

SURVEY OF RESIDENTS' ATTITUDES ON JAGUAR CONSERVATION - FINAL REPORT

ORDER NUMBER: F13PD0754

PERIOD OF PERFORMANCE: 4/4/13 – 6/5/15

PREPARED FOR: US DEPARTMENT OF THE INTERIOR | FISH AND WILDLIFE SERVICE
500 GOLD AVENUE SW, ROOM 5108 | ALBUQUERQUE, NEW MEXICO 87102



Photo of a male jaguar in Santa Rita Mountains, taken by an automatic wildlife camera, 14 September 2014. Courtesy of FWS.

PREPARED BY: HARRIS ENVIRONMENTAL GROUP, INC.
650 N. 6TH AVENUE | TUCSON, ARIZONA 85705

SUBMITTED: JUNE 2015

TABLE OF CONTENTS

LIST OF TABLES.....1

LIST OF FIGURES.....2

EXECUTIVE SUMMARY.....3

INTRODUCTION.....4

 Purpose and Need Statement.....4

 Background.....5

METHODS.....6

 Study Area.....6

 Surveys.....6

 Residents.....6

 Stakeholders.....11

 Analysis.....13

RESULTS.....14

 Demographic Data.....14

 Outdoor Activities.....16

 Organization Membership.....18

 Land-based Livelihoods.....19

 Knowledge of Jaguar Status and Ecology.....21

 Attitudes toward Jaguars and Conservation Efforts.....23

 Threats and Obstacles.....25

 Awareness of Government Conservation Efforts.....26

DISCUSSION.....27

CONCLUSIONS.....29

 Key Findings.....29

 Recommendations.....29

REFERENCES.....30

APPENDIX A.....32

APPENDIX B.....33

APPENDIX C.....38

APPENDIX D.....42

APPENDIX E.....43

APPENDIX F.....44

LIST OF TABLES

Table 1. Residents surveyed by county.....7

Table 2. Number of surveys with stakeholders and residents.....12

Table 3. Results of the demographic data questions.....14

Table 4. Results of the demographic data questions.....15

Table 5. Participation in outdoor activities.....16

Table 6. Purpose of outdoor activity participation.....16

Table 7. Outdoor activities.....17

Table 8. Reasons given for supporting jaguar conservation.....24

Table 9. Reasons given for not supporting jaguar conservation.....25

Table 10. Threats to jaguars listed by respondents.....25

LIST OF FIGURES

Figure 1. Study area for the jaguar survey interview of residents. 8

Figure 2. Pima County, Arizona, census tracts selected for survey locations for the jaguar survey interview of residents. 9

Figure 3. Santa Cruz County, Arizona, census tracts selected for survey locations for the jaguar survey interview of residents. 10

Figure 4. Hidalgo County, New Mexico, and Cochise County, Arizona, census tracts selected for survey locations for the jaguar survey interview of residents. 11

Figure 5. Stakeholder membership in a conservation or recreation organization 18

Figure 6. Resident membership in a conservation or recreation organization..... 18

Figure 7. Percent of individuals with land-based livelihoods..... 19

Figure 8. Percent with land-based livelihoods by income source. 20

Figure 9. Correct responses to jaguar status and ecology questions. 21

Figure 10. Jaguar status..... 22

Figure 11. Jaguar support scale..... 23

Figure 12. Support for jaguars and jaguar conservation. 24

EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (FWS) contracted Harris Environmental Group, Inc. (Harris Environmental) to survey residents and stakeholders in the United States portion of the Northwestern Recovery Unit (southern Arizona and southwestern New Mexico) on their attitudes, knowledge, and perceptions about jaguars and jaguar conservation. The purpose of this information collection was to inform FWS conservation efforts and education and outreach programs.

A total of 200 interviews were conducted between February 13 and April 24, 2015 with residents and stakeholders with a survey instrument consisting of closed-ended, open-ended, and demographic questions. Of these, 100 residents were interviewed in Hidalgo County, New Mexico, and Pima, Cochise, and Santa Cruz counties in Arizona. Additionally, 100 stakeholders were interviewed within the same area, identified by their work (paid or voluntary) in a conservation or natural resource-related government, business, or non-profit/non-governmental organization.

Residents were sampled through a stratified, random sample using the street-intercept method. Stakeholders were purposively sampled. Both resident and stakeholder surveys were geographically distributed to ensure adequate participation of residents from the less populated Hidalgo, Santa Cruz, and Cochise counties. The FWS was interested in surveying relevant stakeholder groups that do not frequently engage with federal or state agencies regarding wildlife conservation policy or planning. Responses were analyzed with content and narrative analysis and descriptive statistics.

Key findings:

1. Survey participants were knowledgeable about jaguar status and ecology, but were not familiar with FWS or state efforts regarding jaguar conservation.
2. Overall, residents and stakeholders were in favor of jaguars living within the U.S. portion of the Northwestern Recovery Unit and support conservation efforts and the use of government resources to achieve this.
3. Participants generally agreed with conservation strategies, such as rancher incentives and voluntary conservation easements, but many were not well-informed about such programs and wanted more information about them.
4. As a group, respondents dependent on land-based livelihoods had lower levels of support for jaguars and jaguar conservation.
5. Two main potential barriers to FWS's jaguar conservation efforts were identified: a.) concerns about the necessity and effectiveness of government-led conservation efforts; and b.) negative attitudes toward opposing groups' perceived values and actions regarding wildlife, and their perceived role in conflicts over conservation policies.

While there is a growing research-based literature on attitudes toward wildlife and wildlife conservation, to our knowledge, this was the first survey of attitudes toward jaguars in the United States.

Harris Environmental coordinated the development of the survey instrument, conducted the surveys and data analysis, and prepared this report. Harris Environmental also coordinated with other researchers to reduce the likelihood of overburdening specific stakeholder groups with research-related contacts. This information collection received approval from the Office of Management and Budget, in accordance with the Paperwork Reduction Act. The Notice of Approval, Supporting Statement A, and Supporting Statement B are included in this report as Appendix A, B, and C, respectively. Interviews were conducted under OMB Control Number 1018-0159 and followed established procedures to obtain voluntary consent and protect the confidentiality of survey responders. The Resident Surveys Initial Contact Script, Stakeholder Surveys Initial Contact Script (each of which includes the OMB Paperwork Reduction Act Statement), and a copy of the Survey Instrument are also included in this report as Appendix D, E, and F, respectively.

INTRODUCTION

Purpose and Need Statement

Historically, the jaguar (*Panthera onca*) ranged from the southern U.S. (from California to Texas, and possibly Louisiana) to northern Argentina (Alanen 2015; Caso et al. 2008). But, jaguar populations declined and their range shrank throughout the twentieth century. While still abundant, they now occupy an estimated 46 percent of their historical range (Caso et al. 2008; McCain and Childs 2008). The primary causes of decline have been persecution, habitat loss and fragmentation, and reduction in prey populations (Caso et al. 2008; Rosas-Rosas and Bender 2012). By the mid-twentieth century, they were likely extirpated from the U.S. The last known female jaguar confirmed in the U.S. was killed on the Mogollon Rim in 1963, while male jaguars were confirmed on rare occasions in the U.S. until 1986.

Following ten years without a confirmed sighting, jaguars were again detected in the study area. In March 1996, while mountain lion hunting with hound dogs, Warner Glenn and his daughter, Kelly, treed a jaguar in the Peloncillo Mountains along the Arizona-New Mexico border (New Mexico Department of Game and Fish 2015; 77 FR 50214; August 20, 2012). Instead of shooting, Glenn took photographs. The jaguar was confirmed as an adult male, estimated at 3 to 5 years of age. Soon after, another jaguar was treed and photographs again obtained, this time in the Baboquivari Mountains in southern Arizona (New Mexico Department of Game and Fish 2015; McCain and Childs 2008; 77 FR 50214; August 20, 2012). This second sighting was confirmed as another male, estimated to be perhaps 2 to 3 years of age. These initial events galvanized efforts to monitor for jaguar presence and spurred the development of jaguar conservation plans.

The Jaguar Conservation Team was formed, with leadership from the Arizona Game and Fish Department, the New Mexico Department of Game and Fish, and the FWS and participation by scientific advisors, conservation advocates, land users, and members of the public. A concerted monitoring effort was put in place in 2001, with tracking surveys and camera-traps established in mountainous terrain across southern Arizona. From 2001 through 2009, this effort yielded confirmation of at least two male jaguars, one of which turned out to be the younger male photographed in 1996 (Alanen 2015; McCain and Childs 2008). An additional jaguar was documented, but the sex and identity could not be determined (McCain and Childs 2008). In 2006, another individual was sighted in New Mexico, and in 2011, another was sighted in southern Arizona (Alanen 2015). In 2012, FWS established a comprehensive monitoring program with the University of Arizona, using camera-trap survey methods in 16 mountain ranges across southern Arizona and southwestern New Mexico (Alanen 2015). This study yielded evidence that the same male documented in 2011 remained in southern Arizona from 2012 through 2015 (U.S. Fish and Wildlife Service 2015). In total, at least five jaguars have been confirmed in Arizona and New Mexico since 1996 (79 FR 12572; March 5, 2014).

The jaguar is listed as endangered throughout its range under the Endangered Species Act of 1973 (62 FR 39147; July 22, 1997). In accordance with the Endangered Species Act, the FWS designated approximately 3,110 square kilometers of critical habitat for jaguar conservation in 2014. The critical habitat includes land within Pima, Santa Cruz, and Cochise counties in Arizona and Hidalgo County, New Mexico. It consists primarily of habitat within the Baboquivari, Atacosa, Santa Rita, Whetstone, Peloncillo, and San Luis mountain ranges (79 FR 12572; March 14, 2014). The Recovery Outline for the jaguar (Jaguar Recovery Team 2012) includes the following objectives:

- Mediate or mitigate the effects of human population growth and development on jaguar survival and mortality, where possible.
- Assure the long-term viability of jaguar conservation through partnerships, the development and application of incentives for landowners, application of existing regulations, and public education and outreach.

Land in this region is a mixture of public and private ownership. The actions of land-owners and land-users in both public and privately-owned lands will be important to the jaguar's continued presence in the U.S. Understanding and reducing human-wildlife conflict and improving tolerance for jaguars in the region will, therefore, be a critical component of effective conservation efforts. Protecting jaguars and jaguar habitat in this human-dominated landscape will require communication with the public, including rural land users and residents, as well as coordinating efforts with numerous state and federal agencies with land management responsibilities. The development of effective conservation tools and public outreach and education strategies will be strengthened by information on resident and stakeholder knowledge, attitudes, and beliefs about jaguars and jaguar conservation.

Social science research on public and stakeholder attitudes toward large carnivores has played an important role in conservation programs. Identifying the variables that influence attitudes toward wildlife and support for or tolerance of carnivore conservation is one of the key goals of continued research (Kansky and Knight 2014). This research has also shown that qualitative methodologies are crucial to understanding the patterns and drivers of attitudes toward wildlife and conflicts over their management and conservation (Dickman et al. 2014; Dickman 2010; Madden and McQuinn 2014; Marshall et al. 2007). Wildlife conservation efforts are complicated by the direct impacts of living with wildlife, such as perceived threats to human life, damage to agricultural crops and domestic livestock, and competition for habitat and prey. These direct impacts are the basis of many human-wildlife conflicts (Dickman 2010; Woodroffe et al. 2005). Conflict can be defined as a difference or disagreement within an individual or between two or more parties, which affects the individual or parties in a significant way (Madden and McQuinn 2014). An important finding of recent research, however, is that conflict over the conservation and management of wildlife species, especially between stakeholder groups, also influences attitudes towards wildlife species and can prolong disputes over conservation priorities and approaches. These human-human conflicts, which may be driven by social and cultural factors as much as or more than direct experience with wildlife, can present formidable barriers to successful conservation efforts (Dickman et al 2014; Dickman 2010; Kansky and Knight 2014; Madden and McQuinn 2014; Marshall et al. 2007; Redpath et al. 2013).

Despite the clear need for better understanding of public and stakeholder attitudes to jaguar conservation, a comprehensive survey of knowledge, attitudes, and beliefs about jaguars and jaguar conservation in the study area had not yet been conducted. A primary purpose of this information collection was to fill this critical gap. The FWS requested a survey of resident and stakeholder attitudes, beliefs, and knowledge about jaguars and jaguar conservation grounded in qualitative methods of data collection and analysis. The results of this survey will lead to better understanding of the opportunities and challenges to jaguar conservation, and inform FWS conservation strategies and education and outreach efforts.

Background

The jaguar is the largest wild cat found in the Western Hemisphere. Jaguars are charismatic animals with distinctive black spots on buff to cinnamon colored pelts. Less common is a melanistic, or black, coat. Across its range, the jaguar feeds on a wide variety of animals, including fish, turtles, reptiles and numerous mammals, a diet that is likely influenced by prey availability and competition with other felids (Brown and López González 2001; Gomez-Ortiz and Monroy-Vilchis 2013; Rodriguez-Soto et al. 2011). Medium to large mammals are likely their preferred prey (Gomez-Ortiz and Monroy-Vilchis 2013). The diets of jaguars found in the southwestern U.S. are likely to be most similar to those of jaguars in northern Mexico, where large-bodied mammals (more than 10 kilograms) are the preferred prey (Rosas-Rosas et al. 2008). Hernandez-SaintMartín et al. (2015) found that 85 percent of jaguar diet in northeastern Mexico consisted of white-tailed deer and collared peccary. Studies in northern Mexico have also found jaguar use of domestic livestock, and documented resultant human-jaguar conflicts (Rosas-Rosas and Bender 2012; Rosas-Rosas et al. 2008).

Jaguar habitat preferences are also influenced by access to water, and they do not inhabit high elevations, greater than 3,000 meters (Jaguar Recovery Team 2012). In Central and South America, they are found in closed canopy rainforest, swampy lowlands, and deciduous dry forests (Brown and López González 2001; Jaguar Recovery Team 2012). In northern Mexico and the southwestern U.S., they have been found in many different habitats, displaying “ecological flexibility” at the periphery of their range (Gomez-Ortiz and Monroy-Vilchis 2013). Jaguars in northern Mexico and the U.S. have been found in Sinaloan thornscrub, Madrean evergreen woodlands, semi-desert grasslands, lowland desert, pine-oak woodlands and riparian habitats (Brown and López González 2001; Jaguar Recovery Team 2012; McCain and Childs 2008).

METHODS

Study Area

Our study area consisted of Pima, Cochise, and Santa Cruz counties in Arizona and Hidalgo County, New Mexico. The U.S. portion of the Northwestern Recovery Unit for the jaguar lies within these four counties, and it contains all areas designated as critical habitat for jaguar. This region of southern Arizona and southwestern New Mexico has been the focus for continued jaguar monitoring and conservation efforts in the U.S.

The study area consists of numerous mountain ranges separated by riparian valleys and lowland deserts. It is a semi-arid region, with precipitation and temperature determined primarily by elevation. Habitats include desert scrub, thornscrub, semi-desert grassland, and pine-oak woodlands, with mixed conifer forests found at the highest elevations.

The total population of the study area counties was 1,163,923 at the 2010 U.S. Census. The majority of this total lives in Pima County (980,263), with 520,116 people living in Tucson, Pima County's largest city (U.S. Census Bureau 2010). The area has experienced rapid growth in recent decades, especially between 1990 and 2005. Pima County's population increased by 84 percent between 1980 and 2010. Population growth has also occurred in the small cities in the study area, along with the expansion of exurban subdivisions in rural areas. The impact of habitat fragmentation and range land management on the quality of potential habitat is an ongoing concern for jaguar conservation.

