

**CONTRIBUTED PAPER**

From human invaders to problem bears: A media content analysis of grizzly bear conservation

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Abstract

Across their North American range, grizzly bears (*Ursus arctos*) occupy a special place in human imagination, as icons of nature's rugged and raw power, to representations of safety risks and economic costs of living with carnivores. Different bear representations can also be found across news media, from controversial and sensational descriptions of attacks, tragic events and conflicts, to scientific accounts of conservation research. News media certainly has the power to pique curiosity, spark debate, or elicit emotional responses through framing and repetition of content. In turn, news stories can influence how people might interpret and internalize information about grizzly bears. Using media content analysis, we examined newsprint stories on grizzly bears across their North American range between 2000 and 2016, to understand message framing and attention cycle, as well as attitudinal expression and representative anecdote conveyed to the readership. We found that human–bear conflict stories are over-reported compared to other narratives, where a single incidence garners more attention than a story about new scientific findings. We also found articles that included hunting frames largely originated in Alberta, likely due to the threatened species listing and hunting moratorium. Attitudinal expressions included ecological, negative or neutral, and moral sentiments toward bears. The most common representative anecdote conveyed to the readership reflected the dire state faced by grizzly bears. The bear eco-gossip expressed in the articles we reviewed, which included clear protagonists and antagonists and the occasional man-bites-bear surprise, appears to be the diet of manufactured information fed to the public. Results of our study can help scientists and conservationists understand how news media portrays grizzly bears to the public and how this might influence public sentiment toward their conservation, but also identifies the roles that scientists, conservationists and journalists together can play in crafting effective, factual and engaging news stories about bears.

KEYWORDS

carnivore, conservation, grizzly bear, human–bear conflict, media content analysis

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1 | INTRODUCTION

Across their North American range, grizzly bears (*Ursus arctos*) occupy a special place in human imagination, as icons of nature's rugged and raw power, strength, intelligence and maternal love, but also as representations of safety risks and economic costs of living with carnivores (McFarlane, Stumpf-Allen, & Watson, 2007; Richie, Oppenheimer, & Clark, 2012). These representations are shared and amplified through news stories, and have the potential to influence human perceptions, attitudes and actions toward conservation efforts (Bombieri et al., 2018; Kaczensky, Blazic, & Gossow, 2001; Sakurai, Jacobson, & Carlton, 2013; Stemple III, 2003). Certainly, the attention given to grizzly bears in the news media can heighten public interest or incite alarm (Downs, 1972).

Pennington (2012) suggests there are two aspects to communication—content and relationships—where the news media offers a way for people to experience world events and construct their own ideas and theories about how the world works. For example, news stories that pique curiosity, spark debate or elicit other emotional responses through repetitively highlighting a certain narrative can influence how people might interpret and internalize information (Downs, 1972; McCombs, 2014). News stories about human–shark interactions (Pepin-Neff & Wynter, 2018), coyotes or wolves (Alexander & Quinn, 2011; Houston, Bruskotter, & Fan, 2010) or leopards and panthers (Bhatia, Athreya, Grenyer, & MacDonald, 2013; Jacobson, Langin, Carlton, & Kain, 2011) are examples of media coverage emphasizing the threats carnivores can pose, which may invoke or perpetuate fear, but can also highlight proactive conservation action to benefit these and other species (Bhatia et al., 2013; Gore, Siemer, Shanahan, Scheufele, & Decker, 2005; Muter, Gord, & Riley, 2009; Muter, Gore, Gledhill, Lamont, & Huveneers, 2012; Sabatier & Huveneers, 2018).

Stories about bears seem to follow a similar path, becoming newsworthy when tragic incidents occur or management controversy exists, with “problem bear” narratives found throughout media discourse (Sakurai et al., 2013; Siemer, Decker, & Shanahan, 2007). On the other hand, news stories can generate support for wildlife conservation, as seen with coverage on the killing of “Cecil” the Zimbabwean lion or Alberta's grizzly bear 148, igniting overwhelming public debate and activism (Foote & Nielsen, 2017; Jacobson et al., 2011; MacDonald, Jacobsen, Burnham, Johnson, & Loveridge, 2016).

