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WINTERING-SITE PERSISTENCE AND FIDELITY OF EIGHT PASSERINE MIGRANTS AT A LOCATION IN NORTHERN FLORIDA

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Abstract.—Data from captures with mist nets at a partially wooded suburban location in northern Florida were used to document annual returns of eight non-breeding migratory passerine species to their wintering site. An extended stay at the study site during a winter as established through recaptures of banded individuals proved to be an effective criterion for identifying likely wintering individuals among the captured birds, of which many were transients or occasional visitors to the study site. Extreme cases of winter residence lasting five months or longer were recorded for one individual each of the uncommon overwinterers Black-and-white Warbler (*Mniotilta varia*) and Ovenbird (*Seiurus aurocapillus*). Whereas annual returns were documented for individuals of all eight species, application of the criterion of documented site persistence allowed wintering-site fidelity to be attributed to only seven of them. The data for Yellow-rumped Warbler (*Dendroica c. coronata*) showed comparatively few and irregular incidences of return to the wintering site, probably due to low capture efficiency caused by this species' foraging habits and the tendency of many overwinterers to associate in nomadic flocks. Some solitary individuals, however, developed a strong attachment to their wintering location. Capture records of Ruby-crowned Kinglets (*Regulus calendula*) after their return suggest that many individuals may not have remained on the study area, presumably after reassessment of their former habitat's quality. Even so, the extended stay of many migrants at the study site, and their return to it in one or more subsequent seasons, indicate that adequate resources for overwintering are available in fragmented suburban habitats like that covered by this study.

Data collected during a long-term mist-netting project at a suburban location in Tallahassee in northern Florida were used to document wintering-site fidelity of small passerine migrants, i.e., a return to their wintering grounds in another year. Studies of wintering Nearctic passerines usually are conducted in the tropics (e.g., Holmes and Sherry 1992, Staicer 1992, Warkentin and Hernandez 1996, Wunderle and Latta 2000, Latta and Faaborg 2001), but the data presented here

complement previously published information on site fidelity of passerines wintering in northern Florida (Homann 1973, 1979 for another Tallahassee location), central Florida (Legare et al. 2000, Poole et al. 2003), and extreme southern Florida (Fisk 1978, 1979). Even though located in the same state, these study sites are quite distinct from one another because their climate ranges from subtropical in the south to more temperate in the north. Moreover, in Tallahassee more migrants from the Mississippi Flyway may be encountered than at the other two sites, which are located farther to the east in the path of birds migrating along the Atlantic Flyway.

After excluding wintering granivorous passerines from analyses because of their attraction to bird feeders, I selected the following study species: Eastern Phoebe (*Sayornis phoebe*), Blue-headed Vireo (*Vireo solitarius*), Black-and-white Warbler (*Mniotilta varia*), Orange-crowned Warbler (*Vermivora celata*), Yellow-rumped "Myrtle" Warbler (*Dendroica c. coronata*), Ovenbird (*Seiurus aurocapillus*), Ruby-crowned Kinglet (*Regulus calendula*), and Hermit Thrush (*Catharus guttatus*). The captured birds were marked with numbered metal bands, but without supplemental colored bands that would have allowed visual recognition in the field. Instead, for subsequent identification I relied on a bird's recapture. This strategy suffers from various shortcomings of mist net use such as the dependence of the effectiveness of capture on weather conditions and the target species' foraging habits (MacArthur and MacArthur 1974, Remsen and Good 1996). Moreover, comparative analyses based on mist-net captures are compromised when the project does not follow a strict regime with respect to type, number, and location of mist nets and the timing of their use (Hussell and Ralph 2005). Aside from such limitations, it also had to be taken into account that the pool of birds available for capture often was very heterogeneous because of the simultaneous presence of short-term visitors, transients, and overwinterers. I did not select an arbitrary time period as "winter" to minimize this last complication because the timing of migratory activity and wintering in this area overlap considerably (Crawford 1978, 1981). Instead, I categorized birds as likely winter residents when they had been documented to have remained at the study site for at least 4 weeks. This allowed the identification of conservative subsets of individuals with relatively high rates of return.

