DIFFERENCES IN FORAGING ABILITY OF ADULT AND JUVENILE SNOWY EGRETS OBSERVED IN THE SAUGUS RIVER MARSH

by Donald M. Kent

It is generally accepted that young birds are less skilled foragers than adult birds are. Differences in foraging ability can be attributed to juveniles feeding in suboptimal habitats or at unsuitable times, juveniles having a more difficult time than adults locating prey within a habitat, juveniles having less success than adults at capturing prey, or juveniles having more difficulty than adults handling prey.

During a study of habitat use by Snowy Egrets *(Egretta thula)* in the Saugus River marsh (Kent 1987), I had the opportunity to compare adult and juvenile foraging behavior. In July and August adults and juveniles forage side by side in large tidal creeks. While in the creeks, egrets feed almost exclusively on sand shrimp *(Crangon septemspinosa)*. This affords a unique opportunity to compare juvenile and adult abilities to locate and capture a standard prey item, i.e., sand shrimp.

Foraging Snowy Egrets were observed July 24, 25, and August 6, 1985, and August 7 and 8, 1986. Age classes were distinguished on the basis of breeding plumes on adults and the pale color of the bill and legs of juveniles (Palmer 1962). Each age class was observed for 111 one-minute periods, 67 in 1985 and 44 in 1986. Observations were initiated following an egret's successful strike at prey and continued for one minute, after which a one-minute observation was conducted on the nearest bird of the other age class. Observations were made with a zoom spotting scope from a blind on the creek bank. The distance from the blind to the focal bird never exceeded twenty-five meters. The number of captures attempted (strikes), the number of successful captures, and the size of the shrimp captured were noted and dictated directly into a tape recorder.

There was no significant difference in juvenile and adult Snowy Egret striking rates (number of captures attempted per minute): juveniles averaged 5.00 strikes per minute, whereas adults averaged 4.96 strikes per minute. Nor was there a significant difference in juvenile and adult capture rate (number of shrimp captured per minute): juveniles averaged 2.26 captures per minute, whereas adults averaged 2.37 captures per minute.

Determination of shrimp size was made possible by my closeness to the egrets (less than twenty-five meters), by the relatively long time the egrets handled the shrimp (two to three seconds), and by the known length of Snowy Egret bills (Palmer 1962). The size of a captured shrimp observed as it was handled by the egret was designated as "quarter-bill" or "half-bill" length. Juvenile Snowy Egrets ate significantly more quarter-bill-length shrimp than

half-bill-length shrimp, 141 of 238 shrimp (59 percent), whereas adults ate significantly more half-bill-length shrimp than quarter-bill-length shrimp, 194 of 258 (75 percent). The difference in proportion of each size class of shrimp eaten by juveniles and adults is statistically significant.

Determining the gross energy intake rate for juvenile and adult egrets required assigning an energy value to the shrimp. Therefore, shrimp were collected in August 1986 and "bombed" in an adiabatic oxygen calorimeter. Given an average bill length of 81 millimeters, quarter-bill-length shrimp have an energy value of 320 J (joules), whereas half-bill-length shrimp have an energy value of 2234 J.

By assigning the above energy values to captured and eaten shrimp, the gross energy intake rate for juvenile and adult Snowy Egrets foraging in the Saugus River marsh was determined. Juveniles obtained energy at a rate of 2.57 kJ (kilojoules) per minute. This is significantly less than the adult rate of 4.23 kJ per minute, which is one and a half times that of juveniles.

In a Canadian study (Draulans and Van Vessem 1985), the relative inefficiency of juvenile Grey Herons *(Ardea cinerea)* was attributed to the use of unsuitable times and places. However, in the Saugus River marsh, juvenile Snowy Egrets began feeding in the creek at approximately the same time as the adults, and they were not observed foraging in other less suitable parts of the marsh (e.g., pannes) when the creek was accessible. Therefore, juvenile Snowy Egrets in the Saugus River marsh appear to be as able as the adults to select an appropriate time and place to feed.

