American black bear predation of an adult white-tailed deer

Author(s): Nathan J. Svoboda, Jerrold L. Belant, Dean E. Beyer, Jared F. Duquette, Heather K. Stricker, and Craig A. Albright
Source: Ursus, 22(1):91-94.
Published By: International Association for Bear Research and Management
https://doi.org/10.2192/URSUS-D-10-00024.1
URL: http://www.bioone.org/doi/full/10.2192/URSUS-D-10-00024.1

American black bear predation of an adult white-tailed deer

Nathan J. Svoboda[1,4], Jerrold L. Belant[1], Dean E. Beyer[2], Jared F. Duquette[1], Heather K. Stricker[1], and Craig A. Albright[3]

[1]*Carnivore Ecology Laboratory, Forest and Wildlife Research Center, Mississippi State University, Box 9690, Mississippi State, MS 39762, USA*
[2]*Michigan Department of Natural Resources, Wildlife Division, 1990 US Highway 41 S, Marquette, MI 49855, USA*
[3]*Michigan Department of Natural Resources, Wildlife Division, 6833 US Highway 41, Gladstone, MI 49837, USA*

Abstract: American black bears (*Ursus americanus*) are opportunistic omnivores and can be proficient predators of neonate ungulates, but predation of adult ungulates is rare. In November 2009 we investigated a probable black bear predation of a radiocollared, adult (7.5 years old) female white-tailed deer (*Odocoileus virginianus*) in a densely vegetated, lowland conifer forest in the Upper Peninsula of Michigan, USA. The deer carcass was 80% buried with puncture wounds and lacerations on the back and hindquarters. The hide was everted, the intestines and stomach partially eaten, the mammary glands were punctured, and the skeleton remained articulated. All woody vegetation <5.0 cm diameter within 5 m of the carcass was trampled and contained bear and deer hair. We found no evidence of other carnivores. Based on the condition of the carcass, physical evidence at the site, and the similarity of this predation to reported black bear predations, we suggest this deer was attacked and killed by a black bear.

Key words: American black bear, Michigan, *Odocoileus virginianus*, predation, ungulate, *Ursus americanus*, white-tailed deer

Ursus 22(1):91–94 (2011)

American black bears (*Ursus americanus*) are opportunistic omnivores (Pelton 2003, Zager and Beecham 2006), with most of their diet consisting of vegetation in the form of grasses, forbs, and soft and hard mast (Bull et al. 2001, Pelton 2003). However, black bears will often switch their diet in response to seasonally and regionally abundant food sources (Raine and Kansas 1990, Holcroft and Herrero 1991, Pelton 2003), including animals such as insects, small mammals, fish, and ungulates (Bull et al. 2001, Belant et al. 2006). Although researchers have reported animal remains in black bear diets (Holcroft and Herrero 1991, Debruyn 1997, Bull et al. 2001), many believe consumption of larger mammals is by scavenging (Zager and Beechum 2006). Although scavenging is common (Raine and Kansas 1990, Debruyn 1997, Pelton 2003), black bears can be proficient predators of neonate ungulates including elk (*Cervus elaphus*; Smith 1994, Singer et al. 1997), moose (*Alces alces*; Franzmann et al. 1980, Schwartz and Franzmann 1991, Ballard 1992, Ballard and Van Ballenberghe 1997), deer (*Odocoileus* spp.; Ozoga 1982, Wilton 1983, Ozoga and Clute 1988, Kunkel and Mech 1994), and caribou (*Rangifer tarandus*; Rettie and Messier 1998). However, reports of black bear predation on adult ungulates are rare (Behrend and Sage 1974, Austin et al. 1994). Adult ungulates can be dangerous prey for adult black bears (Obbard et al. 2000), which may partially explain why observations of adult ungulate predation by black bears are uncommon. To our knowledge, there are no documented reports of black bear predation of free-ranging adult white-tailed deer (*O. virginianus*).

We describe a probable American black bear predation of an adult female white-tailed deer in Menominee County, Upper Peninsula of Michigan, USA (45°34′14″N, 87°20′47″W). This observation was part of a larger study examining multi-scale resource selection by carnivores and white-tailed deer. Deer were captured from 16 February to 22 March 2009. Major land-cover types within the study area include upland hardwoods, lowland hardwoods, lowland conifer swamps, upland conifers, aspen (*Populus* spp.) stands, agriculture, wetlands, and occasional patches of berry-producing shrubs (e.g., raspberries [*Rubus* spp.], and blueberries [*Vaccinium* spp.]).

