

A brown bear is swimming in a river, with its head and shoulders above water. The background shows a dense forest of evergreen trees and fallen branches along the riverbank.

Bear Spray Works





Every year millions of people in North America, from Florida to the Arctic, have the opportunity to enjoy watching bears in the wild. They get to see bears fish, mothers interact with their cubs, or search for food amongst wildflowers and waterfalls.

This presentation was prepared for those rare instances where you may need to use your Bear Spray. Your goal should be to avoid encounters by practicing appropriate bear avoidance techniques and wildlife stewardship.

Dr. Tom Smith (Brigham Young University)

Dr. Stephen Herrero (University of Calgary)

Terry Debruyn (National Park Service)

James Wilder (Minerals Management Service)

“Bear spray stopped bears' undesirable behavior **92% of the time when used on brown bears, **90%** for black bears, and **100%** for polar bears. Of all persons carrying bear sprays, **98% were uninjured by bears in close-range encounters.** All bear-inflicted injuries (three incidences) associated with using bear spray involved brown bears and were relatively minor (i.e., no hospitalization required).”**

Bear Spray works.

Section One

History of Bear Spray



BeBearAware.org

Bear Spray: History

A4 Jackson Hole Guide, Wednesday, September 30, 1998

EDITORIAL

Bring an oil-based spray to spice up backcountry trips

Be prepared.

Sound advice, for sure, but all too often good words such as these vanish like smoke in the evening sky.

In rugged country, there's no room for ignorance. Whether in winter, summer, spring or fall, Jackson Hole has the ability to surprise any traveler with a dangerous and potentially fatal challenge.

It would also make sense for wildlife managers to delve a bit deeper into the pepper spray issue in order to come up with a firm recommendation as to what brands, and types of sprays, have earned their approval.

were equipped with an apparently less-than-satisfactory pepper spray.

While Wyoming Game and Fish biologists continue to assert that pepper spray is more effective in deterring a grizzly attack than a gun, we learned this week that oil-based pepper sprays seem to be most effective at fending off grizzlies.

In light of the increased possibility of encountering a grizz as their numbers rise and the volume of people heading into the backcountry continues to increase, pepper spray makes good sense for hunters who prefer not to be the hunted.

It would also make sense for wildlife managers to delve a bit deeper into the pepper spray issue in order to come up with a firm recommendation as to what brands, and types of sprays, have earned their approval.

In 1998, the Yellowstone Ecosystem Subcommittee of the Interagency Grizzly Bear Committee asked Chuck Bartlebaugh and the Be Bear Aware Campaign to conduct a review of what **was** and **wasn't** Bear Spray.

- Bear Spray was working in some areas but not others.
- Some individuals using Bear Spray were injured, and some died.
- Regional and national news media were asking **why**.



Bear Spray: History



Chuck Bartlebaugh, BBA & Dr. Chris Servheen, USFWS.

The market research done by the Be Bear Aware Campaign garnered considerable recognition from wildlife and land management agencies.

The Yellowstone Ecosystem Subcommittee recognized their work with an award for, “Outstanding dedication to grizzly bear conservation.”

Bear Spray: History



Sources for the following presentation include:

- Initial Bear Spray research by Dr. Charles Jonkel, Bill Pounds and lead investigator Carrie Hunt.
- Dr. Tom Smith, Brigham Young University, who published numerous papers on Bear Spray and firearms.
- Dr. Stephen Herrero, University of Calgary (emeritus), Author of *Bear Attacks: Their Causes and Avoidance* and many scientific papers on Bear Spray and bear deterrence.
- Be Bear Aware Campaign's media research, incidence reports, study of bear attacks and survivor interviews.
- State and Federal Wildlife, Land Management, and bear professionals.
- Environmental Protection Agency registration requirements.

Bear Spray: Research & Development

Bear Spray was developed in the mid-1980s during a research project conducted by Border Grizzly Project at the University of Montana.

Carrie L. Hunt

Principle Investigator

Overseeing the project was:

Dr. Charles J. Jonkel

Border Grizzly Bear Project Leader

Dr. Bart O’Gara

Wildlife Professor

Bill Pounds

Founder of Counter Assault Bear Spray



Carrie Hunt and Cassie.

Pepper Spray: **What Didn't Work**



When researchers tested **pepper spray** utilized for personal defense or law enforcement, they learned the following:

- **Pepper spray** was often dispersed in a narrow stream that required precise aim. This required the charging bear be too close, resulting in contact.
- **Pepper spray** only went a short distance allowing the bear to remain focused on the person it was charging.
- The potency of the ingredients in **pepper spray** was **inconsistent** and **unreliable**.
- The quality and effectiveness of different brands of **pepper spray** varied greatly.
- The actual ingredients in a given **pepper spray** were often **unknown**.
- Pepper spray is often sold in small, palm-sized cans with limited spray duration and spray distance, **ineffective** against a charging bear.

Bear Spray: What Did Work

Researchers successfully developed a spray for black bears, brown bears, grizzly bears and polar bears.

- **Bear Spray** contained quality solvents, and active ingredient, **1%-2% capsaicin** and related **capsaicinoids**.
- **Bear Spray** used a new nozzle mechanism that improved the **distance**, **duration** and **expansion** of the spray cloud.
- **Bear Spray** was now deployed in a **powerful expanding cloud**, creating a barrier that the bear would pass through. This cloud could be directed rather than aimed.
- **Bear Spray duration** was increased to **7+ seconds**, providing additional spray to correct for the wind, multiple bears, zig-zagging bears, those that stop and recharge and for the hike out.
- **Bear Spray distance** increased to **25+ feet** so that a bear charging from within 60 feet would meet an expanding cloud at approximately 30 feet (if not affected by wind, cold or rain).



Bear Spray: What's in a Name



Bear Spray

- Only **Bear Spray** is allowed to use the word bear in their labeling or text, by EPA regulation.
- Only **Bear Spray** is allowed to be sold for deterring charging or attacking bears.
- **Bear Spray** must be registered with the EPA and tested by certified labs.
- **Bear Spray** uses a special nozzle that provides the **distance**, **duration** and **expansion** of the spray cloud.

Pepper Spray

- Neither pepper spray nor law enforcement spray is monitored by the EPA or tested in certified labs.
- No one monitors the ingredients or dispersal systems of pepper sprays to see if they are using what they claim.
- There are hundreds of pepper sprays with unknown ingredients and dispersal systems.
- It's **against the law** to sell pepper spray for use on bears.

Section Two

EPA Registration

The EPA implemented a formal registration and verification program with all manufacturers claiming to produce a Bear Spray.



BeBearAware.org

Bear Spray: EPA Registration



- **Bear Spray** is a powerful chemical formula, specifically prepared for use on charging or attacking bears.
- **By law**, all formulas and ingredients have to be verified, tested and registered with the EPA.
- All labels, counter displays and promotional packaging have to be **approved** and **registered** with the EPA.
- The EPA or state agencies have the authority to review the records of any **Bear Spray** manufacturers.
- This verifies they are in compliance and using the ingredients listed on the can and registered with the EPA.



Bear Spray: What is Bear Spray



- **Bear Spray** is developed specifically to deter **aggressive, charging** or **attacking** bears by directly affecting the nervous system, **irritating** and **inflaming** the bear's eyes, nose, mouth, throat and lungs.
- Active Ingredient:
1%-2% capsaicin and related **capsaicinoids**.
- Disperses in a **powerful, expanding cloud**, so you do not have to aim for the eyes, nose or mouth.
- The powerful, expanding cloud creates a **wide barrier** which the charging bear must pass through, exposing the bear's eyes, nose and mouth to the active ingredient.
- Minimum Net Contents is **7.9 ounces** or **225 grams**.
- Research has shown a **spray duration** of **7 seconds** and a **spray distance** of **25 feet** are important to deter bears in a variety of charging scenarios.

