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FOODS OF THE PINE WARBLER AND BROWN-HEADED NUTHATCH

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and
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The pine woodlands of the southeastern United States are changing rapidly under modern forestry practices and are being developed rapidly as the human population increases. This is particularly true in Florida. It is important, therefore, to better understand the ecology of the indigenous wildlife of the southern pine woodlands.

As knowledge of food items is important in understanding the ecology of any species, we have studied the diets of two passerines typical of the southern pine woods. During 1972 and 1973 we collected and analyzed the stomach contents of 21 Pine Warblers (*Dendroica pinus*) and 17 Brown-headed Nuthatches (*Sitta pusilla*). Specimens were taken seasonally from Long-leaf Pine (*Pinus palustris*) and Loblolly Pine (*Pinus taeda*) communities on the Dee Dot Ranch south of Jacksonville Beach, Duval County, Florida. The specimens were collected in connection with a pesticide monitoring program following the application of Mirex in 1972 for control of Fire Ants (*Solenopsis spp.*). Table 1 presents collection dates and the number of specimens taken. Identification of stomach contents was made by the junior author and Dr. L. A. Hetrick.

TABLE 1. Collection dates and number of stomachs examined

Dates	Brown-headed Nuthatch	Pine Warbler
29, 30 May 1972	3	4
16, 17 Aug. 1972	3	6
9, 10 Oct. 1972	2	3
11, 12 Jan. 1972	3	3
5 April 1973	3	2
11, 12 July 1973	<u>3</u>	<u>3</u>
TOTALS	17	21

The diets of both the Pine Warbler and Brown-headed Nuthatch are poorly understood. Howell (1932) described the foods of Pine Warblers, from seven stomachs, as consisting of insects, including grasshoppers, grouse locust, moths and their larvae, beetles, ants and other Hymenoptera, bugs, flies and scale insects as well as spiders and small quantities of vegetable matter. Martin *et al.* (1951) gave the same animal foods and lists the fruit of pine (*Pinus sp.*), dogwood (*Cornus sp.*), grape (*Vitis sp.*), sumac (*Rhus sp.*) and Panic-Grass (*Panicum sp.*) as the principal plant foods. Weston (1957) states that "the food consists largely of insects and spiders. In winter, the food includes many vegetable items: Pine seeds, many kinds of wild fruits and berries and some weed and grass seeds."

Knowledge of the diet of the Brown-headed Nuthatch is also incomplete. Bent (1948) described the bird as mainly insectivorous but also fond of pine seeds. Howell (1932) reporting on 10 stomachs from Alabama and Florida described the diet as "mainly insects, including leaf beetles, wood-boring beetles, click beetles, roaches, bugs, grasshoppers, moths, ants, wasps, scale insects and caterpillars. Spiders and psuedo-scorpions and small quantities of pine seeds were also eaten." In Louisiana (Oberholser 1938) the diet included moths, grasshoppers, beetles, ants, caterpillars, and scale insects, plus spiders and pine seeds. Martin *et al.* (1951) described the food of the Brown-headed Nuthatch as ants and other Hymenoptera, moth eggs, caterpillars and cocoons, scale insects and pine seeds.

Our analyses (Table 2) showed a high occurrence of arachnids and Coleoptera, especially Chrysomelidae in the stomachs of both species. Pine Warblers showed a higher occurrence of Homoptera (57.1 vs. 29.4%) especially Cicadellidae (leafhoppers) (28.3 vs. 5.9%) as well as Lepidoptera (38.1 vs. 11.8%), Hymenoptera (57.1 vs. 11.8%) and Diptera (19.0 vs. 0%) over Brown-headed Nuthatches. Nuthatches, however showed a higher occurrence of Orthoptera (76.5 vs. 52.4%) especially Blattidae eggs (70.6 vs. 38.1%) and Hemiptera (47.1 vs. 28.6%) over Pine Warblers. The Blattidae eggs were principally those of the Gem Cockroach (*Agalopteryx gemma*) which are usually attached to tree trunks. Seeds and other plant materials were found in six nuthatch stomachs (35.3%); no plant material was found in a warbler stomach.

