

Essay: This past summer I interned at The Cheetah Conservation Fund (CCF) in Namibia. CCF uses an integrated approach to conservation with the philosophy that in order to secure a future for cheetahs, a future for the people that live with them must be secured. While there, I learned about livestock-predator conflicts as well as predator friendly management practices and supplemental sources of income that can be used in order to enable ranchers to live with predators. A few days after this internship, I went to the Pantanal with Stanford's Overseas Seminar. During the three weeks, I was exposed to various stakeholder perspectives surrounding cattle ranching and jaguars. The fact that Panthera, the local jaguar conservation group, predominantly focuses on strictly ecological studies instead of finding ways to work with ranchers was one of the biggest motivators for this project. I'm hoping that by the end of this research project, a better understanding of the perceptions of cattle ranchers can shed light on the best ways for conservation groups to work with cattle ranchers to meet a mutually beneficial outcome. This is a perfect example of an interdisciplinary problem involving multiple stakeholders. I am particularly excited about the opportunity to do a qualitative study. While I have previous experience in quantitative research, I have yet to fully try qualitative research outside the realm of my methodology class. In order to truly be an interdisciplinary scholar, I want to gain more experience in qualitative research. I think it is a true testament to interdisciplinary nature of the Earth Systems program that I can become equally confident in lab techniques, ecology field methods, GIS, and qualitative research to help solve different aspects of similar issues that we are passionate about (which in my case happens to be land use and mitigating predator-ranching conflicts).

Cattle Ranching in the Brazilian Pantanal

An analysis of perceptions of ranchers towards conservation and livestock predation by large felids

Earth Systems-Land Use Track '16
Research Advisor- Rodolfo Dirzo
In-field Contact- Ethan Shirley, founder of the Juara Foundation
2/27/2015



Abstract:

The Pantanal is the world's largest wetland, yet it has a long history of cattle ranching. Cattle ranching practices have remained traditional with low cattle densities due to environmental constraints. As such, cattle ranching in this area is considered sustainable and even advocated as an important conservation tool in order to keep large areas of land intact for wildlife habitats. However, predators are an important part of any healthy ecosystem, and the Pantanal is home to the largest jaguar population in the world. As such, this has resulted in predator-ranching conflict with numerous jaguars killed each year despite Brazil's law banning hunting of all wildlife. Despite its uniqueness, little research has been done on this area. While a study was published in 2014 on perceptions of ranchers, only closed-ended questions were used. To date, no qualitative studies of cattle ranching have been done in this area. I propose conducting a qualitative study using semi-structured interviews to discover factors influencing ranchers' perceptions of jaguars and conservation as a whole. Knowledge gaps in the underlying causes of ranchers' perceptions and management choices can only be filled using qualitative methods. This will be useful to conservation organizations as a means of understanding ranchers' experiences in order to facilitate partnership and removal of obstacles to more sustainable cattle management.

Background Information

The Pantanal is one of the most pristine and biodiverse environments in the world. It is the world's largest freshwater wetland, primarily occupying the Brazilian states of Mato Grosso and Mato Grosso do Sul with parts spanning into Bolivia and Paraguay. It is one of the most diverse areas of the world and is even home to the South American "Big Five": Jaguar, Giant River Otter, Giant Anteater, Brazilian Tapir, and Maned Wolf. Birds, capybaras, and caiman are found in abundance (Dolabell, 2000).

Surprisingly 95 percent of the Pantanal is owned by private cattle ranchers (Junk et al, 2005). Cattle ranching has a history in the area of over 250 years, starting when the Portuguese first colonized the area (Junk et al, 2005). Due to the seasonal flooding, cattle ranching is one of the few viable industries for the area. Cattle ranching practices have remained traditional with low cattle densities due to environmental constraints. Cattle live freely with native wildlife and are moved around in response to seasonal changes in water level. Unlike the Amazon, deforestation is not a problem as a large portion of the area is made up of natural pasturelands. In fact, cattle ranching has been advocated as a sustainable option for the Pantanal as it keeps large areas of land intact for native fauna and prevents more intensive development for soy bean farming or gold mining. Therefore, ensuring the livelihood of small-scale cattle ranchers is crucial in order to guarantee the conservation of this unique ecosystem for future generations (Dolabell, 2000).