Media content analysis offers a systematic method to examine the content of news stories and their potential to influence public perception toward wildlife conservation (Alexander & Quinn, 2011; Franzosi, 2007; Krippendorf,

2004; Stemple, 2003). This includes identifying how “newsworthy” content is framed and agendas are set (Lakoff, 2010; McCombs, 2014; Price, Tewksbury, & Powers, 1997; Reese, Gandy, & Grant, 2001). Framing refers to how a news story's content is organized and communicated, signaling the intent to influence the readership's perceptions of a topic (Bhatia et al., 2013; Lakoff, 2010). Framing can reinforce ideology, provoke critical reflection, or create contrast (Boreus & Bergstrom, 2017; Simon & Xenos, 2000). Headlines, composition, imagery, or the people interviewed for a story are examined as part of framing (Matthes, 2009; Somerville, 2017). The attention a topic receives includes the agenda set by the journalist, media outlet or perhaps influenced by the socio-political context, and can be promulgated repetitiously over time based (Downs, 1972; Wolfe, Jones, & Baumgartner, 2013). Journalists' preferences to report on certain topics also influences agendas, whether meeting a company's requirement to sell subscriptions or improve ratings, or highlighting professional preferences for pursuing content (Pew Research Center, 2007; Shoemaker & Reese, 1996; Trussler & Soroka, 2013). A single news story, for example, can stimulate the proliferation of subsequent stories if it generates public interest—if the public consumes it, the press will publish more of it (Downs, 1972; Miller & Riechert, 2008; Wozniak, Luck, & Wessler, 2015). News media therefore plays a role in shaping normative public thought, and can influence behavior (Bombieri et al., 2018; Matthes, 2009; McCombs, 2014). As such, conservation scientists would benefit from understanding how media communications shape public knowledge, attitudes, or support for conservation efforts (Jacobson et al., 2011; Muter et al., 2009). In addition, scientists may benefit from proactively engaging with journalists to help craft effective and engaging information for news media use.

Our research grew out of a particularly active debate about grizzly bears across the rapidly changing landscape in North America, where we analyzed online news media across grizzly bear range. We sought to (a) understand the framing and attention focused on grizzly bears by news media, (b) quantify categories and typologies of messages, including overarching attitudinal sentiments and representative anecdotes, and (c) relate the potential influence of news stories to grizzly bear conservation efforts. Results of our study help to clarify the importance of news media in conservation, including how news stories might influence public sentiment, and identify the roles that scientists, conservationists and journalists can play in crafting effective, factual stories about bears (Houston et al., 2010; Jacobson et al., 2018; Kaczensky et al., 2001; Reese et al., 2001; Verissimo et al., 2017).

2 | METHODS

We used two online searchable databases (Factiva, www.dowjones.com/products/factiva/ and Sun Media, www.postmediaadvertising.com) to collect newspaper articles from across the North America distribution of grizzly bears for the period 2000–2016. We also referenced circulation statistics from the Media Intelligence Center to identify relevant newspapers for our study (Alliance for Audited Media, 2017). We developed a comprehensive search with Boolean operators around the major concepts: “bears,” “humans,” and “interactions,” for example (“brown bear*” or “grizzly bear*”) AND humans AND (conflict* or livestock*). While there are “negative” based terms (e.g., kill, conflict, threat), broad terms that retrieve results around human–bear interactions are also present (e.g., habitat, cycling, snow, species, interact, outreach, backpack, and many others). The limiter “NOT” was used to reduce excessive or irrelevant search results (e.g., bears in performing arts, football mascots, zoo reports, or editorials; see Data S1). The search was adapted for each database.

