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Winter Prey Caching by Northern Hawk Owls in Minnesota

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ABSTRACT.—Northern Hawk Owls (*Surnia ulula*) have been reported to cache prey during the breeding season for later consumption, but detailed reports of prey caching during the non-breeding season are comparatively rare. We provided prey to four individual Northern Hawk Owls in wintering areas in northeastern Minnesota during 2001 and 2005 and observed their caching behavior. These owls cached 93% (n = 14) of prey items presented to them and consumed one item immediately after capture. A number of bird species relocate stored food by remembering the spatial locations of caches. Prominent landmarks (dead trees larger than the surrounding vegetation, sites concealed in the snow next to a utility pole or clump of grass) or sites near them were often selected for caching by Northern Hawk Owls and likely facilitate relocation of stored prey. Prey caching during winter allows exploitation of temporary increases in prey abundance and may aid in survival during times of food shortage or adverse weather. *Received 24 October 2006. Accepted 14 March 2007.*

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The Northern Hawk Owl (*Surnia ulula*) is ''one of the least-studied birds of North America'' (Duncan and Duncan 1998:1). It resides nomadically, in response to prey availability, in boreal forests throughout its Holarctic breeding range (Andersson 1980, Mikkola 1983). In some years the species wanders well south of its year-round range during winter. These irruptive winter movements are believed to result from reproductive success in preceding years and low prey availability in the year of irruption (Duncan and Duncan 1998). Northern Hawk Owls are primarily diurnal and hunt from tree top perches (Duncan and Duncan 1998). Small mammals comprise the bulk of their diet, but birds become important during winter (Hogstad 1986, Rohner et al. 1995).

Several owl species have been reported to cache prey, particularly during the breeding season (Phelan 1977, Korpimaki 1987, Young et al. 1988). Reports of this behavior for owls during winter are rare (Collister 1995). Prey caching by Northern Hawk Owls has been observed during nesting (Ritchie 1980, Kertell 1986) and in winter (Collister 1995, Nero 1995), and may provide a safeguard for potential times of food shortage (Huhtala et al. 1987). A number of observers have witnessed

winter prey caching by Northern Hawk Owls (Nero 1995, Duncan and Duncan 1998), but few detailed accounts are available in the literature (Collister 1995). We report observations of prey caching by wintering Northern Hawk Owls in northeastern Minnesota.

OBSERVATIONS

On 18 February 2001 we located a Northern Hawk Owl perched on top of a tree next to a gravel road in the Sax-Zim bog area northwest of Duluth, Minnesota. Habitat within the immediate area included thickets of deciduous shrubs and small trees interspersed with small openings and scattered medium-sized deciduous trees. Snow depth was approximately 20 cm. We offered the owl a recently road-killed Red Crossbill (*Loxia curvirostra*). The crossbill was placed in the middle of the road ~10 m in front of our parked car. Soon thereafter, the owl retrieved the crossbill, flew over some low vegetation, and disappeared into the shrubbery at or near ground level. The owl returned to its perch <30 sec later without the crossbill. Our view was obscured and we did not see what the owl did with the crossbill. We suspected, based on the short time the owl was out of view, that it did not consume it entirely and had cached all or a portion. On 19 February 2001 we returned to the same location and quickly relocated what we presumed to be the same Northern Hawk Owl. This time we brought along five commercially obtained dark-colored mice (*Mus musculus*). We placed a live mouse on the road and the owl immediately captured it. As with the crossbill, the owl carried the mouse into low shrubbery, at or near ground level, and returned <30 sec later without the mouse. Again, we could not see precisely what the owl did with the prey item, but we presumed it was cached. We then experienced identical results with two additional mice. We had no success observing the actual caching of prey by this individual due to the obscuring vegetation and opted to try a different Northern Hawk Owl 0.8 km distant along the same road. Habitat and snow cover were similar to the first location. The first mouse offered to this owl was held at arm's length. The mouse was captured and carried into nearby shrubbery at or near ground level. The owl returned to its perch <30 sec later without the mouse. It behaved similarly to the first Northern Hawk Owl and we again believed the prey was cached. We then offered a second mouse to this owl. The owl captured the mouse and this time we were able to see where it took the prey. The owl landed on the ground near the base of a telephone pole. With the mouse in its beak, it pushed its prey approximately 6 cm into the snow. The owl then used sideways swipes of its beak to push snow over the mouse. After caching its prey the owl returned to its perch within roughly the same amount of time as with the previous captures. This is the only instance where we observed prey being cached, but are confident the other mice and the crossbill were also cached.