However, predators are an important part of any ecosystem, and given its diversity, it should come as no surprise that the Pantanal houses the largest jaguar population in the world (Macdonald and Loveridge, 2010). Thus this healthy predator population coupled with the importance of cattle ranching for human livelihood in this area has resulted in human-wildlife conflict. Many ranchers shoot jaguars on sight due to perceived threats, despite Brazilian law banning all wildlife hunting. Despite very low levels of cattle predation (Boulhosa and Azedo, 2014), jaguars continue to be persecuted by ranchers in response to putative predation. Jaguar (and puma) depredation on livestock has been found to be influenced by five factors: innate and learned behavior, health of individual cats, division of space and resource among cats, cattle husbandry practices, and an abundance of natural prey (Polisar et al, 2003). Yet local rancher's understanding of cattle predation is limited (Cavalcanti et al, 2010). This disconnect between research and dissemination of knowledge to ranchers highlights the missed opportunity of working with cattle ranchers as stakeholders and stewards to conservation. Prior research has shown the effectiveness of engaging ranchers as stakeholders, with a notable example being The Cheetah Conservation Fund's research on perceptions ranchers have towards predators, which resulted in programs such as predator-friendly ranching workshops and livestock guardian dog breeding. This has resulted in a 90% decrease in cheetah shootings (Marker et al, 2013). Precisely because cattle ranchers own 95% of the Pantanal (Junk et al, 2005), it is critical to understand their experiences in order to partner with them in the protection of the world's largest wetland.

This gap in community involvement is a reflection of a larger disparity of research in the Pantanal. Despite its uniqueness, it is still "one of the least-known regions of the globe, where scientific information is scarce" (Boulhosa and Azevedo, 2014). But perhaps the greatest gap in our knowledge is qualitative research involving cattle ranchers. In 2004, Sayre highlighted the need for qualitative research of cattle ranching in order to understand ranch management.

However, in 2014, Boulhosa and Azevedo evaluated perceptions based off quantitative methods, such as a 5-point Likert scale, in order to study the perceptions of ranchers toward jaguars.

While useful, this method does not allow for the understanding of underlying reasons for these perceptions. As such, my goal is to interview ranchers to better understand the factors influencing their perception on jaguars and conservation. A strength of qualitative research is its ability to supplement, validate, or illuminate quantitative data. Emphasis on people's lived experiences is well suited for locating the meanings people place on things (Humberman and Miles, 1994). As such, my research will use Boulhosa and Azevedo quantitative perception study as a framework for my own research. My interview questions will be based on their value statements (Appendix) in order to discover the underlying causes for the survey responses of Boulhosa and Azevedo. Understanding the factors influencing rancher perceptions is extremely useful for conservation and government organizations as a tool to facilitate future partnerships.

This research is critical in order to preserve one of the treasures of the natural world. While the Pantanal is currently considered very healthy, the Pantanal faces an uncertain future and "without correct understanding, timely action and wise management, its future could be seriously compromised. Given the important role of predators in stabilizing ecosystems, the protection of jaguars is a critical aspect in the health of the Pantanal. Yet ensuring the livelihood of traditional ranchers is one of the best ways to ensure conservation of this area for the future. As such, identifying ways in which ranchers and jaguars can coexist is vitally important. Human-wildlife conflict is a world-wide problem, particularly for mammalian carnivores (Zimmerman, 2005). By improving our understanding of the underlying causes of these conflicts, we can work towards finding ways for humans and predators to coexist.

Goals/Objectives

Goal: Improve sustainable management solutions to predator-rancher conflict in the Pantanal

- Using qualitative research methods , objectives are...
 - Discover underlying factors that shape perceptions towards predators
 - Identify why ranchers kill jaguars
 - Identify barriers for adopting more sustainable cattle management strategies
- Utilize results from qualitative study to better craft sustainable management solutions and facilitate partnerships between ranchers and environmental organizations (long term objective)

Project Motivation

This past summer I interned at The Cheetah Conservation Fund (CCF) in Namibia. CCF uses an integrated approach to conservation with the philosophy that in order to secure a future for cheetahs, a future for the people that live with them must be secured (Marker, 2013). While there, I learned about livestock-predator conflicts as well as predator friendly management practices and supplemental sources of income that can be used in order to enable ranchers to live with predators. A few days after this internship, I went to the Pantanal with Stanford's Overseas Seminar. During the three weeks, I was exposed to various stakeholder perspectives surrounding cattle ranching and jaguars. The fact that Panthera, the local jaguar conservation group, predominately focuses on strictly ecological studies instead of finding ways to work with ranchers was one of the biggest motivators for this project. I'm hoping that by the end of this

research project, a better understanding of the perceptions of cattle ranchers can shed light on the best ways for conservation groups to work with cattle ranchers to meet a mutually beneficial outcome.

