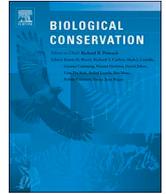




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Conservation professionals' views on governing for coexistence with large carnivores



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ABSTRACT

Decision-making about large carnivores is complex and controversial, and processes vary from deliberation and expert analysis to ballot boxes and courtrooms. Decision-makers range from neighboring landowners to the United Nations. Efficacy, longevity and legitimacy of policies may often depend as much on process as the policy itself. Overcoming controversy requires greater understanding of preferences for decision-makers and processes as well as deeper beliefs about human-carnivore interactions. Although academic debates are rich with recommendations for governance, practitioners' perceptions regarding decision-making processes have been rarely examined. Doing so can facilitate constructive discourses on managing and conserving carnivores across highly-variable social-ecological landscapes. To gain insight into different viewpoints on governance regarding large carnivore conservation, we asked a global community of conservation professionals ($n = 505$) about their preferences for governance alternatives for carnivore conservation through an online survey. Respondents agreed that government biologists should make decisions while legislators and commissions received low agreement and less consensus. Findings also indicated a general rejection of turning decision processes completely over to the general public, to courts, or to politicians who are perceived as lacking both technical knowledge and local insights. We found evidence for consensus on best management processes using a combination of science, local knowledge and participatory decision-making. According to our sample, sustainable coexistence strategies may require significant shifts in processes that remove mistrusted political influences vis-à-vis ballot boxes, courtrooms, commissions and legislative chambers. Our sample believed governance structures that combine technical expertise with local perspectives in a co-management framework may best withstand tests of time and controversy.

1. Introduction

Decision-making about large carnivores (hereafter carnivores) is one of the most contentious processes in the realm of wildlife conservation and involves complex interactions between historical, social, political, psychological, economic, legal and ethical dimensions (Carter et al., 2012a; Clark and Rutherford, 2005; Epstein et al., 2019; López-Bao et al., 2017a; Lute et al., 2016). Given the ever-increasing presence of humans across landscapes, coexistence with carnivores will require sharing land in many, if not most, contexts across the globe (López-Bao et al., 2017a). Landscapes will be increasingly required to meet the demands of feeding a hot, hungry and crowded world and simultaneously provide habitat for wildlife, including carnivores (Crespin and Simonetti, 2019; Fischer et al., 2014; Kremen, 2015).

Conservation professionals believe that humans and large carnivores can share the same landscapes (Lute et al., 2018), but the question remains how to best make policy decisions regarding the inevitably contentious human-carnivore conflicts. Much of what has been traditionally labeled as human-carnivore conflict is actually a conflict between people over how large carnivores should be managed, rather than the direct impacts of these species on humans or human interests (e.g. livestock depredations or attacks on people; Redpath et al., 2015; Young et al., 2010). Conflict within and among stakeholder groups and authorities is often over differences in values and uses for carnivores (i.e., from utilitarian to mutualistic values and uses; Bruskotter et al., 2019; Dietsch et al., 2016), but is also related to social identity and the competition between groups over access to resources and power (Baynham-herd et al., 2018; Dickman, 2010; Lute and Gore, 2014;

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Redpath et al., 2013). Additionally, human-human conflict over carnivores is also about risk perceptions and what level of risk is acceptable (Gore et al., 2007; Lute et al., 2016).

Decision makers are increasingly using collaborative and inclusive decision-making processes in part to assuage conflicts among stakeholders (Emerson and Nabatchi, 2015; Redpath et al., 2017); which have not escaped scrutiny, such as the debate about who should make decisions (López-Bao et al., 2017b; Skogen et al., 2017; Treves et al., 2017). Given that decisions about carnivores can occur on scales from local to global and involve a massive diversity of social-ecological contexts, there exists a wide spectrum of decision processes and players. Some participatory governance systems form formal decision-making bodies that include representatives of multiple stakeholder groups (Carter et al., 2014, 2017; De Vente et al., 2016; López-Bao et al., 2017a; Sterling et al., 2017). This level of inclusion in decision-making processes and authority may work in some contexts but also has failed to assuage conflict in several circumstances (e.g., Michigan Wolf Management Roundtable, Washington Wolf Advisory Group; López-Bao et al., 2017a, 2017b; Oosting, 2013; Press, 2013). Adding to this complexity is a growing acknowledgment that decision-making processes about carnivores, which require vast territories (Gittleman et al., 2001) and can have cascading impacts in ecosystems (Ripple et al., 2014), should include ecosystem-scale and multi-sectorial considerations (Linnell and Kaltenborn, 2019).

Carnivore conservation is sometimes mandated by an institutional nested-hierarchy, where international legislation provides a broad policy framework (Trouwborst et al., 2017) and delegates to ever lower levels with each level being constrained by the one above, such as in the case of carnivore conservation in Europe (Linnell and Kaltenborn, 2019; López-Bao et al., 2017a, 2017b; Sazatornil et al., 2019). Multiple institutions can play a role in the ultimate decision-making process, ranging from subnational institutions to informal local groups or landowners. Each of these institutions may include various stakeholders at varying levels of participation, adding complexity and potential value-based conflicts to the process (Decker et al., 2016). Although some conflict between social groups and between humans and carnivores may need to be accepted (Jacobsen and Linnell, 2016b), too much controversy can result in swings between policies with divergent conservation implications (i.e., the predator-pendulum; Bruskotter, 2013).

