	2	3	4	5	DK

15g	Payments or Markets for Ecosystem Services	1	2	3	4	5	DK
		(If no answer leave blank)					dk

## **Section 2: Conservation Program Participation**

We would like to ask you about your involvement in conservation payment programs. These include federal and state programs that provide financial and technical assistance to landowners and ranchers who voluntarily conserve soil, water, wildlife habitat and other natural resources on their land. Examples include the Environmental Quality Incentives Program, the various reserve programs, the Conservation Stewardship Program, the Williamson Act, etc.

16. **On your owned/rented land, do you currently participate in conservation programs? If you do, please indicate, if relevant, how many acres of rangelands do you currently have in the following conservation programs?**

**Yes                      No                      Acres**

- Acres in a permanent conservation easement

### Federal conservation programs:

#### Practice Based Programs

- |                                                   |                |          |          |      |
|---------------------------------------------------|----------------|----------|----------|------|
| - Environmental Quality Incentives Program (EQIP) | <div>16b</div> | <b>v</b> | <b>n</b> | 16bb |
| - Wildlife Habitat Incentives Program (WHIP)      | <div>16c</div> | <b>y</b> | <b>n</b> | 16cc |

#### Acreage Based Programs

- |                                                         |                |          |          |      |
|---------------------------------------------------------|----------------|----------|----------|------|
| - Conservation Stewardship Program (CSP)                | <div>16d</div> | <b>v</b> | <b>n</b> | 16dd |
| - Grassland Reserve Program (GRP)                       | <div>16e</div> | <b>y</b> | <b>n</b> | 16ee |
| - Conservation Reserve Program (CRP)                    | <div>16f</div> | <b>v</b> | <b>n</b> | 16ff |
| - Conservation Reserve Enhancement Program (CREP)       | <div>16g</div> | <b>v</b> | <b>n</b> | 16gg |
| - Wetlands Reserve Program (WRP)                        | <div>16h</div> | <b>y</b> | <b>n</b> | 16hh |
| - Farm and Ranchland Protection Program (FRPP)          | <div>16i</div> | <b>v</b> | <b>n</b> | 16ii |
| - U.S. Fish and Wildlife Partners for Fish and Wildlife | <div>16j</div> | <b>y</b> | <b>n</b> | 16jj |
| - Coordinated Resource Management Program (CRMP)        | <div>16k</div> | <b>v</b> | <b>n</b> | 16kk |

State conservation programs:

- Williamson Act

**v** **n** **16ll**

- CA Dept. of Fish and Game Landowner  
Incentives Program (LIP)

**y** **n** **16mm**

**(If no answer put down an n)**

17. **If you currently participate in a conservation payment, rental, or easement program, please indicate your level of satisfaction with each program below by circling number that best reflects your level of satisfaction. (Please DO NOT circle a number if you have **NOT** participated in a given program)**

		<i>Very unsatisfied</i>		<i>Neutral</i>		<i>Very satisfied</i>	<i>Don't know</i>
<input type="text" value="17a"/>	<b>Conservation Reserve Program (CRP)</b>	1	2	3	4	5	DK
<input type="text" value="17b"/>	<b>Wetland Reserve Program (WRP)</b>	1	2	3	4	5	DK
<input type="text" value="17c"/>	<b>Environmental Quality Incentives Program (EQIP)</b>	1	2	3	4	5	DK
<input type="text" value="17d"/>	<b>Wildlife Habitat Incentives Program (WHIP)</b>	1	2	3	4	5	DK
<input type="text" value="17e"/>	<b>Farm and Ranchland Protection Program (FRPP)</b>	1	2	3	4	5	DK
<input type="text" value="17f"/>	<b>Conservation Stewardship Program (CSP)</b>	1	2	3	4	5	DK
<input type="text" value="17g"/>	<b>Conservation Reserve Enhancement Program (CREP)</b>	1	2	3	4	5	DK
	<b>Grassland Reserve Program (GRP)</b>	1	2	3	4	5	DK
	<b>CA Dept of Fish and Game Landowner Incentives Program (LIP)</b>	1	2	3	4	5	DK
	<b>U.S. Fish and Wildlife Service Partners for Fish and Wildlife</b>	1	2	3	4	5	DK
	<b>Coordinated Resource</b>	1	2	3	4	5	DK

Management Program (CRMP)							
Williamson Act (CLCA)	1	2	3	4	5	DK	
Other:	17mm	1	2	3	4	5	DK

