

BOARD OF REVIEW REPORT

Fatality of Mr. Lance Crosby from a bear attack on Elephant Back Mountain in Yellowstone National Park on August 6, 2015

January 6, 2016

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Summary:

Mr. Lance Crosby, a 63-year old man from Billings, Montana, was killed by a grizzly bear on Elephant Back Mountain on August 6, 2015. Mr. Crosby had worked for five summers as a seasonal employee at the Lake Medical Clinic at Lake Village in Yellowstone National Park. Mr. Crosby was last seen alive by co-workers between 1100 and 1200 hours on Thursday, August 6 at the Lake Medical Clinic. He was reported missing at approximately 0901 hours on August 7 after he did not show up for his 0800 hours work shift. A Search and Rescue crew found Mr. Crosby's remains on August 7.

Format of this Report:

An interagency Board of Review composed of state and federal personnel prepared this report. A Board of Review is required after any human fatality caused by a grizzly bear as per the Interagency Grizzly Bear Guidelines (p. 59). This report is based on the efforts and investigation reports by Yellowstone National Park personnel, particularly

¹ Arranged in alphabetical order by agency affiliation.

² Chair of the Board of Review.

bear management biologist Kerry Gunther. This report summarizes the incident, the management response, and the eventual resolution. After examining the detailed investigation materials, the Board of Review members discussed the incident and followed up on some details to clarify particular issues. Information that was used to develop the finding of the Board of Review is appended to this report. The Board of Review attempted to reconstruct the incident as much as possible given the information available while avoiding speculation about details not supported by the evidence. All times in this report are Mountain Daylight Time.

Situation:

The Elephant Back Trail is a day-use loop trail that does not have any designated backcountry campsites. Dispersed backcountry camping is prohibited in this area. The trailhead for the Elephant Back Trail is located approximately 1.6 kilometer (km) (1 mile (mi)) south of Fishing Bridge Junction on the road between Lake Village and Fishing Bridge (Figure 1, Figure 2). The trail climbs about 244 vertical meters (m) (800 feet (ft)) from the trailhead at 2,377 m (7,800 ft) to the Elephant Back Mountain overlook at 2,621 m (8,600 ft). The distance from the trailhead to the overlook and back is approximately 5.96 km (3.7 mi). The lower section of the trail is located in a closed-canopy forest dominated by lodgepole pine approximately 150 to 300 years post-fire, with the overstory still largely intact (Figure 3). The understory along the lower trail consists of lodgepole pine, Englemann spruce, subalpine fir, and whitebark

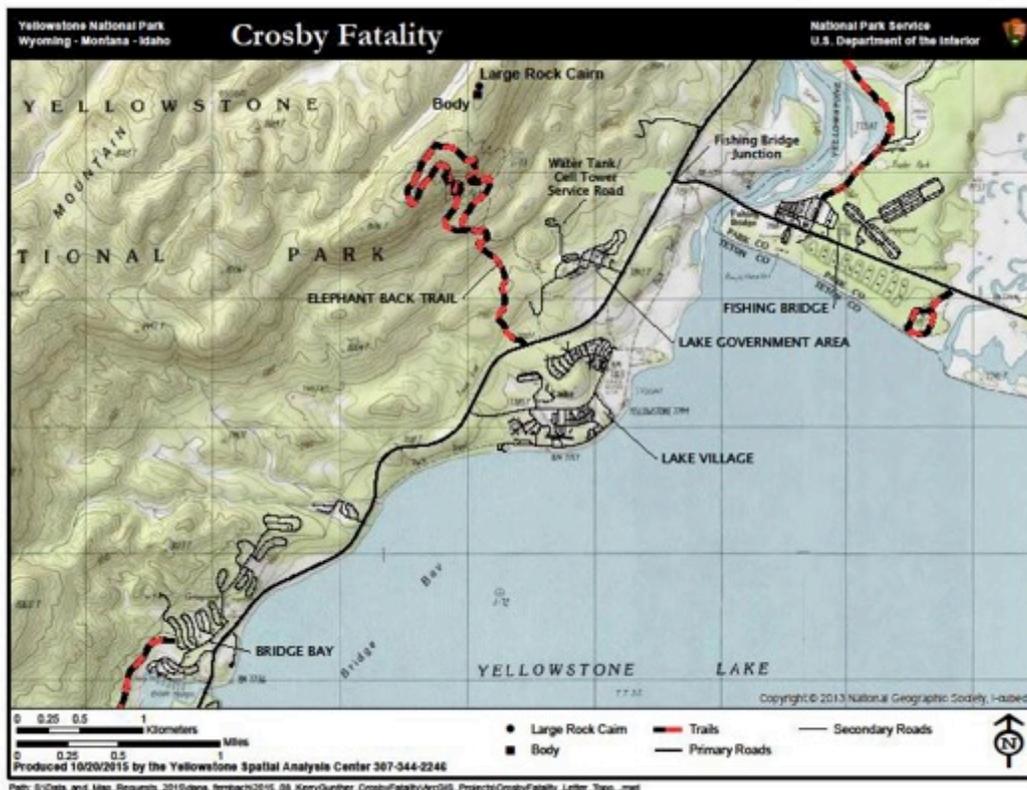


Figure 1. Map of Elephant Back Mountain trail area and location of fatality. seedlings and saplings. The upper section of the trail and the body burial cache site

pine are located in a climax stand of over-mature lodgepole pine that is over 300 years old, with some whitebark pine present. The stand is beginning to break up; regeneration in the understory consists of lodgepole pine and whitebark pine. The trail is popular with park visitors staying at the Lake Hotel, Lake Hotel rental cabins, and Lake Lodge rental cabins as well as visitors camping in the Bridge Bay Campground. Due to the trail's proximity to National Park Service and Concessioner (Xanterra Parks & Resorts, Delaware North, Yellowstone Park Service Stations, Medcor, Federal Highways Department) housing facilities (dormitories, apartments, trailers, cabins), the trail is also very popular with employees for day-hiking, exercise walking, and jogging. The trail receives a high level of human recreational use.

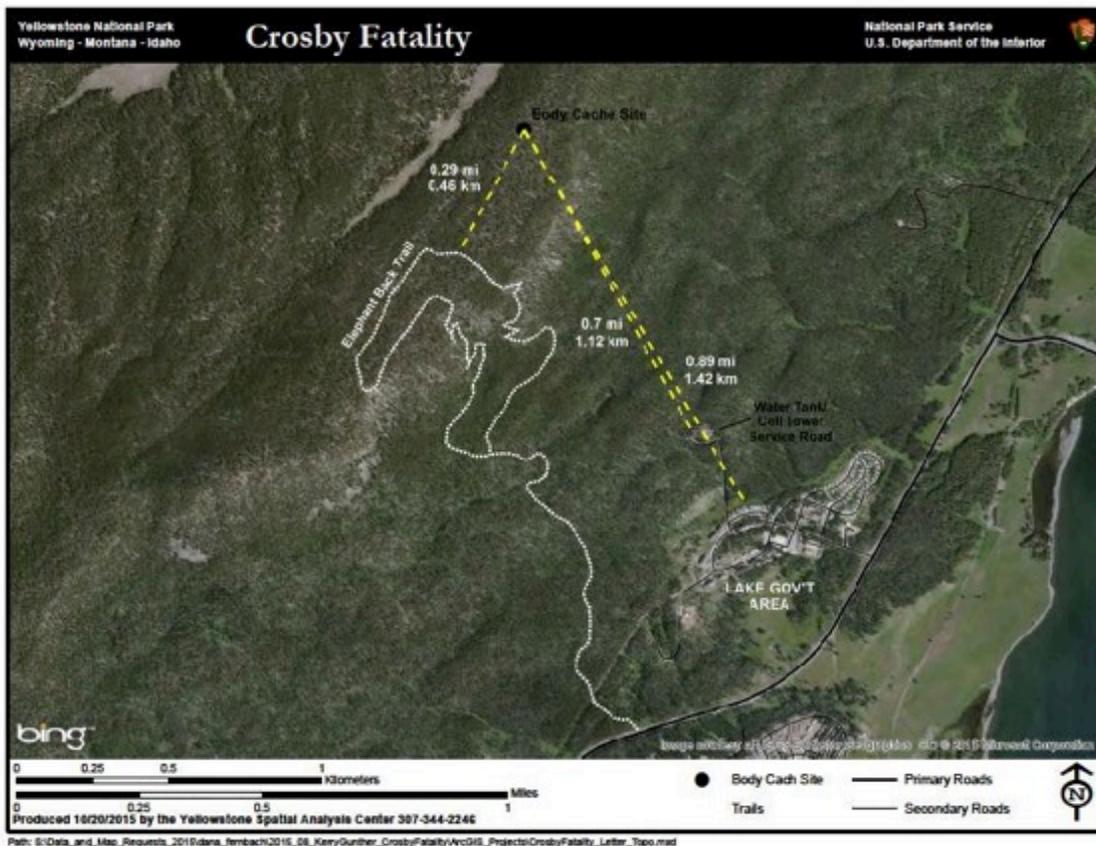


Figure 2. Map of the Crosby fatality site showing straight-line distances from the body burial cache to the Elephant Back Trail, Lake Village water tank/cell tower service road, and the nearest residence in the Lake Village Government Area.

Background on the Search for Mr. Crosby:

The summer of 2015 was Mr. Crosby's fifth summer working for Medcor at the Lake Village facility. Mr. Crosby's wife and friends stated that he was an experienced hiker who loved Yellowstone National Park, enjoyed exploring, and had a strong interest in bears. Mr. Crosby was last seen alive by co-workers between 1100 and 1200 hours on Thursday August 6 at the Lake Clinic. He was reported missing at approximately 0901 hours on August 7, after he did not show up for his 0800 hours work shift. There are no

known witnesses to Mr. Crosby's movements or whereabouts between 1100 and 1200 hours on August 6 and when his body was found at 1201 hours on August 7.