Other studies have found that juvenile herons are sometimes less efficient at locating and capturing prey. For seven species of herons in Florida there was a tendency for juveniles to attempt more captures than adults (Rodgers 1983). Adult and juvenile Great Blue Herons *(Ardea herodias)* in Canada had comparable striking rates, but adults had a greater capture rate (Quinney and Smith 1980). In New Jersey juvenile Little Blue Herons *(Egretta caerulea)* captured fewer prey per attempt than did adults (Recher and Recher 1969). However, the same authors reported that juvenile and adult Little Blue Heron capture rates were comparable in Florida. In the Saugus River marsh juvenile Snowy Egrets were able to locate prey as well as the adults as is indicated by comparable striking rates. Juveniles were also able to capture prey as well as the adults, which is indicated by comparable capture rates.

However, juvenile Snowy Egrets in the Saugus River marsh were less efficient foragers than were the adults. This inefficiency was the result of juvenile Snowy Egrets eating more quarter-bill-length shrimp than half-bill-length shrimp, whereas adults were eating more shrimp of the larger size. Given that half-bill length shrimp contain almost seven times as much energy as do quarter-bill-length shrimp, both age classes should have been eating as many

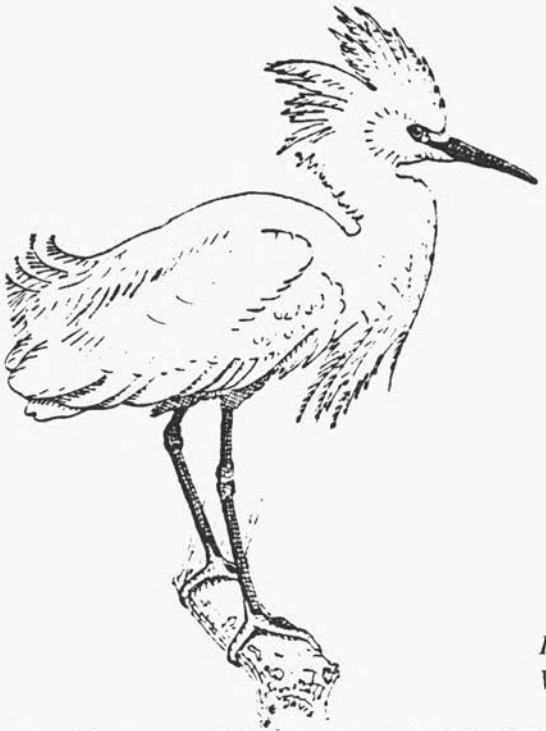

Illustration by
William E. Davis, Jr.

half-bill-length shrimp as possible. Juveniles and adults feeding side by side, as they did in the Saugus River marsh, should have encountered approximately equal numbers of half-bill-length shrimp.

There could be several reasons why juvenile Snowy Egrets foraging in the Saugus River marsh captured proportionately fewer half-bill-length shrimp than did the adults. The relative value of half-bill-length shrimp to juveniles may have been reduced because of handling difficulties. Juvenile egrets required less than one additional second to handle half-bill-length shrimp. While this difference in handling time is statistically significant, it cannot be considered biologically significant given the large difference in energy value between the two size classes of shrimp. Also adult egrets as well as juveniles dropped a greater percentage of half-bill-length shrimp than of quarter-bill shrimp, indicating only that the half-bill shrimp may be more difficult to handle, regardless of the age of the egret. The difference in size of shrimp eaten by juvenile and adult Snowy Egrets in the Saugus River marsh may be related to juvenile inability to differentiate the size of shrimp before attempting capture or the ability of half-bill-length shrimp to avoid capture by juvenile egrets. Neither can be determined without a controlled experiment.

Generally, juvenile heron mortality is almost two and a half times greater than adult mortality (Lack 1949, Owen 1959, Hickey in Palmer 1962, Kahl 1963). Juvenile mortality is especially high from the time just following

fledging to December of the first year. Juvenile and adult differences in the size of prey eaten, as identified in this study, may help to explain this difference in mortality rate.

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