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Functional Ecology

BRITISH ECOLOGICAL SOCIETY

How to get there: golden eagle flight behaviour during migration

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Modern technologies allow us to follow wide-ranging animals over large distances and long periods of time, opening a window on unknown aspects of their behaviour and ecology. For example, the data collected by GPS tracking devices can be used to understand not only where animals go, but also how they choose to move in their environment.

Birds adopt different strategies to move through air, depending on their size, body structure, the reason for moving, and the environmental and weather conditions they encounter. Because flapping flight is energetically expensive, heavier birds tend to use air currents to support straight-winged flight, an efficient way of moving known as soaring. The air currents can either result from layers of warm air that rise from the earth (known as thermals), or from horizontal winds that get deflected by structures such as hills, mountain ridges or trees.

In this study, we used a large tracking dataset from golden eagles in eastern North America to develop a model that identifies the different types of flight used during migration. Particularly, our model can tease apart the various forms of soaring used by the animals. We described different flying strategies depending on the year, season, sex, age category and individual. For example, in autumn thermals are less available, so



A golden eagle, Aquila chrysaetos *(Photo credit: David Brandes, Lafayette College, Easton, PA).*

the birds more frequently used deflected horizontal winds, which are less energy-efficient. Adult birds were also better at optimising energy efficiency than sub-adults. Moreover, females, which tend to be larger than males, used more deflected horizontal winds during the autumn migration.

Shedding light on the strategies used by soaring birds to migrate is important to understanding how they allocate their time and energy during this critical phase. In addition, it allows us to assess their susceptibility to changing weather conditions and to various human activities that occur along the migratory route. For example, some types of flight may put eagles at higher risk of collision with renewable energy devices.