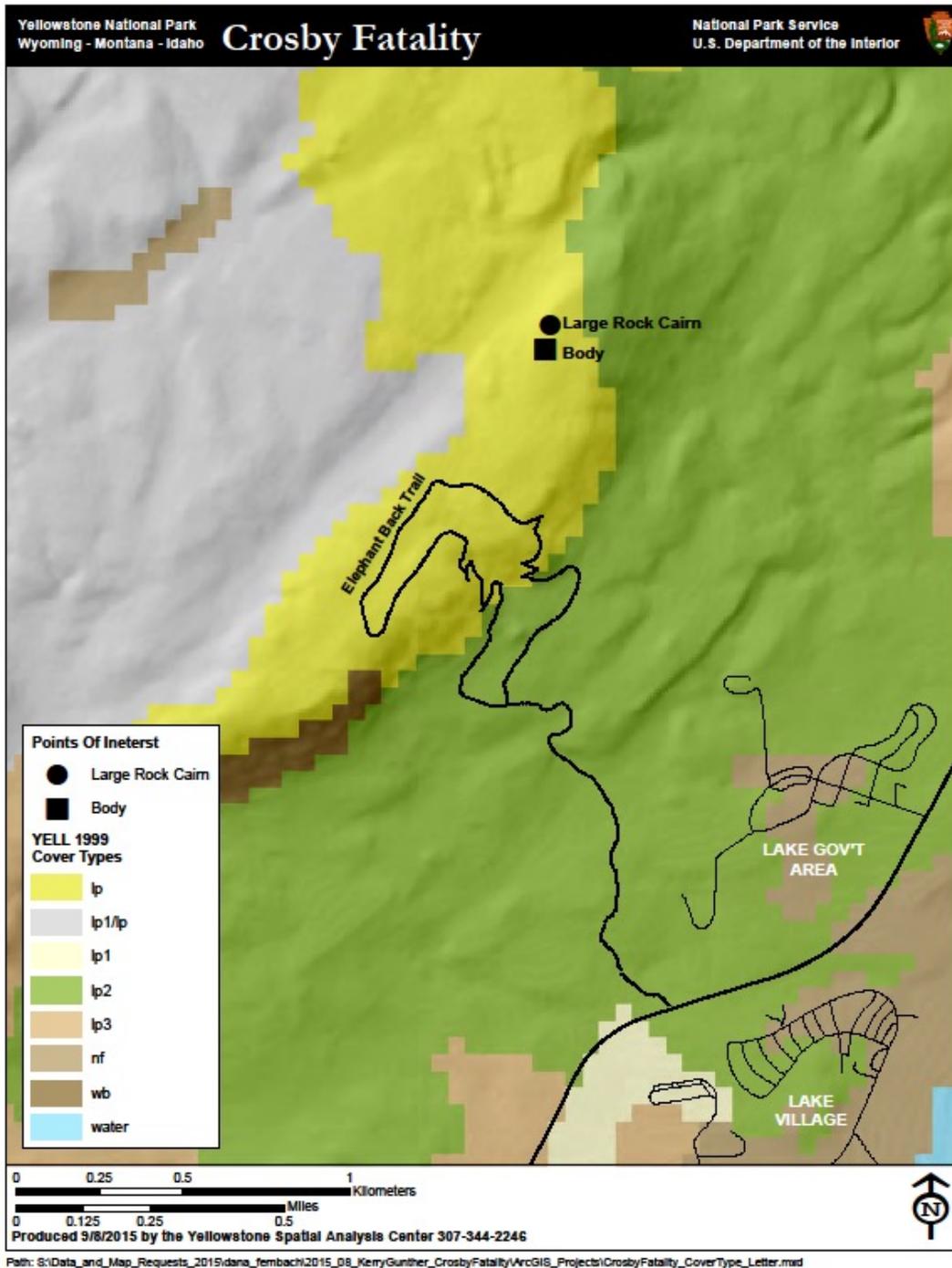


Figure 3. Vegetation cover-types along the Elephant Back Trail and Crosby body burial cache site, Elephant Back Mountain, Yellowstone National Park (Yellow [lp]: climax stage lodgepole pine more than 300 years old; Green [lp2]: lodgepole pine stand 150 to 300 years old; Dark Brown [wb]: climax stage whitebark pine; Gray [lp1/lp] intermixed mosaic of small diameter lodgepole pine 50 to 150 years old and climax stage lodgepole pine).

Upon receipt of the missing person report on Mr. Crosby, Search and Rescue Team foot searches were initiated along the Yellowstone Lake beach from the Lake Ranger Station to Fishing Bridge Junction, the Natural Bridge Road, and the Elephant Back Loop Trail as these were three of Mr. Crosby's favorite local trails. A search of the beach and shoreline of Yellowstone Lake by boat from Bridge Bay to Fishing Bridge was also initiated. Mr. Crosby's body was found at 1201 hours approximately 3 hours after he was reported missing during a search of the Elephant Back Trail area. The ranger that found the body initially saw hiking boots protruding from a carnivore burial cache. For safety, the ranger immediately backed-out of the area and reported his find. To preserve evidence and promote visitor safety, the Elephant Back trail and Elephant Back Mountain area were immediately closed to public access (Figure 4).

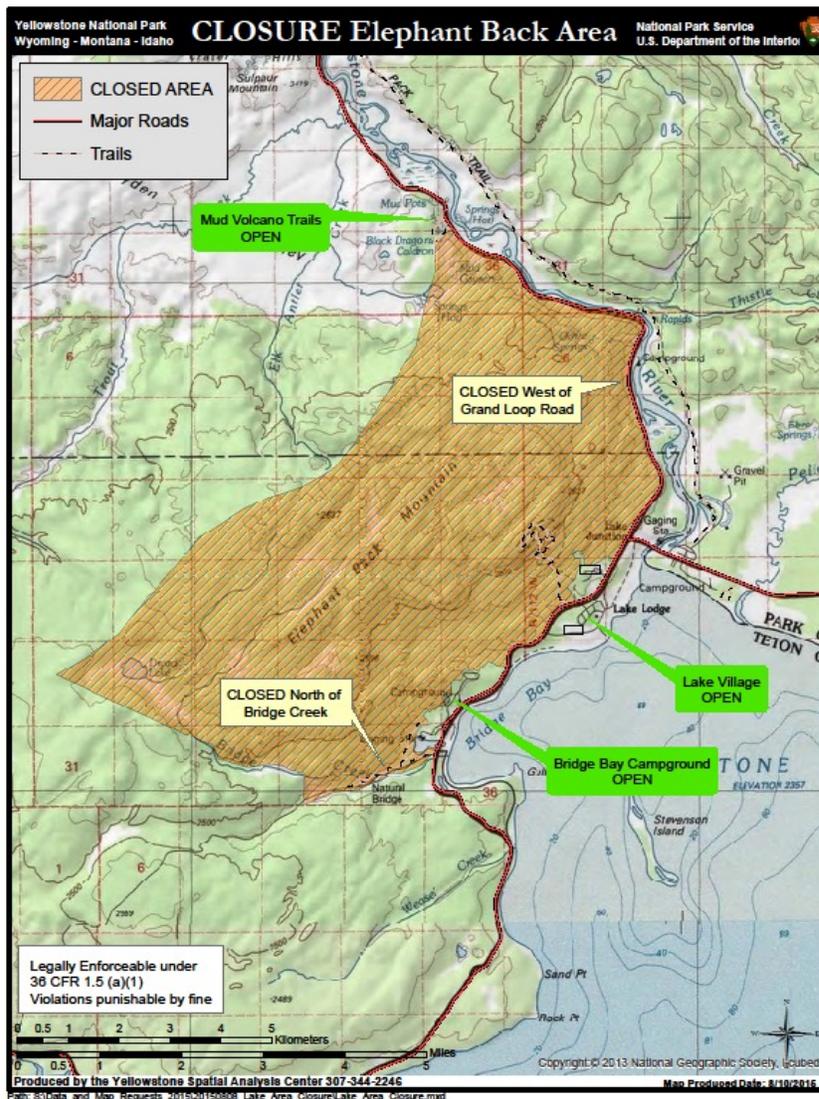


Figure 4. Map of the recreational activity closure of the Elephant Back Trail and Elephant Back Mountain area, August 7 – August 17, 2015, to preserve evidence and enhance visitor safety following the fatal bear attack on Lance Crosby on Elephant Back Mountain, August 6, 2015.

Fatality Site Investigation:

As soon as the body was found, an investigative team consisting of law enforcement rangers, bear management personnel, and medical personnel was formed. At this time, the search became a body recovery and cause of mortality investigation.

At 1304 hours the investigative team began hiking to the site, clearing all hikers from the trail as they went. At 1342 hours, the investigative team reached Elephant Back Mountain, left the trail, and began heading northeast toward the body burial cache site. Visibility was relatively poor due to forest cover. As the team approached the body cache site, a bear cub or cubs barked/bawled three to four times and an adult bear with a light brown rump and dark brown legs was observed running away from the burial cache.

Body recovery site: Mr. Crosby's body had been cached by a carnivore 0.46 km (0.29 mi) from the upper end of the Elephant Back Trail (Figure 2). The body was located 1.12 km (0.7 mi) from the Lake Village water-tank/cell tower service road and 1.42 km (0.89 mi) straight-line distance from the Lake Government housing area.

Elephant Back Mountain, where Mr. Crosby's body was found, forms a natural off-trail travel corridor for people, bears, and other wildlife. The amount of sign of human activity (rock cairns, campfire ring, peoples initials outlined with rocks, etc.) found in the area indicates that it receives at least a low level of dispersed recreational day-use, probably primarily by local residents of Lake Village and the Lake Village Government Area (Figure 5). Elephant Back Mountain is just over one-half mile from the nearest road and less than 1 mile from the nearest residential home. The Elephant Back Mountain area is not remote wilderness, but in a transition zone between rural human development and wilderness.

The victim was found face down on his stomach with his left arm under his chest and his left leg crossed over the calf of his right leg (Figure 6). The body had been covered with dirt, duff, rocks, grass, sticks, and pine needles typical of the manner in which grizzly bears, black bears, and mountain lions cache animal carcasses. Mr. Crosby was wearing leather hiking boots, long pants of a lightweight canvas material, and a brightly colored, long-sleeved, button down, collared shirt over a t-shirt. Sunglasses hung from a strap around his neck and a ball cap was found near his body approximately 0.9 m (3 ft) from his left foot. Although the area was thoroughly searched, no camera, cell phone, pack, water bottle, or bear spray were found at the burial cache or the surrounding area.

The only other potential personal possession found at the scene was an old electronics vacuum tube located on the top of the burial cache approximately 0.8 m (2.5 ft) below Mr. Crosby's feet (Figure 7). Vacuum tubes largely disappeared from use in the



Figure 5. Sign of human activity - large rock cairn 75 m (248 ft) from body burial cache [bottom photo], two small rock cairns [top left & right photos], and someone's initials [top right photo] on Elephant Back Mountain, an off-trail dispersed hiking area accessed by the Elephant Back Trail, Elephant Back Mountain, Yellowstone National Park, August 7, 2015.