Like many policy arenas, decision-making processes about carnivores can be undermined by tension and tradeoffs among four basic policy goals of efficiency, liberty, equity and security, or by tyranny of either the minority or the majority (Bishin, 2009; Cooke and Kothari, 2001; Serenari et al., 2018; Stone, 2002). Collaborative governance with inclusive stakeholder participation prioritizes equity over efficiency. Disallowing local stakeholders the liberty to make decisions about carnivores in their backyards is often justified in terms of security of populations of conservation concern. Public referenda, so-called “ballot box biology” where ballot initiatives put a policy up for public vote, are an example of a decision process that can result in a tyranny of the majority whereby local, rural and minority interests are swamped by mass public opinion. Referenda and the potential resulting backlash (e.g., new counter-referenda, illegal take) can lead to swings in carnivore policies and continued contention between groups (Manfredo et al., 2017). When certain interests or stakeholders have privileged access to power and disproportionate influence over the ultimate decision-makers, a tyranny of the minority may occur (Bishin, 2009; López-Bao et al., 2017a, 2017b). When broader society or particular stakeholders perceive that a decision process was unfair, biased or simply do not approve of the results, they will often revisit the decision process through new avenues of litigation, ballot initiatives, or non-compliance with laws and regulations (Keane et al., 2008; Loker et al., 1998; Ludwig et al., 2001).

Much research has been dedicated to understanding values, attitudes, and preferences for carnivores (e.g., Carter et al., 2012a, 2012b; Eriksson, 2016; Lute et al., 2016). But little work has focused on

enhancing understanding of the values, attitudes and preferences regarding decision-making processes and potential for conflict over these policy preferences among key stakeholder groups. Here, we aim to measure policy preferences among conservation professionals, defined broadly as professionals with positions that focus at least in part on carnivores, including but not limited to natural resource decision-makers and scientists. We focus on this stakeholder group because 1) they interact with many other stakeholders and decision-makers, 2) their values and attitudes have a strong influence on policy processes and conservation outcomes, and 3) public discourse suggests that there are strong disagreements about the priorities and objectives of carnivore conservation policies and processes among this group (e.g. see Redpath et al., 2017; and Treves et al., 2017). These disagreements likely reflect divergent underlying viewpoints, which are often not transparent and can drive debates in conservation, including those on coexisting with carnivores (Carter and Linnell, 2016). Additionally, few scientific studies have evaluated viewpoints on carnivore conservation of conservation professionals across the world (Lute et al., 2018; also see Sandbrook et al., 2019).

To help fill this research gap, our objectives were to measure preferences for policy processes and players in large carnivore conservation among our sample of professionals in the global conservation community and uncover patterns among preferences, disciplinary expertise and background. Importantly, we are not arguing that institutions should bend solely to the will of conservation professionals. We are arguing that preferences and perspectives of all stakeholders should be measured and understood to improve decision-making processes that consider expert and public preferences. Because conservation professionals have expert knowledge about carnivores, practical experience in carnivore governance, and often function as liaisons between decision-makers and stakeholders or are decision-makers in their own right, they are important players in policy processes. Understanding their governance preferences is key to finding solutions and interventions to current carnivore policies and decision-making processes that remain entrenched in controversy.

2. Methods

2.1. Participant recruitment and survey instrument

We used convenience, snowballing sampling via email, social media and listserv announcements (e.g., Society for Conservation Biology regional groups, The Wildlife Society, Ecolog) to recruit 727 conservation professionals 18 years or older in December 2015 (Creswell, 2009; Salant and Dillman, 1994). We asked participants self-identifying as professionals with positions that focus at least in part on carnivores to complete a web-based survey and pass it along to their colleagues. Further details on methodology can be found in Lute et al., 2018 (Boise State University Internal Review Board approval 090-SB15-182).

We measured preferences related to decision-making processes relevant to carnivore conservation, including how local stakeholders are incorporated, who makes decisions, who bears the costs of those decisions, as well as issues of process transparency and mistrust. The survey consisted of a series of close-ended questions, alternating between 5-point Likert scales and multiple choice, and concluded with socio-demographic questions and professional measures (i.e., region of field-work, work sector, job role, extent of carnivore focus, years of experience). Table 1 outlines the questions relevant to this analysis. We asked professionals their preferences regarding (1) who makes decisions and how, (2) who has the most accurate perspectives, and (3) who should generally bear the burden of paying for carnivore conservation. The complete survey and dataset can be found in the Supplemental Information section.

Table 1
Terms and survey measures.

