

Attraction of brown bears to red pepper spray deterrent: caveats for use

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Humans in brown bear (*Ursus arctos*) country may unexpectedly encounter bears with sometimes harmful consequences. Firearms may be an effective defense, but they destroy bears, their use is illegal in most national parks, and many people prefer not to carry them. Consequently, nonlethal bear deterrents have long been sought as a means of self-defense against bear attacks. In the 1970s a liquid spray containing oleoresin capsicum (the chief irritant in red peppers) was developed. This mixture could be defensively discharged at aggressive bears (Herrero and Higgins 1995), and today, several commercially manufactured products, generically called "red pepper spray," are sold for the purpose of deterring aggressive bear attacks. Many hikers, campers, and outdoor enthusiasts carry this spray for self-defense in bear country. Additionally, some states (e.g., Wyoming) and many national parks (e.g., Glacier National Park) highly recommend that back-country users carry red pepper spray for use in an aggressive bear encounter.

Herrero and Higgins (1998) found that red pepper spray was effective in halting aggressive brown bear behavior in 88% (14 of 16) of incidents studied. However, red pepper spray is not claimed to be a bear repellent when applied to objects. Nonetheless, instances have been reported of people applying red pepper spray to objects and around campsites in order to repel curious bears. The impetus for this study came from an observation I made of a bear rolling vigorously on beach gravels that had been accidentally sprayed with red pepper spray. To further investigate brown bear reaction to red pepper spray residues, I conducted systematic observations of bear responses to spray discharged at selected sites. I discuss those findings and their implications in this report.

Methods

To observe bear response to red pepper spray residues, I selected test sites along the Kulik River in Katmai National Park, Alaska (Fig. 1). Test sites were deliberately placed in bear travel corridors because I was not testing the ability of red pepper spray to attract bears from a distance, but rather bear response to spray residues encountered at close range: were bears repelled (i.e., initiate avoidance movements), indifferent (i.e., behavioral mode unchanged), or attracted (i.e., curiosity piqued and site investigation) to red pepper spray residues? At each of 9 locations, I treated a 1-m² area of beach gravel with a 4-second burst of commercially available bear deterrent spray. I used red pepper spray products representing 4 manufacturers and 2 strengths of oleoresin capsicum content. Seven sites were sprayed with 10% oleoresin capsicum concentration, and 2 sites were sprayed with a 15% oleoresin capsicum concentration.

An "all occurrences" sampling protocol (Altmann 1974) was used to document bear response to treated

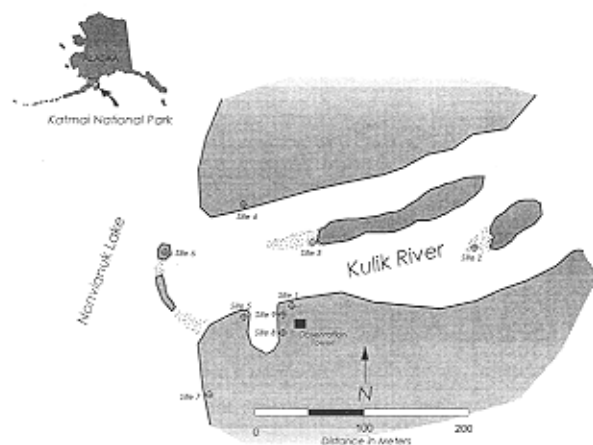


Fig. 1. Sites of pepper spray treatments along the Kulik River, Katmai National Park, Alaska, 1997.

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Key words: brown bear, deterrents, oleoresin capsicum, red pepper spray, repellents, *Ursus arctos*

soils. Treatment sites ranged from 10 to 200 m from a blind used for observations. Whenever a single bear or a family group approached within 3 m of a treatment site, I counted the occurrence as 1 observation. For each observation I recorded time, wind direction and speed, direction of approach, behavioral activity at the site, and total time of interaction. Mutually exclusive categories of behavior were used, including no response, sniff, head rub, back rub, lick, paw, and body rolling. An "other" category was used to designate unspecified behaviors. Intensity of bear response to treated sites was subjectively defined as follows: no response (no sign of response to spray residues), slight (bear only sniffed location), moderate (bear sniffed, pawed, or rubbed head on site), and high (bear sniffed, pawed, rubbed head on site, lay directly on site, rolled on back, or rubbed with rump and head). Data were collected from 1000 to 1700 Alaska Standard Time on 25, 26, and 27 October 1997.