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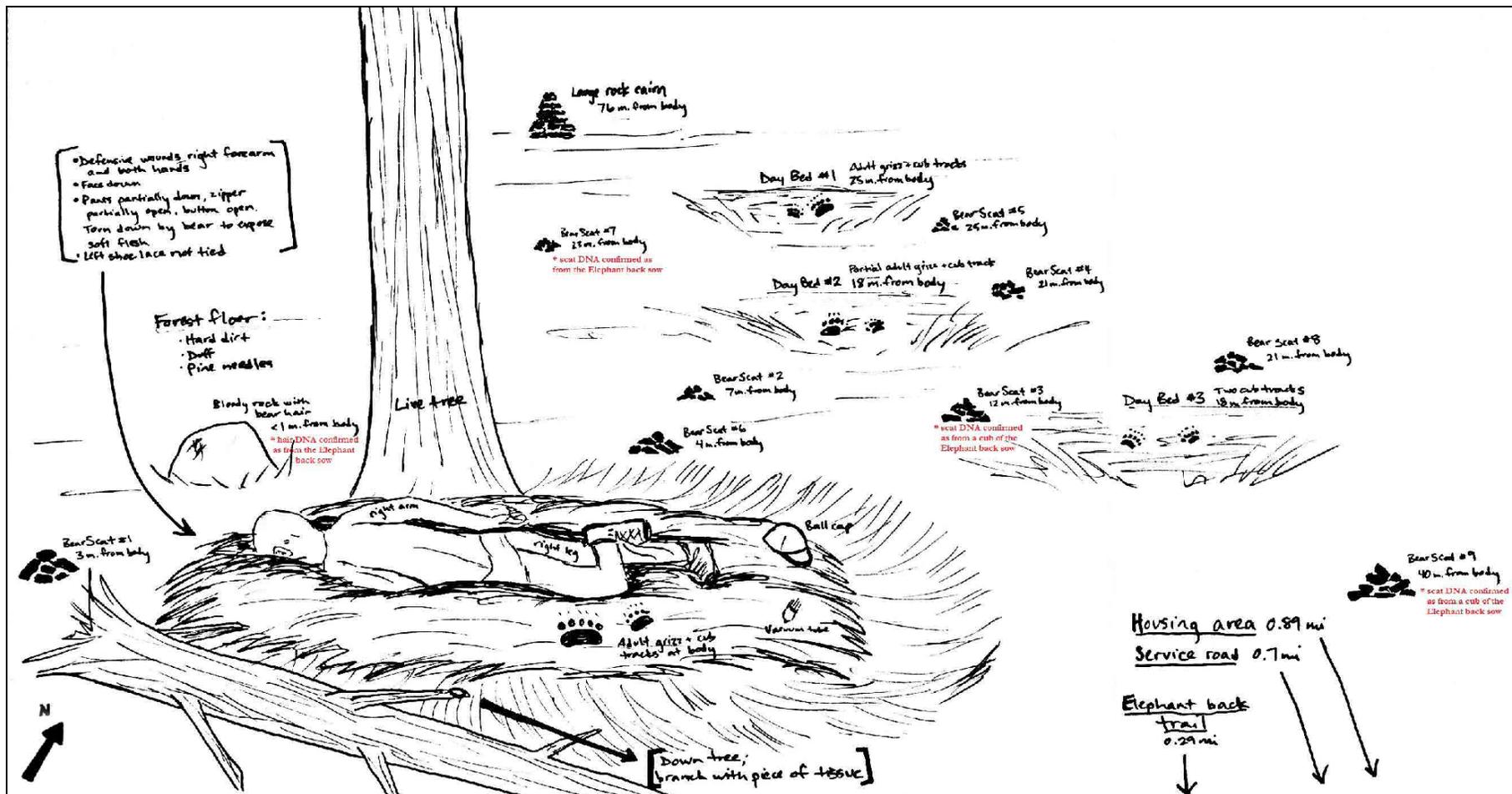


Figure 6. Sketch diagram of the Crosby fatality scene on Elephant Back Mountain, Yellowstone National Park displaying the body burial cache in relation to bear tracks, hair, scat, daybeds and other evidence found at the scene; results of DNA analysis are shown in red letters (map not drawn to scale).

1960's after the invention of silicon transistors. It could not be determined if the vacuum tube had fallen out of Mr. Crosby's pocket, or if it had been dug up from the soil as the body was being cached. The vacuum tube did not have the appearance (corrosion, soiling, etc.) of something that had been buried in the dirt or exposed outside to the elements for a long period of time.

The body had been partially consumed and exhibited canine bite wounds and other injuries consistent with a bear attack. There were defensive (blocking type) bite wounds on Mr. Crosby's right arm and both hands. Bruising associated with some wounds on the arms, hands, head, face, shoulders, and upper back indicated that Mr. Crosby was alive at the time these wounds were inflicted.

Tracks of an adult female grizzly bear and cub(s) were found next to the body and in daybeds near the body. Grizzly bear hair was found on the body, in the hinge on the stem of Mr. Crosby's sunglasses, in the burial cache dirt/duff pile covering the body, on a bloody rock next to the body, and in bear daybeds near the body. The canine width distance of puncture wounds inflicted on Mr. Crosby while he was alive were consistent with those of an adult female grizzly, subadult male grizzly, or large adult male black bear. The width of the canine puncture wounds were too small to have been inflicted by an adult male grizzly bear and too large to have been inflicted by a mountain lion, wolf, coyote, or an adult female or subadult male or female black bear.

The incident scene was compact and remarkably free of human-related evidence (boot tracks, blood spatter, clothing fragments, personal possessions), except at the burial cache. Evidence at the site indicated that the attack and death occurred in a small area at the site of the cached body. There was no body drag trail, no disturbed ground indicating an attack path, no disturbed soil or vegetation indicating a struggle, no blood anywhere outside the body cache, and no clothing fragments or personal possessions found outside of the body burial cache. All of this evidence and the fact that Mr. Crosby's ball cap was found within 3 ft of his left foot on the cache suggest that the initial contact by the bear and the death of Mr. Crosby occurred at the location where the body was found. Only bear scats, bear feeding sites (mushroom digs), and bear daybeds with associated bear tracks and hair were found outside the body cache.

At 1957 hours, after the incident scene investigation had been completed, the body was flown out by helicopter and two bear traps were flown in and set 9.4 m (10.3 yd) from the body burial cache. The body was further examined at the Lake Clinic to measure canine bite wounds and to collect bear hair and bite wound saliva for DNA analysis.

Evidence of Bear Activity in the area of Elephant Back Mountain:

Lake Village, the Lake Village Government Area, Elephant Back Mountain, and the Elephant Back Trail are located in habitat frequented by both grizzly bears (Figure 8) and American black bears (Figure 9). In 2015 up to August 6, the likely date of the fatality, 327 reports of grizzly bear activity and 40 reports of black bear activity were



Figure 7. Old electronic vacuum tube from an electric device found partially buried on top of the body burial cache near Mr. Crosby's feet. The presence of this item in the area where Mr. Crosby's body was found is unexplained.

recorded within a 30-km radius of the fatality site. The majority of these bear sightings occurred along the Grand Loop Road where most visitors in the area spend the majority of their time. The absence of reported bear sightings in backcountry areas further from the road is due to fewer people in those areas to see and report bears. From spring den emergence through August 6, 2015, only one bear sighting on the Elephant Back Trail itself had been reported. No bear sightings had been reported on Elephant Back

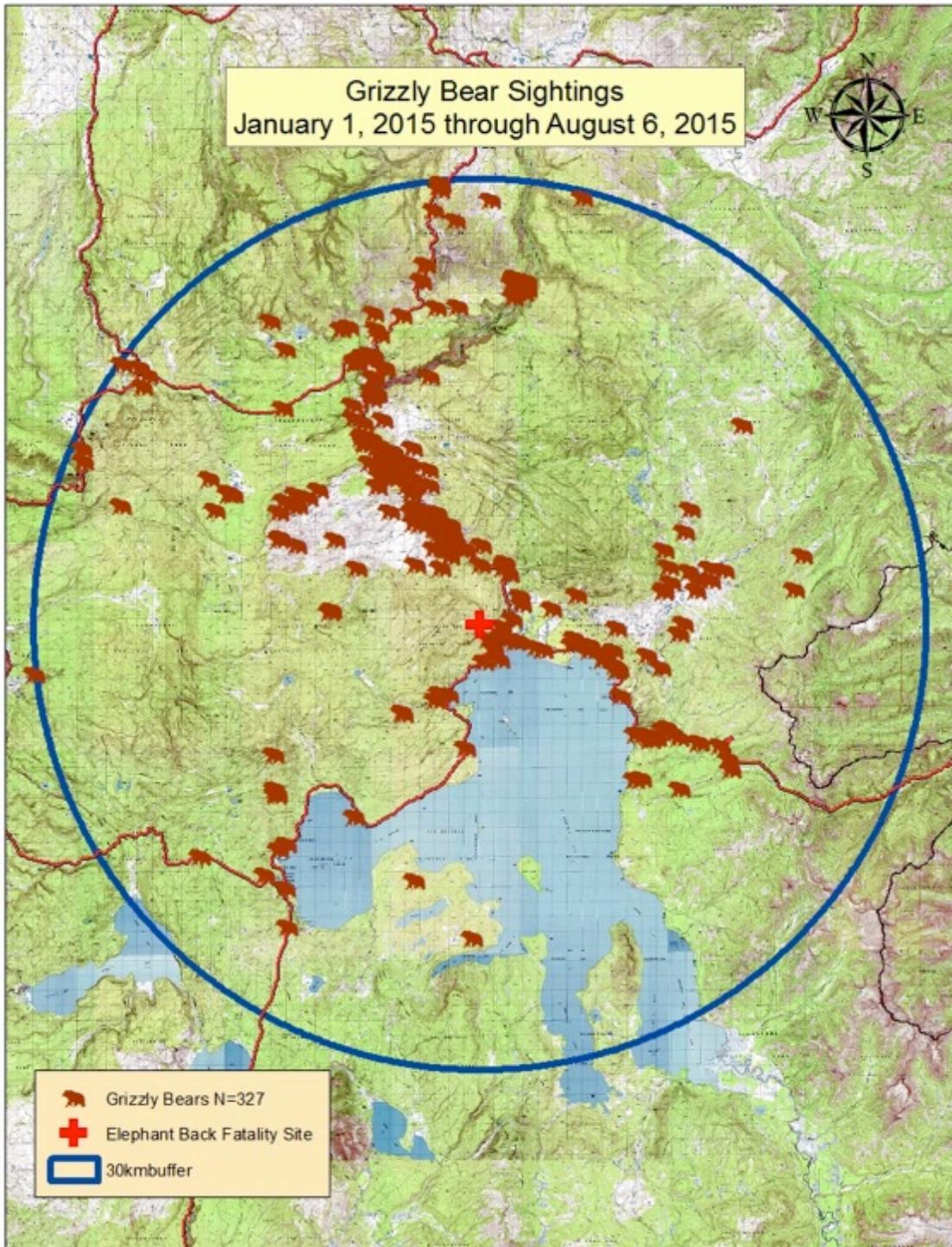


Figure 8. Grizzly bear activity (observations and tracks) reported from spring den emergence through August 6, 2015, within a 30-km radius of the Crosby fatality site on Elephant Back Mountain, Yellowstone National Park.