Bear Spray: Ingredients



- **CRC (capsaicin and related capsaicinoids):** An irritant and inflammatory agent that temporarily overwhelms the bear's senses, affecting the bear's eyes, nose, mouth, throat, and lungs. Listed as "Active Ingredient."
- **Propellants:** These liquid propellants help project the active ingredient from the can. Listed as "Other Ingredients."
- **Solvents:** Such as 134A mixing all ingredients so they can be projected from the can in a powerful atomized expanding cloud. Listed as "Other Ingredients."
- **OC, Oleoresin Capsicum:** What the active ingredient is derived from (it is not the active ingredient).

The EPA requires all the ingredients to be tested to determine their effects on the skin, eyes and the Ozone layer.

Bear Spray: Misinformation



The Environmental Protection Agency does not allow these marketing terms on **Bear Spray** labels because they can be misleading or inaccurate:

- **‘SHU, Scoville Heat Units’**: This information can often be very misleading and inaccurate.
- **‘10%, 15%, or 20% Oleoresin Capsicum’**: Not found on **Bear Spray** labels and can be misleading.
- **‘The hottest’**: How ‘hotness’ affects **Bear Spray** has never been tested, and can be misleading.
- **‘Pharmaceutical-grade Capsaicin and related Capsaicinoids’**: **Does not exist.**
- **‘Empties faster, delivering more ‘pepper’ to the bear.’**: Just empties the can faster. **2% does not become 4%.**
- **‘The most powerful.’**: **No testing has been performed** to determine who has the most powerful.

Bear Spray: Misinformation



- Claims that it worked ‘instantaneously’ or ‘like hitting a brick wall,’ gave a **false sense of effectiveness**.
- Claiming that their product is the ‘hottest, or most powerful.’ **The EPA does not allow this type of claim because it can be misleading and inaccurate.**
- Often listed ‘Oleoresin of Capsicum’ as the active ingredient. **It is not! The active ingredient is 1%-2% capsaicin** and related **capsaicinoids**.
- ‘Disperses more capsaicin and related capsaicinoids quicker.’ **2% CRC does not become 4% CRC.**
- Pepper spray labels often do not reflect the actual ingredients. **It’s something in a can?**

The Internet provides even more misinformation that is not allowed on Bear Spray labels or promotional material. What is on the can’s label is regulated by the EPA.

Bear Spray: Registration Enforcement



Some Bear Spray companies were in violation of the EPA's registration policy and continued to misinform customers about their products and their capabilities.

- September, 2003: A **\$17,000 fine** was placed against UDAP by the EPA for misleading labeling and marketing materials.
- November, 1999: The **stop-sale** of the Bear Pause product line manufactured by ChemArmor, Inc. The company falsified their ingredients while registering their product. They were removed from retail outlets in the United States and Canada.
- October, 1998: Sales of Carlton's Calls Pepper Spray were **stopped** and products were **removed** from retail outlets.
- The Environmental Protection Agency, in partnership with state agencies continues to monitor Bear Spray for compliance of their registration.

Bear Spray: Registration Enforcement

September, 2003: UDAP fined \$17,208.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 8

999 18TH STREET - SUITE 300

DENVER, CO 80202-2466

Phone 800-227-8917

<http://www.epa.gov/region08>

DOCKET NO.: FIFRA-08-2003-0015

IN THE MATTER OF:

UDAP INDUSTRIES

13160 Yond^{er} Road

Bozeman, MT 59718

Respondent

FINAL ORDER

10. Upon consideration of the nature, circumstances, extent and gravity of the violations, and Respondent's ability to continue in business, the size of Respondent's business, prior history of compliance, degree of culpability, lack of economic benefit resulting from the violations, its good faith and immediate effort to comply once informed of the violations, other matters as justice may require, and upon consideration of the entire record herein, EPA offers this CESA under its expedited enforcement procedures in order to settle the violations based upon the findings noted above, for the total civil penalty amount of **seventeen thousand two hundred and eight dollars (17,208.00).**

Bear Spray: Registration Enforcement

November, 1999:



"We don't want people going into bear country with a product on their hip that may not do its job if needed."

—Tim Osag, EPA.



Pepper Spray is not **Bear Spray**.

October, 1998: Carlton's Calls
EPA Stop Sale, Use or Removal Order



“Not intended for use as **pesticide** (aka Bear Spray) under EPA-FIFRA-7 U.S.C. Section 136-ET SEQ.”

‘This is not a Bear Spray.’



Section Three

Buying & Selling

Bear Spray: Buying & Selling.



Whether you are buying or selling Bear Spray, it is important to read the label and specifically ask for “**Bear Spray.**” Always call it “**Bear Spray.**”

- Only **Bear Spray** is allowed to use the word “**bear**” on the label to identify the product. It will say either, “bear deterrent” or “to deter bears from attacking humans.”
- Active ingredient:
1%-2% capsaicin and related **capsaicinoids** (derived from Oleoresin of Capsicum).
- Suggested spray duration until the can empties is **7 seconds** and a spray distance of **25 feet**.
- Bear Spray durations vary from 4 seconds to 9+ seconds, and the spray distance varies from 15 feet to 30+ feet, depending on the brand. **Check the performance standards of the product you are considering.**
- Net content will be at least **7.9 ounces** or **225 grams**.
- **EPA registration numbers** and **EPA Est. numbers** are located on the bottom of the label.

Bear Spray vs. Pepper Spray

Bear Spray:

- Will clearly state for use on bears and not people.
- Active ingredient: **1%-2% capsaicin** and related **capsaicinoids**.
- EPA restricts what can be stated on the label.
- Label must represent actual ingredients.
- Net weight a minimum of 7.9 ounces or 225 grams.

Pepper Spray:

- Not allowed to indicate it may be used on bears and is illegal to sell for use on bears.
- May say it has 10, 20, or 30% Oleoresin of Capsicum—this is not allowed on bear spray cans.
- Label may make exaggerated claims such as, “works instantaneously,” “the hottest,” and “like hitting a brick wall.”
- Label and contents are not regulated by any agency.

When buying or selling, always call it **“Bear Spray.”**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

June 5, 2000

Pepper Spray

Bear Spray

Alleged Similarity Between Human-Deterrent and Bear-Deterrent Products

	Human-Deterrent	Bear-deterrent
Regulator	CPSC ¹	EPA
Registration Required Prior to Marketing Product	No	Yes
Chemistry Data reviewed	No	Yes
Complete product identity required	No	Yes
Formula checked for ozone-depleting chemicals and other ingredients of toxicological concern	No	Yes
Toxicity Data required	No	Yes
Efficacy Data required	No	Yes
Distance Requirement	No	Yes
Can Size Requirement	No	Yes
Duration Requirement	No	Yes
Enforcement potential	Low	High
Labeling requirements	Little	Extensive

¹CPSC = Consumer Product Safety Commission

Bear Spray: Read the Label

Look for the following when purchasing Bear Spray:



- Uses the word **“Bear”** to indicate that it is a **Bear Spray**.
- Clearly indicates the product is **for deterring bears from attacking humans**.
- Clearly indicates the product is **not for use on humans**.
- Active ingredient:
1% to 2% capsaicin and related **capsaicinoids**.
- States that the active ingredients **capsaicin** and related **capsaicinoids** are derived from Oleoresin of Capsicum.
- States that the minimum net contents is: **7.9 ounces or 225 grams**.
- Must show the EPA registration number and EPA establishment number.

