



Using Preliminary Data to Guide a Research Project: Bear Safety and Bear Management

Justin Harmon¹

Received: 25 January 2024 / Accepted: 12 April 2024 / Published online: 26 April 2024
© The Author(s) 2024

Abstract

This methodological and theoretical note is the cornerstone of empirical research I began this past summer (2023) on bear safety in backcountry wilderness settings. I am using this pilot data to inform the future iterations of the study to learn more about people’s relationships to bears and their knowledge of safe practices while recreating in the presence of bears. This note, written in the early months of 2024, focuses on refining the pilot survey and developing the research program which will be expanded to four locations in the U.S. to assess the knowledge of backcountry hikers regarding bear safety and their preferences for bear management. This essay ponders the development of future iterations of this research agenda, including methodology, theoretical development, and practical value.

Keywords Bears · Recreation · Methods · Research program

1 Background

During the summer of 2022, I was staying near Ouray, Colorado, USA, and the person’s cabin I was renting mentioned there was a “problem bear¹” on the property, but it was small enough that humans could still scare it away. The owner then regaled a story from a few years earlier where a problem bear broke into several people’s

¹ A “problem bear” is a bear that has adapted to humans and can pose a problem to human safety. This is also a loaded term, because it assumes that bears are viewed as lesser than humans and that human life takes priority over bears’ lives. See Harmon (2023) for more. Some problems include aggressive behavior, like breaking into homes, ransacking camps, and attacking both animals and humans, most commonly when a mother bear has cubs.

✉ Justin Harmon
harmon@uncg.edu

¹ Department of Community and Therapeutic Recreation, University of North Carolina Greensboro, Greensboro, NC 27412, USA

houses, killing a German shepherd that tried to fight it. Because of this, the decision to euthanize the bear was made, but first it needed to be located. This resulted in the extermination of nearly a dozen bears because so many were deemed “insufficiently scared” of humans. It made me sad. From there, I went up into the panhandle of Idaho, USA, and the man’s property I stayed on said there was a nuisance bear there, too. He lived right next to a grizzly habitat, so this was not terribly surprising, but it added another layer to my thinking about bears.

The final layer came shortly thereafter when a few days later I was hiking in nearby Montana, USA, and ran into a woman who worked for the U.S. Forest Service deep in the backcountry. She told me she was a “bear ranger,” and her job was to hike around and see if other recreationists knew proper behavior around bears and were equipped with bear spray² to respond to aggression if necessary. I asked her what she did with the data, and she said nothing – it was merely an informational campaign. I thought this was strange because that information could inform policy, education, and intervention. This got me interested in studying people’s relationships to bears, specifically as it relates to how we view and treat them in their habitat. While I have spent a significant amount of time in the backcountry of the Western United States, I have not worked extensively in wildlife management, nor have I trained as a wildlife biologist³. There is a robust literature about all things bears, including bear safety, human-bear conflicts, bear management practices, the impact of human migration on bears, and the role of climate change in affecting bear habitats (Alldredge et al., 2015; Booth et al., 2016; Dickman, 2010; Dunn et al., 2008; Hunter et al., 2010; Merkle et al., 2011; Miller et al., 2018; Miller et al., 2019; Nettles et al., 2021; Voyles et al., 2015). So, finding a “niche” or novel research lane would require much reading and thinking. Instead of starting with a specific “problem” to address, I am instead starting out of genuine curiosity about bears, and more specifically, human impacts on bear livelihood. Because human sojourns into the backcountry do not only involve bears, but numerous other species, more broadly I am interested in the human impact on what we deem “wilderness,” and how that reality shapes the larger narrative of the human role in the natural environment. In sum, I aim to study human-bear relations as a vehicle to understand the future viability of wildlife and wildlands in the United States.

Thus, this methodological and theoretical note is the cornerstone of empirical research I began this past summer (2023), mostly as pilot data to inform the upcoming summer’s (2024) study, and the summers that will follow. The data collected in 2023 are being used simply to establish my research questions and program going forward. The early months of 2024 are focused on refining the survey, as I will take it to four locations in the U.S. to assess the knowledge of backcountry hikers regarding bear safety and their preferences for bear management. The second phase of research

² Bear spray resembles mace or pepper spray and comes in a canister to be discharged when a bear is close and behaving aggressively.

