Adaptive Migration Strategies of Raptors Tracked from Southern Sweden

Roine Strandberg started his Master's degree in 2002 under the direction of Professor Thomas Alerstam of Lund University, Sweden; Roine studied the migration of birds and conducted fieldwork in the wetlands of Kristianstad in southernmost Sweden where he lives. The studies of Osprey passing the lake Hammarsjön in the centre of the wetlands evolved into a PhD project involving the tracking of raptors. Roine has just completed his PhD.

In May 2003, I started my work with satellite telemetry at the Grimsö Research Area in south-central Sweden together with Mikael Hake and under the supervision of Thomas Alerstam. This was one year before we obtained funding for a PhD project at Lund University, Sweden. During this first season we attached transmitters to the short-distance migrant Common (or Eurasian) Buzzard *Buteo buteo* as we wanted to compare their migration strategies with other long-distance migrants. Hence, during the further studies as a PhD student I tracked four long-distance migrating raptors; Osprey *Pandion haliaetus*, Western Honey Buzzard *Pernis apivorus* (both species tracked by the raptor migration group in Lund since 1995 and 1997, respectively), Western Marsh Harrier *Circus aeruginosus* and Eurasian Hobby *Falco subbuteo*.

Photo by Mikael Hake

Adult male Marsh Harrier at Kristianstad, Sweden in June 2006. This bird was tracked during two years and visited Ngolfagnick, Senegal in November 2006.

The aim of the project was to address questions about how raptors adapt to the fluctuating environments during the transition seasons (the migration) between breeding and wintering. The migration is highly affected by the local prey abundance, the foraging strategies, weather conditions and landscape patterns along the migration routes as well as the navigation and orientation mechanisms and cues that the birds use.

The development of satellite-based radio transmitters has contributed enormously to the advancement of the migration research field, and much of what were only qualified guesses two decades ago, now either have been proven or rejected with the aid of the ever expanding data sets from satellite tracking.

Interesting findings in my studies were how raptors can mix foraging and active migration during their travels. A strategy of fly-and-forage migration is favourable for birds that hunt on the wing, capable of combining foraging with long distance travel. Fly-and-forage migration is, for example, favourable for Ospreys in Europe because benefits (energy intake) more than outweigh costs (reduced flight time) passing through the landscape with abundant fishing opportunities in the many lakes, rivers and fish ponds. With a combination of field studies and tracking with the GPS equipped transmitters, we could detect and explore this fascinating behavior in great detail.

Map showing the male Marsh Harriers' migration routes from Sweden to Senegal. The red track represents spring migration.

I had the good fortune to visit two of our transmitter birds in tropical Africa, both with amazing life-histories partly revealed by the satellite tracking. One of them was an adult male Osprey carrying a 45g GPS equipped transmitter which he was provided with in July 2006. Together with photographer Patrik Olofsson, I travelled to Saint Louis, northwestern Senegal in November 2006 to try to track down the male Osprey at his wintering site in the outskirts of the city. With newly received positions it took us no more than a 15 minute drive from the hotel at the Atlantic coast to locate the bird perched on a branch in the shallow water. The bird spent most of its time the last two winters in an area of only a few hectares at this coastal lagoon, and arrived again to the area the 6th of October this autumn.

Photo by Patrik Olofsson

Adult male Osprey handled by René Dekkers at Grimsö, Sweden in July 2006. This male was visited at Saint Louis, Senegal in November 2006.

The other bird we visited in Senegal was an adult male Marsh Harrier making a post-migratory stopover some kilometers south of Thies, not far from Dakar. This bird was a little harder to locate as it did not have a GPS equipped transmitter. Nevertheless, we managed to find the bird in a small-scale cultivated valley together with twenty other harriers which had a communal night roost in the area. We had truly fantastic moments meeting these two birds in their winter quarters!

I defended my thesis "Migration strategies of raptors – spatio-temporal adaptations and constraints in travelling and foraging" on the 24th of September 2008 during a public dissertation with Professor Martin Wikelski as my opponent. Despite the tricky, questions I was awarded a PhD some hours later.

As a new graduate you need plans for the future to keep your research going. The most important and challenging goal for my future studies of raptor migration will be to track juveniles from their first naïve journeys until they are migrating as experienced adults. This would give a better understanding of the relative importance of genetics versus learning for the birds' migration patterns and strategies.