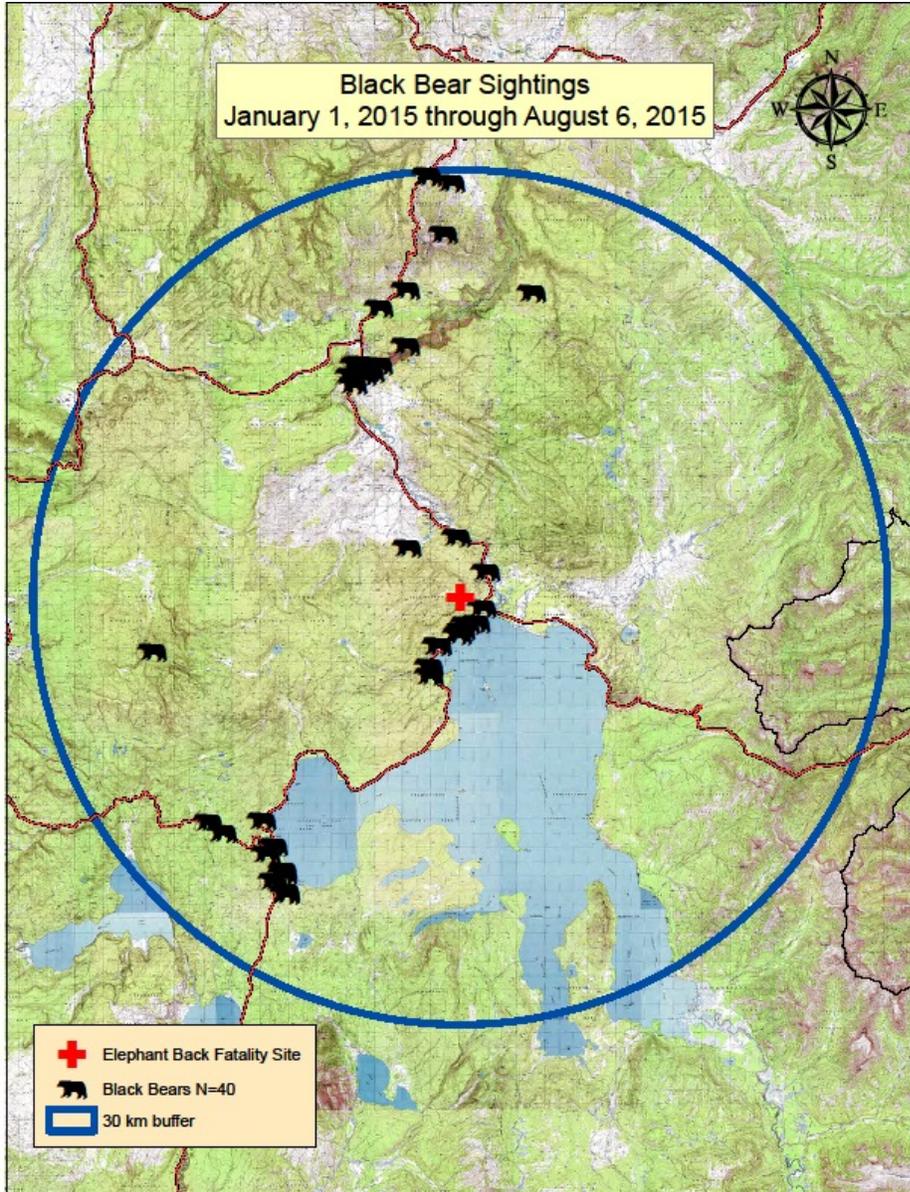


Figure 9. Black bear activity (observations and tracks) reported from spring den emergence through August 6, 2015, within a 30-km radius of the Crosby fatality site on Elephant Back Mountain, Yellowstone National Park.

Mountain. The bear sighting along the Elephant Back Trail occurred on June 23, 2015, 43 days before the fatal attack. The hiker who reported this bear on the trail was not able to identify the species of bear that he saw.

Burial Cache Site:

The forested ridge where the body was found forms a natural off-trail travel corridor for people, bears, and other wildlife. The amount of sign of human activity (rock cairns,

campfire ring, peoples initials outlined with rocks, etc.) found on Elephant Back Mountain indicates that it receives at least a low level of dispersed recreational day-use, primarily by local residents of Lake Village and the Lake Village Government Area (Figure 5). Elephant Back Mountain is just over one-half mile from the nearest road and less than 1 mile from the nearest residential home.

Bear Foods Proximal to the Body Burial Cache:

The forest floor along the lower section of the Elephant Back Trail is covered with herbaceous vegetation and grouse whortleberry. Bear foods present along the trail include strawberry, grouse whortleberry, clover, graminoids, log-dwelling ants, and some whitebark pine. Growing conditions on the ridge where the body was found are less favorable due to drier, more sterile soils. Herbs and small shrubs on the ridge were much more widely scattered than along the Elephant Back trail. Bear foods present in the general area include mushrooms, log-dwelling ants, grouse whortleberry, and red squirrel middens containing some whitebark pine seeds and cones. There was evidence of bears digging mushrooms on Elephant Back Mountain at the time Mr. Crosby was killed.

Mr. Crosby's Presence on Elephant Back Mountain:

Because Mr. Crosby was alone when attacked, there is no way of knowing exactly what activity he was engaged in prior to the attack. Recreationalists use the Elephant Back Trail primarily for day hiking, exercise walking, jogging, and scenic photography (at the overlook). No camera or cell phone was found with Mr. Crosby, so he was not engaged in photography at the time of the attack. An acquaintance of Mr. Crosby stated that Mr. Crosby was not a jogger. At the time of the attack, Mr. Crosby was wearing leather hiking boots, long pants of a light canvas material, and a long sleeved, button-down, collared shirt, which are not typical jogging attire. In addition, Mr. Crosby had sprained his ankle the week prior to the fatality and had been on light desk duty at work following that injury. This hike was thought to be his first physical activity after the ankle injury; making it unlikely he was jogging on the steep trail. It is reasonable to conclude that Mr. Crosby's mode of travel on Elephant Back Mountain on August 6 was most likely hiking. Since Mr. Crosby did not have any camping gear with him, he likely did not intend to camp overnight on Elephant Back Mountain. Since Mr. Crosby was not carrying a daypack, water bottle, rain gear, or any food, he was most likely on a short day-hike or walk for exercise rather than a long extended day-hike.

Mr. Crosby's family and friends considered him an experienced hiker. Mr. Crosby was hiking alone, off-trail, and was not carrying bear spray. Mr. Crosby's family and friends stated that he often hiked alone, often hiked off-trail, and never carried bear spray. It is not unusual for experienced outdoor recreationalists to hike alone in grizzly bear country, off-trail, and not carry bear spray. A friend of Mr. Crosby stated that Mr. Crosby believed carrying bear spray would make him "complacent" and that he thought it better to remain vigilant and rely on his senses to avoid confrontations with bears.

YNP Hiker Information and Outreach:

In a recent survey of 7,770 people (2,669 groups) day-hiking in Yellowstone National Park, 60% of the hiking groups had fewer than the recommended party size of three people for hiking in bear country, and 14% hiked alone (Gunther et al. 2015). Of the 7,770 day-hikers surveyed, only 1,061 (13.6%) carried bear spray. Mr. Crosby’s hiking alone and his failure to carry bear spray are typical behavior observed for day hikers in Yellowstone. As a day hiker, the only bear safety information Mr. Crosby would have been exposed to was the bear warning signs posted at the trailhead, unless he sought further information on his own (e.g. from a park visitor center or backcountry office, park web page, day-hike planner, backcountry trip planner, etc.). Two bear warning signs, “Bear Attack: Are you Prepared” (Figure 10) and “Danger: You Are Entering Bear Country” (Figure 11) are posted at all trailheads in Yellowstone National Park. On August 7, 2015, the “Danger: You are Entering Bear Country” was the only bear warning sign posted on the trailhead information board when the investigative team arrived at the Elephant Back Trailhead. The “Bear Attack: Are You Prepared” sign was missing from the trailhead information board when the investigative team arrived and had likely been stolen sometime prior to the attack. In the following days, all trailheads in Yellowstone National Park were checked and both signs were present at every other trailhead in the park. The “Danger: You Are Entering Bear Country” sign contains many safety recommendations for hiking in bear country including discouraging hiking alone and encouraging staying on maintained trails and using bear spray when charged by bears.



Figure 10. “Bear Attack: Are You Prepared to Avoid One?” trailhead bear safety information and warning sign posted at all trailheads in Yellowstone National Park. This sign was missing from the Elephant Back Trailhead information board on August 7, 2015, when the investigative team arrived at the trailhead.

DANGER: You Are Entering Bear Country



All of Yellowstone is inhabited by black and grizzly bears. There are inherent dangers associated with hiking in bear country. **THERE IS NO GUARANTEE OF YOUR SAFETY.** While attacks are rare, visitors have been injured and killed by bears. The chances of being attacked by a bear may be reduced by adhering to the following guidelines:

WHEN HIKING

- Make noise to announce your presence. Use extra caution where vision is obstructed.
- Be alert and aware of your surroundings, and watch for tracks, scat, and carcasses.
- Stay on maintained trails and keep children close to reduce the risk of surprising a bear.
- Do not hike after dark.
- Hiking alone is discouraged.
- Avoid carcasses: a bear may be out of sight, guarding its food.
- Never intentionally approach or attempt to feed bears or other wildlife.

WHEN CAMPING

- Avoid carrying and using odorous foods.
- “Pack It In, Pack It Out.” Carry out all trash including food waste.
- Sleeping areas should be 100 yards or more from your food storage and cooking area whenever possible.

WHEN FISHING

- Dispose of entrails by puncturing the air bladder and throwing them into deep water, at least 100 yards from the nearest campsite or trail.
- Do not clean fish in backcountry campsites.

FOOD STORAGE REGULATIONS
apply to ALL backcountry users

- All food and odorous items, including cooking gear, toiletries, and trash, must be properly stored when not in your immediate possession or when not in use and directly attended.
- Proper food storage means that all food and odorous items must be suspended at least 10 feet above the ground and 4 feet out from the trunk of the tree or secured in a metal bearproof storage container located at some campsites.
- Designated backcountry campsites have food storage poles to make food storage easier. Carry a minimum of 35 feet of rope.

If You Encounter a Bear: Stay calm. Do not run. Do not make sudden movements or loud noises.

- Slowly detour or back away, but stop if this seems to agitate the bear.
- Avoid direct eye contact; talking quietly and calmly to the bear may help.

If a Bear Charges: Stand still, do not run. If a bear charges it may be a bluff charge.

- If you are charged, bear pepper spray is a good last defense, but it must be instantly available and not in your pack. Become familiar with its use, read instructions, and know its limitations. Remember, carrying pepper spray is not a substitute for vigilance and good safety precautions in bear country.

If the Bear Makes Physical Contact: Drop to the ground and play dead.

- Lie face down and clasp your hands over the back of your neck.
- Remain still and stay silent to convince the bear that you are not a threat.
- Wait several minutes after the bear leaves before getting up and leaving the area.

Important: Information is valuable in helping to protect both visitors and bears. Please report all carcasses, bear sightings, bear sign, damage, or personal injuries to a park ranger. Additional information on traveling in bear country is available at backcountry offices and visitor centers.

Figure 11. “Danger: You Are Entering Bear Country” bear safety information and warning sign present on the Elephant Back Trailhead Information Board, August 6, 2015, the day Mr. Crosby started his hike.