Methods

Qualitative Research

My research is a qualitative study that will follow the common flow of qualitative research depicted in the image below.

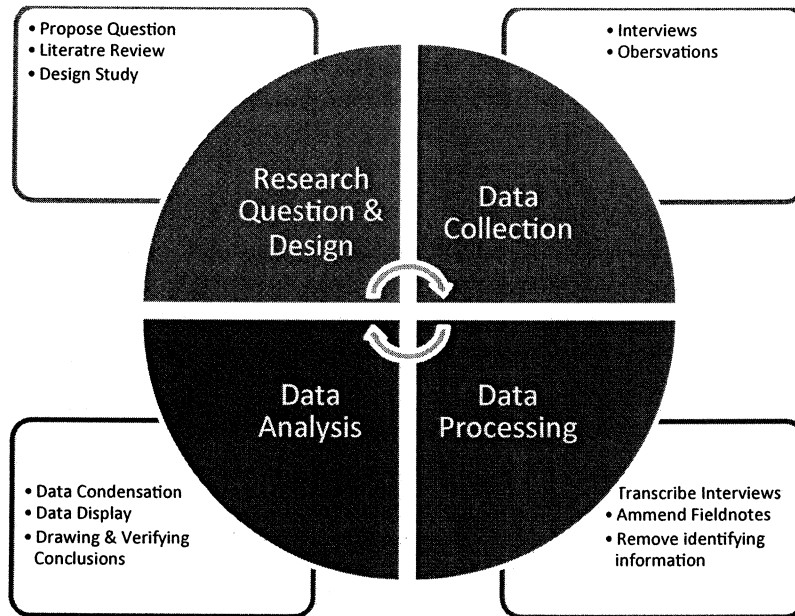


Figure 1. Qualitative Research Process. Adapted from (Merriam, 2002), (Creswell, 2003), and (Weiss, 1994)

My research can best fit the category of a mixed methods, primarily since I will be using qualitative methods to discover the underlying factors of the quantitative data generated by Boulhosa and Azevedo. However, this study has many elements of phenomenology. Phenomenology takes into consideration participants opinions as a produce of their relationships to that specific time and place (Creswell, 2003).

Study Area

The entire Brazilian Pantanal covers nearly 140,000 km² with 11 sub-regions (Dolabell, 2000). There is only a single road, the Transpantaneira, making some ranches only accessible via canoe or horseback. While Boulhosa and Azevedo surveyed 8 the sub-regions, this is not feasible for a college student to achieve in a single summer. As such, I will focus only on Pocone as it is the region most accessible by the Transpantaneira. Additionally, I spent three weeks in that area last summer with Stanford's Overseas Seminar. The organizer of our trip, Ethan Shirley, is my in-field contact. He started the Juara Foundataion, a non-profit dedicated to promoting research and education in the Pantanal. He primarily works in Pocone, and therefore will have a better idea of whom to talk to in this area.