Results

During observation, 13 independent brown bear groups approached treatment sites a total of 40 times (Table 1). Among these were 7 single bears (sex unknown), 3 adult boars, 1 sow with 2 dependent yearlings, 1 sow with 3 cubs of the year (COY), and 1 sow with 2 COY. Both concentrations of spray elicited interest ranging from no response (40%) to slight (20%), moderate (12%), and high (28%) responses. In no instances were bears observed to be repelled from test sites by spray residues. Bear behaviors observed at treatment sites included 25 bouts of sniffing, 9 pawing bouts, 10 licking bouts, 16 head rubbing bouts, and 11 bouts of bears rolling their entire body on the pepper spray residues. Behavioral bouts at individual treatment sites lasted for 0.1–2.5 minutes (\bar{x} = 1.0 min, SD = 0.47).

Discussion

Bears rely most heavily on olfaction to locate food in their environment (Herrero 1985). Therefore, it was not surprising to me that a very strong, pungent, and novel scent, such as red pepper spray, was of interest to brown bears. However, I had not anticipated that red pepper spray residues would elicit vigorous scent rubbing and whole body rolling by bears.

This study demonstrates that the bears I studied found consid-

erable interest in red pepper spray residue and responded positively to it. Although bears showed no visible reaction to treatment sites 40% of the time (16 of 40 observations), in all of these instances I observed strong winds (>37 km/hr) channeling scent directly away from the bears. Prior to this study my field crews and I spent >750 hours observing brown bears at this location. During that time no one observed bears rubbing their heads on the ground, pawing and licking soils, or rolling on their backs as done in the presence of red pepper spray residues, strongly suggesting that these novel behaviors stemmed directly from exposure to the red pepper spray I had deposited on soils.

Red pepper spray is apparently a stable, weather-resistant compound that does not lose its irritant, nor attractant properties quickly. Bears reacted strongly (i.e., intensive scent rubbing and body rolling) to residues 5 days-old. Additionally, I found that red pepper spray residues discharged 2 months earlier elicited a strong burn response when rubbed on my forearm, suggesting that spray residues may have the potential to rouse interest in bears for weeks after discharge.

Some red pepper spray manufacturers and natural resource agencies encourage people to test-fire newly purchased canisters so that they may get a feel for spray range and dispersion pattern, and to verify that canisters are pressurized and working properly. However, test spray residues near camps or other human high-use areas may enhance the site's appeal to inquisitive bears. Similarly, the application of red pepper spray to objects, in the hope of repelling curious bears, may instead invite investigation and subsequent destruction. Visitors to bear country are strongly encouraged to rid their tents and sleeping areas of all food items and otherwise odiferous articles (e.g., toothpaste, soap, food items, etc.), as a safety precaution. Given that red pepper spray residues elicit intense interest and scent rubbing in bears, it may be prudent to keep canisters which have been fired free of residues by careful cleaning

Table 1. Frequency and intensity of brown bear responses to red pepper spray residues on beach gravels, Kulik River, Katmai National Park and Preserve, Alaska, 25–27 October 1997.

Bear cohort	n	Intensity of reaction			
		No response	Slight	Moderate	High
Adult males	3	2		1	
Females with dependents	3	2	3	1	2
Single bears (sex unknown)	7	12	5	3	9
Totals	13	16	8	5	11



Bear lying in red pepper spray.

or storage in locations other than sleeping areas. Given these findings, I recommend a cautious approach to the use and storage of red pepper spray products in bear country.

Acknowledgments. The author wishes to thank B. Bennett and S. Petersen of Katmailand, Inc. for their logistical support of this project. Additionally, I thank R. Clark and E. Bindseil of Katmai National Park; and S. Farley, D. Mulcahy, J. Keay, J. Dunlap, and L. Holland-Bartels of the Alaska Biological Science Center in Anchorage for their invaluable assistance at various stages of this project.

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