METHODS

Study area.—The study area was a strip about 50 m wide and 300 m long in suburban Tallahassee Florida (Leon County; 30°29'N, 84°17'W). I concentrated my activity on approximately 80 m at its northern end in a residential yard and the adjacent edge of second-growth mixed woods, and at the southern end on 100 m of the same mixed woods

with a wetland area, approximately 50 m × 30 m, bordering an interstate highway. The woods extended beyond the study area approximately 150 m eastward to a cleared area with a telecommunication tower, and were flanked to the west by partially cleared land with a few residences, a pasture, and more telecommunication towers. The wet area was much larger originally but part of it had been filled in just prior to the period selected for this report for construction of one of the telecommunication towers. This event was followed by a regeneration of patches of vegetation where land had been cleared. Depending on the amount and pattern of rainfall, the wetland could be completely dry or hold surface water that occasionally was knee-deep in some spots, making some netting lanes inaccessible. Effects of these long- and short-term changes on bird abundance were more evident in the banding records of transient migrants in fall and spring than with respect to the wintering species that are the subject of the study reported here.

Terminology.—The terminology describing the relationship of a bird to a particular location adheres to established use in the literature (e.g., Holmes et al. 1989, Ketterson and Nolan 1990, Wunderle 1995). A bird that restricts its activities to a particular area often learns and memorizes the location's characteristics and becomes capable of finding it again after an absence. This trait may be acquired during an extended stay referred to as "site-persistence," but some migrants can develop it in just a few days during a stop-over. The reappearance of a bird on the study area in another season will be called a "return," and a bird's ability to do so is attributed to "site fidelity." In the present study, most of the wintering individuals were documented to have settled close to where they had been encountered initially. Because I never observed territorial behavior such as defense against conspecifics, I cannot conclude that a territory was established and, instead, use the term "home range" (Winker et al. 1990, Staicer 1992).

Bird capture and data analysis.—From my long-term bird banding project, I selected for this paper the data collected in the "winter seasons" September through April from fall 1988 through spring 2003. I used up to three 12-m nets and two 9-m nets (12 or 9 × 2.6 m, 32-mm mesh) in the residential yard and the adjacent edge of the woods, and another two to four 12-m nets of the same type in the wetland and the woods around it. The netted birds were individually marked with official U.S. Geological Survey aluminum bands and released at the location where they had been captured. The birds' attachment to the capture location and study area was determined from the records of future recaptures.

The mist nets were operated on weekends and holidays but the schedule was not standardized, because it depended on personal commitments and weather conditions. For all-day operations, I kept the nets open from around sunrise to about 0.5 hour before sunset. The average total net hours per season was approximately 3,500. Beginning with 2000/2001, I occasionally opened nets also on weekdays, especially in the residential yard, but from these seasons I took into account only those captures that had occurred on days that might have been used on the weekend/holiday schedule. This protocol prevented an artificial inflation of the number of recorded captures during the later years but could have introduced a bias toward lower capture rates because birds captured on weekdays may have avoided the nets subsequently (cf. Hussell and Ralph 2005).

Banding operations had been going on with less consistent effort and under somewhat different habitat conditions before the selected time period and have been continued subsequently. Individuals banded during the years preceding the selected period and returning within it were treated as new captures. On the other hand, I used the records from the seasons 2003/2004 through 2005/2006 to identify returning individuals banded during the last seasons of the selected period.

For my analyses, I used all data collected between 1 September and 30 April. This allowed tracking of wintering birds that arrived early as well as those departing late, but also required a criterion that identified likely winter residents among the captured birds, of which many were likely transients. Considering what is known about maximal dura-

tions of stopover by transients (Salewski et al. 2007), I chose a documented stay of at least 4 weeks on the study area as an adequate criterion for likely winter residence. A return of any such site-persistent individual was assumed to be a case of wintering-site fidelity.

