In situ Caching of a Large Mammal Carcass by a Fisher, *Martes pennanti*

ETHAN A. HÜNER and JUSTIN F. B. PETER

Algonquin Park Visitor Centre, Algonquin Provincial Park, P.O. Box 219, Whitney, Ontario K0J 2M0 Canada

Hüner, Ethan A., and Justin F. B. Peter. 2012. *In situ* caching of a large mammal carcass by a Fisher, *Martes pennanti*. Canadian Field-Naturalist 126(3): 234–237.

We document what is apparently the first reported instance of *in situ* caching of a large mammal carcass by a Fisher (*Martes pennanti*).

Key Words: caching, Fisher, *Martes pennanti*, mustelid, scavenging, carcass, Algonquin Park, Ontario.

Caching is an animal behaviour widespread across taxa that involves the handling of food to conserve it for future use. Two key components of caching are that the consumption of the cached item is deferred and that the food item is handled in such a way as to deter competition for that item (Vander Wall 1990). For the purposes of this note, food caching is considered synonymous with hoarding and storing, as per Vander Wall (1990).

The Fisher (*Martes pennanti*) is one of several members of the family Mustelidae (order Carnivora), including the American Marten (*Martes americana*), the European Pine Marten (*Martes martes*), the Long-tailed Weasel (*Mustela frenata*), the Wolverine (*Gulo gulo*), and the American Badger (*Taxidea taxus*), that are known to cache food (Vander Wall 1990; Henry et al. 1990; Muths 1998; Michener 2000; Inman et al. 2012).

Caching by Fishers generally entails the carrying of prey or otherwise loose food items away from the kill or find site to a sheltered or concealed place such as a den, where the animal may store the item and later retrieve it (Pittaway 1978; Powell 1993). When they encounter an immovable food item such as a large mammal carcass, Fishers have been known to reside in close proximity to the carcass and return to the food item periodically to feed (Powell 1993). However, to our knowledge, there are no published accounts of Fishers or any other mustelids caching large, immovable items, and this note describes the first documented instance of this behaviour by a Fisher.

Study Area and Methods

On 20 October 2008, we initiated a study of carrion feeders at a large mammal carcass depot in southwestern Algonquin Provincial Park, Ontario (45°29'51"N, 78°45'55"W). A digital motion-triggered trail camera (Moultrie Game Camera, Moultrie Feeders, Alabaster, Alabama) was installed on a tree 2.5 m behind the carcass of an adult male American Black Bear (*Ursus americanus*) that had been shot dead and deposited there fresh on 18 October 2008. The carcass was placed on the ground, facing west in a prone position, and was intact except for three bullet holes in the area of the left shoulder.

The site was bounded to the north and northeast by a <0.5 acre stand of Eastern White Pine (*Pinus strobus*), White Spruce (*Picea glauca*), and Balsam Fir (*Abies balsamea*) with a sparse shrub layer of Beaked Hazelnut (*Corylus cornuta*), on the southeast by a gravel hillside opening of >2 acres, and to the west by an unpaved road running in a north–south axis. The roadside opposite the carcass was bounded by a narrow strip of forest cover similar to the above-mentioned; beyond it lay an open bog below the grade of the road.

The camera was aimed towards the road and was set so as to be triggered to take three photographs 30 seconds apart, followed by a one-minute latent period, during which the camera could not be triggered. The camera recorded the ambient temperature when each photograph was taken. EAH subsequently visited the site every two to five days (total seven visits) to monitor the camera batteries and adjust the camera position. The ambient temperature during the study ranged from –9°C to 14°C.

During his second visit (26 October 2008), EAH noticed scrapes in the gravel substrate forming a semicircle round the rear end of the carcass. The distal edge of the scraped surface was approximately 0.9–1.2 m away from the carcass and the scraping patterns were directed towards it. The hind legs of the carcass were completely covered with dead and green grasses, dead Eastern White Pine needles, Moose (*Alces alces*) bones, and twigs, and this material was packed in between the legs, over the tail, onto the rump, and round the American Black Bear's perimeter. EAH viewed photos recorded by the camera and determined that a male Fisher was responsible for the placement of the materials, starting late in the afternoon on 22 October 2008.

