

The Biological Significance of Age-specific Return Schedules in Breeding Purple Martins

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Fig. 1. An adult male (ASY-M) Purple Martin that has been color-banded with Red #1 left for individual identification. A spotting scope is needed to read these bands.

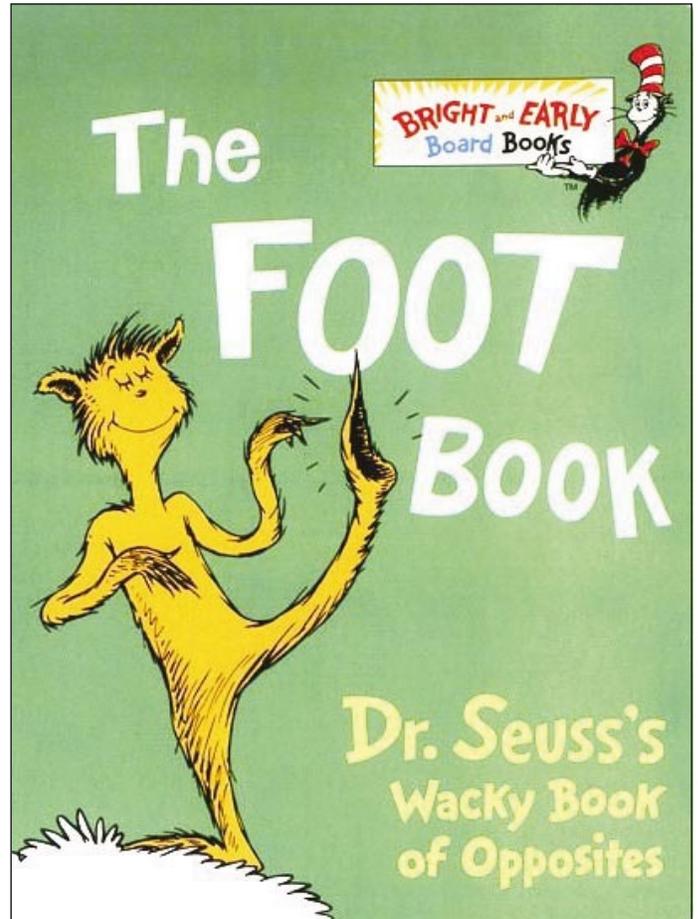


Photo Courtesy of Random House Publishers

Fig. 2. "The Foot Book: Dr. Seuss's Wacky Book of Opposites" taught this martin biologist how to distinguish banded from unbanded martin feet, and also right feet from left.

Most martin landlords get to know their birds, but I got to know mine intimately well. The only reason I thought you might find my quest interesting is that I knew more than the individual quirks of my birds. I banded them with plastic color bands with numbers (Figs. 1, 3) by using traps that caught all the adults at once inside their compartments as they roosted at night with their kids (see Figs. 4-6). This was accomplished during one night in early July (for greater details of this annual party, see the 1992 article, "Martin Night at the Mortons," published in *Purple Martin Update* 4(1):1-5). Color banding allowed me to know all my returning birds as individuals. The current article is the story of my

attempts to know who came back when. It was madness.

My colony in Severna Park, Maryland (comprised of three Trio Castles) was situated only 35 feet from the window of my home. This allowed me to see the numbers on their colored bands and tally when each bird arrived at the colony by looking at their legs through a 40-power Bushnell telescope mounted on a tripod. There could be only three numbers that ranged from 001 to 500 on either red, white, blue, or yellow plastic bands placed on the birds' right or left feet. Easy, right? If I were Dr. Seuss, it surely would have been the inspiration for "The Foot Book: Dr. Seuss's Wacky Book of Opposites"!

I sat at my window on the second floor, at about the same height as the martins, from sunup until about 9:30 AM trying to spot birds that had just arrived and had not been identified. Bird-watchers get 'warbler neck' looking up to see birds in the tree-tops. I got 'martin neck' from trying to mentally budge martin legs to reveal their hidden numbers. Stress is stress even when you're having fun!

Naturally, the birds rarely showed me their band numbers right away. But I knew how many new birds had arrived each day so I could at least gauge how many new feet I needed to check for numbers. So, I persisted. When martins first arrive from the south they spend the morning hours bickering and defending nest sites. There is some sex difference in how much bickering versus defending they do, but I won't get

Fig. 4 (right). Each season Gene sets his traps in early afternoon of Martin Night so the martins will have plenty of time to adjust to them before dark.