Bear Spray: Back Label

Check for the specific duration and distance standards of the product you are looking at:

- **Suggested bear spray duration** of **7 seconds** to deal with a variety of charging scenarios and to adjust for wind.
- **Suggested bear spray distance** of **25 feet** to allow a charging bear to meet the expanding cloud far enough away to feel the effects and divert its charge.

The section that tells you how to use Bear Spray on the label has insufficient space to go into proper detail for a variety of different types of bear charges.

- It may still contain information that carries over from pepper spray labeling and suggest that you ‘aim’ for the bear’s face and eyes. (**Aiming requires extra time. The bear may be too close to stop its charge.**)
- Instead, **direct** the powerful expanding cloud **in front of** the charging bear. This creates a barrier that the bear must pass through.



Bear Spray: Buying Questions



Ask specifically to be shown only **Bear Spray** and make sure to look for the following details when buying or selling Bear Spray:

- The words “**For deterring bear attacks.**”
- Active Ingredient:
1%-2% Capsaicin and related **capsaicinoids**.
- Suggested spray **duration** at least **7 seconds**.
- Suggested spray **distance** at least **25 feet**.
- Net contents at least **7.9 ounces** and **230 grams**.
- EPA registration and establishment numbers.
- Know the performance of what you are buying.
- It will state, “Not for use on humans.”



Section Four

How & When to Use Bear Spray



If you came across this situation on foot, how would this bear respond? How would it charge? How would you use your Bear Spray?

This bear is obviously on a fresh kill and could charge spontaneously and very aggressively, leaving little time to respond. (**Be prepared.**)

Bear Spray: Carrying Bear Spray



- Bear Spray can easily be carried in an accessible hip or chest holster. (Practice removing the can from the holster so that it is **spontaneous**.)
- During winter months, put your Bear Spray in an insulated bottle warmer and place in a readily accessible side pocket to **keep the ingredients warm for better performance**.
- Rafters and kayakers can attach to their craft or carry in a chest holster.
- Mountain bikers should have it readily accessible in either a chest or hip holster.



Bear Spray: Removing Safety Wedge

- Firmly grasp the can with one hand by placing your finger through the circular hole located under the trigger.
- Place your thumb in front of the **safety wedge** and pull directly back toward you. The **safety wedge** will pull back and fall from can.
- The trigger is now accessible and is operated by simply pushing down with your thumb.
- Hold the can firmly **so it does not tilt up** and spray above of the bear.
- Practice removing the canister from the holster and the safety wedge so that it is **spontaneous**.



Bear Spray: It Billows Up

Correct Spray (so it billows up):



Bear spray is dispersed in a powerful expanding cloud that will billow up in front of the charging or attacking bear. Direct the spray slightly downward to create a large expanding cloud **in front of** the charging bear.

Incorrect Spray (shoots above):



If the bear spray canister is not held firmly, when you push down on the trigger, the can will tilt upward and disperse the powerful expanding cloud **above** the charging bear.

Bear Spray: Holding the Can

One-Handed

A person with firearm experience or practice with Bear Spray can firmly hold and direct the spray slightly downward and **remain facing** the charging bear.



Two-Handed

A person with no firearm experience may need to hold the can with two hands in order to hold it firmly in a downward position and **remain facing** the charging bear.



Bear Spray: Angle of Spray

Tilt can slightly downward so the spray billows up in front of the charging bear.

Do not let the can tilt upward. It will shoot over top of the charging bear.



It is important to spray slightly downward. A bear often charges with its head down near the ground, making it easy to spray above the charging bear.

Bear Spray: Body Language

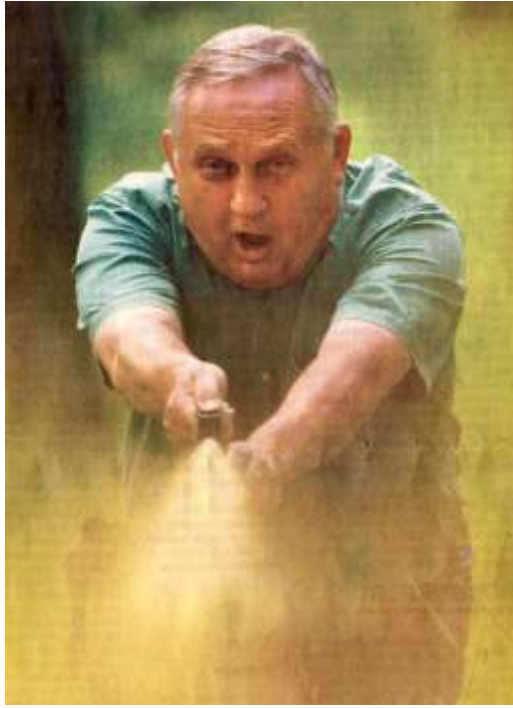


Photo by: Michael Gallacher, Missoulian

Your voice and body language while spraying can help convey a message to the charging bear to stop or divert its charge.

- Thrust the Bear Spray in front of you, while telling the charging bear in a firm voice to **“STOP”** or **“GO AWAY.”** The bear does not know these terms but may recognize the **tone of your voice** and **body language**.
- If you don't have experience using a firearm or confronting bears you may need to hold the Bear Spray in two hands so that you **remain facing** and **spraying slightly downward** at the front of the charging bear.

- **Let the Bear Spray do its job** by affecting the charging bear's nervous system, temporarily overwhelming its eyes, nose, mouth and lungs.
- Bears have responded to the whooshing sound, the expanding cloud, the voice and the body language by diverting their charge **without entering the spray cloud**.
- Once the charging bear has retreated, **leave the area** immediately.

Bear Spray: Suggested Spray Duration



Suggested minimum spray **duration** is **7 seconds**. This is how long the can will spray until it empties, not how long you spray a charging bear. It is suggested you spray a burst for 2-3 seconds, but you may need to re-spray for the following reasons:

- To compensate for **wind** or **cold weather**.
- **Multiple bears**—mating pairs, mothers with cubs or juvenile pairs.
- Bears may **zig-zag** or **circle around** the spray cloud when charging.
- Bears may charge, **stop**, **retreat** and **recharge**.
- For other encounters during the **hike out**.
- Any charging bear may require **more than one spray**.
- For these reasons, it is suggested that **group leaders carry two cans** and other adults and responsible teenagers carry their own can for backup.

Bear Spray: Short Bursts?

The use of a ‘half-second’ or a ‘short-burst’ spray is not practical and has never been tested.

- With a half-second burst, the propellant, solvent, and active ingredients will **only begin to combine** and atomize into a fine, powerful spray.
- A short burst may only spray **10-12 feet**. This may not be far enough to stop an extremely agitated and charging bear.
- A bear charging at full speed (35 mph) is traveling **51 feet every second** and has the potential to make contact within 2-3 seconds. There is **no time** for you to spray a short or warning burst, pause, then spray again, etc.
- The products that marketed a half-second or short burst also included marketing claims that it “works instantaneously” or “like hitting a brick wall.” These are unsubstantiated claims.

No testing has been provided to show that short bursts work.