(If no answer put down a 0)

dk

18. If you do not currently participate in a conservation payment, rental or easement program, what are the reasons you do not to enroll or have not continued participation in these programs (Check all that apply)

0 = Not Checked

- 0/1 ☐ Too much paperwork/general hassle
- ☐ Applied, but not accepted into program
- 18c ☐ Application/enrollment process takes too long
- 18d 0/1 ☐ Payments not high enough
- 18e 0/1 ☐ Contract length was too long
- 18f 0/1 ☐ Concern about government restriction and/or access on private property
- 18g 0/1 ☐ Did not know about or understand how to apply for a program
- 18h 0/1 ☐ Did not want to change the way I manage my land
- 18i 0/1 ☐ Interferes with livestock production/management
- 18j 0/1 ☐ Not allowed under lease
- 18k 0/1 ☐ Other. Please specify 18kk

19. How important are the following aspects of conservation programs to you?

		<i>Not important</i>		<i>Neutral</i>		<i>Very important</i>	<i>Don't know</i>
19a	<b>Saves money</b>	1	2	3	4	5	DK
19b	<b>Increases productivity of the land</b>	1	2	3	4	5	DK
19c	<b>Increases land value</b>	1	2	3	4	5	DK
19d	<b>Erosion control</b>	1	2	3	4	5	DK
19e	<b>Improves water quality</b>	1	2	3	4	5	DK
19f	<b>Promotes wildlife</b>	1	2	3	4	5	DK
19g	<b>Technical assistance from experts</b>	1	2	3	4	5	DK
19h	<b>Saves time/effort</b>	1	2	3	4	5	DK
19i	<b>Promotes soil preservation/health</b>	1	2	3	4	5	DK
19j	<b>Another source of income</b>	1	2	3	4	5	DK



19k	Meet regulatory requirements	1	2	3	4	5	DK
	Other (please specify): 19ll	1	2	3	4	5	DK

(If no answer leave blank)

dk

20. If you have applied conservation practices to your land, please indicate your level of experience and satisfaction with the practice by circling one number or letters next to the practice. (Please DO NOT circle a number if you have not used a given practice)

		<i>Very unsatisfied</i>		<i>Neutral</i>		<i>Very satisfied</i>	<i>Don't know</i>	<i>Never Tried it</i>
20b	Grazing management plan	1	2	3	4	5	DK	NA
20c	Water developments	1	2	3	4	5	DK	NA
20d	Cross fencing	1	2	3	4	5	DK	NA
20e	Riparian fencing	1	2	3	4	5	DK	NA
20f	Rangeland improvements	1	2	3	4	5	DK	NA
20g	Fire fuel load reduction	1	2	3	4	5	DK	NA
	Invasive species control	1	2	3	4	5	DK	NA
20h	Pest control	1	2	3	4	5	DK	NA
20i	Filter strips	1	2	3	4	5	DK	NA
20j	Riparian buffers	1	2	3	4	5	DK	NA
20k	Native plant restoration	1	2	3	4	5	DK	NA
20l	Oak planting	1	2	3	4	5	DK	NA
20m	Other practice: 20mm	1	2	3	4	5	DK	NA
20n	Other practice: 20nn	1	2	3	4	5	DK	NA
20o	Other practice: 20oo	1	2	3	4	5	DK	NA

(If no answer put na)

dk

na

21. Have you gotten information about conservation payment programs from any of the following sources? (Please check all that apply)

0 = Not Checked

I have received information about conservation payment programs from:

21a	0/1	Agricultural magazine
21b	0/1	Television/radio
21c	0/1	USDA bulletins
21d	0/1	
21e	0/1	
21f	0/1	
21g	0/1	
21h	0/1	

- ☐ Ag Extension newsletter  
☐ Internet  
☐ Agricultural organization  
☐ Resource Conservation District  
☐ Other rancher  
☐ Trade show  
☐ Conservation organization (e.g., Ducks Unlimited)  
☐ Other. Please specify   
☒ 0/1 None of the above

### **Section 3: Conservation Benefits**

**There is a growing awareness that ranchlands provide many environmental benefits or services to society, such as purifying air and water, renewing soils, providing habitat**

22. **If there were a public or private conservation program that offered you a payment for improving the quantity and/or quality of environmental benefits your land provides to society, would you consider participating in such a program? (Check ONE)**

**y** ☐ Yes  
**n** ☐ No  
**dk** ☐ Don't know

**(If no answer leave blank)**

23. **Please indicate your level of interest with the following statements (Circle one number that most closely matches your interest level or "DK" for "don't know"):**