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Fig. 3. Gene Morton used colored leg bands like these to individually mark and identify his Purple Martins.



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From about 7:10 PM to 7:35 PM in early April, then later as the season progressed, I added birds that landed on the Trios and subtracted birds leaving for that last snack before bedtime. I got pretty good at adding and subtracting, and judged my accuracy on the count the next morning. I was ready for tax time! I emphasize that this was not due to any natural talent, but because I practiced tallying arriving banded martins for 8 years during the springs of 1982 through 1989! It was do or die. I had become a martin accountant.

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Fig. 5. Gene Morton attaching a Patterson-style trap to one of his three Trio Castle martin houses. When the string is cut, the trap falls, closing all 24 cavities at once.



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Fig. 6. After setting the traps, Gene cranks his houses up, then secures the single string from each house to one common point, so all can be cut simultaneously after dark.

What Can Be Learned by Studying a Color-banded Population of Purple Martins?

There are several exciting things that can be learned by studying a color-banded population of Purple Martins. For instance: Who arrives first, males or females? When do older and younger birds arrive? Do birds that nest together arrive together, or what? Do earlier birds nest in different heights of the four-tiered Trio Castles? And finally, are penthouses really better? Do birds securing higher cavities have lower rates of nest predation? Let's answer these questions in order and hope they don't just describe the situation at my colony and no others!

Do Purple Martins Have an Arrival Schedule Based on Sex and/or Age?

I classified my birds by age class, so a first-time breeder is an Age 1 bird, or "1-year-old" ("SY" in bird banding parlance, or "subbie," a colloquialism for "subadult.") Two-year-olds are Age 2 birds, and so on. These I call year classes, like graduates. To begin, yes, it is true that males arrive earlier than females in all age classes except for Age 1 birds (SYs). Instead, Age 1 females arrive 5.2 days earlier than their male counterparts (see Fig. 7). But in Age Classes 2 through 6, males average 4.8, 2.5, 7.1, 2.6 and 8.8 days earlier than females, respectively. That dawn-singing really attracts the subbie females! I suspect the subbie girls are looking for old males for mates and use dawn-song as a key to their whereabouts. (More about this in a future article.)

Birds 3-years-old or older arrive in early April; most are in by 25 April, and there is no difference between any of the older age classes. It's the Age 2 class that surprised me. These males may be purple, but they are still not the same as older males. They arrive AFTER these older birds, but before the subadults. The average date of arrival for two-year-old males is 25 April and 3 May for two-year-old females. The bickering begins to subside, the neighbors stop complaining and then it ratchets up again when the subbies arrive from 15 May into early June! Dawn-singing begins in mid-May too, not surprisingly, if it functions to attract subbie hens. Without the ruckus the kids bring with them, martins would be boring (no, no, I didn't mean that, honest).

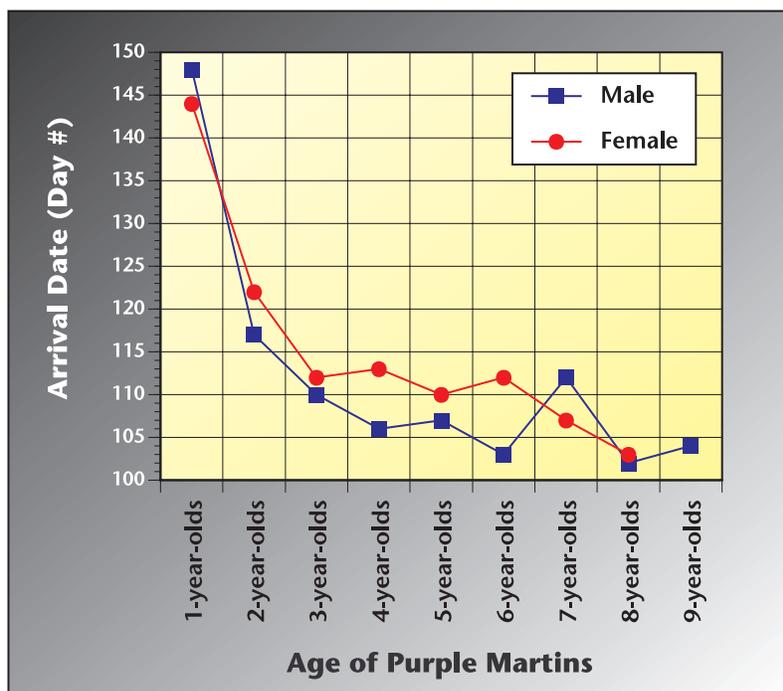


Fig. 7. Average return dates of male and female Purple Martins of different ages at the main Morton study site in Severna Park, MD (38° N). Day 100 = 10 April. Note that 1-year-olds (subadults), returned about 39 days later on average than the 3 through 9-year-olds.