We returned to northeastern Minnesota during mid-March 2005 and recorded Northern Hawk Owl prey caching behavior in more detail. Observations were made of two owls. Dead, white lab mice were frozen for transport and thawed before being offered to the owls. The first owl was west of Duluth, in Aitkin County, on the morning of 12 March 2005. Habitat within the immediate area was a mosaic of thickets (mostly small deciduous trees ~5–6 m tall), openings, and occasional medium-sized conifers and deciduous trees. Dense hardwood-conifer forest was ~0.8 km distant. A power line right-of-way paralleled the county road. Snow cover was 20–30 cm in depth. Four mice were offered to this individual. We placed the first mouse on the county road. The owl retrieved the prey and flew to a nearby telephone pole where it consumed the head before swallowing the remainder of the mouse. A second mouse was then placed on the road. The owl picked it up and took it briefly to a telephone pole. It then flew 0.16 km where it cached the mouse on top of a 2-m-high hardwood snag before returning to the capture area. A third mouse was then offered to the owl. It took this mouse 0.65 km away and cached it ~8 m above snow level in a 20-m-tall hardwood tree near the edge of the dense forest. The exact position in the tree was not observed. The owl then returned to a telephone pole near the capture site. The fourth and final mouse was presented by hand, and was taken by the owl to a pole. Briefly afterwards it flew 0.48 km and cached the mouse about 10 m above snow level (exact location not observed) in a 23-m-tall

tree just inside the densely forested area. The owl then returned to a telephone pole near the capture site.

The second Northern Hawk Owl was in the Sax-Zim bog area during the afternoon of 12 March 2005 at the same location as the 2001 observations. Five dead mice were offered to this owl by hand. All were taken and subsequently cached. After each capture, the owl briefly landed on a nearby telephone pole before flying elsewhere to cache the prey. The first mouse was cached in a crevice at the top of a 3-m-tall snag, 40 m from the capture site. The second mouse was cached in snow at the base of a grass clump, 60 m from the capture site. The third mouse was cached in snow 45 m from the capture site. Caching behavior for mice cached in the snow was similar to that observed in 2001. The fourth mouse was cached in a large shrub 100 m from the capture site (details not observed). The fifth mouse was cached 6 m above snow level in a 12-m-tall snag (diameter = 22 cm at the cache site). This mouse was placed beneath loose bark with only its hind legs and tail remaining visible. Distance from the capture site was not recorded but was <200 m.

DISCUSSION

Caching behavior is exhibited by a number of bird and mammal species, and provides critical resources during times of food scarcity (Sherry and Vaccarino 1989, Sklepkovych and Montevecchi 1996, Samelius et al. 2002, Rogers 2005). This strategy seems particularly important in regions of climatic extremes. Prey caching appears to be a common behavior in wintering Northern Hawk Owls (Collister 1995, Nero 1995, Duncan and Duncan 1998). However, caching is rarely reported for nonbreeding owls (Collister 1995). The four Northern Hawk Owls observed cached 93% (n = 14) of prey items presented to them. One item was eaten immediately after capture. As with other prey-caching species, the strategy of storing prey allows Northern Hawk Owls to take advantage of temporary increases in prey abundance and may aid in survival during times of food shortage or adverse weather (Collister 1995). Snow and sub-freezing temperatures can preserve prey for lengthy periods (Ehrlich et al. 1988).

Several species within the family Corvidae possess the ability to accurately recover cached food items through spatial memory (Balda and Kamil 1989, Heinrich and Pepper 1998). Our observations of winter prey caching and those of others (Collister 1995, Nero 1995, Duncan and Duncan 1998) document that Northern Hawk Owls regularly cache prey at relatively prominent visual sites, suggesting their ability to recall landmarks. These sites include dead trees larger than the surrounding vegetation, conspicuous tree cavities such as old woodpecker holes, and sites concealed in the snow next to a prominent pole, tree, or clump of grass. These visual features may facilitate recovery of stored prey.

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