Accidental Egg Removal by Incubating Piping Plovers

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ABSTRACT.—Clutch reduction (the disappearance of 1 or more eggs) is often reported in studies examining avian reproductive success and has typically been attributed to nest predation. We recorded clutch reductions at 20 (11%) of 188 Piping Plover (Charadrius melodus) nests at Chaplin Lake, Saskatchewan from 2002 to 2004. Partial clutch reductions were initially assumed to be the result of predation. However, all egg disappearances at three nests we monitored using video cameras were due to accidental removal by incubating parents. Our observations suggest that accidental removal may occur more frequently than expected in alkaline environments, and are likely misclassified as losses due to predation.

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Estimating demographic rates and identifying factors that influence these rates are essential for understanding population ecology (Stearns 1992, Miller and Knopf 1993, Lukas et al. 2004), and effectively managing wildlife species (Sarno et al. 1999). A large proportion of applied ornithological research has focused on estimating reproductive success, in particular nest survival (Beauchamp et al. 1996, Knitter et al. 2002, Davis 2003). Critical to this understanding is the correct classification of nest fate. Unfortunately, logistical constraints often influence nest visitation schedules and make accurate assessment of nest fate difficult (Pietz and Granfors 2000). For example, reduction in clutch size between nest visits is typically attributed to predation, but could result from brood parasitism (Payne 1977), accidental breakage by the nest owners themselves, or by abiotic factors such as strong winds and heavy rains (Sealy 1994).

Video monitoring has become a relatively common means of studying nesting behavior and allows an accurate assessment of nest fate (Pietz and Granfors 2000, Sanders and Maloney 2002, Williams and Wood 2002). We documented the accidental removal of eggs by incubating Piping Plovers (Charadrius melodus) breeding at Chaplin Lake, Saskatchewan (50°26’N, 106°40’W) during a study which used video monitoring of nests (White 2005).

OBSERVATIONS

Chaplin Lake is a large saline lake covering 11,777 ha. The basin is composed of 10 interconnected pools used for harvesting brine shrimp (Artemia franciscana) and extraction of sodium sulfate. This lake supports a large nesting population of Piping Plovers with up to 23% of the Saskatchewan population in a given year. Nest searches and monitoring were conducted from early May until mid August in 2002–2004 following Murphy et al. (1999). Nests were checked every 3–5 days to assess hatching success or failure. Four video systems were used during each of the three breeding seasons to monitor nests (n = 24 total). Small (29 mm diameter, 74 mm long) remote color/infrared cameras (National Electronics Bullet C/IR, B&E Electronics, Regina, SK, Canada) were hidden in artificial “rocks” constructed from hollow wood and placed at randomly selected nests around the lake. The cameras provided color video images during the day and black and white footage at night. Video was continuously recorded (24 hrs) on a time-lapse videocassette recorder (VCR, Sanyo Real Time SRT 2400DC, or Sanyo Real Time 4040AC). We reviewed all video tape records from nests at which egg losses were recorded during nest visits.

Clutch size reduction occurred at 10–17% of monitored nests each year (n = 188 nests, Table 1). Review of the video (1,946 hrs) at the 3 nests (1 in each year), where video cameras were used and which experienced clutch

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reduction, revealed in each case that an egg was accidentally removed by an incubating parent. None of the missing eggs was the result of predation (Table 1). In each instance, the egg adhered to the abdominal feathers of the incubating adult and was carried by the adult as it left the nest.

Accidental egg removal accounted for the only partial clutch reductions documented on video. These removals, without the video record, would have been attributed to predators. In two of the three events, the adult searched for the egg within the scope of the video camera and either incubated the egg where it detached from the feathers or attempted to roll the egg back into the nest bowl. The egg that was incubated where it fell hatched. The other egg was rolled into the nest by one or both tending adults over the course of 26 hrs. This latter egg was damaged and failed to hatch. In the third case, the adults did not search for the egg within the field of view of the camera and the fate of the egg is unknown. Additionally, at the same study site in 2001, one egg from each of three plover nests was found outside but near nests (≤3.0 m), consistent with accidental removal.

**DISCUSSION**

Reports of accidental egg removal have also been reported for Black Stilts (*Himantopus novaezelandiae*), Black-fronted Terns (*Sterna albostriata*), and Double-banded Dotterels (*Charadrius bicinctus*) (Sanders and Maloney 2002), all of which nest in marine habitats. One explanation for eggs sticking to the plumage is that high salinity leads to the egg becoming encrusted in salt, which adheres to the feathers. Chaplin Lake is highly saline and a number of plover eggs have been encrusted in salt, particularly after heavy rains (CLW, pers. obs.). An additional reason for egg adherence to feathers may be due to pipped eggs that catch on the feathers of the incubating adult, although only one of the three eggs removed by parents in our study was close to hatching.

Removal of a single egg from a nest does not represent reproductive failure for a breeding pair, but an egg failing to hatch represents an energetic cost to the bird that laid it as well as to the individuals that participated in incubation (Koenig 1982, Clutton-Brock 1991). Partial clutch reduction was recorded at 10–17% of nests in any given year at Chaplin Lake. Although it is unknown whether accidental removal by incubating parents was the cause at all nests, our results suggest that researchers should exercise caution when attributing partial clutch loss to predators, particularly on highly alkaline lakes. Misidentification of sources of reproductive loss may result in misdirected management efforts for this endangered species. Our observations provide additional examples of the uncertainty associated with inferring the fate of eggs when direct evidence of nest fate is unavailable.

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Gray Jays Accept Brown-headed Cowbird Eggs

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ABSTRACT.—Results of simulated brood parasitism on five Gray Jay (Perisoreus canadensis) nests suggest acceptance of model Brown-headed Cowbird (Molothrus ater) eggs. This finding is contrary to results of experimental parasitism on four other species of jays, also with little or no recent history of parasitism, which eject cowbird eggs. Given that Gray Jays

nest in the boreal forest and earlier in the season than cowbirds initiate breeding, it may be that neither Gray Jays nor their congeners have been parasitized regularly in their evolutionary histories, which may explain acceptance of cowbird parasitism. Received 22 January 2008. Accepted 15 July 2008.

Gray Jays (Perisoreus canadensis) initiate clutches in late winter in boreal and sub-alpine forests of North America (Strickland and Ouellet 1993) and are largely isolated from brood parasitism by the Brown-headed Cowbird (Molothrus ater), both spatially and temporally. In Ontario, where Gray Jays have