Surveys

Our survey was primarily designed to elicit in-depth responses to open-ended questions. All interviews were conducted in person and by phone, between February 13 and April 24, 2015. A standardized survey instrument was used, but interviews were conducted in an informal and conversational manner to encourage in-depth responses to open-ended questions (Denzin and Lincoln 2011). The survey also included closed-ended and objective questions to compare responses across individuals and groups and to explore the influence of specific variables on respondents' level of support for jaguars and jaguar conservation. Responses to demographic data questions were used to characterize our sample. Due to our sample size and qualitative methodology, survey results cannot be generalized to the population of Hidalgo, Cochise, Santa Cruz, and Pima counties (Bernard 2011). All interviews, 200 total, were conducted using our standardized survey instrument. Survey questions addressed the following topics regarding participants and their knowledge, attitudes, and beliefs about jaguars:

- Outdoor activities
- Organization membership
- Land-based livelihoods
- Knowledge of jaguar status and ecology
- Attitudes toward jaguars and conservation efforts
- Obstacles or challenges to jaguar conservation
- Awareness of government jaguar conservation efforts

The 200 interviews were comprised of two groups: 100 interviews were conducted with residents of Hidalgo, Cochise, Pima, and Santa Cruz counties; 100 were conducted with stakeholders. The sampling method differed by group, as explained below.

Residents

Residents were randomly sampled, using a stratified design based on geographic location. Residence by county and urban versus exurban or rural locations was considered in choosing interview locations. This disproportionate sample was justified to ensure that Hidalgo County residents were included; a truly random sample would not have adequately represented residents from the lightly populated New Mexico county or rural residents (Bernard 2011). Table 1 shows the study area population by county and the total number of interviews conducted with participants by county. Population numbers are drawn from the 2010 U.S. Census.

Table 1. Residents Surveyed by County. The table shows the number of residents surveyed by county in the study area, as well as the total population by county and the percent of the total study area population residing in each county. Population numbers are drawn from the 2010 U.S. Census.

County	Population	Percent of Total Population	Survey Results
Pima County, AZ	980,263	84	65
Santa Cruz County, AZ	47,420	4	9
Cochise County, AZ	131,346	11	19
Hidalgo County, NM	4,894	1	7
Totals	1,163,923	100	100

To select the geographic locations in Cochise, Pima, and Santa Cruz counties within which we surveyed residents, we randomly selected census tracts in Cochise, Pima, and Santa Cruz counties. Census tract boundaries and demographic data were obtained from TIGER/Line shapefiles (U.S. Census 2014) and imported into a GIS map, using ESRI's ArcGIS 10.2 software suite, and downloaded as an MS Excel spreadsheet. We used a random generate function in MS Excel to select the census tracts within which we conducted our interviews with residents. We aimed for five interviews per census tract and a balance of urban and rural tracts. Hidalgo County, New Mexico contains just two census tracts. One is centered in the small city of Lordsburg, and the other is a rural tract that spans the rest of the county. As such, we did not randomly select census tracts for Hidalgo County, New Mexico, but rather conducted interviews in both of them.

All resident interviews were conducted in-person at public places within each selected census tract, such as stores, libraries, parks, and post offices. Care was taken to conduct interviews at a variety of days and times in order to maximize the likelihood that participant age and income level would be balanced. Prospective participants were approached and invited to participate through the "street-intercept" sampling method (Bernard 2011). Depending on traffic volume, every second or third person passing by was asked to participate. Our selection was adjusted, as necessary, to obtain surveys from equal numbers of males and females.

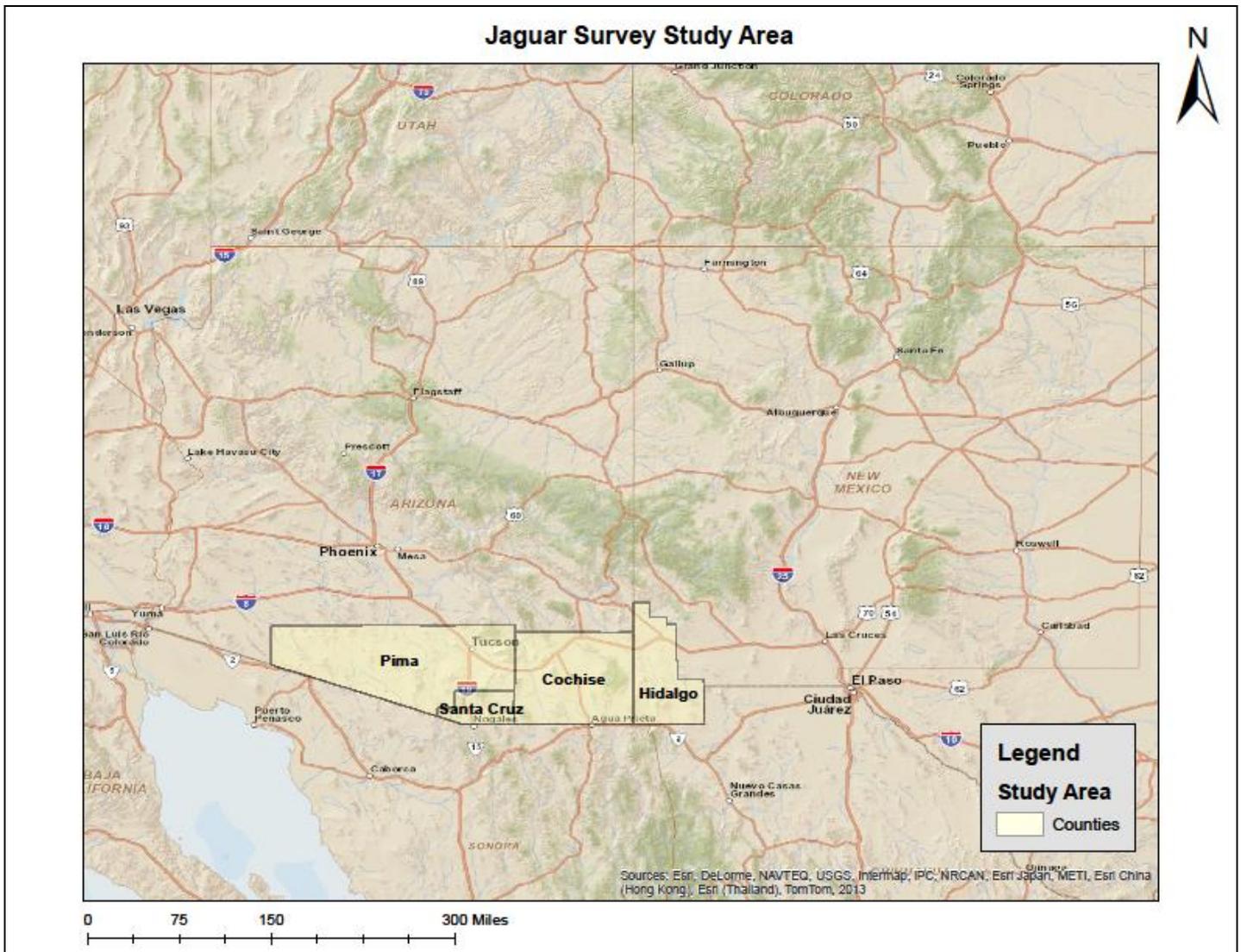


Figure 1. Study area for the jaguar survey interview of residents.

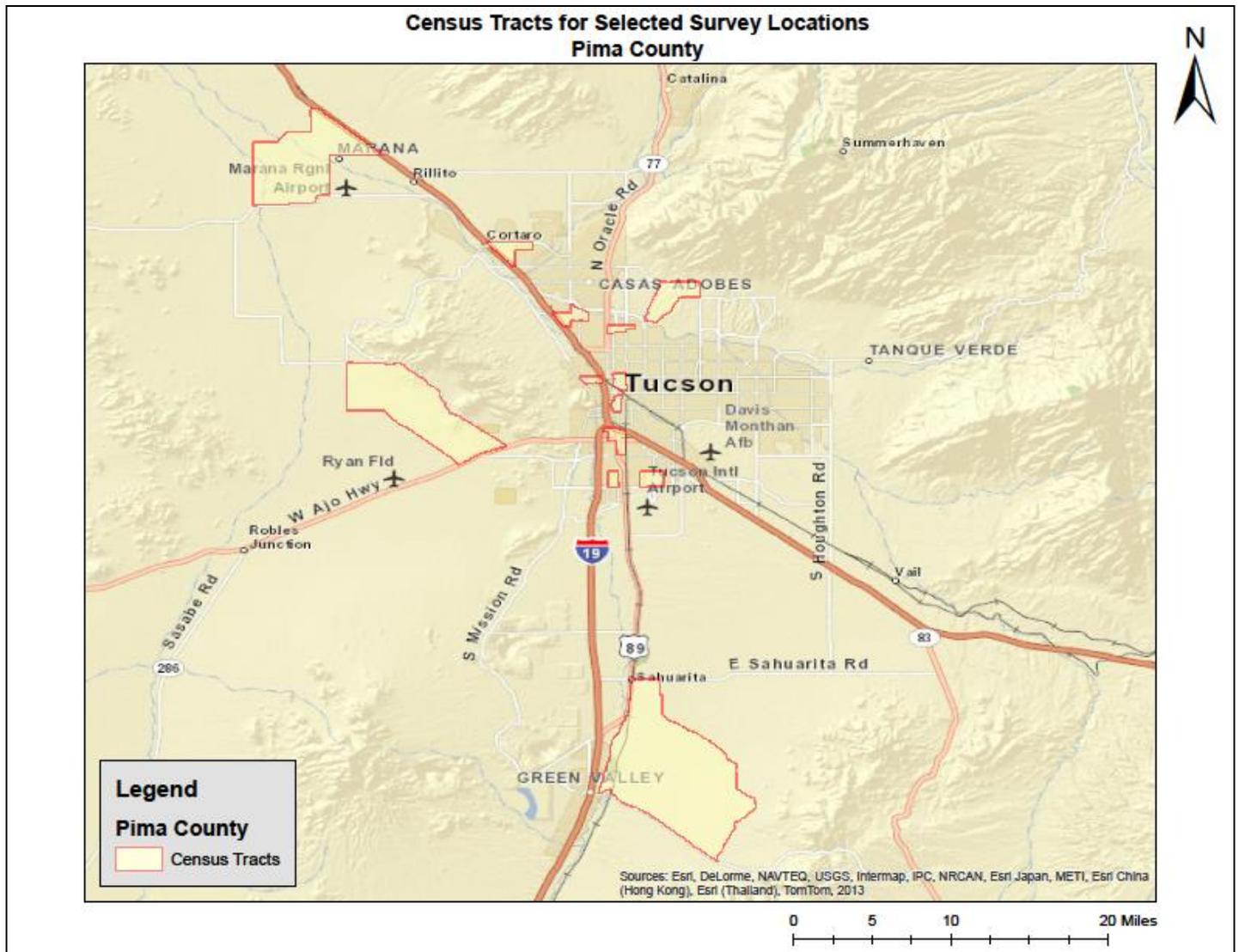


Figure 2. Pima County, Arizona, census tracts selected for survey locations for the jaguar survey interview of residents.

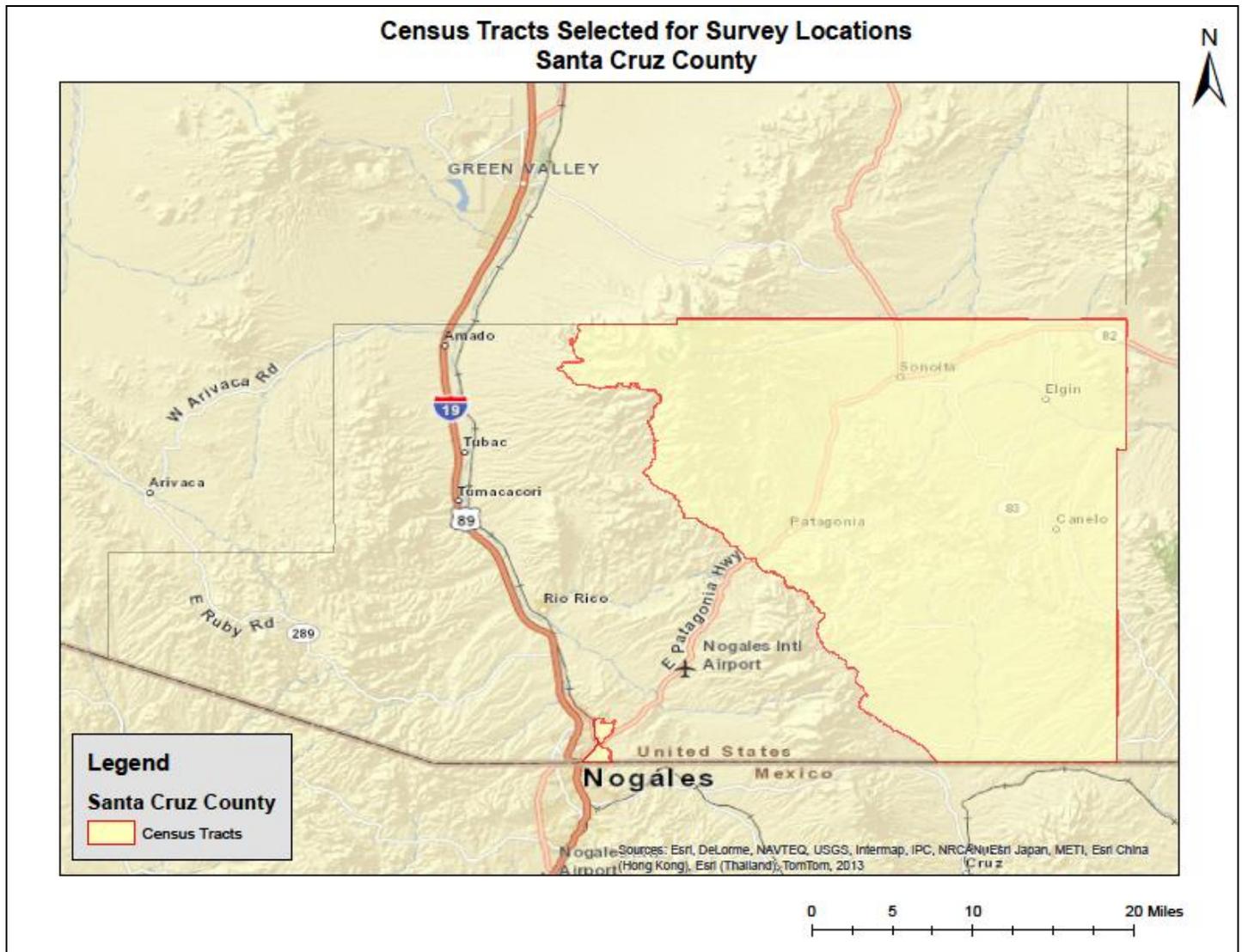


Figure 3. Santa Cruz County, Arizona, census tracts selected for survey locations for the jaguar survey interview of residents.

