

NESTING OF YELLOW-FRONTED WOODPECKERS, *MELANERPES FLAVIFRONS* (PICIDAE)

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Key words: Yellow-fronted Woodpecker, *Melanerpes flavifrons*, nest, nestlings, caches, Brazil.

INTRODUCTION

Recently, Yamashita & Lo (1995) showed that the Yellow-fronted (*Melanerpes flavifrons*) and White-fronted (*M. cactorum*) woodpeckers (Picidae) store food near their nests, like the better-studied *M. lewis*, *M. erythrocephalus*, *M. formicivorus*, *M. carolinus* (see Short 1982), and *M. rubricapillus* further north (Skutch 1969). They suggested that food storage might be regular, even fairly primitive, in the genus. Here, we report on observations at another nest of *Melanerpes flavifrons*, confirming Yamashita's findings for this behaviorally little known species and giving further details of nesting behavior.

METHODS

A nest with young, 28 m up in a hole on the west side of the trunk of a tall dead tree, was found in a partly burnt forest zone next to unburnt forest in the Rio Preto National Forest (FLONA do Rio Preto, or "Floresta Nacional," about 18°12'S, 39°51'W, elevation about 50 m). This area is south of the Rio

Preto, some 15 km east of Braço do Rio, Espírito Santo. The nest was studied on 19–20 and 22 February 1993, for a total of 29.25 h. Oniki made most observations, helped at intervals by Willis.

RESULTS

One male and three females were feeding nestlings. On 22 February, at least one red-capped young was sticking its head out the entrance much of the day, for the first time during the three days. The male fed less often than the females, staying high on the dead trees for long stretches of the day. One female, which the male greeted with "wika" notes and waving the head back and forth at times, followed when she gave "dididit" calls on leaving, apparently was feeding less than the other two females. The latter may have been young helpers because she often was high looking about when the male was present; however, we could not be sure. On 22 February, at about 12:30 h, there was a series of "wika" dances in several other dead

TABLE 1. Number of feedings at given hours.

Date	Sex	Hours										
		7	8	9	10	11	12	13	14	15	16	17
19/2	Female	-	-	2	9	6	16	15	7	5	10	12
	Male	-	-	-	2	1	2	1	1	1	2	-
20/2	Female	4	8 ¹	22	10	20	17	8	9	11	10	4
	Male	-	3	1	3	-	2	3	-	2	1	-
22/2	Female	-	-	3	21	1	9	15	6	16	7	7
	Male	-	-	1	2	1	-	1	5	-	1	2

¹Problems with aracarís.

trees, 80 m W. The male displayed first with one female and then with another.

After 10:00 h, all the birds spent long periods preening and watching near the nest, often on the shady side of dead snags. The birds sometimes alternated watch periods, apparently as "sentinels", but at times no bird was present, while at other times 2 or 3 were resting or preening. In several cases, the three females fed the nestlings in quick succession, so we are certain that all were feeding.

Feeding rates varied widely, so we could not detect a pattern (Table 1). Certainly, the birds were active even at the hottest hours of the day. However, the last feedings for the day were at 17:44, 17:34 and 17:47 h, well before the birds roosted. On two days, the male roosted in the nest with the young, roughly at 18:13 h, except on 22 February when he disappeared at 18:14 h behind the nest tree. On 20 February, he watched from inside, his head partly out, until 18:35 h, when *Pauraques* (*Nyctidromus albicollis*) were calling. One or two females roosted in a hole facing southeast 3 m above the nest, while the other females left the area. Two entered at 18:24 and 18:27 h on 19 February, versus 18:13 and 18:18 h (one head out until 18:26 h) on 22 February; one entered on 21 February at 18:15 h (head out until 18:27). The male sometimes visited this

female roost during the day, pecking nearby without actually looking in or entering, but females never did so. On 19 and 22 February, the male drummed up to 10 times atop the nest tree or on nearby trees, between 18:00–18:08 h. On 20 February, there was a "toucan problem" (see below) and no drumming.

On 19 February, the last six visits (17:30–17:44 h) were from food caches located high in dead trees close to the nest. Food was cached irregularly in high crevices during the day, but actual caching was difficult to observe. Two "anvils," i.e., horizontal broken limb bases high in the dead trees, were sometimes used to batter an insect or fruit before going to the nest, or during brief visits between repeated tries for feeding a too large food item to the young. Sometimes, birds pecked a bit of food or tiny insect on these anvils later in the day, often bringing the item to the young. Once, part of a katydid was left on the anvil, and the adult brought it to the young as soon as it had fed the other part. On 20 and 22 February, there was no obvious evening concentration of cache feedings, perhaps in part because of toucans on both evenings. Red "biciuba" (*Virola* sp., Myristicaceae) fruits, a common food item, as well as dark unidentified items, were sometimes cached and fed to the young later.

TABLE 2. Number of fecal sacs removed at given hours.

Date	Hours										
	7	8	9	10	11	12	13	14	15	16	17
19/2	-	-	-	2	4	2	4	1	2	2	2
20/2	-	4	3	1	4	1	4	-	3	2	1
22/2	-	-	-	-	1	4	2	3	3	2	3

The red "bicuibas", brought 12, 14 and 13 times on different days, were the only easily identified food items. In four cases, 2 or 3 females brought bicuibas in a row, suggesting joint foraging. Cases of 2 or 3 females returning jointly with other food were common, which also suggested joint foraging. The fruit was rarely brought after 15:00 h, except on 3 cases late on 22 February, plus one each evening; one of the latter was a cached fruit, the next was cached at 17:06 h and brought to young at 17:20 h, and the third may have been cached. Even when crushed, large fruits required many tries before being taken by the young, except on the last day. Once, one had to be cached because the young could not eat it. Commonly, a fecal sac was carted away after each feeding. Elsewhere (Willis & Oniki in press), we noted that round fruits are often too big to be eaten by the young, unless small and not worth bringing to the nest.

