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Institutional stakeholders' views on jaguar conservation issues in central Brazil

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HIGHLIGHTS

- Jaguar conservation influences, and is influenced by, many stakeholders in Brazil.
- We identified three institutional stakeholder perspectives about jaguar issues.
- Institutional stakeholders in central Brazil agree on most key issues.
- We found no evidence of clearly institutionalized stakeholder perspectives.

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ABSTRACT

Large carnivore management is typically a source of heated controversy worldwide and, in the Americas, jaguars (*Panthera onca*) are at the centre of many human–wildlife conflicts. Although findings suggest that social, rather than economic, factors are important reasons for why humans kill jaguars, few studies focus on stakeholder attitudes towards jaguar conservation beyond quantifying livestock depredation. Yet insights from other large carnivore conflicts demonstrate the importance of the political landscape and stakeholder attitudes in carnivore conservation. To explore the extent to which stakeholder views about jaguar conservation aligned with institutional arrangements, we conducted a stakeholder analysis among personnel working for key institutions in central Brazil. Using Q methodology, we identified three stakeholder perspectives focusing on: A) jaguars' intrinsic right to exist; B) wider ecocentric values; and C) contesting jaguar-focused conservation. The three institutional stakeholder groups all accepted the jaguar's fundamental right to exist and agreed that it was important to establish protected areas for jaguars. Yet, institutional stakeholder views diverged regarding the desired distribution of jaguars in Brazil, hunting policies, and the effects of hunting and development projects on jaguar conservation. These differences and their underlying motivations are important to consider for successful jaguar conservation strategies in Brazil.

1. Introduction

Humans are responsible for many extinctions, but the notion that conservation issues often are people issues is relatively new to conservation biologists (Redpath et al., 2013). The form, manifestation, and scale of the conflicts

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regarding conservation depend on factors involving the species themselves, conservation measures, or motivations for conservation (Inskip and Zimmermann, 2009). Conflicts may be material (Singh et al., 2002), economic (Madhusudan, 2003), interpersonal, social and/or emotional (Heikkinen et al., 2011), involve direct threats to humans (Inskip and Zimmermann, 2009), or be symbolic, e.g., about power (Moore, 1994), or politics (Kleiven et al., 2004). Additionally, conflict levels are often high where stakeholders' understandings of each other's perspectives are poor, or the functions and actions of institutions are incomprehensible to the public (Heikkinen et al., 2011).

Jaguars (*Panthera onca*), are central in many human–wildlife conflicts in the Americas (Inskip and Zimmermann, 2009), partially because of their large size, extensive home ranges, and predatory feeding habits, including domestic species (Cavalcanti et al., 2010). Consequently, competition for resources, habitat loss, and killings are major threats to jaguars, whose populations are declining in many areas (Caso et al., 2008). Brazil, with the world's largest jaguar populations, developed a national jaguar conservation action plan in 2009 (Desbiez and de Paula, 2012). However, it does not cover "human values or the relationship between jaguars and people" (Desbiez and de Paula, 2012, p. 5). Yet research suggests that social, rather than economic, motivations are important reasons why humans kill jaguars in Brazil, including fear of jaguars (e.g., Palmeira and Barrella, 2007) and group identity (Marchini and Macdonald, 2012; Marchini, 2010). Additionally, even generally positive attitudes towards jaguar existence have not guaranteed successful jaguar conservation in Brazil (cf. Santos et al., 2008). Hence, a need exists to understand "the attitudes and impacts of different stakeholder groups" (Soto-Shoender and Main, 2013, p. 112).

Policy regarding jaguar management is developed and implemented by several political and management institutions at the state and federal levels. Thus, recognizing that "managing human–wildlife conflicts depends on the political landscape" (Treves and Karanth, 2003, p. 1489), we aimed to investigate whether conflicts about jaguar conservation existed among actors at the institutional level (Bruskotter and Shelby, 2010). Building on insights from jaguar conflict studies and qualitative research on large carnivore conflicts elsewhere (e.g. Krange and Skogen, 2011), our research was problem-based rather than theory-driven, seeking to contribute to jaguar conservation by exploring the extent to which views on jaguar conservation aligned with institutional arrangements.