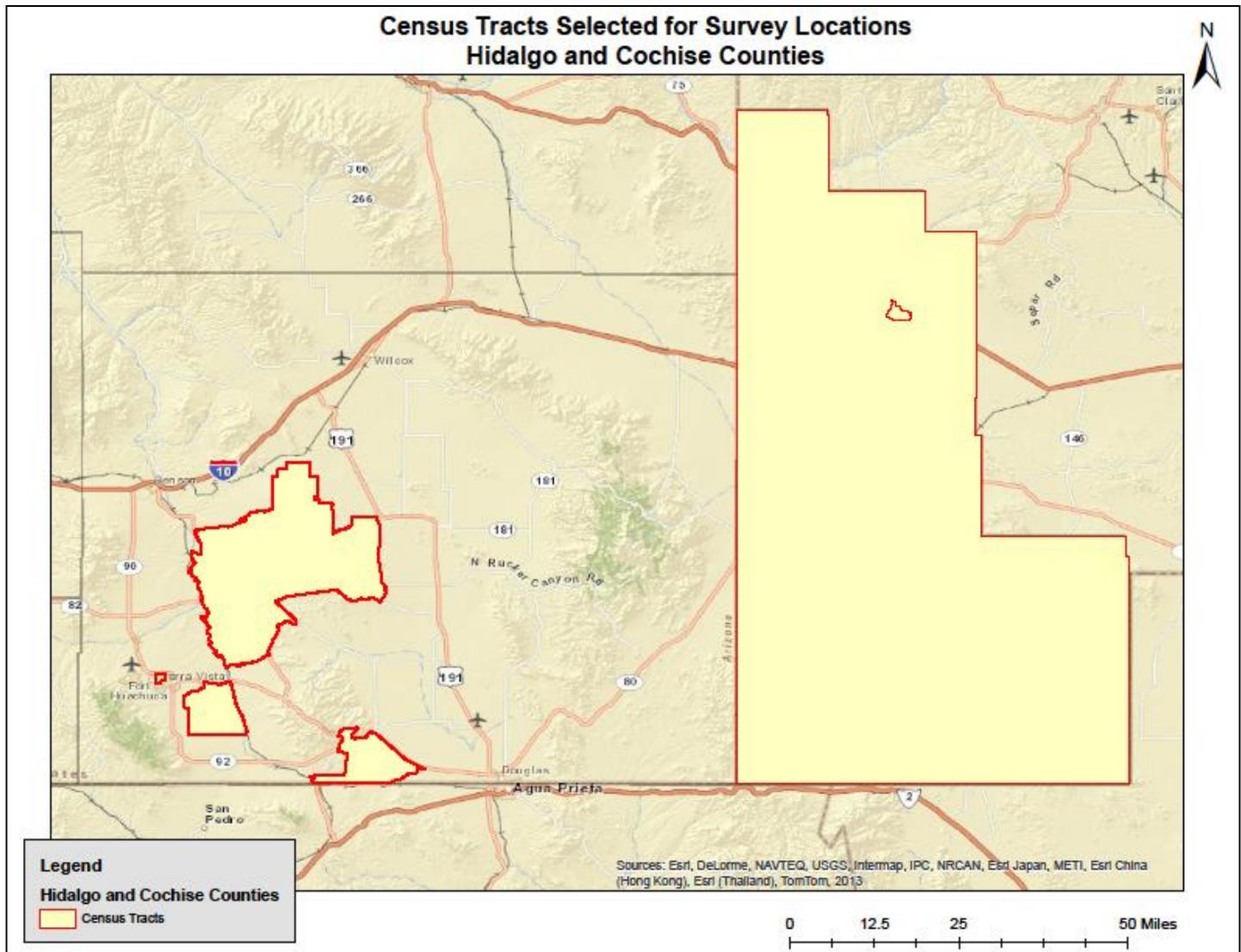


Figure 4. Hidalgo County, New Mexico, and Cochise County, Arizona, census tracts selected for survey locations for the jaguar survey interview of residents.

Stakeholders

One hundred stakeholders were purposively sampled. Purposive sampling is a non-random sampling method. Interview participants are identified according to criteria chosen by the researcher(s) in order to obtain information of particular relevance or depth. Purposive sampling is especially appropriate in qualitative methodologies that aim to achieve depth and thick description of issues through semi-structured interviews (Oliver 2006). In our survey design, stakeholders were identified and invited to participate based on their work (paid or voluntary) or affiliation with a relevant, previously chosen group. We surveyed members from three primary stakeholder groups: Businesses, Governments, and Organizations. Within each primary group, interviewed participants were divided into subgroups according to their organization’s mission and activities. All organizations selected have missions or conduct professional activities that are related to or might be affected by jaguar conservation. In order to complete the surveys within the available timeframe, we could not rely on snowball sampling (also known as referral sampling) to identify stakeholders, a method which maximizes response rates (Bernard 2011). Instead, we contacted individuals through unsolicited emails and phone calls. We obtained email addresses and phone numbers from publicly accessible organization websites, found through internet searches for relevant organizations and their members, researcher knowledge of the study area, and keyword searches. The resulting stakeholder response rates were

consistent with mail and phone-based surveys (Denzin and Lincoln 2011; Willits et al. 2014). Interviews with stakeholders were primarily conducted by phone.

The following is our list of stakeholder groups and subgroups:

Business

- Ranching
- Agriculture
- Outfitting/Guiding
- Tourism
- Development

Government

- Federal
- State
- County

Organization

- Conservation
- Recreation

Table 2 shows the total number of jaguar survey interviews conducted with stakeholders and residents.

Table 2. Number of Surveys with Stakeholders and Residents. The table shows the total count of interviews with stakeholders, by group and by subgroup, and with residents, by county of residence.

Survey Composition	Count
Stakeholders	100
<i>Government</i>	14
Federal	6
State	4
County/Local	4
<i>Business</i>	62
Tourism	7
Development	4
Ranching	5
Agriculture	3
Outfitters/Guides	42
Mining	1
<i>Organization</i>	24
Conservation	18
Recreation/Sportsmen	6
Residents	100
Hidalgo County	7
Cochise County	19
Santa Cruz County	9
Pima County	65

Analysis

Participants' responses were analyzed using content and narrative analysis. Participant responses to open-ended questions were also coded to identify recurring themes. These themes were evaluated in conjunction with demographic variables, other question responses, and the three nominal data points listed below. The level of support for jaguars and jaguar conservation (in particular, the Jaguar Support Score) was treated as the dependent variable in our analysis of relationships between themes and responses.

Particular questions were coded to reduce open-ended responses to three nominal data points:

1. **Jaguar Knowledge Score:** The percent of correct responses to five objective questions regarding jaguar presence and ecology was computed and used to categorize participants based on their level of knowledge.
2. **Land-based Livelihood Group:** Participants who responded "Yes" to "Do you depend on the land for your livelihood?" were categorized as Producers or Consumers according to the type of work they engaged in, based on their responses to the open-ended follow-up question, "For what purpose?" This categorization allowed us to compare the responses of groups who self-identified as being dependent on land-based livelihoods with the responses of researcher-identified stakeholder groups.
3. **Jaguar Support Score:** Participants' responses to seven closed-ended questions were used to compute a Jaguar Support Score. Question responses were coded as negative, neutral, or positive (-1, 0, 1) to support for jaguar conservation and summed, in order to arrive at a numerical value ranging from -7 to 7. The resulting Jaguar Support Score was assigned to the following ranked categories: Strongly Negative, Negative, Weakly Negative, Neutral, Weakly Positive, Positive, and Strongly Positive.

RESULTS**Demographic Data**

The results of the demographic data questions asked of survey participants are summarized in Tables 3 and 4, below.

Table 3. Results of the Demographic Data Questions. Results are from all surveys conducted with stakeholders and residents. Results show the number of responses from stakeholders (out of 100) and residents (out of 100) for each question, as well as the combined number of responses (All Participants) from all 200 participants.

Category	All Participants	Stakeholders	Residents
Male	127	78	49
Female	73	22	51
Average number of people in household	2.6	2.6	2.5
Age distribution			
18-29	38	1	37
30-49	66	40	26
50-64	63	41	22
65+	32	17	15
N/A	1	1	0
Total household income			
Less than \$24,999	28	4	24
\$25,000 - 49,999	43	10	33
\$50,000 - 99,999	56	28	28
\$100,000 or more	44	38	6
N/A	29	20	9
Highest education level completed			
Less than high school	2	0	2
High school	40	22	18
Some College	248	18	30
Bachelor's degree	60	29	31
Graduate/Professional degree	48	30	18
N/A	2	1	1
Childhood residence			
Rural area	64	47	17
Small town	44	19	25
Suburban area	39	19	20
City	52	15	37
N/A	1	0	1
Current residence			
Rural area	71	52	19
Small town	29	15	14
Suburban area	23	14	9
City	57	19	58
N/A	0	0	0

Table 4. Results of the Demographic Data Questions. Results are from all surveys conducted with stakeholders and residents. Results show the percent of responses for stakeholders and residents (out of 100) for each question, as well as the percent of all participants.

Category	% All Participants	% Stakeholders	% Residents
Male	63.5	78	49
Female	36.5	22	51
Age distribution			
18-29	19	1	37
30-49	33	40	26
50-64	31.5	41	22
65+	16	17	15
N/A	0.5	1	0
Total household income			
Less than \$24,999	14	4	24
\$25,000 - 49,999	21.5	10	33
\$50,000 - 99,999	28	28	28
\$100,000 or more	22	38	6
N/A	14.5	20	9
Highest education level completed			
Less than high school	1	0	2
High school	20	22	18
Some College	24	18	30
Bachelor's degree	30	29	31
Graduate/Professional degree	24	30	18
N/A	1	1	1
Childhood residence			
Rural area	32	47	17
Small town	22	19	25
Suburban area	19.5	19	20
City	26	15	37
N/A	0.5	0	1
Current residence			
Rural area	35.5	52	19
Small town	14.5	15	14
Suburban area	11.5	14	9
City	38.5	19	58
N/A	0	0	0

Outdoor Activities

Respondents reported regularly engaging in a wide variety of outdoor activities. Overall, 179 of 200 respondents (89 percent) said they regularly engage in outdoor activities. Across all respondents, the average number of times per month spent in outdoor activities was 13.34 (see Table 5). Respondents' main purpose for these activities was recreation, while work-related activities and health were also important (see Table 6). Respondents also interpreted the outdoor activities question quite broadly. When questioned about their "primary" outdoor activity, nearly all participants listed multiple activities. Table 7 shows the percent of stakeholders, residents, and all survey participants who responded with the listed activity as a primary outdoor activity that they regularly engaged in.

Table 5. Participation in Outdoor Activities. Results show the percent of respondents who stated they regularly engage in outdoor activities, by residents, stakeholders, and for all participants, as well as the average number of times per month respondents reported engaging in outdoor activities, by residents, stakeholders, and all participants.

Activities	% All Participants	% Stakeholders	% Residents
Regularly engage in outdoor activities	89%	96%	83%
Times per month participants engage in outdoor activities	13.34	15.23	11.1

Table 6. Purpose of Outdoor Activity Participation. Results show the percent of respondents who listed each primary purpose for their outdoor activities, by stakeholders, residents, and all participants.

Primary Purpose of Outdoor Activities	% All Participants	% Stakeholders	% Residents
Recreation	79.9	40.8	33.5
Work	39.7	34.6	5.0
Physical fitness/Health	17.3	6.1	11.2
Spiritual/Mental health	4.5	2.8	1.7
Transportation	2.2	0.0	2.2
To help animals/nature	1.7	1.1	0.6

Table 7. Outdoor Activities. Results show the percent of respondents who listed each activity as a primary outdoor activity in which they regularly engage, by stakeholders, residents, and all participants.

Activities Reported	% All Participants	% Stakeholders	% Residents
Hiking	54.2	28.5	25.7
Hunting	26.8	21.8	6.1
Fishing	20.1	11.7	8.4
Walking	15.6	3.9	11.7
Bicycling	11.7	3.9	7.8
Camping	8.9	5.6	3.4
Sports	5.6	2.2	3.4
Conservation work	4.5	3.9	0.6
Scouts	4.5	4.5	0.0
Ranching	3.9	3.9	0.0
Birding	3.9	3.4	0.6
Gardening	3.4	1.7	1.7
Horses	3.4	2.8	0.6
Mountain biking	3.4	3.4	0.0
Running	3.4	2.8	0.6
Yard work/Home maintenance	3.4	1.7	1.7
Guiding/Outfitting	2.8	2.8	0.0
ATV	2.2	1.7	0.6
Shooting	2.2	2.2	0.0
Wildlife/nature watching	2.2	2.2	0.0
Photography/Videography	1.7	1.1	0.6
Dogs	1.7	1.1	0.6
Running hounds	1.1	1.1	0.0
Archery	0.6	0.6	0.0

Organization Membership

Eighty-four respondents (42 percent) said they were a member of a conservation or wildlife-related recreation organization. Of these 84, 68 members were stakeholders and 16 were residents. Thirty-six stakeholders reported membership in both organization categories (conservation and recreation). Figures 5 and 6 show the percent of stakeholders and residents who are members of an organization, by organization type.

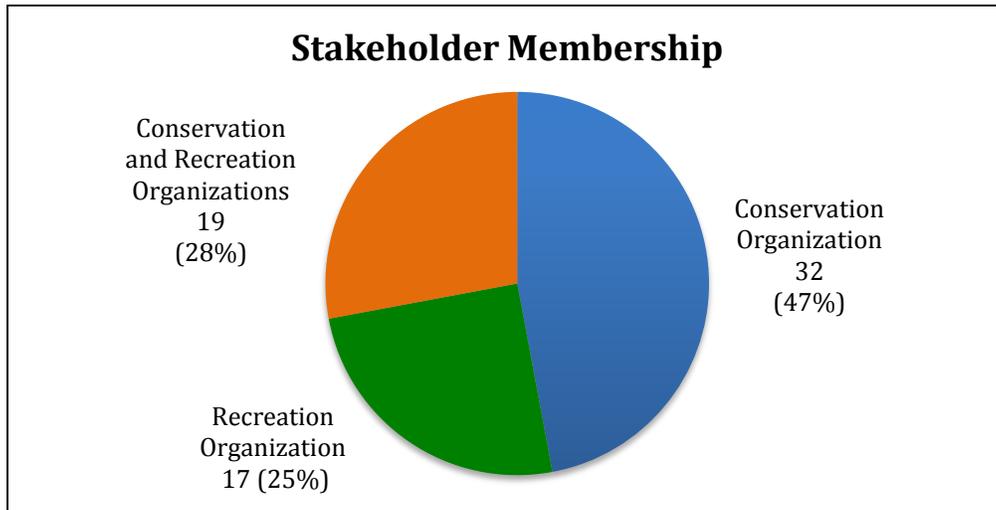


Figure 5. Stakeholder membership in a conservation or recreation organization. Results show the number of stakeholders who responded that they are a member of a conservation or recreation organization. The percent of stakeholders who are members of both a conservation and recreation group is also shown.