RESULTS

Site persistence and wintering-site fidelity of newly banded birds.—The data in Table 1 show that, in general, only a small percentage of the birds was recaptured in a subsequent year, but the percentage was much higher of those individuals that were site persistent after banding and, therefore, could be assumed to have been overwinterers. However, of most species only about 10% of the netted individuals were shown to have become site persistent. The exceptions were Ruby-crowned Kinglet and Hermit Thrush, of which apparently a larger percentage of individuals had already terminated migratory activity. For some returning birds that had not become site persistent after banding, the study area may have been a favored stopover site. I suspected this when an individual was never captured between 1 December and 1 March in the year of banding and when it returned. Such individuals were identified especially among Yellow-rumped Warblers.

The sample size for several species is quite small. I included these species because individuals of all of them had met the criterion of site persistence. The single returning site-persistent individuals of Ovenbird and Black-and-white Warbler were determined to have remained for five and six months on the study site, which is located at the edge of their wintering ranges (Kricher 1995, Van Horn and Donovan 1994). Both were hatch-year birds when they were banded, and the Black-and-white Warbler returned for a third overwintering.

Future wintering-site fidelity of returning birds.—The returns listed in Table 1 are for birds of all ages because, in many cases, young birds could not be reliably distinguished from older ones. Recaptured returning individuals, on the other hand, are old birds that have completed a migration at least once and shown wintering-site fidelity for the study area. The rate of return of these experienced birds, therefore, should be higher than that of individuals selected on the basis of just site persistence in the year of banding. Furthermore, I expected a previously developed attachment to the study area as expressed by site persistence to be evident again in subsequent years. In Table 2, relevant data for the three species with the largest number of returns are categorized as in Table 1, but recaptured individuals for each species are divided into two groups depending on whether they were shown to be site persistent when banded. Although sample sizes are small, a comparison of the data in Tables 1 and 2 suggests that individuals that had already returned once were not more likely to be encountered again in a subsequent year than those that were site persistent in the

Table 1. Banding totals, recorded overwinter site persistence, and returns in a subsequent season of eight migratory passerine species on a site in northern Florida during the seasons 1988/1989 through 2002/2003.

	All banded individuals			Site persistent individuals			
	Total	All returning individuals ¹		Probable returning transients ²	Total	Returning individuals ¹	
		Totals	%			Totals	%
Eastern Phoebe	38	1 (1)	3 (3)	0	2	1 (1)	50 (50)
Blue-headed Vireo	51	2 (5)	4 (10)	0	6	0 (1)	0 (17)
Black-and-white Warbler	17	2 (2)	12 (12)	0	1	1 (1)	100 (100)
Orange-crowned Warbler	41	1 (1)	2 (2)	0	5	0 (0)	0 (0)
Yellow-rumped Warbler	2035	51 (83)	3 (4)	13 (22)	50	10 (12)	20 (24)
Ovenbird	28	2 (2)	7 (7)	1	3	1 (1)	33 (33)
Ruby-crowned Kinglet	565	49 (55)	9 (10)	1	124	32 (33)	26 (27)
Hermit Thrush	75	10 (11)	13 (15)	0	20	8 (8)	40 (40)

¹The two numbers for returning individuals and the corresponding percentages represent the number of individuals that returned in the season immediately following the year of banding and (in parentheses) the number of all individuals that returned over the course of all study years or subsequently during the seasons 2003/2004 through 2006/2007.

²Likely returning transients were those individuals that were never captured between 1 December and 1 March.

Table 2. Additional annual returns to the study area of returning individuals.

