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White-breasted Nuthatch (Sitta carolinensis) fecal sac dispersal in northwestern Nevada

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Fecal sac dispersal by parent White-breasted Nuthatches (*Sitta carolinensis*) has not been reported in the literature, although Tree Swal-


Upon removal, fecal sacs can be consumed, dropped, placed on substrate, or a combination of these possibilities. While many passerines do not remove nestling feces, parent White-breasted Nuthatches remove and disperse fecal sacs away from the nest. Petit and Petit (1988) concluded that the significance of fecal sac removal deserves attention in the future, and Lang et al. (2002) observed that this parental behavior remains a neglected topic.

The purpose of this study was to contribute to our knowledge of fecal sac dispersal by parent White-breasted Nuthatches during the nestling stage.

**STUDY AREA AND METHODS**

This field study of fecal sac dispersal by parent White-breasted Nuthatches was made 19 km south of Reno, Nevada, at 1828 m elevation, on the eastern slopes of the Sierra Nevada. Big sagebrush (*Artemisia tridentata*), mountain mahogany (*Cercocarpus ledifolius*), and other aridland vegetation give way to mature ponderosa pine (*Pinus ponderosa*) and Jeffrey pine (*Pinus jeffreyi*) of higher elevation.

The White-breasted Nuthatches are year-round residents nesting in May.

Although observations and fecal sac counts were made in 2001 and 2002, only in 2003 did I record accurate and reliable data to support this study. My observations during the nestling phase (3–19 May) were made daily between 0700 and 1600 with 10×50 binoculars and a 40-power spotting scope from the dining and great rooms of my home 34 m east of the nest. Also, observations were made from a blind 6 m southeast of the nest and another blind 26 m south of the nest. I was able to accurately count and mark fecal sac droppings as or where they were dropped by making an extensive survey of bare ground, driveway and parking area, and mowed grasses in the remaining area (Fig. 1).

The nest cavity was 2.7 m above the ground in a dead, partially delimbed Jeffrey pine snag 3.7 m in height. From the nest as point of origin, I established northwest, northeast, southwest, and southeast quadrants (Fig. 1). I recorded the distance and direction of sac dispersal and tabulated flights with and without fecal sacs.

**RESULTS AND DISCUSSION**

**Distance of Dispersal**

Parent White-breasted Nuthatches dispersed fecal sacs 6–60 m from the nest, with 56% of total droppings (*n = 66*) being dropped 48–60 m away. Seventeen percent were dropped at the end distance of 60 m (Fig. 2). This dropping...
distance was opposite of what I reported (Weitzel 2003) in Western Bluebirds (Sialia mexicana), where 56% of the sacs were dropped within 20 m of the nest. I attributed this greater dispersal distance by White-breasted Nuthatches to nestling protection behavior by the parents because of common and ever-present predators: Black-billed Magpies (Pica pica), Scrub Jays (Aphelocoma coerulescens), Steller Jays (Cyanocitta stelleri), and European Starlings (Sturnus vulgaris). In my Western Bluebird field study, predators were absent. Tree Swallow parents dispersed fecal sacs 20–50 m away (Weatherhead 1984), approximately 40 m in Prothonotary Warblers (Protonotaria citrea; Petit and Petit 1987), and 91 m ± 11 m in Eastern Bluebirds (Lang et al. 2002).

Direction of Dispersal

Ninety-five percent of total fecal sac dispersals were in the southwest quadrant, 4% in the southeast quadrant, 1% in the northwest quadrant, and 0% in the northeast quadrant (Fig. 3). In the southwest quadrant, a standing, 3-year-dead, mature Jeffrey pine was the predominant foraging site. It had an abundance of various stages of bark beetles, termites, ants, bugs, and other insects, as well as arachnids and other arthropods. Parent White-breasted Nuthatches collected food items at the dead tree and delivered them to the nestlings. Most flights with and without fecal sacs were in the direction of the dead pine tree in the southwest quadrant (Fig. 3). I found that 95% of fecal-sac flights and 75% of non-sac flights were in the direction of the foraging pine. All but 6 fecal sacs dropped in the southwest quadrant were within a narrow, 12-m, nest-to-foraging-pine corridor even though 65 other pines grew there (Fig. 1). Most flights from the nest were to the foraging area during the nesting phase in Western Bluebirds (Weitzel 2003).

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Fig. 1. Map of the White-breasted Nuthatch nest-foraging area, sac-dropping points, and quadrant origins at the White-breasted Nuthatch nest.
When a Tree Swallow made a sac-carrying flight, it apparently flew to a foraging area after dropping the fecal sac (Weatherhead 1984). Petit et al. (1989) suggested that when dispersing fecal sacs, birds do not have to deviate from preferred foraging pathways. I did not observe any attempt by parent White-breasted Nuthatches to disperse sacs at random 360° around the nest.

As the nestlings aged from day 1 to day 16, fecal sac droppings increased in number and distance from the nest (Fig. 4). These data suggest that as the nestlings aged, parental investment increased and the brood became more valuable. Weitzel (2003) found this parental behavior true in Western Bluebirds.

Many passerines dispose of fecal sacs in various patterns from the nest so as to reduce or eliminate detection of nestlings by predators. The pattern depends on the species and ecological factors such as the presence or absence...
of predators and a dependable food source. Greater attention in field research is given to food items brought to the nest than to fecal sacs brought out. Complete understanding of fecal sac dispersal requires future field studies.

LITERATURE CITED


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Fig. 4. Distance of fecal sac droppings from hatching to fledging in White-breasted Nuthatches. (n) = number of sac droppings.