ARTICLES

Notes on feeding and nesting behaviour of Northern Saw-whet Owl (*Aegolius acadicus*), and its status in the vicinity of Wawa, Ontario.

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Figure 1: Northern Saw-whet Owl with immature Deer Mouse *(Peromyscus maniculatus gracilis).*

Although the Northern Saw-whet Owl is one of the most common owls in forested habitats of Canada and the northern United States, much remains to be learned about its behaviour and breeding biology (Cannings 1993). Published information on the breeding season diet of this species was mostly determined from the analysis of pellets and prey remains recovered from nests (Cannings 1987, 1993, Marks and Doremus 1988). Skulls found in pellets are usually crushed, and dentaries are often the most useful clue to prey identification (Swengel and Swengel 1992, Cannings 1993, Holt and Leraux 1996). In the present note, I report on the results of a photographic study of feeding behaviour of this species in Algoma District, northeastern Ontario.

A nest of the Northern Saw-whet Owl was found on 4 April 1999 in a clearing south-east of Wawa (N 47º 59'24", W 084º46'34") in a cavity at ca. 4m above the ground in a paper birch (*Betula papyrifera*) snag. Although clear-cut logging is widespread throughout the Northern Saw-whet Owl's range in northern and central Ontario (Ontario Ministry of Natural Resources, 2001) no other nests of this species were reported from clearings in this province or in Quebec (Sleep 2005, P. Drapeau, pers. comm., L. Imbeau, pers. comm.).

In this study, I photographed prey brought by the male to feed the female and the young. Observations were carried out for a total of 29 hours and 20 minutes (3 hours 40 minutes per night on average) on 19, 22, 26-29 May, and 3 and 4 June 1999, typically between 2130 and 0130 hours. Every owl visit to the nest with or without prey was logged, and an attempt to photograph every prey delivery was made. During my observations, food was delivered 47 times, and on 26 occasions photographed prey was identifiable (Figures 1-10).

Figure 2: Northern Saw-whet Owl with adult Deer Mouse *(Peromyscus maniculatus gracilis)*.

Figure 3: Northern Saw-whet Owl with Meadow Vole *(Microtus pennsylvanicus)*.

Methods

A 3.5 m tower built of wooden 2" x 4"s was fitted with a fabric blind on top. The tower was moved to the vicinity of the nest (about 5 m away) on 12 May after the young had hatched. A dead sapling was planted about 3 m from the cavity to provide an obvious perch. A Nikon F90X camera fitted with Sigma

Figure 4: Northern Saw-whet Owl with Southern Red-backed Vole (*Clethrionomys gapperi).*

APO 170-500mm lens and 2 Metz flashes were used, with Fujichrome Provia film (400 ASA). A small 4.8v flashlight with a sawed-off reflector, run by a 12v battery, was placed between the tower and the nest to provide just enough light to see the arriving owl and to focus. Most of the time, the lens was pre-focused on the cavity entrance or the perch. This technique was modified from Pukinski (1976).

Prey Items

Woodland Deer Mouse (*Peromyscus maniculatus gracilis*), both immature and adults, made up 30.8% of all prey (Table 1) as it would be expected (Catling 1972, Cannings 1987, Swengel and Swengel 1992, Holt and Leraux 1996). Other frequent prey included shrews (mostly Masked Shrew *Sorex cinereus*) 23.1%, jumping mice (mostly Woodland Jumping Mouse (*Napaeozapus insignis*)) 15.4%, Meadow Voles (*Microtus pennsylvanicus*) 19.2%, and birds (White-crowned Sparrow (*Zonotrichia leucophrys)* and Black-and-white Warbler (*Mniotilta varia*)) 7.7%. Smoky Shrew (*Sorex fumeus)*, Woodland Jumping Mouse and Black-and-white Warbler apparently have not been recorded among prey of Northern Saw-whet Owl, although related species were. According to Hayward and Garton (1988) and Cannings, (1993) prey selection in this owl is influenced by habitat selection. In the present study, most hunting had likely been done within the clearing because all mammal species recorded in this study are known to occur along shrubby forest edges and in wet meadows (Banfield 1977).