Species	Category ¹	All captured first-time returns		First-time returns-becoming site-persistent			
		Total	Individuals returning another time ²		Total (% of all returns)	First-time returns returning another time ²	
			Totals	%		Totals	%
Yellow-rumped Warbler	Group 1	12	1 (1)	8 (8)	2 (17%)	0 (0)	0 (0)
	Group 2	71	5 (8)	7 (11)	3 (4%)	0 (0)	0 (0)
Ruby-crowned Kinglet	Group 1	33	6 (7)	18 (21)	16 (48%)	6 (7)	38 (44)
	Group 2	22	2 (2)	9 (9)	4 (18%)	2 (2)	50 (50)
Hermit Thrush	Group 1	8	4 (4)	50 (50)	4 (50%)	2 (2)	50 (50)
	Group 2	3	2 (3)	67 (100)	1 (33%)	0 (1)	0 (100)

¹Group 1 comprises the returning individuals that were shown to have been site-persistent in the year of banding, and Group 2 the ones that were not.

²The two numbers for individuals that returned again and the corresponding percentages represent the number of individuals that returned in the season immediately following the year of their first return and (in parentheses) the number of all individuals that returned a second time over the course of all study years or subsequently during the seasons 2003/2004 through 2006/2007.

year they were banded. On the other hand, individuals with previously established site persistence apparently were more likely to be site persistent than those that had not shown site persistence. For Yellow-rumped Warbler, this can in part be attributed to the 22 suspected stopover visitors among the returning birds that had not been site persistent after banding (cf. Table 1). Interestingly, three of these returned to the study area again in a subsequent year.

DISCUSSION

Wintering-site fidelity.—The panhandle of northern Florida is a way station for many Nearctic passerines migrating south, but individuals of some species are encountered in this area throughout the winter. Each of these birds cannot be assumed to be a local overwinterer, however, because many may remain roving “wanderers” (Winker et al. 1990) or they may be undertaking facultative migration, i.e., migration in response to external factors such as weather conditions or food availability (Terrill 1990, Terrill and Ohmart 1984, Terrill and Crawford 1988). For the present report, I used recaptures at least 4 weeks after banding as a criterion to identify individuals that presumably had become winter residents, and I considered their return likely cases of wintering-site fidelity. Returning individuals captured exclusively either early or late in a season after their return and in the year of banding were assumed to exhibit stopover site fidelity. This trait was quite common among Yellow-rumped Warblers.

Returns in a subsequent season were registered for all eight species, and application of the criteria just outlined confirmed wintering-site fidelity for all except Orange-crowned Warbler (however, a site-persistent Orange-crowned Warbler banded in 2005, i.e. outside the study period, did return a year later). Almost all the returning individuals were recaptured at the location where I had netted them in the year they were banded, suggesting that they had established a home range on a particular portion of my study area. Most exceptions to this rule were recorded for the Yellow-rumped Warbler, consistent with an often fleeting attachment of many individuals to a specific wintering location.

The relatively high rates of return of some wintering passerines that I documented with an admittedly non-systematic method of data collection and from some inadequate data sets reveal nevertheless that even a fragmented suburban habitat such as the study area and its surroundings offers attractive wintering grounds for migratory passerines. In fact, the 13% return rate of all banded Hermit Thrushes is similar to the 18% recaptured in southern Louisiana (Brown et al. 2000) and 11-20% for three different forest sites in Mexico (Gram and Faaborg 1997).

“Missed” returns.—Complicating the interpretation of my data was the occasional failure to record a return of an individual in one year even though I documented it to have returned in a subsequent year. It is possible that some birds do not return to the study site consistently, but it also has to be taken into account that sampling by captures in mist nets could provide me with only a low estimate of the number of returning birds. The probability of being captured must have been low especially for Yellow-rumped Warbler and Blue-headed Vireo, which usually forage above net height (Hunt and Flaspohler 1998, James 1998). Indeed, “missed” returns were most common with these two species, and my records show that multiple captures of documented site persistent individuals were especially rare events also.