Weather:

Weather records from the Lake Yellowstone Climatological Weather Station located approximately 1.5 km (0.96 mi) southeast of the body burial cache site indicate that there had been no precipitation or thunderstorms in the Elephant Back Mountain area on the day prior (August 5) or the day of (August 6) the fatality (Table 1). The dry soil

combined with pine needles and duff covering the ground inhibited the chances of good track evidence being left behind during the attack, but also ensured that any track and DNA evidence that was left behind would not have deteriorated significantly prior to the body being discovered. On August 7, the day the body was discovered, 0.03 cm (0.01 inches (in)) of rain were recorded, falling after dark after the body had been discovered and the fatality site investigation had already been completed. On August 8, 0.89 cm (0.35 in) of rain was recorded which likely obliterated any track evidence not previously discovered at the scene.

Table 1. Precipitation and maximum and minimum temperatures recorded at the Lake Village Climatological Weather station August 1 through August 11, 2015, five days prior and five days after the Elephant Back Mountain fatality, Yellowstone National Park.

Date	Maximum Temperature (F)	Minimum Temperature (F)	Precipitation (inches)
August 1	76	41	0.00
August 2	78	44	0.00
August 3	80	50	0.00
August 4	75	48	0.30
August 5	69	42	0.00
August 6	65	39	0.00
August 7	65	42	0.01
August 8	70	46	0.35
August 9	54	40	0.23
August 10	64	39	0.01
August 11	73	42	0.00

Ungulate Carcasses:

Ungulate carcasses are a high quality, calorically rich bear food that are known to attract and hold multiple bears in a concentrated area, and can contribute to the risk of human-bear encounters if such carcasses are in human use areas. Grizzly bears will defend carcasses from other bears, wolves, and people and surprise encounters between grizzlies and people at carcasses have resulted in bear attacks. There were no ungulate carcasses found along the Elephant Back Trail or on Elephant Back Mountain during the fatality investigation. The nearest known ungulate carcass to the Crosby fatality site was that of a bull bison located approximately 12.2 km (7.6 mi) southwest of the fatality site (Figure 12). The bull bison had died on August 1, and had likely been mostly consumed by August 6, the day of the fatality. Due to the distance of the bison carcass from the fatality site, it likely had no influence on the bear attack on Mr. Crosby Elephant Back Mountain.

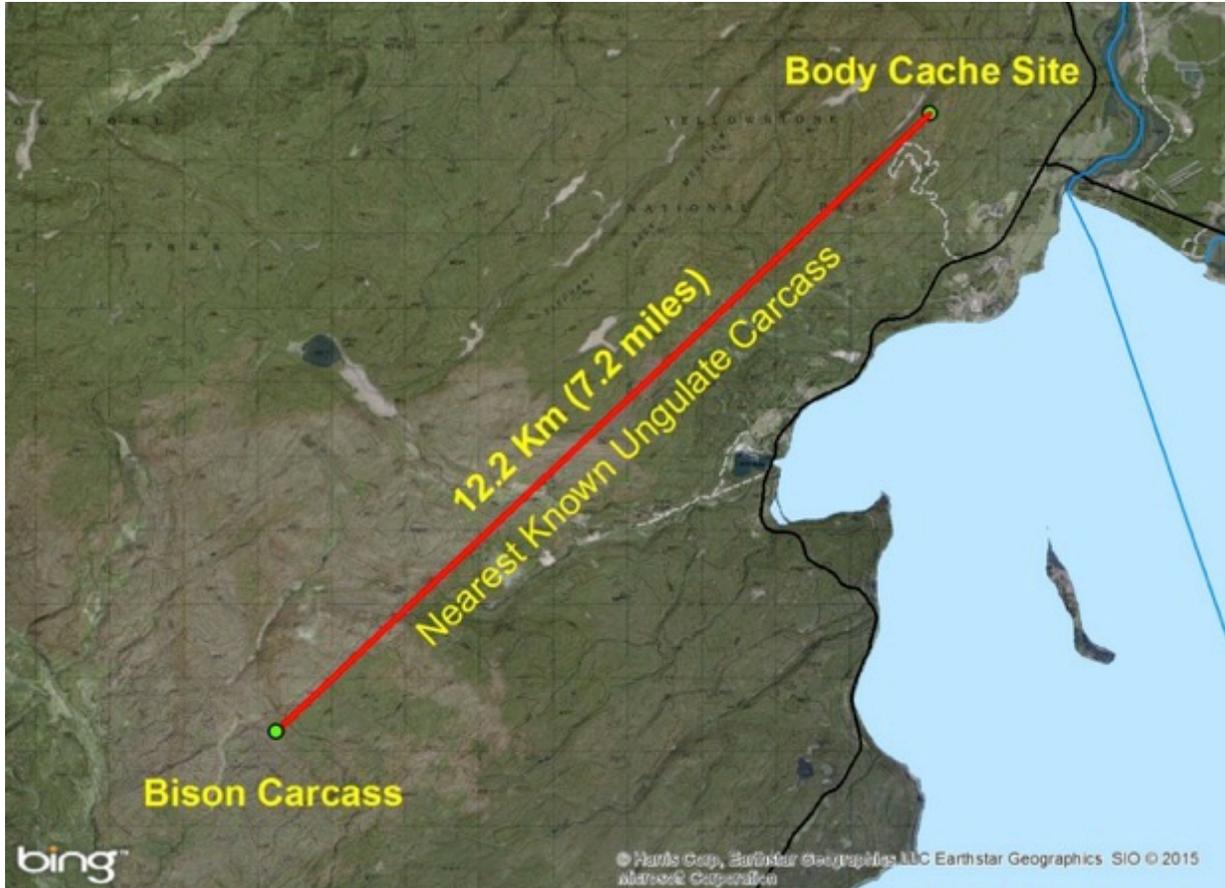


Figure 12. Location of nearest known ungulate carcass, a bull bison that had died on August 1, to the Crosby fatality site, August 6, 2015.

Unique Female Grizzlies with Cubs in the Elephant Back Mountain Area:

Visual sightings and track evidence indicated that a female grizzly bear with cubs-of-the-year (cubs) were likely responsible for the consumption of Mr. Crosby's body. To gain insight into how many different female grizzly bears with cubs were using the Elephant Back Mountain area in 2015, we queried the Interagency Grizzly Bear Study Team database for all known unique females with cubs in a 30-km radius around the body burial cache site. During the spring and summer (den emergence through August 6) of 2015, reliable observers reported 43 sightings of female grizzly bears with cubs within a 30-km radius of the body burial cache site (Figure 13). These sightings were of at least eight different unique individual adult female grizzly bears that were accompanied by litters of one to three cubs-of-the-year. Thirty-four of these sightings were of four unique individual adult female grizzlies that had two cub litters (Figure 14). The bear involved in the attack and consumption of Mr. Crosby's body was likely one of these four grizzly bears. However, the presence of additional female grizzly bears accompanied by two cub litters in the Elephant Back Mountain area that had not been

previously documented by the Interagency Grizzly Bear Study Team cannot be ruled out.

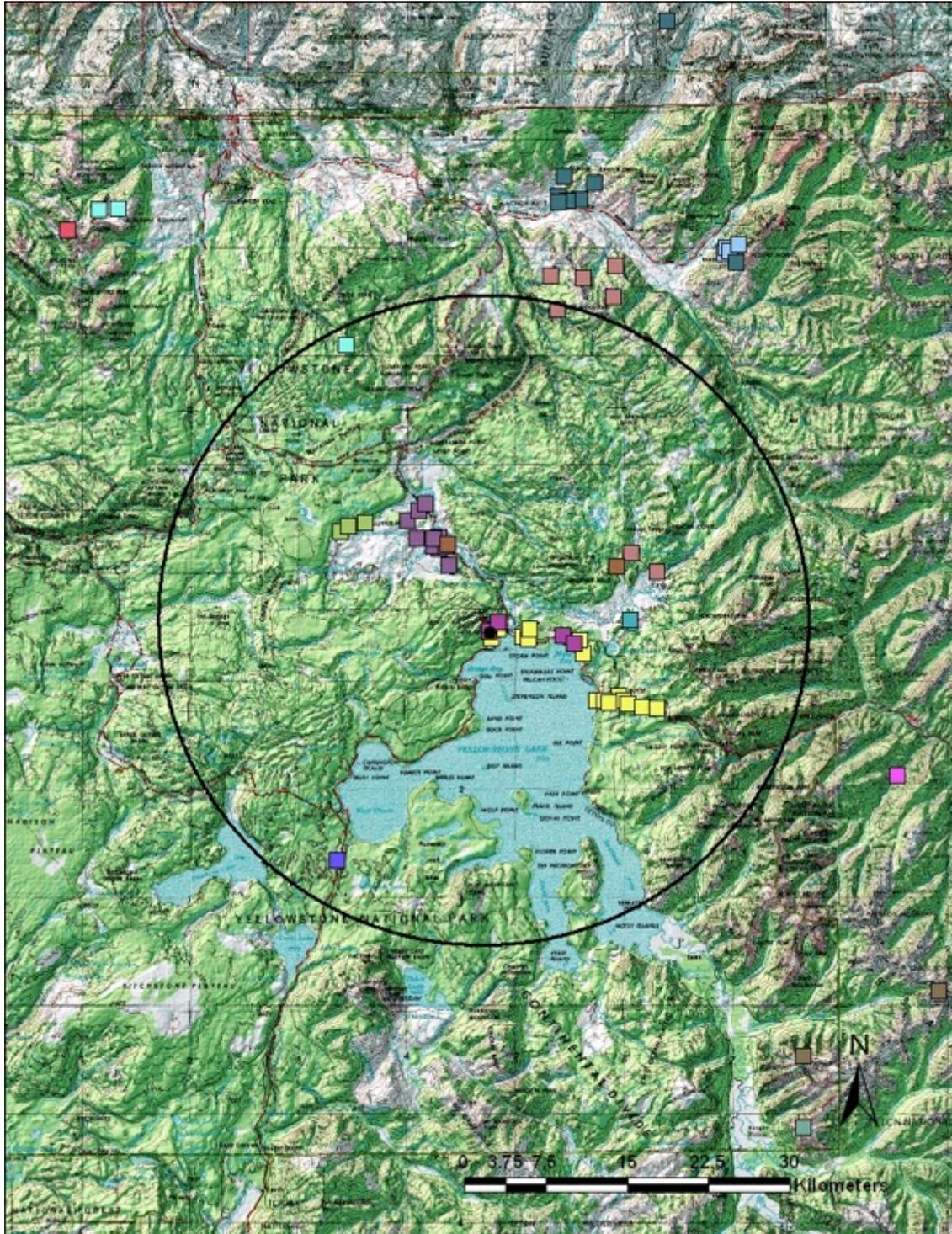


Figure 13. Confirmed sightings of eight unique individual female grizzly bears with litters of from one to three cubs-of-the-year within a 30-km radius of the Crosby fatality site, Elephant Back Mountain, Yellowstone National Park, 2015 (Interagency Grizzly Bear Study Team unpublished data).