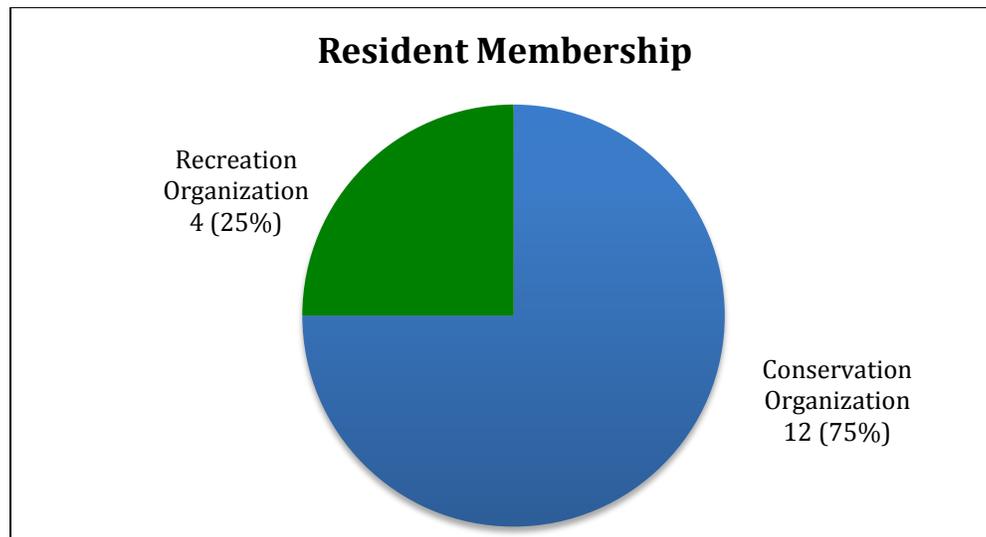


Figure 6. Resident membership in a conservation or recreation organization. Results show the number of residents who responded that they are a member of a conservation or recreation organization. There were no residents who were members of both a conservation and recreation group.

Land-based Livelihoods

As stakeholders were purposively sampled based on their involvement in land-based or conservation-related activities, it is not surprising that 71 stakeholder respondents (71 percent) reported that they were dependent on the land for their livelihoods. In addition, 11 surveyed residents considered themselves to be dependent on the land for their livelihoods. Overall, 61 survey respondents (74 percent of those dependent on the land) claimed that land-based activities were the primary source of their household income. Seventy-six respondents (38 percent) answered yes to having ever been dependent on the land for their livelihood, and 48 respondents (24 percent) reported that land-based activities were their parents' primary source of income. Figure 7 shows the percent of residents, stakeholders, and all participants with land-based livelihood experiences.

Participants also reported on the types of work that generated their land-based income or livelihood support. Using their open-ended responses, we characterized their reported activities as productive (Agriculture, Ranching, Outfitting/Guiding, Subsistence Agriculture, or Mining related work) or consumptive (Conservation, Tourism, and Development related work). Of those who reported land-based livelihoods, 51 (62 percent) were characterized as productive land-users and 33 (46 percent) were characterized as consumptive land users; 2 respondents reported primary activities in both categories.

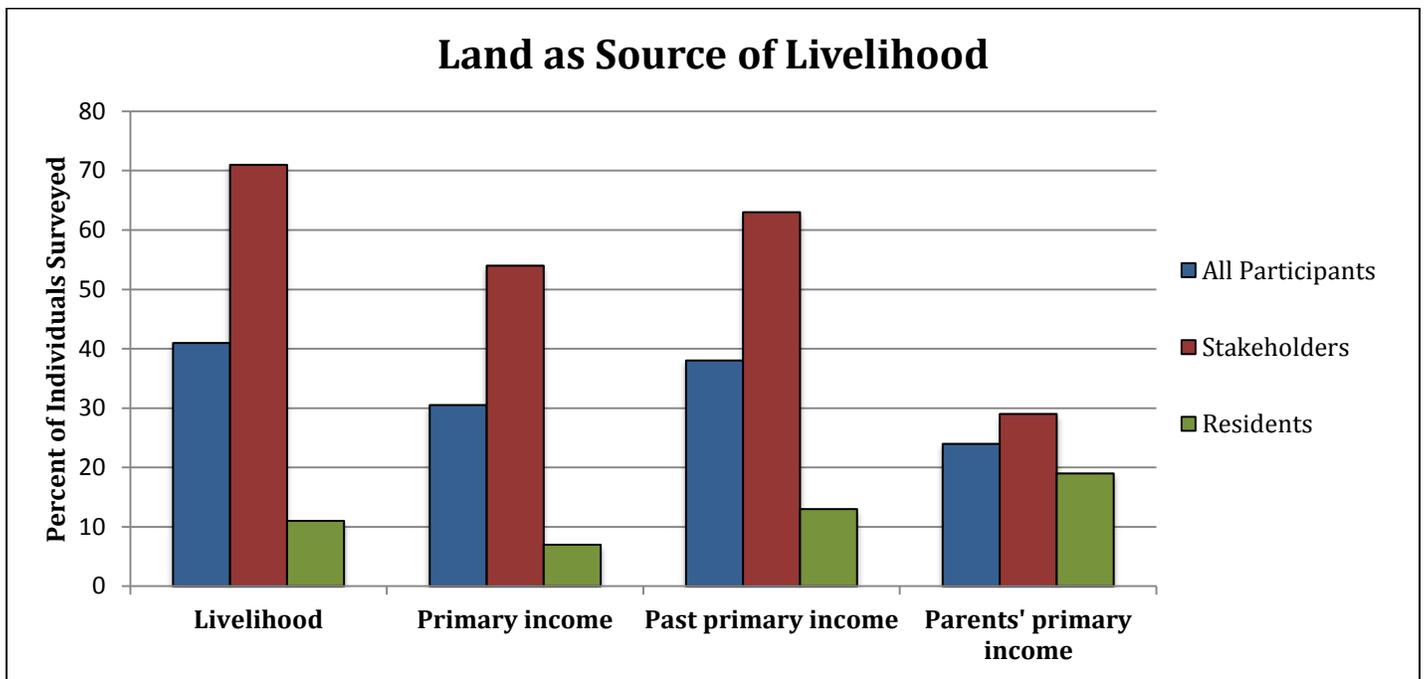


Figure 7. Percent of individuals with land-based livelihoods. The figure shows the percent of participants, by stakeholders, residents, and for all participants, who indicated that they are dependent on the land for their livelihood, that land-based activities were a primary source of their income, that land-based activities were a primary source of their income in the past, and that land-based activities were a primary source of their parents' income.

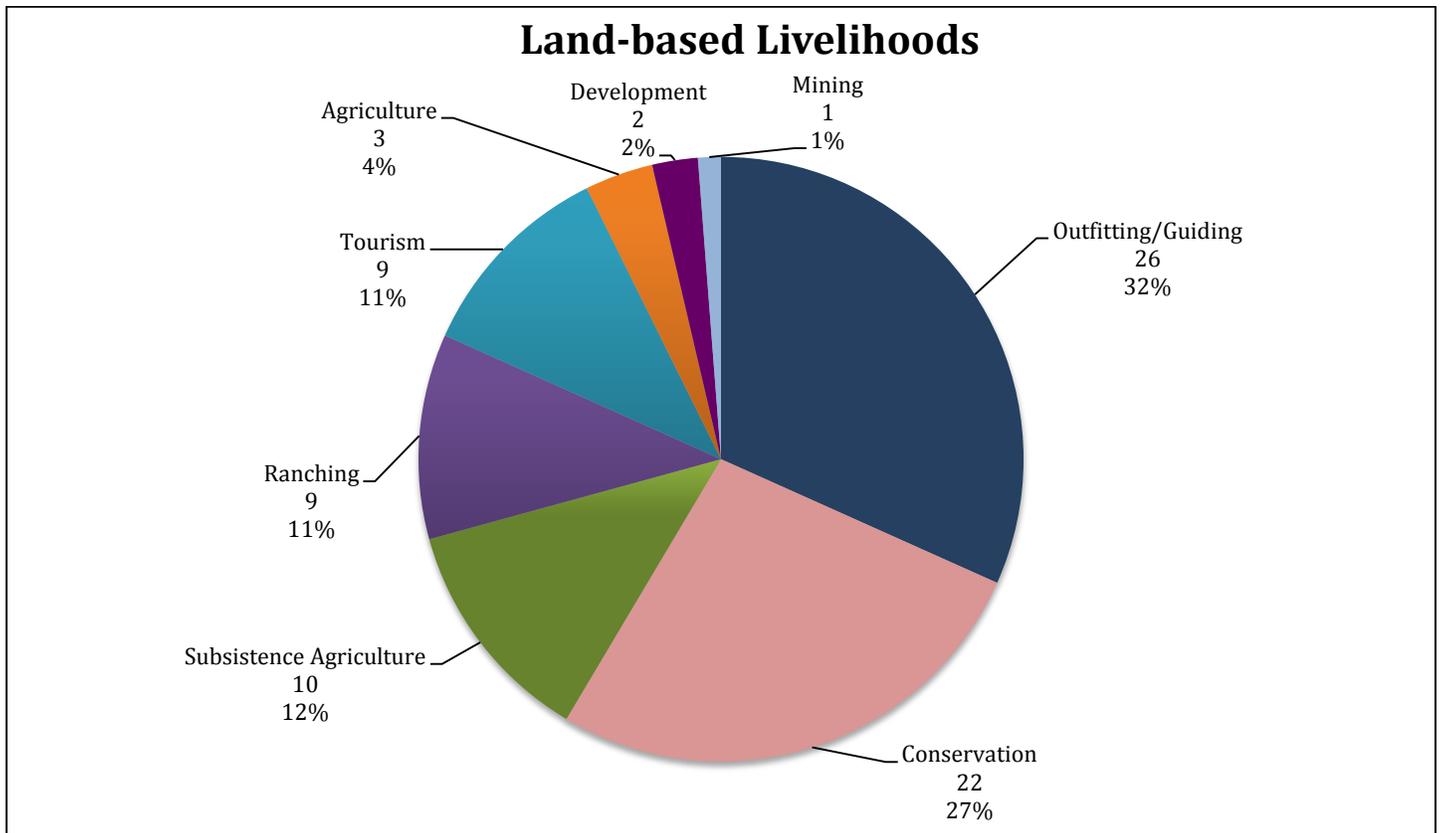


Figure 8. Percent with land-based livelihoods by income source. The figure shows the number and percent of participants with land-based livelihoods who listed the indicated activities as the source of their land-based livelihoods.

Knowledge of Jaguar Status and Ecology

Overall, survey respondents were knowledgeable about jaguars. They responded correctly to questions about jaguar status and ecology, and the historical and recent presence of jaguars in study area. We asked seven objective questions to ascertain their level of knowledge. The questions are listed below. See the Survey Instrument (Appendix F) for the question order and answer choices.

1. Were jaguars historically found in territory that is now part of the U.S.?
2. Are jaguars in jeopardy of extinction in the U.S.?
3. Are jaguars in jeopardy of extinction throughout their global range?
4. Has a jaguar sighting been confirmed in the U.S. during the last 50 years?
5. Are jaguars and mountain lions (cougars/pumas) different species?
6. Which of the following best describes jaguars?
 - Solitary animals with only females involved in rearing young.
 - Social animals that reproduce and live in packs and cooperatively protect and feed their young.
 - Jaguars mate for life and males help to rear young.
7. The primary prey of jaguars in this region is:
 - Deer and peccaries/javelina
 - Rabbits and rodents
 - Snakes and lizards

Respondents averaged 3.92 (out of 5) correct responses on questions 1 and 4-7 (78.4 percent correct). These 5 questions were used to compute each respondent's Jaguar Knowledge Score. The stakeholder Jaguar Knowledge Score was higher than the resident score, and a higher percentage of stakeholders than residents correctly answered each of these five questions.

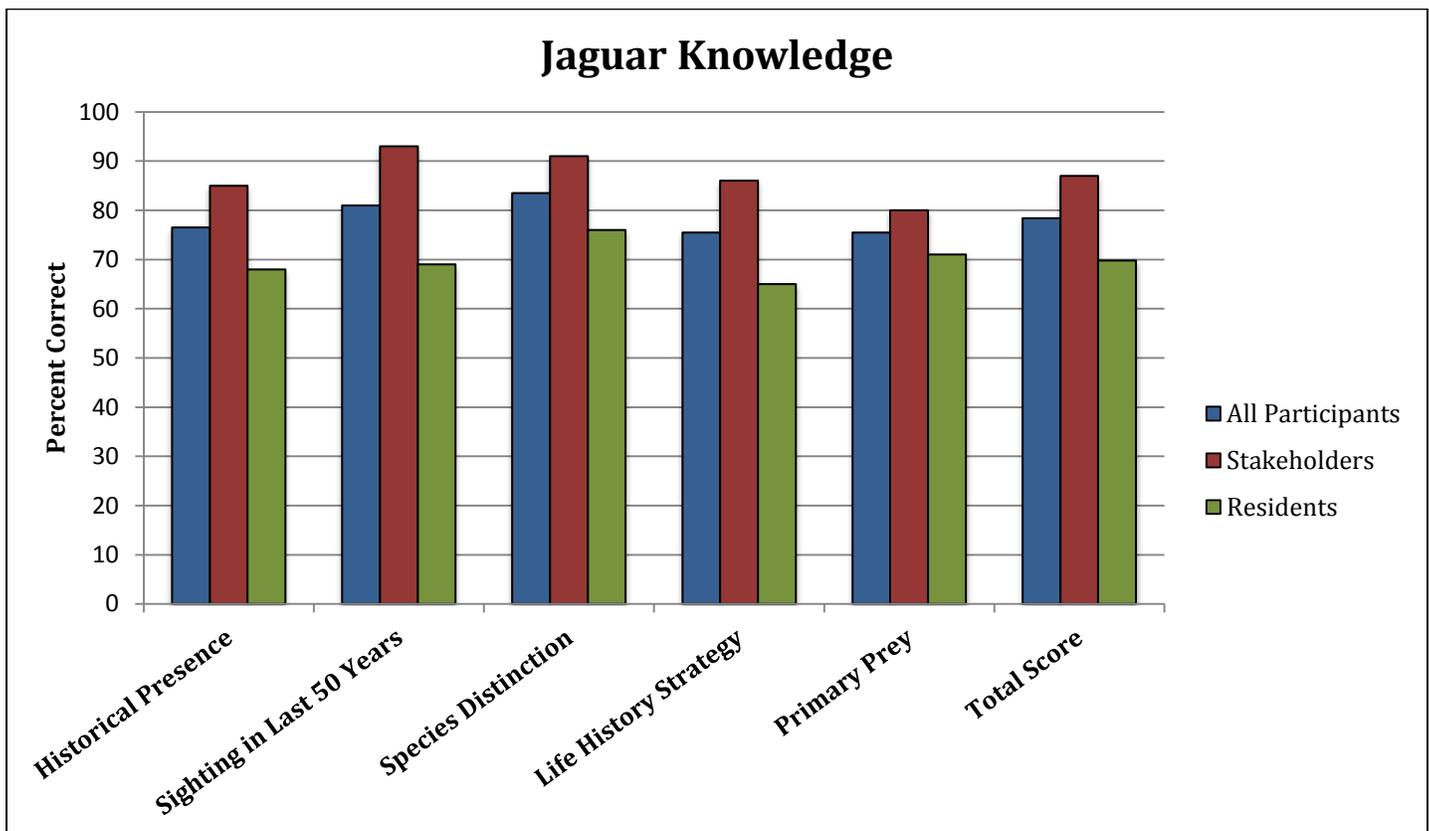


Figure 9. Correct responses to jaguar status and ecology questions. Results show the average percent correct across the five Jaguar Knowledge questions, by stakeholders, residents, and all participants (“Total Score”), as well the percent correct for each of the five Jaguar Knowledge questions, by stakeholders, residents, and for all participants.

The phrase “in jeopardy of extinction” (in questions 2 and 3, listed above) does not directly correspond to the definition of threatened or endangered species according to the Endangered Species Act. Due to this phrasing, participants’ responses to questions 2 and 3 are difficult to interpret as correct or incorrect, and do not contribute to accurately characterizing respondents’ level of jaguar knowledge. These two questions were therefore not included in the Jaguar Knowledge Score. The number of respondents who answered “yes” to questions 2 and 3 are reported in Figure 10, below.