Other birds may have eluded capture because they spent most of their time just outside the study area which, after all, was not a well-defined patch of habitat. Observations of banded kinglets in the shrubs around the communication towers to the west are consistent with this assumption, and an Orange-crowned Warbler I had banded was reported injured approximately 0.5 km to the east almost exactly 2 years later. Many Yellow-rumped Warblers may actually have visited the study area only as members of a nomadic foraging flock, but others were recorded to have been overwinter site-persistent for longer than 2 months. Of the site persistent Yellow-rumped Warblers, I observed some to have remained for at least 4 weeks at the precise location where they had been netted initially and not to join transient flocks that foraged on their home range. In fact, fewer “missed returns” were registered for Yellow-rumped Warblers documented to have been site persistent after banding than for those that were not, and none at all for individuals known to have remained at the study location for 60 days or longer. During the early phase of my banding project, moreover, I documented a site-persistent male to have returned in eight consecutive winters to the northern end of the study area where it had been banded (cf. Dunning 1992). These observations point to individual differences among Yellow-rumped Warblers with respect to social interactions and the relationship they develop to a wintering site. Winker et al. (1990) discussed probable implications of the existence of different “behavioral classes” of wintering individuals on the basis of observations of Wood Thrushes (*Hylocichla mustelina*) in Mexico.

Future returns of returning individuals.—Among the returning birds of all species were some that had not been shown to be site persistent in the year they were banded, and a few of them were now found to have become site persistent and even to return another time. These birds presumably had been site persistent after banding but were not recaptured. On the other hand, a perfect correlation between recorded site persistence and a future return was recorded for Ruby-

crowned Kinglets after their first return. All individuals that were documented to have returned a second time were from the small contingent of approximately one third of the returning individuals that had become site persistent. Unless this finding was a mere coincidence, the seeming disappearance of almost two thirds of the individuals must be attributed either to mortality after arrival or to a relocation of a considerable number of individuals after they had assessed the quality of the wintering grounds they had returned to.

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LITERATURE CITED

- BROWN, D. R., P. C. STOUFFER, AND C. M. STRONG. 2000. Movement and territoriality of wintering Hermit Thrushes in southeastern Louisiana. *Wilson Bulletin* 112:347-353.
- CRAWFORD, R. L. 1978. Autumn bird casualties at a Northwest Florida TV tower, 1973-75. *Wilson Bulletin* 90:335-345.
- CRAWFORD, R. L. 1981. Bird Casualties at a Leon County, Florida TV Tower. A 25-year Migration Study. *Bulletin of Tall Timbers Research Station* 22:1-29.
- DUNNING, J. B., JR. 1992. Significant encounters. *North American Bird Bander* 17:26-32.
- FISK, E. J. 1978. Site tenacity in wintering migrants in Florida. *North American Bird Bander* 3:145.
- FISK, E. J. 1979. Fall and winter birds near Homestead, Florida. *Bird Banding* 50:225-243, 297-303.
- GRAM, W. K., AND J. FAABORG. 1997. The distribution of Neotropical migrant birds wintering in the El Cielo Biosphere Reserve, Tamaulipas, Mexico. *Condor* 99:658-670.
- HOLMES, R. T., AND T. W. SHERRY. 1992. Site fidelity of migratory warblers in temperate breeding and Neotropical wintering areas: implications for population dynamics, habitat selection, and conservation. Pages 563-575 *In Ecology and Conservation of Neotropical Migrant Landbirds* (J. M. Hagan III and D. W. Johnston, Eds.), Smithsonian Institution Press, Washington, D.C.
- HOLMES, R. T., T. W. SHERRY, AND L. REITSMA. 1989. Population structure, territoriality and overwinter survival of two migrant warbler species in Jamaica. *Condor* 91:545-561.
- HOMANN, P. H. 1973. Studies on wintering Myrtle Warblers in North Florida (1966-1972). *EBBA News* 36:79-84.
- HOMANN, P. H. 1979. Wintering bird returns in North Florida. *North American Bird Bander* 4:154-157.
- HUNT, P. D., AND D. J. FLASPOHLER. 1998. Yellow-rumped Warbler (*Dendroica coronata*). *In The Birds of North America*, No. 376 (A. Poole and F. Gill, Eds.). The Birds of North America, Inc., Philadelphia, PA.
- HUSSELL, D. J. T., AND C. J. RALPH. 2005. Recommended methods for monitoring change in landbird populations by counting and capturing migrants. *North American Bird Bander* 30:1-20.