Topic	Question	Specific items	Response options
Accurate perspectives	Who has the most accurate perspective on carnivore conservation?	Biologists at government agencies General public	0 = not selected 1 = selected
Appropriate decision-makers	To what extent should each group decide on carnivore conservation actions?	Indigenous groups Legislators/politicians	1 = Not At All 2 = A Little 3 = Some 4 = A Lot
Cost bearer	To what extent should each group bear the costs of carnivore conservation?	Natural resource commissioners or equivalent Non-governmental organizations Rural inhabitants living near or with carnivores University researchers	
Decision-making process	Which of the following strategies are appropriate for decisions about carnivore conservation?	Consensus decision-making involving stakeholders Consideration of both scientific and local knowledge Consideration of scientific knowledge only Lawsuits Public votes	0 = not selected 1 = selected
Work sector	In which of the following sectors do you primarily work?	Government Non-governmental organization Private sector Research institute University Other	0 = not selected 1 = selected
Role	Which of the following roles best describes your involvement in conservation?		Conservation biologist Conservationist Conservation social scientist Ecologist Naturalist Veterinarian Wildlife biologist Wildlife manager Zoologist
Experience	How many years of conservation-related experience do you have?		1–5 years 6–10 years 11–20 years 21–30 years > 30 years
Fieldwork region	Where do you conduct fieldwork or study?		North Africa Sub-Saharan Africa North America Central America South America Antarctica Central Asia Russia Southeast Asia Indian subcontinent Middle East Europe Oceania Not applicable

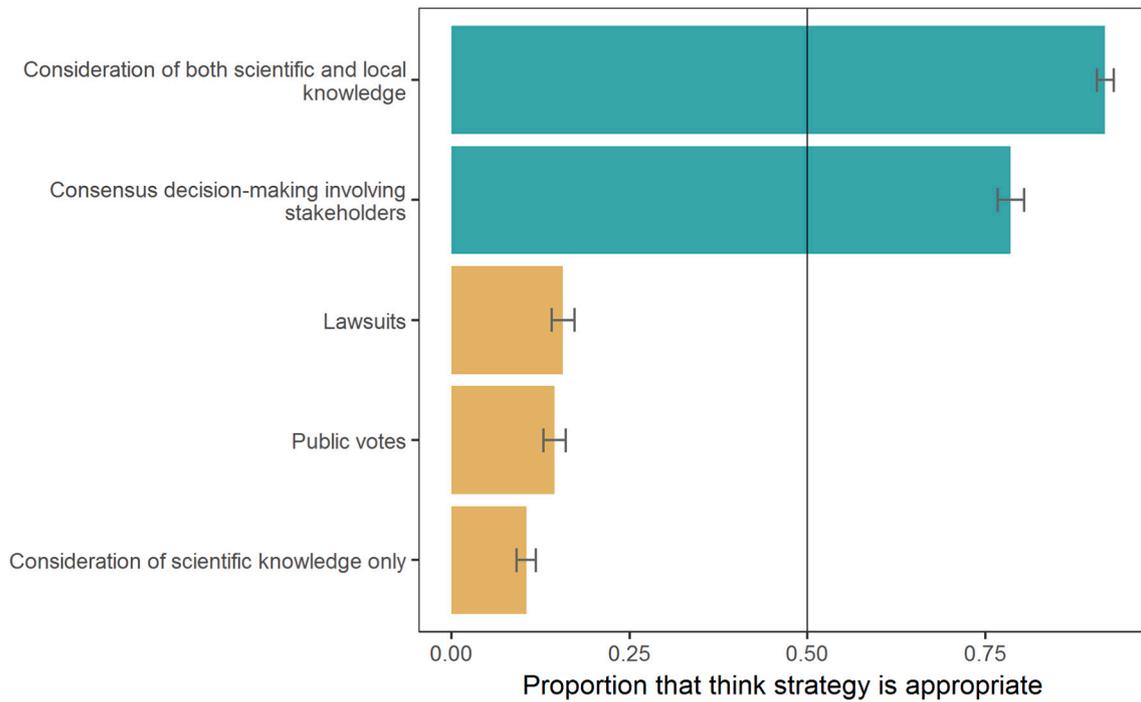
2.2. Statistical methods and analysis

Descriptive statistics, normality tests and tests for the relationships between dependent variables related to decision-making and independent variables were conducted in STATA 13.1 (StataCorp, TX). To test differences among categorical groups (i.e., work sector, role) for: a) ordinal dependent variables (i.e., decision makers, payers), we ran Kruskal-Wallis tests and Cramer's V (i.e., effect sizes of 0.3 are considered medium magnitude and 0.1 a small magnitude; Cohen, 1988) and b) categorical dependent variables (i.e., decision processes, accurate perspectives), chi-square tests. Because samples sizes were low for respondents working in developing countries, we did not test for significant differences between developed and developing country respondents. To test differences among groups based on experience (i.e., ranked ordinal variable) for: a) ordinal dependent variables (i.e., decision makers, payers), we ran Spearman rank correlations and b) categorical dependent variables (i.e., decision processes, accurate

perspectives), simple logistic regressions. Using the “corrplot” and “Hmisc” packages in R software (R Core Team 2018), we calculated Pearson correlations to compare preferences regarding accurate perspectives, preferred decision makers, payers and decision processes. Correlation significance was calculated at the 0.05 level.