78% of the girls pair with subbie boys and less than 3% of them are fortunate enough to pair with males three-years-old or older, leaving 20% lucky enough to latch onto two-year-old males. So birds of an age class pair with one another. Now, this could happen because martins form lifetime pair bonds, but the same individual martins rarely remate. I checked this out between 1984 and 1985. For fifteen 1984 pairs where both pair members returned in 1985, only two pairs (13%) remated. They just don't care. If you guessed that birds that arrive together get together you are wrong. There was zero correlation between the date a bird arrived back and that of the bird that became its mate, excluding subbies from consideration.

Do Purple Martins Prefer to Nest in the Higher Tiers of Martin Housing?

Finally to our last question about penthouse preference. Only a few (25%) of the subbies manage to nest in the top tier of the Trio Castles. The proportion of birds nesting in the penthouse tier increases with their age. The older you are the more penthouse space you get! Older birds prefer to nest in the top two tiers and keep many of the younger from using them. I think that predation explains this preference because certainly the compartments themselves are identical by tier in a Trio Castle! In fact, before I found good predator guards, raccoons and black rat snakes preyed on 13 of 24 (54%) nests in the lowest tier, three of 15 (20%) nests in the second tier, one of 17 (6%) nests in the third tier and none of the 22 nests in the highest penthouse tier. I had no flying predators. So it looks like the early bird gets the penthouse and for good reason.

Do Purple Martins Pair with Birds of the Same Age?

Well, we have the arrival times down, but does this have anything to do with who pairs with whom? Yes indeed it does. Let's start with the old geezers and hens. None of the old hens 4-years-old or older mate with 1-year-old males. Forget it, you can't be a rhinestone cowboy if you're subbie! Three out of 4 (75%) pair with males 3-years-old or older. Two- and 3-year-old hens are in between with 27% and 49% pairing with males greater than 3-years-of-age, respectively. Moving on to the subbies,

Early Arrival By Old Adults

Dangerously early spring arrival is the norm in several secondary cavity-nesting species (for example, Tree Swallows and Purple Martins). One hypothesis is that this early arrival is driven by competition for limited nesting cavities. The extremely early arrival of Age 3 and older Purple Martins may be viewed as escape from competition from Age 2 birds for cavities in the higher tiers, which are safer from predators that climb, especially if lower nest sites are occupied. A relatively high nest cavity was undoubtedly important to escape predation in natural nest sites as well. Tier levels in martin houses are a feature shared with natural tree snag arrays, in which the age-related separation evolved. In fact, vertical separation in natural cavities is even greater than in artificial martin houses and might have provided even more safety from predators than do the closely-packed compartments of martin houses. This shows that, even without competition for secondary cavities, predation can cause selection that favors early arrival in colonial species, such as Purple Martins.

Does Early Arrival Mean Early Egg Laying?

