

1 **Conservation professionals' views on governing for coexistence with large carnivores**

2

3 **ABSTRACT**

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

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24 expertise with local perspectives in a co-management framework may best withstand tests of
25 time and controversy.

26

27 INTRODUCTION

28 Decision-making about large carnivores (hereafter carnivores) is one of the most contentious
29 processes in the realm of wildlife conservation and involves complex interactions between
30 historical, social, political, psychological, economic, legal and ethical dimensions (Carter et al.,
31 2012; Clark and Rutherford, 2005; Epstein et al., 2019; López-Bao et al., 2017; Lute et al.,
32 2016). Given the ever-increasing presence of humans across landscapes, coexistence with
33 carnivores will require sharing land in many, if not most, contexts across the globe (López-Bao
34 et al., 2017a). Landscapes will be increasingly required to meet the demands of feeding a hot,
35 hungry and crowded world and simultaneously provide habitat for wildlife, including carnivores
36 (Crespin and Simonetti, 2019; Fischer et al., 2014; Kremen, 2015).

37

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

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47 between groups over access to resources and power (Baynham-herd et al., 2018; Dickman, 2010;
48 Lute and Gore, 2014; Redpath et al., 2013). Additionally, human-human conflict over carnivores
49 is also about risk perceptions and what level of risk is acceptable (Gore et al., 2007; Lute et al.,
50 2016).

51
52 Decision makers are increasingly using collaborative and inclusive decision-making processes in
53 part to assuage conflicts among stakeholders (Emerson and Nabatchi, 2015; Redpath et al.,
54 2017); which have not escaped scrutiny, such as the debate about who should make decisions
55 (López-Bao et al., 2017b; Skogen et al., 2017; Treves et al., 2017). Given that decisions about
56 carnivores can occur on scales from local to global and involve a massive diversity of social-
57 ecological contexts, there exists a wide spectrum of decision processes and players. Some
58 participatory governance systems form formal decision-making bodies that include
59 representatives of multiple stakeholder groups (Carter et al., 2014, 2017; De Vente et al., 2016;
60 López-Bao et al., 2017a; Sterling et al., 2017). This level of inclusion in decision-making
61 processes and authority may work in some contexts but also has failed to assuage conflict in
62 several circumstances (e.g., Michigan Wolf Management Roundtable, Washington Wolf
63 Advisory Group; López-Bao et al., 2017; Oosting, 2013; Press, 2013). Adding to this complexity
64 is a growing acknowledgment that decision-making processes about carnivores, which require
65 vast territories (Gittleman et al., 2001) and can have cascading impacts in ecosystems (Ripple et
66 al., 2014), should include ecosystem-scale and multi-sectorial considerations (Linnell and
67 Kaltenborn, 2019).

68

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69 Carnivore conservation is sometimes mandated by an institutional nested-hierarchy, where
70 international legislation provides a broad policy framework (Trouwborst et al., 2017) and
71 delegates to ever lower levels with each level being constrained by the one above, such as in the
72 case of carnivore conservation in Europe (Linnell and Kaltenborn, 2019; López-Bao et al., 2017;
73 Sazatornil et al., 2019). Multiple institutions can play a role in the ultimate decision-making
74 process, ranging from subnational institutions to informal local groups or landowners. Each of
75 these institutions may include various stakeholders at varying levels of participation, adding
76 complexity and potential value-based conflicts to the process (Decker et al., 2016). Although
77 some conflict between social groups and between humans and carnivores may need to be
78 accepted (Jacobsen and Linnell, 2016a), too much controversy can result in swings between
79 policies with divergent conservation implications (i.e., the predator-pendulum; Bruskotter, 2013)
80 .

81
82 Like many policy arenas, decision-making processes about carnivores can be undermined by
83 tension and tradeoffs among four basic policy goals of efficiency, liberty, equity and security, or
84 by tyranny of either the minority or the majority (Bishin, 2009; Cooke and Kothari, 2001;
85 Serenari et al., 2018; Stone, 2002). Collaborative governance with inclusive stakeholder
86 participation prioritizes equity over efficiency. Disallowing local stakeholders the liberty to make
87 decisions about carnivores in their backyards is often justified in terms of security of populations
88 of conservation concern. Public referenda, so-called “ballot box biology” where ballot initiatives
89 put a policy up for public vote, are an example of a decision process that can result in a tyranny
90 of the majority whereby local, rural and minority interests are swamped by mass public opinion.
91 Referenda and the potential resulting backlash (e.g., new counter-referenda, illegal take) can lead

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92 to swings in carnivore policies and continued contention between groups (Manfredo et al., 2017).
93 When certain interests or stakeholders have privileged access to power and disproportionate
94 influence over the ultimate decision-makers, a tyranny of the minority may occur (Bishin, 2009;
95 López-Bao et al., 2017). When broader society or particular stakeholders perceive that a decision
96 process was unfair, biased or simply do not approve of the results, they will often revisit the
97 decision process through new avenues of litigation, ballot initiatives, or non-compliance with
98 laws and regulations (Keane et al., 2008; Loker et al., 1998; Ludwig et al., 2001).