In total, 1,285 articles published between 2000 and 2016 were indexed into a database and randomly assigned to one of five coders on the study team (Table 1). The majority of articles ($n = 1,212$) were from Alberta and British Columbia. Given the difficulties in accessing news stories across the western USA, we grouped these articles into an overall western USA stratum. This was also done for Canadian national news

stories, reported by the Globe and Mail. While insightful for understanding media framing and topic focus, under-sampling of USA news stories limits our understanding of the broader USA news content. However, excluding Alaska, USA contains a smaller proportion of occupied grizzly bear range.

We coded all compiled articles to allow quantitative analysis of media framing and themes. Our coding framework was informed by other similar studies, and after a series of refinements and five coder training sessions, the final framework was entered into Survey Monkey (Gore et al., 2005; Kaczensky et al., 2001; Nueuendorf, 2002; Sakurai et al., 2013). Eighteen variables were organized into three categories: (a) general information (e.g., source location, date, and newspaper name), (b) dominant theme, (c) attitudinal expressions and representative anecdote conveyed to the readership. General information included source location, date, and newspaper name. We classified articles into one of three dominant themes representing the general topic (i.e., science, human–bear conflict, or hunting). We adapted five categories from Kellert's (1994) attitude typology (utilitarian, ecological, aesthetic, moral, and neutral/negative) to reflect the attitudinal expressions about bears conveyed to the readership (Kaczensky et al., 2001). We also developed six representative anecdotes, narratives used by the media to bolster a certain perspective about a topic and often consistently repeated, during our intercoder test phase (Gore et al., 2005; Parker & Feldpausch-Parker, 2013).

TABLE 1 Newsprint articles indexed for a media content analysis of grizzly bears published from 2000 to 2016 across the species' North American range

Year	Alberta	British Columbia	Western USA	National (US and Canada)
2000	26	—	—	2
2001	24	7	2	4
2002	68	16	—	4
2003	48	10	—	2
2004	61	10	1	6
2005	99	2	—	15
2006	63	1	—	—
2007	80	8	—	5
2008	85	5	—	3
2009	65	6	—	3
2010	68	6	1	8
2011	57	6	—	4
2012	63	7	—	3
2013	77	16	—	6
2014	90	10	2	3
2015	74	13	11	5
2016	22	1	1	—
Total	1,070	124	18	73

FIGURE 3 Number of newspaper articles published about grizzly bears from 2000 to 2016 across its North American range compared to Alberta

