squirrel appeared to have been entering the tunnel with nesting material when it became stuck.

This is apparently the only record of a flying squirrel being found stuck in the resin around a Red-cockaded Woodpecker cavity. An Eastern Bluebird (*Sialia sialis*) and a probable Pine Warbler (*Dendroica pinus*) have been found stuck in the resin flow on a cavity tree (Dennis 1971), and a Red-cockaded Woodpecker has been found stuck in sap in the entrance tunnel to its cavity (Locke, Conner, and Kroll 1979). In the latter case, the authors felt that the entrance tunnel was atypical in shape, allowing resin to pool on its floor. Though the shape of the tunnel was not specifically noted in my observation, the fact that the squirrel's entire ventral surface was fairly stuck to the tunnel floor suggests that sap had pooled there to some extent. I cannot state with absolute certainty that the squirrel died as a result of being mired in the sap, or that it was alive when it became stuck. It is possible that the squirrel died in the cavity and was left in the tunnel by another animal trying to eject it. However, the squirrel's posture in the tunnel left the impression that it died while struggling to enter the cavity.

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Mortality Rates in Nesting Purple Martins

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Breeding individuals of the California Condor (*Gymnogyps califorianus*), particularly pairs foraging together, reportedly gain first access to available food (C.B. Koford, The California Condor, Dover Press, New York, 1966). Thus Koford reasoned that the reproducing segment of the population was the most fit in terms of ability to garner and hold resources. One could further hypothesize that the effective portion of a given population of organisms—the breeders—are the most fit from a physical and pyschological standpoint. Further, it is likely that survival during the breeding season is high for those individuals gaining access to the resources required for reproduction.

The Purple Martin (*Progne subis*) seems ideally suited for use in testing such an hypothesis. The birds nest in colonies near human habitation, and they are site-tenacious once a pair selects a nesting compartment. I have constructed a table that records the mortality of nesting birds in my martin colony in Raleigh, N.C., from 1959 through 1979. Causes of mortality are given where appropriate, and mortality was assumed when one, or more, of a pair disappeared after nesting had commenced. Thus the estimates given are maximum estimates. Observations cover only the period when the birds were nesting. Information on parental survival during the period of post-nesting care of the young is not available.

Total mortality for the 21-year period was 12 birds for an average mortality rate of 2.3%, very low considering the early arrival of adult birds, usually in March, the toll of territorial combat, indulged by both sexes, and the stresses from rearing large broods.

Table 1. Mortality rates of nesting Purple Martins at Raleigh, N.C., 1959-1979.

Year	*No. pairs*	*% Mortality*	*Losses*
1959	6	0%	None
1960	12	0%	None
1961	16	6%	One female suffered broken wing; another killed by a cat.
1962	20	5%	Two females disappeared after eggs had hatched; each surviving male reared out two young.
1963	20	5%	One male found in an emaciated, moribund condition on ground; another killed by cat.
1964	16	6%	Two females found dead on nests.
1965	14	4%	One male killed by a cat.
1966	12	0%	None
1967	10	0%	None
1968	9	0%	One female disappeared during nesting season.
1969	7	0%	None
1970	10	0%	None
1971	9	6%	One male killed by a cat.
1972	11	0%	None
1973	12	0%	None
1974	12	0%	None
1975	12	4%	One female found dead on nest.
1976	9	0%	None
1977	12	0%	None
1978	12	0%	None
1979	12	0%	None
Pairs	253	Avg.	
Individuals	506	1.3%	Total birds lost = 12

Predation by cats accounted for about half the losses, and such mortality is doubtfully related to the general condition of the birds. Martins are extremely vulnerable when on the ground, as when gathering nesting material, or when males fall to the ground in combat.

Mortality was greatest when the colony was largest. Considering the low rate of mortality from all causes, that might have been merely a matter of sampling deviation. Once the colony began declining in the number of nesting pairs, I began limiting the number of nesting compartments (gourds) to 12. Recently the colony has stabilized around the maximum space available, an average of about 10 pairs of adults birds, plus 1 or 2 pairs of subadults, per year. Since the colony has become reduced in size, fighting among the males seems to be much less, and the rate of abandonment of nests by subadults has dropped to zero. Perhaps conditions in modest-sized colonies are less stressful on inhabitants than in large ones.

I have recorded about a 30% rate of recruitment per year for 2-year-old males in the colony. Males of this age class can be identified by the white stripe on either side of the black venter. Assuming site-tenacity of males, once the birds have nested in a given colony, the 30% recruitment rate must be a replacement rate. Therefore there is the likelihood that relatively young, though mature, martins are the most fit of the population available for reproduction for a pending season. The rigors of migration must be severe on the young and the aging. Results of 20 years of observation at Raleigh show that the survival of nesting Purple Martins, at least in one colony, is high. Therefore most of the mortality of adult birds must occur during the nonreproductive period.