³ I worked as a wildlife technician along the Front Range of Colorado, though my responsibility was solely with the overpopulation of prairie dogs. Additionally, I interned under a wildlife biologist with the Fish and Wildlife Service in Mississippi, but my duties were primarily related to hunting season for deer and ducks, though I also worked extensively with the endangered red-cockaded woodpecker.

will involve mail surveys to residents who live in bear country⁴ in these four areas, who may not engage in backcountry hiking, but are proximate to significant populations of bears. As with backcountry hikers, the intent is to learn about these residents' knowledge of bear safety and bear management preferences. The third and final stage will involve conducting interviews with wildlife managers in these areas to gauge their thoughts on the same issues, with the hope of triangulating this data to better understand the human-bear relationship.

This short essay will explore how I will use the preliminary data in crafting the research agenda going forward, and broader thoughts about its relevance to the future intersection of backcountry recreation and wildlife/wildland management. Because this research is in its very embryonic stages, this should not be seen as a "how-to" or clearly defined research program, but one in its early stages of development, a "brainstorming," of sorts. Graduate students and early career faculty may find value in reading about one investigator's attempt to conceptualize, launch, and implement a new research program, including the un/anticipated challenges that come with the endeavor.

2 From Idea to Implementation

2.1 Phase One

During the summer of 2023, I posted fliers with a brief description of my research goals, my contact information, and a QR code to be scanned for opt-in participation. Before doing so, I asked for and received approval from the district ranger of the Columbine Ranger District (CRD) in southwestern Colorado, roughly between the cities of Durango and Silverton. I selected eleven trails dispersed along this corridor, with varying levels of difficulty and accessibility. The fliers were posted for roughly two months, and at the time I took them down, I had received 120 completed surveys. The questions on the survey instrument were informed by several other scholars' work in this area, and included the following questions (Miller et al., 2018, 2019; Nettles et al., 2021): How informed are you about staying safe while hiking in bear country? Do you believe that hiking in bear country is different than hiking in other areas? How much have you thought about encountering bears while hiking? How prepared are you for an encounter with a bear? Do you believe it is important to carry bear spray while hiking in bear country? How likely are you to carry bear spray in bear country? Would you be interested in learning more about avoiding bear encounters and appropriate behavior while hiking in bear country? Do you think some parts of public lands should have restricted human access due to the presence of bears and/or the need to secure critical habitat for bears? Do you believe bears should be protected (i.e., no intervention or minimal intervention) or need to be managed (e.g., removal or euthanization of problem bears)? What effect, if any, do you believe loss of habitat (e.g., expansion of the wildland-urban interface, people relocating to bear country)

⁴ Bear country includes the natural habitats of bears, and those who reside there, need to be knowledgeable of safety practices and proper behavior around bears.

has on human-bear interactions and bear viability? I also asked respondents to leave their email addresses if they were interested in a possible follow-up study.

Upon early analysis of the data, it was quickly apparent that I had left out two important questions, one about which trail they were on, as well as their home zip code. My assumption is that those who pursue the more strenuous and harder to access trails likely have better knowledge of bear safety practices. Home zip codes from outside the state may also predict lesser knowledge of appropriate backcountry behavior due to lack of proximity to bear populations. I am unsure how either question would affect preferences for bear management. Thus, this upcoming summer's (2024) refined survey will include those two questions.

2.2 The Preliminary Data and its Impact on Future Data Collection

Because the data collected during the summer of 2023 was only intended to be preliminary, I will abstain from a full analysis, and only highlight some interesting findings that I will need to consider as I refine the survey and continue to think about the program going forward. Regarding the first two questions, 18% of respondents indicated they were not at all informed about bear safety, suggesting that they either had never considered potential dangers, or did not think encountering bears was something to worry about. However, that dropped to 9% when asked whether they thought hiking in bear country was different from hiking elsewhere. So, it may be that more acknowledge this difference, but do not necessarily see the potential for dangerous encounters.