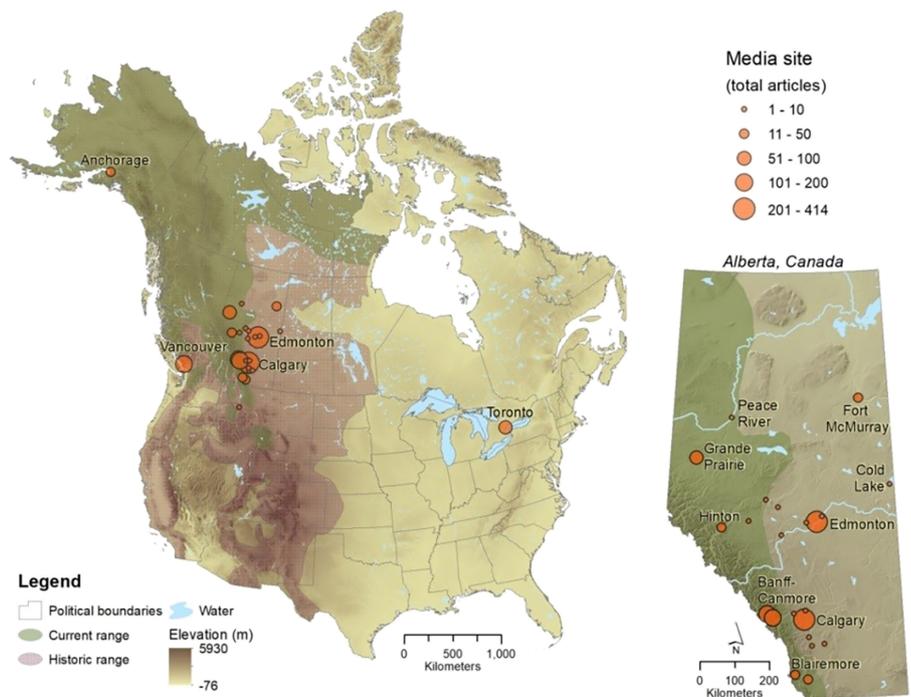


TABLE 2 Representative anecdote of newspaper articles about grizzly bears by dominant theme, published from 2000 to 2016 across the species' North American range

Representative anecdote	Dominant theme (%)			
	Human–bear conflict ($n = 777$)	Science ($n = 327$)	Hunting ($n = 181$)	Total ($n = 1,285$)
Dire state for grizzly bears	15.3	9.18	8.33	32.8
Grizzly bears are a public safety threat	23.4	0.39	0.39	24.1
Government management responsibility	8.64	3.19	2.49	14.3
More research is necessary	2.26	10.0	1.32	13.6
Communities play a role in management	8.87	1.09	0.39	10.4
There are no problems for/with bears	2.02	1.56	1.17	4.75

$df = 4$, $p = <.05$). The most frequent representative anecdote reported was “safety risk” from bears (38.6%) followed by a “dire state” for grizzly bear populations (25.4%). The primary voice in these stories were government staff (e.g., biologists, communication specialists, 49.7%), followed by general public commentary (25.7%) and non-governmental organizations (10.6%). Academics, recreationalists, forestry, petroleum, and agricultural industries together comprised only 13.2% of commentary.

3.1.2 | Hunting bears

Hunting topics ($n = 181$) included establishing or maintaining a suspension (48.1%), reopening or setting

limits/quotas (21.0%), poaching (18.2%), and news stories reflecting uncertainty about hunting as a management or conservation strategy (12.7%). Of hunting articles, 67.4% specifically focused on the hunting debate in Alberta alone, with 48.4% reflecting consternation in Alberta over the province's hunting moratorium established in 2006.

We found that moral sentiments were most frequently conveyed (44.4%) and were associated with stories about the hunting moratorium ($\chi^2 = 20.81$, $df = 4$, $p < .05$). A representative anecdote of a “dire state” dominated hunting stories (59.0%), followed by “government responsibility” to manage bears (17.7%). Non-governmental organizations were the primary voice (36.5%), followed by government officials (29.3%).

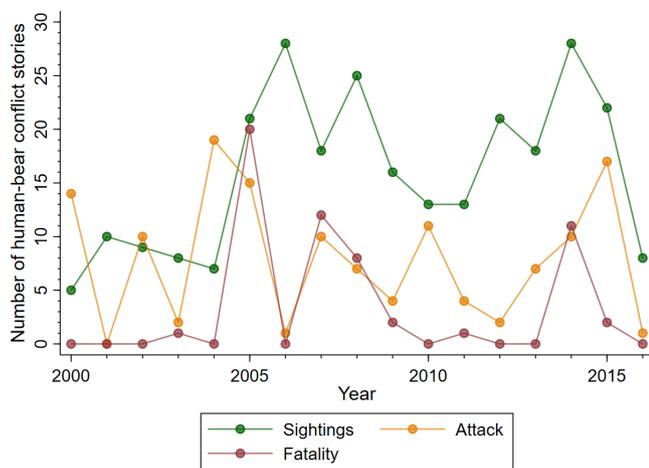


FIGURE 4 Sightings, fatalities and attacks reported in newspaper articles about grizzly (brown) bears published from 2000 to 2016 across the species' North American range ($n = 1,285$)

Sportsmen or recreationalists perspectives were infrequently captured in stories (4.97%).