The Fisher was recorded engaging in at least seven caching episodes[1], during which it placed the above-

[1] We define an episode as an uninterrupted period during which the Fisher engaged in one activity without leaving the camera's field of view.

mentioned materials over the carcass, using his mouth and forelimbs to position the material. The Fisher was also recorded feeding on the carcass at least three times between 22 October and 26 October 2008, beginning through the American Black Bear's anus. Other than two brief episodes (documented <1 minute each) when he consumed uncovered flesh exposed at the bullet holes, the Fisher concentrated feeding round the anus. The Fisher was not recorded feeding on the American Black Bear prior to the first episode of caching. The last day of the study was 17 November 2008, and we did not monitor the carcass by any means beyond this date. We assume that a single male Fisher was the only individual recorded during the entire duration of the study.

Observations

During the third visit by EAH, on 1 November 2008, EAH checked the photo log and confirmed that the Fisher had continued to eat and cache the American Black Bear's hindquarters *in situ*. Before departing, EAH placed a pile of dead Bracken Fern (*Pteridium aquilinum*) fronds and a pile of fresh White Spruce boughs, measuring approximately 60–100 cm in length, at the side of the carcass in order to determine whether the Fisher would incorporate these materials into the cache materials.

At EAH's next visit, on the afternoon of 5 November 2008, the photo record indicated that the Fisher had utilized all of the Bracken Fern for the cache on 1 November 2008 by taking mouthfuls from the pile and translocating them onto the top of the carcass (Figure 1), in addition to dragging up a White Spruce bough onto the American Black Bear's left shoulder area (the area with the bullet holes). During this visit, EAH removed debris off the American Black Bear's rump and partially from the upper hind limbs. The purpose of this type of intervention was to get an anecdotal sense as to whether the Fisher's caching represented a real tendency. The Fisher subsequently completely recovered areas of the American Black Bear's rear upon his next visit, on the night of 5 November 2008. On 7 November 2008, EAH once again removed all of the caching material for the same purpose as stated above. On 9 November 2008, the Fisher re-covered the American Black Bear's hindquarters. At a certain point, American Black Bear entrails were left exposed through the material even though the caching material was otherwise intact.

Up until 17 November 2008, our camera documented 36 feeding episodes by the Fisher with a mean duration of 14.9 minutes (range <1 minute to 65 minutes) and 21 caching episodes with a mean duration of 7 minutes (range <1 minute to 13 minutes). The Fisher fed on the American Black Bear under the covered area either by completely exposing an area from which to feed or by penetrating the cache material with its muzzle. Visits to the carcass were almost exclusively nocturnal or crepuscular. The Fisher engaged in apparent scent-marking activity on at least one occasion. The Fisher covered as much as approximately one third of the carcass's surface.

Other vertebrates were also recorded at the site during the study. Twelve episodes of Red Fox (*Vulpes vulpes*) activity were recorded at the carcass (always crepuscular or nocturnal) between 29 October and 11 November 2008. During two of these episodes, two Red Foxes were recorded in the field of view simultaneously. Six episodes of a Red Fox feeding on the carcass, on two consecutive nights (29 and 30 October 2008), were recorded; a Red Fox initially displaced the caching material at the carcass's rear on the first night to feed, and the area was left uncovered until after a Red Fox fed a second time, at which point the Fisher returned. There were no recorded direct interactions between a Red Fox and the Fisher. However, during episodes just prior to, or following, the Fisher's recorded visits, the attending Red Fox appeared preoccupied by something in the environment.

A single Eastern Wolf (*Canis lupus lycaon*) was recorded investigating the carcass on the night of 23 October 2008 but it did not feed. One American Marten (*Martes americana*) was recorded briefly feeding on the rear of the carcass during the evening of 31 October 2008 (exact point of entry not visible). Common Raven (*Corvus corax*) activity was recorded during the day over the entire duration of the study, with up to seven birds recorded at one time. A Common Raven was first recorded feeding on 23 October 2008 at the bullet holes. Common Ravens scrutinized the rest of the carcass but were recorded feeding exclusively at the bullet holes from 23 to 28 October 2008.

