ABSTRACT

Animal behaviour is especially sensitive to environmental variability and prey availability during the breeding season, and this is particularly true for non-volant, central place foragers such as the endangered African Penguin (Spheniscus demersus). Individual sex and morphology, as well as the level of assortment within mated pairs can influence both the behaviour and the reproductive success of species exhibiting biparental care. This study made use of a large biometric database and nest attendance video footage to determine the influence of intrinsic (assortative mating, brood size and chick age) and extrinsic (environmental conditions, anthropic disturbance) factors on breeding behaviour and performance of African Penguins on Bird Island, Algoa Bay, during peak breeding (March - July) in 2013. While sexual dimorphism in African Penguins is subtle, the colony-specific discriminant functions presented here provide an accurate sexing tool when only bill and flipper length are available. Despite the premise that selection of a large, high-quality mate in this long-lived, monogamous seabird governs lifetime fitness, only low levels of assortative mating were found, and this only for earlier breeders, when larger females (but not males) bred. The 2013 season was a particularly successful one, coinciding with above-average sardine and anchovy abundance, and almost 80% of monitored nests were double-brooded, with very low levels of mortality. A- and B-chicks of double broods and singleton chicks grew at similar rates and exhibited similar body condition indices. In these conditions, chick developmental rates were independent of parental size, assortment or provisioning behaviour. Females raising a double brood were significantly lighter and in poorer body condition than those raising a single chick, although the same trend was not evident in iii males. Offspring sex ratio in 2013 (2.27:1) favoured male chicks, suggesting that there is potential to over-produce the larger sex when resources are plentiful. Peak nest arrival and departure times of parents did not change over the course of monitored breeding attempts (March-June), nor were they different for disturbed and undisturbed nests or for a single or double brood. The increase in CCTV-observed provisioning rate as chicks grew larger was best explained by brood size, at-sea chlorophyll a concentration, and maximum air temperature, but was unrelated to parental morphology or assortative index. Importantly, parental absenteeism commenced earlier and was markedly greater in nests frequently handled by researchers than in undisturbed nests. Both the time spent...
together by parents, and absenteeism were measurably affected by maximum afternoon air temperatures, the effects of which are expected to be exacerbated by poorer foraging conditions and climate change. A third of manually-monitored nests shared chick-guarding duties unequally, although this phenomenon was independent of parental sex or morphology. The adaptive benefits of mating patterns and division of labour during chick-rearing may only become apparent in a year of below-average food availability and it is highly recommended that this study be repeated in a year of scarce food resources. These findings augment past foraging ecology studies and demonstrate that investigator disturbance and environmental conditions can affect the nesting behaviour of this highly threatened seabird.

Keywords: African Penguin, assortative mating, morphometrics, nest attendance, provisioning rate, disturbance.