From the diet, the Brown-headed Nuthatch would appear to be primarily a gleaner, doing little or no hawking. The Pine Warbler, on the other hand apparently feeds to a much greater extent on flying insects. This is particularly apparent within the order Hymenoptera of which nuthatches took representatives only of the family Formicidae (ants), whereas warblers took representatives of six additional families of flying insects.

TABLE 2 Foods of Brown-headed Nuthatch and Pine Warbler

Food Items	Developmental Stage		Volume ml (%)		Frequency (%)	
	Nuthatch	Warbler	Nuthatch	Warbler	Nuthatch	Warbler
Odonata						
Coenagrionidae (narrow-winged damselflies)	.05 (3.8)	.02 (0.6)	.05 (3.8)	NF ¹	1 (5.9)	2 (9.5)
Libellulidae (dragonflies)	NF	.02 (0.6)	NF		NF	2 (9.5)
Orthoptera						
Mantidae	.37 (28.0)	.57 (15.9)	.37 (28.0)		13 (76.5)	11 (52.4)
Blattidae (cockroaches)	NF	.1 (2.8)	NF		NF	1 (4.8)
Tetrigidae (pygmy grasshoppers)	.37 (28.0)	.47 (13.2)	.37 (28.0)		12 (70.6)	8 (38.1)
Gryllidae (crickets)	NF	Trace (+)	NF		NF	1 (4.8)
	Trace (+)	Trace (+)	Trace (+)		1 (5.9)	1 (4.8)
Isoptera						
Kalotermitidae (drywood termites, above ground)	Trace (+)	NF	Trace (+)		1 (5.9)	NF
	Trace (+)	NF	Trace (+)		1 (5.9)	NF
Psocoptera						
Psocidae (barklice)	NF	.04 (1.1)	NF		NF	4 (19.0)
	NF	.04 (1.1)	NF		NF	4 (19.0)
Hemiptera						
Pentatomidae (stink bugs)	.04 (3.0)	.2 (5.6)	.04 (3.0)		8 (47.1)	6 (28.6)
Reduviidae (assassin bugs)	Trace (+)	Trace (+)	Trace (+)		4 (23.5)	2 (9.5)
Coreiidae (leaf-footed bugs)	.01 (0.8)	NF	.01 (0.8)		1 (5.9)	NF
Tingitidae (lace bugs)	.02 (0.8)	NF	.02 (0.8)		2 (11.8)	NF
Unidentified	NF	.2 (5.6)	NF		NF	1 (4.8)
	NF	Trace (+)	NF		NF	1 (4.8)
Homoptera						
Coccidae (wax scales)	.12 (9.1)	.32 (8.9)	.12 (9.1)		5 (29.4)	12 (57.1)
Aphididae (aphids)	.01 (0.8)	.05 (1.4)	.01 (0.8)		2 (11.8)	3 (14.3)
Cercopidae (spittle bugs)	NF	Trace (+)	NF		NF	1 (4.8)
Cicadellidae (leafhoppers)	NF	.01 (0.3)	NF		NF	2 (9.5)
Margarodidae (ground pearl)	.02 (1.5)	.26 (7.3)	.02 (1.5)		1 (5.9)	5 (28.3)
Fulgoridae (planthoppers)	.09 (6.8)	NF	.09 (6.8)		2 (11.8)	NF
	NF	Trace (+)	NF		NF	1 (4.8)