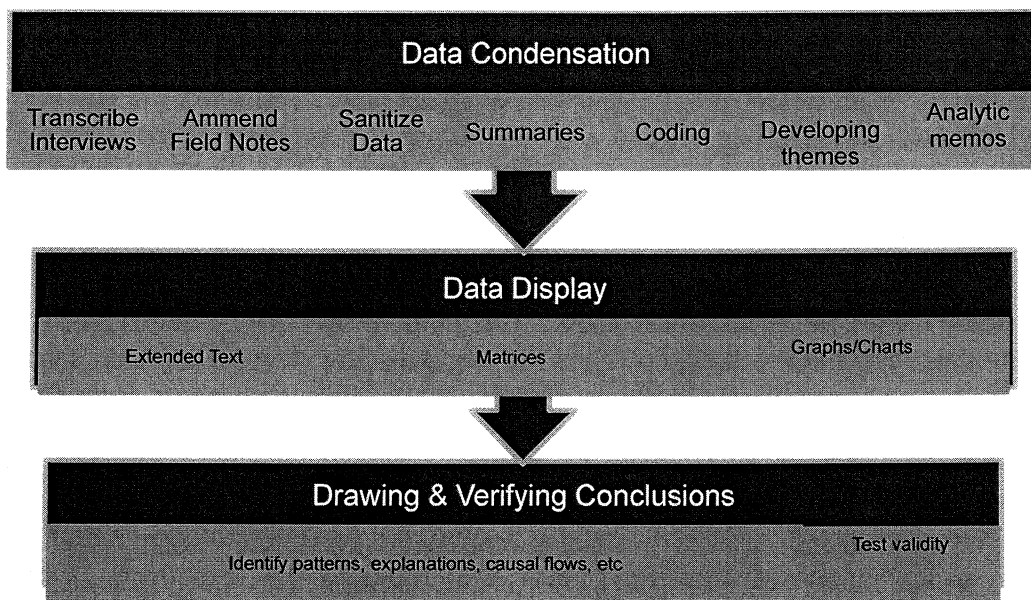
While the original study conducted survey interviews at rural associations and focused on the landowners and managers (*fazanderos*), these people do not spend most of their lives in the Pantanal. Rather landowners and managers leave workers (*peões*) to oversee ranching operations. Therefore it is important to include the *peões* in the study, as they are likely the ones who must directly deal with jaguar problems (Pottier, 2009).

Interviews

I will use the case study format for qualitative research. The methods used are the in-depth interview with semi-structured questions created from the original set of closed statements from Boulhosa and Azevedo. The appendix includes examples of some of these statements. Interviews will talk to relatively few people, attempting to maintain parity with stakeholder demographics. The National Center for Research Methods recommends that student researchers aim for 12 interviews and maximum of 20 if it is extended research like an honors thesis (Baker and Edwards, 2012). To account for reduction in data due to malfunctions (interview not audible, participant no longer wants the interview recorded, etc), 15 interviews will be scheduled. Participants will be selected to include characteristics that might influence a rancher's perceptions. Accessibility is a potential factor, and therefore *fazanderos* and *peões* from both near and far from the road will be included. While, *fazanderos* and *peões* are predominately male, it is important to have female representation as well (something uncommon in previous studies) in order to maintain parity to the entire demographic of the area. Additionally, we would like to ensure that both people with and without direct interactions with *Panthera* (the local jaguar conservation group) are included. Initial surveys collecting demographic questions will be used to identify survey participants. Given the limited internet access and government services the most successful way to get participants is by visiting individual ranches. Sayre identified the need for more qualitative research in cattle ranching and suggested case studies focusing on the interactions among ranchers and their environment, thereby giving them a greater role in identifying research needs. As such, we would like to invite all participants to become a part of a focus group in order to gain more insight. See appendix for examples of the semi-structured research questions.

Analysis

The overall analysis of qualitative research is a continuous, iterative process. The steps are highlighted below. Analysis of qualitative data will use an interactive, iterative process of data condensation, data display, and drawing and verifying conclusion. This continuous process is demonstrated in the image below adapted from (Huberman and Miles, 1994).



While the methods highlighted above are largely self-explanatory, I would like to delve deeper into the “coding” of qualitative data. Data will be coded manually over the course of multiple readings. Besides initial and focused coding, there are several types of codes that can be implemented. A select few are listed below:

- Descriptive vs Interpretive
- Internal vs External (i.e. codes that you implement prior to reading vs codes that become apparent after going through the data, otherwise known as *grounded theory*)
- Thematic
- Metaphorical
- Categorical

Familiarity with one’s own data is vitally important. Coding is a very long and tedious process, therefore the use of NVivo software. NVivo has powerful search, query, and visualization tools. While codes chosen still must be manually inputted into the software. This allows for the data to be easily integrated together in order to see finer detail or a larger picture. It facilitates discovering subtle connections and rigorously justifying findings. The final analysis will result in data visualization (matrices, charts, examples from extended text) as well as analytic summaries of common themes. It is important to note that the entire process (from data collection to verifying conclusions) is fluid and iterative (Schutt, 2012; Huberman and Miles, 1994).