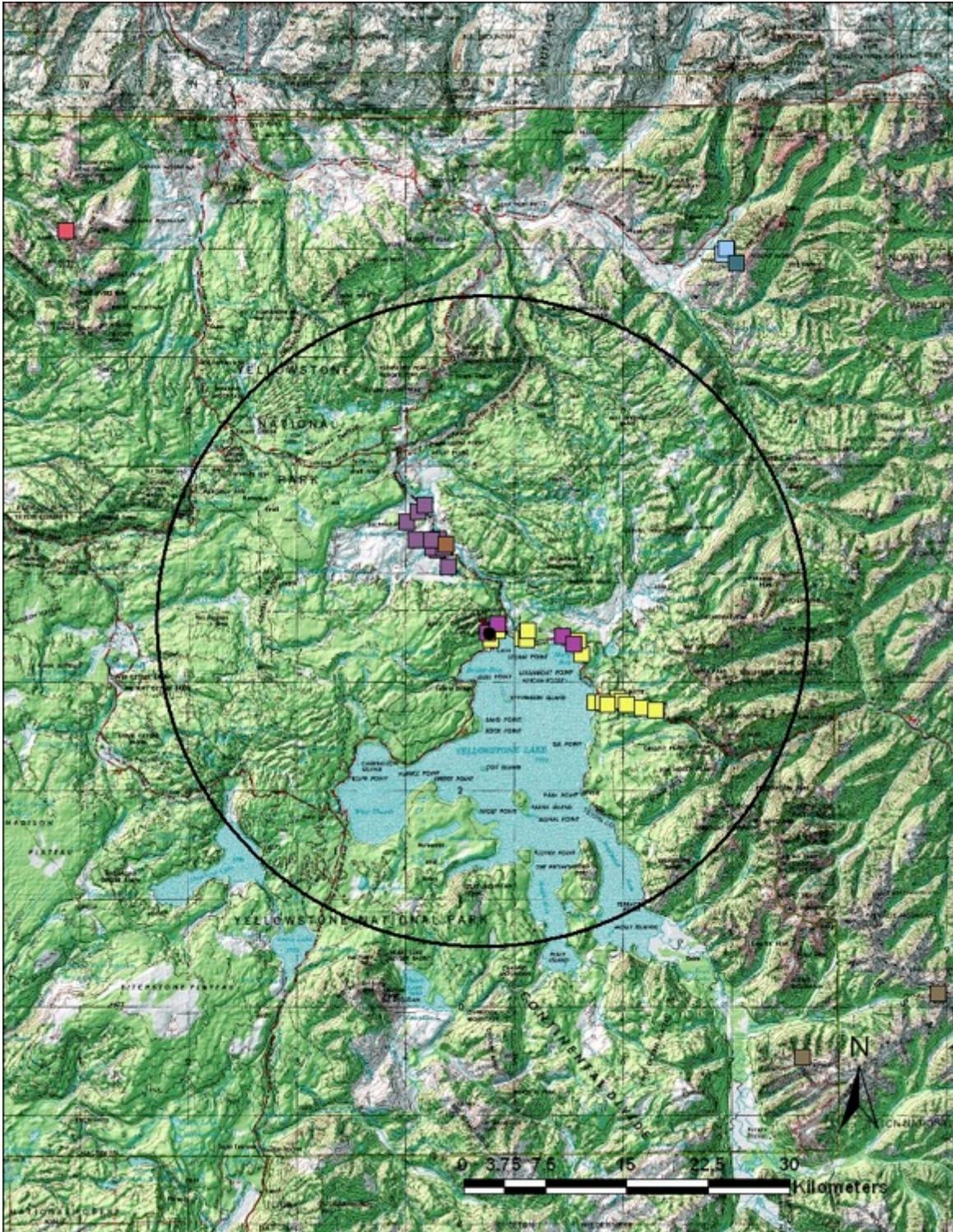


Figure 14. Confirmed sightings of four unique individual female grizzly bears with litters of two cubs-of-the-year within a 30-km radius of the Crosby fatality site on Elephant Back Mountain, Yellowstone National Park, 2015 (Interagency Grizzly Bear Study Team unpublished data).

Incident Scene Evidence:

Forensic evidence collected as part of the investigation included bear track measurements and bear bite wound measurements, as well as bear hair, bear scat, and bear saliva for DNA (genetic) analyses (Table 2, Figure 15). Measureable tracks were found in the dirt next to the victim's body and in daybeds near the body on the day the body was discovered. Measureable canine bite wounds were found on the victim's right forearm and left shoulder. Saliva was swabbed from bite wounds on the victim's shoulder and forearm. Bear hair was collected from the victim's body, clothes, bracelet, and sunglasses, from a bloody rock found next to the body, from the soil of the burial cache covering the body, and from bear daybeds near the body. Bear scats were collected next to the body, near daybeds, and from a 200-meter (219 yd) perimeter around the body.

Tracks found at the scene can be used to determine the species of predator involved in an attack and also for determining the species of carnivores that scavenge the body. Tracks can also aid in determining the sex and age class of the carnivore involved in an attack. However, bear tracks are not 100% reliable as a method for identifying individual bears. An individual bear can leave different sized track impressions depending on the type of substrate (sand, fine dirt, dust, hard packed ground, duff, wet ground, mud, snow, etc.). The bear's gait (walking, running, loping, standing on two legs, etc.) and the amount of weight or pressure placed on each foot will also affect the size of the foot pad impression left on the ground. In addition, there is significant overlap in track sizes between bears of the same sex and age classes and some overlap between bears of different sex and age classes. Also, the actual footpad measurements taken from captured bears often don't match 100% with measurements of footpad impressions in substrate.

Bite wounds can also be used to determine the species of predator involved in an attack and can aid in determining the sex and age class of the attacking animal. As with tracks, bite wounds are not 100% reliable for identifying individual bears because human skin is somewhat elastic. Any movement by the bear (pushing, pulling, shaking of the head) or by the person being bitten (pulling away) can tear or stretch the skin and change the shape and distance between canine impressions left in the skin. In addition, the amount of pressure of the bite determines how deep the canines penetrate the skin. Therefore, the center point of the canines must be visually estimated when measuring the canine width distance. As with tracks, there is significant overlap in bite wound impressions between bears of the same species, sex and age class, and some overlap between bears of different sex and age classes. There is also some overlap in canine width distances between different species of carnivores (grizzly bear, black bear, mountain lion, wolf, etc.).

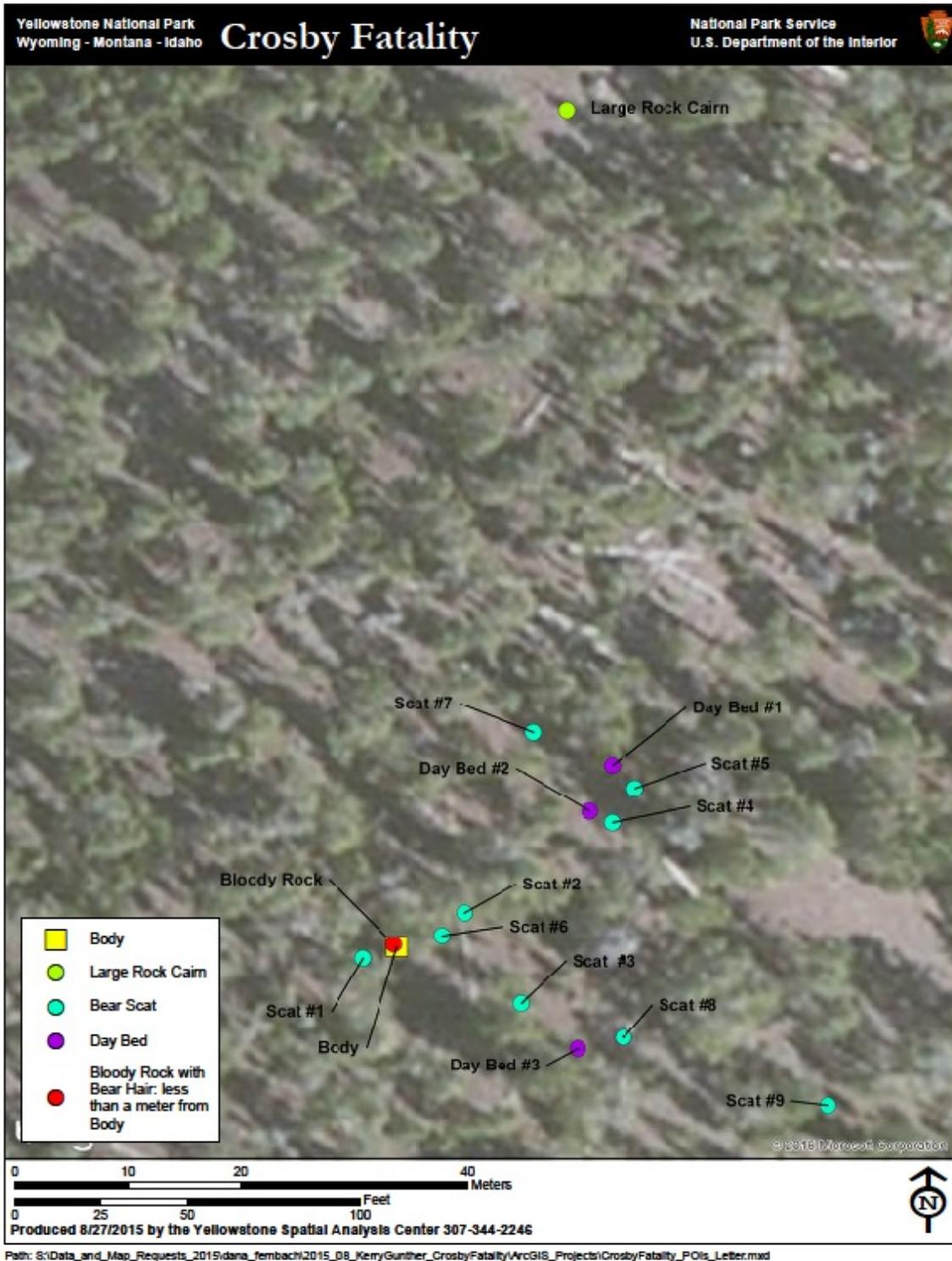


Figure 15. Bear sign (tracks, scat, daybeds) found at the Crosby fatality site, Elephant Back Mountain, Yellowstone National Park, on August 7, 2015.

DNA from blood, tissue, hair, scat, or saliva is the most accurate method of identifying individual bears. However, DNA deteriorates rapidly under outdoor environmental conditions, especially wet conditions. Although it did not rain from the time of death to the time the body was discovered, moisture from blood and body fluids may have deteriorated bear DNA samples taken from the body. Hair, scat, and saliva samples collected for DNA analysis were sent to two laboratories for analyses:

Wyoming Game and Fish Wildlife Forensic and Fish Health laboratory
Biological Sciences Building
Laramie, Wyoming

Wildlife Genetics International
Nelson, British Columbia, Canada

Body Burial Cache:

When the body was found it had been covered with dirt, duff, rocks, grass, sticks, and pine needles typical of carcass caching behavior by a large carnivore. The three species of carnivores in Yellowstone National Park that cache mammal carcasses for future feeding are grizzly bears, black bears, and mountain lions. Although the presence of a burial cache cannot be used to determine with certainty the species of carnivore that killed Mr. Crosby, it does give an indication of the species that consumed his body. The presence of a burial cache indicates that the body was consumed by a grizzly bear, black bear, or mountain lion.