¹NF = Not Found

TABLE 2 Continued

Food Items	Developmental Stages		Volume ml (%)		Frequency (%)	
	Nuthatch	Warbler	Nuthatch	Warbler	Nuthatch	Warbler
Neuroptera						
Chrysopidae (common lacewings)	Totals	NF	NF	.05 (1.4)	NF	3 (14.3)
	Adult	NF	NF	.05 (1.4)	NF	3 (14.3)
Coleoptera	Totals	.23 (17.4)	.46 (12.9)	1.2 (70.6)	17 (80.9)	
Scolytidae (bark beetles)	Adult	Trace (+)	.01 (0.3)	1 (5.9)	2 (9.5)	
Chrysomelidae (leaf beetles)	Adult	.12 (9.1)	.28 (7.8)	5 (29.4)	7 (33.3)	
Elateridae (click beetles)	Adult	Trace (+)	Trace (+)	1 (5.9)	1 (4.8)	
Curculionidae (weevils)	Adult	Trace (+)	.01 (0.3)	1 (5.9)	1 (4.8)	
Cerambycidae (long-horned beetles)	Adult	NF	.02 (5.6)	NF	2 (9.5)	
Scarabaeidae (scarab beetles)	Adult	NF	.10 (2.8)	NF	2 (9.5)	
Carabidae (ground beetles)	Adult	Trace (+)	NF	1 (5.9)	NF	
Nitidulidae (sap beetles)	Adult	.06 (4.5)	NF	1 (5.9)	NF	
Unidentified	Adult	.05 (3.8)	.04 (1.1)	2 (11.8)	2 (9.5)	
Mecoptera	Totals	NF	NF	Trace (+)	NF	1 (4.8)
Panorpidae (common scorpion flies)	Adult	NF	NF	Trace (+)	NF	1 (4.8)
Lepidoptera	Totals	.02 (1.5)	.91 (25.5)	2 (11.8)	8 (38.1)	
Noctuidae (noctuid moths)	Adult	NF	.56 (15.7)	NF	4 (19.0)	
Limacodidae (slug caterpillars)	Adult	NF	Trace (+)	NF	1 (4.8)	
Saturniidae (silkworm moths)	Adult	NF	.05 (1.4)	NF	1 (4.8)	
Unidentified	Adult	.02 (1.5)	.3 (8.5)	1 (5.9)	2 (9.5)	
Caterpillar		Trace (+)	NF	1 (5.9)	NF	
Diptera	Totals	NF	.12 (3.4)	NF	4 (19.0)	
Tabanidae (horse flies)	Adult	NF	.11 (3.1)	NF	2 (9.5)	
Syrphidae (syrphid flies)	Adult	NF	.01 (0.3)	NF	1 (4.8)	
Unidentified	Adult	NF	Trace (+)	NF	1 (4.8)	

TABLE 2 Continued

Food Items	Developmental Stage	Volume ml. (%)			Frequency		
		Nuthatch	Warbler	Nuthatch	Nuthatch	Warbler	Warbler
Hymenoptera	Totals	Trace (+)	.68 (19.0)	2 (11.8)	12 (57.1)		
Vespidæ (paper wasps)	Adult	NF	.02 (0.6)	NF	1 (4.8)		
Formicidæ (ants)	Adult	Trace (+)	Trace (+)	2 (11.8)	2 (9.5)		
Diprionidæ (conifer sawflies)	Adult	NF	.6 (16.8)	NF	3 (14.3)		
Andrenidæ (bee)	Adult	NF	Trace (+)	NF	2 (9.5)		
Ichneumonidæ (ichneumonid wasp)	Adult	NF	Trace (+)	NF	1 (4.8)		
Chrysididæ (cuckoo wasps)	Adult	NF	Trace (+)	NF	1 (4.8)		
Tenthredinidæ (common sawflies)	Adult	NF	.05 (1.4)	NF	1 (4.8)		
Unidentified	Adult	NF	.01 (0.3)	NF	1 (4.8)		
Unidentified Insects	Egg	Trace (+)	NF	1 (5.9)	NF		
Arachnida (spiders)	Totals	.27 (20.5)	.20 (5.6)	13 (76.5)	16 (76.2)		
	Adult	.27 (20.5)	.20 (5.6)	12 (70.6)	16 (76.2)		
	Egg Case	Trace (+)	NF	1 (5.9)	NF		
Plants	Totals	.22 (16.7)	NF	11 (64.7)	NF		
Seeds		.11 (8.3)	NF	4 (23.5)	NF		
Vegetation		.05 (3.8)	NF	2 (11.8)	NF		
Lichens		.03 (2.3)	NF	3 (17.6)	NF		
Bark		.03 (2.3)	NF	2 (11.8)	NF		
Miscellaneous	Totals	Trace (+)	Trace (+)	1 (5.9)	1 (4.8)		
Sand		Trace (+)	Trace (+)	1 (5.9)	1 (4.8)		
TOTALS		1.32	3.57				

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