Identification of small mammals from photographs may appear controversial. Indeed, in areas that may harbour several species of *Peromyscus*, *Microtus* or *Sorex*, this technique is unlikely to produce positive identification beyond genus. However, north-eastern Ontario supports a relatively impoverished fauna of small mammals, *e.g.*, 2-3 species of *Sorex,* 1 *Microtus*, 1 *Peromyscus*, 1 *Clethrionomys*, etc. (Banfield 1977, Dobbyn 1994). In this study, I based identification on good personal knowledge of small mammals of Ontario: all mammal species detected during this study (Table 1) were previously caught, kept, observed and pho-

Common Name	Scientific Name	Number of Prey Items
Woodland Deer Mouse	*Peromyscus maniculatus gracilis*	8
Immature	*(Peromyscus maniculatus gracilis)*	(4)
Adult	*(Peromyscus maniculatus gracilis)*	(3)
Unaged	*(Peromyscus maniculatus gracilis)*	(1)
Masked Shrew	*Sorex cinereus*	5
Meadow Vole	*Microtus pennsylvanicus*	5
Woodland Jumping Mouse	*Napaeozapus insignis*	5
Meadow Jumping Mouse	*Zapus hudsonius*	1
Southern Red-backed Vole	*Clethrionomys gapperi*	1
Smoky Shrew	*Sorex fumeus*	1
White-crowned Sparrow	*Zonotrichia leucophrys*	1
Black-and-White Warbler	*Mniotilta varia*	1
Total		**26**

Table 1: Prey items delivered by male Northern Saw-whet Owl to the nest under observation. (Identified from photographs)

Figure 5: Northern Saw-whet Owl with Woodland Jumping Mouse (*Napaeozapus insignis).*

Figure 6: Northern Saw-whet Owl with Meadow Jumping Mouse (*Zapus hudsonius)*.

Figure 7: Northern Saw-whet Owl with Masked Shrew *(Sorex cinereus)*.

tographed by me. Every image obtained during photo sessions at the owl nest was compared to those kept in my personal photo library.

Feeding and Nesting Behaviour

The male Northern Saw-whet Owl always announced its arrival with food "with a series of whistled notes, similar to the advertising song" (Johns *et al.* 1978, Cannings 1993). Earliest calls were heard at 2130 hours. Sometimes the male called for 30 seconds or longer prior to arrival, and on one occasion (3 June) he called for about 5 minutes after delivering food to the nest. On many occasions, the male first flew to a perch holding prey in its talons, and there transferred prey to his beak and then flew to the nest cavity. The male usually passed food to the female or the young without entering the cavity. The female usually left the nest between 2117 and 2156 hours, and returned in 5-6 minutes. According to Cannings (1993), the females use this time to defecate and cough up a pellet. On 27 and 29 May, the female left the nest and returned at least three times, possibly hunting and providing food. However, on two occasions the female was seen removing an uneaten rodent carcass from the nest, and she might have used this time to feed away from large young or she simply removed excess carcasses from the nest. According to Cannings (1993), nesting duties in this species are strictly divided; males provide

Figure 8: Northern Saw-whet Owl with Smoky Shrew *(Sorex fumeus)*.

Figure 9: Northern Saw-whet Owl with White-crowned Sparrow *(Zonotrichia leucophrys)*.

Figure 10: Northern Saw-whet Owl with Black-and-white Warbler *(Mniotilta varia)*.

almost all of the food for the female and young, while females incubate the eggs and brood the young until the youngest nestling is about 18 days old. Thus, it is safe to assume that the owl that emerged from the nest cavity shortly after dark and quickly returning to the nest was the female, and another one that arrived with food was the male. The Northern Saw-whet Owl is known to store uneaten food on tree branches during winter (Bondrup-Nielsen 1977), and Cannings (1993), reported that males often bring an excess of food to the nest, especially during egg laying. My observations suggest that males may store food from a previous night or perhaps store at least one item on the same night before bringing food to the nest. On 26 May, the male delivered two prey items (a White-crowned Sparrow and a Black-and-white Warbler) to the nest within one minute (2210), and on 27 May, two small mammals were brought in quick succession at 2206 hours. Although it is possible that the male detected, caught and brought two prey items from the immediate vicinity of the nest within a minute, it is more probable that at least one prey item was caught previously and stored by the male.

Collected information on frequency of feeding rates revealed that feeding was most intensive during 26-29 May (1.6 visits/hour), and was reduced to 0.6-0.8 visits/hour during 3-4 June. The male fed the female and young most frequently between 2201 and 2300 hours (2.4 ±1.6 feedings) (Figure 11). When the same analysis was done by 30 minutes intervals, highest feeding frequency fell within 2201-2230 hours (1.750 ± 1.035) and 0001-0030 hours (1.125 ± 0.835) (Figure 12). Time intervals between male visits varied from 13.0 minutes on 19 May to 36.7 minutes on 3 June. Interestingly, longer intervals between visits (28.7 and 34.2 minutes) were recorded on 28 and 29 May when the overall number of visits was equal to those on 26 and 27 May (8 visits per observation period). The male fed young less frequently on 4 June when the female possibly was not present at the nest.

