

MODEL SNAKE ELICITS NEST DEFENCE BEHAVIOUR BY WHITE-BREASTED NUTHATCHES, *SITTA CAROLINENSIS*

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Abstract -- Seven nuthatches of four pairs studied at their nests inspected models of snakes placed nearby without otherwise reacting to them initially. Six of these seven then flew away, gave alarm calls, and/or performed threat displays to the snake model. Threat displays included Tail-Fan-Back-Ruffle, Wing Spread and/or Sway.

Key Words: Displays, Nest Defence Behaviour, Okanagan, Reactions to Snakes, *Sitta carolinensis*, White-breasted Nuthatch.

Many bird species use defensive behaviour to protect eggs and young from snakes (e.g. Nolan 1959; Jackson 1974; Gottfried 1979; James *et al.* 1983; Brown and Brown 1987; Walters 1990; Winkler 1991, 1992). White-breasted Nuthatches (*Sitta carolinensis*) direct threat displays towards some other birds and mammals (Kilham 1968; Stokes and Stokes 1983; Bancroft 1987), but such behaviour has apparently seldom been observed in response to snakes. An observation of White-breasted and Pygmy nuthatches (*S. pygmaea*) inspecting a live snake near a pond near Penticton, British Columbia led me to conduct experiments that indicated that nuthatches were more likely to inspect snake models than other novel stimuli, suggesting that they recognized snakes as significant environmental factors (Bryan 1998). Although none of these nuthatches exhibited threat displays towards model snakes away from the vicinity of nests (Bryan 1998), they might be expected to respond more strongly to snakes in the vicinity of nests if snakes were recognized as a threat. The purpose of this note is to document tests of this expectation with model snakes placed near nest holes and boxes.

METHODS

I studied four pairs of nesting White-breasted Nuthatches during May and June 1993 and 1995 in Ponderosa or Lodgepole pine (*Pinus ponderosa* or *P. contorta*) forests of the Okanagan Valley near Penticton, B. C. (49° 30'N, 119° 38'W). To test the response of nuthatches to snakes at their nests, models were placed in the vicinity of the nests after the birds left to forage. The snake model was placed on the ground about 50 cm. from a nest in a hollow tree stump with its hole at ground level, and on top of the nest boxes used by the other three pairs. Models were left in place until reactions to them by returning birds were observed and documented, usually from both parents (4-60 minutes). To record behaviour of the returning birds, I sat about 15 m. from the nests in plain view of the nest site. My observations were

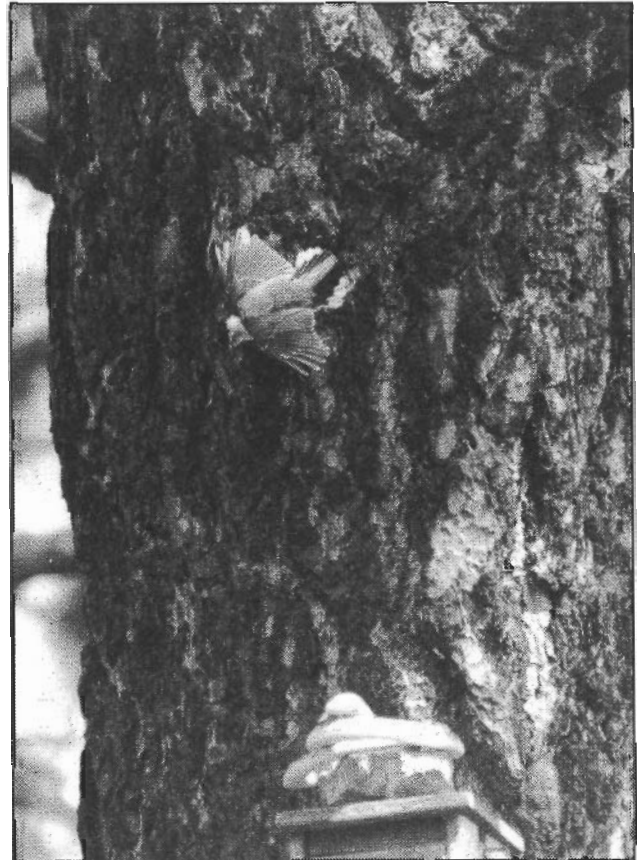


Figure 1. White-breasted Nuthatch performing Sway display. The realistic model snake is shown above the nest box.

recorded with pencil and paper while watching the birds. After the initial observations were recorded, the behaviour of the third nesting pair was also photographed (Figure 1) and videotaped.

In my previous experiment, I found that a wide range of snake models elicited inspections (Bryan 1998). In three of the present experiments, I used a model like the most realistic of these, a 120 cm. rubber toy snake with brown spots on a tan background coiled in an approximate 16 cm. diameter circle (Figure 1). At these nests, the behaviour of returning birds was observed and recorded only on their first trip back to the nest after the snake model had been placed nearby.

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At one of the nest boxes, I performed a slightly different experiment by first placing out a cruder model (a black-and-white striped rope) (Bryan 1998: Figure 1) and observing the reaction of the birds to this model on their initial return. When they left again, I replaced this crude model with the more realistic one, and observed their behaviour on their next two return trips to the nest.