Visual Sightings of Bears Near the Body Cache Site:

On August 7, 2015, at approximately 1400 hours, the investigative team heard a cub or cubs bark/bawl several times and observed an adult size bear with dark brown legs and light brown sides running from the body burial cache. Due to tree cover and the short duration of the sighting, it could not be determined with certainty whether the adult bear was a grizzly bear or black bear. The sighting of an adult bear with cubs running from the burial cache indicates that this bear was at the body cache when it sensed the investigation team at the site and fled.

On August 10, 2015, at approximately 1500 hours, the trapping team and helicopter personnel observed a large adult, cinnamon colored black bear on Elephant Back Mountain approximately 100 – 150 m (109 - 164 yd) below the body burial cache. Because no black bear tracks, hair, or DNA were found at the body, there is no evidence linking this black bear to the death or consumption of Mr. Crosby.

Track Evidence:

Grizzly bear tracks were found next to Mr. Crosby's body in the burial cache and in daybeds near the body. The tracks indicate that an adult female sized grizzly and at least one grizzly cub-of-the-year were present at the body. No tracks of adult male

grizzly bears, or tracks from black bears, mountain lions, or wolves were found at the scene.

Body burial cache site: A partial adult grizzly bear track (based on claw and toe imprints) and a partial grizzly bear cub track were found next to the body in the burial cache. The adult track was not complete enough to make an accurate measurement. The partial front pad width of the grizzly bear cub front track found at the body measured 8.0 cm front (3.1 in).

Daybed #1: An adult grizzly bear track was found in daybed #1, 24.8 m (27.1 yd) from the body. The estimated outline of the front pad width measured 11.4 cm (4.5 in). A partial cub track was also found in daybed #1, the estimated outline of the front pad width measured 8.9 cm (3.5 in).

Daybed #2: A partial grizzly bear cub front foot track was found in daybed #2, 20.8 m (22.7 yd) from the body. The estimated outline of the front pad width measured 7.6 cm (3.0 in).

Daybed #3: Two partial cub front tracks were found in daybed #3, 18.4 m (20.1 yd) from the body. The outlines of the front pads were estimated for measurement. One track measured 7.6 cm (3.0 in) and one track measured 7.0 cm (2.8 in).

Bite Wound Evidence:

Because the body was partially consumed there were relatively few bite wounds where the canine widths could be accurately measured. Although there were bite wounds on some areas of the body that had not been consumed, these areas contained multiple bites proximal to each other making it difficult to accurately determine paired upper or lower canines. Two pairs of matched upper canine bites were present, including one set on the anterior and one on the posterior of the right forearm. In addition, two pairs of matched lower canine bites were present, one on the right anterior forearm and one on the left scapula.

Upper canine width: A matched set from what was believed to be upper canine bite marks were measured on the anterior of the victim's right forearm. The estimated center-to-center distance of the canines was 60 mm (2.4 in). Another matched set of what appeared to be upper canines were measured on the posterior of the right forearm. The estimated center-to-center distance was 60 mm (2.4 in). Upper canine bite wounds of this size are too large to be from a mountain lion, wolf, coyote, or average-sized adult male or female black bear, and too small to be from a large adult male grizzly bear. A 60 mm (2.4 in) upper canine width is consistent with an adult female grizzly bear, subadult male grizzly bear, or large adult male black bear.

Lower canine width: A matched set of what appeared to be lower canine bites were measured on the victims left scapula. The center-to-center distance was 55 mm (2.7 in). Another matched set of what appeared to be lower canine bites were measured on the

anterior of the right forearm. The center-to-center distance was 50 mm (2.0 in). Lower canine bite wounds of this width are too large to be from a mountain lion, wolf, coyote, or average-sized adult male or female black bear, and too small to be from a large adult male grizzly bear. A 50 - 55 mm (2.0 – 2.7 in) lower canine width is consistent with an adult female grizzly bear, subadult male grizzly bear, or large adult male black bear.

Bear Saliva DNA Evidence:

Multiple bite wounds on the victim's body were swabbed to collect saliva of the bear that attacked and/or partially consumed Mr. Crosby. All of these swabs were non-reactive (no DNA extracted) for bear DNA (Table 2).

Bear Scat DNA Evidence:

DNA was successfully extracted from three of the nine bear scats collected near Mr. Crosby's body, including bear scats #3, #7, and #9. All of the other bear scats collected (#'s 1, 2, 4, 5, 6, and 8) were non-reactive. DNA indicated that the three bear scats were from two related individual female grizzly bears. The DNA replicated from bear scat #7, a large adult size bear scat located 22.5 m (24.6 yd) from the body, was from a female grizzly bear and was a match to the DNA from the tissue, hair, and blood collected from the bear known as the Elephant Back female (Fig. 15). The Elephant Back female was captured in a culvert trap at the body burial cache site on the night of August 7 or the morning of August 8. The DNA replicated from bear scat #3, a small cub size scat located 12.1 m (13.2 yd) from the body was from a female offspring of the Elephant Back female. The DNA from bear scat #9, a small cub size scat located 40.5 m (44.2 yd) from the body was from the same cub as scat #3.

Bear Hair DNA Evidence:

Bear hair was collected from Mr. Crosby's body, clothes, bracelet, and sunglasses, and from the soil that the bear had raked over the body, as well as from a bloody rock found 0.9 m (3 ft) from his head. DNA was successfully replicated from the bear hair collected from the bloody rock found near the victim's head (Table 2, Figure 6). The bear hair collected from Mr. Crosby's body, clothes, jewelry, and sunglasses and from the burial cache and surrounding bear daybeds were all non-reactive (no DNA extracted). The bear hair collected from the bloody rock allowed identification of species, sex, and individual genotype. The DNA collected from the hair on the bloody rock was from a female grizzly bear and was a match to the DNA from the tissue, hair, and blood collected from the bear known as the Elephant Back female captured in a culvert trap at the body burial cache on the night of August 7 or the morning of August 8.

Aerial Reconnaissance:

In an effort to identify individual grizzly bears using the Elephant Back Mountain area, a fixed-wing aerial reconnaissance flight was scheduled for the day after the body was discovered. Due to bad weather, the flight could not be conducted until August 9.

Reconnaissance Flights:

August 8, 2015: Flight cancelled due to weather.

August 9, 2015: Aerial reconnaissance flown in a fixed-wing aircraft over the Bridge Creek drainage, Elephant Back Mountain, and the area around the Lake Village, Lake Village Government Area, and Bridge Bay development complex. No grizzly bears, black bears, wolves, or mountain lions were visually observed and no radio-collared bears were located with telemetry in the area.

Bear Trapping Operation:

Bear culvert traps (Figure 16) were set at the Crosby fatality site on Friday, August 7, 2015; the same day the body was discovered. Traps were set 9.4 m (10.3 yd) from the body burial cache. Trapping operations used minimal trap bait in an effort to minimize the chances of luring bears that were not involved in the incident to the site while trying to catch the target bears. Bear trapping operations were terminated at approximately 1100 hours on August 11, 2015.

Bear Trapping Effort:

Adult size aluminum culvert traps and cub size aluminum box style bear traps were used in the trapping operation. No snares were set.

August 7: two adult size aluminum culvert traps set (2 trap-nights).

August 8: one adult size aluminum culvert trap set (1 trap-night).

August 9: one adult size aluminum culvert trap set (1 trap-night).

August 10: two aluminum cub box traps set (2 trap-nights).

August 11: All traps closed and all traps and bait pulled from site.

Bear Captures:

In 6 trap-nights, three grizzly bears were captured including an adult female and two female cubs-of-the-year. No other bears were captured.

August 7, 2015 – On Friday evening or Saturday morning, an adult female grizzly bear (became #201518) was captured at the body burial cache site (Figure 17). Weight = 117.6 kilograms (kg) (259.3 pounds (lb)), 21.3% body fat, qualitative body fat index = 2 on a scale of 1 to 5; upper canine width = 59.2 cm (2.3 in), lower canine width = 50 mm (2.0 in); front foot pad width = 12.4 cm (4.9 in); hind foot pad width = 11.3 cm (4.5 in). Based on tooth wear, this bear was estimated to be 15+ years old. DNA from this bear matches DNA from the bear hair found on a bloody rock 90 cm (3 ft) from the head of



Figure 16. Culvert traps set at the fatality site the evening on the day the body was found.

the victim in the body burial cache. There were numerous cub-of-the-year sized muddy paw prints left on the outside of the trap and trap door, indicating that the captured adult female bear had cubs with it that remained at large.

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Table 2. DNA results from bear hair, saliva, scat, tissue, and blood samples collected at the Crosby fatality site and from the adult female grizzly bear captured at the fatality site on Elephant Back Mountain, Yellowstone National Park, 2015.

Evidence	Distance To Body	DNA Results				Match With Known Bear in GYE DNA Database
		DNA Successfully Extracted	Genus/Species	Sex	Individual Genotype	
Swab from bite wound on Crosby Left upper cheek	0 meters	Non-reactive				
Swab from bite wound on Crosby right shoulder	0 meters	Non-reactive				
Swab from bite wound on Crosby right forearm	0 meters	Non-reactive				
Bear hair collected Crosby Right shoulder	0 meters	Non-reactive				
Bear hair collected from Crosby stomach	0 meters	Non-reactive				
Bear hair collected from Crosby Left shoulder (#1)	0 meters	Non-reactive				
Bear hair collected from Crosby Left shoulder (#2)	0 meters	Non-reactive				
Bear hair collected from Crosby chin	0 meters	Non-reactive				
Bear Hair from leather bracelet worn on right wrist	0 meters	Non-reactive				
Bear hair from sunglasses (#1)	0 meters	Non-reactive				
Bear hair from sunglasses (#2)	0 meters	Non-reactive				
Bear Hair from Body Burial Cache dirt/duff	< 1 meter	Non-reactive				
Bear hair (7 hairs) on bloody rock next to body	0.9 meters	Yes	Ursus/arctos	Female	Elephant Back female	n/a
Blood from bloody rock next to body	0.9 meters	Non-reactive				
Bear hair from day-bed #1	24.8 meters	Non-reactive				
Bear hair from day-bed #2	20.8 meters	Non-reactive				
Bear hair from day-bed #3	18.4 meters	Non-reactive				
Bear scat #1 (mucosal swab)	3.2 meters	Non-reactive				
Bear scat #2 (mucosal swabs)	6.7 meters	Non-reactive				
Bear scat #3 (mucosal swab)	12.1 meters	Yes		Female	Offspring of Elephant Back female	
Bear scat #4 (mucosal swab)	22.0 meters	Non-reactive				
Bear scat #5 (mucosal swab)	25.2 meters	Non-reactive				
Bear scat #6 (mucosal swab)	4.1 meters	Non-reactive				
Bear scat #7 (mucosal swab)	22.5 meters	Yes		Female	Elephant Back female	
Bear scat #8 (mucosal swab)	21.5 meters	Non-reactive				
Bear scat #9 (mucosal swab)	40.5 meters	Yes		Female	Offspring of Elephant Back female	

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Hair collected from adult female grizzly bear captured at fatality site on August 7/8, 2015	9.4 meters	Yes	Ursus/arctos	Female	Elephant Back female	n/a
Blood collected from adult female grizzly captured at fatality site on August 7/8, 2015	9.4 meters	Yes	Ursus/arctos	Female	Elephant Back female	n/a
Tissue collected from adult female grizzly captured at fatality site on August 7/8, 2015	9.4 meters	Yes	Ursus/arctos	Female	Elephant Back female	n/a

August 9, 2015 – On Sunday evening at 2109 hours (based on camera-trap pictures), a female cub-of-the-year (became #201519) was captured at the body burial cache site. Weight = 24.3 kg (53.5 lb), qualitative body fat index = 3 on a scale of 1 to 5.