Loud peeping of the young was heard on 27 May, and they were look-

ing out of the nest cavity and snapping beaks at mosquitos swarming at the entrance on 3 - 4 June. When the cavity was examined on 6 June, it was filled with 4 large young; only 2 remained in the nest on 8 June, and no further visits were made.

Status of Northern Saw-whet Owl in the Wawa Area

In 1999, Northern Saw-whet Owls were relatively common in the general area around Wawa: at least 11-12 calling males along High Falls, Surluga, Tikamaganda, Paint Lake, Firesand

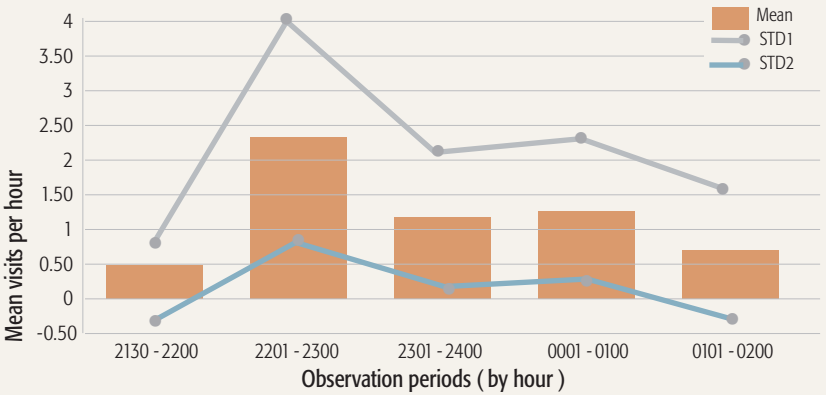

Figure 11: Feeding rates by hour (coloured bars represent mean frequency of visits per hour, and solid lines show upper and lower limits of standard deviation).

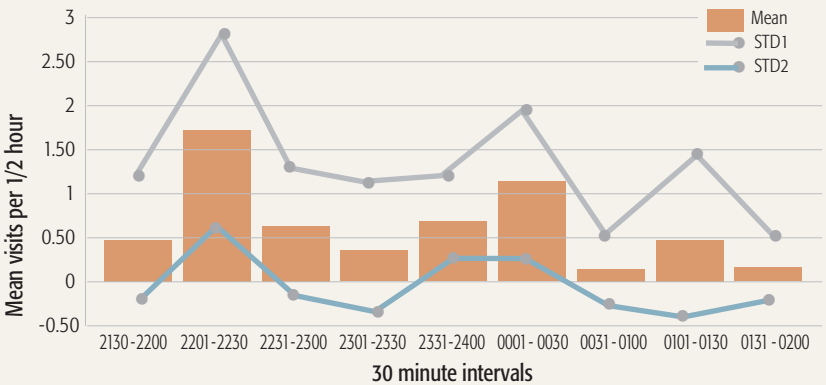

Figure 12: Feeding rates by 1/2 hour (coloured bars represent mean frequency of visits per half hour, and solid lines show upper and lower limits of standard deviation).

Creek and Mijinimunshing roads (total length 68 km, *i.e.*, 0.16-0.18 calling males/km). However, the following winter probably had a profound effect on this species. During the entire nesting season of 2000 only one male was heard calling along Tikamaganda Road and none elsewhere. The winter of 2000 had seen the most unusual weather in north-eastern Ontario. During 21-27 February temperature remained above freezing in the afternoons reaching +11.5ºC, and the snow mostly melted. This thaw was followed by a freeze on the 28th, but on the 29th temperatures rose to +8.5ºC and 30 mm of rain fell. The warming trend with above freezing temperatures (up to +15.7ºC) and rain in the afternoons, and below freezing temperatures at night continued into March (Meteorological Service of Canada 2006). This weather either caused mortality among small mammals in the area or formed a crust that prevented Saw-whet Owls from reaching and capturing their mammalian prey. It is possible that the majority of Northern Saw-whet Owls did not breed in the vicinity of Wawa in that year or moved away or perished prior to the nesting season. Their numbers did not recover in the subsequent years (2002-2005). None were recorded along Paint Lake Road in 2002-2005 and no owls at all along Tikamaganda Road in 2005 (S. Debreceni, *in litt.*). Such effects of the climate change on productivity and survivorship of the Northern Saw-whet Owl (and perhaps other mice-eating owls) may occur throughout its range in Ontario, and should be investigated.

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