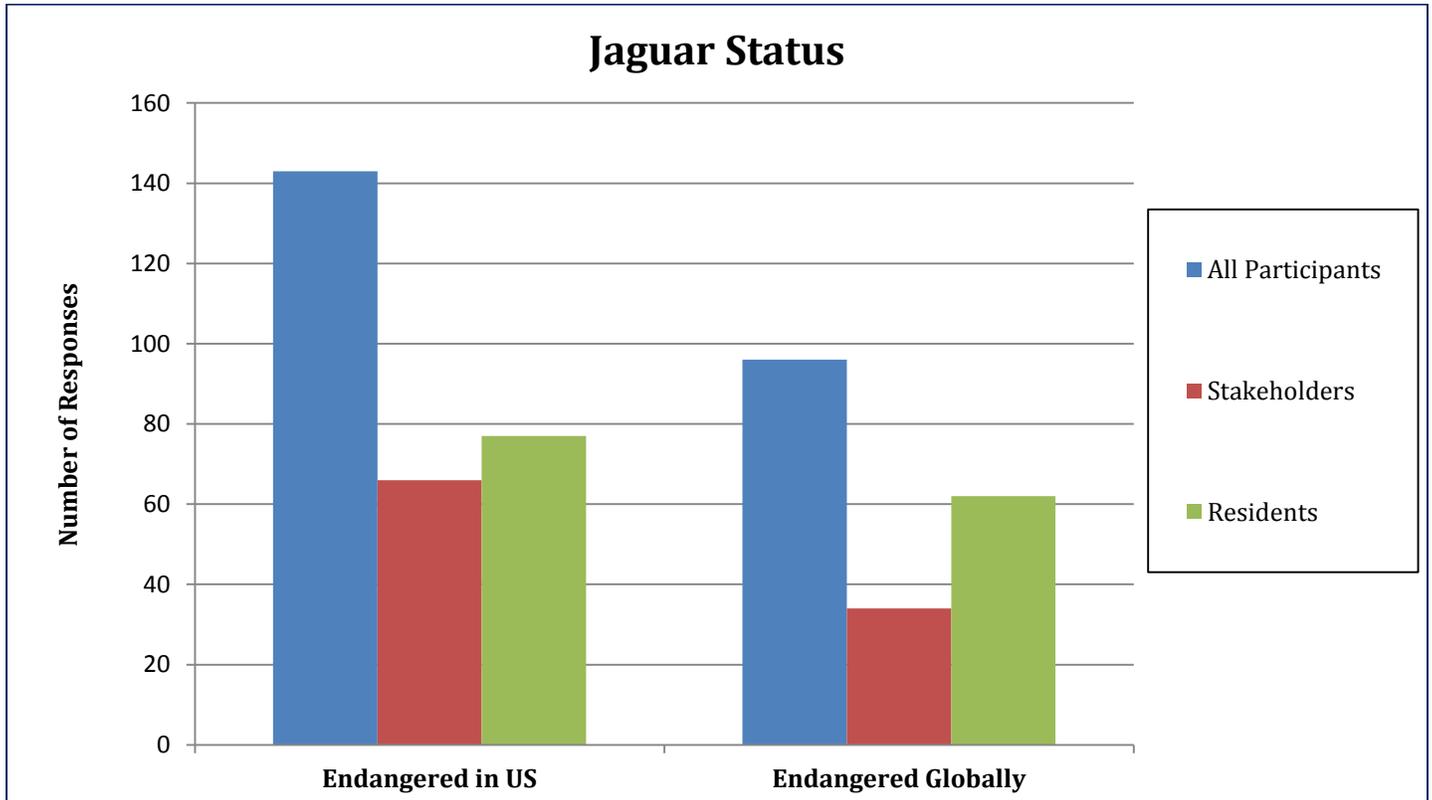


Figure 10. Jaguar status. The figure shows the number of “yes” responses to the questions, “Are jaguars in jeopardy of extinction in the U.S?” and “Are jaguars in jeopardy of extinction throughout their global range?” by all participants (200 total), and by stakeholders (100 total) and residents (100 total).

Attitudes toward Jaguars and Conservation Efforts

Overall, 172 respondents (86 percent) are in favor of jaguars living in our region and 108 (63 percent) believe the government should spend resources to improve habitat for jaguars in our region. Support for jaguars varied according to respondent categorization. Ninety-three percent of females were in favor, compared to 82 percent of males. While 86 percent of all participants surveyed were in favor of jaguars, the percentage of rural residents in favor was 75 percent. A higher percentage of residents (94 percent) than stakeholders surveyed (78 percent) were in favor of jaguars. Business stakeholders were the least supportive. Figures 11 and 12 show the results of the Jaguar Support Score and the questions, "Are you in favor of jaguars living in our region?" and "Do you think the government should spend resources to improve habitat for jaguars in our region?"

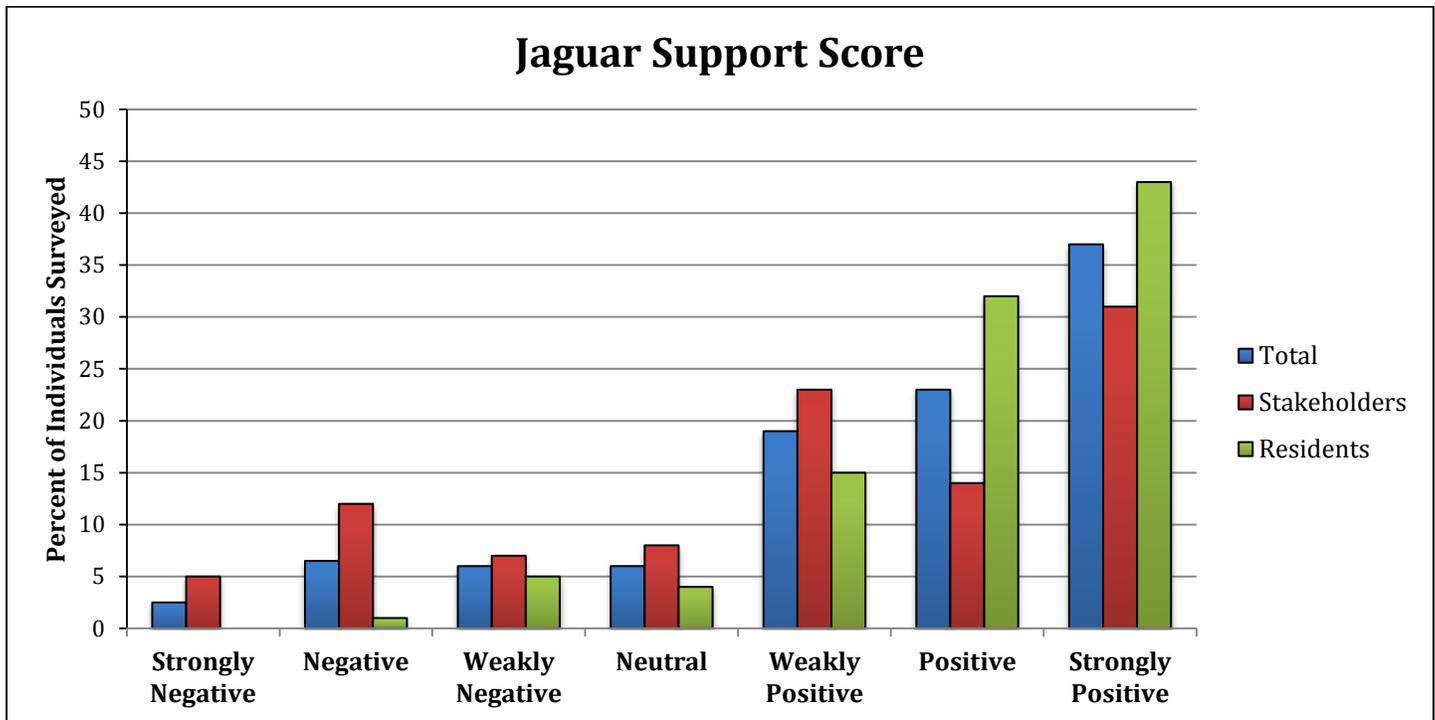


Figure 11. Jaguar support score. The results show the percent of all participants, stakeholders and residents classified in each Jaguar Support category. Classification was determined by participants’ responses to seven questions related to support for jaguars and jaguar conservation.

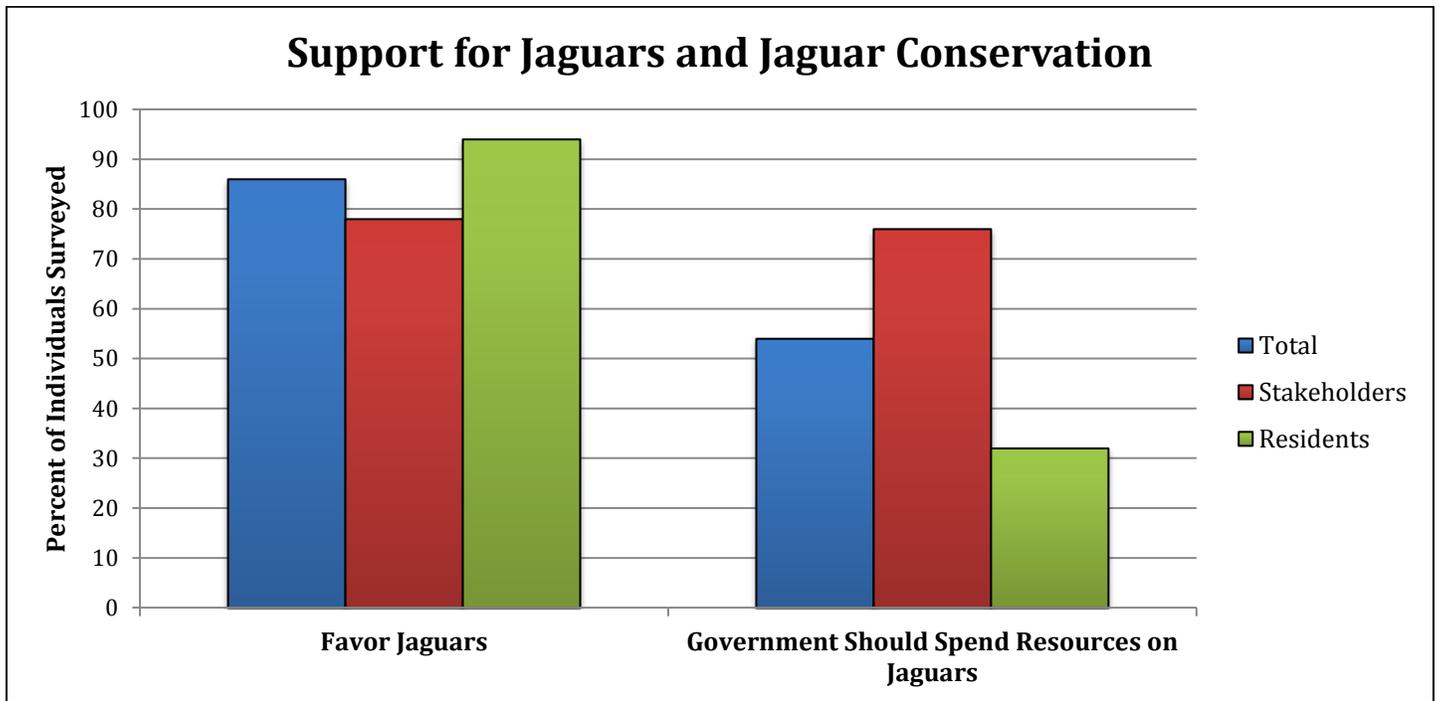


Figure 12. Support for jaguars and jaguar conservation. The figure shows the percent of stakeholders, residents and all participants who answered “yes” to “Are you in favor of jaguars living in our region?” and “Do you think the government should spend resources to improve habitat for jaguars in our region?”

The objective question, “Are you in favor of jaguars living in our region?” (see Appendix F for Survey Instrument) was followed by the open-ended question, “Why or why not?” Respondents’ answers to this open-ended question were first categorized as in favor, then as not in favor. Within the two categories, recurrent key phrases indicating respondents’ reasons for their answer to the question were coded as themes. The number of times each theme was responded with was counted for each category (in favor; not in favor). Table 8 shows the number of responses for each theme given as a reason for being in favor of jaguars living in our region, out of all 200 participants surveyed. Table 9 shows the number of responses for each theme given as a reason for not being in favor of jaguars living in our region, out of all 200 participants surveyed. Some respondents cited multiple themes in their response to this open-ended question.

Table 8. Reasons Given for Supporting Jaguar Conservation. The table shows the frequency count of responses which expressed the listed theme as a reason for respondents’ support of jaguars living in our region.

Reasons for Jaguars	Number of Responses
Natural / Native to region	32
Animals have rights to exist; they were here first	23
Important to ecosystem health	20
Aesthetic – jaguars are “beautiful” or “cool”	17
Importance of biodiversity	13
Important to the heritage of this region	10
Control prey populations	5
Balance of nature	5

Table 9. Reasons Given for Not Supporting Jaguar Conservation. The table shows the frequency count of responses that expressed the listed theme as a reason the respondent was not in favor of jaguars living in our region.

Reasons Against Jaguars	Number of Responses
Detrimental to livestock or ranchers	8
People's interests should come first	5
Jaguar conservation will create conflicts	4
Will restrict people's access to land	2
Not enough space for jaguars	1
Will cause more restrictions for hunters	2
Jaguars do not belong here	2
Fear for people's safety	3
Negative example of the Mexican wolf program	2
Should not create artificial environments for jaguars	2

Threats and Obstacles

Respondents believe that humans are primarily responsible for the endangered status of jaguars. When asked, "What are the primary threats to jaguars in this region?" (see Appendix F. Survey Instrument; Knowledge of Jaguar Status and Ecology section) they responded most often with habitat loss or degradation, humans or people, hunters or poaching, or development (housing and roads). Table 10 lists all the threats identified by respondents and the frequency count of survey respondents who referred to the identified threat. Notably, nine respondents replied that there are no threats to jaguars in our region. Two objected to the question (indicating they perceived it as a "trick question"), pointing out that the question's premise is that jaguars are present and threatened in our region, premises with which the respondents implied they did not agree.

Table 10. Threats to Jaguars Listed by Respondents. The table shows the frequency count of the number of times each listed theme was expressed by respondents in answer to the question, "What are the primary threats to jaguars in this region?"

Threats to Jaguars	Number of Responses
Habitat loss or degradation	38
People or human activity	36
Hunters/Hunting	22
Development (roads, housing)	18
None	9
Border issues	8
Ranchers	6
Lack of prey	6
Population growth	6
AZGF/Contract employees with AZGF	5
Climate change	5
Poaching	5
Mining	4
Region is at the periphery of jaguar range/marginal habitat	3
Poaching/Predator control in Mexico	3
Trick question	2
Pollution	1
The NRA	1

We asked two questions regarding the potential effects of activities along the U.S./Mexico border on jaguar or wildlife conservation (see Appendix F. Survey Instrument):

- Are you aware of any activities along the U.S./Mexico border that negatively or positively affect jaguars or other wildlife species?
- Are you aware of any activities along the U.S./Mexico border that could be negatively or positively affected by the conservation of jaguars or other wildlife species?