Other items, except one dragonfly and one katydid, seemed mostly very small dark beetle-like insects. Once, there was a caterpillar or cecropia catkin which took 28 feeding tries before being taken by the young. Most items were barely visible in the beak. The loud squeaks of the young, inside the nest with head protruding, and its pecks at the bird that brought food, were noted several times. The arriving bird often stopped on dead trees nearby or on the trunk of the nest tree, circling or hitching up or down to the nest, but seldom paused much except to

break a food item on an anvil, unlike the wary behavior of the female piha (Willis & Oniki in press). When two or three birds came at once, they queued up at the nest or waited briefly on more distant trunks.

Fecal sacs were carried away, which required the adult to enter the nest, even when the young had been fed from outside. At times, a bird did not feed but entered and carried a sac away. Once a female fed, and the male entered to carry off a sac.

The peaks of sac removal (Table 2) seemed about 2 h after peaks of feeding activity on a given day. Sac removal did take place during feeding peaks, even though feeding the young with large bicuiba fruits often (14 times) was followed by sac removal. Total removals were 60 in 328 feedings, less than 1/5 in contrast to 1/3 for bicuiba feedings. Fecal sacs were normally dropped or wiped off on other dead trees in the area; the bird sometimes wiped its bill several times. Not one was dropped at the nest tree, indicating possible predator avoidance.

Once, the male attacked a Blue-winged Parrotlet, *Forpus crassirostris*, nesting in a nearby dead tree, when it flew to the nest tree. Toucans seemed a more serious problem, perhaps because they usurp nest sites or prey on nestlings. Feedings stopped from 08:16 to 08:53 h on 20 February when a group of three or more Black-necked Aracaris, *Pteroglossus aracari*, was in the area. The woodpeckers fluffed up their feathers,

attacked an aracari twice, waited 1–2 m atop the nest tree, watched as the aracaris moved west (the male drumming and preening at 08:31 h). As the aracaris returned, all four woodpeckers followed. The male and two females left at 08:44 h; the third female left at 08:46 h, after the aracaris had passed. The male began acting as sentinel at 09:02 h and drummed several times between 09:26 and 10:00 h, feeding only at 09:47 or over an hour after they left.

Two birds, a Channel-billed Toucan, *Ramphastos vitellinus*, and an aracari, passed in the area at 17:27 h and caused all four woodpeckers to remain silent. All watched and, at 17:35, the male tapped on a tree to the W, behaving as if he was foraging while the others preened. One fed at 17:34 h, but this was the only feeding after 17:20 h that day. The male did not drum that evening. At 17:25 h on 22 February, the male followed three passing aracaris, but there were feedings at 17:21 and 17:29 h. One female entered the nest and removed a fecal sac just after an aracari passed. At 16:58 h on 20 February, the male was alert to a nearby Laughing Falcon, *Herpetotheres cachinans*, while one female entered the nest and stayed in it even after another female fed.

Displaying periods sometimes interrupted feedings, as between 10:54 and 11:24 h on 19 February when several birds arrived without food. Between 15:05 and 15:45 h, there was only one feeding at 15:26 h; one female had been calling, fussed with another, then preened after the male came in. On 20 February, one female gave "dididit" calls, and the male displayed or drummed with her several times, from 13:38 to 13:53 h and from 14:35 to 14:56 h, then the two watched as the other females worked. More displays on 22 February resulted in the young not being fed between 11:13 and 12:02 h, and between 12:20 and 12:51 h. Male and female engaged in calling ("dididit") that interrupted feeding a bit between 16:00 and 16:16 h, then in drum-

ming and head-weaving dances from 17:02 to 17:17 h. Once the male supplanted a female twice, and chased a female another time. Between 16:25 and 16:54 h on 19 February, the birds seemed to be sunning or waiting, for no obvious reason, nearby the treetops. The male remained watching the area from the nest or near it until 16:43 h.

At 16:00 h on 19 October 1996, Oniki saw another *M. flavifrons* caching an arillate fruit high in a pre-existing crevice on a limb in a large fruit tree in the Bralanda Forest, Bahia, about 17°05'S and 39°20'W; no nest was recorded.

In summary, 3 females and one male fed insects and fruit to one or more nestlings, the spherical fruits being hard to swallow because of their size. On several occasions, females came in groups to feed. As reported by Yamashita & Lo (1995), insects and fruits were cached in crevices, and fed to the young later or late in the day. Feedings stopped well before dark and were sometimes interrupted due to interactions with passing toucans, or during display sessions. The male, and to some extent females, seemed to keep watch from nearby trees. The male roosted with the young at night as in most woodpeckers do, and 1–2 females stayed in a nearby hole.

ACKNOWLEDGEMENTS

We appreciate a grant from the National Geographic Society for studies in Espírito Santo, and the hospitality of the Rio Preto National Forest staff. The comments from Danny Ingold in an earlier version, as well as those from an anonymous reviewer and the editor of ON helped improving the manuscript greatly. Publication n° 1 of the Institute for Studies of Nature.

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Accepted 27 January 1997.