If you’re facing an extremely agitated bear in a full charge, you only have time to take the canister out of your holster, remove the safety wedge and push the trigger down, directing the expanding cloud slightly downward in front of the charging bear.



Bear Spray: Suggested Spray Distance



Suggested minimum spray **distance** is **25 feet**. This is how far the expanding spray cloud can be directed (without wind).

- This creates a wide and expanding cloud, **a barrier between** you and the bear.
- When the charging bear is **within 60 feet**, it will meet the cloud **at approximately 25 feet**, giving the bear time to feel the effects of the Bear Spray and divert its charge.
- Be prepared for the bear to **re-charge**, or for **other bears to charge**, requiring additional sprays.
- Be prepared to **adjust for wind or cold**.
- Charging bears may stop short of you, posture aggressively and **retreat**. They may then **complete the charge**.

Source: Bear management specialists with State and Federal Wildlife Management Agencies and incident reports, and the original Bear Spray research.

Bear Spray: More Than 60 Feet Away



If an extremely agitated bear is charging from **more than 60 feet away**, prepare but do not spray. The spray may be depleted before the charging bear is in range.

- Once the bear is **within 60 feet**, direct your spray downward, with a side-to-side movement in 2-3 second burst of spray. **This will create a wide barrier that the bear will meet at approximately 25-35 feet.**
- In some cases, merely the **whooshing sound** and the **orange cloud** may cause the bear to stop, reassess its charge and either retreat or charge again.
- Wind towards you or a cross-wind may redirect Bear Spray away from the bear. Prepare to re-spray in order to **adjust for the wind.**
- Some bears may **circle around** the orange cloud. Be prepared to re-spray.

Bear Spray: Be Bear Aware

Be aware of your surroundings and react to signs of bear activity. If you see fresh signs like these, be prepared for a possible bear encounter. You may consider having your Bear Spray out and ready.



Bear Spray: Don't Spray?

If a bear is close to you (within 50 feet) but not menacing, do not spray or confront the bear. Simply back away and return the way you came or pass by the bear allowing as much distance as possible.

- Standing bears are trying to better see, hear and smell what has disturbed them. They do not charge standing up. **Only spray if a bear drops and charges.**
- If a bear is acting curious but not aggressive, encourage the bear to leave by **grouping together** and speaking in a firm voice to help the bear identify who and what you are.
- If a bear is approaching in a non-aggressive fashion, group together and move away from the bear's line of travel, **allowing it to pass by.**
- If a bear is acting agitated, popping its jaws, clacking its teeth, woofing or pacing back and forth but not charging, let the bear assess the situation, and **be prepared to spray if it does charge.**
- Try to leave the area **without spraying the bear** if possible.



Bear Spray: Bear Behavior

The degree of aggressiveness by bears can vary greatly.

- Nuisance or curious bears **may not show any aggressive behavior**, but once close enough, could charge.
- A **startled bear** may charge towards you to find out what you are. Bears may bounce on their front legs, have their ears erect, stomp, turn sideways, and pace back and forth. They will then either **retreat** or **recharge**.
- A startled **mother bear with cubs** may be more agitated and respond more aggressively by charging immediately.
- A dominant bear **guarding a fresh kill** may respond aggressively in a spontaneous and non-stopping charge.
- A **predatory bear** (black or grizzly) may show stalking behavior, such as disappearing and reappearing, but not showing aggression. It may charge when it gets close enough or finds the opportunity.
- Bears that have learned to **tolerate** other bears or people may approach closer than normal, then charge. When bears are near, have your Bear Spray ready.



Bear Spray: Irritating & Inflammatory



Active Ingredient:

1%-2% capsaicin and related **capsaicinoids**.

These produce an irritating and inflammatory reaction that is amplified by a bear's more developed sense of smell. This overwhelms the bear's primary means of perception.

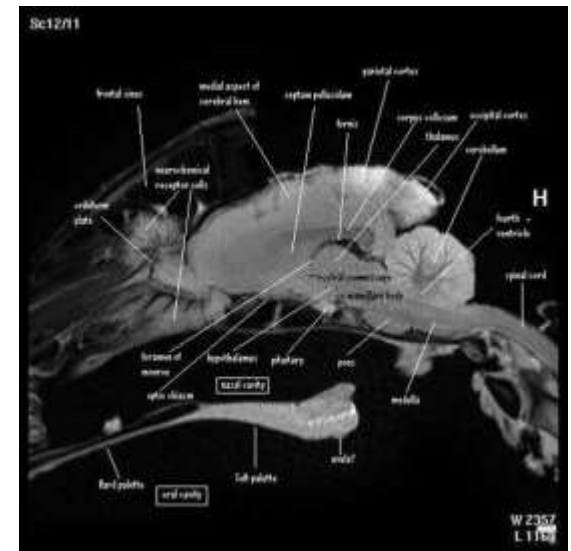
- The charging bear's eyelids become swollen, watering and burning and difficult to keep open. The bear's ability to see is disrupted and it **can no longer focus on its target**.
- The nose becomes swollen, irritated and runny. The bear's sense of smell is **overloaded** and **interrupted**.
- The mouth, throat, and lungs become irritated and inflamed. The mouth fills with saliva, the throat swells, and the lungs contract. **The bear's ability to breathe deeply is made difficult**. The muscles may no longer receive enough oxygen to sustain the attack.

None of these effects are permanent or long-lasting.

Bear Spray: Why it Works

The structures in a bear's brain that correspond to smell are 5-7 times larger than ours. There is significant observational evidence that their sense of smell is thousands times more sensitive. This pronounced sense is what makes bears susceptible to the active ingredients in Bear Spray.

