

Effects of Nest Site and Parental Behaviour on Shorebird Reproductive Success

Paul A. Smith*, H. Grant Gilchrist and Mark R. Forbes



Objectives

Many studies have demonstrated that nest sites are selected actively, such that microhabitat at nest sites differs from random sites. However, far fewer studies have clearly demonstrated that such nest microhabitat preferences are adaptive; i.e., that individuals nesting in preferred microhabitats experience higher nest success in the long run (Clark and Shuttler 1999). Nest success may also depend on



factors other than habitat, such as nest distribution or the behaviour of the incubating parents. These latter factors may be of particular importance in tundra systems, where habitats are comparatively homogeneous and suitable nest sites are abundant.

We studied shorebird nest habitat and parental behaviour to determine which factor has the greater influence on nest success in a tundra system.

Study Site



East Bay, Southampton Island, Nunavut,
63° 59' N 81° 40' W

Shorebirds at East Bay



Nest Habitat

We tested for patterns of nest preference by contrasting nests with random sites, and looked for differences between the microhabitat of successful and unsuccessful nests to test for adaptive nest site choice. Nest sites (n=21-63/species) and random sites were characterized at scales of 1m² and 75m².

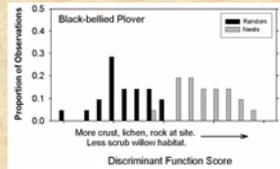


Figure 1: The distribution of scores from a discriminant function analysis of random sites versus nest sites for Black-bellied Plovers.

For all species, there were clear patterns of non-random nest site selection (Fig. 1). In contrast, there were no significant differences in habitat between successful and failed nest sites (Fig. 2).

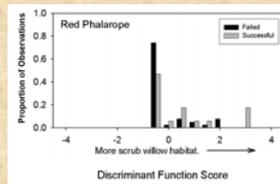


Figure 2: The distribution of scores from a discriminant function analysis of successful versus failed nest sites for Red Phalaropes.

An artificial nest experiment was conducted to assess relative predation pressure in the various habitats within the study site. "Clutches" of two Japanese Quail (*Coturnix japonica*) eggs were distributed in a stratified random design. Eggs were laid out for two periods of 10 days, in mid and late incubation.



Figure 3: Proportion of artificial nests taken by predators in two 10 day trials. The number of nests deployed appears above the bars for each habitat.

The rate of predation on artificial nests differed between habitats, but the pattern did not explain differences in nest success between species. Species preferring the habitat with the lowest artificial nest loss (sedge meadow) in fact had the highest rate of predation.

Behaviour

When predators use visual cues to locate nests, the amount of activity exhibited by incubators can influence the risk of predation (Ghalambor and Martin 2002). In shorebirds, the amount of activity near the nest is related to incubation system; uniparental incubators must leave the nest more often to feed. At East Bay, uniparental incubators suffered higher predation in all years (Fig. 4).

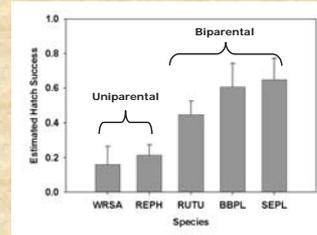


Figure 4: Hatch success (±SE) for shorebird nests at East Bay, 2000-2002.

The importance of activity around the nest in determining success is corroborated by the observation that artificial nests (with no incubator) had lower daily mortality than real nests (Fig. 5).

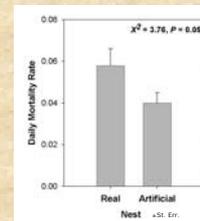
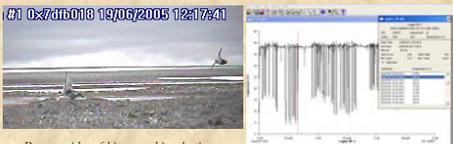


Figure 5: Mayfield estimates of the daily mortality rate (±SE) for shorebird nests and artificial nests at East Bay, 2000-2002.



Remote video of biparental incubation

Temperature trace of uniparental incubation behaviour

We have expanded the field program to a second site at Coats Island, Nunavut, and incorporated 3 new species. Using remote video systems and temperature probes we are collecting detailed information on the incubation behaviour of bi- and uniparental birds to answer the questions above.

*Contact: paulallen.smith@ec.gc.ca

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