The third question, regarding how much people have thought about encountering bears while hiking indicated that 91% of participants have thought about it some or a lot. Further information to help distinguish what respondents consider as "some" is warranted, because it might inform wildlife agencies education initiatives, including trailhead signage, or the need to post staff at highly trafficked trails in areas with higher levels of bear activity.

A somewhat troubling finding was that 30% of backcountry hikers are not at all prepared for an encounter with a bear. This suggests that they do not know what to do if they encounter a bear, how to respond to a bear based on its behavior (passive or aggressive), or what safety techniques and resources might improve their safety in the event of an encounter. Thankfully, most respondents (91%) wanted to learn more about appropriate bear safety practices. I can only hope that the 9% who did not want to learn more are already well-versed in this knowledge, but that is something worthy of further investigation.

Almost half of respondents (48%) were unsure about the need to carry bear spray while in bear country. As alluded to in the opening vignette, this is one practice that federal wildlife and wildland agencies do actively promote the value of doing (Miller et al., 2019). Bear spray is not cheap (roughly \$30–40 USD), cannot be carried on flights, and may not be readily accessible to novice hikers just visiting an area, so some thought to how to increase the likelihood of backcountry hikers to carry bear spray, and know how to properly use it, is warranted. 26% were unlikely to carry bear spray, and 47% said it depended on the situation. When hiking deep in bear country, someone in the party should always have bear spray on them (Frank et al., 2015).

The final questions on the pilot survey all solicited open-ended responses and related more to current and preferred practices for bear management. Perhaps in part to the opportunity to respond in their own words, or because of the ideological implications of the questions, there were diverging opinions on the rights of bears, the value of protecting and/or restricting access to their habitat, and the general impact of humans on bears' livelihood and viability. A deep dive into this aspect of the data is not necessary for this methodological/theoretical note, but I do want to highlight just a few responses to illustrate both the differences of opinions on these matters, and the need for further investigation in this area.

Regarding responses to the question, "Do you think some parts of public lands should have restricted human access due to the presence of bears and/or the need to secure critical habitat for bears?," a common theme for "yes" respondents was that "humans are the problem, not bears" or "we don't need every inch of the backcountry." Common themes in response for "no" answers included "we are part of the habitat, too," "we need to coexist," and that people just "need to be bear aware and educate themselves" about proper behavior before entering bear country. One respondent insightfully noted that this "is not a binary question," as it can depend on many factors, including "the potential for negative outcomes for humans." As the human population continues to grow, and more people move to areas where bears reside, this question will become more polarizing – and more necessary to consider.

Regarding responses to the question, "Do you believe bears should be protected (i.e., no intervention or minimal intervention) or need to be managed (e.g., removal or euthanization of problem bears)?," the replies were equally heterogeneous. One response in the affirmative was that "they need to be protected, as this is their habitat, and they provide a healthier ecosystem." An answer in the negative was that "problem bears need to be euthanized if removal/relocation has no effect." More often, people were ambivalent about having to relocate, or especially euthanize a bear, particularly because the necessity to do so would be directly tied to the presence of humans. Some suggested that it is humans whose behaviors need to be curbed. One informant who saw both sides of the issue put it this way: "I live in bear country, and I hate hearing about bear euthanization. But in extreme cases, it's probably necessary. It's rare, though, that the problem is the bear and not the human. I've seen strewn trash [on the trails] a few times this week. Why can't people learn?!" Indeed. How people justify littering and disrespectful behavior in wilderness environments is another avenue in need of exploration.

The final question, "What effect, if any, do you believe loss of habitat (e.g., expansion of the wildland-urban interface, people relocating to bear country) has on human-bear interactions and bear viability?" also generated mixed responses, but it was mostly those who felt loss of habitat did have a profound effect who provided more robust responses. One response captures the general sentiment of respondents who felt there was a negative effect: "More areas where bears and humans interface would logically lead to more interactions, some of which are negative. With current management practices, this could lead to more bears being classified as problem bears and result in euthanization. There is a clear relationship between more people and less bears in some areas. For example, grizzlies being hunted to extinction in Colorado." This gets to the heart of the motivation for this research, in that I am most

concerned about the future livelihood and existence of bears in this country, both brown (grizzlies) and black.