2. Methods

2.1. Study area

We conducted the study in central Brazil, particularly the state of Goiás, but also considered the neighbouring regions of Mato Grosso state. The area includes the transition between the Cerrado savannah and the Amazon rainforest, and part of the Pantanal wetlands; all important jaguar habitats. The Cerrado savannah is Brazil's second most important biome in size and biodiversity (Sano et al., 2007) and Brazil's most productive grain-producing area, 80% of which has already been converted into agriculture or suffered some perturbation in recent decades (Mittermeier et al., 1999). Goiás and Mato Grosso account for almost 20% of Brazilian cattle farming (Costa and Rehman, 1999). With a combined human population of over nine million (Instituto Brasileiro de Geografia e Estatística, 2012) and an annual national increase of 0.88% (Indexmundi, 2011), the combined impacts of people, crop and cattle production, and land use changes are considerable. Subsequently, conflicts regarding jaguars and their conservation have become relatively conspicuous in the area, not least due to cattle depredation and conservation efforts.

2.2. Identifying stakeholders

We used a combination of techniques to identify key stakeholder institutions (cf. Bryson, 2003; Crosby, 1991). We compiled a list of potential stakeholder groups and consulted the current literature on jaguars (e.g. peer-reviewed articles and Brazilian news articles) and IUCN's listed threats towards jaguars (Caso et al., 2008). We considered 10 important categories of institutional actors that either (1) influenced jaguar conservation, (2) were influenced by jaguar conservation, or (3) both. The categories were "NGOs/scientists", "cattle producers", "agriculture (including ranching)", "environmental institutions/management/government", "tourism", "forestry", "landless/indigenous people", "financial institutions/development institutions", "hydropower" and "transport". For each category, we attempted to identify all possible relevant Brazilian institutes within the focal states. Using an influence–interest grid, we selected the three to six most relevant institutions from each category for the interviews (Reed et al., 2009; Bryson, 2003; Grimble and Wellard, 1997). For a complete overview of these institutions, see Appendix. We selected representatives primarily based on their positions within the institutions, which reflected their relative importance for decision making, their institutional knowledge, and their knowledge about jaguar-related issues.[1] There was a certain element of chance in the selection process, because the predisposition of institutional representatives to participate dictated the inclusion of institutions. Therefore, unfortunately some categories were underrepresented. Table 1 lists all the institutions from which representatives participated in the stakeholder analysis.

[1] Whereas the institutional representatives' views may not be dominant within their respective institutes, it is important that their views should reflect the diversity of views that exist about jaguar related issues at the institutional level in Brazil (cf. e.g. Brown, 1980).

Table 1
Stakeholder clusters showing the institutional representatives' affiliations for each of the perspectives, A, B, and C, identified in our study.

Perspective A
FETAEG, Goiás' Farmers' Association.
MAPA, Ministry of Agriculture, Livestock and Supply.
MMA, Ministry of Environment.
SEMARH, Department of Environment and Water Resources.
IBAMA, Brazilian Institute for Environment and Renewable Natural Resources.
MTUR, Ministry of Tourism.
AGETUR, Goiás State Agency of Tourism.
SFB, Brazilian Forest Service.
MST, The Landless Workers' Movement.
CLOC Vía Campesina, International Peasants' Movement.
CIMI–CNBB, Indigenous Missionary Council–National Conference of Brazilian Bishops.
FNMA, National Environmental Fund.
ANA, National Water Agency.
MME, Ministry of Mines and Energy.
Perspective B
ISPN, The Institute for the Society, Population and Nature.
Embrapa, Brazilian Institute for Research on Agriculture and Livestock keeping.
CENAP, National Centre for Research and Conservation of Carnivorous Mammals.
ICMBio, The Chico Mendes Institute for Biodiversity Conservation.
MST, The Landless Workers' Movement.
The World Bank
FUNBIO, Brazilian Fund for Biodiversity.
Perspective C
EMATER, Company of Technical Assistance and Rural Extension for the State of Goiás.
SEAGRO, Secretariat of Agriculture, Livestock and Irrigation for the State of Goiás.
CELG, Power plants in Goiás.
Ten of the sorts did not load significantly into any perspective
WWF, The World Wildlife Fund.
AGRODEFESA, Agricultural Protection Agency of Goiás.
CNA, Brazilian Confederation of Agriculture and Livestock.
MDA, Ministry of Agrarian Development.
INCRA, National Institute of Agrarian Reform and Colonization.
IMAFLORA, Institute for Agricultural and Forest Management and Certification.
ANEEL, Brazilian Electricity Regulatory Agency.
PRONAF, National Program to Strengthen Small Scale Agriculture.
FUNBIO, Brazilian Fund for Biodiversity.
DNIT, National Bureau of Infrastructure and Transport.