We also calculated the Potential for Conflict Index₂ (PCI₂; Vaske et al., 2010) to examine differences in consensus among policy preferences for decision-makers and payers. The PCI calculates distances between people's responses on a variable (e.g., 1 vs 2) summarized over the entire sample to simultaneously describe a variable's central tendency, dispersion, and shape using a graphic display. PCI₂ can only analyze non-binary variables and ranges from 0 to 1. A PCI₂ = 0 indicates complete consensus, where all respondents give the same response. A PCI₂ = 1 indicates the lowest consensus, where respondents are equally divided between opposite responses (e.g., 50% strongly disagree, 50% strongly agree).

a)



b)

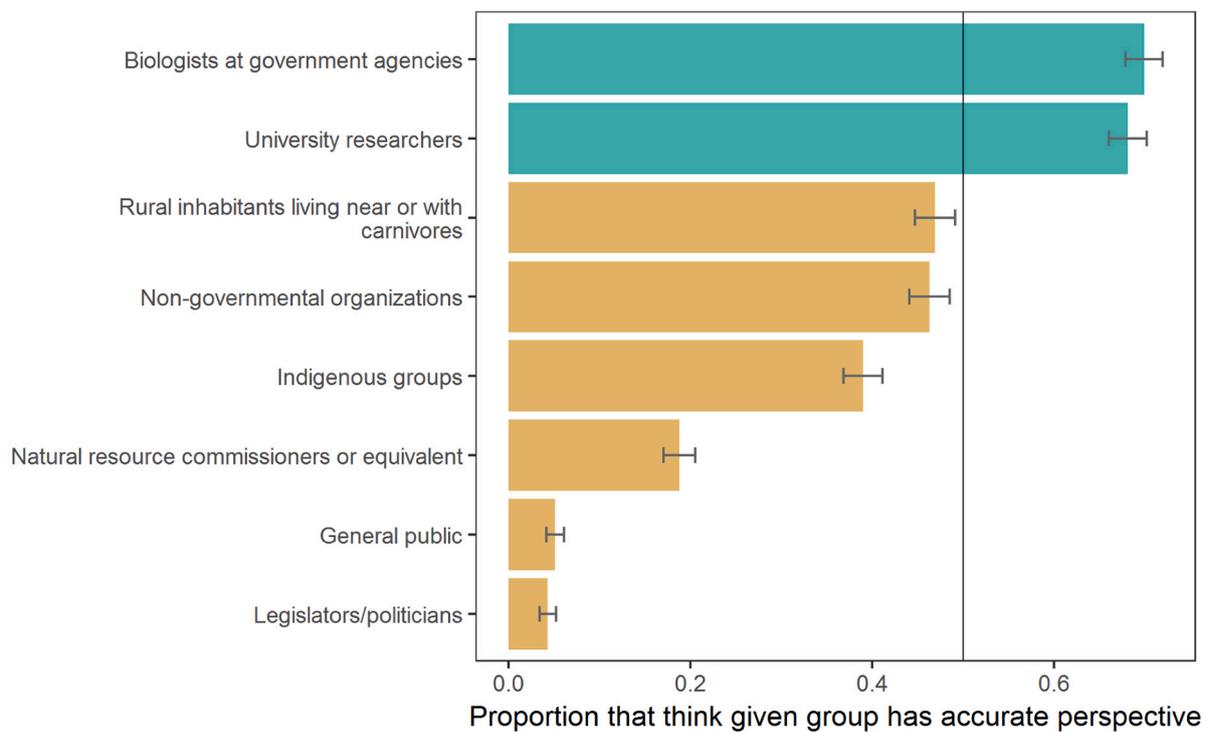


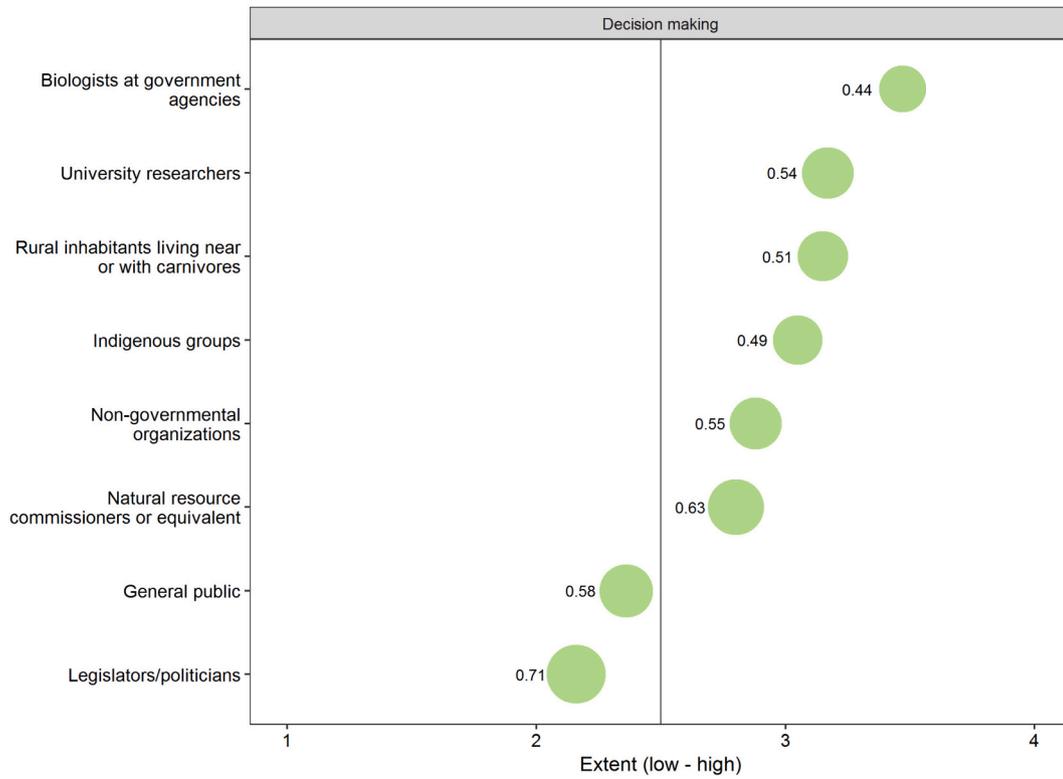
Fig. 1. Preferences for a) decision-making processes and b) accurate perspectives (n = 505). Green bars indicate response options that had agreement proportion over 0.5; yellow bars indicate proportions under 0.5. Error bars denote standard deviation. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

