

# Abstract

Songbird migrants use stopovers between flight bouts to rest and refuel for the upcoming flights. Behaviours affecting where, when and how long to stay at stopover sites will affect how successful the overall migration will be, which has significant consequences for the overall fitness and mortality of the birds.

The main purpose of this work was to investigate stopover behaviours in free-flying migrants to understand the effects of intrinsic (age and body condition) and environmental (weather) factors on the behaviours that guide birds as they depart from migratory stopovers. I studied some of our most common migratory songbirds using an automated radiotelemetry system at the Falsterbo peninsula, Sweden.

Our results show that stopover duration is affected by fuel load and weather conditions, and that they differ between the migratory seasons. Furthermore, timing of departures on nocturnal flights appears primarily determined by ecological factors, and are to a large degree affected by the lengths of the nights. Birds with larger fuel stores departed before lean individuals, indicating that they prepared for a longer flight. We found that reverse movements during migration are slower, take place at lower latitudes and later in the night than movements in the expected migratory direction, and are most common in juvenile or lean individuals. Route choice across the Baltic Sea after departure from Falsterbo is largely affected by wind directions.

In cue conflict experiments between magnetic compass and celestial cues at sunset we found no recalibration of the magnetic compass. We suggest that access to stars during calibration is necessary for all compasses to be calibrated when the birds depart for a night's flight. Comparisons between departure directions and directions of birds in climbing and level flight revealed that birds adjust their directions after take-off, once at cruising altitudes. Winds were the primary factor affecting flight duration for the first 50 km of flight after departure. Interestingly, cloud coverage affected flight duration negatively, while fuel load affected it positively. Collectively, this work shows how intrinsic and environmental factors modulate stopover behaviours in migratory songbirds, with essential implications on the birds' migratory schedules.