**I would be interested in enrolling in a conservation payment program that would:**

		<i>Not Interested</i>		<i>Somewhat Interested</i>		<i>Very Interested</i>	<i>Don't know</i>
<input type="checkbox"/> 23a	<b>Increase carbon storage (i.e. grazing management plan)</b>	1	2	3	4	5	DK
<input type="checkbox"/> 23b	<b>Improve water quality (i.e. fence riparian areas)</b>	1	2	3	4	5	DK
<input type="checkbox"/> 23c	<b>Improve wildlife habitat</b>	1	2	3	4	5	DK

23d	Restore native plants	1	2	3	4	5	DK
23e	Increase oak numbers	1	2	3	4	5	DK

(If no answer leave blank)

dk

**The 2008 Farm Bill takes a first step towards encouraging landowner/operator participation in emerging private markets for ecosystem services. Guidelines are being developed to inform new ways to provide payments for ecosystem services. These include programs that would be voluntary and would give landowners the opportunity to receive payments for applying conservation practices on their property. The potential programs are described by the following three features:**

*Contract Length* – Programs offer landowners several different options for the length of time that land can be enrolled in them. Contract length options are 5, 15, and 30 years.

*Program Administration* – The organization administering the program enrolls the land, works with the landowners, and distributes the payments to participating landowners. Organization options are Federal agency (e.g., USDA-NRCS, US Fish & Wildlife Service), State agency (e.g., CA Department of Conservation, CA Department of Fish and Game), Non-profits (e.g., RCD's, Land Trust, Cattlemen's), or a Private for profit company.

*Program Payment* – Landowners receive a payment for enrolling land in a program. Payment level options are \$5, \$10, \$20, and \$50 per acre per year

24. **Directions:** In each of the following five choice decision tables we ask you to select your preferred option from Programs A or B or Neither. Please assume that these programs would apply to your owned/rented land. *In each case, also assume that the options in each table are the only ones available to you and do not consider programs shown in the other decision choice tables.* Given the description Program A and B please decide which one you would choose by circling the box on the last row *only* for the program that you would most prefer, or circle Neither if neither choice interests you.

24a **Choice Table 1.**

<b>Program Features</b>	<b>Program A</b> (If no answer leave blank)	<b>Program B</b>	<b>Neither</b>
<b>Contract length</b>	30 years	15 years	
<b>Program administration</b>	Non-profit organization	State agency	
<b>Payment level (per acre per year)</b>	\$20	\$5	
<i>Please indicate your preferred program (circle one)</i>	<b>I would prefer Program A</b>	<b>I would prefer Program B</b>	<b>I would not participate in either program.</b>

24b

**Choice Table 2.**

<b>Program Features</b>	<b>Program A</b>	<b>Program B</b>	<b>Neither</b>
<b>Contract length</b>	15 years	5 years	
<b>Program administration</b>	Federal agency	Non-profit organization	
<b>Payment level (per acre per year)</b>	\$10	\$5	

<i>Please indicate your preferred program (circle one)</i>	<b>I would prefer Program A</b>	<b>I would prefer Program B</b>	<b>I would not participate in either program.</b>
------------------------------------------------------------	---------------------------------	---------------------------------	---------------------------------------------------

**a**

**b**

**c**

**(If no answer leave blank)**

24c

**Choice Table 3.**

24d

**Choice Table 4 (If no answer leave blank)**

<b>Program Features</b>	<b>Program A</b>	<b>Program B</b>	<b>Neither</b>
<b>Contract length</b>	15 years	5 years	
<b>Program administration</b>	Non-profit organization	Federal agency	
<b>Payment level (per acre per year)</b>	\$5	\$10	
<i>Please indicate your preferred program (circle one)</i>	<b>I would prefer Program A</b>	<b>I would prefer Program B</b>	<b>I would not participate in either program.</b>

<b>Program Features</b>	<b>Program A</b>	<b>Program B</b>	<b>Neither</b>
<b>Contract length</b>	5 years	5 years	
<b>Program administration</b>	State agency	Federal agency	
<b>Payment level (per acre per year)</b>	\$20	\$5	
<i>Please indicate your preferred program (circle one)</i>	<b>I would prefer Program A</b>	<b>I would prefer Program B</b>	<b>I would not participate in either program.</b>

25. When you were considering the Program A and B alternatives just presented, how important were each of the following program features to your decision? (Please circle one number that most closely matches the level of importance)