3. Results

Our final sample consisted of n = 505 participants, excluding incomplete responses, from 71 countries (North America n = 181; Europe n = 77; all other countries n = 247) ranging in self-declared age from 20 to 99 years (median age = 41 years). The sample was skewed

toward males (61%). Median education was at the master's level and median experience was in the category of 11–20 years. The majority of the participants were wildlife or conservation biologists (27%, 22% respectively) working at universities (39%), NGOs (22%) and government agencies (20%).

a)



b)

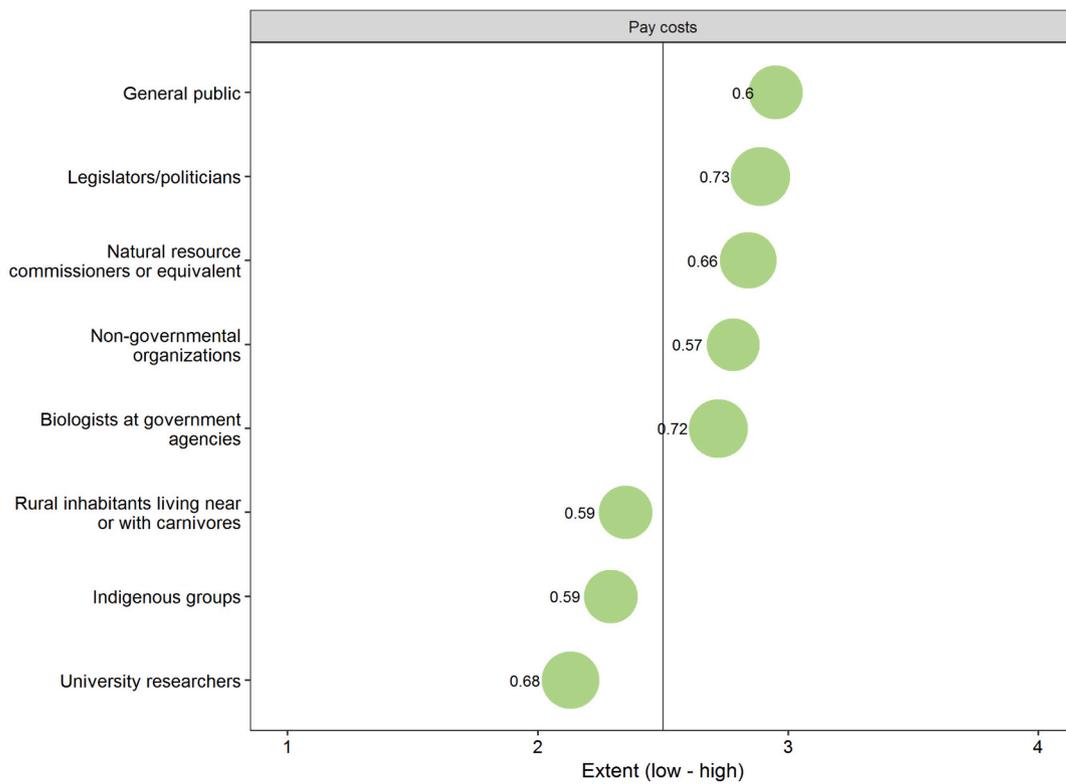


Fig. 2. Potential for conflict among 505 participants about who should be a) decision players (top) and b) payers (bottom). Responses to these questions were 1) not at all, 2) a little, 3) some, and 4) a lot. Median value of 2.5 provided as reference. Bubble size illustrates the relative magnitude in PCI₂ values, ranging from 0 (complete consensus) to 1 (no consensus). Larger bubble size indicates less consensus.

3.1. Preferences regarding decision players and payers

Among the conservation professionals surveyed, we found greatest consensus that government biologists (93% agreement, Fig. 1; $PCI_2 = 0.44$, Fig. 2) should make the decisions about carnivore conservation. University researchers, rural inhabitants and indigenous groups also received very high marks as appropriate decision-makers (83, 82 and 81%, respectively). We found lowest agreement for the general public and legislators as decision-makers (45 and 35% respectively); however, there was also the least consensus on responses for these two groups, especially for legislators ($PCI_2 = 0.71$).

Respondents indicated the greatest agreement that the general public should bear the costs of conservation policy (74%), but also identified a diversity of parties as appropriate co-financiers. Over 70% of respondents believed that the formal institutions attached to legislators and commissioners (e.g., county or wildlife commissions/boards, state and federal legislative bodies) should pay for conservation, followed by NGOs (69%) and government biologists (66%). PCI_2 values were relatively high for all groups, indicating less consensus around these responses. Lowest consensus on who should pay was indicated for the institutions associated with government biologists and legislators ($PCI_2 = 0.72, 0.73$ respectively). Highest consensus was indicated for NGOs as payers ($PCI_2 = 0.57$).