3.1.3 | Grizzly bear science

News stories on scientific research ($n = 327$) were most frequently reported from Alberta (84.4%) and British Columbia (11.3%). Topics of scientific stories included information on “bear population” (44.0%) and “habitat studies” (24.8%), “educational outreach related to scientific findings” (17.1%) and “climate change” or new research (14.1%). As a discrete theme, human dimensions or social science perspectives were lacking across news stories, and if reported, comprised only a small part of the story or were relatively dispassionately described.

Solutions to bear conservation problems were proposed in almost half (49.2%) of the science stories, including the need to address grizzly bear population concerns (e.g., monitoring) and habitat loss (70.0%), with the primary voice reflecting academics (47.4%) followed by government staff (26.9%) and non-government organizations (18.0%). An ecological attitude (77.4%) was most commonly conveyed in the science stories, and was associated with the representative anecdotes of “safety threat” (39.5%) and “dire state” (36.1%; $\chi^2 = 51.21$, $df = 8$, $p < .05$) for bears.

3.2 | Effect of newsprint source on dominant theme

A majority of articles ($n = 644$; 50.1% of total) came from the two largest cities in Alberta, with Calgary having 1.8

times ($p < .001$) as many articles as Edmonton ($n = 230$, Calgary: $n = 414$, $p < .001$). Each city contained two popular newspapers, the Calgary Sun, Calgary Herald, Edmonton Sun, and Edmonton Journal. The Calgary Herald and Edmonton Journal ($n = 441$) published 2.2 times the number of newspaper articles on grizzly bears, compared to the Calgary and Edmonton Sun ($n = 203$, $p < .001$). Science-themed articles comprised 32.7% of the grizzly bear-related articles in the Edmonton Journal compared to 22.2% in the Calgary Sun (Table 3). Conflict-themed articles were 55.6% of articles in the Edmonton Journal and 65.9% of articles in the Calgary Sun (Table 3). Finally, hunting-themed articles made up 11.1% of Calgary Herald stories and 15.6% of the Edmonton Sun (Table 3).

4 | DISCUSSION

Grizzly bears in North America, and in Alberta, Canada, specifically incite a variety of reactions from the public, from wonder and awe to fear and loss (Hughes & Nielsen, 2019; McFarlane et al., 2007; Richie et al., 2012). By examining news media stories about grizzly bears, we found that journalists used certain words in headlines, such as “kill” or “attack,” presumably with the goal of garnering the readers' attention and drawing them into a manufactured narrative (Freeman & Jarvis, 2013). This included stories about human–bear conflict and hunting, with dramatized events and encounters, to science stories that detailed factual content about bears and research or conservation efforts (Sabatier & Huveneers, 2018). We found, however, that a human dimensions or social science perspective was lacking across news stories, and if reported comprised only a small part of the story or was relatively dispassionately described. This bias in not reporting social science perspectives may be problematic given the role and utility of social sciences in bear conservation, particularly since much of conservation itself hinges on peoples' actions.

We found journalists framed news stories to highlight issues or events that would elicit an emotional response from the readership, with certain key words used as headliners to draw readers in, which can shape public perceptions and action toward grizzly bears (Bombieri et al., 2018; Nguyen, 2017; Ragusa, 2018; Richardson, 2007; Sabatier & Huveneers, 2018). Notably, this included framing many human–bear interactions as “conflicts,” despite a lack of imminent threat to humans. Indeed, human–bear conflict stories were over-reported compared to other narratives, where a single incidence garnered more attention over communicating factual information or peaceful human–bear interactions

TABLE 3 Composition of articles about grizzly bears published in Edmonton and Calgary, Alberta, newspapers from 2000 to 2016 by dominant theme

Dominant theme	Calgary Herald	Edmonton Journal	Calgary Sun	Edmonton Sun
Science	24.7	32.7	22.2	23.4
Human–bear conflict	64.2	55.6	65.9	61.0
Hunting	11.1	11.8	11.9	15.6