For just as many affirmative or negative responses there were for each question, there were just as many responses of uncertainty, suggesting a need for future outreach and education, both for the safety of backcountry recreationists, but more importantly, for the wellbeing of bears. That is the primary goal of this project, even though the project is still in its earliest stages of development.

As I embark on refining the survey for upcoming iterations of the research, I need to consider the vast differences of opinions evidenced among the respondents, and how I can best capture future sentiments fully, and importantly, how I can draw conclusions from these, at times, conflicting notions, and preferences, not to mention varying levels of knowledge about bear safety among backcountry hikers and bear country residents.

As I write this, midway through January 2024, I have begun my next phase of communication with district rangers for the locations I plan to collect data. I will return to the CRD, but I will also collect data in three other different regions of the country: the Nantahala National Forest in western North Carolina (Cheoah Ranger District); the Kootenai National Forest in western Montana (Libby Ranger District); and the White Mountains National Forest along the border of New Hampshire and Maine (Androscoggin Ranger District). The intent behind my selection of ranger districts in four different and distinct regions of the country is multifaceted and includes the likelihood of different regional perspectives about bear safety and bear management, different behaviors of bears in these areas based on proximity to human populations and their frequency of interactions, different management strategies already employed in each region, and different narratives about bears and their place in the local ecosystem.

2.3 Phase Two

While it is highly possible that people who live in bear country⁵ also recreate there, some evidence suggests the forms of recreation differ from that of tourists, such as more emphasis on consumptive recreation like hunting, fishing, or ATV riding (Cordell, 2012; Stedman & Heberlein, 2001). While the data may not bear this out (no pun intended), my assumption is that people who reside deep in bear country are less likely to be backcountry hikers due to different motivations or attractions to living in these areas. These results will be important to future theorizing about the human-bear relationship, and the future of bear management practices.

As stated earlier, the plan to reach this population is through mail surveys, and I will obtain addresses from county tax roll data (Measells et al., 2005). It is possible that many of those contacted may not respond for any number of reasons, including general wariness of sharing personal opinions with an unknown investigator, the

⁵ I consider bear country to be a rural, heavily forested area with sparse human residential presence, and typically considerable distance between residences. Many cities across the United States are proximate to bears and frequently have them come into town, but for the purposes of this paper, I am speaking of remote, wooded areas with higher percentages of bear activity.

possibility that many of these residences are second homes or rental homes, and thus there may not be someone who receives the information to respond, or that it just simply is not a priority for them to do so. Based on my discussions with other leisure researchers who have conducted mail surveys, they have given me some helpful tips to increase response rate. These include creating a simple, but official, website that people can go to verify the trustworthiness of the study, including an incentive with the initial mail contact, likely a small monetary token, such as \$1 bill, and following up the initial mailer with a secondary one to remind them to complete the survey (Ryu et al., 2006). Obviously, this will be an expensive undertaking, especially to reach statistical significance, so my plan is to pursue internal funding from my university once I have collected and analyzed all data from the first phase of research, and ideally, submitted a manuscript on those findings to lend academic credence to the project and its potential for future success.

2.4 Phase Three

The third phase will be onsite interviews with a small sample of wildlife managers from each of the four regions, both to get their thoughts on backcountry hikers' and bear country residents' knowledge of bear safety and bear management practices, but also to glean insights into the problems they face with these people's behavior as it relates to bears and bear management practices (Voyles et al., 2015). I anticipate that there will be extra need for clearance for this component of the study, as it will not be as simple as allowing me to post fliers at trailheads for phase one. There may be some reluctance to share information from agencies about their perspectives on or problems with people as it relates to bears, bear safety, and bear management. Because there is sometimes a contentious relationship between residents and recreationists and wildlife and wildland managers due to conflicting ideals (Baron et al., 2000), it is possible that some rangers may temper their positions, or possibly, not agree to share on-the-record information at all, but more likely, that there will need to be authorization to do so from people in positions of greater authority. This is purely speculative at this point, but it is something to consider as a possibility. It is my hope that getting successful and open engagement in one region will increase the chances of receiving similar engagement in another region.