99

100 Much research has been dedicated to understanding values, attitudes, and preferences for
101 carnivores (e.g., Carter et al., 2012; Eriksson, 2016; Lute et al., 2016). But little work has
102 focused on enhancing understanding of the values, attitudes and preferences regarding decision-
103 making processes and potential for conflict over these policy preferences among key stakeholder
104 groups. Here, we aim to measure policy preferences among conservation professionals, defined
105 broadly as professionals with positions that focus at least in part on carnivores, including but not
106 limited to natural resource decision-makers and scientists. We focus on this stakeholder group
107 because 1) they interact with many other stakeholders and decision-makers, 2) their values and
108 attitudes have a strong influence on policy processes and conservation outcomes, and 3) public
109 discourse suggests that there are strong disagreements about the priorities and objectives of
110 carnivore conservation policies and processes among this group (e.g. see Redpath et al., 2017;
111 and Treves et al., 2017). These disagreements likely reflect divergent underlying viewpoints,
112 which are often not transparent and can drive debates in conservation, including those on
113 coexisting with carnivores (Carter and Linnell, 2016). Additionally, few scientific studies have

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114 evaluated viewpoints on carnivore conservation of conservation professionals across the world
115 (Lute et al., 2018; also see Sandbrook et al., 2019).

116

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

129

130 METHODS

131 *2.1. Participant recruitment and survey instrument*

132 We used convenience, snowballing sampling via email, social media and listserv announcements
133 (e.g., Society for Conservation Biology regional groups, The Wildlife Society, Ecolog) to recruit
134 727 conservation professionals 18 years or older in December 2015 (Creswell, 2009; Salant and
135 Dillman, 1994). We asked participants self-identifying as professionals with positions that focus
136 at least in part on carnivores to complete a web-based survey and pass it along to their

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137 colleagues. Further details on methodology can be found in Lute et al., 2018 (Boise State
138 University Internal Review Board approval 090-SB15-182).

139
140 We measured preferences related to decision-making processes relevant to carnivore
141 conservation, including how local stakeholders are incorporated, who makes decisions, who
142 bears the costs of those decisions, as well as issues of process transparency and mistrust. The
143 survey consisted of a series of close-ended questions, alternating between 5-point Likert scales
144 and multiple choice, and concluded with socio-demographic questions and professional measures
145 (i.e., region of fieldwork, work sector, job role, extent of carnivore focus, years of experience).
146 Table 1 outlines the questions relevant to this analysis. We asked professionals their preferences
147 regarding (1) who makes decisions and how, (2) who has the most accurate perspectives, and (3)
148 who should generally bear the burden of paying for carnivore conservation. The complete survey
149 and dataset can be found in the Supplemental Information section.

150

151 *2.3. Statistical methods and analysis*

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

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160 and developing country respondents. To test differences among groups based on experience (i.e.,
161 ranked ordinal variable) for: a) ordinal dependent variables (i.e., decision makers, payers), we
162 ran Spearman rank correlations and b) categorical dependent variables (i.e., decision processes,
163 accurate perspectives), simple logistic regressions. Using the “corrplot” and “Hmisc” packages
164 in R software (R Core Team 2018), we calculated Pearson correlations to compare preferences
165 regarding accurate perspectives, preferred decision makers, payers and decision processes.
166 Correlation significance was calculated at the 0.05 level.

167

168 We also calculated the Potential for Conflict Index₂ (PCI₂; Vaske et al., 2010) to examine
169 differences in consensus among policy preferences for decision-makers and payers. The PCI
170 calculates distances between people’s responses on a variable (e.g., 1 vs 2) summarized over the
171 entire sample to simultaneously describe a variable’s central tendency, dispersion, and shape
172 using a graphic display. PCI₂ can only analyze non-binary variables and ranges from 0 to 1. A
173 PCI₂ = 0 indicates complete consensus, where all respondents give the same response. A PCI₂ =
174 1 indicates the lowest consensus, where respondents are equally divided between opposite
175 responses (e.g., 50% strongly disagree, 50% strongly agree).

176

177 RESULTS

178 Our final sample consisted of n=505 participants, excluding incomplete responses, from 71
179 countries (North America n=181; Europe n=77; all other countries n=247) ranging in self-
180 declared age from 20-99 years (median age = 41 years). The sample was skewed toward males
181 (61%). Median education was at the master’s level and median experience was in the category of

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182 11-20 years. The majority of the participants were wildlife or conservation biologists (27%, 22%
183 respectively) working at universities (39%), NGOs (22%) and government agencies (20%).