(Cohen & Richardson, 2002; Hathaway et al., 2017; Muter et al., 2009; Sakurai et al., 2013). It also appeared as though several grand narratives were used by the news media to resonate with the public, who may be eager to consume and internalize sensational bear stories (Bombieri et al., 2018). This eco-gossip, with very predictable and clear protagonists and antagonists and the occasional man-bites-bear surprise, appears to be the diet of manufactured information fed to the public (Boan, Malcolm, Vanier, Euler, & Moola, 2018). Repetitious and negative storylines like these undoubtedly have the power to influence public perceptions about bears by unrealistically elevating risk perception among the public, and perhaps hampering conservation efforts or polarizing conservation debates (Bombieri et al., 2018; Bornatowski, Hussey, Sampio, & Barreto, 2019; Hathaway et al., 2017; Kaczensky et al., 2001; Sabatier & Huvener, 2018; Stoddard & MacDonald, 2011). So while the journalistic principles of objectivity, fairness, accuracy and balance should be espoused by journalists and news editors, the reality may be *if it bleeds, it leads* (Boykoff & Boykoff, 2007; Stoop, 2007). On the other hand, we identified a contradictory nature to some human–bear conflict stories, where representative anecdotes reflected grizzly bears as a “threat” but also “threatened” species. This juxtaposed how bears were characterized in terms of safety risk to the “dire state” of grizzly bear survival, particularly where bears were killed as a result of conflict.

News stories on hunting bears was the next most popular storyline, predominantly reflecting discourse across Alberta given the 2006 hunting moratorium and 2010 threatened species listing (Alberta Sustainable Resource Development, 2008). These stories polarized the hunting debate as either a legitimate or an unethical practice, framed as a trophy sport or as a “problem bear” management tool, particularly after high-profile attack stories. Again given the emotional appeal used by journalists, these news stories appeared to serve as an advocacy platform and stirring stick to incite public debate. Given the recent grizzly bear hunting ban in British Columbia, Canada, similar outcomes might present themselves across news media today (Ministry of Forests, Lands, Natural Resource Operations and Rural Development, 2017).

Lastly, news stories about grizzly bear science were generally not dramatic and instead repeatedly quoted a small number of experts, earning a nod to journalists for capturing current and factual information and to scientists motivated to share their research with the public (Tsfati, Cohen, & Gunther, 2011). Some stories did appear to put an emotional spin on bear safety information, which may play on peoples’ fear of bears and work against conservation efforts (Bombieri et al., 2018; Sakurai et al., 2013). Moreover, some science stories linked with conflict stories in terms of reporting on research related to grizzly bear mortality as a result of train collisions, largely occurring in Banff National Park (Gangadharan et al., 2017). This framing reflects both the iconic status grizzly bears occupy as a wilderness symbol alongside one of Canada’s most popular protected areas, suggesting a moral imperative to address bear deaths as a result of human land use.

Overall, our results appear to indicate that the North American news media is largely prone to report dramatic, high-consequence, human tragedy stories about bears, and while bears as front-page news may initially be perceived to be a positive signal for conservation, the negative connotations repeatedly associated with these narratives are likely to heighten fear and risk perceptions (Budak, Goel, & Rao, 2016; Downs, 1972; Lakoff, 2010; Muter et al., 2012; Pepin-Neff & Wynter, 2018). In turn, this might influence support for less desirable conservation interventions, such as lethal “problem bear” control or relocation, rather than seeking to shift human behaviors to work toward coexistence (Hathaway et al., 2017). While unlikely that broader news media has an intrinsic interest in grizzly bear conservation, individual journalists and editors may have a bias for keeping bears front and center, including personal or economic interests (Bornatowski et al., 2019; Somerville, 2017). Geographic location and political motivations of media outlets, journalists, the public and scientists (e.g., liberal, conservative) may also influence the content of news articles published and what the public chooses to read (Mitchell, Kiley, Gottfried, & Matsa, 2014). Political beliefs, alongside other personal views and values, can influence not only journalistic framing but how a news story is regarded by the readership (Mitchell et al., 2014;

Morgenroth, Ryan, & Peters, 2015). Political motivations or beliefs may also influence the credibility and trust the public places in media sources, experts or others quoted in news stories. Certainly, people tend to prefer stories, and the people who tell them, that align with their own ideas and beliefs (Reagan, Mitchell, Kiley, Danforth, & Dodds, 2016).