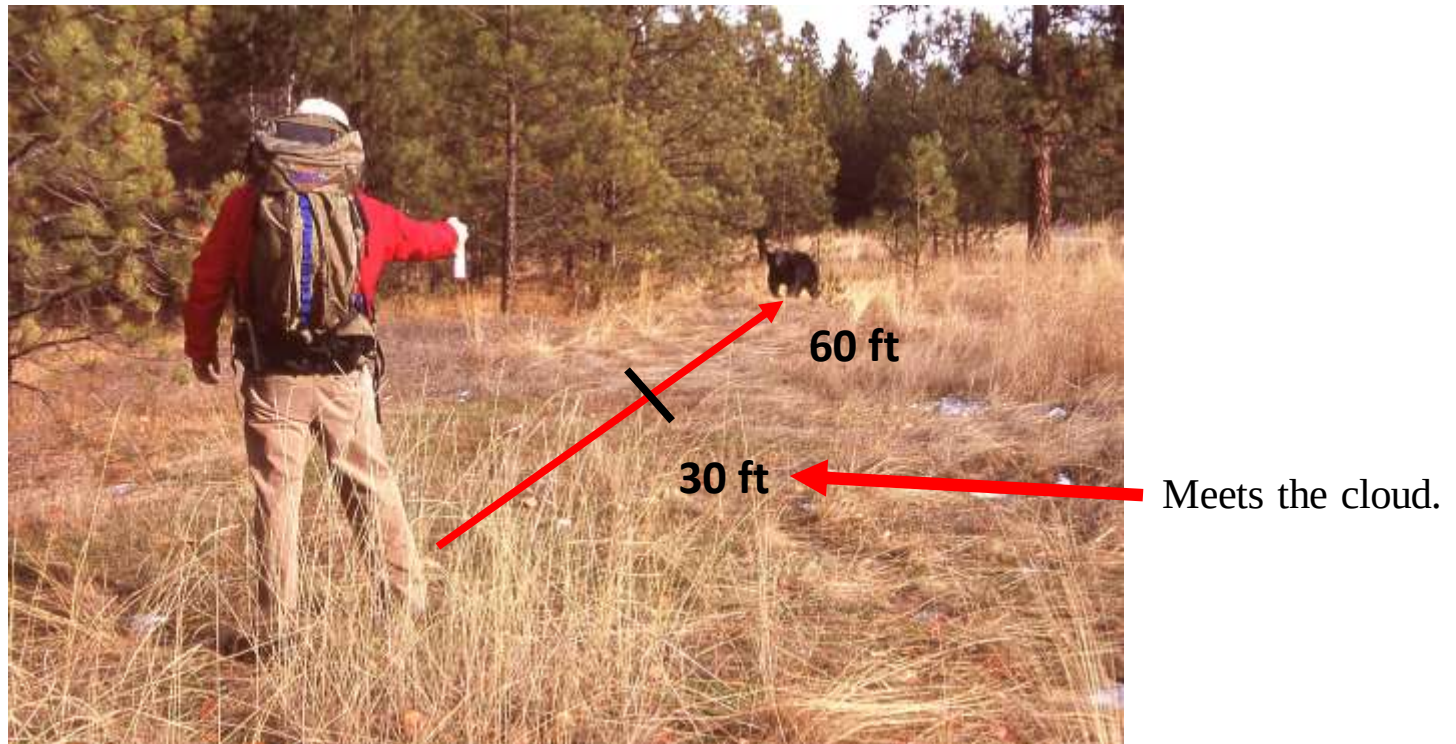
- Research done with humans and mice show that **capsaicin** and related **capsaicinoids** activate receptors not only in the **olfactory system** (for smelling), but the **trigeminal nerves** responsible for sensation of **touch**, **temperature** and **pain** in the face and skin, as well as control over muscles around the **jaws**.¹
- These systems signal **other parts of the brain** that govern decision-making, adrenaline and hormone release, as well as motor function and memory.
- While the specific neurological effect has not been investigated in bears, observational evidence suggests that Bear Spray affects bears more thoroughly than the initial irritation, and is **amplified** by their **pronounced senses**.
- This suggests that it is this effect on the nervous system, amplified by the bear's anatomy, that **explains the effectiveness of Bear Spray**.



1. See [Vanilloid \(Capsaicin\) Receptors and Mechanisms \(Szallasi & Blumberg, 1999\)](#) and [Olfactory/trigeminal interactions in nasal chemoreception \(Brand, 2006\)](#) for more information.

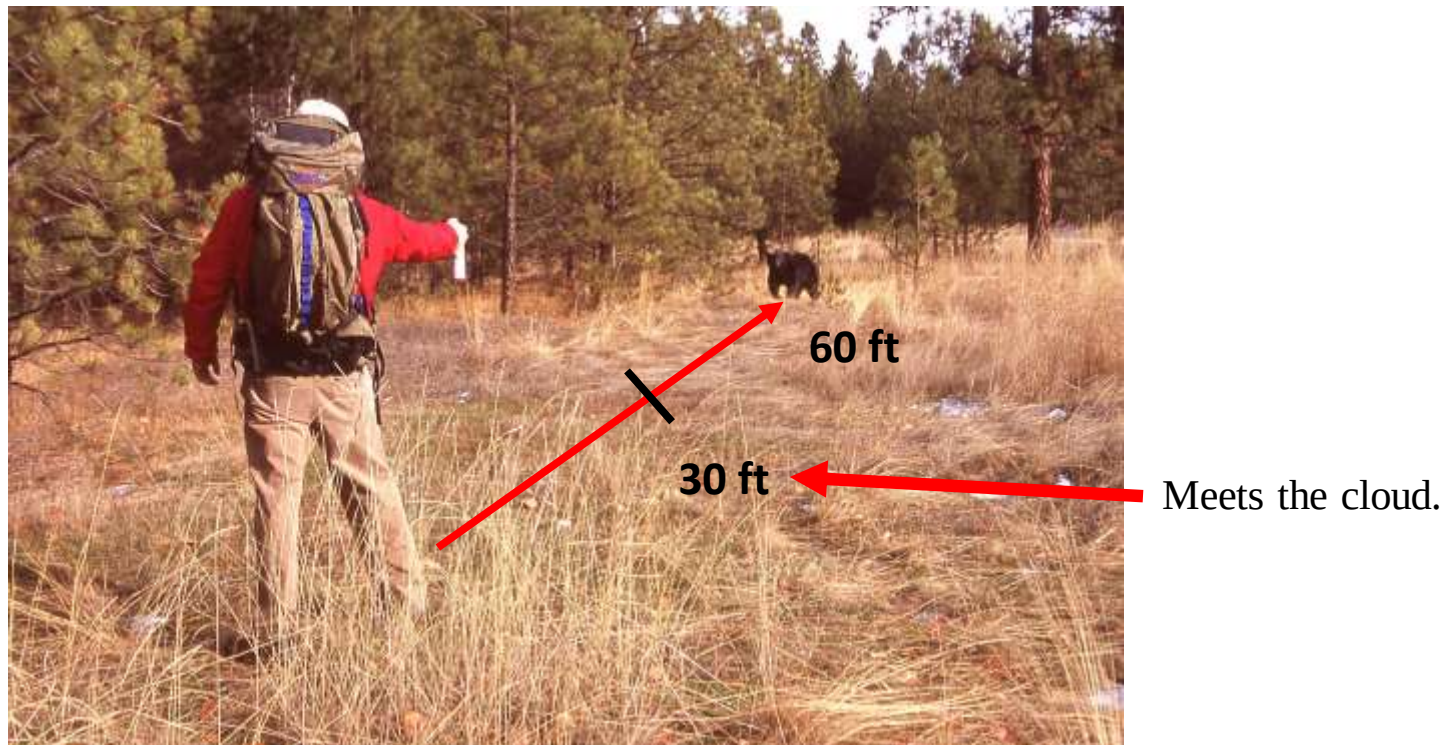
Bear Spray: Close Distance Charge

- If the bear is charging from a close distance of 30-60 feet, spray for **2-3 seconds**. Direct the can **downward** and use a slight **side-to-side movement** to create a wide barrier that the charging bear must pass through to reach you. Monitor any effects of wind.
- The bear spray will billow up in front of the charging bear and the charging bear **will meet** the expanding cloud at about 20-30 ft.



Bear Spray: Close Distance Charge

- Monitor the expanding cloud to see if it drifts from in front of the charging bear or if the bear stops or circles around the expanding cloud.
- **Prepare to spray a second or third time** if the bear continues to re-charge. Monitor the area for other bears.



Bear Spray: Extremely Close Charge

- If the bear is charging from an **extremely close distance** (within 30 feet), direct the can slightly downward and direct the spray at the front of the bear. Continue spraying until the bear breaks off its charge.
- Monitor the bear closely. It may zig-zag or circle around to try to avoid the expanding cloud. Continue to spray in front of the bear while tracking the bear's movements.



Bear Spray: Extremely Close Charge

- If the bear is about to (or does) make contact, try to hang on to the can, drop to the ground on your stomach, and clasp your hands behind your neck to protect your neck and face.
- The bear may smell you and swat you to determine if you are a threat. The Bear Spray will reduce the severity and length of the contact. It will abruptly leave the area. Make sure it is gone before you get up.