2.3. Interviews and Q methodology

The Q methodology originates from the field of psychology and is a structured way of exploring subjectivities, thus making it a useful tool for studying stakeholder views (Webler et al., 2009; Cross, 2005; Van Exel and de Graaf, 2005; Barry and Proops, 1999; Brown, 1980). Whereas Q methodology does not allow for estimates of population statistics (commonly a goal in surveys), it provides insights into the range of views that exist about a topic (Brown, 1980). By asking Q participants to sort a set of statements about a specific topic, it is possible to explore differences and commonalities across a range of perspectives (shared views). This is particularly useful for studying conflictive issues, such as carnivore conservation; to identify common ground across potentially polarized views, and foster understanding among stakeholders (Rastogi et al., 2013; Mattson et al., 2006). Thus, following the steps as described by Webler et al. (2009), we used Q methodology to explore the range of views among personnel working for key stakeholder institutes and tried to determine if jaguar conservation in the Brazilian context was associated with wider social or political divisions.

Between 11 November 2011 and 18 January 2012, we interviewed 34 representatives from 32 stakeholder institutions. To protect participants' identities, we refer to them as representatives of their institutions. Two representatives participated from two of the institutes (The Landless Workers' Movement, MST, and the Brazilian Fund for Biodiversity, FUNBIO). One representative consented to participate from each of the remaining institutes. We conducted the interviews in person. We distributed the Q sorts (orderings of statements) as a card game, in which institutional stakeholders took a position on a set of 33 statements that we had designed to ensure a representative sample of values for and against jaguar conservation (Table 2). The statements were based on existing literature on jaguars and jaguar-related issues, online Brazilian news reports, expert opinions, as well as studies about large carnivore management conflicts elsewhere. To understand the institutional stakeholders' reasoning and views during the sorting processes, we complemented the Q sorts with open follow-up discussions, where we encouraged the institutional stakeholders to explain why they had arranged the statements in their particular ways (Webler et al., 2009; Brown, 1980).

Table 2
Complete Q-statements and associated Q statement numbers for each of the statements (1–33).

1	Jaguars have the right to exist in Brazil
2	Mining is a threat to jaguar survival
3	The construction and upgrading of new roads is a major threat to jaguar survival
4	Jaguar conservation represents a threat to human rights and basic freedoms
5	The hunting of jaguars for their skins is a major threat to their survival
6	The survival of healthy jaguar populations is a positive symbol for Brazil's as a modern nation in the 21st century
7	It is important that future generations of Brazilians should be able to experience jaguars in the wild
8	The presence of jaguars is crucial for the health of forest ecosystems
9	The present focus on jaguar conservation involves an unwelcome degree of involvement from foreign organizations
10	Jaguars represent a major threat to the economic viability of cattle ranching
11	Illegal killing of their prey is a major threat to jaguar survival
12	Logging of forests represents a major threat to the survival of jaguars
13	Jaguars can only survive in wilderness areas
14	Jaguar conservation benefits the rich while the poor pay the price
15	Jaguar conservation represents a serious obstacle to rural development
16	Hunting by indigenous people represents a threat to jaguar survival
17	The conversion of cattle ranches to crop production threatens the survival of jaguars
18	Jaguars represent a high value for promoting ecotourism in Brazil
19	Carefully regulated trophy hunting of jaguars may be a useful tool to promote their conservation
20	Jaguars should be allowed to survive throughout Brazil, including in human-modified landscapes
21	The conservation of jaguars should be primarily based on scientific knowledge
22	Jaguars are a threat to human safety
23	The killing of jaguars should always be prohibited
24	Ranchers should be allowed to kill jaguars that kill cattle
25	Conserving jaguars will also conserve many other species
26	Jaguar conservation represents an obstacle to the economic development of Brazil
27	It is important to establish protected areas for jaguars
28	Brazil has a major international obligation to ensure that jaguars survive
29	Decisions about jaguar conservation should be taken at the local level
30	Retaliatory killing of jaguars by ranchers is a major threat to their survival
31	It is necessary for public environmental agencies to take measures that will secure the connectivity of jaguar populations
32	The development of hydroelectric power plants causes conflict with the preservation of jaguar habitat
33	To hunt for jaguars is an act of bravery and skill that increases the hunter's reputation in the community