Relevance to Conservation Science and Application

The results of this proposed research are critical for shedding light on an important, yet understudied ecosystem. These qualitative results will help fill a gap of knowledge of ranchers’ perceptions and their underlying causes that cannot adequately be answered by quantitative studies. The issue of human-predator conflict is of particular importance to Brazil, but is present throughout the world, whether it be cheetahs in Africa, tigers in India, or mountain lions in the western United States (Macdonald and Loveridge, 2010). More qualitative studies are needed in order to compare the perceptions and opinions of ranchers throughout the globe.

Timeline

- Summer (June 22th-August 28th)
Prior to arrival, in field contact will have helped with the initial survey to find participants
 - Week 1: Finish selecting interview participants
 - Week 2-7: Interviews & Focus Group Formation
 - Week 7-10: Focus Group Meetings; Initial Data Analysis(Each week will involve in depth analytic memo writing in order to document the process)
- Fall Quarter:
 - HumBio 82B: Advanced Data Analysis in Qualitative Research
 - “Complete draft presenting their own qualitative research study including results, with reports drafted section by section, week by week”
- Winter Quarter
 - Finish any remaining analysis and start thesis writing
 - Attend Weekly Soup & Support sessions held by Dr. Jennifer Wolf
- Spring Quarter
 - Finish thesis writing
 - Attend Weekly Soup & Support sessions held by Dr. Jennifer Wolf

Resources

Project Mentor

My mentor for this project (as well as my major advisor) is Rodolfo Dirzo. He clearly is qualified to advise me on this project as not only is he a renowned conservation biologist and tropical ecologist, but also the head of the Center for Latin American Studies. While his expertise is in quantitative studies, he has done several projects relating the impact of the environment on human communities. His extensive knowledge of ecology and Latin America are invaluable. While not my formal adviser, I work with Zephyr Frank, expert on Brazilian history especially the Mato Grosso region, on GIS related projects for Brazil. I also will have support in the analytical part of my study through Dr. Jennifer Wolf. She will teach HumBio 82B in the fall and offers weekly “Soup and Support” for those working on qualitative studies.

Field Contact

As mentioned earlier, Ethan Shirley, founder of the Juara Foundation and organizer of my Overseas Seminar, is my in field contact (see Appendix for his letter of support). He too will be doing a qualitative research study on the motivations behind observance of environmental law. As such, it will be very convenient to travel with him for our interviews. While I am not fluent in Portuguese, I have taken a class at Stanford, which was just enough to make my fluent Spanish sound like Portuguese (which I have found can get you surprisingly far in Brazil). However, while I can understand the majority of Portuguese, in order to have the smoothest interview possible and avoid missing information, Ethan will be my translator and will help facilitate the interviews.

Challenges

Because transcription is such a long process and Ethan is busy with his own research, I will look into partnering with the local university, Universidade de Cuiaba, to see if a student would be interested in being compensated to transcribe my interviews. Because we will be returning back to the city relatively frequently, I can give the student the recordings I have done so far and

repeat that process as the weeks go by. Ethan can assess the validity of the transcripts by reviewing random portions of interviews. Given the similarity of written Spanish and Portuguese, once transcribed, I can use my own rough translation for the initial coding. Once I am back on campus, I will hire a native speaker for a formal translation that will be used for the focused coding. Again, to ensure validity, random portion of these translations will be shown to another native speaker.