On 10 March 2009, we captured an adult female white-tailed deer using a Clover trap (Clover 1956). This deer was 1 of 36 adult or yearling females captured and radiocollared during winter 2009. The deer was manually restrained in the trap and hand-

[4]nsvoboda@cfr.msstate.edu

injected intramuscularly with a 4:1 ketamine–xylazine mixture of 100mg/kg ketamine hydrochloride (Fort Dodge Laboratories, Inc., Fort Dodge, Iowa, USA) and 100 mg/kg xylazine hydrochloride (Butler Schein Animal Health™, Dublin, Ohio, USA). After immobilization, we removed a canine (Nelson 2001) for age estimation (Michigan Department of Natural Resources Diagnostics Laboratory, Lansing, Michigan, USA; Gilbert 1966), estimated weight to the nearest 1 kg using a spring scale, and attached a very high frequency (VHF) radiocollar equipped with an 8-hour motion-sensitive mortality signal (Advanced Telemetry Systems, Isanti, Minnesota, USA). We estimated body condition (scale: 1 [moribund]–5 [obese]; Gerhart et al. 1996), and determined pregnancy using ultrasonography (DelGiudice et al. 2007). We released the deer at the capture site following recovery and subsequently located the animal using standard telemetry techniques (White and Garrott 1990) 2–4 times weekly until late-May, almost daily through mid-August, then about weekly thereafter. Animal handling protocols were approved by the Mississippi State University Institutional Animal Care and Use Committee (IACUC #09-004).

Assuming a parturition date of 1 June (J.F. Duquette, unpublished data), the pregnant female at capture was 6.8 years old and weighed 47 kg with a body condition score of 3. We received a mortality signal on 2 November 2009; the last known location while the animal was alive was on 22 October, 12.9 km from the capture location and 0.8 km from the carcass location. The carcass was located on 3 November in a lowland conifer stand about 18 m from a deer trail, 138 m from the nearest seasonal road, and 300 m from an elevated hunting platform. The area surrounding the carcass included a dense understory of tamarack (*Larix laricina*), northern white cedar (*Thuja occidentalis*), hemlock (*Tsuga canadensis*), and tag alder (*Alnus serrulata*).

The carcass was about 80% covered with broken branches, soil, and leaf litter and did not exhibit signs of decomposition (e.g., no insect larvae). We noted puncture wounds on the outside of the right hindquarter near the femur and the inside of the left hind leg near the flexor digitorum. Apparent claw marks punctured and lacerated the hide near the thoracic vertebrae about 35 cm from the scapulae, resulting in subcutaneous hemorrhaging. The hide was everted from the lumbar vertebrae to the posterior end of the animal, and uncoagulated blood covered most of the hind legs. The intestines and stomach were removed and partially consumed. Remaining stomach contents contained shelled corn and unidentified vegetation. The heart, lungs, and liver were intact and not removed from the ribcage; ribs were intact and not consumed. The head, neck, and legs were uneaten and the skeleton was articulated. Possible tooth marks or lacerations were visible on the hide near the teats but no measurements could be obtained. No evidence of hunting wounds (e.g., projectile hole) or collision with a vehicle (e.g., multiple fractures, extensive hemorrhaging, multiple cuts and bruises) was located on the hide or internal organs. Femur bone marrow was light pink in color with a firm, waxy consistency. Fresh bear scat was identified next to the carcass and had the color and consistency of meat consumption (dark in color and liquefied).

All tree branches and saplings <5.0 cm in diameter were broken at heights 38–216 cm above ground within 5 m of the carcass. Black bear and deer hair were located on numerous broken branches surrounding the carcass. Recent bear tracks were observed near the carcass (<3 m) as well as claw marks on surrounding woody debris. We found no evidence (hair, scat, tracks) of other carnivores (wolf, *Canis lupus*; bobcat, *Lynx rufus*; coyote, *Canis latrans*) within 30 m of the carcass.

The carcass was <3 m from a probable bear den that was partially constructed. The den was 2 m in diameter, located under the roots of a fallen tree, and was recently lined with grasses and other bedding material. Black bear hair was located inside the den, at the 2 den entrances, and on multiple tree branches surrounding the den, suggesting substantial activity (i.e., den construction). Recent bear claw marks were located on a cedar stump and 2 logs adjacent to the den.