Bear Spray: Contact Charge

- If a bear is charging from within 15 feet, such as from a day bed, a berry patch, or a stream bed, you may only have time to **spontaneously spray in front of the bear**.
- If the bear does make contact, hold the can firmly, drop to the ground on your stomach, laying flat, clasping your hands and the can behind your head. **Remain absolutely still.**
- Once the bear **feels the effects** of the inflammatory and irritating agent, it should retreat.
- **Do not move** or **get up** until you are sure the bear **has left the area.**



Bear Spray: Bear in Camp



Habituated and food conditioned bears may enter your campsite during the day or at night. This requires working as a group. Once you are close together, do the following to chase the bear out of the camp:

- **As a group**, yell at the bear. If possible bang pots and pans to get the bear away from the tents and camping equipment.
- Only use your Bear Spray in a way that will **not compromise** your group or camping equipment.
- Bear Spray has been successfully used to get a bear to leave a camp site but **not necessarily to keep it away**.
- Testing on dump bears that were not acting aggressive showed they could be chased from the dump but **would return later** for the established food source.
- Set up a monitoring system and a **buddy system** in case the bear does come back.
- Leave the area and report the incident to local authorities.



Bear Spray: Entering Your Tent

Bears often visit camps at night, sniff around and leave. In case one doesn't:

- When sleeping, keep your bear spray and flashlight together in a consistent spot and within **easy reach**.
- If a bear is entering your tent, either through the entrance or by ripping the side, spray a **short burst directly into the bear's face**.
- **Exit the tent** as quickly as possible to avoid excessive inhalation of bear spray. Most people should be able to function but it's important to leave the confined space as quickly as possible.
- **Be prepared to spray the bear again** once out of the tent.
- **Group together** and retreat to a place of safety (car, tree, building, etc.).



Bear Spray: Nuisance Bear

- In situations where a bear approaches a group of people or enters a residential, picnic or camping area, but is not showing aggressive behavior, you may want to spray a short burst (2 seconds) toward the bear. **Be careful not to force the nuisance bear toward other people.**
- This may cause the bear to charge. Be prepared to spray for an **extended period** until the bear breaks off the charge and retreats.
- Bear spray tested on dump bears that were not charging or attacking showed **only temporary deterrence.**
- Non-aggressive bears that have been sprayed often **return to areas** of food reward.
- Report the incident to local authorities.



Bear Spray: Hunting & Fishing



Always carry your Bear Spray.

Bear Spray: Off-Trail



Hunting and **working** in bear country sometimes requires individuals to travel off-trail. This can lead to a higher risk of sudden close encounters. Use the following techniques to increase your awareness in bear country:

- Heighten your ability to **listen carefully** for breaking branches, rustling leaves, and even heavy breathing and growling.
- Use your **sense of smell** to locate carrion before you find it with an overprotective bear on it. Bird activity may indicate a bear.
- When traveling off-trail try to **avoid going through thick brush**. Go around or between large brushy areas.
- When near **fast-moving water** or on **windy days** be extra alert. Your sounds and scent may not alert a bear of your presence.
- **Scan the area** ahead on both sides and periodically behind you, looking for things out of place, and monitor shadows.
- **Have your Bear Spray ready** if you feel uneasy or you start seeing numerous bear signs (scat, diggings, claw marks on trees, rocks and logs flipped over, etc.).

Bear Spray: Retrieving Game

Hunt and field dress your game with a partner and monitor your surroundings.

Field Dressing & Quartering

- Be aware that **more than one bear** may be drawn to your kill-site.
- When field dressing, have your Bear Spray **within reach** with the **safety wedge off**.
- Monitor the area around you while you work. (**Avoid tunnel vision.**)
- Separate the carcass from the entrails and leave in a clearing where it can be seen **from a distance** on return.

Retrieving

- When returning to your game, watch for ravens and other scavengers. They can signal the presence of bears.
- More than one bear may have bedded down near your game. Monitor the carcass **from a distance** before approaching.



If a bear has claimed your carcass, leave the area and report it to your local wildlife management agency.

Always have your **Bear Spray** ready.

Bear Spray: Bear Spray vs. Gun?



It's not bear spray versus guns, it's about having **options**. Both have advantages and disadvantages.

Bear Spray Advantages:

- You do not have to aim bear spray, **just create a cloud barrier** for the bear to pass through.
- Bear spray allows you to spray the bear even if the bear is **mauling your partner** (avoiding accidentally shooting your partner).
- Bears respond **more quickly** to the active ingredients of Bear Spray than a bullet.
- You do not have to see the bear to spray it.
- The **orange spray cloud** and **whooshing sound** may deter a charging bear.

Bear Spray Disadvantages:

- Bear spray is adversely affected by **wind** and **cold**.
- A **sudden close charge** may leave little time to use either Bear Spray or a firearm.

Bear Spray: Bear Spray vs. Gun?



It's not bear spray versus guns, it's about having **options**. Both have advantages and disadvantages.

Guns Advantages:

- You are already carrying it.
- It is not affected by wind or cold.
- The muzzle blast and sound may deter a charging bear.

Guns Disadvantages:

- Difficult to aim (especially if the charging bear is **not yet visible** due to high grass or brush).
- May not **immediately** stop the bear.
- Bears can **die very slowly**.
- Risk of shooting others.
- Hunters are often carrying an insufficient caliber or load to stop a charging bear.
- Firearms require more training for effective use.
- A **sudden close charge** may leave little time to either spray or use a firearm.

Bear Spray: Bear Spray vs. Gun?

THE SPOKESMAN-REVIEW

SATURDAY, SEPTEMBER 24, 2011



MOSTLY SUNNY ▲ 91 ▼ 55

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Gunshot killed hunter during grizzly's attack

Shooter's family says investigators think bullet ricocheted

By Chelsea Bannach

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A hunter who died during a grizzly bear attack was killed by a single gunshot wound to the chest, the Montana State Crime Lab medical examiner announced Friday.

Steve Stevenson, 39, was killed

when his hunting partner, Ty Bell, 20, shot the grizzly multiple times in an attempt to stop the bear's attack on Stevenson, according to the Lincoln County Sheriff's Office. One of the rounds struck Stevenson in the chest.

Stevenson's funeral was Friday in Winnemucca, Nev. Ty Bell was a pall-

bearer.

"It has been a terrible, terrible journey," said Belinda Bell, Ty Bell's stepmother.

Investigators have indicated to her family they believe the bullet likely hit the bear first, she said.

See HUNTER, A7

ALSO TODAY

» **Study:** Yellowstone National Park will review ways to reduce encounters between bears and humans/**Page A5**

COMING SUNDAY

» **Outdoors:** A look at hiking in the bear country of Yoho National Park, Canada.

Shot by partner during a polar bear attack:



Bear Spray: Farm & Ranch



On the eastern front of the Rocky Mountains grizzly bears have followed creeks and rivers away from the mountains onto the plains, visiting farms and ranches to feed on crops such as corn, peas and grains. This has been a common occurrence elsewhere in North America with black bears.

To avoid encounters, the following safety precautions are recommended:

- When working before dawn and after sunset be extra alert for sudden bear encounters. Call out to alert unseen bears.
- Monitor kids who walk to school bus stops or to school.
- Windbreaks, hedge rows and fence lines are all potential bed sites for bears and mountain lions.
- Equipment operation and noise can easily distract from a bear's approach. Scan the area often.
- Creeks, streams and rivers can be corridors for bears. Be extra alert when working close to them.



Always carry your **Bear Spray**.