We used PQMethod software (Schmolck, 2012, retrieved from http://www.lrz.de/~schmolck/qmethod/index.htm) for the analysis. Typically, there are two alternative, but essentially equivalent, methods for analysing the Q data; either using a Centroid Factor Analysis (CENT) or a Principle Components Factor Analysis (PCA). To minimize subjective interference in the analysis, we chose the PCA option (O'Leary et al., 2013) and rotated the factors through the Varimax algorithm (Brown, 1980) by applying the automatic pre-flagging option and considering only factors with eigenvalues greater than 1 (Barry and Proops, 1999). We finalized the Q analysis by running a correlation analysis. To understand the different perspectives and associated clusters of institutional stakeholders, we combined the quantitative data analysis with a qualitative analysis of the follow-up discussions. We did this by identifying and examining all statements relevant to each of the clusters. Then we checked and compared each individual account (interview transcript), with the rest of the data within and among all clusters (so-called constant comparison; Webler et al., 2009; Van Exel and de Graaf, 2005).

3. Results

We found that three perspectives best described the range of views within the Q sorts (Tables 1 and 2); 24 of the 34 sorts (orderings of statements made by the institutional stakeholders) loaded significantly into one of the three perspectives (Table 2; Fig. 1). Ten of the sorts did not load significantly into any perspective (Table 1). There was a high reliability in the three perspectives ((A) = 0.982; (B) = 0.966; (C) = 0.923; see Sridharan et al., 2010), which together explained 68% of the total variance in the Q sorts.

Below is a description of each of the perspectives and the groups of institutional stakeholders that clustered into them (Table 1). Numbers in parentheses refer to specific Q statements that were important to each of the perspectives (Table 2; Fig. 1). Quotation marks mark direct quotations from the follow-up discussions. Significance values refer to the degree that statements ranked similarly or differently across perspectives.

3.1. Perspective A

Perspective A explained 29% of the total variance in the Q sorts and accommodated the views of 14 individuals (Table 1), 11 from the national level and three from the state level. Their institutes worked with environmental management and

Disagree most								Agree most
-4	-3	-2	-1	0	1	2	3	4
Perspective A (Percent Explanation of Variance: 29%, Number of Sorts: 14)								
10	26	14	17	5	28	25	31	23
24	22	19	32	21	6	7	27	1
	33	4	16	20	13	8	11	
		15	29	18	3	12		
			9	2	30			
Perspective B (Percent Explanation of Variance: 24%, Number of Sorts: 7)								
10	15	19	28	17	6	31	7	12
4	14	22	2	29	20	21	1	25
	26	24	5	23	27	32	8	
		16	11	13	18	30		
			9	33	3			
Perspective C (Percent Explanation of Variance: 15%, Number of Sorts: 3)								
4	10	26	22	7	5	32	12	11
29	33	15	23	16	24	31	21	27
	20	14	18	28	6	2	1	
		8	25	30	17	13		
			19	9	3			

Fig. 1. Optimal Q sorts for perspectives A, B and C regarding attitudes about the conservation of jaguars in central Brazil. The sorts are orderings of Q statements, as they would look for persons who completely agreed with the perspectives. Numbers refer to specific Q statements (Table 2); ranked from −4, "disagree most", to +4, "agree most". "Number of Sorts" is the number of persons whose views make up a specific perspective. "Percent Explanation of Variance" describes how much of the total variation, among all sorts, each perspective explains.

governance, tourism, forestry, hydropower, landless and indigenous people's rights, agriculture, livestock, and finance. Within perspective A, jaguars were highly valued as a "native" species, with the right to exist in Brazil (1). Jaguars were not a threat to human safety (22), or the economic viability of cattle ranching (10). Jaguar hunting was not an act of bravery and skill (33), and the illegal killing of jaguar prey was a major threat to jaguar survival (11). Perspective A represented a significantly more negative view of retaliatory killing of jaguars than perspectives B or C ($p < 0.01$) and opposed ranchers being allowed to kill jaguars that kill cattle (24). The institutional stakeholders within perspective A thought that the killing of jaguars should always be prohibited (23) (significantly different from perspectives B and C at $p < 0.01$).