Accurate perspectives about carnivore conservation were attributed to government biologists (70%) and university researchers (68%) but not to the general public (5%) or legislators (4%); Fig. 1). For each group, scores for preferred decision-makers were positively correlated with accurate perspective scores (Fig. 3, Supplemental Fig. 1). Government biologists were the group most agreed on as having accurate

perspectives and being the preferred decision-makers, followed by university researchers, rural residents, commissions, the general public and finally legislators. NGOs were seen as having accurate perspectives but more moderately rated as preferred decision-makers. Respondents showed slightly higher agreement that indigenous groups should be decision-makers compared to a belief in their having accurate perspectives. Generally, this ranking was inversely related to who should bear the costs. The groups with the lowest agreement regarding accurate perspectives and preferred decision-making status were seen as the appropriate payers: general public, legislators, and commissions. NGOs received moderate agreement as payers, similar to their rank as decision-makers. Finally, those with the highest agreement regarding accurate perspectives and preferred decision-making status received less agreement about being appropriate payers: government biologists, rural residents, indigenous and university researchers.

Private sector respondents (e.g., those employed by consulting companies) showed lower mean agreement (2.0) that government biologists should be decision-makers (Kruskal-Wallis test = 23.4, $p \leq 0.001$; Cramer's V = 0.17). NGO respondents had higher mean agreement that NGOs should be decision-makers (mean = 3.3; Kruskal-Wallis test = 31.7, $p \leq 0.0001$; Cramer's V = 0.17) and have accurate perspectives (mean = 0.7; $\chi^2 = 46.2$, $p \leq 0.001$). Government employees had higher mean agreement (0.9) that government biologists have accurate perspectives ($\chi^2 = 43.2$, $p \leq 0.001$). Respondents working in government and NGOs had lower mean agreement (0.5) that university researchers have accurate perspectives ($\chi^2 = 26.3$, $p \leq 0.001$). Among all respondents we found lower mean agreement that government biologists have accurate perspectives (mean = 0.4; $\chi^2 = 35.7$, $p \leq 0.0001$). Wildlife managers had lower mean agreement

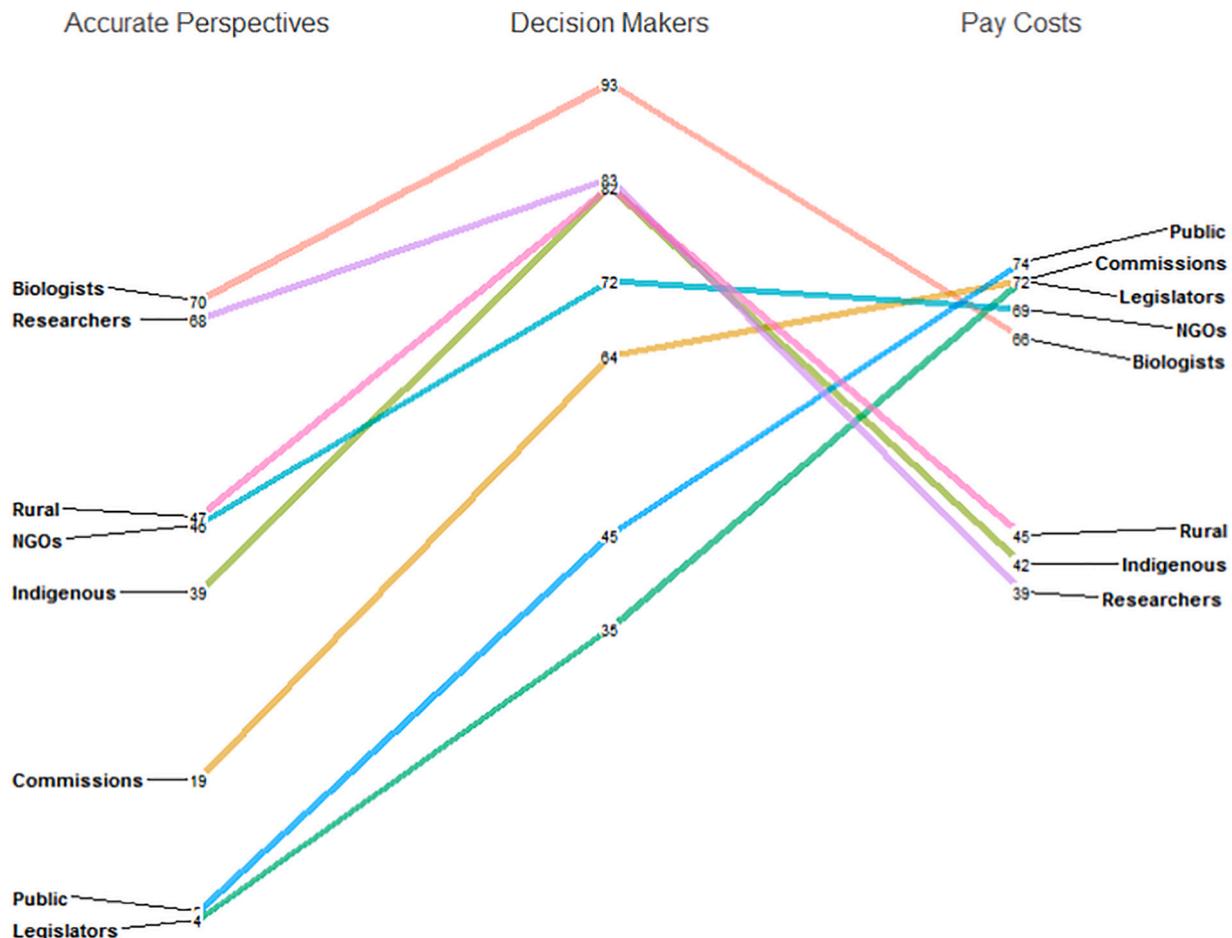


Fig. 3. Groups ranked as those with accurate perspectives, appropriate decision-makers and payers. Groups perceived as having accurate perspectives were also considered appropriate decision-makers. Numbers indicate percentage agreement and lines connect group ranking across categories.