Bear Spray: Predatory Bears



Predatory bears are very rare but extremely dangerous. They can become very focused on an individual, groups or children. They will try to take down or reach the individuals they are focused on and ignore all other activities.

- Bear Spray or a firearm are crucial for the person who is being attacked.
- **Spontaneous response** with your Bear Spray. This is where practice unholstering your Bear Spray and removing the safety wedge provides vital seconds when protecting someone being attacked.
- If an attacking bear has someone down or is about to take them down. First, stop the behavior and spray the attacking bear with a 2-3 second burst before attending to the victim.
- Be prepared for the attacking bear to focus on you and charge. Be prepared to re-spray.
- Work as a group to make it clear to the attacking bear that it should retreat and stop its attack.

Always carry your **Bear Spray**.

Bear Spray: Polar Bears

Bear Spray has not been formally tested on polar bears, but there have been numerous recorded accounts of biologists successfully using Bear Spray to deter polar bears. Many of these instances have been recorded and are available online. The following precautions should be used in polar bear habitat:

- **Cold temperatures** directly affect the Bear Spray distance, so the bear will need to be closer than what is recommended to be sprayed effectively.
- Carry Bear Spray in a bottle warmer, inside of an insulated pocket that is still readily accessible.
- At night Bear Spray should be readily accessible and **protected from the cold**.
- Polar bear habitat also often includes **extremely high wind**. Prepare to redirect or re-spray.
- Appropriate back up protection is recommended such as a **shotgun with slugs** and proper load.
- Travel and **work in groups**.
- Carefully scan the area around you and in the distance. Polar bears can disappear and re-appear in the snow-covered environment.



Bear Spray: Cougars, Wolves, Coyotes

- Bear spray has been successfully used in deterring attacks by cougars, wolves and coyotes.
- As with charging bears, **additional sprays (up to two or three times)** were sometimes needed to stop the aggressive advances.
- There is only anecdotal evidence for this and there has been no formal EPA testing to verify its effectiveness. Because of this, bear spray **cannot be sold for use on other animals**, but individuals can use it in self-defense against them.
- Use the same techniques for spraying bears to spray cougars, wolves and coyotes.



Visualizing Bear Encounters



- Practice removing the bear spray canister from the holster until it is **spontaneous**.
- Practice removing the safety wedge until it is **spontaneous**.
- Practice holding the can firmly with either one hand or two hands until it is **spontaneous**.
- Practice directing the canister **slightly downward** so the spray **billows up** in front of the bear.
- **Use mental visualization** to prepare yourself for a charge that may never happen.
- Use your **ears**, **eyes**, and **nose** to be aware of your surroundings and your **voice** to call out, “Oh bear, hey bear,” to let bears know you are coming down the trail.
- Learn to identify **bear activity signs**, such as scat, diggings, rocks and logs rolled over, claw marks, and pungent smells.

Bear Spray: Test What You've Learned



The scenario:

You are hunting, hiking or working off trail in a bushy area and you have seen lots of bear sign.

How prepared are you for a bear encounter and what would you do?

Are you ready?

Are you practicing **bear awareness**?

Bear Spray: Test What You've Learned



The scenario:

You are hiking in bear country and you come upon a photographer and tourists watching a bear eat clover. It is non-aggressive. Do you take out your camera and start taking photos?

How prepared are you for a bear encounter and what would you do?

Are you ready?

Are you practicing bear awareness?



Bear Spray: Bear Encounter



A mother grizzly and her three cubs come out of the woods onto the road you're walking on. Notice that the cubs are almost as big as the mother. The Bear Spray you are carrying sprays for **4 seconds**? **5 seconds**? **7 seconds**? Or **9 seconds**? Which bear would you spray first, and will you have enough additional spray for the others? Did you bring one can or two?

Bear Spray: Carefully Review



1. Active Ingredient:
1%-2% capsaicin and related **capsaicinoids**.
2. You do not aim bear spray, you **direct** the **powerful, expanding cloud in front of the charging bear**.
3. Short or half-second bursts are **ineffective** unless in a confined situation, such as a tent.
4. Spray **distance** is **25 feet**, enabling you to spray a charging bear within 60 feet. The bear will meet the spray cloud at approximately 25 feet, giving it time to divert its charge.
5. Spray **duration** of **7 seconds** allows you to compensate for wind, cold, multiple bears and multiple charges.
6. Hold the can firmly so it **doesn't tilt up** and spray above the charging bear. The spray cloud will naturally billow up.
7. If the bear is **within 60 feet**, spray with a **side-to-side movement**, creating a **barrier** in front of the charging bear.
8. If the bear is charging **within 30 feet**, **direct the spray slightly downward** in front of the bear and continue spraying until it breaks away.

Section Five

Transportation & Storage



Bear Spray: Storage

General:

- Cool dry place out of reach of children.
- Transport carrier designed for spray.
- Low tech: Ammunition box lined with foam (add vent hole for propellant to escape) or multiple layers of towels.



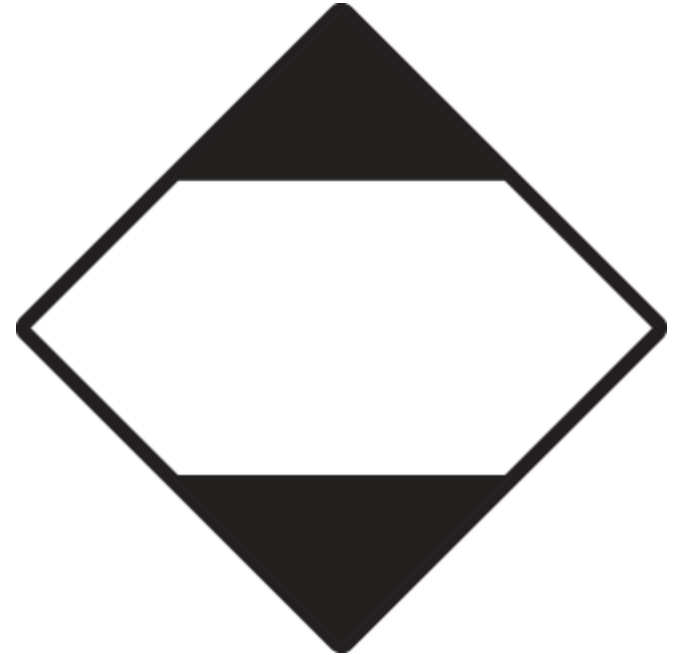
Vehicles:

- In separate area away from driver (i.e. trunk or rear of vehicle).
- In storage canister or other form if available.

Bear Spray: Shipping

Bear Spray can be shipped home by ground using a Limited Quantity Label with the following information included:

- Shipping classification:
Ground: Limited Quantity
UN 1950, Aerosols Flammable
- Chemical emergency phone number.
- List the product as Bear Spray.
- The size of the canister.



It should be packaged in a reinforced box with a tie strip around the safety wedge.

Labels are available online under “Limited Quantity Label.” Some shippers have them.

Please note, these are new requirements and may change.

Bear Spray: Transporting

Aircraft

- Fixed aircraft or helicopters ship bear spray in floats or external storage areas.
- Some outfitters have taped bear spray to the outside of the aircraft.
- Store in protective transporting container.
- It is illegal to take Bear Spray on commercial airlines.



Vehicles

- Follow departmental policy.
- Store as far away from the driver as possible.
- Secure the canister to prevent it from moving around.
- Do not store in direct sunlight.