2.5 Phase Four (?)

It may be necessary to add a fourth, yet-to-be defined, phase of data collection. This could include interviews with respondents from the hiker and resident surveys, planned educational intervention initiatives with wildlife managers, adding additional areas to the study, or looking to wildlife policies, initiatives, and/or interventions for other species that have been successful. This cannot be determined at this point, but it is imperative to not treat the research program as having a point of culmination (Gonzalez, 2000).

3 Theoretical Development and Closing Thoughts

The methodological approach, at least currently, is very clear to me. While it is likely there will be some modification of strategy based on the findings to come, I am comfortable with being able to implement the study, even if the questions that need to be asked are still in need of refinement. The next few months will lend to the shaping of the survey instrument. At the very least, I am thankful to have conducted a pilot study to generate preliminary data. Had I not done so, I would have likely missed out on opportunities to think deeply about not only what I am asking, but what my goals are with this research agenda. Even after completing the pilot study, that is still being determined.

While the descriptive data is interesting and can lend to informing education and outreach initiatives for land and wildlife agencies, the potential for theoretical contributions is what I am most intrigued by. Of course, theory often informs practice, so this will not be a purely academic exercise. Instead, future research beyond the three phases outlined here will likely seek to explore why people just head out into bear country without complete knowledge of bear safety, including being unprepared for an encounter with bears. One could surmise that those who are uneducated and unprepared for these possibilities are likely also to be unprepared for other potential backcountry problems, like broken limbs, getting lost, or getting stuck in a thunderstorm (Daniel et al., 2010).

Related, how do other social, educational, and political identities inform perspectives about bears (and other predators), their need for management, and their value to the broader ecosystem? In some ways, this is implicit in phase two of the current research, as rural residents tend to be more conservative, but it is important to not be too reductive on this account (Brown et al., 2021). Many rural and conservative outdoor recreation enthusiasts are great champions of conservation. Nonetheless, theoretically, it is a layer that needs to be peeled back and examined.

Finally, and perhaps core to what I am after with this research, what might my examination of one type of outdoor recreationists' relationship to one predator species tell us about humans' general relationship to wilderness more broadly, if anything? What role does land and wildlife policy play in curating people's relationship to certain species and habitats, for better or worse?

I am still in the nascent stages of this research, a project I expect to unfold over the next 4–5 years. There is a lot I will learn along the way, and no doubt I will have challenges and stumble through the process at times. And that is okay. The purpose of research is to learn something new, and that can be said about any researcher at any stage of their career. While still mid-career myself, I am hopeful that this reflection on the development of my research program is helpful to those who read it, as embarking on a new thread of scholarship is both exciting and intimidating. My hope is that next time you read something from me on this account, that I will have worked through some of the issues I have laid out here satisfactorily, but no doubt I will come upon new issues and questions in need of being untangled.

In closing, after working with graduate students as an advisor or committee member on numerous thesis and dissertation committees, I have seen firsthand the struggles that may have had when it comes to mapping out their research questions and

programs. Often, these are determined through trial and error, but my hope in providing this account is that it will make the abstract more visceral, and ideally, assist others in plotting out what they want to study, how they will study it, and why it is important to do so. That is the purpose and promise of research.

Acknowledgements No declarations or acknowledgements to make.

Author Contributions I am the sole author on this research and manuscript.

Funding Open access funding provided by the Carolinas Consortium. No funding was obtained for this study.

Open access funding provided by the Carolinas Consortium.

Data Availability Availability of data section does not apply

Declarations

Ethics Approval and Consent to Participate The names of the IRB board are not publicly available at the University of North Carolina Greensboro. The IRB approval number is IRB-FY23-584. No consent was required because it was an opt-in study with no physical interaction between the researcher and prospective participants. They either choose to scan a QR code and complete the survey or not.

Consent for Publication No “Consent for Publication” is necessary for participants, because no information used can be traced back to participant comments.