that NGOs have accurate perspectives (mean = 0.3; $\chi^2 = 23.2$, $p \leq 0.01$). The number of years working in conservation was positively and significantly related to the general public as both decision-makers and payers ($r = 0.13$, 0.12 respectively; $p < 0.01$).

3.2. Preferences for decision-making processes

Conservation professionals agreed on the joint consideration of scientific and local knowledge (92% agreement) and participatory consensus decision-making (79% agreement) as the best decision-making processes. Respondents, however, showed little support for lawsuits (16%), public votes (15%) and considering only science (11%) as preferred decision processes.

Respondents from research institutes had higher mean agreement (0.4) that lawsuits are an appropriate decision-making strategy ($\chi^2 = 30.2$, $p \leq 0.001$).

4. Discussion

Our results suggest conservation professionals' preferences for two key elements: technical input from well-informed professionals (scientific knowledge) coupled with local input (local knowledge) from those directly affected by the decisions. At the same time, the sampled practitioners did not believe publics held accurate perspectives and generally rejected turning decision processes completely over to the general public, to courts, or to politicians who are perceived as lacking both technical knowledge and local insights. These results are important for three reasons. First, because of the central role that conservation professionals play in decision processes and carnivore conservation generally, it is important to be aware of the perceptions of this key group of expert stakeholders. Understanding expert perceptions helps identify their potential biases while also measuring their values, policy preferences and professional insights. Second, our findings revealed a tension between preferences for decision authority and financial responsibility, which may belie an assumption that the public contributes to conservation more through funding than decision-making capacity. Underlying this assumption may be a desire to more equitably distribute the costs and benefits of carnivores across society. Third, our results highlight a number of areas where the efficacy, perceived process legitimacy, and adaptive capacity of governance institutions to simultaneously preserve carnivores, livelihoods, and human and animal wellbeing need to be studied with more objective criteria, as well as being studied in other stakeholder groups.

Conservation professionals in this study preferred a situation where a combination of expert and local perspectives are integrated to inform decision processes aimed at achieving consensus to co-manage coexistence with large carnivores. This finding, that professionals underline a need for technical support as opposed to a purely local decision-making delegation, aligns with Ostrom's criteria for local management of common-pool resources. Large carnivores, with their large spatial requirements and asymmetrical distribution of risks and benefits, violate many of the criteria for effective local-level management (Ceașu et al., 2019; Linnell, 2015; Ostrom et al., 1999). The revealed preferences for balancing technical with local considerations, government biologists as decision-makers, and the close relationship between accurate perspectives and preferred decision-making status suggest that our sample of conservation professionals support a co-management approach for formulating carnivore policies. Although scholars have suggested that tension exists between democracy and technocracy (Ribot, 2003), governance systems that balance power by legitimizing knowledge of both experts and locals may be able to avoid that tension along with tyrannies of either the majority or minority interests. Similarly, within the global conservation community we sampled, experts revealed a tension between preference for consensus-based participatory strategies and low support for public players in the decision-making process. The concept of agonistic value pluralism, which

emphasizes embracing diverse viewpoints and even conflict through debates rather than consensus-building (which silences minority voices), may help address this tension (Berlin, 2013; Mansbridge, 1999; Townsend, 2001; von Essen and Hansen, 2015). Agonistic value pluralism could be incorporated into conservation policy by explicitly recognizing that diverse conservation players have fundamental value-based incompatibilities but that all are legitimate, by creating space for dissent in the decision sphere (even when that dissent does not agree with technocratic perspectives) and through "explicit acknowledgement of, and persistent willingness to address, uneven power relations" (Matulis and Moyer, 2017, pg 284).

Respondents most often linked those with the most accurate perspectives (i.e., government biologists, university researchers) as preferred decision players, but not payers. In other words, those seen as appropriate payers appeared to be those who were not seen as appropriate decision-makers with accurate perspectives. These findings suggest that our sample of conservation professionals view the most important contribution of the general public to be in supporting conservation policies. Emphasizing the importance of the general public's monetary contribution to conservation addresses the challenges of bridging the gaps between local and global scales and Stone's (2002) basic policy goals of equity and security. Because the conservation of carnivores benefits society in general but implies asymmetrical risks across different sectors of society (i.e., higher risks for farmers due to livestock depredations), our respondents are stating that they believe conservation costs should be borne by society broadly to engender equity and increase income security for people directly affected by carnivores.

It may be difficult to imagine alternative processes that are perceived as legitimate enough to avoid either cultural backlash when a powerful group is dissatisfied with a decision or retaliatory actions where dissatisfied stakeholders and carnivores share landscapes. But if decision-making processes can progressively improve legitimacy, over time, human-carnivore coexistence may be better tolerated. This optimistic outlook assumes that other sectoral large-scale policies, such as agricultural policies like the Common Agricultural Policy in Europe or the Farm Bill in the U.S., do not undermine the needed increases in equity and security (e.g., for rural livelihoods).