- JAMES, R. D. 1998. Blue-headed Vireo (*Vireo solitarius*). In The Birds of North America, No. 379 (A. Poole and F. Gill, Eds.). The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.
- KETTERSON, E. D., AND V. NOLAN, JR. 1990. Site attachment and site fidelity in migratory birds: experimental evidence from the field and analogies from neurobiology. Pages 117-129 In Bird Migration: Physiology and Ecophysiology (E. Gwinner, Ed.), Springer Verlag, Berlin-Heidelberg.
- KRICHER, J. C. 1995. Black-and-white Warbler (*Mniotilta varia*). In The Birds of North America, No. 158 (A. Poole and F. Gill, Eds.). The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.
- LATTA, S. C., AND J. FAABORG. 2001. Winter site fidelity of Prairie Warblers in the Dominican Republic. Condor 103:455-468.
- LEGARE, M. L., D. B. MCNAIR, W. C. CONWAY, AND S. A. LEGARE. 2000. Swamp Sparrow winter-site fidelity records in Florida. Florida Field Naturalist 28:73-74.
- MACARTHUR, R. H., AND A. T. MACARTHUR. 1974. On the use of mist nets for population studies of birds. Proceedings of the National Academy of Sciences of the USA 71:3230-3233.
- POOLE, R., M. WILSON, AND C. BROWN. 2003. Site fidelity and crown plumage in winter Swamp Sparrows in central Florida. Florida Field Naturalist 31:6-7.
- REMSEN, J. V., JR., AND D. A. GOOD. 1996. Misuse of data from mistnet captures to assess relative abundance in bird populations. Auk 113:381-398.
- SALEWSKI, V., M. THOMA, AND M. SCHAUB. 2007. Stopover of migrating birds: simultaneous analysis of different marking methods enhances the power of capture-recapture analyses. Journal of Ornithology 148:29-37.
- STAICER, C. A. 1992. Social behavior of the Northern Parula, Cape May Warbler, and Prairie Warbler wintering in second growth forest in southwestern Puerto Rico. Pages 309-320 In Ecology and Conservation of Neotropical Migrant Landbirds (J. M. Hagan III and D. W. Johnston, Eds.), Smithsonian Institution Press, Washington, D.C.
- TERRILL, S. B. 1990. Ecophysiological aspects of movements by migrants in the wintering quarters. Pages 130-143 In Bird Migration: Physiology and Ecophysiology (E. Gwinner, Ed.), Springer Verlag, Berlin-Heidelberg.
- TERRILL, S. B., AND R. L. CRAWFORD. 1988. Additional evidence of nocturnal migration by Yellow-rumped Warblers in winter. Condor 90:261-263.
- TERRILL, S. B., AND R. D. OHMART. 1984. Facultative extension of fall migration by Yellow-rumped Warblers (*Dendroica coronata*). Auk 101:427-438.
- VAN HORN, M. A., AND T. M. DONOVAN. 1994. Ovenbird (*Seiurus aurocapillus*). In The Birds of North America, No. 88. (A. Poole and F. Gill, Eds.), The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.
- WARKENTIN, I. G., AND D. HERNANDEZ. 1996. The conservation implications of site fidelity: a case study involving Nearctic-Neotropical migrant songbirds wintering in a Costa Rican mangrove. Biological Conservation 77:143-150.
- WINKER, K., J. H. RAPPOLE, AND M. A. RAMOS. 1990. Population dynamics of the Wood Thrush in southern Veracruz, Mexico. Condor 92:444-460.
- WUNDERLE, J. M. 1995. Population characteristics of Black-throated Blue Warblers wintering in three sites on Puerto Rico. Auk 112:931-946.
- WUNDERLE, J. M., JR., AND S. C. LATTA. 2000. Winter site fidelity of Nearctic migrants in shade coffee plantations of different sizes in the Dominican Republic. Auk 117:596-614.