

RETURNS AND WINTER-SITE FIDELITY OF NORTH AMERICAN MIGRANTS Banded IN BELIZE, CENTRAL AMERICA

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The rapid destruction of Central and South American forests is causing concern over the potential impact of deforestation on North American migrant birds that winter in these areas (see Rappole and Morton 1985, and Terborgh 1980, for discussion and references). At least 49 of these migrant species, which spend a majority of the year in the tropics, demonstrate winter-site fidelity (McNeil 1982, see Loftin 1977 for summary of species), and thus may be particularly sensitive to habitat destruction. Studies of winter-site fidelity in the Neotropics to date have been widely dispersed geographically and most have not compared results between sites which have been subjected to differing degrees of human disturbance. We report returns from wintering North American migrants banded at three study sites in Belize, Central America, each of which has been subjected to different degrees of human disturbance.

STUDY AREA AND METHODS

The study was carried out in Blue Creek, Toledo District, Belize, (16°30'N, 89°03'W, 100 m elev.) during parts of January 1982, 1983, and 1984. The first study site (Field Station, FS) was located along Blue Creek, at the base of the Maya Mountains, near a field station in mature rain forest with a canopy of up to 35-40 m. The forest has been minimally disturbed. Trees such as mahogany (*Swietenia macrophylla*), ironwood (*Dialium guianense*), sapodilla (*Achras zapota*), yemerí (*Vochysia hondurensis*), negrito (*Simaruba glauca*), santa maria (*Calophyllum brasiliense*), and kapok (*Ceiba pentandra*) grow to full stature in the forest. The second site (Indian Village, IV) was located approximately 1 km from the field station site, at the edge of the Kekchi Indian village of Blue Creek. This area has been recently disturbed by cutting and subsequent abandonment by Indian farmers. It is composed of thick tangles of herbaceous and woody vegetation as well as dense vine growth. *Miconia* spp., *Piper* spp., *Cecropia mexicana*, and cohune palm (*Orbignya cohune*) as well as many leguminous vines and trees comprise the most abundant species on the site. Vegetation height averages 2-3 m with trees such as cecropias as emergents. The third study site, named Pig Alley (PA) because of the occasional presence of domestic swine as well as collared peccaries, was located approximately 300 m from the village off a gravel road. The area has been cut less recently than the Indian Village site and succession has resulted in a thick jungle of woody vegetation averaging 4-12 m high, the trees with boles up to 15 cm diameter. Full-sized cecropias, gumbo limbo (*Bursera simaruba*), and cohune palms were among the most common trees on the site.

TABLE 1. Migrant birds banded in 1982 and 1983 at Field Station (FS), Indian Village (IV), and Pig Alley (PA) study sites, individuals recaptured [in brackets] excluding same day, and individuals recovered (in parentheses) for 1983 and 1984.

Species	Number of individual birds			% re-covered
	FS	IV	PA	
Yellow-bellied Flycatcher <i>Empidonax flaviventris</i>	4	3	0	0
Wood Thrush <i>Hylocichla mustelina</i>	9 [2] (2)	6 [1]	5 [2]	10
Gray Catbird <i>Dumetella carolinensis</i>	2	8 (1)	8 (1)	11
Ovenbird <i>Seiurus aurocapillus</i>	3 [1]	14 [3] (1)	5 [1] (1)	9
Northern Waterthrush <i>Seiurus noveboracensis</i>	0	2 [1]	7 [2] (2)	22
Kentucky Warbler <i>Oporornis formosus</i>	10 [2] (4)	5 [1] (2)	5 (1)	35
Common Yellowthroat <i>Geothlypis trichas</i>	0	1	5	0
Hooded Warbler <i>Wilsonia citrina</i>	2	2	3 (1)	14
Yellow-breasted Chat <i>Icteria virens</i>	0	4	2	0

Mist-netting was conducted in each of the above sites for approximately 10 d during the Januarys of 1982–1984. Migrants were banded with U.S. Fish and Wildlife Service bands. The number of net hours for the 3 stations was roughly comparable. Only those species in which the sample size was 6 or more were included in the analysis presented here, since all other species were represented by 4 or fewer captures.