How bear stories are framed then is important, where scientists and journalists have the opportunity to play a powerful role in creating positive narratives about species and their conservation. Scientists could register with their university press corps as a subject matter expert, and make themselves available in this role to news media. Scientists can also keep a file of pertinent speaking points, in this case about grizzly bears, to highlight factual information above sensational sound bites. Additionally, scientists may want to proactively write editorials for newspapers, to make their research and knowledge more publicly accessible. In addition, scientists and journalists can together craft media messages that communicate individual and collective responsibility for people to adopt strategies to coexist with bears and value their ecological role or economic potential (Boan et al., 2018; Freeman & Jarvis, 2013; Jacobson et al., 2018; Lakoff, 2010). Borrowing from behavioral sciences, messages could be crafted using loss aversion techniques, for example, that focus on bear safety without over-dramatizing the nature of a bear or human–bear interactions (Gal & Rucker, 2018; Lopez-Baucells, Rocha, & Fernandez-Llamazares, 2017; Lu, Siemer, Baumer, & Decker, 2018). As Cinner (2018) suggests, loss aversion could improve people's motivation and participation in conservation actions. Other techniques include promoting positive emotional connections between people and bears, or utilizing expectancy-value theories of motivation to influence positive perceptions about bears and encourage participation in conservation action (Bornatowski et al., 2019; Cinner, 2018; Morgenroth et al., 2015; Swim & Bloodhart, 2015). For example, framing an emotional connection between people and bears (e.g., maternal love) might appeal to some readers, whereas others may resonate with stories that describe non-lethal practical solutions (e.g., bear spray, electric fencing) communicated by trusted role models (Morgenroth et al., 2015). Scientists could also reach out to communications specialists to learn new techniques or help craft and convey scientific information in appealing ways (Lu et al., 2018; Sabatier & Huvneers, 2018; Verissimo et al., 2017). There is a reason why sensational stories sell, and so engaging with communications experts would be advantageous to sharing messages that elicit the change we want to see.

Together, scientists can help frame accurate, verifiable content in interesting ways while journalists can

help cultivate responsible and evidence-informed norms among the public readership (and other journalists). While these suggestions are not a panacea to the conservation challenges faced by grizzly bears let alone other species, how we communicate stories about bears, other wildlife, and our relationship to them can play an important role in shaping public opinion and action (Jacobson et al., 2018; Lopez-Baucells et al., 2017; Richardson, 2007; Verissimo et al., 2017).

5 | CONCLUSIONS

News media in its various print and online forms remains central to how people receive information about the world or local community, including the wildlife that share their lives (Ramsey & Moss, 2009; Reese et al., 2001). Our study demonstrates the important role news media can play in communicating information to the public about grizzly bears, from articulating the safety precautions people should take in bear country, to sharing the latest scientific findings and conservation efforts. Our work also demonstrates there is a role and need for scientists, conservationists and journalists to cooperate together in crafting and sharing grizzly bear stories, in ways that cultivate stewardship, problem-solving, and positive conservation action (MacDonald et al., 2016; Sakurai et al., 2013). In future, it may be of interest to assess the international scale of news media communications on grizzly bears, including social media content, and the impact these stories can have on public perception and action.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

AUTHOR CONTRIBUTIONS

CH was the lead author of this paper and conceptualized the study with LF, SN, CH and JT. CH and JT led data collection and management, with CH, LF, CH, JT and SN analyzing data. CH led the writing with major input from all authors. NTY led formatting and all authors contributed to the revision and preparation of the final manuscript.

DATA AVAILABILITY STATEMENT

The search string and codebook are available as Data S1 as is the summary data. Other data requests can be made to CH.

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