		<i>Not important</i>		<i>Neutral</i>		<i>Very important</i>	<i>Don't know</i>
25a	<b>Contract length</b>	1	2	3	4	5	DK
25b	<b>Program administration</b>	1	2	3	4	5	DK
25c	<b>Payment level (per acre per year)</b>	1	2	3	4	5	DK

(If no answer leave blank)

dk

26. How frequently do you consult with the following sources about land management decisions?

		<i>Never</i>		<i>Sometimes</i>		<i>Very frequently</i>
26a	<b>Agricultural extension agent</b>	1	2	3	4	5
26b	<b>Neighboring rancher</b>	1	2	3	4	5
26c	<b>Other producers/landowners</b>	1	2	3	4	5
26d	<b>U.S. Fish &amp; Wildlife biologist</b>	1	2	3	4	5
26e	<b>Family members</b>	1	2	3	4	5
26f	<b>District conservationist</b>	1	2	3	4	5
26g	<b>Conservation organization biologist</b>	1	2	3	4	5
26h	<b>Internet</b>	1	2	3	4	5
26i	<b>Other:</b>	1	2	3	4	5

(If no answer leave blank)

27. A number of organizations recognize the important role that private landowners play in wildlife conservation and are considering the creation of voluntary programs in which landowners could receive payments to apply conservation practices that improve habitat for wildlife. What is your initial reaction to such programs?  
(Please circle the number that most closely matches your response)

<i>Strongly oppose</i>	<i>Oppose</i>	<i>Neutral</i>	<i>Favor</i>	<i>Strongly favor</i>	<i>Don't know</i>
1	2	3	4	5	DK

(If no answer leave blank)

dk

28. Please give your opinion on the following statements:

- 28a A. Payments for ecosystem services such as water quality, carbon sequestration, wildlife habitat, etc., should be separated by *different* areas on the ranch.

<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>	<i>Don't know</i>
--------------------------	-----------------	----------------	--------------	-----------------------	-------------------

1	2	3	4	5	DK
(If no answer leave blank)					dk

28b

**B.** Multiple payments for different multiple ecosystem services (i.e. wildlife habitat and carbon sequestration from oak restoration) should be provided for the *same* land area on the ranch.

<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>	<i>Don't know</i>
1	2	3	4	5	DK
(If no answer leave blank)					dk

28c

**C.** Payments for ecosystem services should be based on the cost of conservation practices that generate those services.

<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>	<i>Don't know</i>
1	2	3	4	5	DK
(If no answer leave blank)					dk

29. At this time, please feel free to provide any information, opinion or comment you may have on efforts to promote wildlife conservation on California rangelands. Remember, your response is completely anonymous.

**Fill in under Q29 (Comments) tab**



## **Section 4: Personal Background**

*This information will only be used for statistical purposes and will not be associated with you. All responses will be held as strictly confidential.*

30. Are you (please check one): m male f female (If no answer leave blank)

31. How old are you? 1 <30 2 31-45 3 46-60 4 >60 years

32. What is the highest level of education that you have achieved? (Check ONE)

<u>1</u>	Less than high school diploma	<u>4</u>	Some college at a 4-year institution
<u>2</u>	High School diploma or GED	<u>5</u>	4-year college degree
<u>3</u>	Technical/vocational degree	<u>6</u>	Advanced degree beyond 4-year degree

33. In what county is your primary residence? (Write in)  
County \_\_\_\_\_

34. How long have you lived in that County? \_\_\_\_\_ years

35. Please indicate if you and/or other members of your household work off the property to support the household, even if only part-time.

0 = Not Checked

1 = Checked

35a

0/1 You  
er

35b

0/1 Spouse

35c

0/1 Other members

35d

0/1

36. What is your approximate *NET (after production expenses)* annual household income after taxes last year? (Check ONE)

<u>1</u>	My ranching operation lost money last year.	(If no answer leave blank)
<u>2</u>	I roughly broke even last year.	
<u>3</u>	Less than \$5,000	<u>7</u> \$50,000 to \$75,000
<u>4</u>	\$5,000 to \$10,000	<u>8</u> \$75,000 to \$100,000
<u>5</u>	\$10,000 to \$25,000	<u>9</u> \$100,000 to \$150,000
<u>6</u>	\$25,000 to \$50,000	<u>10</u> Over \$150,000

**DON'T FORGET TO LOOK AT PAGE 17 AND THEN SAVE THE DATA!!**

Thank you very much!

Please fold the survey in half, place it in the postage-paid envelope provided, and drop it in the mail.



**Use the space below to write any comments you have  
about this survey or our research.**

**Use tab labeled “End Comments” for comments left on this page**