A majority of respondents (136; 68 percent) responded that they were aware of activities that negatively affect jaguars and other wildlife species. Most responses referred to the negative impact of the border wall/fence on wildlife movement, including jaguars and their prey species; the activities of the Border Patrol, including traffic on borderland roads and lights; and the activities of border crossers, including migrants and drug smugglers. Mining also was referred to as an activity that negatively affects jaguars or other wildlife in the border region. Only five people responded that border activities positively affect jaguars and wildlife. Four of the five referred positively to habitat restoration work being conducted by conservationists or the efforts of ranchers to improve habitat in the border region. One person indicated that the border wall itself has a positive impact on wildlife.

A majority of respondents said “no” (112 respondents; 56 percent) to the question, “Are you aware of any activities along the U.S./Mexico border that could be negatively or positively affected by the conservation of jaguars or other wildlife species?” Twenty-six respondents (13 percent) said yes, conservation could have a positive effect, while 47 (24 percent) said yes, but that conservation could have a negative effect. We were unable to determine whether 17 “yes” responses (9 percent) were viewed as positive or as negative by respondents. Some respondents expanded on their answer to this question to indicate they thought that a positive effect of conservation might be the restriction of Border Patrol activities along the border or the development of tourism in the study area. Of those who indicated that they thought conservation activities could have a negative effect, some explained they were concerned that conservation efforts might result in restrictions on access to land along the border by Border Patrol and/or by land users.

Awareness of Government Conservation Efforts

Participants were asked three open-ended questions about their awareness of and perceptions about government-led conservation efforts (see Appendix F. Survey Instrument):

- Are you aware of jaguar conservation efforts currently being conducted by the U.S. FWS?
- Do you think state and federal government agencies are doing enough to conserve jaguars?
- What else do you think they should be doing to conserve jaguars?

Participants said they are not aware (142 participants; 71 percent) of any conservation efforts conducted by the FWS. Of the 45 participants who said they are aware of conservation efforts by the FWS, only 12 (6 percent) referred to any specific actions. Actions participants did refer to included setting camera traps, monitoring, and the designation of critical habitat. Given the high percentage of respondents who were not aware of specific FWS conservation efforts, it is not surprising that few people think federal and state agencies are doing enough to conserve jaguars. Only 42 participants (21 percent) responded positively to the question, “Do you think state and federal government agencies are doing enough to conserve jaguars?” while 65 of those surveyed (33 percent) do not think they are doing enough. A large number of respondents to this question, however, expressed uncertainty, lack of information to judge, or said, “I don’t know” (61 respondents; 31 percent). Twenty-one respondents’ answers (11 percent) could not be characterized as either yes or no to the question, but their statements indicated that they distrust, or reject, conservation efforts by the FWS or state agencies.

DISCUSSION

The open-ended questions generated rich descriptions of participants' answers to survey questions. This section discusses the key themes that emerged from participant responses to the open-ended questions and relates these themes to groups' differing levels of support for jaguars and jaguar conservation.

Respondents in favor of jaguars spoke eloquently of their reasons. Respondents said they were in favor of jaguars living in our region because of their importance to the ecosystem, because animals have a right to exist and we can and should share space with them, and for their aesthetic beauty. Some respondents in favor of jaguars indicated they consider them to be part of the heritage of our region and a powerful symbol of the desert southwest.

Those not in favor of jaguars were concerned about the impact of conservation on ranchers and hunters and their livelihoods and on continued access to public lands. Some of those not in favor also indicated that they doubted the ability of the human-dominated landscape in southern Arizona and New Mexico to support jaguars, a belief that could be also be held by those in favor of jaguars living in our region. Those not in favor of jaguars also expressed distrust in both government and the actions of environmental advocacy groups.

Support for jaguars and jaguar conservation varied by demographic and stakeholder groups. More females than males were in favor of jaguars living in our region. Ninety-three percent of females were in favor, compared to 82 percent of males. While 86 percent of all participants surveyed were in favor of jaguars, 75 percent of rural residents were in favor. A higher percentage of residents (94 percent) were in favor of jaguars than stakeholders surveyed (78 percent).

Respondents were generally in favor of spending government resources to conserve jaguars. Respondents also were in favor of incentivizing rancher tolerance of jaguars in the study area. The majority supported the two specific conservation strategies discussed: providing monetary incentives for ranchers to improve habitat for jaguars and compensating ranchers for livestock depredations; and voluntary conservation easements with regulatory relief benefits. In addition, participants expressed a willingness to pay for these conservation tools – the most common response to the question of who should pay for such programs was “taxpayers.” Many survey respondents commented, though, that they lacked enough information to make such a judgment and/or responded with “I don’t know.”

Many participants, however, expressed reluctance to support the use of government resources to conserve jaguars, including some of those supportive of jaguars living in our region. The reasons given against spending government resources included both the concern for the effectiveness of programs led by government agencies and concern over whether such programs would lead to increased regulation or restricted access to land, both public and private.

Responses to the questions, “Are you aware of jaguar conservation efforts currently being conducted by the U.S. FWS?” and “Do you think state and federal government agencies are doing enough to conserve jaguars?” revealed a lack of awareness of FWS efforts and also dissatisfaction with or distrust of government-led conservation efforts. General distrust of government-related activity, though, could negatively affect people’s perceptions about FWS jaguar conservation efforts. Statements made by some respondents associated with negative responses to the jaguar conservation efforts of FWS implied, and may have been precipitated by, such a general distrust in government. Our survey, however, did not include specific questions to ascertain the level of trust in government in general, in order to fully evaluate this interpretation.

Reluctance to support government conservation efforts was also clearly tied to the preference for non-intervention when it came to human-jaguar relations in our region. Statements made by some respondents suggested they believe that direct efforts for jaguar conservation are unnecessary. Reasons given included: jaguars capable of living here will be able to do so without our help; our region is not important to jaguar recovery; and jaguar recovery in the U.S. is most dependent on the conservation of jaguars in Mexico. In responses to several of our questions, respondents referred to the radio-collaring of the jaguar dubbed “Macho B” and what was referred to by participants as his subsequent capture-related death.

The differences in responses to why we should or should not engage in jaguar conservation revealed divisions in values between different groups. Those in favor valued the existence and rights of animals and ecosystem health. Those not in favor, or less supportive, were more likely to assert the value of satisfying human interests and needs.

Among all survey questions, the answers to the question, "What do you think the biggest obstacles or challenges to conservation are in our region?" were the most varied. They revealed divisions in different groups' perceptions about obstacles to conservation and potential solutions to human-jaguar and human-human conflicts. In responses to this question, some respondents referred to groups that they indicated they believed held different or opposing values, implying that these opposing groups' actions and values were an obstacle to jaguar conservation in the study area. From analysis of these questions, it appears that some stakeholder groups hold negative perceptions of each other's role in conservation conflicts and actions regarding wildlife conservation. This might present a potential barrier to further jaguar conservation and recovery efforts.

CONCLUSIONS

The level of support for jaguars and jaguar conservation in the study area is considerable. The level of knowledge that people surveyed had about jaguar status and ecology was high. These two factors could potentially benefit the goals of jaguar recovery in the study area. There are several factors, however, that could be obstacles to support for conservation efforts. They include a lack of awareness of FWS jaguar conservation efforts, potential distrust of government activities in general, uncertainty regarding specific conservation tools, and distrust between stakeholder groups.

The following is a summary of conclusions that can be drawn from the results of our survey.

Key Findings

1. Survey participants were knowledgeable about jaguar status and ecology, but were not familiar with FWS or state efforts regarding jaguar conservation.
2. Overall, residents and stakeholders were in favor of jaguars living within the U.S. portion of the Northwestern Recovery Unit and support conservation efforts and the use of U.S. government resources to achieve this.
3. Participants generally agreed with conservation strategies, such as rancher incentives and voluntary conservation easements, but many were not well-informed about such programs and wanted more information about them.
4. As a group, respondents dependent on land-based livelihoods had lower levels of support for jaguars and jaguar conservation.
5. Two main potential barriers to FWS jaguar conservation efforts were identified: a.) concerns about the necessity and effectiveness of government-led conservation efforts; and b.) negative attitudes toward opposing groups' perceived values and actions regarding wildlife, and their perceived role in conflicts over conservation policies.

Recommendations

Given our conclusions and key findings, we propose the following recommendations for FWS conservation strategies and education and outreach efforts:

1. Develop outreach and education materials that explain the purpose and need for jaguar conservation in the study area, as well as specific information that highlights key programs and efforts.
2. Develop education and outreach programs and materials that specifically explain key conservation strategies, such as rancher incentives and voluntary conservation easements.
3. Consider methods to foster the development of trust between stakeholder groups in the study area, for example by offering opportunities for dialogue in mediated workshops that address the development and implementation of jaguar conservation programs.

REFERENCES

- Alanen, M. 2015. Conserving Arizona's Resident Jaguars. U.S. Fish and Wildlife Service Endangered Species Bulletin. Spring 2015. Accessed online, May 15, 2015: <http://www.fws.gov/endangered/news/episodes/bu-spring2015/story2/index.html>.
- Bernard, H.R. 2011. *Research Methods in Anthropology: Qualitative and Quantitative*, 4th ed. New York: Alta Mira Press.
- Brown, D., and C. López González. 2001. *Borderland Jaguars*. Salt Lake City: The University of Utah Press.
- Caso, A., C. López González, E. Payan, E. Eizirik, T. de Oliveira, R. Leite-Pitman, M. Kelly, and C. Valderrama. 2008. *Panthera onca*. The IUCN Red List of Threatened Species. Version 2014.3. Accessed online, May 15, 2015: <http://www.iucnredlist.org>.
- Denzin, N., and Y. Lincoln. 2011. *The SAGE Handbook of Qualitative Research*, 4th ed. Los Angeles: SAGE Publications, Inc.
- Dickman, A. 2010. Complexities of conflict: the importance of considering social factors for effectively resolving human-wildlife conflict. *Animal Conservation* 13: 458–466.
- Dickman, A., L. Hazzah, C. Carbone, and S. Durant. 2014. Carnivores, culture and 'contagious conflict': Multiple factors influence perceived problems with carnivores in Tanzania's Ruaha landscape. *Biological Conservation* 178: 19–27.
- Gomez-Ortiz, Y., and O. Monroy-Vilchis. 2013. Feeding ecology of puma (*Puma concolor*) in Mexican montane forests with comments about jaguar (*Panthera onca*). *Wildlife Biology* 19(2): 179-187.
- Hernández-Saint Martín, D., O. Rosas-Rosas, J. Palacio-Núñez, L. Tarango-Arambula, F. Clemente-Sánchez, and A. Hoogsteijn. 2015. Food Habits of Jaguar and Puma in a Protected Area and Adjacent Fragmented Landscape of Northeastern Mexico. *Natural Areas Journal* 35(2): 308–317.
- Kansky, R., and A. Knight. 2014. Key factors driving attitudes towards large mammals in conflict with humans. *Biological Conservation* 179: 93–105.
- Madden, F. and B. McQuinn. 2014. Conservation's blind spot: The case for conflict transformation in wildlife conservation. *Biological Conservation* 178: 97–106.
- Marshall, K., R. White, and A. Fischer. 2007. Conflicts between humans over wildlife management: On the diversity of stakeholder attitudes and implications for conflict management. *Biodiversity Conservation* 16: 3129–3146.
- McCain, E.B., and J.L. Childs. 2008. Evidence of resident jaguars (*Panthera onca*) in the southwestern United States and the implications for conservation. *Journal of Mammalogy* 89: 1–10.
- New Mexico Department of Game and Fish. 2015. Jaguar (*Panthera onca*). *Wildlife Notes*. Accessed online: May 18, 2015: www.wildlife.nm.us.
- Oliver, P. 2006. Purposive Sampling. In *The SAGE Dictionary of Social Research Methods*. V. Jupp, Ed. Thousand Oaks: SAGE Publications, Inc.
- Redpath, S., J. Young, A. Adams, W. Sutherland, W. Whitehouse, A. Amar, R. Lambert, J. Linnell, A. Watt, and R.J. Gutiérrez. 2013. Understanding and managing conservation conflicts. *Trends in Ecology and Evolution* 28(2): 100–109.
- Rodriguez-Soto, C., O. Monroy-Vilchis, L. Maiorano, L. Boitani, J.C. Faller, M. Briones, R. Nunez, O. Rosas-Rosas, G. Ceballos, and A. Falcucci. 2011. Predicting potential distribution of the jaguar (*Panthera onca*) in Mexico: identification of priority areas for conservation. *Diversity and Distributions* 17: 350–361.
- Rosas-Rosas, O.C. and L.C. Bender 2012. Population Status of Jaguars (*Panthera onca*) and Pumas (*Puma concolor*) in Northeastern Sonora, Mexico. *Acta Zoológica Mexicana* 28(1): 86–10.
- Rosas-Rosas, O.C., L.C. Bender, and R. Valdez. 2008. Jaguar and puma predation on cattle calves in northeastern Sonora, Mexico. *Rangeland Ecology and Management* 61: 554–560.

U.S. Census Bureau. 2014. TIGER/Line Shapefiles. Accessed online, May 15, 2012: <https://www.census.gov/geo/maps-data/data/tiger-line.html>.

U.S. Census Bureau. 2010. State and County QuickFacts. Accessed online, May 20, 2012: <http://www.census.gov/quickfacts/>.

U.S. Fish and Wildlife Service. 2015. Jaguar/Ocelot Survey. Accessed online, June 2, 2015: https://www.flickr.com/photos/usfws_southwest/sets/72157632294203147.

Willits, F., A.E. Luloff, and G.L. Theodori. 2014. Monitoring Controversial Environmental/Natural Resource Issues: Differential Effects of Telephone and Mail Surveys. *Society and Natural Resources* 27(12): 1355–1358.

Woodroffe, R., S. Thirgood, and A. Rabinowitz (Eds.), 2005. *People and Wildlife, Conflict or Coexistence?* Cambridge: Cambridge University Press.

APPENDIX A.

NOTICE OF OFFICE OF MANAGEMENT AND BUDGET ACTION

Date 02/05/2015

Department of the Interior
 United States Fish and Wildlife Service

FOR CERTIFYING OFFICIAL: Sylvia Burns
 FOR CLEARANCE OFFICER: Don Bieniewicz

In accordance with the Paperwork Reduction Act, OMB has taken action on your request received 11/07/2014

ACTION REQUESTED: New collection (Request for a new OMB Control Number)

TYPE OF REVIEW REQUESTED: Regular

ICR REFERENCE NUMBER: 201410-1018-002

AGENCY ICR TRACKING NUMBER:

TITLE: Survey of Residents' Attitudes on Jaguar Conservation

LIST OF INFORMATION COLLECTIONS: See next page

OMB ACTION: Approved with change

OMB CONTROL NUMBER: 1018-0159

The agency is required to display the OMB Control Number and inform respondents of its legal significance in accordance with 5 CFR 1320.5(b).

EXPIRATION DATE: 02/28/2018

DISCONTINUE DATE:

BURDEN:	RESPONSES	HOURS	COSTS
Previous	0	0	0
New	425	61	0
Difference			
Change due to New Statute	0	0	0
Change due to Agency Discretion	425	61	0
Change due to Agency Adjustment	0	0	0
Change due to PRA Violation	0	0	0

TERMS OF CLEARANCE:

OMB Authorizing Official: Dominic J. Mancini
 Acting Deputy Administrator,
 Office Of Information And Regulatory Affairs

APPENDIX B.