Preparation

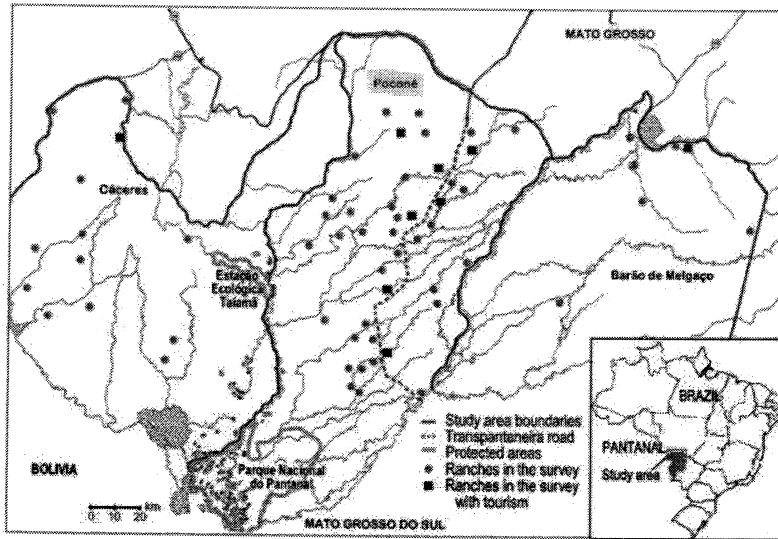
Since my internship with The Cheetah Conservation Fund last summer, predator friendly ranching has been one of my passions. As such, for all of my class projects I always try to incorporate something related to ranching or predator ecology. Some examples of these projects include (several presentations centered around the Pantanal in order to prepare for the Overseas Seminar, a project on spatial ecology of cheetahs using GIS, and a paper on the sustainability of cattle ranching in the Pantanal for my Conservation Biology from a Latin American perspective class. Currently, I am in a class called “The Peninsula Open Space Trust Practicum.” As such I have been doing a project related to the sustainability of cattle ranching of the Cloverdale property in Pescadero. I also am part of a Qualitative Research Methodology class, and therefore have also incorporated a qualitative research aspect in my work with POST. I gained experience interviewing three different ranchers on their experiences with sustainable cattle ranching as well as problems with puma predation. Since the summer, I have been in communication with Ethan in preparation for this research. See appendix for extended background/preparation.

Budget (10 weeks)

Item	Cost	Notes
Equipment (sound recorder, external file storage, notebooks, and pens/pencils)	\$100	(Recorders range from \$30-50; external hard drive around \$50)
Living Expenses in Brazil (lodging, food, travel)	\$6,000	Ethan recommended a bare minimum of \$350 per week. Optimal would be \$1,000 would be ideal in order to reach ranchers that are far from the Transpantaneira. Largest cost is transportation given the remoteness of the area. Budgeted \$600 per week.
Flight	\$1,300	Round trip ticket from DFW to CGB (Marechal Rondon International Airport in Cuiaba)
Compensation for Transcribers	\$500	
Compensation for Translator	\$100	
Total Expenses	\$8,000	(realize over grant amount, but will find other means of covering the difference)

Appendix

Appendix 1. Study Area (Boulhosa and Azevedo, 2014)



Appendix 2. Closed Ended Questions (Boulhosa and Azevedo, 2014)

Questions	Yes	No	No answer	Total
Do you see jaguars within your property?	86	4	1	91
Do you see pumas within your property?	88	1	2	91
Does the property have another income source besides cattle?	19	72	0	91
Did you have any problems with livestock predation by large cats in the last 24 months?	71	19	1	91
Did you confirm the presence of jaguars on this ranch in the last 12 months?	89	2	0	91
Do you see more jaguar than 5 years ago?	39	15	15	69
Do you believe the number of attacks by big cats have increase in the last five years?	63	25	3	91
Do you try to prevent big cats attacks on cattle?	30	60	0	90
Do you believe killing jaguars would prevent attacks on cattle?	52	14	25	91
Have you ever received any compensation for cattle taken?	4	87	0	91
Do you believe a compensation scheme should be implemented?	58	17	16	91
Would you like to receive help to solve the predation problem?	77	09	0	86
Is there any type of hunting of wild species within this ranch?	26	65	0	91
Did you have any problems with livestock predation by jaguars in your property?	73	15	3	91
Did you have any problems with livestock predation by pumas in your property?	76	13	2	91
Did you have any problems with livestock predation by jaguars and pumas in your property?	62	28	1	91

Appendix 3. Survey of General Attitudes (Boulhosa and Azevedo, 2014)

Attitudinal Items	1. Strongly agree	2. Agree (%)	3. Neutral (%)	4. Disagree (%)	5. Strongly disagree (%)
Jaguars are a menace to your cattle	12	49	11	18	1
Jaguars are a menace to people	6	25	7	47	6
I would be happy if there was no more jaguars around	3	23	5	51	9
Jaguars need to be protected	9	58	6	18	0
At this ranch we can't tolerate jaguars and pumas attacking the cattle	5	17	6	58	4
Jaguars and pumas attacking cattle is an acceptable risk in cattle business	4	66	6	15	0
It is necessary to find a solution for livestock predation	20	56	2	13	0
Livestock predation should be solved by local, state or federal authorities	14	53	7	17	0
Livestock predation should be solved at each ranch without external help	0	21	3	64	3
I would like to receive help to solve the problem of predation	16	58	6	9	0
I benefit directly from tourism activities	3	21	4	63	0
Tourism in the Pantanal is a menace to my personal life and to Pantanal culture and traditions	4	14	4	58	11
The Pantanal needs more progress and development	13	58	1	18	1
Nature in the Pantanal is a national asset	27	59	1	3	0
Nature in the Pantanal is properly protected	3	25	10	50	3
I am concerned with the future of nature in the Pantanal	16	71	0	4	0
I am fully aware of the problems regarding conservation of the Pantanal	8	80	1	2	0
The Pantanal needs more National Parks and wildlife reservations	1	41	8	38	3
Current laws are sufficient to protect wildlife and flora of the Pantanal	1	44	10	33	3