Within perspective A, it was deemed necessary for public environmental agencies to secure the connectivity of jaguar populations (31), because "everything is connected" and therefore it "is important to consider ecosystems". It was also important to establish protected areas for jaguars (27), because habitat loss was a key limiting factor to jaguar survival. Yet, it was significantly less important within perspective A that jaguar conservation be based primarily on scientific knowledge (21), compared to perspectives B and C ($p < 0.01$). Although the institutional stakeholders within perspective A were sceptical towards local-level decision making about jaguar conservation (29), because such decisions might not be as "factually grounded" as public policies, it was "imperative to consider the local level" and traditional knowledge, because many "local people possess both important knowledge and respect" for nature. Furthermore, perspective A was the only perspective in which the development of hydroelectric dams (32) was viewed as relatively unproblematic for jaguar conservation, as were the effects of mining (2) (both significant at $p < 0.01$). "With mining, there are two sides of the coin. No one should do anything that threatens a species, without also contributing to its conservation; you would have to secure both an area for its conservation and give economic compensation to contribute to its conservation". Furthermore, "Brazil is a developing country and development is important. Nature conservation is also important, but both can coexist". Hence, "there must be a balance between development and nature conservation".

3.2. Perspective B

Perspective B explained 24% of the total variance in the Q sorts and accommodated the views of seven individuals with national or international institutions working on the national level. The institutional stakeholders within perspective B came from NGOs and research institutes working with environmental issues, social issues and agriculture, as well as financial institutions and The Landless Workers' Movement. Perspective B primarily focused on the jaguar as an integral part of ecosystems and emphasized that the conservation of jaguars, "as an umbrella species" could enhance the conservation

of other species (25, significantly more positive than in the other perspectives at $p < 0.05$). An important theme was that jaguar conservation would not compromise Brazil's rural or economic development (15; 26), threaten human rights or basic freedoms (4), or constrain the economic viability of cattle ranching, because "losses caused by jaguars are minimal" (10). Within perspective B, jaguar conservation did not cause skewed distributions of costs and benefits between rich and poor people (14). Jaguar conservation was important for future generations of Brazilians, who have a "right" to experience jaguars in the wild (7, significantly different from perspectives A and C at $p < 0.05$).

Although logging was viewed as a major threat to jaguars (12), which were essential for the health of forest ecosystems (8), the establishment of protected areas for jaguars (27) was significantly less important within perspective B, compared to the other perspectives ($p < 0.01$). Contrary to perspectives A and C, both illegal hunting of jaguar's prey species (11) and killing jaguars for their skins (5) were not major threats to jaguar survival within perspective B (significantly different at $p < 0.01$ respectively). Mining, "the way it was done in Brazil" (2), as well as hunting by indigenous people (16), were also significantly less threatening ($p < 0.01$). Additionally, only perspective B was relatively neutral towards local decision making about jaguar conservation (29, significantly different at $p < 0.05$), and, although "the local population must be considered/involved", "it was important to consider more general threats and impacts". Furthermore, jaguar hunting (23), and jaguar hunting as an act of bravery and skill (33), was significantly less controversial within perspective B than the other perspectives (at $p < 0.05$ and $p < 0.01$, respectively).

3.3. Perspective C

Perspective C explained 15% of the total variance in the Q sorts and comprised the views of three individuals from State of Goiás institutions, two from institutes related to cattle production, and one from an electricity company working with hydropower. Compared to the other perspectives, within perspective C it was not very important that jaguars were a species worth conserving, because jaguars were not considered any differently than other Brazilian animals and, as all other animals; jaguars had a right to exist in Brazil (1). The establishment of protected areas was important to perspective C (27), but, in contrast to perspective B, jaguar conservation was not believed to enhance overall biodiversity conservation; that would depend on the particularities of every locality (25, significantly different from perspectives A and C at $p < 0.01$). Similarly, jaguars were not crucial for forest ecosystems (8, significantly different from perspectives A and C at $p < 0.01$). Although the illegal killing of jaguar prey (11, significantly different from perspectives A and C at $p < 0.05$) and logging of forests represented major threats to jaguar survival (12), the negative implications of illegal hunting and logging for nature conservation in general were more important. Within perspective C, it was important that decisions about jaguar and nature conservation should not be taken at the local level (29, significantly different from perspectives A and C at $p < 0.01$). Instead, scientific knowledge was emphasized for appropriate management (21).

