

Acknowledgements

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HATCHING SUCCESS OF YEARLING AND OLDER BREEDERS IN THE SEMIPALMATED SANDPIPER *CALIDRIS PUSILLA*

by C.L. Gratto, F. Cooke and R.I.G. Morrison

Introduction

A number of ornithological studies have attempted to determine the age of first breeding members of a population, and others have compared success of inexperienced versus experienced breeders. This information is necessary in calculating the reproductive potential of a population.

Studies of several small shorebird species have shown that at least some yearling (first year) birds may attempt to breed, e.g. Piping Plover *Charadrius melodus* (Wilcox 1959), Western Sandpiper *Calidris mauri* (Holmes 1973), Temminck's Stint *Calidris temminckii* (Hildén 1978), Least Sandpiper *Calidris minutilla* (Miller 1979), Dunlin *Calidris alpina* (Holmes 1966, Soikkeli 1967), and Northern Phalarope *Phalaropus lobatus* (Hildén & Vuolanto 1972). However, the percentage of birds breeding in their first year may vary. Soikkeli (1967), in Finland, estimated that one third of the Dunlin bred in their first year, and two thirds at 2 years; while in Alaska apparently all first year Dunlin nested (Holmes 1966).

The purpose of this paper is to document the presence of first year breeders in a population of Semipalmated Sandpipers *Calidris pusilla*, to compare their hatching success with that of more experienced nesters, and to discuss possible reasons for the observed difference in hatching success.

Study Area and Methods

Studies were carried out at La Perouse Bay, 50 km east of Churchill, Manitoba, on the coast of Hudson Bay, during the summer of 1980. Semipalmated Sandpipers were studied in a 4 km² area in the Delta of the Mast River, where nesting occurred in drier, shrubby areas consisting mainly of *Salix brachycarpa* or *Betula glandulosa* and mixed sedges and grasses. Birds were captured on nests using walk-in or drop-door traps and measurements, including wing (maximum chord, flattened), exposed culmen, tarsus and bill width, and weight taken. Birds were also examined for evidence of partial post-juvenile wing (PPW) moult (see Gratto and Morrison 1981). A nest was considered successful if at least one egg hatched and eggs were considered to have hatched if they had been strongly pipped one to two days before finding an empty nest.

Results and Discussion

An estimated 100 pairs of Semipalmated Sandpipers nested in the 4 km² study area. Forty-five nests were found, from which 43 complete pairs were captured. Partial post-juvenile (PPW) moult was discovered in 9 of the 86 (10.5%) individuals, indicating that at least 10.5% of the breeding birds captured were yearlings (not all yearlings have PPW moult but this moult has been recorded only in yearlings - see Gratto and Morrison 1981). Seven pairs included one bird with PPW moult, and one pair consisted of two PPW birds, so that 8 of the 43 nests (18.6%) had at least one yearling parent. Two out of these 8 (25%) "yearling" nests were successful, compared to 28 of the 35 (80%) "other" nests. Nest failure was attributed to desertion (of the remaining mate after the other was killed by a predator) in 2 of the "yearling" nests, and predation of eggs in 4 "yearling" and the 7 unsuccessful "other" nests. There were a number of predators in the area - Parasitic Jaegers Stercorarius parasiticus, Herring Gulls Larus argentatus, Arctic Foxes Alopex lagopus and Short-tailed Weasels Mustela erminea.

Blus & Keahey (1978) have summarized the major theories explaining the low reproductive success of inexperienced breeders. Clutch size is normally reduced in young adults - either because physiologically they cannot produce more eggs, or the number of eggs laid is adapted to the number of young which they can raise. Inexperienced breeders are often found on the periphery of colonies or in unsuitable habitats, and often nest later than adults - either because they arrive later, or are less able to recognize, obtain and defend suitable nest sites.

Shorebirds do not normally vary their clutch size. At La Perouse Bay, 1 "other" nest had 3 eggs when found and 34 had 4. Of the "yearling" nests, 7 had 4 eggs, and 1 had 2, although in the latter case the female was found dead at the nest. Since a lesion was found below the left ear of this bird, it was presumed to have been killed by a predator. Its ovary contained one obviously enlarged follicle.

It is possible that the eggs of the two groups varied in size, though Vaisanen et al. (1972) state that in precocial species such as shorebirds, egg weights would be expected to depend very little on the age of the female. There was also no significant difference between the weights of incubating yearling (PPW moult - 29.0 ± 1.9 g) and "other" females (29.0 ± 2.2 g).

Although habitat quality was not measured, there were no obvious differences between territories of "other" and "yearling" pairs, and "yearling" nests were scattered throughout the entire breeding area. Although only two "yearling" nests hatched, these were at the end of the hatching period, perhaps indicating a slightly later nesting (by about 3 days).

It is also possible that "yearling" nests were less well concealed, and behaviour of the birds somehow led to the higher predation rate. One yearling female was found dead at the nest, and its mate (also definitely a first summer bird) incubated alone for several days but eventually deserted. Another yearling (presumed female by measurement) soon deserted after its mate was depredated. No other parent of the 86 captured was known to have died during incubation or deserted its nest. One "yearling" nest contained four Semipalmated Sandpiper and two Northern Phalarope eggs. It was incubated by two Semipalmated Sandpipers, one with PPW moult, and was later depredated.

In this study at least one parent of each "yearling" pair was a first time breeder, being a known first summer bird (PPW moult). Not all first summer Semipalmated Sandpipers undergo partial remige moult (Gratto and Morrison 1981), so other yearlings may have existed in the breeding population. If pairs tend to consist of birds of similar age and/or experience, as may occur in Arctic Terns - Sterna paradisea (Coulson & Horobin 1976), non-PPW yearlings would tend to be mated to PPW moult birds especially as very few second year birds existed in the population as a result of a very poor breeding year in 1978.

If the high predation rate of "yearling" parents and their eggs continued after hatch, it would appear that these birds gained little immediate reproductive fitness by nesting in their first year. Their chances of producing offspring were low, and the risk of being predated themselves was high. In fact, portions of another adult Semipalmated Sandpiper were found near one of the 2 successful "yearling" nests shortly after hatch.

We postulate that this low reproductive success of yearlings is due more to inexperience, rather than immature physiology or lower quality nest sites - at least in this particular year. If inexperienced second year birds are as successful as experienced second year individuals, there would seem no advantage in even attempting to breed in the first year. If, alternatively, the first breeding attempt is hazardous and unproductive regardless of the age of the bird, potentially there would be some advantage in risking higher mortality by migrating and breeding in the first summer, rather than remaining in the south (see Gratto and Morrison 1981), even if little is contributed to the lifetime reproductive output of the individual.

The question of age versus inexperience in this population can only be conclusively answered if known inexperienced second year birds (banded as nestlings) can be compared to experienced second year birds. In the meantime a second year of study concentrating more on the "yearling" versus "other" pair differences (quality of nest site, egg measurements, and adult behaviour) will be conducted.

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