184

185 *3.1 Preferences regarding decision players and payers*

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

193

194 Respondents indicated the greatest agreement that the general public should bear the costs of
195 conservation policy (74%), but also identified a diversity of parties as appropriate co-financiers.

196 Over 70% of respondents believed that the formal institutions attached to legislators and
197 commissioners (e.g., county or wildlife commissions/boards, state and federal legislative bodies)

198 should pay for conservation, followed by NGOs (69%) and government biologists (66%). PCI_2

199 values were relatively high for all groups, indicating less consensus around these responses.

200 Lowest consensus on who should pay was indicated for the institutions associated with

201 government biologists and legislators ($PCI_2=0.72$, 0.73 respectively). Highest consensus was

202 indicated for NGOs as payers ($PCI_2=0.57$).

203

204 Accurate perspectives about carnivore conservation were attributed to government biologists
205 (70%) and university researchers (68%) but not to the general public (5%) or legislators (4%;
206 Figure 1). For each group, scores for preferred decision-makers were positively correlated with
207 accurate perspective scores (Figure 3, Supplemental Figure 1). Government biologists were the
208 group most agreed on as having accurate perspectives and being the preferred decision-makers,
209 followed by university researchers, rural residents, commissions, the general public and finally
210 legislators. NGOs were seen as having accurate perspectives but more moderately rated as
211 preferred decision-makers. Respondents showed slightly higher agreement that indigenous
212 groups should be decision-makers compared to a belief in their having accurate perspectives.
213 Generally, this ranking was inversely related to who should bear the costs. The groups with the
214 lowest agreement regarding accurate perspectives and preferred decision-making status were
215 seen as the appropriate payers: general public, legislators, and commissions. NGOs received
216 moderate agreement as payers, similar to their rank as decision-makers. Finally, those with the
217 highest agreement regarding accurate perspectives and preferred decision-making status received
218 less agreement about being appropriate payers: government biologists, rural residents,
219 indigenous and university researchers.

220

221 Private sector respondents (e.g., those employed by consulting companies) showed lower mean
222 agreement (2.0) that government biologists should be decision-makers (Kruskal-Wallis test =
223 23.4, $p \leq 0.001$; Cramer's $V = 0.17$). NGO respondents had higher mean agreement that NGOs
224 should be decision-makers (mean = 3.3; Kruskal-Wallis test = 31.7, $p \leq 0.0001$; Cramer's $V =$
225 0.17) and have accurate perspectives (mean = 0.7; $\chi^2 = 46.2$, $p \leq 0.001$). Government employees
226 had higher mean agreement (0.9) that government biologists have accurate perspectives ($\chi^2 =$

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227 43.2, $p \leq 0.001$). Respondents working in government and NGOs had lower mean agreement
228 (0.5) that university researchers have accurate perspectives ($\chi^2 = 26.3$, $p \leq 0.001$). Among all
229 respondents we found lower mean agreement that government biologists have accurate
230 perspectives (mean = 0.4; $\chi^2 = 35.7$, $p \leq 0.0001$). Wildlife managers had lower mean agreement
231 that NGOs have accurate perspectives (mean = 0.3; $\chi^2 = 23.2$, $p \leq 0.01$). The number of years
232 working in conservation was positively and significantly related to the general public as both
233 decision-makers and payers ($r = 0.13$, 0.12 respectively; $p < .01$).

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234 3.2 Preferences for decision-making processes

235 Conservation professionals agreed on the joint consideration of scientific and local knowledge
236 (92% agreement) and participatory consensus decision-making (79% agreement) as the best
237 decision-making processes. Respondents, however, showed little support for lawsuits (16%),
238 public votes (15%) and considering only science (11%) as preferred decision processes.
239 Respondents from research institutes had higher mean agreement (0.4) that lawsuits are an
240 appropriate decision-making strategy ($\chi^2= 30.2, p \leq 0.001$).

241

242 DISCUSSION

243 Our results suggest conservation professionals' preferences for two key elements: technical input
244 from well-informed professionals (scientific knowledge) coupled with local input (local
245 knowledge) from those directly affected by the decisions. At the same time, the sampled
246 practitioners did not believe publics held accurate perspectives and generally rejected turning
247 decision processes completely over to the general public, to courts, or to politicians who are
248 perceived as lacking both technical knowledge and local insights. These results are important for
249 three reasons. First, because of the central role that conservation professionals play in decision
250 processes and carnivore conservation generally, it is important to be aware of the perceptions of
251 this key group of expert stakeholders. Understanding expert perceptions helps identify their
252 potential biases while also measuring their values, policy preferences and professional insights.
253 Second, our findings revealed a tension between preferences for decision authority and financial
254 responsibility, which may belie an assumption that the public contributes to conservation more
255 through funding than decision-making capacity. Underlying this assumption may be a desire to
256 more equitably distribute the costs and benefits of carnivores across society. Third, our results

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257 highlight a number of areas where the efficacy, perceived process legitimacy, and adaptive
258 capacity of governance institutions to simultaneously preserve carnivores, livelihoods, and
259 human and animal wellbeing need to be studied with more objective criteria, as well as being
260 studied in other stakeholder groups.