Based on the condition of the deer carcass, physical evidence at the kill location, and the similarity of this predation to reported black bear predations (e.g., Wade and Bowns 1984), we suggest this adult female deer was attacked and killed by a black bear. Consistent with other bear predations of ungulates (Bertram and Vivion 2002, Barber et al. 2005), the hide was everted and mostly intact, the intestines and stomach were removed and partially eaten, the legs were untouched, and the skeleton remained articulated. Austin et al. (1994) reported a black bear predation of an adult moose in Canada and noted all organs were consumed, the hide was

everted, and most of the skeleton remained intact. In addition, Ozoga and Verme (1982) investigated 2 black bear predations of neonate white-tailed deer in an enclosure in Michigan's Upper Peninsula and found the carcasses partially consumed and uneaten portions of the legs remained. Consistent with our observation, black bears have been observed caching or partially covering their kills with vegetation and soil (Elgmork 1982, Bertram and Vivion 2002). The udders of the deer were bitten or lacerated, similar to other predation events in which bears have reportedly consumed the udders of female prey, possibly to obtain milk (Hygnstrom et al. 2005). Zager and Beechum (2006) reported that deer with decreased body condition are more vulnerable to bear predation; however, femur bone marrow indicated the deer was not severely malnourished (Stockle et al. 1978).

Because there was no indication the carcass was moved, we suggest the deer was killed at the location the carcass was found. The dense understory at the kill location may have facilitated this predation. Broken branches with bear and deer hair and knocked down trees in the area surrounding the kill suggested a considerable struggle occurred (Austin et al. 1994). Similar to Austin et al. (1994), a bear-rest site (i.e., den) and scat were located near the carcass. Evidence of a struggle further supports the assumption the deer was not compromised by a previous injury and was not scavenged. It is also unlikely this deer was struck by a vehicle because the carcass was located 138 meters from a rarely traveled, seasonal, gravel road in poor condition. Rough conditions of the road limit maximum vehicle speed to 15–25 km/hr, and the deer did not incur the types of injuries typically seen in vehicle collisions. Evidence at the kill site suggests the deer died from exsanguination from injuries received during the attack. However, it is possible the bear suffocated the deer by covering the muzzle or closing off the trachea (Austin et al. 1994).

Black bears can be effective predators of neonate ungulates (Zager and Beechum 2006), including moose, elk, and caribou, but are not considered predators of adult deer (Ballard 1992). The paucity of documented predation events on adult white-tailed deer undoubtedly reflects the increased speed and agility of mature white-tailed deer (Adams et al. 1995, Zager and Beechum 2006). Consequently, we consider this observation an opportunistic predation event and suggest the overall direct effects of black bear predation on adult white-tailed deer are negligible.

Acknowledgments

This project was supported by the Federal Aid in Wildlife Restoration Act under Pittman-Robertson project W-147-R. We thank the Michigan Department of Natural Resources, Mississippi State University, Safari Club International Foundation, and the Michigan Involvement Committee of Safari Club International for project support. Much gratitude to T. Petroelje, C. Ayers, and R. Karsch, who assisted in capturing and radiolocating deer.

Literature cited

ADAMS, L.G., F.J. SINGER, AND B.W. DALE. 1995. Caribou calf mortality in Denali National Park, Alaska. Journal of Wildlife Management 59:584–594.

AUSTIN, M.A., M.E. OBBARD, AND G.B. KOLENOSKY. 1994. Evidence of a black bear, *Ursus americanus*, killing an adult moose, *Alces alces*. The Canadian Field Naturalist 108:236–238.

BALLARD, W.B. 1992. Bear predation on moose: A review of recent North American studies and their management implications. Alces Supplement 11:162–176.

———, AND V. VAN BALLENBERGHE. 1997. Predator/prey relationships. Pages 247–273 in A.W. Franzmann and C.C. Schwartz, editors. Ecology and management of the North American moose. Smithsonian Institution Press, Washington, DC, USA.

BARBER, S.M., D.L. MECH, AND P.J. WHITE. 2005. Yellowstone elk calf mortality following wolf restoration: Bears remain top summer predators. Yellowstone Science 13:37–44.

BEHREND, D.F., AND R.W. SAGE JR. 1974. Unusual feeding behavior by black bears. Journal of Wildlife Management 38:570.

BELANT, J.L., K. KIELLAND, E.H. FOLLMANN, AND L.G. ADAMS. 2006. Interspecific resource partitioning in sympatric ursids. Ecological Applications 16:2333–2343.

BERTRAM, M.R., AND M.T. VIVION. 2002. Moose mortality in eastern interior Alaska. Journal of Wildlife Management 66:747–756.

BULL, E.L., T.R. TORGERSEN, AND T.L. WERTZ. 2001. The importance of vegetation, insects, and neonate ungulates in black bear diet in northeastern Oregon. Northwest Science 75:244–253.

CLOVER, M.R. 1956. Single-gate deer trap. California Fish and Game 42:199–201.

DEBRUYN, T.D. 1997. Habitat use, food habits and population characteristics of female black bears in the central Upper Peninsula of Michigan: A geographic

information system approach. Dissertation, Michigan Technological University, Houghton, Michigan, USA.