Bear Spray: Accidental Discharge

Do not store where temperatures are above 120° F. An increase in temperature creates an increase in pressure, which may cause seals and seams to fail. **Do not leave in direct sunlight in a vehicle.**

If you have an accidental discharge or leakage:

- The bear spray cloud will degrade in sunlight in 48 to 72 hours, but the oil will remain.
- Open door and windows.
- Clean surfaces with soap (Dawn or Simple Green), water, and wear gloves.
- Discharge container outdoors and into the ground on a calm day.
- Wrap in paper and discard with normal waste.

Bear Spray: Other Considerations

- Cans should be replaced after **3-4** years. Check your manufacturer's guidelines.
- Cans should be disposed of after **any** type of use, even if it was only partially used.
- Avoid storing cans in areas above 120 ° F. Cans may rupture at these temperatures. Avoid direct sunlight or through a window, which causes magnification.
- Bear spray is flammable, keep away from flame or spark.

Bear Spray: First Aid

Treatment

- Move into uncontaminated area.
- Remove your contacts immediately. They may need to be replaced.
- Remove and replace clothing that has been sprayed.
- Thoroughly rinse affected areas with cool water.
- Use non-oil based soaps and rub the affected area VERY gently.
- Do not use creams or lotions.
- Irritation may last 45 minutes or longer.
- If symptoms persist or if you have breathing or vision problems, seek medical attention.

USGS Employee Certification

USGS 445-2-H - Appendix 46-2

Certificate of Need/Completion of Training for Use/Issuance of Bear Spray

Name of Requestor: _____
Project: _____
Location of field work: _____
Purpose of Use: _____

First Name MI Last Name

Sample

Time Frame of Use: _____

Start Date Return Date Date of Request

Employee Training Certification: I certify that I have completed all appropriate training requirements as outlined in Chapter 46 of the Occupational Hazards and Safety Procedures Handbook (445-2-H) on the use of bear spray as follows:

- 1.Date of Bear Pepper Student Manual review:_____
- 2.Date of Completion of USGS Instructor Led; CD-ROM or Online Training:_____
- 3.Date of Completion for Instructor Led practical hands-on demonstration or conducting a practice release using an inert canister in accordance with the directions and method of use outlined in the Student Manual _____

Employee's Printed Name/Signature: _____
Date:_____

Supervisor Approval: I certify that the following employee has a need for the use of bear spray in connection with his/her official duties and that he/she has met the training requirements outlined in the USGS Occupational Hazards and Safety Procedures Handbook (445-2-H), Ch. 46.

Supervisor's Printed Name/Signature: _____
Date:_____

Original: Filed locally by the Employee's Supervisor.

Copies: Employee and Collateral Duty Safety Program Coordinator

Completion of "Certificate of Need" and Supervisor Approval/Signature is required for certification to carry/use Bear Spray.

Employee Training

To be certified to carry/use Bear Spray:

1. Read and understand bear spray BBA instructions and PowerPoint.
2. Train using an inert bear spray canister.
3. Complete a “Certificate of Need for Use/Issuance of Bear Spray” with your Supervisor’s Approval and Signature.
4. Forward copies of the Certificate of Need to your Supervisor and Team/Local Safety Officer.
5. Employees who carry Bear Spray should be first-aid and CPR-certified.

Recommended Policy & Guidelines

1. Bear Spray can only be carried/used by employees who have completed the training requirements.
2. Completion of bear habitat/behavior training is strongly recommended.
3. Bear Spray is only intended to deter against charging bears. It has shown effectiveness with wolves, cougars, and coyotes, but has not been officially tested on them.
4. Bear Spray should always be handled with care and safety in mind.
5. Storage and transportation of Bear Spray shall meet Department of Transportation (DOT), Environmental Protection Agency (EPA), and DOI regulations/policies.

Continued...

Recommended Policy & Guidelines

6. Bear Spray canisters will be replaced every four years if unused and as soon as possible following any usage. Only full canisters should be carried in the field.
7. Bear Spray shall meet the guidelines of the Interagency Grizzly Bear Committee (IGBC).
8. Bear Spray Refresher training may be required with significant bear spray product changes.
9. All animal encounters where deterrence was required shall be reported to local authorities, your immediate supervisor, and appropriate Safety personnel.
10. All accidental releases of bear spray shall be reported to your immediate supervisor.

Bear Spray: References & Credits

Carrie Hunt

Montana Fish, Wildlife & Parks

Dr. Charles Jonkel

Parks Canada

Bill Pounds

U. S. Forest Service

Dr. Stephen Herrero

U. S. Fish & Wildlife Service

Dr. Tom Smith

National Park Service

James Claar, USFS, retired

Alaska Game and Fish

Kim Barber, USFS, retired

Wyoming Game and Fish

Karrie Gunther, NPS

Environmental Protection Agency

John Waller, NPS

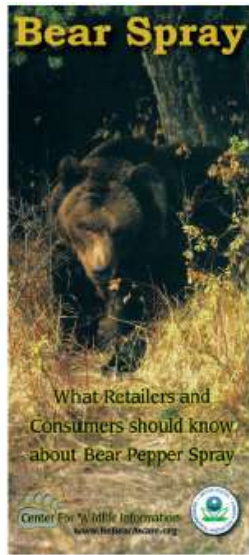
Aerosol Spray Industry

Ellen Beller, Biologist

Morgan Sparks, Biologist

Dan Lowe, Mac to Basics

Chuck Bartlebaugh, Be Bear Aware Campaign



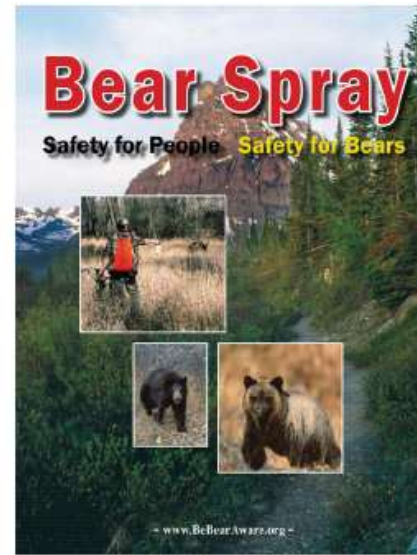
Bear Spray Brochure



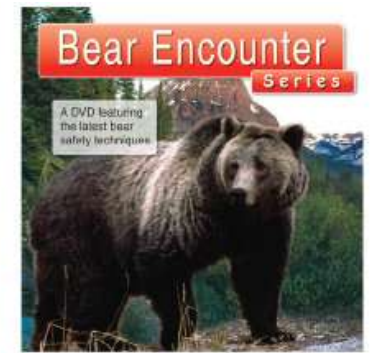
Hiking In Bear country



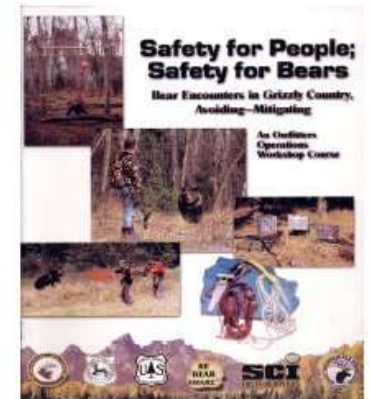
11x17 Bear Spray Poster



CWI Bear Spray Instructing Guide



Bear Encounter Series #1



Instructors Guide For Training, Employees and Guests



4x6 Bear Id Card



4x9 Bear Spray ED Card





Presenting bear avoidance education programs across the United States and Canada since 1976.