261
262 Conservation professionals in this study preferred a situation where a combination of expert and
263 local perspectives are integrated to inform decision processes aimed at achieving consensus to
264 co-manage coexistence with large carnivores. This finding, that professionals underline a need
265 for technical support as opposed to a purely local decision-making delegation, aligns with
266 Ostrom's criteria for local management of common-pool resources. Large carnivores, with their
267 large spatial requirements and asymmetrical distribution of risks and benefits, violate many of
268 the criteria for effective local-level management (Ceașu et al., 2019; Linnell, 2015; Ostrom et
269 al., 1999). The revealed preferences for balancing technical with local considerations,
270 government biologists as decision-makers, and the close relationship between accurate
271 perspectives and preferred decision-making status suggest that our sample of conservation
272 professionals support a co-management approach for formulating carnivore policies. Although
273 scholars have suggested that tension exists between democracy and technocracy (Ribot, 2003),
274 governance systems that balance power by legitimizing knowledge of both experts and locals
275 may be able to avoid that tension along with tyrannies of either the majority or minority interests.
276 Similarly, within the global conservation community we sampled, experts revealed a tension
277 between preference for consensus-based participatory strategies and low support for public
278 players in the decision-making process. The concept of agonistic value pluralism, which
279 emphasizes embracing diverse viewpoints and even conflict through debates rather than

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280 consensus-building (which silences minority voices), may help address this tension (Berlin,
281 2013; Mansbridge, 1999; Townsend, 2001; von Essen and Hansen, 2015). Agonistic value
282 pluralism could be incorporated into conservation policy by explicitly recognizing that diverse
283 conservation players have fundamental value-based incompatibilities but that all are legitimate,
284 by creating space for dissent in the decision sphere (even when that dissent does not agree with
285 technocratic perspectives) and through “explicit acknowledgement of, and persistent willingness
286 to address, uneven power relations” (Matulis and Moyer, 2017, pg 284).

287
288 Respondents most often linked those with the most accurate perspectives (i.e., government
289 biologists, university researchers) as preferred decision players, but not payers. In other words,
290 those seen as appropriate payers appeared to be those who were not seen as appropriate decision-
291 makers with accurate perspectives. These findings suggest that our sample of conservation
292 professionals view the most important contribution of the general public to be in supporting
293 conservation policies. Emphasizing the importance of the general public's monetary contribution
294 to conservation addresses the challenges of bridging the gaps between local and global scales and
295 Stone's (2002) basic policy goals of equity and security. Because the conservation of carnivores
296 benefits society in general but implies asymmetrical risks across different sectors of society (i.e.,
297 higher risks for farmers due to livestock depredations), our respondents are stating that they
298 believe conservation costs should be borne by society broadly to engender equity and increase
299 income security for people directly affected by carnivores.

300
301 It may be difficult to imagine alternative processes that are perceived as legitimate enough to
302 avoid either cultural backlash when a powerful group is dissatisfied with a decision or retaliatory

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303 actions where dissatisfied stakeholders and carnivores share landscapes. But if decision-making
304 processes can progressively improve legitimacy, over time, human-carnivore coexistence may be
305 better tolerated. This optimistic outlook assumes that other sectoral large-scale policies, such as
306 agricultural policies like the Common Agricultural Policy in Europe or the Farm Bill in the U.S.,
307 do not undermine the needed increases in equity and security (e.g., for rural livelihoods).

308

309 Continued controversy over carnivores despite various institutional attempts at participatory
310 democracy highlights the intrinsic limitations of current governance practices in dealing with
311 what is essentially a “wicked problem” (Mena and Palazzo, 2012; Serenari and Taub, 2019).
312 Some challenges in carnivore governance include fundamental differences in stakeholders’ value
313 for these species, or the flexibility needed in technocratic approaches and top-down policies
314 (Sandström and Pellikka, 2008; von Essen and Hansen, 2015). Although value-based conflicts
315 among diverse stakeholders may remain and prohibit true consensus, enduring policies may be
316 achieved by increasing three forms of legitimacy (Serenari and Taub, 2019; Suchman, 1995): i)
317 Input legitimacy addresses stakeholder preferences and expert knowledge. Findings of our study
318 herein highlight conservation professionals’ focus on input legitimacy centers on both expert and
319 local involvement to inform policies (e.g., Bennett et al., 2016; Berkes, 2009; Lute and Gore,
320 2014a); ii) Output legitimacy is policy efficacy and efficiency. In a previous study from this
321 same sample (Lute et al., 2018), we measured two concepts that approximate output legitimacy:
322 the ideal goal of carnivore conservation and strategy efficacy for reducing human-carnivore
323 conflict. The majority of our sample indicated that the ideal goal is to re-establish carnivore
324 populations to the point they can fulfill their ecological functions and the most effective
325 strategies were those that prevent conflict (Lute et al., 2018); iii) Throughput legitimacy is the