Within perspective C, jaguars were not a threat to human rights or basic freedoms (4). Nevertheless, the institutional stakeholders within perspective C did not want jaguars to survive throughout the country, including in human-modified landscapes (20, significantly different from perspectives A and C at $p < 0.01$). Within perspective C, it was felt that jaguars should survive in their proper place in nature. Additionally, although jaguars generally did not pose major threats to the economic viability of cattle ranching (10), the situation could differ among smallholders or among breeders and "there are situations in which killing jaguars ought to be permitted, for example, for small-holders". Hence, ranchers should be allowed to kill jaguars that kill cattle (24) "to defend themselves when threatened" and jaguar killings should not always be prohibited (23). In contrast to perspectives A and B, perspective C was thus significantly more positive towards hunting (at $p < .01$ and $p < 0.05$ for 24 and 23 respectively). However, perspective C would only allow hunting under controlled circumstances and strongly opposed "indiscriminate killing of jaguars" and hunting as an act of bravery and skill (33).

4. Discussion

Previous studies of stakeholders' attitudes towards jaguars and jaguar conservation in Brazil have tended to focus only on cattle ranchers (Cavalcanti et al., 2010; Marchini and Macdonald, 2012; Zimmermann et al., 2005). Although they comprise a very important stakeholder group, due to their control over large areas of jaguar habitat and influence over retaliatory killing, they are not the only stakeholders who influence jaguar conservation. Brazil is currently undergoing rapid development, with the expansion of mining, transport infrastructure, and energy generation projects, the conversion of pastureland to cropland, the conversion of forest to farmland, and widespread social changes among rural communities. Therefore, we adopted a wider view, trying to look at all institutional sectors that influence jaguars, their habitat, and the social-economic conditions of the people with whom they share the landscape.

Studies about decision makers' values indicate that decision makers rely on intuition, previous experience, appropriateness and compromise in their decision-making (Berejikian and Dryzek, 2000; March and Olsen, 1984). Thus, by interviewing people holding prominent positions within the respective institutes included in this study, we presumably gained knowledge about influential views on jaguar conservation in the Brazilian context. Such insights are important, because an understanding of differing views at the institutional level could aid coordination across management and policy-making organizations. Additionally, compatibility between policies and local stakeholder views is a prerequisite for effective conservation (Kansky et al., 2014; Heberein, 2012). Therefore, understanding the different views across institutes at the decision-, and policy-making level is important for identifying potential incongruities in views.

Although the Q methodology is a useful tool for exploring the range of extant views, to identify common ground across potentially polarized views, and foster understanding among stakeholders, it does have several limitations. Like all other methods that rely on self reported information, the Q methodology is prone to respondent bias. In particular when the topic of investigation is sensitive, respondents may report what they believe to please the interviewer rather than their honest views. Yet, to some extent, the Q methodology does allow the researcher to check for inconsistencies between actual respondent views and reported views through the follow-up discussions. Therefore we were careful to ask stakeholders to explain any apparent inconsistencies in responses to clarify their logic. Thus we believe that respondent views herein presented are honest.

Another methodological limitation ensues from the impossibility to know, a-priori, the number of respondents needed to capture the range of extant perspectives. In our case, it seems that we unfortunately failed to capture some of the views on jaguar conservation at the institutional level, because the three perspectives explained 68% of the total variance in the sorts, and 10 of Q sorts did not significantly load into any perspective. In addition, there is a certain element of chance in the selection process as the unwillingness or inability of stakeholders to participate, dictates their inclusion. Subsequently some key stakeholder institutes are missing from our analysis, and possibly some perspectives.

Moreover, the inclusion of Q statements and the limited number of issues that can be managed by interviewees, predicates the possible scope of perspectives. Clearly, there are as many possible perspectives are there are viewers of a problem and any selection will involve leaving out some points of view. Thus, a main challenge in Q methodology will always be to retain a manageable set of Q statements, reflecting as great a diversity of points of view as can be encompassed by the statements. Yet, balancing values for and against jaguar conservation and basing our Q statements on various sources, including large carnivore management conflicts elsewhere, we believe that we managed to ensure as inclusive a sample of relevant jaguar related issues as 33 Q statements allow.

