BEHAVIORAL ECOLOGY OF AN INCUBATING SHOREBIRD: THE EFFECTS OF AMBIENT TEMPERATURE AND HUMAN DISTURBANCE ON PIPING PLOVER (CHARADRIUS MELODUS) INCUBATION PATTERNS AT CAPE COD NATIONAL SEASHORE

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Abstract

During incubation birds attend their nests to provide their eggs with conditions suitable for proper development. However, while incubating, a bird's ability to forage and replenish body reserves is limited. To balance the requirements of their eggs with their own body condition, birds must come and go from their nest with some frequency. Nest attendance patterns of birds, including the duration and frequency of incubation bouts and recesses, can be affected by environmental factors, such as weather, disturbance by humans, and predation pressure. In turn, attendance patterns can influence reproductive success. The primary goals of my research were to (1) compare the efficacy of using iButton data loggers and custom-built thermocouples to measure temperature in nests of piping plovers (*Charadrius melodus*) in relation to their nest attendance (Manuscript I), and (2) determine how environmental factors, in particular disturbance by humans, affected the incubation patterns of plovers at Cape Cod National Seashore in Massachusetts, USA (Manuscript II).

We found that iButtons alone were too insensitive to be used for estimating nest attendance of incubating piping plovers; however, iButtons were effective for determining when nests were abandoned or predated. Using thermocouples in plover nests and iButtons near nests allowed us to estimate nest attendance patterns with 93-96% accuracy as long as air temperatures were between 12-29°C and surface temperatures were between 12-55°C. In general, plovers increased the duration of incubation bouts as air temperature decreased from 29°C to 12°C, however, visitor use affected the duration and frequency of incubation bouts. Plovers nesting in high-use areas were absent from their nest less frequently and remained off nests for shorter

intervals than plovers nesting in areas with less visitor use. Incubation-bout duration adjusted for air temperature was longest in areas of high visitor use compared to areas with less visitor use, and was shortest during late morning compared to other times of day. These patterns of nest attendance are consistent with the hypothesis that plovers reduce their activity at the nest in response to increased perceived predation risk. We detected no short-term reproductive costs of this behavioral adjustment. We suggest that future research examine whether plovers that have longer incubation bouts in high-use areas suffer longer-term consequences such as reduced body condition, survival, or life-time reproductive success.