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326 quality of the decision-making process and includes accountability, transparency, deliberation,
327 responsiveness, and reliability (Serenari and Taub, 2019). Conservation professionals may view
328 ballot initiatives and lawsuits as lacking in one or more of these qualities. A vast literature on
329 adaptive co-management exists to aid in addressing the qualities of throughput legitimacy (e.g.,
330 Berkes, 2009, 2004; von Essen and Hansen, 2019; Jacobsen and Linnell, 2016; Linnell et al.,
331 2015; Redpath et al., 2017).

332

333 Realistic alternatives and improvements to current carnivore governance will need to address
334 underlying reasons for human-human conflict (e.g., value-based differences, historical
335 disenfranchisement, asymmetrical costs/benefits, competition over resources) and forms of
336 legitimacy while finding appropriate tradeoffs between efficiency, liberty, equity and security of
337 adopted policies (Stone, 2002). To withstand ongoing and evolving challenges, decisions about
338 controversial carnivores, and other conservation issues, may need to occur under a true
339 deliberative approach (Rask and Worthington, 2015) and within nested levels that include local
340 as well as higher level trusted institutions perceived as resistant to illegitimate influences
341 (Linnell, 2015). Because intergroup competition in conservation often includes power contests
342 over whose knowledge is more legitimate (Skogen et al., 2006; Skogen and Krange, 2003), co-
343 creation of knowledge and inclusion of both local and scientific knowledge may help increase
344 trust and provide a mechanism for incorporating local interests at multiple governance scales
345 (Berkes, 2004; Skogen, 2003, 2001; Young et al., 2016). Importantly, governance needs to be
346 informed but cannot necessarily be dictated by all relevant forms of evidence (e.g., both
347 qualitative and quantitative science, indigenous knowledge; Adams and Sandbrook, 2013).
348 Science can help predict outcomes with varying degrees of uncertainty but policies are inevitably

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349 a political negotiation between goals, values and judgments. When stakeholder preferences are
350 highly divergent or conservation goals do not align with local interests, difficult compromises are
351 likely inevitable. In these cases, input and throughput legitimacy may be increased with a
352 redefining of stakeholders as policy contestants whereby decision-makers consider contestants'
353 arguments for various policies (Mena and Palazzo, 2012; Serenari et al., 2018). In order to be
354 perceived as legitimate and trustworthy, decision-makers may need to function as judges,
355 addressing historical power dynamics and asymmetrical costs and benefits while maintaining
356 neutral, unbiased positions that avoid perceptions of undue influence from any one particular
357 interest (Fleischman and Briske, 2016; Lute and Gore, 2014b; Skogen, 2001).

358

359 The Anthropocene has and will continue to be a time of unprecedented change across socio-
360 ecological systems experiencing climate change, habitat fragmentation, and de-democratization
361 of institutions across the globe (Cassani and Pellegata, 2015). Conservation decisions will
362 continue to be made by global, national, regional and local institutions (Linnell and Kaltenborn,
363 2019). Adaptive capacity of multi-scale governance systems will not only need to create and
364 implement policies that address a complex combination of needs for both nature and humans, but
365 also do so through processes that are perceived as legitimate, equitable and informed by both
366 scientific knowledge and local perspectives. However, our research has only focused on the
367 beliefs and preferences of conservation professionals. Decisions about best governance practices
368 need to be informed by this and many other groups (e.g., non-conservation stakeholders) as well
369 as by continued scholarship on governance. Next steps should include exploring preferences
370 among other stakeholders, dissecting and finding solutions to the potential discrepancies, biases

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371 and ethics of stakeholder preferences, and developing objective ways to evaluate the
372 performance of different conservation practices and policies that are currently being used.