RESULTS

Nineteen species of North American migrants were banded in 1982 and 1983, but only 9 of these had a sample size of 6 or more birds. Sixteen individuals belonging to 6 of these 9 species were recovered during the mist-netting of 1983 and 1984 (Table 1). All 16 individuals were recovered at the same study site in which they were originally banded, in no case at a distance greater than 100 m from their original capture site. The 16 recoveries represent 11% of the 146 individual migrant birds of all species banded during 1982 and 1983 and 17% of the 96 individuals of the 6 species in which recoveries occurred. Three Kentucky Warblers, 2 at the Field Station and 1 at Pig Alley, were recovered in both 1983 and 1984. In the analysis they were treated as single entries.

DISCUSSION

Winter-site fidelity for North American migrant birds has been demonstrated in a number of Neotropical environments, and all 9 species considered here have been previously recovered in succeeding winters in

TABLE 2. Comparison of Blue Creek, Belize recovery percentages with recovery percentages from other geographic areas.

Species	% of birds recovered					
	Blue Creek Belize	Mexico ^a	Guate- mala ^b	Ja- maica ^c	Puerto ^d Rico	Vene- zuela ^e
Yellow-bellied Flycatcher	0	18				
Wood Thrush	10	5	6			
Gray Catbird	11	8	0			
Ovenbird	9	15	19	8	8	
Northern Waterthrush	22		36	1		2
Kentucky Warbler	35	15				
Common Yellowthroat	0			6		
Hooded Warbler	14	43	20			
Yellow-breasted Chat	0	36				

^a Ely 1973, Ely et al. 1977.^b Rogers et al. 1982.^c Diamond and Smith 1973.^d Faaborg and Winters 1979.^e McNeil 1982.

the same area, often caught in the same net location. Loftin (1967) recorded winter-site fidelity in Kentucky Warblers and Ovenbirds in Panama, Ely (1973) recovered Yellow-bellied Flycatchers, Wood Thrushes, Hooded Warblers, and Yellow-breasted Chats in Mexico, McNeil (1982) Northern Waterthrushes in Venezuela, and Nickell (1968) recovered Gray Catbirds, Common Yellowthroats, and 4 other of our 9 species in disturbed habitats in the Stann Creek Valley of Belize. Similar recoveries from our 9 species have been made in Guatemala (Rogers et al. 1982), and El Salvador (Thurber and Villeda 1976). In addition, recoveries for some of these 9 species have been made from the islands of Puerto Rico (Faaborg and Winters 1979), Trinidad (Snow and Snow 1960), Haiti (Woods 1975), and Jamaica (Diamond and Smith 1973).

Our recapture results are consistent with those previously reported by other workers. Our 17% overall migrant recovery rate for 1983 and 1984 combined is equal to the 17% reported for 4 localities in Mexico (Ely 1973, Ely et al. 1977) for 4 years of return data, and higher than the 5.5% reported in an orange grove in Guatemala (Rogers et al. 1982) for a single year of returns. Previous studies have provided percentages of each species recaptured, or the raw data from which we calculated the percentages. These comparisons are presented in Table 2.

The sample sizes for our return data in our 3 study sites are too small to make statistical treatment meaningful, but the patterns presented by the data suggest inferences that may warrant further investigation. The Gray Catbird, Wood Thrush, Ovenbird, Northern Waterthrush, Kentucky Warbler, and Hooded Warbler appear to use all 3 habitats successfully. Although no Northern Waterthrushes were netted in the rain

forest, they were commonly sighted along Blue Creek and its tributaries in the forest. Although the sample size is small, the data suggest that as in their temperate breeding areas, the Common Yellowthroat and Yellow-breasted Chat are better adapted to the scrubby disturbed areas than to the mature forest where the undergrowth is not as extensive. The Yellow-bellied Flycatcher is primarily a forest bird, and the Indian Village records probably reflect the close proximity of the village to the forest edge. The data further suggest that the scrub species that choose winter habitats structurally similar to those they inhabit in temperate regions during the breeding season may not be adversely affected by human disturbance as long as the disturbance is intermittent. However, forest species may be adversely affected by the dramatic increase in deforestation that currently characterizes much of the New World tropics.

SUMMARY

North American migrant birds were netted and banded in January of 1982, 1983, and 1984 in mature rain forest and 2 recently disturbed areas in Blue Creek, Belize, Central America. Of 19 species banded in 1982 and 1983, 9 had sample sizes of 6 or more individuals and were studied for site fidelity. Previously banded individuals from 6 of the 9 species were recovered in 1983 or 1984. All 16 individuals were recovered in the same study sites in which they were originally banded, in no case at a greater distance than 100 m from their original capture site. Our results indicate high winter site fidelity for these species.

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