Whereas the analysis failed to capture the views of some institutional actors in this explorative study, the results indicated that institutional stakeholders' views on jaguar conservation issues in central Brazil do not necessarily conform to the polarized perspectives so often seen in European and North American contexts (Mattson et al., 2006; Skogen and Krange, 2003). Additionally, the composition of the perspectives was relatively heterogeneous and associations among institutional stakeholders within groups were not obvious. Thus the perspectives did not indicate that institutional stakeholder' views on jaguar conservation aligned with institutional arrangements. Compared to other large carnivore conflicts, where conflicts are clearly polarized and perspectives cluster along obvious interest lines (e.g. Redpath et al., 2013; Mattson et al., 2006; Skogen and Krange, 2003), these are uplifting results. This was supported by the finding that the basic premise of jaguar conservation was not contested among those we interviewed and our results indicated that well-educated leaders/officials of central institutions in Brazil shared many basic views.

Specifically, jaguar conservation was not viewed as a major threat to individual well-being or national development, and there was a widespread awareness of the need for science and large-scale coordination to guide the process. There was also a widespread view that killing jaguars for any reason other than defence of livestock was unacceptable. In addition, the stakeholders thought that the survival of healthy jaguar populations could be a positive symbol for Brazil as a modern nation in the 21st century. Hence the perspectives suggested that many of the pre-conditions for successful jaguar conservation exist at the institutional level in Brazil. However, all stakeholders clearly articulated that the needs of jaguars had to be balanced against the needs of development and other social problems. Therefore, it is important that conservation plans for jaguars recognize this need.

A final cautionary note concerns potential differences between the views of people at the institutional level and those on the ground (Karlsson and Sjöström, 2007; Bjerke et al., 2000). This is important considering the institutional stakeholders' general scepticism towards devolving power (sensu Sandström et al., 2009) over jaguar conservation to grant the rural population a greater feeling of ownership over management through, for example, regulated jaguar hunting or local decision making. Moreover because local stakeholders expect Brazilian authorities to solve livestock predation problems (Boulhosa and Azevedo, 2014) and a perceived lack of support from the authorities could incentivize jaguar hunting just like a perceived lack of support from the local authorities incentivized tiger hunting in Bangladesh (Inskip et al., 2014). Therefore, it is also imperative to acknowledge the differing views among institutional stakeholders regarding the desired distribution of jaguars in Brazil, hunting policies, and the effects of hunting. Especially because a failure to adequately address such differences could negatively affect jaguar conservation (cf. the highly polarized and politicized debate over large carnivore management in Northern Europe). Furthermore, a division among institutional stakeholders regarding the influence of developing hydropower electric plants or mining on jaguar conservation alluded to the presence of additional politicized discourses within the Brazilian context that could influence the conservation of jaguar habitat. An important next step would therefore be to investigate the views of a diversity of stakeholders who share the landscapes where jaguar conservation occurs and to infer about possible mismatches in local and institutional stakeholders' views (Inskip and Zimmermann, 2009).

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Appendix. List of the three to six most relevant institutions from each of the 10 stakeholder categories for the interviews regarding attitudes towards the conservation of jaguars in central Brazil

NGOs/scientists
1. WWF, World Wildlife Fund
2. ISPN, The Institute for the Society, Population and Nature (Instituto Sociedade, População e Natureza)
3. Pró-Carnívos
4. Panthera
5. JCF, Jaguar Conservation Fund
6. IPE, Institute for Ecological Research (Instituto de pesquisas ecológicas)

Cattle producers
1. EMATER, Company of Technical Assistance and Rural extension for the state of Goiás (Empresa de Assistência Técnica e Extensão Rural do Estado de Goiás)
2. SEAGRO, Secretariat of Agriculture, Livestock and Irrigation for the state of Goiás (Secretaria de Agricultura, Pecuária e Irrigação do Estado de Goiás)
3. MAPA, Ministry of Agriculture, Livestock and Supply (Ministério de Agricultura, pecuária e abastecimento)
4. CNA, Brazilian Confederation of Agriculture and Livestock (Confederação da Agricultura e Pecuária do Brasil)
5. FAEG Federation of Agriculture and Livestock Goiás (Federação da Agricultura e Pecuária de Goiás)