August 10, 2015 – On Monday afternoon at 1512 hours (based on camera-trap pictures), a female cub-of-the-year (became #201520) was captured at the body burial cache site. Weight = 18.7 kg (41.3 lb), front foot pad width = 8.2 cm (3.2 in), hind foot pad width = 8.0 cm (3.2 in), qualitative body fat index = 3 on a scale of 1 to 5.



Figure 17. The adult female grizzly bear captured 9.4 m (10.3 yd) from the body cache on the night the body was discovered. .

Camera Trap Operation:

On August 8 at approximately 1500 hours, two trail cameras were set up at the body burial cache and bear trap locations to confirm how many cubs the adult female bear that had been captured on the evening of August 7 had with it. A secondary objective of the camera traps was to determine if any other grizzly bears or other carnivores (bears, wolves, mountain lions) were frequenting the body burial cache.

Camera Trap Captures:

August 8, 2015, 1500 – 2359 hours: The cameras captured no bear activity.

August 9, 2015, 0001 – 2359 hours: Photos from the remote cameras indicate that two grizzly cubs visited the body burial cache and trap site at 2052 hours, the remote camera indicated that one cub was captured in a trap at the site at 2109 hours, and the second cub remained at the trap site until midnight. The cameras captured no other bear activity

August 10, 2015, 0001 – 2359 hours: Photos from the remote cameras indicate that one cub was present at the trap site from 2359 hours on August 9 until it was captured in a trap at the site at 1512 hours on August 10.

August 11, 2015, 0001 – 1100 hours: The two cameras captured no bear activity. The cameras were pulled from the incident site at approximately 1100 hours.

Conclusion:

On August 7, 2015, the partially consumed and cached body of 63-year-old Mr. Lance Crosby was found on Elephant Back Mountain 0.46 km (0.29 mi) from the Elephant Back Trail. All physical evidence found at the scene including the body burial cache, visual bear sighting, daybeds, hair, scats, tracks, and bite wounds were consistent with a bear attack by an adult female grizzly bear with two cubs-of-the-year. The autopsy indicated that Mr. Crosby had been in good health prior to his death. Defensive, blocking type bite wounds on the victim's hands and arm, as well as bruises associated with bite wounds on his head, face, shoulders, and upper back indicate that Mr. Crosby was alive when attacked by the bear. His good health combined with the presence of defensive wounds and bruising associated with bite wounds rules out the possibility that Mr. Crosby died from non-bear related natural causes and was later scavenged by the bears.

On the night the body was found (August 7) or the following morning (August 8) an adult female grizzly bear (#201518, referred to as the Elephant Back female) was captured in a trap set 9.4 m (10.3 yd) from the body burial cache. One (#201519) of the adult female's two cubs (both females) was captured at the site on August 9 and the second cub (#201520) was captured at the fatality site on August 10. Photos from camera traps set at the trap site indicated that two cubs had accompanied the captured female and that there were no other bears visiting the body burial cache. DNA evidence indicates that the Elephant Back female and one of her two female cubs were both present at the body burial cache and left hair and/or scats there. By association, the Elephant Back female's second cub was likely present as well, as cubs are usually accompanied by their mothers. No DNA, tracks, or other physical evidence from any other grizzly bears, black bears, mountain lions, wolves, or coyotes was found at the incident site. Due to the DNA evidence linking the Elephant Back female and her cubs to the body burial cache and the consumption of a portion of the body, they were permanently removed

from the wild. The adult female grizzly was euthanized and the two cubs were sent to the Toledo Zoo in Ohio.

There was evidence of bear day beds and recent feeding by bears digging mushrooms on Elephant Back Mountain very near to the attack site and body cache. The time period of use of the day beds is unknown but since there is evidence of natural feeding in the area, it is likely that the bears involved in the attack and consumption of Mr. Crosby were in the area feeding and/or bedding when Mr. Crosby entered the area. This brings up the possibility that the bears were surprised at close range by Mr. Crosby's off-trail approach, although we have no way of knowing this for certain.

Necropsy of the adult female grizzly bear conducted at the Montana Veterinary Diagnostic Laboratory did not reveal any injuries, condition, or disease that would have contributed to her attack on Mr. Crosby or consumption of his body (Appendix A). The adult female bear was in a good nutritional state with moderate fat stores. Her musculoskeletal system, brain, skull, reproductive tract, esophagus, and heart were all normal. Gross and histologic lesions to account for the atypical behavior of bear #201518 were not present.

The primary reason these bears were removed from the wild is the killing and consumption of a human. The objective of removing the adult female grizzly bear and two cubs that were involved in the fatal attack and consumption of Mr. Crosby within hours of his death was to prevent these bears from killing and consuming another human in the future. Bears are an intelligent, highly adaptable species that quickly learn to exploit new food resources, especially foods that are easily obtained and contain concentrated sources of fat and protein. Since bears readily learn new foods and remember the locations, circumstances, and foods that are available, the possibility of these bears preying on people in the future could not be ruled out.

Literature Cited:

Gunther, K.A., E.G. Reinertson, T. Wyman, D. Bergun, N.R. Bowersock, A.M.
Bramblett, E. Johnston, and J. Nicholson. 2015. Visitor Compliance with Bear Spray and Hiking Group Size in Yellowstone National Park. *Yellowstone Science* 23(2):41-43.

LIST OF APPENDICES

Appendix A. Montana Veterinary Diagnostic Laboratory necropsy report for the Elephant Back female (Bear #201518), August 13, 2015.

08/20/2016 Thu 14:27

MVDL fax number

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MVDL**MONTANA VETERINARY DIAGNOSTIC LABORATORY**1011 West Lincoln, Bozeman, MT 59716
P.O. Box 997, Bozeman, MT 59717
Web: www.mvdl.mt.govPhone: (406) 264-4993
Fax: (406) 264-6366
Email: mvdl@mt.govKERRY GUNTHER YELLOWSTONE NATL
PARK
PO BOX 168
YELLOWSTONE NATL PAR WY 82190

CASE: 16-879

FINAL REPORT 08/20/15

Name/ID: 215-18

Species: Brown Bear (Grizzly)

Breed: Brown Bear (Grizzly)

Sex: Female Age: Adult

Owner: Yellowstone National Park

Accessioned: 08/13/15

Authorized by: BL

Previous Reports
08/20/15**CASE SUMMARY**

Case Summary

Verified on: 08/20/15 by: BL

REASON FOR SUBMISSION:
Human predation

LABORATORY DIAGNOSIS:

Congestion, spleen with multifocal capsular fibrosis
Perineal hemorrhage, acute, mild with mild hemo-abdomen
Myositis, suppurative (injection site resolution)

COMMENT:

Splenic congestion and the myositis are considered related to the Telazol injection for sedation/analgesia. The perineal hemorrhage is acute and is presumed to have occurred because of some traumatic injury from the capture. The hemorrhage was minor and insignificant. The spleen also had capsular fibrosis which is indicative of a past traumatic event with healing. This animal was in an excellent state of preservation and good nutritional state. A scant amount of milk could be expressed from the mammary glands. Gross and histologic lesions to account for the atypical behavior of this animal were not present.

A. W. Layton, DVM, Diplomate, ACVP

PATHOLOGY

Pathology

Verified on: 08/20/15 by: BL

Necropsy was performed by AWL and SKS on 8/13/15 between 10:30 am and 12:30 pm.

GROSS DESCRIPTION:

The carcass is of an adult Grizzly Bear showing good postmortem and fair nutritional state. Fat stores are moderate. Perist fat varies in thickness from 0.2 cm - 2 cm thick. Musculoskeletal system is normal. Scant amount of milk can be expressed from the mammary gland. Pleural cavity is normal. There is a hematoma on the lateral/caudal pole of the right kidney that occurs pericapsular and does not involve the adjacent kidney. Small amounts of red tinged fluid occur within the abdominal cavity. Left kidney is normal. Ureter and urinary bladder are normal. Spleen is 35x8x5 cm (enlarged) with multiple linear to patchlike capsular fibrosis. Fibrosis does not extend into the deeper parenchyma. Splenic parenchyma is dark red/black and exudes blood. Liver is brown with sharp margins. Gall bladder is filled with green thick bile. Esophagus is normal. The stomach wall in the pyloric region is 2.5 cm thick and primarily involves the tunica muscularis. Pyloric lumen is patent. Stomach has tan/gray rugated mucosa covered by mucous. Small intestine contains a scant amount of yellow thick fluid and few roundworms. The mucosa is tan and smooth to folded. Large intestine contains scant amounts of green mucoid feces. The animal was euthanized via captive bolt method. Otherwise, brain and skull are normal. Reproductive tract is normal. Lungs are partially collapsed, tan and spongy. Heart is normal.

Case No: 16-879 - .

Page 1 of 3

Muscle of the left hip has a red opaque fluid and the adjacent musculature is pale (injection site Tetazo).

HISTOLOGIC DESCRIPTION:

Tissue sections of eye, brain, mammary gland, skeletal muscle, tongue, heart, spleen, kidney, thyroid gland, parathyroid gland, liver, lung, lymph node, adrenal gland, stomach, intestine, lymph node, urinary bladder, esophagus, uterus and third eyelid are examined. The internal muscle layer of the tunica muscularis of the stomach is 5 times thicker than the outer layer. Non-staining vacuolar change occurs within the adrenal cortex region of the fasciculate and reticularis. In multiple sections of skeletal muscle along one edge is an inflammatory infiltrate of numerous neutrophils with fewer macrophages. Adjacent musculature is relatively intact yet the interstitium is edematous and infiltrated with smaller numbers of cells. In all sections of spleen, the splenic red pulp is markedly congested.

HISTOLOGIC DIAGNOSIS:

Congestion, spleen with multifocal capsular fibrosis
Perineal hemorrhage, acute, mild with mild hemo-abdomen
Myositis, suppurative (injection site reaction)

Hypertrophy, internal layer of tunica muscularis, pyloric region, stomach

Crosby BOR Report Final

06/20/2018 Thu 14:27

NIDOL fax number

ID: #302 Page 3 of 3

FEES:

Hematoxylin S. Eosin	0.00
Case Summary	0.00
Histopathology	150.00
Incineration per pound	65.00
Total	215.00

(This is not a bill. Do not make payments from this report.)