The first recorded instance of a Common Raven feeding on the rear of the carcass was on 29 October 2008, following disturbance of the cache materials by the Red Fox. Ravens subsequently fed here throughout the remainder of the study by accessing the area directly where the Red Fox had left it exposed, by pilfering through caching material, or by feeding on the exposed edge of the feeding entry point once the opening in the carcass had become larger. On 1 November 2008, a Common Raven may also have removed a White Spruce bough that the Fisher had placed over the area of the bullet holes. There was one instance in which several Common Ravens were recorded at the carcass simultaneously with the Fisher; one Common Raven landed on the carcass as the Fisher fed, and moved in small increments towards the Fisher.

Discussion

Partial concealment of the American Black Bear carcass by the Fisher did not deter competition for the carcass from other vertebrates, since Red Foxes, Common Ravens, and an American Marten all fed from it, including the area where the concealment activity by the Fisher was concentrated. However, the concealment did

FIGURE 1. Fisher placing a mouthful of dead Bracken Fern fronds on the hindquarters of the American Black Bear carcass in Algonquin Provincial Park on 1 November 2008 at 1027 h. Note previously placed cache material surrounding Fisher and piled along the right flank of the American Black Bear.

delay the consumption of the carcass's rear by Common Ravens. The caching may therefore have prolonged the availability of the food source to the Fisher, although our data do not allow us to confirm this.

Common Ravens can be significant competitors, not only because they consume carrion at the source, sometimes in large numbers, but because they can also carry away significant quantities of carrion in excess of their immediate energetic requirements in order to cache it (Kaczensky et al. 2005). Common Ravens are, however, unable to break through hide to access the flesh and must rely on other organisms to open the carcass (Boarman and Heinrich 1999). Concealment activity could be particularly important, given that Common Ravens are diurnal and the Fisher is mainly nocturnal and crepuscular. This means that the Fisher would presumably have no other means to dissuade them.

Concealment of a food source can deter Common Ravens if they have not seen the food source previously (B. Heinrich, personal communication). This might explain why the concealment activity ceased to be effective against the Common Ravens when it did. It is not known whether a greater thickness or area of caching material might have increased the caching effectiveness against any of the observed vertebrate scavengers.

Although it did not extend to the entire carcass, the concealment activity may have been effective in increasing the persistence of the food source in other ways. Experiments involving Cougar (*Puma concolor*) caching of ungulate carcasses showed that caching can reduce the temperature of a carcass and reduce the discernible odour emanating from the carcass, suggesting that carrion may be useable for longer (due to a reduction in scavenging microbe and arthropod populations) and that competing scavengers may not be able to detect the carrion by olfactory means from as far away as without caching (Bischoff-Mattson and Mattson 2009). We did not measure carcass temperatures or odour, and we did not have an unconcealed carcass with which to experimentally compare the concealed one. As well, were the placement of caching materials by the Fisher serving to reduce decomposition or detection, the removal of said materials twice during the course of this study by us might have offset some of the positive effects of caching.

It is unlikely that the caching activity we observed would have been effective in preventing larger scav-

engers, such as wolves (*Canis* spp.), from utilizing a carcass. At least one Eastern Wolf was obviously aware of the carcass. Also, Eastern Wolves in Algonquin Park will feed on American Black Bear carcasses (EAH, personal observation) and will dig through barriers such as deep snow in order to access a carcass (JFBP, personal observation).

The food source in this study may not have been what is typically available to a Fisher. Fishers are opportunistic carnivores that subsist mainly by hunting any mammal or bird they can overpower (Powell 1993). They will search for prey throughout a relatively fixed home range that largely excludes conspecifics of the same sex (Arthur et al. 1989). Where it occurs, Snowshoe Hare (*Lepus americanus*) is a staple of the Fisher's diet (Raine 1987; Weir et al. 2005). Fishers will also scavenge carrion from a variety of organisms when encountered (Pittaway 1978; Powell 1993). Carrion can form an important component of the diet; carrion from deer (*Odocoileus* spp.) harvested by hunters can supplant the Snowshoe Hare as a primary food source when Snowshoe Hare populations decline, and carrion may even buffer Fishers against the cyclical nature of Snowshoe Hare numbers (Kuehn 1989).