Continued controversy over carnivores despite various institutional attempts at participatory democracy highlights the intrinsic limitations of current governance practices in dealing with what is essentially a "wicked problem" (Mena and Palazzo, 2012; Serenari and Taub, 2019). Some challenges in carnivore governance include fundamental differences in stakeholders' value for these species, or the flexibility needed in technocratic approaches and top-down policies (Sandström and Pellikka, 2008; von Essen and Hansen, 2015). Although value-based conflicts among diverse stakeholders may remain and prohibit true consensus, enduring policies may be achieved by increasing three forms of legitimacy (Serenari and Taub, 2019; Suchman, 1995): i) Input legitimacy addresses stakeholder preferences and expert knowledge. Findings of our study herein highlight conservation professionals' focus on input legitimacy centers on both expert and local involvement to inform policies (e.g., Bennett et al., 2016; Berkes, 2009; Lute and Gore, 2014); ii) Output legitimacy is policy efficacy and efficiency. In a previous study from this same sample (Lute et al., 2018), we measured two concepts that approximate output legitimacy: the ideal goal of carnivore conservation and strategy efficacy for reducing human-carnivore conflict. The majority of our sample indicated that the ideal goal is to re-establish carnivore populations to the point they can fulfill their ecological functions and the most effective strategies were those that prevent conflict (Lute et al., 2018); iii) Throughput legitimacy is the quality of the decision-making process and includes accountability, transparency, deliberation, responsiveness, and reliability (Serenari and Taub, 2019). Conservation professionals may view ballot initiatives and lawsuits as lacking in one or more of these qualities. A vast literature on adaptive co-management exists to aid in addressing the qualities of

throughput legitimacy (e.g., Berkes, 2004, 2009; von Essen and Hansen, 2015; Jacobsen and Linnell, 2016b; Linnell et al., 2015; Redpath et al., 2017).

Realistic alternatives and improvements to current carnivore governance will need to address underlying reasons for human-human conflict (e.g., value-based differences, historical disenfranchisement, asymmetrical costs/benefits, competition over resources) and forms of legitimacy while finding appropriate tradeoffs between efficiency, liberty, equity and security of adopted policies (Stone, 2002). To withstand ongoing and evolving challenges, decisions about controversial carnivores, and other conservation issues, may need to occur under a true deliberative approach (Rask and Worthington, 2015) and within nested levels that include local as well as higher level trusted institutions perceived as resistant to illegitimate influences (Linnell, 2015). Because intergroup competition in conservation often includes power contests over whose knowledge is more legitimate (Skogen et al., 2006; Skogen and Krange, 2003), co-creation of knowledge and inclusion of both local and scientific knowledge may help increase trust and provide a mechanism for incorporating local interests at multiple governance scales (Berkes, 2004; Skogen, 2001, 2003; Young et al., 2016). Importantly, governance needs to be informed but cannot necessarily be dictated by all relevant forms of evidence (e.g., both qualitative and quantitative science, indigenous knowledge; Adams and Sandbrook, 2013). Science can help predict outcomes with varying degrees of uncertainty but policies are inevitably a political negotiation between goals, values and judgments. When stakeholder preferences are highly divergent or conservation goals do not align with local interests, difficult compromises are likely inevitable. In these cases, input and throughput legitimacy may be increased with a redefining of stakeholders as policy contestants whereby decision-makers consider contestants' arguments for various policies (Mena and Palazzo, 2012; Serenari et al., 2018). In order to be perceived as legitimate and trustworthy, decision-makers may need to function as judges, addressing historical power dynamics and asymmetrical costs and benefits while maintaining neutral, unbiased positions that avoid perceptions of undue influence from any one particular interest (Fleischman and Briske, 2016; Lute and Gore, 2014; Skogen, 2001).

The Anthropocene has and will continue to be a time of unprecedented change across socio-ecological systems experiencing climate change, habitat fragmentation, and de-democratization of institutions across the globe (Cassani and Pellegata, 2015). Conservation decisions will continue to be made by global, national, regional and local institutions (Linnell and Kaltenborn, 2019). Adaptive capacity of multi-scale governance systems will not only need to create and implement policies that address a complex combination of needs for both nature and humans, but also do so through processes that are perceived as legitimate, equitable and informed by both scientific knowledge and local perspectives. However, our research has only focused on the beliefs and preferences of conservation professionals. Decisions about best governance practices need to be informed by this and many other groups (e.g., non-conservation stakeholders) as well as by continued scholarship on governance. Next steps should include exploring preferences among other stakeholders, dissecting and finding solutions to the potential discrepancies, biases and ethics of stakeholder preferences, and developing objective ways to evaluate the performance of different conservation practices and policies that are currently being used.

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CRediT authorship contribution statement

Michelle L. Lute: Project administration, Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Writing - original draft. **Neil H. Carter:** Conceptualization, Methodology, Formal analysis, Resources, Visualization, Writing - original draft. **José V. López-Bao:** Methodology, Writing - review & editing. **John D.C. Linnell:** Methodology, Writing - review & editing.

Declaration of competing interest

The authors declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.biocon.2020.108668>.

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