**Supporting Statement A for
Paperwork Reduction Act Submission****Survey of Residents' Attitudes on Jaguar Conservation
OMB Control Number 1018-0159**

Terms of Clearance. This is a new collection.

1. Explain the circumstances that make the collection of information necessary.

The proposed information collection will support the work of the U.S. Fish and Wildlife Service (we, Service) to recover the jaguar (*Panthera onca*) in the United States. Under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), we listed the jaguar as endangered in the United States on July 22, 1997 (62 FR 39147). Recovering the jaguar in the United States may be important to the continued survival of northern jaguars, and also contribute to the species' long-term genetic diversity (Jaguar Recovery Team 2012).

The Recovery Outline for the Jaguar (Jaguar Recovery Team 2012) identifies research needs, preliminary recovery objectives, and actions to be taken. The proposed information collection will contribute to addressing these items. The information we plan to collect will support the following objectives:

- Mediate or mitigate the effects of human population growth and development on jaguar survival and mortality where possible.
- Assure the long-term viability of jaguar conservation through partnerships, the development and application of incentives for landowners, application of existing regulations, and public education and outreach."

The information will also support the Recovery Action to put in place conservation tools, including research and education programs that increase awareness of the value and current status of jaguars.

In the human-dominated landscape of the U.S. portion of the Northwestern Recovery Unit, protecting jaguars and jaguar habitat will require communication with the public, including rural land users and residents, as well as coordinating efforts with numerous state and federal agencies with land management responsibilities. Recovery planning, the development of conservation tools, and public outreach and education strategies and materials will be strengthened by information on resident and stakeholder knowledge about jaguars, attitudes towards jaguars, and beliefs pertinent to jaguar conservation. To date, a comprehensive survey of knowledge, attitudes and beliefs about jaguars in this region has not been conducted. The proposed information collection will fill this critical gap.

A full understanding of public and stakeholder attitudes, beliefs and knowledge about jaguars requires a qualitative methodology. The proposed information collection is designed to elicit in-depth responses to open-ended questions through in-person interviews. The interview instrument also collects demographic data on respondents in order to describe and characterize our sample through descriptive statistics.

2. Indicate how, by whom, and for what purpose the information is to be used.

The purpose of this information collection is to inform Jaguar Recovery Planning and Service efforts towards jaguar conservation, including outreach and education activities.

The information will be collected through in-person (face-to-face) interviews, using our standard interview instrument. Harris Environmental Inc. is the contractor that will carry out the information collection. All interviews will be conducted by Harris Environmental staff members.

The information collection is a one-time event. Approximately 200 people will be interviewed. Interview participation is voluntary. There is not another method for respondents to take part in the information collection.

Respondents will be drawn from two main groups: residents and stakeholders. Residents living in urban and rural areas in Pima, Santa Cruz, and Cochise counties in Arizona and Hidalgo County, New Mexico will be randomly sampled. Stakeholders

will be deliberately sampled. Stakeholders are members of an identified group such as: land user; member of an outdoor recreation or conservation group; land/housing developer; land management agency staff; city or county government leader. This design will elicit information from groups with which the Service coordinates its conservation efforts. It will also yield information from the wider public, and likely involve contact with a range of people with which the Service is not normally in regular contact.

The interview instrument includes questions in the following categories: Activities; Knowledge of Jaguar Status and Ecology; and Open-Ended Questions.

Activities

The questions in the "Activities" section ask respondents to inform us about how much time they spend participating in outdoor activities, such as hunting, fishing, hiking, camping or other kinds of recreation. This section also asks whether respondents depend on the land for their livelihood and whether they are a member of a conservation or hunting organization.

Knowledge of Jaguar Status and Ecology

The questions in the "Knowledge of Jaguar Status and Ecology" section ask respondents basic questions about jaguar conservation status and ecology, to better understand the level of public and stakeholder knowledge about jaguars.

Open – Ended Questions

This section asks open-ended questions to better understand public values for and opinions about jaguars and their conservation, including views on potential conservation actions that the Service and other relevant government agencies might take. Analysis of interview responses will include the identification of opportunities and barriers to jaguar recovery in this region. Questions pertaining to human values, attitudes and beliefs are best addressed through qualitative methods, including in-depth interviews in which responses are elicited in a conversational manner that allows for a systematic exploration of complex issues.

The information obtained will be shared with organizations pertinent to jaguar conservation and recovery.

- 3. Describe whether, and to what extent, the collection of information involves the use of automated, electronic, mechanical, or other technological collection techniques or other forms of information technology; e.g., permitting electronic submission of responses, and the basis for the decision for adopting this means of collection. Also describe any consideration of using information technology to reduce burden [and specifically how this collection meets GPEA requirements].**

The information collection does not involve the use of automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

The in-person or face-to-face method of collection was chosen in order to elicit in depth responses to qualitative questions regarding respondents' attitudes, and knowledge about jaguars. This information is best gathered in an in-person interview format, by collectors trained in qualitative methods and interview techniques. Technological means are not suitable for collecting this information.

- 4. Describe efforts to identify duplication.**

There is no duplication. We are conducting a concurrent survey (OMB Control Number 1018-0157) related to rancher opinions about wildlife and jaguar habitat management. However, the study of urban residents is distinctly different from the rancher survey, which is focused on respondents living in rural areas. In addition, the focus of the survey is different, with the rancher survey focused more on the impacts of jaguar habitat on ranching activities. We have coordinated with the group leading the rancher survey to ensure there is no overlap in recipients

- 5. If the collection of information impacts small businesses or other small entities, describe the methods used to minimize burden.**

The information collection will not burden small businesses or other small entities.

6. Describe the consequence to Federal program or policy activities if the collection were not conducted or is conducted less frequently, as well as any technical or legal obstacles to reducing burden.

The information obtained from this survey will be directly relevant to jaguar conservation, including recovery planning and outreach and education efforts. The proposed information collection addresses identified research needs and preliminary actions to achieve recovery goals. Without this information collection, there would remain significant gaps in our knowledge of public perceptions and attitudes to jaguars and conversation. The information collection will not be repeated. It is a one-time collection and cannot be conducted less frequently.

- 7. Explain any special circumstances that would cause an information collection to be conducted in a manner:**
- * requiring respondents to report information to the agency more often than quarterly;
 - * requiring respondents to prepare a written response to a collection of information in fewer than 30 days after receipt of it;
 - * requiring respondents to submit more than an original and two copies of any document;
 - * requiring respondents to retain records, other than health, medical, government contract, grant-in-aid, or tax records, for more than three years;
 - * in connection with a statistical survey, that is not designed to produce valid and reliable results that can be generalized to the universe of study;
 - * requiring the use of a statistical data classification that has not been reviewed and approved by OMB;
 - * that includes a pledge of confidentiality that is not supported by authority established in statute or regulation, that is not supported by disclosure and data security policies that are consistent with the pledge, or which unnecessarily impedes sharing of data with other agencies for compatible confidential use; or
 - * requiring respondents to submit proprietary trade secrets, or other confidential information unless the agency can demonstrate that it has instituted procedures to protect the information's confidentiality to the extent permitted by law.

There are no circumstances that require us to collect this information in a manner that is inconsistent with OMB guidelines.

- 8. If applicable, provide the date and page number of publication in the Federal Register of the agency's notice, required by 5 CFR 1320.8(d), soliciting comments on the information collection prior to submission to OMB. Summarize public comments received in response to that notice (or in response to a PRA statement) and describe actions taken by the agency in response to these comments.**

Describe efforts to consult with persons outside the agency to obtain their views on the availability of data, frequency of collection, the clarity of instructions and recordkeeping, disclosure, or reporting format (if any), and on the data elements to be recorded, disclosed, or reported.

On December 17, 2013, we published in the Federal Register (78 FR 76315) a notice of our intent to request that OMB approve this information collection. In that notice, we solicited comments for 60 days, ending on February 18, 2014. We received the following comments:

Comment: One commenter requested that surveys be collected from residents of Hidalgo County, New Mexico, as well as from residents of Cochise, Pima, and Santa Cruz counties of Arizona and that the number of interviews conducted with residents of each of the four counties in the Northwestern Recovery Unit be proportional to the counties' population.

Response: We will survey residents in Hidalgo County, New Mexico. The contractor will make every effort to distribute the 200 surveys so that each county's residents are adequately represented.

Comment: One comment requested that the survey include farmers and ranchers in Hidalgo County, New Mexico.

Response: The method of interviewing residents will mean that farmers and ranchers will likely be included among the rural residents surveyed. The category of small farmers/ranchers will be targeted purposely, as a stakeholder category. Small acreage land users are often not included in data collection that targets ranchers and other agricultural producers. A concurrent information collection (OMB Control Number 1018-0157) will include ranchers and farmers in the Northwestern Recovery Unit. Thus, they will not be included in this survey to avoid duplication of effort.

Comment: One commenter requested to be included as a survey respondent.

Response: We will include the commenter's agency as a respondent in the related government agency personnel survey stakeholder category.

Comment: One commenter requested a copy of the survey instrument and the results of surveys once completed.

Response: We will send a copy of the survey instrument and the final report, which will include information on the data collected, analysis methods, results, and conclusions. The final report will be available after May 2015.

9. Explain any decision to provide any payment or gift to respondents, other than remuneration of contractors or grantees.

We will not provide gifts or payments to respondents.

10. Describe any assurance of confidentiality provided to respondents and the basis for the assurance in statute, regulation, or agency policy.

We do not provide any assurance of confidentiality. Respondents will be told that their participation in the interview will be anonymous--the statements and information they give will not be attributed to them by their name or any personally identifiable details. Participants' social security numbers will not be collected.

11. Provide additional justification for any questions of a sensitive nature, such as sexual behavior and attitudes, religious beliefs, and other matters that are considered private.

We will not ask questions of a sensitive nature.

12. Provide estimates of the hour burden of the collection of information.

We estimate that 225 respondents will submit 425 responses totaling 61 burden hours.

We estimate the annual dollar value of the burden hours to be \$2,020 (rounded). We used information from the Bureau of Labor Statistics USDL 14-1673, September 10, 2014 (Employer Costs for Employee Compensation-June 2014) to estimate average hourly wages and calculate benefits:

- Individuals – We used the wage and salary costs for all workers from Table 1, which states an hourly rate of \$21.95. To calculate benefits, we multiplied the hourly rate by 1.4. The hourly rate including benefits is \$30.73.
- Private Sector – We used the wage and salary costs for all workers from Table 5, which states an hourly rate of \$22.41. To calculate benefits, we multiplied the hourly rate by 1.4. The hourly rate including benefits is \$31.37.
- State Government – We used the wage and salary costs for all workers from Table 3, which states an hourly rate of \$27.58. To calculate benefits, we multiplied the hourly rate by 1.5. The hourly rate including benefits is \$41.37.

ACTIVITY	NO. OF ANNUAL RESPONSES	COMPLETION TIME PER RESPONSE	TOTAL ANNUAL BURDEN HOURS	HOURLY RATE WITH BENEFITS	\$ VALUE OF ANNUAL BURDEN HOURS
Initial Contact					
Individuals	125	3 minutes	6	\$30.73	\$ 184.38
Private Sector	60	3 minutes	3	31.17	93.51
Govt	40	3 minutes	2	41.37	82.74
Subtotal	225		11		\$ 370.63
Complete Survey					
Individuals	100	15 minutes	25	\$30.73	\$ 768.25
Private Sector	60	15 minutes	15	31.17	467.55
Govt	40	15 minutes	10	41.37	413.70
Subtotal	200		50		\$1,649.50
Total	425		61		\$2,020.13

13. Provide an estimate of the total annual [nonhour] cost burden to respondents or record keepers resulting from the collection of information.

There is no nonhour cost burden associated with this collection.

14. Provide estimates of annualized costs to the Federal Government.

The total Federal cost to administer this survey is \$64,699. This includes \$58,745 for Harris Environmental to develop, administer, and analyze the survey and prepare reports, and \$5,954 in Fish and Wildlife Service salary costs to coordinate and oversee the survey.

We used the Office of Personnel Management Salary Table 2014-RUS to determine average hourly Federal wages. The hourly wage for a GS 12/step 7 is \$39.96. In accordance with BLS news release USDL 14-1673, we multiplied the hourly wage by 1.5 to account for benefits, resulting in an hourly cost factor of \$59.94. We estimate a total of 100 hours, totaling \$5,954, for project coordination, administration, and deliverable review.

15. Explain the reasons for any program changes or adjustments in hour or cost burden.

This is a new information collection.

16. For collections of information whose results will be published, outline plans for tabulation and publication.

Harris Environmental Inc. will prepare a report based on the data collection and analysis. This report will be shared with relevant parties and groups internally and externally. Harris Environmental and Service staff may collaborate on a future publication on this information collection in an appropriate scientific journal based following the project's completion.

17. If seeking approval to not display the expiration date for OMB approval of the information collection, explain the reasons that display would be inappropriate.

The expiration date for OMB approval of the information collection will be displayed.

18. Explain each exception to the certification statement.

There are no exceptions to the certification statement.

APPENDIX C.

**Supporting Statement B for
Paperwork Reduction Act Submission**

Survey of Residents' Attitudes on Jaguar Conservation

OMB Control Number 1018-0159

- 1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g., establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample must be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection has been conducted previously, include the actual response rate achieved.**

This is a one-time data collection event. The potential respondent universe is comprised of two main groups:

- Residents of Pima, Santa Cruz, and Cochise counties in Arizona and Hidalgo County, New Mexico.
- Members of selected stakeholder groups from the above listed counties.

The potential respondent universe for Group 1 is 1,163,923. Residents (Group 1) will be randomly sampled, with a target quota for each of the four counties being surveyed. The quota is based on the population of the counties, but with the consideration that rural residents be adequately sampled. A disproportionate random sample is justified to ensure that exurban and rural residents are included in the survey (Bernard 2011, p 155). Below is a table showing the population of each county, the percent of the total population residing in each county, and the interview quota for each county. Population numbers are drawn from the 2010 U.S. Census.

County	Population	Percent Total	Interview Quota
Pima County, AZ	980,263	84	60
Santa Cruz County, AZ	47,420	4	10
Cochise County, AZ	131,346	11	20
Hidalgo County, NM	4,894	1	10
Total	1,163,923	100	100

U.S. Census Bureau: State and County QuickFacts. Accessed online: <http://quickfacts.census.gov/qfd/index.html#>

A total of 100 interviews will be completed with residents. Social science studies indicate that in-person interviews have a higher response rate than mail, internet-based, or telephone surveys (Bernard 2011; Couper 2011; Denzin and Lincoln 2011; Spooner et al 1997; Willits and Luloff 2014). The literature surveyed indicated an in-person response rate from 74% to 97%. We estimate, therefore, an 80% response rate from Group 1, such that nonresponse bias will be minimized. Thus, we estimate that 125 people will be contacted and asked to participate in order to reach our target of 100 resident interviews. Residents will be randomly selected and asked to participate at public places within each county, an in-person interview method referred to as “street-intercept” sampling (Bernard 2011).

Stakeholders (Group 2) will be purposively sampled. In order to maximize the variation in our sample of stakeholders and to achieve saturation in responses from stakeholders, 100 interviews will be conducted. A list of stakeholder groups was developed to identify those groups whose missions or professional activities are related to or might be affected by jaguar conservation. The stakeholder groups are drawn from the following categories: land-based business owners/operators; government agency personnel; local wildlife associations; conservation and/or recreation organizations. Stakeholder representatives will be asked to participate based on their membership in one of these groups/organizations. Stakeholder groups will be balanced to insure representation in each category of Arizona and New Mexico-based groups/organizations. Given the stakeholder groups’ interest in jaguar conservation, and our in-person interview format, we expect a 100% response rate.