In the study area—where there is no deer harvest—a Fisher may have periodic access to the remains of White-tailed Deer (*Odocoileus virginianus*) or Moose killed by Eastern Wolves. More rarely, they may use the carcass of a large mammal that has died by some other means; however, Eastern Wolves would be expected to scavenge such a carcass and would readily interfere with a Fisher's access to it (EAH and JFBP, personal observations). Therefore, access to an intact large mammal carcass such as the one in this study would provide an unusually large supplement to the Fisher's diet. The importance of such a supplement could be especially great in the study setting because the Snowshoe Hare population in Algonquin Park was experiencing a cyclic decline at the time, according to pellet counts in monitoring plots (Ontario Ministry of Natural Resources, staff communication). A Fisher's ability to prolong the availability of this food source by concealing it could provide it with a significant fitness advantage.

Acknowledgements

This work was supported by Ontario Parks (Ontario Ministry of Natural Resources). We thank Rick Stronks for encouraging the preparation of this note. We also thank him and Cavalcade Color Lab Foto Source (Huntsville, Ontario) for technical assistance and Dan Strickland and two anonymous reviewers for helpful comments on the manuscript.

Literature Cited

Arthur, S. M., W. B. Krohn, and **J. R. Gilbert.** 1989. Home range characteristics of adult fishers. Journal of Wildlife Management 53: 674–679.

Bischoff-Mattson, Z., and **D. Mattson.** 2009. Effects of simulated mountain lion caching on decomposition of ungulate carcasses. Western North American Naturalist 69: 343–350.

Boarman, W. I., and **B. Heinrich.** 1999. Common Raven (*Corvus corax*). No. 476 *in* The Birds of North America. *Edited by* A. Poole and F. Gill. Birds of North America, Inc., Philadelphia, Pennsylvania.

Henry, S. E., M. G. Raphael, and **L. F. Ruggiero.** 1990. Food caching and handling by marten. Great Basin Naturalist 50: 381–383.

Inman, R. M., A. J. Magoun, J. Persson, and **J. Mattisson.** 2012. The wolverine's niche: linking reproductive chronology, caching, competition, and climate. Journal of Mammalogy 93: 634–644.

Kaczensky, P., R. D. Hayes, and **C. Promberger.** 2005. Effect of raven *Corvus corax* scavenging on the kill rates of wolf *Canis lupus* packs. Wildlife Biology 11: 101–108.

Kuehn, D. W. 1989. Winter foods of Fishers during a Snowshoe Hare decline. Journal of Wildlife Management 53: 688–692.

Michener, G. R. 2000. Caching of Richardson's ground squirrels by North American badgers. Journal of Mammalogy 81: 1106–1117.

Muths, E. 1998. An observation on caching of prey by a long-tailed weasel (*Mustela frenata*). Southwestern Naturalist 43: 106.

Pittaway, R. J. 1978. Observations on the behaviour of the fisher (*Martes pennanti*) in Algonquin Park, Ontario. Naturaliste canadien 105: 487–489.

Powell, R. A. 1993. The Fisher: Life History, Ecology, and Behaviour. Second edition. University of Minnesota Press, Minneapolis, Minn. 237 pages.

Raine, R. M. 1987. Winter food habits and foraging behaviour of fishers (*Martes pennanti*) and martens (*Martes americana*) in southeastern Manitoba. Canadian Journal of Zoology 65: 745–747.

Vander Wall, S. B. 1990. Food Hoarding in Animals. University of Chicago Press, Chicago, Illinois. 445 pages.

Weir, R. D., A. S. Harestad, and **R. C. Wright.** 2005. Winter diet of fishers in British Columbia. Northwestern Naturalist 86: 12–19.

Received 15 July 2012
Accepted 1 October 2012