373

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587

589 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 Natural resource commissioners or equivalent Non-governmental organizations Rural inhabitants living near or with carnivores University researchers	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?		
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 More than 30 years
Fieldwork region	Where do you conduct fieldwork or study?		North Africa Sub-Saharan Africa North America

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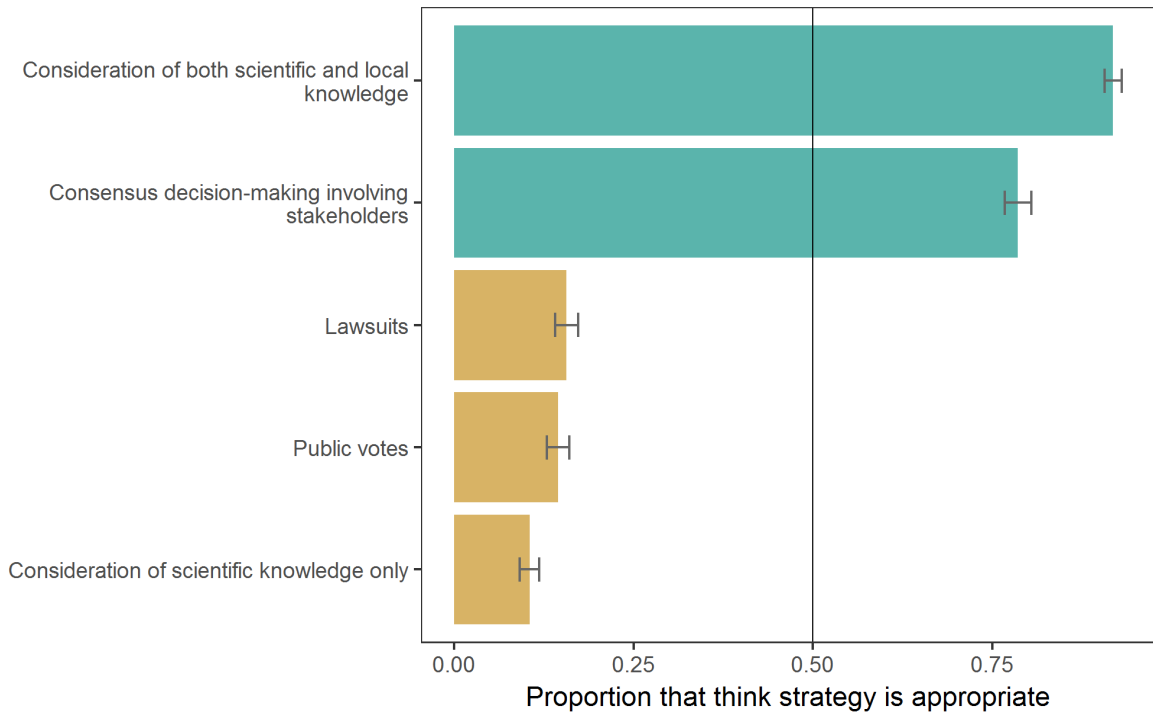
Central America
South America
Antarctica
Central Asia
Russia
Southeast Asia
Indian subcontinent
Middle East
Europe
Oceania
Not applicable

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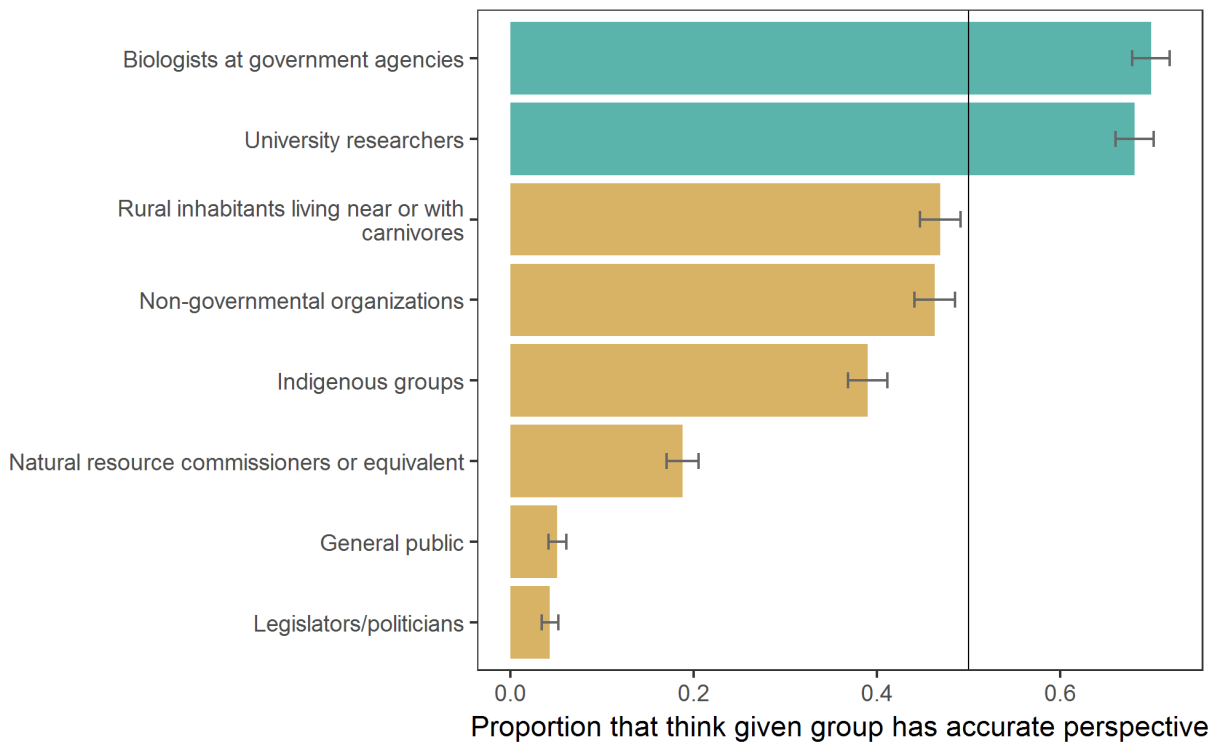
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591 a)