DELGIUDICE, G.D., M.S. LENARZ, AND M. CARSTENSEN POWELL. 2007. Age-specific fertility and fecundity in northern free-ranging white-tailed deer: Evidence for reproductive senescence? Journal of Mammalogy 88:427–435.

ELGMORK, K. 1982. Caching behavior of brown bears (*Ursus arctos*). Journal of Mammalogy 63:607–612.

FRANZMANN, A.W., C.C. SCHWARTZ, AND R.O. PETERSON. 1980. Moose calf mortality in summer on the Kenai Peninsula, Alaska. Journal of Wildlife Management 44:764–768.

GERHART, K.L., R.G. WHITE, R.D. CAMERON, AND D.E. RUSSELL. 1996. Estimating fat content of caribou from body condition scores. Journal of Wildlife Management 60:713–718.

GILBERT, F.F. 1966. Aging white-tailed deer by annuli in the cementum of the first incisor. Journal of Wildlife Management 30:200–202.

HOLCROFT, A.C., AND S. HERRERO. 1991. Black bear, *Ursus americanus*, food habits in southwestern Alberta. Canadian Field Naturalist 105:335–345.

HYGNSTROM, S.E., P.D. CURTIS, G.K. YARROW, AND R.H. SCHMIDT. 2005. Carnivores and mammalian predators damage assessment. Internet center for wildlife damage management, http://icwdm.org/inspection/Livestock.aspx, accessed 15 Sep 2010.

KUNKEL, K.E., AND L.D. MECH. 1994. Wolf and bear predation on white-tailed deer fawns. Canadian Journal of Zoology 72:1557–1565.

NELSON, M.E. 2001. Tooth extractions from live-captured white-tailed deer. Wildlife Society Bulletin 29:245–247.

OBBARD, M.E., G.D. CAMPBELL, AND A. SCHENK. 2000. Evidence for fatal injury inflicted on a female black bear by a moose. Northeast Wildlife 55:57–62.

OZOGA, J.J. 1982. Predation by black bears on newborn white-tailed deer. Journal of Mammalogy 63:695–696.

———, AND L.J. VERME. 1982. Predation by black bears on newborn white-tailed deer. Journal of Mammalogy 63:695–696.

———, AND R.K. CLUTE. 1988. Mortality rates of marked and unmarked fawns. Journal of Wildlife Management 52:549–551.

PELTON, M.R. 2003. Black bear. Pages 547–555 in G.A. Feldhamer, B.C. Thompson, and J.A. Chapman, editors. Wild mammals of North America: Biology, management, and conservation. The Johns Hopkins University Press, Baltimore, Maryland, USA.

RAINE, R.M., AND J.L. KANSAS. 1990. Black bear seasonal food habits and distribution by elevation in Banff National Park, Alberta. International Conference of Bear Research and Management 8:297–304.

RETTIE, W.J., AND F. MESSIER. 1998. Dynamics of woodland caribou populations at the southern limit of their range in Saskatchewan. Canadian Journal of Zoology 76:251–259.

SCHWARTZ, C.C., AND A.W. FRANZMANN. 1991. Interrelationship of black bears to moose and forest succession in the northern coniferous forest. Wildlife Monographs 113.

SINGER, F.J., A. HARTING, K.K. SYMONDS, AND M.B. COUGHENOUR. 1997. Density dependence, compensation, and environmental effects on elk calf mortality in Yellowstone National Park. Journal of Wildlife Management 61:12–25.

SMITH, B.L. 1994. Population regulation of the Jackson elk herd. Dissertation, University of Wyoming, Laramie, USA.

STOCKLE, A.W., G.L. DOSTER, AND W.R. DAVIDSON. 1978. Endogenous fat as an indicator of physical condition of southeastern white-tailed deer. Proceedings of the Annual Conference Southeast Association of Fish and Wildlife Agencies 32:269–279.

WADE, D.A., AND J.E. BOWNS. 1984. Procedures for evaluating predation on livestock and wildlife. Texas Agriculture Experimental Station Bulletin B-1429, College Station, Texas, USA.

WHITE, G.C., AND R.A. GARROTT. 1990. Analysis of wildlife radio-tracking data. Academic Press, San Diego, California, USA.

WILTON, M.L. 1983. Black bear predation on young cervids—a summary. Alces 19:136–147.

ZAGER, P., AND J. BEECHAM. 2006. The role of American black bears and brown bears as predators on ungulates in North America. Ursus 17:95–108.

Received: 11 October 2010
Accepted: 14 January 2011
Associate Editor: M. Obbard