Agriculture (including ranching)
1. FETAEG Goiás' Farmers' Association (Federação dos Trabalhadores da Agricultura do Estado de Goiás)
2. AGRODEFESA, Agricultural Protection Agency of Goiás (Agência Goiana de Defesa Agropecuária)
3. MDA, Ministry of Agrarian Development (Ministério desenvolvimento agrário)
4. INCRA National Institute of Agrarian reform and Colonization (Instituto Nacional de Colonização e Reforma Agrária)
5. Embrapa, Brazilian Institute for Research on Agriculture and Livestock keeping (Empresa Brasileira de Pesquisa Agropecuária)

Environmental institutions/management/government
1. MMA, Ministry of Environment (Ministério do Meio Ambiente)
2. SEMARH, Department of Environment and Water Resources (Secretaria do Meio Ambiente e dos Recursos Hídricos)
3. IBAMA, Brazilian Institute for Environment and Renewable Natural Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis)
4. CENAP, National Centre for Research and Conservation of Carnivorous Mammals (Centro Nacional de Pesquisa e Conservação de Mamíferos Carnívoros)
5. ICMBio, The Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de Conservação da Biodiversidade)

Tourism
1. MTUR, Ministry of Tourism (Ministério do Turismo)
2. AGETUR, Goiás State Agency of Tourism (Agência Goiânia de Turismo do Estado de Goiás)
3. SEDTUR, State Secretariat for Tourism Development (Secretaria de Estado de Desenvolvimento do Turismo)

Forestry
1. SFB, Brazilian Forest Service (Serviço Florestal Brasileiro)
2. IMAFLORA, Institute for agricultural and forest management and certification (Instituto de manejo e Certificação Florestal e Agrícola)
3. SBS, Brazilian Society of Silviculture (Sociedade Brasileira da Silvicultura)
4. ABRAF, Brazilian Association of Planted Forest Producers (Associação Brasileira de Produtores de Florestas Plantadas)
5. BRACELPA, Brazilian Association of Pulp and Paper (Associação Brasileira de Celulosa e Papel)

Landless/indigenous people
1. MST, Landless Workers' Movement (Movimento dos Trabalhadores Rurais Sem Terra)
2. CLOC Vía Campesina, The Latin American Coordination of Rural Organizations (La Coordinadora Latinoamericana de Organizaciones del Campo)
3. CIMI–CNBB, Indigenous Missionary Council–National Conference of Brazilian Bishops (Conselho Indigenista Missionário–Conferência Nacional dos Bispos do Brasil)
4. FUNAI-GO, National Indian Foundation in Goiás (Fundação Nacional do Índio)
5. FUNAI-MT, National Indian Foundation in Mato Grosso (Fundação Nacional do Índio)

Financial institutions/development institutions
1. PRONAF, National Program to Strengthen Small Scale Agriculture (Programa Nacional de Fortalecimento da Agricultura Familiar)

(*continued on next page*)

2. FNMA, National Environmental Fund (Fundo Nacional do Meio Ambiente)
3. The World Bank
4. FUNBIO, Brazilian Fund for Biodiversity (Fundo Brasileiro para a Biodiversidade)
5. BNDES, The Brazilian Development Bank (Banco Nacional do Desenvolvimento)
6. FNDF, National Forest Development Fund (Fundo Nacional de Desenvolvimento Florestal)

Hydropower
1. CELG, Power plants in Goiás (centrais elétricas do Goiás)
2. ANA, National Water Agency (Agência Nacional de Águas)
3. MME, Ministry of Mines and Energy (Ministério minas e energia)
4. ANEEL, Brazilian Electricity Regulatory Agency (Agência Nacional de Energia Elétrica)
5. CEMAT, Power plants in Mato Grosso (centrais elétricas do Mato Grosso)

Transport
1. DNIT, National Bureau of Infrastructure and Transport (departamento nacional de Infraestrutura e transporte)
2. DNIT in the state of Goiás
3. DNIT in the state of Mato Grosso
4. AGETOP, Goiás agency of transport and public works (Agencia Goiana de transporte e obras publicas)
5. AGER, State Agency of Mato Grosso for the Regulation of Public Services (Agência de Regulação dos Serviços Públicos Delegados do Estado de Mato Grosso)

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