592 b)
593



594

595 Figure 1 Preferences for a) decision-making processes and b) accurate perspectives (n=505).

596 Green bars indicate response options that had agreement proportion over 0.5; yellow bars

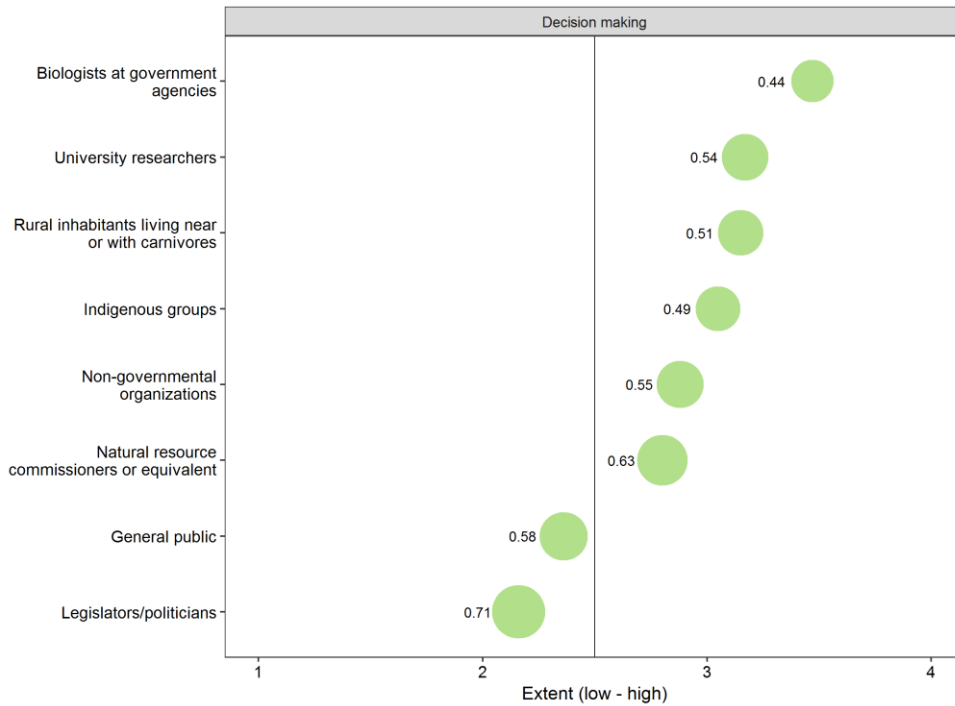
597 indicate proportions under 0.5. Error bars denote standard deviation.

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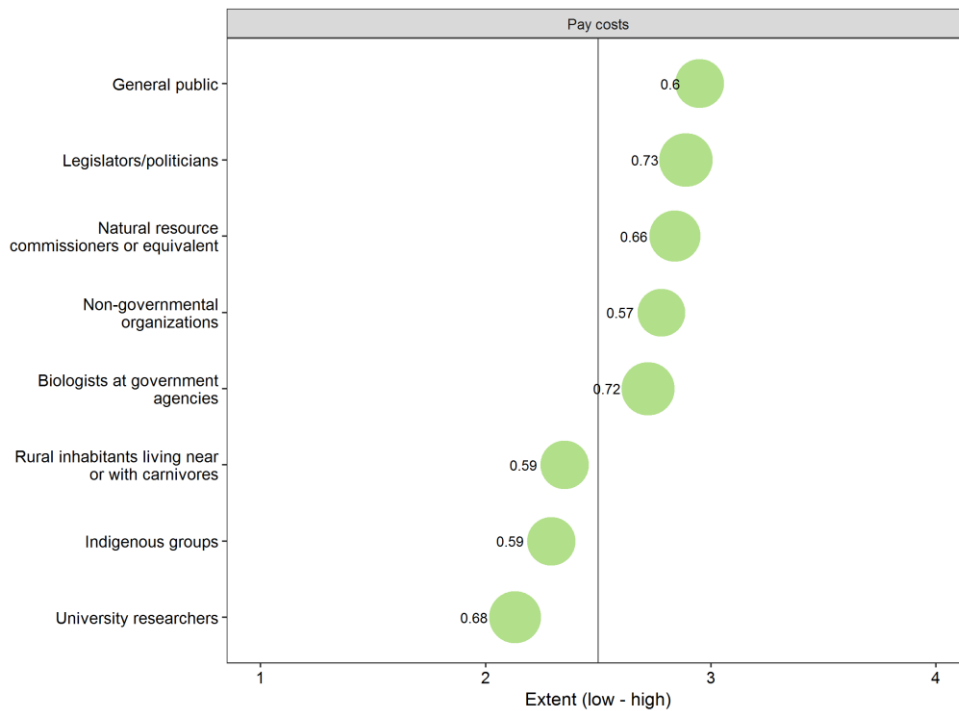
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598 a)