One final accountant bit, then I promise I will

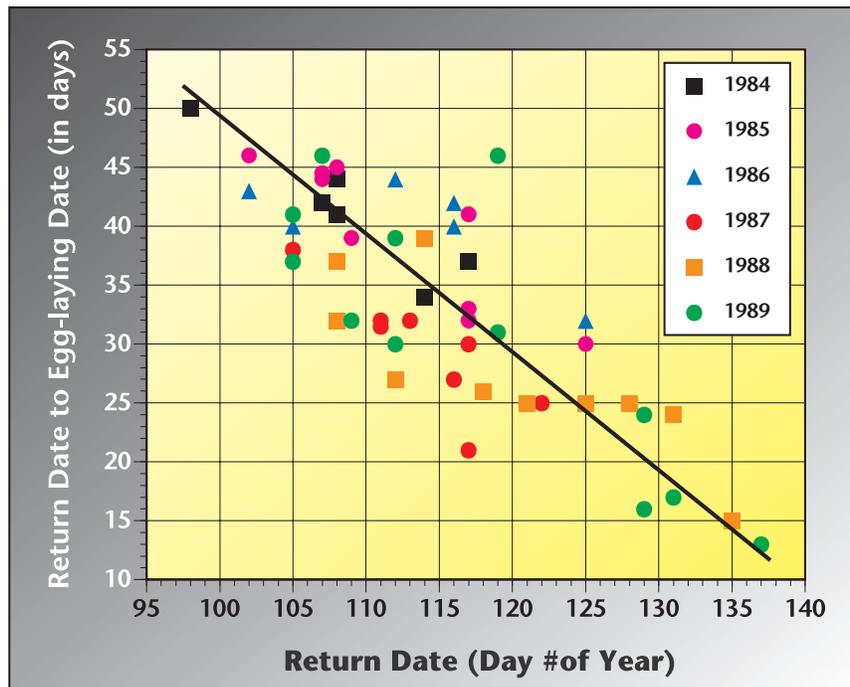
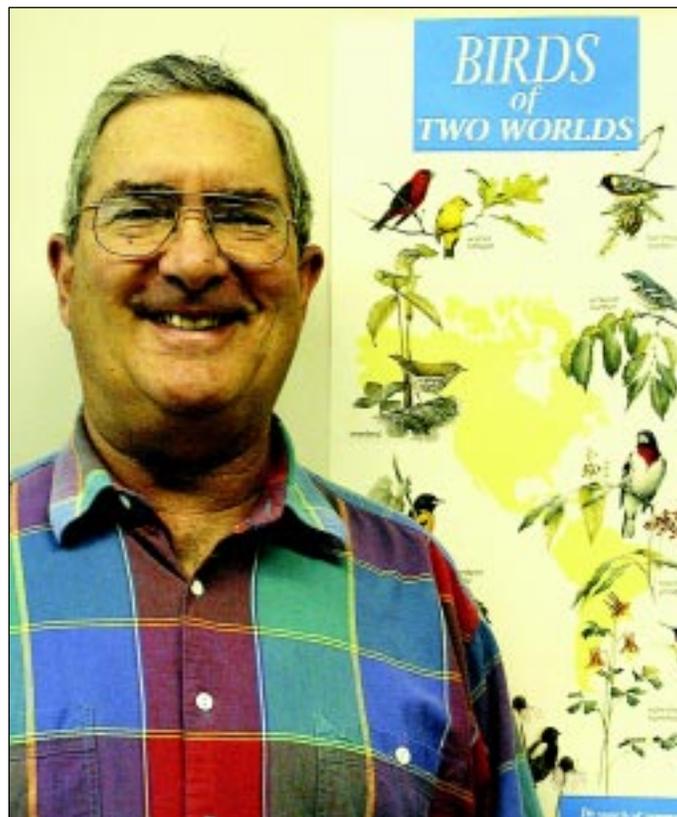


Fig. 8. The number of days of delay between return date and clutch-initiation date in female Purple Martins (vertical axis) as a function of return date (horizontal axis). Return date (day #) 100 equals 10 April. This chart is based on return dates for females two-years-old and older in Severna Park, MD. As you can see, the earlier a female returns, the longer the delay until egg laying.



Bridget Stutchbury

Dr. Morton and his wife Dr. Bridget Stutchbury (both PMCA Scientific Advisors) live in Toronto, Ontario with their two children, Douglas and Sarah. This article summarizes the scientific paper "The Biological Significance of Age-specific Return Schedules in Breeding Purple Martins," published in 1990 in the *Condor*, Volume 92, pages 1040 to 1050.

quit. You might think that the earlier a female Purple Martin arrives the earlier she lays. Makes sense to us, but not, apparently, to martins. I call the period between a female's arrival and her first egg the "delay period." The delay period is longer for earlier birds than for birds arriving closer to the time egg laying generally begins (see Fig. 8). Birds arriving in early April wait 40-50 days to lay while those returning in late April take only 20-30 days before laying. The delay to lay says birds wait for breeding

until weather conditions are best for raising kids. This makes sense. So these guys and gals that arrive early do so in order to get the best places to nest, not a head start on nesting.

Martin arrivals are well orchestrated as well as coveted by landlords. The three arrival groups, old geezers and hens, prime-of-lifers (2-year-olds), and subbies show that experience changes what works best. For the oldest, dangerous early arrival is balanced by a higher breeding success due to high tier choice, for the 2-year-olds, getting established means letting the oldest settle in first rather than compete with experienced birds, and for the subbie boys it works best to take little risk with the weather for, even if they do get to nest, their young are mostly fathered by the old geezers, the ones wearing the rhinestones! 