Appendix 4. Example Semi-structured Interview Questions

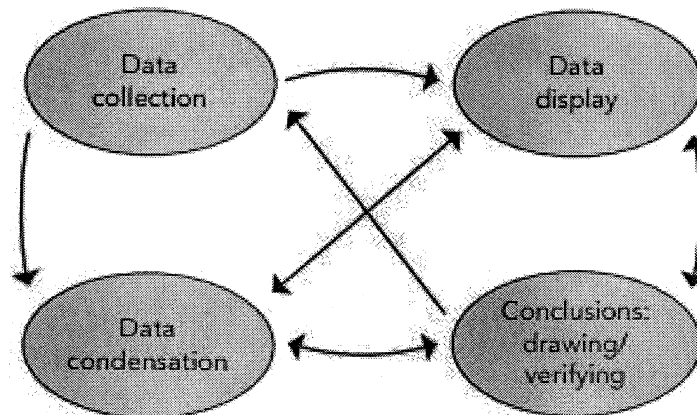
- 1) What are current predator management strategies?
 - a. Why do people use these strategies?
 - b. Do people currently kill too many animals?
 - c. Has the jaguar population in the region been increasing greatly over the years?
 - d. Has the law banning wildlife hunting been effective?
- 2) To what extent are predators a problem?
 - a. Are jaguars the only problem species or do pumas and small predators also pose a threat to livestock?
- 3) What are individuals' views on jaguar conservation?
 - a. Do these views vary widely between stakeholder groups? What are the stakeholder groups?
 - b. What do you think is the biggest factor shaping these views?
 - c. Do people's views towards jaguars and conservation of the environment as whole differ?
- 4) What are the likelihoods of different stakeholders to change their management strategies?
 - a. What factors would contribute to their changing of management strategies?
 - b. Would they be more receptive to listening to certain groups?
- 5) What is the ideal balance of jaguars and livestock?
 - a. Should jaguars ever be killed?

- b. Are there times when certain problem animals should be killed? At what point should they be killed?
- 6) Do you think there are financial benefits from jaguar conservation?
 - a. Have you benefited from eco-tourism? Do many ranchers benefit from it?
- 7) What barriers exist to ranchers who might otherwise not want to kill jaguars?
 - a. How can others (conservation groups, government, etc) best help ranchers remove these obstacles?
- 8) What is your opinion of jaguar conservation groups?
 - a. Have you ever worked with them?
 - b. Is there any value to a rancher who works with them?
 - c. What would you suggest that they do differently?
- 9) Is there a way to compensate ranchers for their losses if they adversely affected by a problem animal?
 - a. Is there a combination of killing problematic animals, changing management strategies to avoid conflict, and some form of compensation that collectively could reduce jaguar killings?
 - b. What is the best combination?
 - c. What form of compensation should be offered?
 - i. Monetary? School? Access to healthcare?
- 10) What do you see as the future of the Pantanal?
 - a. Will cattle ranching still be important? Will the management strategies change?
 - b. Do you see certain industries taking over?

Appendix 5. Iterative Nature of Qualitative Research (Humberman and Miles, 1994)

Display 1.1

Components of Data Analysis: Interactive Model



Source: Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Appendix 6. Template for Field Notes (Emerson and Shaw, 1995)

Time	Observation	Subjective "Gutter"

Appendix 7. Template for Coding (Schutt, 2012)

Code Abbreviation	Code Definition	Example	Code Type	Frequency	Notes
Barrier	"Something that prevents or hinders action" - Merriam Webster	(block of text)	Thematic		

Appendix 8. Letter of Support from Ethan Shirley

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