599 b)



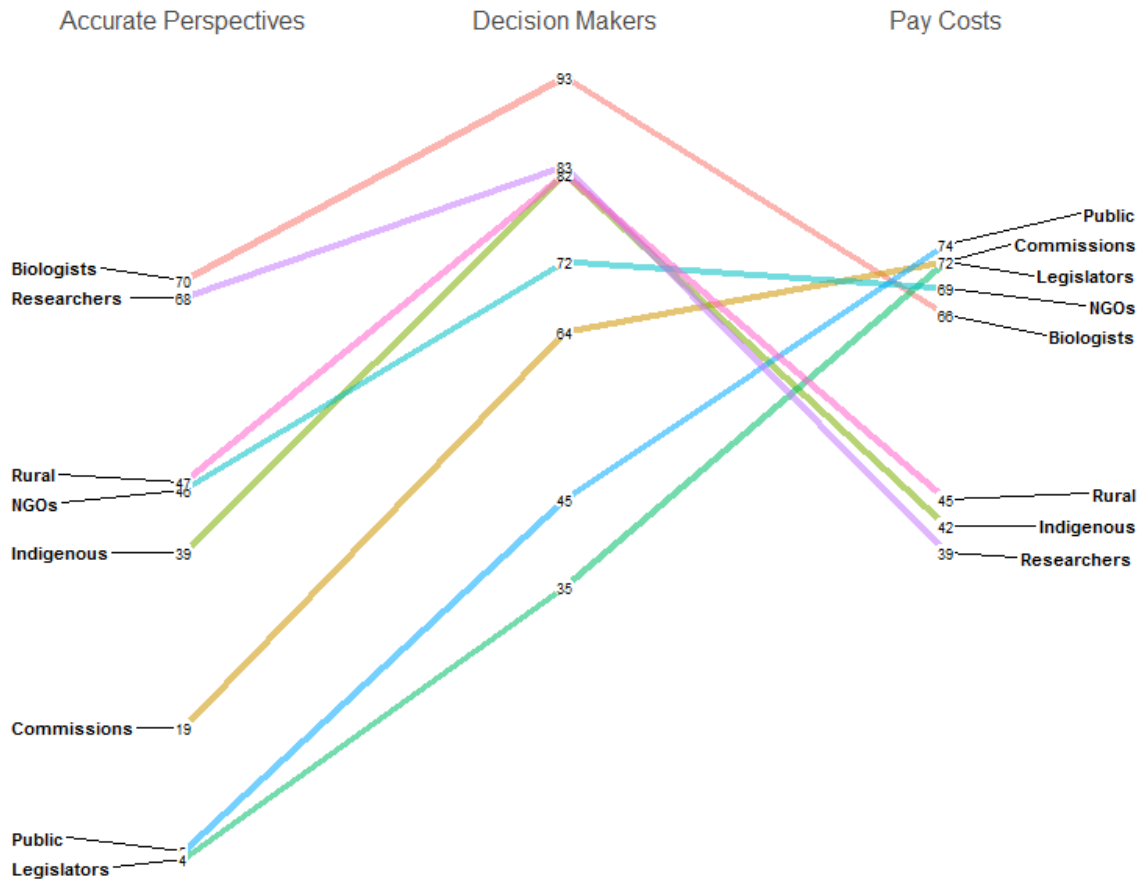
600

601 Figure 2 Potential for conflict among 505 participants about who should be a) decision players
602 (top) and b) payers (bottom). Responses to these questions were 1) not at all, 2) a little, 3)
603 some, and 4) a lot. Median value of 2.5 provided as reference. Bubble size illustrates the relative
604 magnitude in PCI_2 values, ranging from 0 (complete consensus) to 1 (no consensus). Larger
605 bubble size indicates less consensus.

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607

608 Figure 3 Groups ranked as those with accurate perspectives, appropriate decision-makers and
 609 payers. Groups perceived as having accurate perspectives where also considered appropriate
 610 decision-makers. Numbers indicate percentage agreement and lines connect group ranking across
 611 categories.