My operational definition of "inspection" is that near a model the bird landed or stopped hopping down the tree and usually turned its head in the direction of the model. I used the terminology of Stokes and Stokes (1983) for two basic threat displays, Tail-Fan-Back-Ruffle (TFBR) and Wing-Spread (WS) observed, and hereunder describe a variant of WS as Sway. In TFBR, "tail may be fanned, back feathers may be ruffled, and head may point down" (Stokes and Stokes 1983:133). In WS, "body and bill are pointed vertically, wings and tail are fully spread, and bird sways slowly from side to side. It may last only one or two seconds or it may be longer" (Stokes and Stokes 1983:133).

RESULTS

Both members of the pair that nested in the hollow stump arrived back simultaneously. Both inspected the model, although these inspections were not independent, as the birds could see each other. One bird then flew away, uttering an alarm call in flight for 1.5-2 minutes. Its mate followed.

One of the box-nesting pairs was tested with the more realistic model about 1.5 hours before sunset. The female returned with food, inspected the model from several perches above the model, and then began to utter a distress call. She continued calling for about 5 minutes, attracting a sparrow (sp.?) that flew over to the nest box and inspected the model. Eight minutes after returning to the nest site, the female nuthatch began TFBR and Sway (Figure 1) displays on the tree trunk and branches above the nest box. In Sway, the bird's wings are spread out from the body at various angles and heights (but not fully extended vertically as in WS). The bird's tail is spread as in TFBR, but the wings are extended farther away from the body. She moved up and down the tree trunk, but not past the snake model. She began another bout of distress calling, followed by the threat displays. I removed the model after she had displayed and called for a total of 35 minutes without going past the model into the nest hole. Although he had been returning to the nest with food for periods of 1-5 minutes just prior to the test, her mate did not return during the experimental period. Observations ceased 10 minutes after the snake was removed, even though the female had not yet returned to the nest. Both parents apparently returned to the nest later, as six days later at least one parent was nearby and the young were believed to have fledged successfully (M. Harris, personal communication).

The female of the other nest box tested with the more realistic model arrived first, landing on the trunk about 50 cm.

from the model. She watched the model and remained motionless for 5 minutes. The male then arrived, and landed on the tree trunk opposite the female. He looked at the model, then spread his tail and began displaying TFBR. After a few bouts of TFBR, he raised his wings over his head and began swaying from side to side in the WS, followed by Sway displays. He continued for several minutes before the female began doing the same displays. After displaying for about 8 minutes, the male hopped towards the model while continuing WS. Upon reaching the snake, he pecked it several times gently as though exploring it. At this point, I terminated the experiment by removing the model to reduce disturbance to the nesting nuthatches and to facilitate subsequent photography (Figure 1) and videotaping of their responses to the snake model.

At the nest box on which the cruder model was placed initially, the female arrived first with a beak full of food. She hopped down the trunk, paused for about 2 seconds to inspect the model, and then continued into the nest box. When the male returned also carrying food, he paused and inspected the model for a much longer time from the tree trunk. He then flew to a branch from where he looked at the model for several seconds before flying to the top of the nest box near the model, paused, then hopped down the side and into the hole. After I replaced the cruder model with the more realistic one, the male returned first, and inspected the model from the tree trunk for about two minutes. He then performed TFBR and Sway for a few minutes. Next, he flew up the tree to where he was obscured by branches for about one minute before flying back to the trunk and hopping past the realistic model into the nest box. On his next trip back, he hopped past the model without inspecting it, and entered the box. On her first encounter with this new, realistic model, the female hopped past it without pausing.

DISCUSSION

Although White-breasted Nuthatches have been observed to use TFBR and WS to threaten birds and mammals (Kilham 1968; Long 1982a; Stokes and Stokes 1983), Long's (1982a) observation of one full and one partial display induced by a Fox Snake (*Elaphe vulpina*) in Wisconsin appears to be the only previous record of such behaviours directed at snakes. Although my sample size is small, my observations show that both sexes exhibit distraction displays, but when both are present the male at least sometimes displays more intensely than the female, as also found by Long (1982a, 1982b). When similar tests were conducted near two nests of Pygmy Nuthatches (*Sitta pygmaea*), all returning individuals inspected snake models, but none performed threat displays (J. E. Bryan, unpublished data).

The nuthatches presumably inspected and threatened snake models because they recognized snakes as predators. Snakes are not mentioned as known predators of White-breasted Nuthatches in the reviews of this species' biology by Bent

(1948) and Pravosudov and Grubb (1993), and I could find no documented instances of such predation. Nevertheless, they would presumably be as vulnerable to snake predation in the Okanagan as Pygmy Nuthatches, whose young have been eaten by Gopher Snakes (*Pituophis melanoleucus*) there (Cannings *et al.* 1987). Both these nuthatch species in the Okanagan build nests in tree cavities or nest boxes at similar heights (Pygmy: 0.8-21.5 m., mean 6.6 m; White-breasted: 1.5-21 m., mean 5.8 m.) and in similar habitats (Cannings *et al.* 1987). Such nests could be reached by snakes, particularly Gopher Snakes, which are very good climbers (Terres 1980:761; Thompson and Turner 1980).

Swallow defensive behaviours do little to prevent snake predation at nests (Brown and Brown 1987; Winkler 1992), and it seems unlikely that nuthatches could deter snakes with alarm calls or threats. However, recognizing snakes as threatening probably has survival value. Threats and alarm calls could alert mates even if they were ineffective in deterring a snake.

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