Competing Interests No competing interests to declare.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Allredge, M. W., Walsh, D. P., Sweanor, L. L., Davies, R. B., & Trujillo, A. (2015). Evaluation of translocation of black bears involved in human-bear conflicts in south-central Colorado. *Wildlife Society Bulletin*, 39(2), 334–340.
- Baron, J. S., Theobald, D. M., & Fagre, D. B. (2000). Management of land use conflicts in the United States Rocky Mountains. *Mountain Research and Development*, 20(1), 24–27.
- Booth, A. L., & Ryan, D. (2016). Goldilocks revisited: Public perceptions of urban bears in northern British Columbia. *Human Dimensions of Wildlife*, 21(5), 460–470.
- Brown, T., Mettler, S., & Puzzi, S. (2021). When rural and urban become us versus them: How a growing divide is reshaping American politics. *The Forum*, 19(3), 365–393.
- Cordell, H. K. (2012). Outdoor recreation trends and futures: A technical document supporting the forest service 2010 RPA assessment (Gen. Tech. Rep. SRS-150). U. S. Department of Agriculture, Forest Service, Southern Research Station. https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs150.pdf

- Daniel, N. J., Patel, S. B., St. Marie, P., & Schenfeld, E. M. (2010). Rethinking hiker preparedness: Association of carrying ten essentials with adverse effects and satisfaction among day-hikers. *American Journal of Emergency Medicine*, *49*, 253–256.
- Dickman, A. J. (2010). Complexities of conflict: The importance of considering social factors for effectively resolving human-wildlife conflict. *Animal Conservation*, *13*, 458–466.
- Dunn, W. C., Elwell, J. H., & Tunberg, G. (2008). Safety education in bear country: Are people getting the message in bear country? *Ursus*, *19*(1), 43–52.
- Frank, J., Johansson, M., & Flykt, A. (2015). Public attitude towards the implementation of management actions aimed at reducing human fear of brown bears and wolves. *Wildlife Biology*, *21*(3), 122–130.
- Gonzalez, M. C. (2000). The four seasons of ethnography: A creation-centered ontology for ethnography. *International Journal of Intercultural Relations*, *24*, 623–650.
- Harmon, J. (2023). Theriophobia: “Problem bears,” leisure, and living in bear country. *World Leisure Journal*. <https://doi.org/10.1080/16078055.2023.2287222>.
- Hunter, C. M., Caswell, H., Runge, M. C., Regehr, E. V., Amstrup, S. C., & Stirling, I. (2010). Climate change threatens polar bear populations. *Ecology*, *91*(10), 2883–2897.
- Measells, M. K., Grado, S. C., Hughes, H. G., Dunn, M. A., Idassi, J., & Zielinske, B. (2005). Non-industrial private forest landowner characteristics and use of forestry services in four southern states: Results from a 2002–2003 mail survey Southern. *Journal of Applied Forestry*, *29*(4), 194–199.
- Merkle, J. A., Krausman, P. R., & Booth, M. M. (2011). Behavioral and attitudinal change of residents exposed to human-bear interactions. *Ursus*, *22*(1), 74–83.
- Miller, Z. D., Freimund, W., & Covelli Metcalf, E. (2018). Targeting your audience: Wildlife value orientations and the relevance of messages about bear safety. *Human Dimensions of Wildlife*, *23*(3), 213–226.
- Miller, Z. D., Freimund, W., Covelli Metcalf, E., Nickerson, N., & Powell, R. B. (2019). Merging elaboration and the theory of planned behavior to understand bear spray behavior of day hikers in Yellowstone National Park. *Environmental Management*, *63*, 366–378.
- Nettles, J. M., Brownlee, M. T. J., Jachowski, D. S., Sharp, R. L., & Hallo, J. C. (2021). American residents’ knowledge of brown bear safety and appropriate human behavior. *Ursus*, *32*(e18), 1–16.
- Ryu, E., Couper, M. P., & Marans, R. W. (2006). Survey incentives: Cash vs. in-kind; face-to-face vs. mail; response rate vs. nonresponse error. *International Journal of Public Opinion Research*, *18*(1), 89–106.
- Stedman, R. C., & Heberlein, T. A. (2001). Hunting and rural socialization: Contingent effects of the rural setting on hunting participation. *Rural Sociology*, *66*(4), 599–617.
- Voyles, Z., Treves, A., & MacFarland, D. (2015). Spatiotemporal effects of nuisance black bear management actions in Wisconsin. *Ursus*, *26*(1), 11–20.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.