Feeling the burn

The arid ecosystems of south-western Africa – the Kalahari, the Namib and the Karoo – support many endemic bird species. These areas are also characterised by very high summer temperatures, often soaring above 40 °C. Readers who have experienced those brain-numbingly hot days will be acutely aware of the need for swimming pools, air conditioners and ice-cold refreshments.

But these are not options for the native fauna: in the heat of the day, these animals must make behavioural adjustments to prevent their body temperatures from rising to lethal levels and also ensure that they do not expire through dehydration. Many small mammals, for example, retreat into burrows where they can escape the full force of the sun. For most birds this is not an option, although a few species, such as Spike-heeled Larks *Chersomanes albofasciata* do seek shade in underground burrows (facing, of course, the risk of encountering the burrow's owner).

There is a popular conception that birds reside where they 'enjoy' living. However, research on plants in hot, arid environments has shown that several species are eking out an existence at the limits of their physiological tolerances, perhaps because they are excluded from their preferred habitats by competition from other species. If conditions worsen, these species face the risk of local or even global extinction. If this is true of plants, it might also be true of other organisms. In the Australian outback, for example, several mass mortalities of birds have occurred during extreme heatwaves.

Southern Africa's arid-zone birds could be facing an incipient problem because climate-change scenarios predict that these areas will experience faster-than-average increases in temperatures. Climate, stripped to its bare essentials, is nothing more than a sequence of weather events. If periods of extremely hot weather become longer or the temperatures during such events become higher, will birds be able to cope or will some species be left with the choice of either abandoning ship or dying? The answer is that we don't really know. Much climate-based research relies on building mathematical models and very often we do not have the real data about how birds will actually respond.

KEITH BARNES

A Greater Hoopoe-Lark Alaemon alaudipes *pants to keep cool in the north African sun.*

Fitztitute Masters student Justine Cordingley has embarked on a study to redress this imbalance. Based in the western Kalahari Desert, she aims to determine the way in which high ambient temperatures affect the onset of stress behaviours in desert birds: these behaviours include panting, shade-seeking, wing-drooping and feather soaking. A key aim of the study is to determine which species will show stress behaviour first as temperatures rise, and how long they remain stressed. Once we understand the relationship between temperature and stress, we can use existing climate models to calculate how those periods will change in the future. A second phase of the project will be to link behaviour with physiology. For example, what does panting in a particular species mean in terms of the rate of water loss and for how long can this species pant without water loss threatening to compromise its life-support systems?

Theory tells us that small birds should be worse affected than larger ones because they have a large surface area (through which heat can be absorbed) relative to their body weight. However, many desert birds are small, suggesting that the answer might not be this simple and that small birds may be the ones best able to find and use relatively benign microclimates. If, however, we can identify the factors that determine which species will be the most stressed and why, this information will improve our ability to predict how desert bird communities might change in the future and whether this is cause for concern in terms of the ecosystem functions (such as seed dispersal) that they perform. □

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