The overall expected response rate for our 200 interviews is 90%. This study design method will minimize nonresponse bias in our data collection. Our survey is composed of qualitative questions and analyses will not be generalized to the respondent

universe. Given the goals of the survey and chosen methods, our sample size, sampling method, and expected response rates are suitable.

2. Describe the procedures for the collection of information including:

- * **Statistical methodology for stratification and sample selection,**
- * **Estimation procedure,**
- * **Degree of accuracy needed for the purpose described in the justification,**
- * **Unusual problems requiring specialized sampling procedures, and**
- * **Any use of periodic (less frequent than annual) data collection cycles to reduce burden.**

This is a one-time data collection event, which will minimize burden. The proposed information collection uses a qualitative methodology to understand resident and stakeholder knowledge, attitudes, and beliefs about jaguars in the Arizona and New Mexico counties with designated critical habitat for jaguars.

The method of qualitative, semi-structured interviews was chosen to match the purpose of this data collection: to describe the range of attitudes, perceptions and knowledge about jaguars held by residents and stakeholder groups in this region; to explain the relationships between responses, individually and between groups; and to identify the attitudes about jaguars and conservation that present barriers and/or opportunities to Service conservation efforts.

In a semi-structured interview, most questions are open-ended. While a specific list of questions are asked of each participant, the interview is not rigidly scripted. Rather, questions are asked in a conversational manner, such that the exact wording and order of questions is adjusted to maintain an open flow of dialogue between participant and interviewer. This flexibility is necessary to the interviewer's ability to establish a rapport with the participant, and encourage a free flowing dialogue. This method of conducting interviews yields fuller responses, enables the interviewer to ask follow up questions, and results in more information than can be obtained through mail-in, internet-based, or telephone surveys (Bernard 2011; Denzin and Lincoln 2011). The base questions to be asked are included on the submitted survey instrument. Interviewers will take notes of participants' responses. These notes will be transcribed following the interview. While names and identifying details will not be purposely collected, any incidental recording of such details in interviewers' notes will be deleted from the data set at the transcription point, before analysis is undertaken.

The interview instrument includes one section of demographic questions. The demographic questions will allow us to characterize our sample and test for the impacts of these variables on responses to the open-ended questions. The proposed data collection will yield new information and contribute to the larger scientific study of large carnivore conservation.

The open-ended question responses will be analyzed through content and narrative analysis. Narrative and content analysis methods identify key themes in a text (assigning them to specific codes). Themes are examined to understand patterns of responses (Bernard 2011). Themes and patterns of responses are then related to each other and to other variables, such as group membership, demographic responses, and nominal data derived from the coding of the interview text. Aside from descriptive statistics of responses, the qualitative questions are not analyzed with quantitative methods. Narrative and content analysis of survey responses will be stratified by county and by demographics collected (i.e. income, education, rural/urban residency).

This qualitative methodology will enable a full understanding of the opportunities and barriers to jaguar conservation in this region, and thus is a good fit for the purposes of the proposed information collection. This method of conducting a relatively small number (200) of in-depth interviews, which allow for open-ended responses, is more appropriate to the purposes of this data collection than a larger quantitative survey.

3. Describe methods to maximize response rates and to deal with issues of nonresponse. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling, a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.

The in-person interview format will maximize response rates. In order to achieve the estimated 100 interviews, we will contact relevant stakeholder groups and establish the rationale and utility of the information collection to the Service's jaguar conservation efforts. We will use a street intercept method to randomly sample residents in each of the four counties identified. In eliciting participation, we will continue asking a random sample of residents to participate until we reach the

number of resident respondents required. With the expected response rate of 80%, we estimate that we will contact 125 residents.

Given the purposes of this information collection, and the relatively small number (200) of respondents required, this method of sample selection is justified and will maximize response rates and minimize nonresponse bias. Item nonresponse bias is minimized, as well, with clear questions, open-ended questions, and questions that are relevant to the stated purpose of the information collection. With a sample size of 200, it is not possible to identify or control for nonresponse bias.

In quantitative surveys that are mailed to respondents, unit nonresponse bias can be identified, through comparison of the demographic profiles of nonresponders with responders and the population. Item nonresponse bias can also be identified in large sample size surveys. With our qualitative methodology, small sample size, and street-intercept method of contacting potential respondents, we will not be able to test for unit nonresponse. We will not have any demographic information on nonresponders to test for systematic bias due to unit nonresponse. We will tabulate and report the number of survey items that respondents refuse to answer (item nonresponse). Given our small sample size and expected high response rate, due in part to the in-person interview method, we do not expect to have a high enough number of item nonresponses to statistically compare to survey respondents or to the population.

One strategy to address nonresponse bias is to only generalize to the respondents, not to the population. The purpose of our in-person surveys and qualitative interviews generally, is *not* to produce results that are generalized to the population. Therefore, the impact of nonresponse bias on the analysis is minimal. Rather, the goal of the information collection is to better understand the reasoning behind people's attitudes to jaguars in this region, and the factors and policies that they describe affecting their attitudes. This goal requires the in-depth answers that result from in-person interviews in which interviewer and respondent engage in a structured conversation. Respondents' answers, however, cannot be considered representative of the population. The insight into the processes that affect people's attitudes and the identification from respondents' answers of actions the Fish and Wildlife Service might take to positively affect attitudes to both jaguars and jaguar conservation will be very valuable.

The total number of in depth interviews, including 100 with members of key stakeholder groups, is sufficient to achieve the accuracy and reliability needed for the intended purpose of this data collection.

4. Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.

Several survey questions have been pretested with 9 respondents through collaboration with University of Arizona researchers who are interviewing area ranchers for the Landowner Incentive Project.

5. Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.

The following individuals have been consulted on the design of our survey instrument:

Randy Gimblett, Ph.D.
Professor
School of Natural Resources and Environment
University of Arizona
Phone: (520) 621-6360
Email: Gimblett@ag.arizona.edu

Laura López-Hoffman, Ph.D.
Assistant Research Professor of Environmental Policy
Assistant Professor
School of Natural Resources and Environment
University of Arizona
Phone: (520) 626-9851
E-mail: lauralh@u.arizona.edu

Harris Environmental Inc. is the contractor who will collect and analyze information for the Fish and Wildlife Service.

Cited References

- Bernard, H.R. 2011. *Research Methods in Anthropology: Qualitative and Quantitative*, 4th ed. New York: Alta Mira Press.
- Couper, M. 2011. The Future of Modes of Data Collection. *Public Opinion Quarterly* 75(5): 889 - 908.
- Denzin, N. and Y. Lincoln. 2011. *The SAGE Handbook of Qualitative Research*, 4th ed. Los Angeles: SAGE Publications, Inc.
- Spooner, C., Bishop, J., and J. Parr. 1997. Research methods for studying injecting drug users in a rural center. *Drug and Alcohol Review* 16: 349-355.
- Willits, F., Luloff, A.E., and G.L. Theodori. Monitoring Controversial Environmental/Natural Resource Issues: Differential Effects of Telephone and Mail Surveys. *Society and Natural Resources* 27(12): 1355-1358.

APPENDIX D.

Survey of Residents' Attitudes on Jaguar Conservation

Resident Surveys

Initial Contact Script

Hello, my name is XXXX. I am conducting a survey about people's attitudes and knowledge about jaguars. I work for Harris Environmental, and we are carrying out this survey on behalf of the U.S. Fish and Wildlife Service. The Fish and Wildlife Service will use the information from this survey to improve their jaguar conservation efforts. If you agree to answer our questions, your information will be anonymous – you will not need to tell me your name. Would you be willing to participate?

If no:

OK, thank you for your time. Have a good day.

If yes:

I have a statement I am required to read to you regarding this survey before we begin:

Paperwork Reduction Act Statement: This survey is authorized by the Endangered Species Act. It will provide information on people's current knowledge about jaguar ecology and status, people's attitudes towards jaguars, and the social barriers and opportunities for jaguar conservation in Arizona and New Mexico. Your response is voluntary. We may not conduct or sponsor and you are not required to respond to an information collection unless it displays a currently valid Office of Management and Budget (OMB) control number. OMB has reviewed and approved this survey and assigned OMB Control Number 1018-0159, which expires 02/28/2018. We estimate that it will take you about 15 minutes to complete the survey. You may send comments on any aspect of this information collection to the Information Collection Clearance Officer, U.S. Fish and Wildlife Service, 1849 C Street, NW (Mail Stop BPHC), Washington DC 20240.

I have a copy of this statement, if you'd like to have one.

OK, let's begin. I will ask you some questions and take notes on your responses. Please let me know if you have questions during the survey.

APPENDIX E.

Survey of Residents' Attitudes on Jaguar Conservation

Stakeholder Surveys

Initial Contact Script

Hello, my name is XXXX. I am conducting a survey about people's attitudes and knowledge about jaguars. I work for Harris Environmental, and we are carrying out this survey on behalf of the U.S. Fish and Wildlife Service. The Fish and Wildlife Service would particularly like to hear from groups/organizations/agencies, like yours, with experience in land management, wildlife conservation, or outdoor recreation.

I'd like to make an appointment with you or someone in your organization to complete the survey? We can arrange a convenient day and time to meet in person.

I have a statement I am required to read to you regarding this survey:

Paperwork Reduction Act Statement: This survey is authorized by the Endangered Species Act. It will provide information on people's current knowledge about jaguar ecology and status, people's attitudes towards jaguars, and the social barriers and opportunities for jaguar conservation in Arizona and New Mexico. Your response is voluntary. We may not conduct or sponsor and you are not required to respond to an information collection unless it displays a currently valid Office of Management and Budget (OMB) control number. OMB has reviewed and approved this survey and assigned OMB Control Number 1018-0159, which expires 02/28/2018. We estimate that it will take you about 15 minutes to complete the survey. You may send comments on any aspect of this information collection to the Information Collection Clearance Officer, U.S. Fish and Wildlife Service, 1849 C Street, NW (Mail Stop BPHC), Washington DC 20240.

I have a copy of this statement, if you'd like to have one.

Thank you for your time. I look forward to seeing you on _____ at _____.

APPENDIX F.

Survey of Residents' Attitudes on Jaguar Conservation

ID: _____ Date: _____ Interviewer: _____

Activities

Do you engage in outdoor activities on a regular basis?

If yes, how many times per month or per year do you engage in outdoor recreational activities?

What are your primary outdoor activities?

What is the purpose of your outdoor activities? (For example, for recreation, for work, other)

Do you depend on the land for your livelihood? For what purpose? (i.e., guiding, ranching, agriculture)

Is this work your primary source of household income?

Paperwork Reduction Act Statement: This survey is authorized by the Endangered Species Act. It will provide information on people's current knowledge about jaguar ecology and status, people's attitudes towards jaguars, and the social barriers and opportunities for jaguar conservation in Arizona and New Mexico. Your response is voluntary. We may not conduct or sponsor and you are not required to respond to an information collection unless it displays a currently valid Office of Management and Budget (OMB) control number. OMB has reviewed and approved this survey and assigned OMB Control Number 1018-0159, which expires 02/28/2018. We estimate that it will take you about 15 minutes to complete the survey. You may send comments on any aspect of this information collection to the Information Collection Clearance Officer, U.S. Fish and Wildlife Service, 1849 C Street, NW (Mail Stop BPHC), Washington, DC 20240.

Have land-based activities ever been your primary source of income?

Were land-based activities your parents' primary source of household income?

Are you a member of a conservation, hunting or wildlife organization?

If yes, what is the name of the organization?

Knowledge of Jaguar Status and Ecology

Please mark Y - Yes, N - No, or DK - I don't know.

Were jaguars historically found in territory that is now part of the U.S.?	Y	N	DK
Are jaguars in jeopardy of extinction in the United States?	Y	N	DK
Are jaguars in jeopardy of extinction throughout their global range?	Y	N	DK
Has a jaguar sighting been confirmed in the U.S. during the last 50 years?	Y	N	DK
Are jaguars and mountain lions (cougars/pumas) different species?	Y	N	DK

Which of the following best describes jaguars?

- ___ Solitary animals with only females involved in rearing young.
- ___ Social animals that reproduce and live in packs and cooperatively protect and feed their young.
- ___ Jaguars mate for life and males help to rear young.

The primary prey of jaguars in this region is:

- ___ Deer and peccaries/javelina
- ___ Rabbits and rodents
- ___ Snakes and lizards

What are the primary threats to jaguars in this region?

Open-ended Questions

1. Are you in favor of jaguars living in our region? Why or why not?
2. Do you think jaguars can live and raise cubs in this region? Why or why not?
3. Can you tell me about the roles you believe large carnivores, like jaguars, played in our region historically? What roles do you think large carnivores play in our landscapes today?
4. Do you think we should protect mountain lions, coyotes, and other predators in our region? Why or why not?
5. Do you think the government should spend resources to improve habitat for jaguars in our region?
6. Do you believe that jaguar recovery would have any negative impacts in our region?
7. If you knew jaguars lived near your home or the places where you spend time outside, would you fear for your safety or that of your family?
8. Have you taken any actions to promote or oppose jaguar conservation? (Such as donating time or money to a political organization or candidate for public office, attending a public meeting, contacting a political representative).
9. What would you do if you saw a jaguar in the wild?
10. What do you think are the biggest obstacles or challenges to jaguar conservation in our region?
11. One idea to reduce the potential negative impact of jaguars in our region is to compensate ranchers for livestock depredations and/or to offer ranchers monetary incentives to improve habitat for jaguars or their native prey on their land/allotments. Would you support such measures? Why or why not?
12. Another strategy to improve prospects for jaguars (and other wildlife) is for ranchlands to be placed under voluntary conservation easements – in which ranchers agree to certain land use restrictions, including agreeing not to sell the land for private development. In exchange, ranchers would be exempt from some regulatory restrictions. Do you agree with such actions? Why or why not?
13. When it comes to funding such programs, who do you think should pay for them?
14. Are you aware of any activities along the US/Mexico border that negatively or positively affect jaguars or other wildlife species?
15. Are you aware of any activities along the US/Mexico border that could be negatively or positively affected by the conservation of jaguars or other wildlife species?
16. Are you aware of jaguar conservation efforts currently being conducted by the US FWS?
17. Do you think State and Federal Government agencies are doing enough to conserve jaguars? What else do you think they should be doing to conserve jaguars?
18. Is there anything else you would like to tell us that I haven't asked?
19. Would you like to know more about jaguars?

Demographic Data

Gender: _____ How long have you lived in AZ/NM? _____

Age:
____ 18 - 29
____ 30 - 49
____ 50 - 64
____ 65+

Occupation: _____ Number in household: _____

Total household income:
____ Less than \$24,999
____ \$25,000 - 49,999
____ \$50,000 - 99,999
____ \$100,000 or more

Highest education level completed:
____ Less than High school
____ High school
____ Some college
____ Bachelor's degree
____ Graduate/Professional degree

Which of the following best describes where you grew up?
____ Rural area
____ Small town/city (<25,000)
____ Suburban area (less than 15 miles from a major city)
____ City (>50,000)

Which of the following best describes where you live now?
____ Rural area
____ Small town/city (<25,000)
____ Suburban area (less than 15 miles from a major city)
____ City (>50,000)